TRAILER, CARGO, MEDIUM, MC3, HAULMARK TWO-AXLE DOG

LIGHT GRADE REPAIR

This instruction is authorised for use by command of the Chief of Army. It provides direction, mandatory controls and procedures for the operation, maintenance and support of equipment. Personnel are to carry out any action required by this instruction in accordance with EMEI General A 001.

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GENERAL

Introduction

1. This EMEI details all the Light Grade Repair procedures for the Trailer, Cargo, Medium, MC3, Haulmark, Two-Axle Dog.

Associated Publications

2. Reference may be necessary to the latest issue of the following documents:

a. Defence Road Transport Manual (DRTM);

b. SCES 12098 – Trailer, Cargo, Medium, MC3;

c. EMEI Vehicle A 291-1 – Tyres and Tubes – Care and Maintenance of B Vehicles;

d. EMEI Vehicle A 291-5 – Tyres and Tubes – General Service B Vehicles Tyre Guide;

e. EMEI Vehicle H 620 − Trailer, Cargo, Medium, MC3, Haulmark Two-axle Dog − Data Summary;

f. EMEI Vehicle H 624 − Trailer, Cargo, Medium, MC3, Haulmark Two-axle Dog − Medium and Heavy Grade Repair;

g. EMEI Vehicle H 629 − Trailer, Cargo, Medium, MC3, Haulmark Two-axle Dog − Servicing Instruction;

h. EMEI Vehicle H 629-2 − Trailer, Cargo, Medium, MC3, Haulmark Two-axle Dog − Repair of the Cracking in Web Plate;

i. EMEI Workshop D 180 – Flaw Detection – Flaw Detection - Non Destructive – General Instruction;

j. EMEI Workshop D 701 – Painting of Army Equipment – Repair Policy for Equipment Painted in Polyurethane Paint – General Instruction;

k. EMEI Workshop E 621 – Safety Precautions - Welding – Arc Welding Operation – General Instruction;

l. EMEI Workshop E 652 – Occupational Health and Safety Instructions – Application and Removal of Polyurethane Paints and Solvents – General Instruction;

m. EMEI Workshop J 003 – Welding Techniques, General – Electric Welding Processes and Procedures – General Instruction;

n. Repair Parts Scale 02213;

o. Defence Safety Manual (SAFETYMAN);

p. User Hand Book – Trailer, Cargo, Medium, 8 tonne, MC3;

q. Material Safety Data Sheets (MSDS) – Product Information Sheets; and

r. TRAMM-L - Technical Regulation of ADF Material Manual – Land.

Authorised Personnel

3. Repairs are to be carried out by the following technical tradespersons:

a. Vehicle Mechanic ECN 229;

b. Electrical Technician ECN 418;

c. Fitter Armament ECN 146;

d. Metalsmith ECN 235-2; and

e. Civil equivalents qualified in accordance with the requirements of the TRAMM - L.

Safety Precautions

WARNING

CRUSH HAZARD. Do not work on the trailer, when raised, without the use of an axle stand beneath the axle. Place the axle stand as close to the raised wheel as possible. This procedure is required for all repairs and maintenance activities involving positioning of body parts in potential crush zones of the vehicle. Failure to comply may result in serious injury or death.

GENERAL HAZARD. Personnel working on this equipment are to adhere to all industrial safety standards, work practices and equipment operating and maintenance instructions relating to the equipment.

SPRING UNDER TENSION HAZARD. Some assemblies contain powerful springs and injury can result if they are not properly disassembled. Use only proper tools and observe all precautions relevant to the use of the tools.

General Instructions

4. Plug or protect openings to prevent dirt entering the system. Use plastic plugs or covers only for this purpose. Do not use cloth or paper as plugs or covers.

5. Disconnect the trailer electrical connector from the towing vehicle before removing any electrical system components.

6. When disconnecting electrical connectors, hoses and fittings, remove sufficient clamps in order to gain the necessary slack to avoid damage to connectors and fittings. Re-install all clamps and supporting devices as installed by the manufacturer.

7. Use only genuine replacement parts and components supplied by the Original Equipment Manager (OEM).

8. Replacement hardware, tubing, hose fittings, etc. should be of equivalent size, type, length and strength to the original equipment.

9. Use only those lubricants specified in EMEI Vehicle H 629 and the User Handbook (UHB).

10. Any fasteners or fittings being tightened to prescribed torques are to have dry, clean threads unless otherwise specified. When specified, thread sealants are to be applied to dry, clean, oil free threads.

11. Replace all devices with stripped threads or damaged parts.

Identification Numbers

12. Table 1 lists the location of the identification information.

Table 1 Location of Identification Numbers

Serial	Item	Location
1	Axle assemblies	Centre of axle beam, opposite brake chamber mountings
2	Ballrace	Outer circumference, to rear of trailer
3	Spare wheel winch	Front panel of winch assembly

Special Tools and Gauges

13. Special tools required to carry out maintenance tasks on the equipment are shown in Figure 1 and detailed in Table 2.

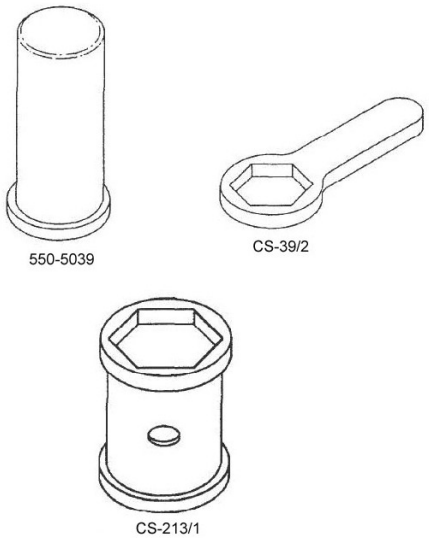


Figure 1 Special Tools

Table 2 Special Tools Identification

Serial	NSN	Part No	Item Name	Use	Para No
1	4910-99-930-6356	550-5039	Installer, Axle Ring	Hub seal installing tool	33
2	5120-66-156-0824	CS-39/2	Wrench, Spanner, 82.5 mm	Hub locknut wrench	28 and 35
3	5120-66-156-0743	CS-213/1	Wrench, Socket	Hub nut tube wrench	28 and 35

Adjustment and Calibrations

14. Light Grade Repairs include the following alignments and adjustments:

a. axle alignment, and

b. brake adjustment.

Functional Tests

15. Light Grade Repair includes the procedure for the Brake System Operation and Leakage Tests.

Repairs

16. Light Grade Repair includes repairs of the following components:

a. Axles and suspension:

(1) springs,

(2) radius rods,

(3) hubs,

(4) hub seals,

(5) hub bearing cups, and

(6) hub odometer.

b. Brakes:

(1) brake relay valve;

(2) spring brake control valve , SR3 and ABV3082;

(3) pressure proportioning valve;

(4) check valve;

(5) yard release valve;

(6) spring brake assembly, 3030 and 2430; and

(7) wheel brake assembly, early and late build.

c. Electrical:

(1) electrical plugs and fittings, and

(2) lamp assemblies.

d. Frame:

(1) ball race,

(2) drawbar,

(3) spare wheel winch assembly, and

(4) drawbar coupler.

ADJUSTMENT PROCEDURES

Axle Alignment

17. Carry out axle alignment after repairs to the axles, hanger brackets or springs, or where abnormal tyre wear is detected.

18. Dolly. Align the dolly axle so that the centre line of the axle is perpendicular to the centre line of the dolly frame (Figure 2).

19. Main Trailer. Align the main trailer axle so that the centre line of the axle is perpendicular to the centre line of the trailer frame. This is achieved when the distances X are equal and distances Y are equal (Figure 2).

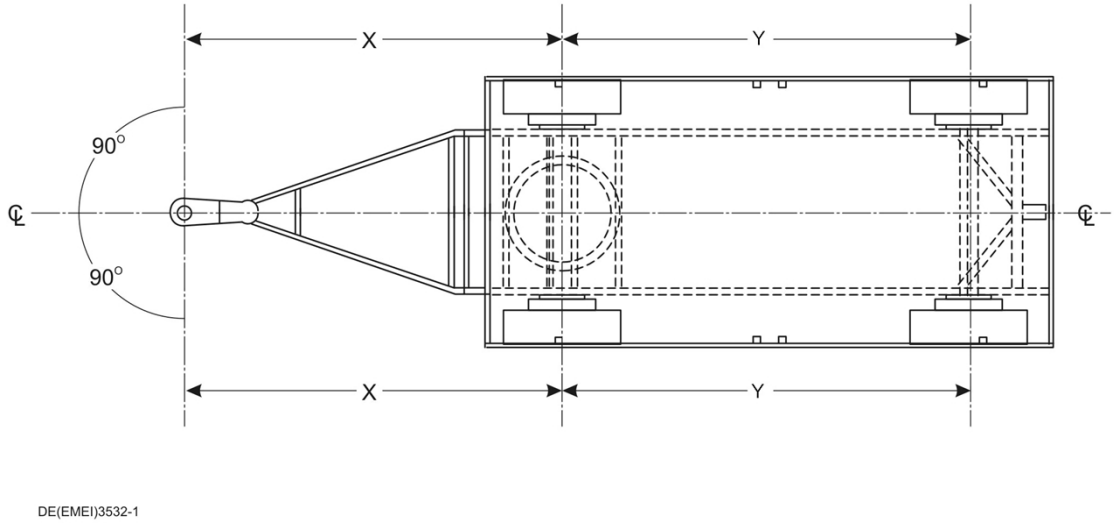


Figure 2 Axle Alignment Diagram

20. Preliminary Checks. Prior to carrying out any axle alignment adjustment:

a. Ensure that all suspension components are in good condition.

b. Ensure that all tyre pressures are correct.

c. Ensure the trailer is on flat, level ground.

21. Adjustment. To adjust the axle alignment:

a. Loosen the four clamp bolts on the adjustable (right-hand) radius rods.

b. Turn the centre section of the applicable radius rod to alter the axle alignment as required.

c. When the axle alignment is correct, tighten the radius rod clamp bolts to 100 N.m.

d. Recheck the axle alignment after tightening the clamp bolts.

Brake Adjustment

22. Check and adjust the brakes as follows:

NOTE

The brakes are set correctly when the angle formed by the centre lines of the slack adjuster and the brake chamber push rod is greater than 90° when the brake is in the released position, and as close to 90° as possible when the brakes are applied (Figure 3).

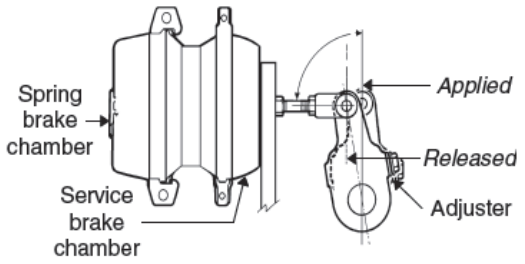


Figure 3 Slack Adjuster Alignment

a. Depress the locking ring around the adjusting screw and turn the adjusting screw clockwise until the brakes are locked on.

b. Back off the adjusting screw to achieve the correct adjustment (approximately three notches).

BRAKE SYSTEM OPERATION AND LEAKAGE TESTS

Brake System Functional Testing

23. When performing the following tests, Table 4 may be referred to for additional information to assist with the identification and presence of operating faults in the trailer air brake system:

WARNING

Before carrying out functional tests ensure that the trailer wheels are securely chocked.

NOTE

The following function tests are designed to be done with the Truck, Cargo Medium, MC2, 4X4, Mercedes Benz Unimog. If a Unimog is not available to use for testing, alternatives can be used to replicate the functions and pressures of the Unimog truck.

Ensure that the air pressure gauge of the truck is fully functional before carrying out the functional tests.

a. Disconnect the air lines from the truck and exhaust all air from the trailer system by opening the drain valve on the trailer air tank.

b. Inspect all four spring brake chambers to ensure that they are in the applied position.

c. Inspect the condition of all air hoses and nylon lines ensuring that they are fully functional (particular attention is to be given to all hose clamps and fittings).

NOTE

The Unimog and trailer configuration applies the service brakes on the trailer when the truck parking brake lever is applied. To test the trailer brake system, the truck parking brake lever is required to be in the check position. This will release the service brakes. The truck parking brake lever check position is activated by applying the truck parking brake lever, depressing the lever firmly and moving it backwards. The lever will be required to be held in this position during the tests. An assistant is required during these tests.

d. Hold the parking brake lever in the check position until instructed to release it.

e. Connect the air lines to the truck. With the assistant monitoring the trailer's brakes, start the truck engine and monitor the air pressure gauge of the truck. Do not operate the footbrake pedal or trailer brake lever of the truck.

f. The spring brake chambers should release as the truck air pressure reaches 4 to 5 bar. Failure of all brake chambers to release indicates a faulty spring brake control valve. Failure of individual spring brake chambers to release indicates a faulty brake chamber or air line.

g. Allow the truck to build up full air pressure, and then shut down the engine. Inspect all components for air leaks. Substantial leaks will be audible; however, minor leaks may be detected by coating suspected areas with soapy water.

h. Disconnect the supply (emergency) line from the truck. This should cause the spring brakes to be applied. Failure of all spring brake chambers to apply indicates a faulty spring brake control valve. Failure of individual brake chambers to apply indicates a faulty brake chamber or air line.

i. Reconnect the trailer supply line to the truck. The spring brakes should release as pressure increases.

j. Open the drain valve on the air tank. The air pressure in the truck air brake system should not fall below 3.5 bar. A pressure below this value indicates a faulty spring brake control valve. The spring brakes should remain released. Application of any spring brake indicates a faulty spring brake control valve.

k. Close the drain valve and allow the air pressure to return to normal levels and release the truck parking brake lever to allow it to return to the brakes applied position. This will apply the service brakes. The failure of all service brake chambers indicates a faulty proportioning valve or relay valve. Failure of individual service brakes to apply indicates a faulty brake chamber; brake hose or insufficient service line pressure.

l. Disconnect the trailer air lines from the truck. Push in the yard release valve to release the spring brakes. Ensure that all spring brakes are released. Failure to do so indicates a faulty yard release valve.

m. Drain the air from the trailer air tank and note the spring brakes are applied before all air is exhausted from the air tank. Failure of all spring brake chambers to apply indicates a faulty spring brake control valve. Failure of individual brake chambers to apply indicates a faulty brake chamber or air line.

n. Connect the air lines between the trailer and truck and allow the system to be fully pressurised.

o. Disconnect the emergency (supply) line between the trailer and truck.

p. Liberally coat all joints and connections with soapy water and inspect for leaks. Valve body leaks are not acceptable. Bubbles in excess of 25 mm in less than five seconds are not acceptable.

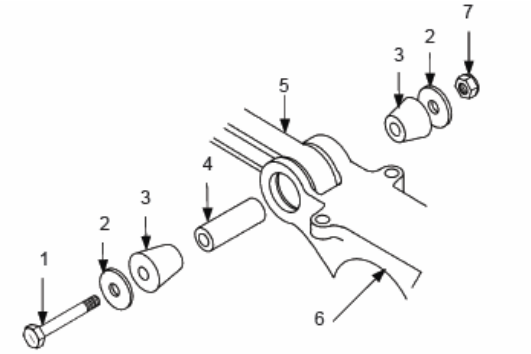
q. Apply soapy water to the emergency line glad hand and inspect for leaks from the emergency line. A bubble in excess of 25 mm in less than five seconds indicates a faulty yard release valve.

r. Push the yard release valve in to release the spring brakes. Apply soapy water to the emergency line glad hand and inspect for leaks from the emergency line. A bubble in excess of 25 mm in less than five seconds also indicates a faulty yard release valve.

AXLES

Radius Rods

24. Removal. Remove the radius rods as follows (Figure 4):



1	Bolt	5	Radius rod
2	Flat washer	6	Spring seat
3	Tapered bush	7	Nyloc nut
4	Steel sleeve		

Figure 4 Radius Rod Mounting Bushes and Pins

a. Support the weight of the trailer frame, leaving the axle assemblies resting on the ground or supported.

NOTE

All weight is to be off the suspension components.

b. Remove the two bolts (Item 1) securing the radius rod to the spring seat (Item 6) and the respective spring hanger.

c. Remove the tapered bushes (Item 3) and the steel sleeve (Item 4) from the radius rod ends.

d. Remove the radius rod (Item 5).

25. Installation. Install the radius rods as follows (Figure 4):

a. Refit the radius rods (Item 5), tapered bushes (Item 3), steel sleeves (Item 4), washers, bolts and nuts.

b. Tighten the nuts to 100 N.m.

c. Lower the trailer frame so that the suspension is taking the weight of the trailer.

d. Check and adjust the axle alignment as detailed in Para 17.

Springs

26. Removal. Remove the springs as follows (Figure 5):

a. Support the weight of the trailer frame.

NOTE

Leave the wheels resting on the ground with all the weight off the suspension components.

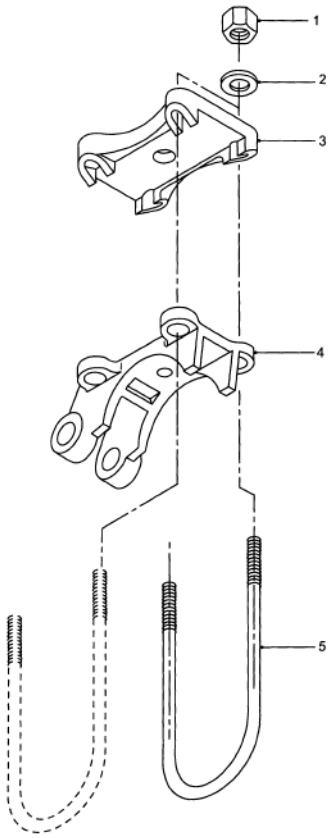
There should be approximately 25 mm clearance between the spring and the spring hanger seats.

b. Remove the hexagon nuts (Item 1) from the U-bolts (Item 5) retaining the spring to the axle.

c. Remove the U-bolts and the spring cap (Item 3).

d. Remove the hexagon headed spring retaining bolts from the spring hangers.

e. Slide the spring clear of the axle and frame.



1 Hex nut
2 Flat washer
3 Spring cap
4 Spring seat
5 U-bolt

Figure 5 Spring Seats and U-bolts

27. Installation. Install the springs as follows (Figure 5):

a. Using a suitable jack, lift the spring up to the axle spring seat.

NOTE

Ensure that the spring ends are correctly located and that the folded leaf end is in the rear spring hanger.

b. Fit the hexagon headed retaining bolts to the rear spring hanger.

c. Fit the spring U-bolts (Item 5), the spring cap (Item 3), flat washers (Item 2) and hexagon nuts (Item 1).

d. Tighten the nuts evenly to 415 N.m.

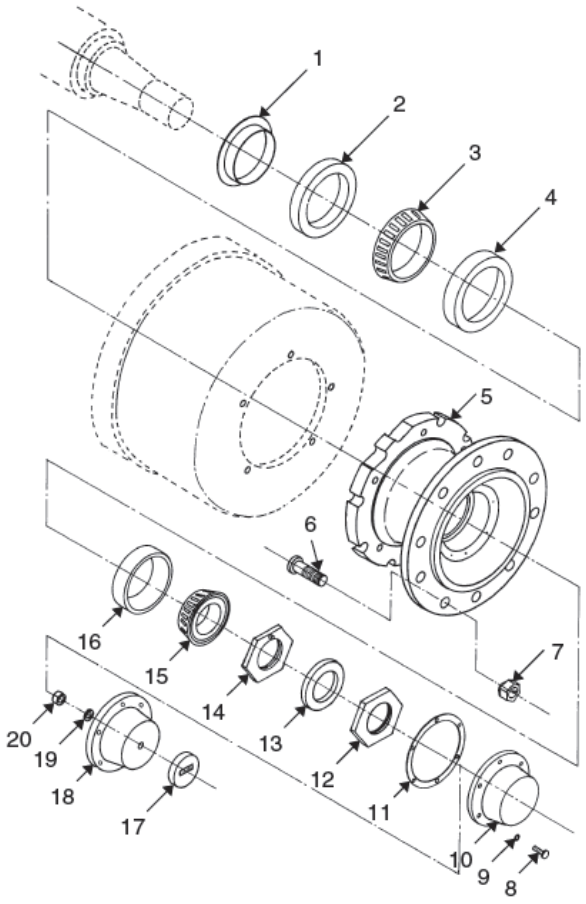
Wheel Hubs

28. Removal. Remove the wheel hubs as follows (Figure 6).

a. Chock the wheels.

b. Loosen the wheel nuts no more than one turn (Item 7).

c. Place a suitable jack beneath the applicable axle and raise the wheel clear of the ground.



1	Sleeve – inner seal	6	Stud – Wheel	11	Gasket	16	Cup – roller bearing
2	Inner hub seal	7	Nut – wheel	12	Bearing locknut	17	Hubodometer
3	Cone and rollers	8	Cap-screw	13	Lock washer	18	Cap - hubodometer
4	Cup – roller bearings	9	Washer	14	Bearing Adjusting Nut	19	Washer
5	Wheel hub	10	Hub cap	15	Cone and rollers	20	Nut

Figure 6 Wheel Hub Assembly – Exploded View

WARNING

CRUSH HAZARD. Do not work on the trailer, when raised, without the use of an axle stand beneath the axle. Place the axle stand as close to the raised wheel as possible. This procedure is required for all repairs and maintenance activities involving positioning of body parts in potential crush zones of the vehicle. Failure to comply may result in serious injury or death

d. Place a safety stand beneath the axle.

e. Lower the axle to the stand ensuring that the wheels remain clear of the ground.

f. Remove the ten wheel nuts securing the wheel to the hub and remove the wheel.

g. Mechanically release the spring brakes (Para 64).

h. Remove the six hexagon-headed screws (Item 8) securing the hub cap (Item 10) to the hub.

i. Remove the hub cap and gasket (Item 11).

j. Using the hub locknut wrench (Table 2, Item 2), remove the bearing locknut (Item 12).

k. Remove the lock washer (Item 13).

l. Using the hub nut tube wrench (Table 2, Item 3), remove the bearing adjusting nut (Item 14).

m. Support the wheel hub and brake drum assembly with a suitable trolley jack.

n. Remove the outer bearing cone (Item 15) from the hub and stub axle.

o. Remove the hub assembly by sliding it off the stub axle.

29. Hub Seal Removal. Remove the inner hub seal as follows (Figure 6):

a. Remove the wheel hub assembly, as detailed in Para 28.

b. Position the hub and brake drum assembly on a solid surface with the wheel studs facing upwards.

c. Using a long steel drift, inserted through the centre of the hub and placed against the inner race of the inner wheel bearing (Item 3), drive the hub seal (Item 2), the hub seal sleeve (Item 1) and the bearing from the hub.

30. Bearing Cup Removal. Remove the bearing cups as follows (Figure 6):

a. Remove the hub and hub seals, as detailed in Para 28. and 29.

b. Place a long steel drift through the hub centre against the inner face of the respective bearing cup (Item 4 or Item 16).

CAUTION

BEARING DAMAGE. Place the drift in alternate positions around the bearing cup, to ensure that it is driven evenly from the hub.

c. Drive out the bearing cups.

NOTE

If the bearing cups removed are to be refitted, ensure that they are matched, and remain with their respective bearing cones.

31. Bearing Cleaning and Inspection. Clean and inspect the bearings as follows:

CAUTION

BEARING DAMAGE. Do not use a steel brush. Avoid spinning the cones when cleaning.

a. Wash the bearing cups and cones in a suitable clean solvent, using a stiff brush.

b. Wipe the cleaned parts dry with clean absorbent cloth or paper

NOTE

Lubricant will not adhere to a surface that is wet with solvent. Solvent will also dilute the lubricant.

c. Inspect the bearing cup for:

(1) discolouration, straw or blue colouring;

(2) chips or scoring on the bearing surface; and

(3) flaking of the case hardening.

d. Inspect the bearing cone for:

(1) discolouration of the tapered rollers;

(2) chipping or scoring of the case hardening;

(3) flaking of the case hardening;

(4) acceptable wear limits on the wear back surface (the large end of the tapered roller); and

(5) the condition of the tapered roller cage.

NOTE

Discard the bearing cup and cone if any defects are found. These must be replaced as a matched set.

32. Bearing Cup Installation. Install the bearing cups as follows (Figure 6):

a. Clean the wheel hub thoroughly inside and outside.

b. Check that the wheel hub is free from any damage.

c. Smear a light coating of grease around the inner surface of the recess where the cups (Items 4 and 16) are to be installed.

d. Pack the bearing cone (Item 3) with the correct grease.

CAUTION

BEARING DAMAGE. Drifts used for fitting bearing cups must be free of all burrs and jagged edges, to prevent steel chips dislodging into the wheel hub and bearings.

e. Place the bearing cup in the hub and drive it into position using a suitable hammer and steel drift.

NOTE

Make sure that the drift is placed in alternate positions around the cup, to ensure that the cup is driven evenly into the hub.

The cup is fully in position when a solid metallic knock is heard in all positions around the cup.

f. Fit the inner bearing cone (Item 3) into the bearing cup.

33. Hub Seal Installation. Install the hub seal as follows (Figure 6):

a. Check that the stub axle land is clean and free from dirt and other foreign material.

b. Using the hub seal installing tool (Table 2, Item 1), drive the hub seal sleeve (Item 1) and the inner hub seal (Item 2) into position on the stub axle.

NOTE

The hub seal and sleeve are pushed into the wheel hub during installation of the wheel hub.

34. Hub Installation. Prior to installation of the hub and brake drum assembly, ensure that:

a. the air tank is drained and that the brakes are released to prevent brake shoe drag during bearing adjustment;

b. the brake drum mounting bolts are fully functional and tensioned to 260 N.m in the sequence shown in Figure 7;

c. the inner bearing cup (Figure 6, Item 4) is fully functional and correctly fitted;

d. the inner bearing cone (Item 3) is properly lubricated and fitted;

e. sufficient grease is packed into the wheel hub to ensure continued lubrication of the wheel bearings; and

f. the inner hub seal (Item 2) and sleeve (Item 1) are functional and correctly fitted to the stub axle.

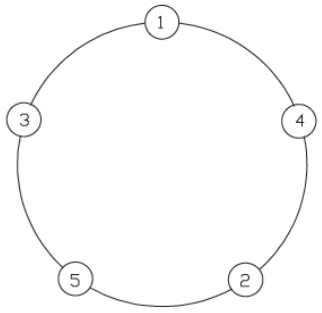


Figure 7 Brake Drum Mounting Bolts – Tightening Sequence

35. Install the hub as follows (Figure 6):

a. Using a suitable trolley jack or similar device, slide the hub and brake drum assembly onto the stub axle.

NOTE

Ensure that the assembly is pushed on as far as possible.

b. Pack the outer bearing cone (Item 15) with grease.

c. Fit the outer bearing cone.

d. Fit the bearing adjusting nut (Item 14) to the stub axle with the lock pin facing out.

NOTE

Spin the hub while tightening the bearing adjusting nut. This ensures no binding occurs as the bearing seats.

e. Adjust the bearing preload by screwing the nut on until it is tight and backing off one-quarter of a turn using the hub nut tube wrench (Table 2, Item 3).

f. Fit the bearing nut lock washer (Item 13) to the stub axle and locate the bearing adjusting nut lock pin into one of the holes around the lock washer.

NOTE

It may be necessary to turn the nut slightly to obtain proper alignment or to reverse the lock washer.

g. Fit the bearing locknut (Item 12) onto the stub axle using the hub locknut wrench (Table 2, Item 2). Use a 1.5 to 2 lb hammer to tighten the nut.

h. Fit the gasket (Item 11) to the wheel hub.

i. Install the hub cap (Item 10), using the six cap-screws (Item 8) and lock washers (Item 9) and tighten them.

j. Remove the spring brake release tool, replace it in its stowage position and secure it.

k. Check for proper brake adjustment and adjust as necessary (Para 22.).

NOTE

Ensure that the air tank is drained and that the brakes are released, to prevent brake shoe drag during adjustment.

l. Fit the wheel to the hub and secure it with the ten wheel nuts (Item 7).

m. Jack the axle clear of the safety stand and remove the stand.

n. Lower the wheel to the ground.

o. Tighten the wheel nuts evenly to 400 N.m in the sequence shown in Figure 8.

CAUTION

Wheel nuts are to be checked and re-tensioned after travelling approximately 50 km. Failure to do so could result in the wheel working loose.

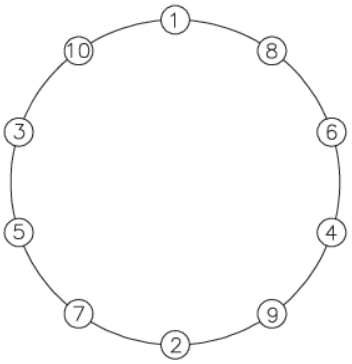
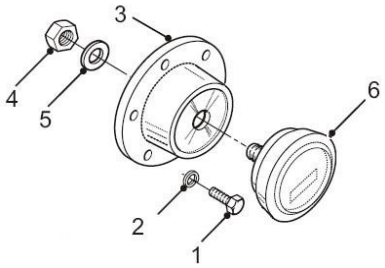


Figure 8 Wheel Nut Tightening Sequence

Hubodometer

36. Removal. Remove the hubodometer as follows (Figure 9):



1	Cap-screw	4	Locknut
2	Lock washer	5	Flat washer
3	Hub cap	6	Hubodometer

Figure 9 Hubodometer Assembly

a. Remove the six cap-screws (Item 1) securing the hub cap (Item 3) to the right-hand rear wheel hub.

b. Remove the hub cap and hubodometer assembly.

c. Remove the locknut (Item 4) and washer (Item 5) located inside the hub cap.

d. Withdraw the hubodometer (Item 6) from the hub cap.

37. Installation. Install the hubodometer as follows (Figure 9):

a. Fit the hubodometer (Item 6) to the hub cap (Item 3) and fit the washer (Item 5) and the locknut (Item 4).

b. Tighten the locknut to 15 N.m.

c. Fit the hub cap and hubodometer to the right-hand rear wheel hub and secure with the six cap-screws (Item 1) and lock washers.

NOTE

Ensure that the gasket (Figure 6, Item 11) is properly seated when fitting the hub cap to the wheel hub.

BRAKE SYSTEM

Brake System Maintenance

WARNING

SPRING UNDER TENSION HAZARD. Some assemblies contain powerful springs and injury can result if they are not properly disassembled. Use only proper tools and observe all precautions relevant to the use of the tools. Never attempt to disassemble an assembly until you have read and understand the recommended procedures.

BRAKE CHAMBER MIXING HAZARD. Early build trailers up to serial number 10228 are fitted with SR3 spring brake control valves and 3030 spring brake chambers. Late build trailers from serial number 12371 are fitted with ABV3802 spring brake control valves and 2430 spring brake chambers. Failure of the brake systems may occur if these assemblies are cross fitted or replaced with alternate parts.

CRUSH HAZARD. Always chock vehicle wheels. Keep hands away from chamber push rods and slack adjusters. They may apply as system pressure drops.

AIR UNDER PRESSURE HAZARD. Never connect or disconnect a hose or line containing air pressure. It may whip as air escapes. Never remove a component or pipe plug unless you are certain all system pressure has been depleted.

Never exceed recommended air pressure and always wear safety glasses when working with air pressure. Never look into air jets or direct them at anyone.

BRAKE DUST HAZARD. Do not use compressed air to remove dust from the brake system. Dust from the brake linings can be a health risk if inhaled.

Brake Relay Valve

38. Removal. Remove the brake relay valve as follows (Figure 10):

a. Chock the wheels.

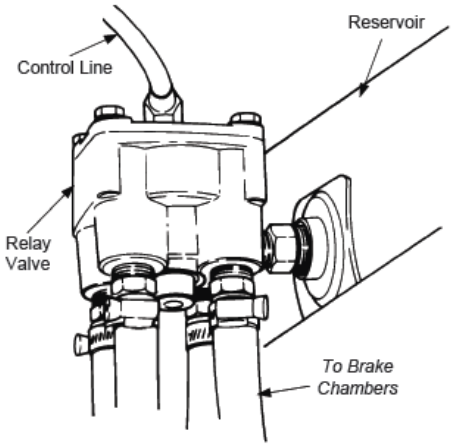


Figure 10 Brake Relay Valve Mounting

b. Drain the brake system reservoir.

c. Tag all air lines connected to the brake relay valve to facilitate installation.

d. Disconnect the control air line by loosening the tube coupling nut and withdrawing the hose from the connector.

e. The control line elbow is to be removed from the valve body if the brake relay valve is being replaced.

f. Disconnect the brake chamber air lines from the brake relay valve by loosening the hose clamps and removing the barbs from the brake relay valve body.

g. Plug or seal the ends of the air lines.

h. Apply a spanner to the hexagon area of the reservoir mounting adapter and remove the brake relay valve from the reservoir.

i. The reservoir mounting adapter is to be removed from the valve body if the brake relay valve is being replaced.

39. Installation. Install the brake relay valve as follows (Figure 10):

a. Clean all air lines to be connected to the valve.

b. Inspect all lines and/or hoses for damage and replace as necessary.

c. Install the mounting adaptor to the brake relay valve and tighten it to 26 N.m.

Do not tighten via the brake relay valve body.

d. Install the brake relay valve to the air reservoir and secure it by applying a spanner to the hexagon area of the mounting adapter and tighten it to 23 to 34 N.m. This torque range will allow the brake relay valve to be correctly orientated.

e. Remove the plug or sealant from the air lines.

f. Install the control line elbow to the valve body.

g. Install the control air line in the elbow and tighten the tube coupling nut.

h. Connect the brake chamber air lines to the brake relay valve according to the labelling attached during removal and tighten the barb to 19 N.m and ensure that the hose clamp is tight.

i. Test the valve as detailed in Para 23.

40. Disassembly. Disassemble the brake relay valve as follows (Figure 11):

a. Mark the location of the top cover in relation to the valve body.

b. Remove the four cover bolts (Item 3) securing the top cover (Item 2) to the body (Item 8).

c. Remove the top cover and O ring (Item 5) from the body.

d. Remove the valve piston (Item 6) and O ring (Item 7) from the body.

e. Turn the valve body upside down and press down the valve poppet guide (Item 13), remove the circlip (Item 15) and slowly relax the compression spring (Item 11) beneath the valve poppet guide.

f. Remove the O ring (Item 14) and the valve poppet guide assembly.

g. Remove the O ring (Item 12) and compression spring from the body.

h. Remove the valve retainer (Item 10) from the inlet/exhaust valve poppet.

i. Remove the inlet/exhaust valve poppet (Item 9) from the body.

41. Cleaning and Inspection. Clean and inspect the parts as follows:

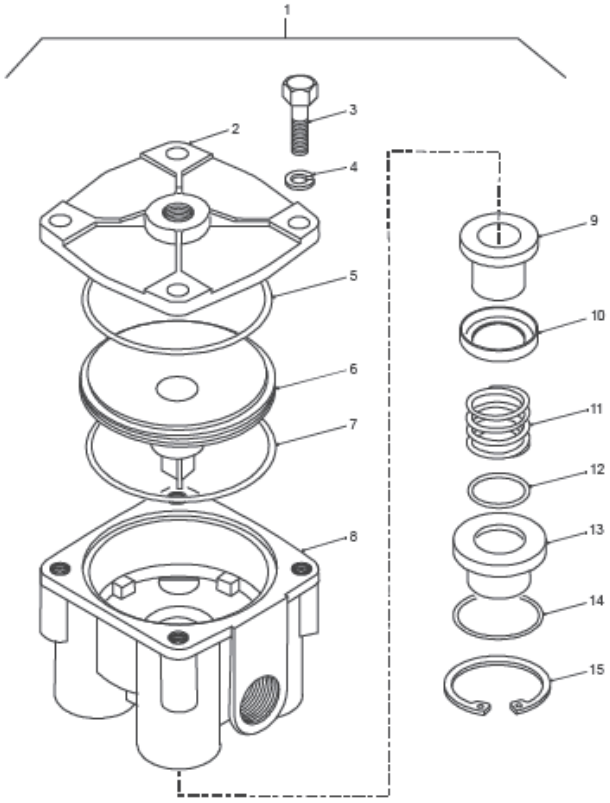
a. Replace all rubber parts, and any other parts showing any signs of wear or deterioration.

b. Wash all metal parts in mineral spirits.

c. Wipe all the metal parts dry.

d. Inspect springs for cracks, distortion or corrosion and replace the defective parts.

e. Inspect the inlet and exhaust seats for nicks and burrs and replace them as necessary.



1	Brake relay valve	5	O ring	9	Inlet and exhaust valve poppet	13	Valve poppet guide
2	Top cover	6	Valve piston	10	Valve retainer	14	O ring
3	Cover bolt	7	O ring	11	Compression spring	15	Circlip
4	Spring washer	8	Valve body	12	O ring		

Figure 11 Brake Relay Valve – Exploded View

42. Reassembly. Reassemble the valve as follows (Figure 11):

a. Lightly coat all the components with Silicone Pneumatic Grease (XG–315).

b. Install the valve retainer (Item 10) on the inlet/exhaust valve poppet (Item 9) and install the valve poppet in the body.

c. Install the compression spring (Item 11) in the body.

d. Install the inner and outer O rings (Item 12 and 14) in the valve poppet guide (Item 13).

e. Install the valve poppet guide in the body; taking care not to damage the O ring (Item 14).

f. Depress the valve poppet guide (Item 13) and install the circlip (Item 15).

NOTE

Make certain the circlip is completely seated in its groove in the body before releasing the pressure on the spring.

g. Fit the large piston O ring (Item 7) onto the valve piston (Item 6).

h. Install the valve piston (Item 6) in the body, taking care not to damage the piston O ring.

i. Install the O ring (Item 5) on the cover (Item 2).

j. Noting the reference marks made during disassembly (Para 40) install the cover on the valve body and the mounting brackets on the cover.

k. Secure the mounting bracket and cover to the body using the four cover bolts (Item 3) and lock washers (Item 4).

l. Tighten the screws to 9 to 14 N.m.

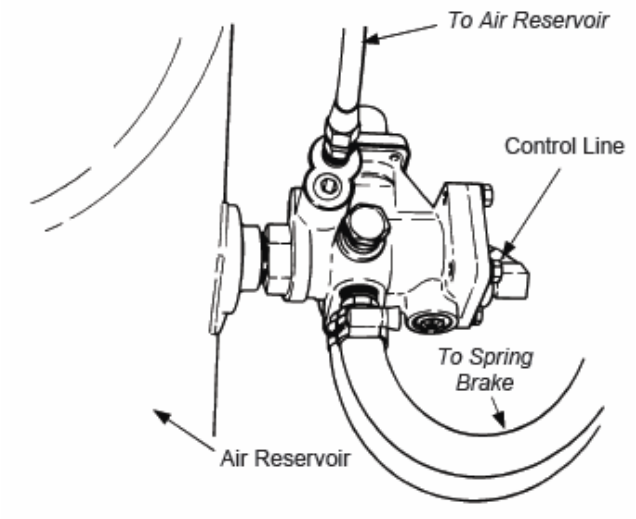


Figure 12 Spring Brake Control Valve Mounting

Spring Brake Control Valve - SR3 and ABV3802

43. Removal. Remove the spring brake control valve as follows (Figure 12):

a. Chock the wheels.

b. Completely drain the air system reservoir.

c. Tag the control, air reservoir, and spring brake air lines at the spring brake valve.

d. Disconnect the control air line by loosening the tube coupling nut and withdrawing the hose from the elbow.

e. The control line elbow is to be removed from the valve body if the spring brake control valve is being replaced.

f. Disconnect the air reservoir air line by loosening the tube coupling nut and withdrawing the hose from the straight connector.

g. The air reservoir air line straight connector is to be removed from the valve body if the spring brake control valve is being replaced.

h. Disconnect the spring brake air lines from the spring brake control valve by loosening the hose clamps and removing the barbs from the valve body.

i. Plug or seal the ends of the air lines.

j. Apply a spanner to the hexagon area of the reservoir mounting adapter and remove the spring brake control valve from the reservoir.

44. Installation. Install the spring brake control valve as follows (Figure 12):

WARNING

The Spring Brake Control Valve (ABV3802) is not to be replaced by any other valve as ADR compliance will be voided.

a. Clean the air lines to be connected to the spring brake control valve.

b. Inspect all lines and/or hoses for damage (replace as necessary).

c. Ensure the replacement spring brake control valve has the same plugs fitted as the removed valve.

CAUTION

Do not tighten using the spring brake control valve body.

USE OF CORRECT SEALANT. If thread sealant is used on the adapter, take particular care to ensure that the material does not enter the spring brake control valve. Do not use tape. Apply Teflon paste to the male threads, beginning with the second thread from the end.

d. Install the spring brake control valve to the air reservoir and secure it by applying a spanner to the hexagon area of the mounting adapter and tighten it to 26 N.m.

e. Remove the plugs or sealant from the air lines.

f. Install the control line elbow in the spring brake control valve body.

g. Connect the control air line by inserting the hose into the elbow and tightening the tube coupling nut.

h. Install the air reservoir air line straight connector in the spring brake control valve.

i. Connect the air reservoir air line by inserting the hose into the straight connector and tightening the tube coupling nut.

j. Connect the spring brake air lines to the valve and tighten the barb to 19 N.m. Ensure the hose clamps are tight.

k. Test the valve as detailed in Para 23.

Spring Brake Control Valve (SR3)

45. Disassembly. Disassemble the spring brake control valve as follows (Figure 13):

WARNING

Take care when removing the cover as it is spring loaded.

a. Remove the four round-headed cover screws (Item 4), washers (Item 5) and remove the cover (Item 6).

b. Remove the spring (Item 7) and the pressure protection valve piston assembly (Items 1, 3, 8 to 10).

CAUTION

Do not attempt to remove the retaining ring (Item 3), pressure protection piston (Item 1) and spring (Item 9) from the pressure protection piston body (Item 8).

c. Remove the pressure protection valve (Item 2).

d. Remove the O ring (Item 10) from the pressure protection piston assembly.

e. Mark the orientation of the control piston cover (Item 16) on the valve body.

f. Remove the four hexagon-headed cover screws (Item 14) and spring washers (Item 15).

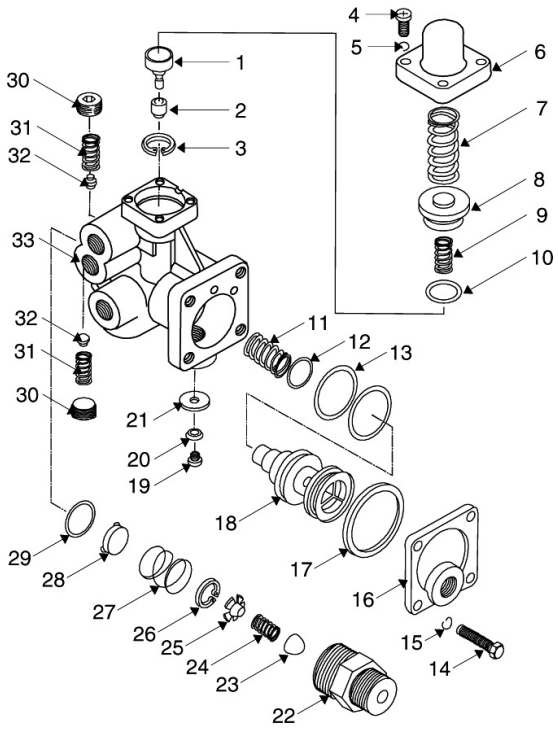
g. Remove the cover, gasket (Item 17), control piston assembly (Item 18) and return spring (Item 11) from the valve body.

h. Remove the three O rings (Item 12 and 13) from the control piston.

i. Remove the adapter (Item 22) from the valve body.

j. Remove the O ring (Item 29) from the adapter.

k. Remove the valve disc (Item 28) and the inlet/exhaust valve spring (Item 27).



1	Valve stem	10	O ring	19	Screw	28	Valve disc
2	Inlet/exhaust valve	11	Spring	20	Washer	29	O ring
3	Circlip	12	O ring	21	Exhaust diaphragm	30	Plug
4	Cover screw	13	O ring	22	Adapter body	31	Spring
5	Spring washer	14	Cover screw	23	Check valve	32	Check valve
6	Cover	15	Spring washer	24	Spring	33	Valve body
7	Spring	16	Control piston cover	25	Retainer		
8	Pressure protection valve piston	17	Gasket	26	Circlip		
9	Spring	18	Control piston	27	Spring		

Figure 13 Spring Brake Control Valve (SR3) – Exploded View

l. Press down on the retainer (Item 25) and remove the circlip (Item 26).

m. Slowly relax the pressure on the retainer and remove the retainer, spring (Item 24), and check valve (Item 23).

n. Remove the screw (Item 19), washer (Item 20), and diaphragm (Item 21) from the exhaust port.

o. Remove the two 3⁄8 in. socket-head pipe plugs (Item 30).

p. Remove the two check valve springs (Item 31) and rubber check valves (Item 32).

46. Cleaning and inspection. Clean and inspect the valve as follows:

a. Wash all metal parts in mineral spirits and then dry them.

b. Replace all the rubber parts.

c. Inspect all the parts for excessive wear or deterioration and replace them as necessary.

d. Inspect the valve seats for nicks or burrs and replace them as necessary.

47. Reassembly. Reassemble the valve as follows (Figure 13):

a. Lubricate all the O rings, O ring grooves, piston bores and metal-to-metal moving surfaces with Silicone Pneumatic Grease (XG-315).

b. Assemble the spring (Item 31) to each of the check valves (Item 32) with a twisting motion.

c. Fit the assemblies into their respective bores in the valve body and install the 3⁄8 in pipe plugs (Item 30).

d. Fit the check valve (Item 23) and spring (Item 24) into the adapter body (Item 22).

e. Fit the retainer (Item 25), apply pressure on the retainer, and fit the circlip (Item 26).

f. Insert the rubber valve disc (Item 28) into the valve body.

NOTE

The flat side of the valve, with the four 'ears' protruding, rests against the inlet and exhaust valve seat.

g. Install the spring (Item 27). Ensure that the spring is aligned and rests evenly on the four 'ears' of the valve disc.

h. Install the O ring (Item 29) into the correct groove on the adapter body (Item 22).

i. Correctly align the spring (Item 27) in the recess at the end of the adapter body (Item 22).

j. Install the adapter body into the valve body and tighten it to 15 to 19 N.m.

k. Install the three O rings (Items 12 and 13) in their respective grooves on the control piston (Item 18).

l. Position the piston spring (Item 11) and the control piston (Item 18) into the valve body.

m. Fit the control piston cover (Item 16), complete with new gasket (Item 17), in the orientation marked during disassembly. Install the washers (Item 15) and screws (Item 14) and tighten them to 5 to 7 N.m.

n. Install the exhaust diaphragm (Item 21), washer (Item 20), and screw (Item 19) in the control piston exhaust port and tighten the screw to 2 N.m.

o. Install the pressure protection valve into the valve body.

p. Install the O ring (Item 10) in the respective groove of the pressure protection valve piston assembly (Item 8).

q. Install the piston assembly (Items 1, 3, 8 to 10) into the valve body.

r. Position the spring (Item 7) and cover (Item 6) on top of the pressure protection piston.

s. Fit the cover (Item 6) and secure with spring washers (Item 5) and cover screws (Item 4). Tighten the screws to 2 to 3 N.m.

Spring Brake Control Valve (ABV3082)

48. Disassembly. Disassemble the spring brake control valve as follows (Figure 14):

CAUTION

Take care when removing the cover as it is spring loaded.

a. Remove the four cover screws (Item 4), washers (Item 5), and cover (Item 6) from the valve body (Item 36).

b. Remove the spring (Item 7) and the pressure protection piston 'A' assembly (Items 1, 3, 8 to 10).

c. Remove the O ring (Item 10) and the inlet/exhaust valve (Item 2) from the from the pressure protection piston 'A' assembly.

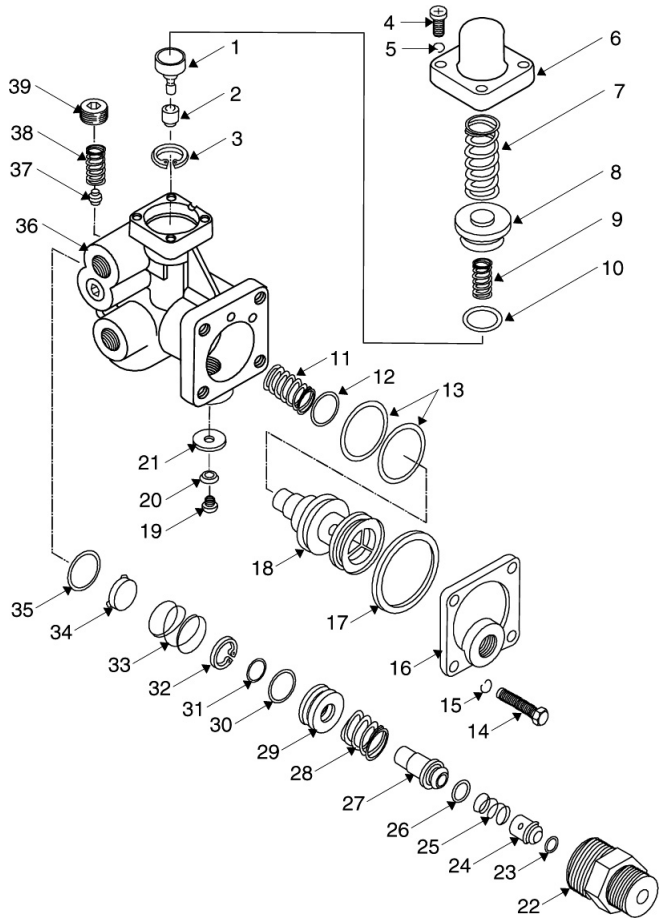
CAUTION

Do not attempt to remove the retaining ring (Item 3), spring (Item 9) and valve stem (Item 1) from the pressure protection piston 'A' (Item 8).

d. Mark the orientation of the control piston cover (Item 16) on the valve body.

e. Remove the four hexagon-headed cover screws (Item 14) and spring washers (Item 15).

f. Remove the cover (Item 16), gasket (Item 17), control piston assembly (Item 18), and spring (Item 11) from the valve body.



1	Valve stem	11	Spring	21	Exhaust diaphragm	31	O ring- inner
2	Inlet/exhaust valve	12	O ring	22	Adapter body check valve	32	Circlip
3	Circlip	13	O ring	23	O ring	33	Spring
4	Cover screw	14	Cover screw	24	Check valve	34	Valve disc
5	Spring washer	15	Spring washer	25	Spring	35	O ring
6	Cover	16	Control piston cover	26	O ring	36	Valve body
7	Spring	17	Gasket	27	Pressure protection piston 'B'	37	Check valve
8	Pressure protection piston 'A'	18	Control piston	28	Spring	38	Spring
9	Spring	19	Screw	29	O ring retainer	39	Plug
10	O ring	20	Washer	30	O ring-outer		

Figure 14 Spring Brake Control Valve (ABV3082) – Exploded View

g. Remove the three O rings (Items 12 and 13) from the control piston (Item 18).

CAUTION

This plug is located at the rear of the valve, immediately above the mounting nipple. Do not interfere with the socket-head plug in the side of the body.

h. Remove the socket-headed pipe plug (39) from the valve body.

i. Remove the spring (Item 38) and the check valve (Item 37).

j. Remove the screw (Item 19), washer (Item 20) and exhaust diaphragm (Item 21) from the valve body.

k. Remove the adapter body check valve (Item 22) from the valve body.

l. Extract the valve disc (Item 34) and spring (Item 33) from the valve body.

m. Remove the O ring (Item 35) from the adapter body check valve (Item 22).

n. Place the adapter body check valve (Item 22) in a vice (gripped by the hexagon area only).

WARNING

Take care when dismantling the adapter, as the components are spring loaded.

o. Whilst placing pressure on the O ring retainer (Item 29), remove the circlip (Item 32), and slowly release the pressure on the O ring retainer until the spring pressure has relaxed.

p. Remove the O ring retainer (Item 29), spring (Item 28), pressure protection piston 'B' (Item 27), spring (Item 25), and check valve (Item 24) from the adapter body check valve (Item 22).

q. Remove the O ring outer (Item 30) and O ring inner (Item 31) from the O ring retainer (Item 29).

r. Remove the O ring (Item 26) from the pressure protection piston 'B' (Item 27).

s. Remove the O ring (Item 23) from the check valve (Item 24).

49. Cleaning and inspection. Clean and inspect the valve as follows:

a. Wash all the metal parts in mineral spirits and dry them.

b. Replace all the rubber parts.

c. Inspect all the parts for excessive wear or deterioration and replace them as necessary.

d. Inspect the valve seats for nicks or burrs and replace them as necessary.

50. Reassembly. Reassemble the spring brake valve as follows (Figure 14):

NOTE

Do not lubricate the O ring (Item 23) on the check valve (Item 24).

a. Lubricate all the O rings (except Item 23), O ring grooves, piston bores and metal-to-metal moving surfaces with Silicone Pneumatic Grease (XG-315).

b. Assemble the spring (Item 38) to the check valve (Item 37) with a twisting motion.

c. Fit the check valve assembly into its bore in the valve body and install the plug (Item 39).

d. Position the valve disc (Item 34) into the valve body.

NOTE

The flat side of the valve disc, with the four 'ears' protruding, rests against the inlet and exhaust valve seat.

e. Install the spring (Item 33). Ensure that the spring is aligned and rests evenly on the four 'ears' of the valve disc (Item 34).

f. Place the adapter body check valve (Item 22) in a vice (gripped by the hexagon area) with the largest threaded connection facing upwards.

g. Place the non-lubricated O ring (Item 23) in the groove in the seating area of the check valve (Item 24).

h. Slide the spring (Item 25) over the check valve (Item 24).

i. Place a new lubricated O ring (Item 26) in the groove in the pressure protection piston 'B' (Item 27) and place the check valve into the piston.

j. Insert pressure protection piston assembly (Items 23, 24, 25, 26, and 27) into the adapter body (Item 22).

k. Insert the spring (Item 28) into the adapter body check valve, ensuring that it seats correctly on the pressure protection piston 'B'.

l. Place the inner O ring (Item 30) and outer O ring (Item 31) onto the O ring retainer (Item 29), and slide the retainer into the adapter body check valve.

m. Whilst exerting pressure on the O ring retainer, fit the circlip (Item 32).

n. Install the O ring (Item 35) in its proper groove in the adapter body check valve (Item 22).

o. Correctly align the spring (Item 35) into the recess of the adapter body check valve (Item 22).

p. Install the adapter body check valve and tighten it to 23 to 34 N.m.

q. Install the three O rings (Items 12 and 13) in their respective grooves on the control piston (Item 18).

r. Position the spring (Item 11) and the control piston (Item 18) in the valve body.

s. Fit the control piston cover (Item 16), complete with new gasket (Item 17), in the orientation marked during disassembly.

t. Fit the spring washers (Item 15) onto the screws (Item 14) and secure the control piston cover to the valve body. Tighten the screws to 5 to 7 N.m.

u. Install the exhaust diaphragm (Item 21), washer (Item 20) and screw (Item 19) in the control piston exhaust port and tighten it to 2 N.m.

v. Install the O ring (Item 10) in the respective groove of the pressure protection piston 'A' (Item 8).

w. Install the inlet/exhaust valve (Item 2) onto the pressure protection piston 'A' (Item 8).

x. Install the piston assembly (Items 2 and 8) in the valve body.

y. Position the spring (Item 7) and cover (Item 6) on top of the pressure protection piston assembly and secure it with the four round-headed cover screws (Item 4) and spring washers (Item 5).

z. Tighten the screws to 2 to 3 N.m.

Pressure Proportioning Valve and Check Valve

51. Removal. Remove the proportioning valve and check valve as follows (Figure 15):

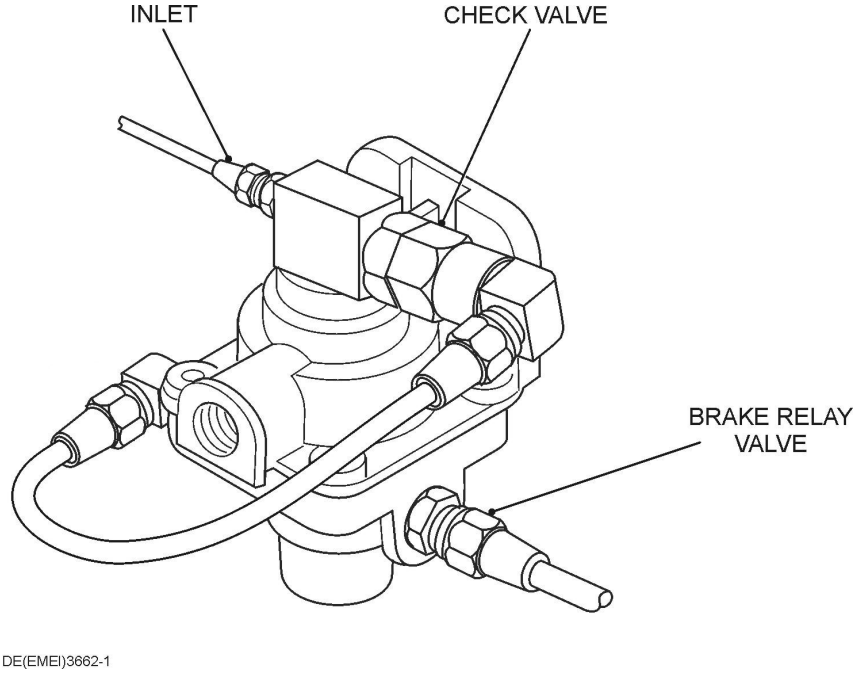


Figure 15 Pressure Proportioning Valve

a. Chock the wheels.

b. Tag the inlet and brake relay valve air lines at the pressure proportioning valve.

c. Disconnect the inlet air line and brake relay valve air line by loosening the tube coupling nuts and withdrawing the hoses from the adapters.

d. Disconnect the emergency glad hand air line by loosening the hose clamp and removing the barb from the yard release valve.

e. Disconnect the hose from the check valve to the discharge port by loosening the tube coupling nuts and withdrawing the hose ends from the elbows.

f. The discharge port adapter and elbow are to be removed from the valve body if the pressure proportional valve is being replaced.

g. Plug or seal the ends of the air lines.

h. Remove the elbow from the check valve.

i. Remove the inlet adapter and check valve from the tee adapter.

j. Remove the tee adapter from the pressure proportional valve.

k. Remove the two bolts holding the pressure proportional valve to the frame cross-member and remove the valve.

52. Installation. Install the pressure proportioning valve and check valve as follows (Figure 15):

a. Attach the pressure proportional valve to the cross-member using the two bolts and tighten them.

b. Install the tee adapter to the pressure proportional valve and tighten it.

c. Install the inlet air line adapter into the tee adapter and tighten it.

d. Remove the plug or seal from the air lines.

e. Connect the inlet air line by inserting the hose into the adapter and tightening the tube coupling nut.

f. Install the check valve into the tee adapter and tighten.

NOTE

Ensure that the check valve is fitted with the arrow pointed towards the inlet port.

g. Install the check valve elbow and tighten it.

h. Install the discharge port adapter and elbow and tighten them.

i. Connect the hose from the check valve to the discharge port by inserting the hose into the adapter and tightening the tube coupling nuts.

j. Install the brake relay valve air line adapter and tighten it.

k. Connect the brake relay valve air line by inserting the hose into the adapter and tightening the tube coupling nut.

l. Test the valve as detailed in Para 23.

53. Disassembly. Disassemble the proportioning valve as follows (Figure 16):

NOTE

Prior to disassembly, mark the relative positions of the valve cover (Item 15) to the valve body (Item 2) to ensure correct alignment on reassembly.

a. Remove the breather (Item 3) and reducer (Item 4).

b. Remove the four cap-screws (Item 17) and lock washers (Item 16).

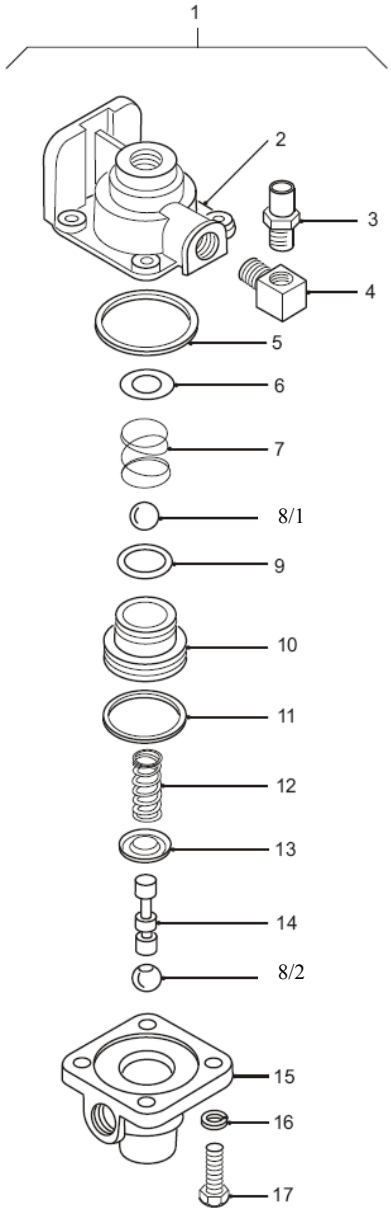
NOTE

Take care not to lose/misplace the inshot spring (Item 7) and the spring seat (Item 6) whilst removing the piston.

c. Separate the valve cover (Item 15) from the valve body (Item 2) and remove the sealing ring (Item 5).

d. Grasp the valve stem (Item 14) and withdraw the valve piston (Item 10) from the valve body (Item 2).

e. Remove the rubberised valve (Item 8/2) from the valve stem and withdraw the valve stem, valve guide (Item 13), and spring (Item 12) from the valve piston.



1	Valve assembly	6	Spring seat	11	Packing	16	Lock washer
2	Valve body	7	Inshot spring	12	Spring	17	Cap-screw
3	Breather	8	Valve (1, 2)	13	Valve guide		
4	Reducer	9	O ring	14	Valve stem		
5	Sealing ring	10	Valve piston	15	Valve cover		

Figure 16 Pressure Proportioning Valve – Exploded View

NOTE

The rubberised material is removed by pulling it from the end of the valve stem.

f. Remove the rubberised valve (Item 8/1) from the valve stem.

g. Remove the O ring (Item 9) and the packing (Item 11) from the piston.

54. Cleaning and Inspection. Clean and inspect the proportioning valve as follows:

a. Wash all the metal parts in mineral spirits and dry them.

b. Replace all the rubber parts.

c. Check the springs for cracks or corrosion and replace them as necessary.

55. Reassembly. Reassemble the proportioning valve as follows (Figure 16):

a. Coat all the new rubberised components with a light coating of XG–315 grease.

b. Fit the rubberised valve (Item 8/1) to the valve stem (Item 14).

NOTE

Ensure that it is fitted to the correct end.

c. Position the valve stem (Item 14) into the valve piston (Item 10) with the valve (Item 8/1) inside the upper portion of the piston.

d. Fit the valve spring (Item 12), valve guide (Item 13), and the rubberised valve (Item 8/2) to the valve stem.

e. Fit the O ring (Item 9) and packing (Item 11) to the piston.

f. Position the inshot spring (Item 7) and spring seat (Item 6) into the valve body (Item 2) and insert the valve piston (Item 10).

NOTE

Ensure that the piston moves freely in the valve body.

g. Place the sealing ring (Item 5) into position on the valve body and position the valve cover (Item 15) onto the body.

NOTE

Ensure that the alignment marks made on disassembly are correctly aligned.

h. Fit the four cap-screws (Item 17) and lock washers (Item 16) to the body and tighten them evenly.

NOTE

Take care not to over tighten these screws.

i. Fit the breather (Item 3) and reducer (Item 4) to the control port.

56. Check Valve Disassembly. Disassemble the check valve as follows (Figure 17):

a. Unscrew body (Item 1) from adapter (Item 6).

b. Remove the spring (Item 5), valve (Item 4), seat (Item 2) and O ring (Item 3).

57. Check Valve Cleaning and Inspection. Inspect the check valve as follows;

a. Wash all parts in mineral spirits and dry them.

b. Inspect the valve, spring and seat for signs of wear and corrosion.

c. Inspect the body and the adapter for damage.

58. Check Valve Assembly. Assemble the check valve as follows (Figure 17):

a. Position the parts in the body in the correct order.

b. Install a new O ring.

c. Screw the body into the adapter securely.

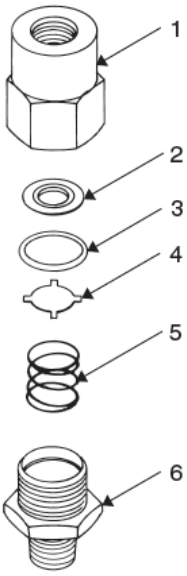


Figure 17 Check Valve

Yard Release Valve

59. Removal. Remove the yard release valve as follows (Figure 18):

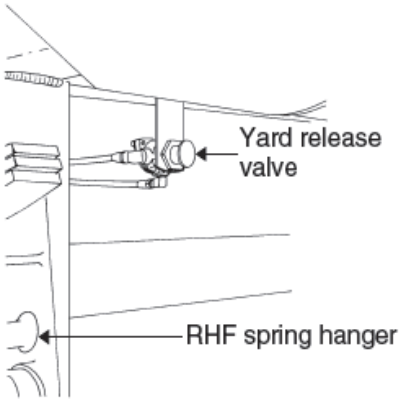


Figure 18 Yard Release Valve Mounting

a. Chock the trailer.

b. Drain the air reservoir.

c. Tag the air lines at the yard release valve.

d. Drive the button roll pin out with a punch and remove the button.

e. Disconnect the emergency glad hand air line by loosening the hose clamp and removing the barb from the yard release valve.

f. Disconnect the remaining air lines by loosening the tube coupling nuts and withdrawing the hose from the elbow or adapter.

g. Plug or seal the ends of the air lines.

h. Remove the elbows and adapters from the yard release valve body.

i. Remove the panel mounting nut.

j. Remove the valve.

60. Installation. Install the yard release valve as follows:

a. Install the valve in the mounting bracket, securing it with the panel mounting nut.

b. Remove the plugs or sealant from the air lines.

c. Connect the emergency glad hand air line to the yard release valve and tighten the barb to 19 N.m. Ensure that the hose clamp is tight.

d. Install the elbow and straight adapters to the yard release valve and tighten them.

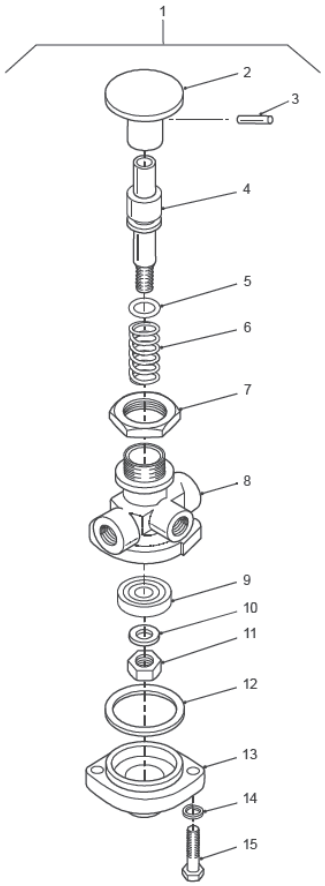
e. Connect the remaining air lines by inserting them into the elbows and adapters and tightening the tube coupling nuts.

f. Install the button.

g. Install the roll pin to secure the button to the plunger.

h. Test the yard release valve as detailed in Para 23.

61. Disassembly. Disassemble the yard release valve as follows (Figure 19):



1	Yard release valve	5	O ring	9	Inlet/Exhaust valve	13	Lower cover
2	Button	6	Spring	10	Washer	14	Spring washer
3	Roll Pin	7	Panel mounting nut	11	Locknut	15	Cap-screw
4	Plunger	8	Body	12	Sealing ring		

Figure 19 Yard Release Valve – Exploded View

a. Remove the two cap-screws (Item 15), spring washers (Item 14), and remove the lower cover (Item 13).

b. Remove the sealing ring (Item 12).

c. Holding the plunger (Item 4) with a small punch through the roll pin hole, remove the locknut (Item 11) and washer (Item 10).

d. Remove the inlet/exhaust valve (Item 9), plunger (Item 4), and spring (Item 6).

e. Remove the O ring (Item 5) from the plunger.

62. Reassembly. Reassemble the yard release valve as follows (Figure 19):

a. Lubricate all the O rings, O ring grooves and metal-to-metal moving surfaces with XG–315 grease.

b. Fit the O ring (Item 5) and spring (Item 6) to the plunger (Item 4).

c. Fit the plunger (Item 4) into the body (Item 8) and fit inlet/exhaust valve (Item 9).

d. Holding the plunger (Item 4) with a small punch through the roll pin hole, fit the washer (Item 10) and the locknut (Item 11).

e. Fit the sealing ring (Item 12) and the lower cover (Item 13).

f. Secure the cover with the two cap-screws (Item 15) and the spring washers (Item 14).

Brake Chambers

63. The brake chambers on the trailer consist of the spring brake chambers and service brake chambers. Repairs are not conducted to the spring brake chambers, and if faulty, they are to be replaced.

WARNING

MIX-MATCHING OF SPRING BRAKE CHAMBER. Early build trailers up to serial number 10228 are fitted with 3030 spring brake chambers. Late build trailers from serial number 12371 are fitted with 2430 spring brake chambers. Under no circumstances are spring brake chambers to be cross fitted.

64. Removal. Remove the brake chambers as follows:

WARNING

SPRING UNDER TENSION HAZARD. Never attempt to 'cage' any spring brake which shows signs of structural damage or significant corrosion.

Handle damaged spring brakes with extreme caution.

a. Chock the trailer.

b. Drain the air reservoir.

c. Remove the plastic plug from the spring brake chamber housing.

NOTE

Prior to inserting the release tool into the spring brake chamber, fit the flat washer and nut to the end of the tool.

d. Remove the spring brake release tool from the spring brake chamber body and insert it into the spring brake chamber, passing it through to the centre of the spring brake pressure plate.

e. Rotate the release tool 90° to engage the lugs with the pressure plate.

NOTE

Pull the tool to ensure that the lugs are properly engaged in the pressure plate.

f. Tighten the nut onto the release tool and continue turning, withdrawing the release tool from the housing.

NOTE

This compresses the spring brake compression spring and releases the brake.

g. Tag and disconnect the air lines from the brake chambers.

h. Plug or seal the ends of the air lines.

i. Remove the cotter pin connecting the clevis assembly to the slack adjuster.

j. Remove the two nuts and bolts from the mounting bracket and remove the brake chambers.

NOTE

As the brake chamber mounting bracket is equipped with a number of sets of mounting holes, identify and mark the mounting holes used, to ensure accurate placement during installation.

65. Installation. Install the brake chambers as follows:

a. Ensure that the spring brake compression spring is fully caged by the release tool.

b. Attach the two hose stems to the brake chambers adapter housing and tighten them.

CAUTION

BRAKE FAILURE DUE TO AIR LOSS. Later brake chamber configuration differs from the original design due to the orientation of the inlet and exhaust ports. Associated hoses may become crushed or cut during heavy braking when loaded when the later chamber is used. Ensure authorised fittings are used at the chamber ports to maintain sufficient hose to chassis clearance. The use of fittings other than those authorised may affect ADR approval. The hoses can be further protected by the use of protective spiral wrap at critical points.

NOTE

To maintain sufficient hose to chassis clearance the use of fittings listed in Table 3 are authorised. Fittings used can be either a 45 degree elbow and hose adaptor (Items 1 & 2) or as an alternate a 90 degree elbow (Item 3). One metre of 20 mm spiral wrap (Item 4) is to be fitted to each hose to add further protection.

Table 3 Spring Brake Chamber, Air Hose Fittings

Item	NSN	Mfr Part No	Description	Unit of Issue	Qty
1	4730-66-161-1832	ABF131	Elbow, Pipe, 3/8 in. NPT M-F, 45 deg	EA	As required
2	4730-66-161-1828	ABF103	Adapter, Straight, Pipe to Hose, 3/8 in. NPT M, 1/2 in. Hose Tail. (For use with item 1.)	EA	As required
3	4730-66-161-1836	ABF316	Elbow, Pipe to Hose, 3/8 in. NPT M, 1/2 in. Hose, 90 deg	EA	As required
4	9330-66-152-6378	R20SSG	Tubing, Plastic Spiral Wrap, 20 mm OD by 25 M	Roll	As required

c. Fit the brake chamber to the holes, identified during removal, in the axle mounting bracket and secure it with the respective hexagon bolts, nuts and washers.

d. Tighten the nuts to 35 N.m.

e. Adjust the slack adjuster toward the brake chambers until the appropriate hole aligns with the clevis.

NOTE

The angle formed by the slack adjuster and the brake chamber push rod is to be greater than 90° when the brake is in the released position, and as close to 90° as possible when the brakes are applied.

f. Insert the cotter pin to connect the clevis to the slack adjuster.

g. Remove the plugs or sealant from the air lines.

h. Connect the two air hoses, ensuring that they are connected to the correct ports.

i. Remove the release tool from the spring brake chamber housing and return it to its stowage boss.

j. Fit the plastic plug into the spring brake housing.

k. Check the brake adjustment and adjust as required (Para 22).

66. Service Brake Disassembly. Disassemble the service brake chamber as follows (Figure 20):

WARNING

SPRING UNDER TENSION HAZARD. Before repairs to the brake chambers, ensure that the spring brake compression spring is fully caged.

Extremely high spring pressures exist within the spring brake chamber.

The spring brake chamber shall not be disassembled.

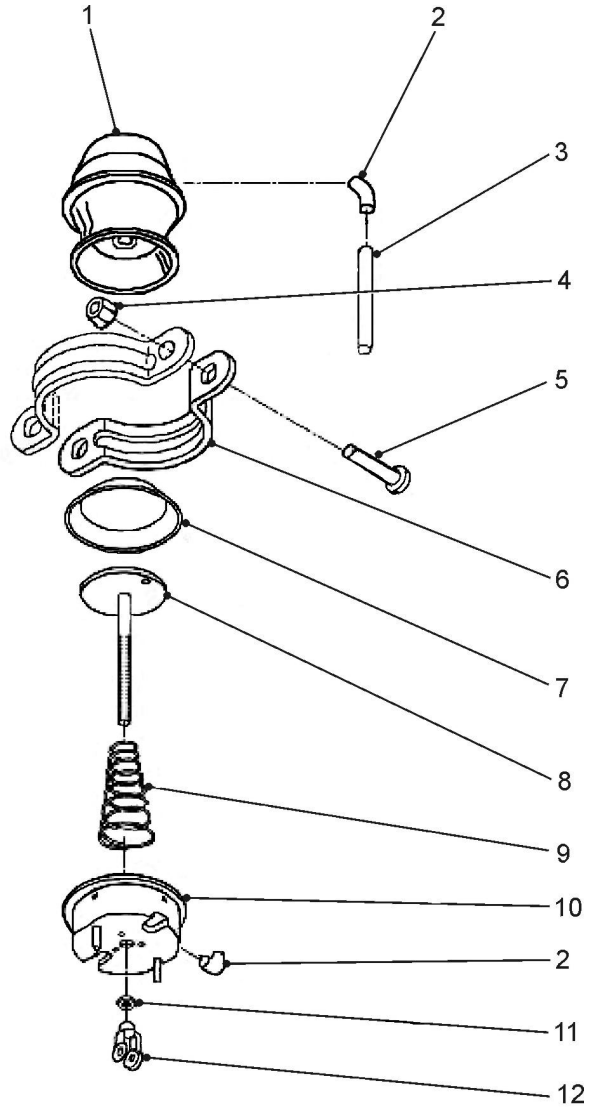
a. Mark the correct alignment of the housings and clamp assemblies to ensure the correct alignment on reassembly.

b. Remove the clevis (Item 12) and the hexagon nut (Item 11) from the pushrod (Item 8).

c. Remove the vent tube (Item 3) and the two vent tube elbows (Item 2).

d. Remove the clamp screws (Item 5), clamp screw nuts (Item 4), and clamps (Item 6).

e. Remove the service brake housing (Item 10), service brake return spring (Item 9), pushrod (Item 8) and the service brake diaphragm (Item 7).



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1	Spring brake chamber	7	Service brake diaphragm
2	Vent tube elbow	8	Pushrod
3	Vent tube	9	Service brake return spring
4	Clamp screw nuts	10	Service brake housing
5	Clamp screws	11	Hexagon nut
6	Clamp	12	Clevis

Figure 20 Brake Chamber – Exploded View

67. Cleaning and inspection. Clean and inspect the valve as follows:

a. Thoroughly wash all the metal components in a suitable solvent and blow them dry with compressed air.

b. Inspect the clevis for any wear or damage and replace it if necessary.

c. Inspect the pushrod for bends or excessive wear and replace it as necessary.

d. Inspect the pressed metal housings for evidence of cracks or metal fatigue around the mounting studs and the clamping flange and replace it if any cracks or metal fatigue are found.

e. Inspect the spring brake housing for wear or cracks, particularly around the clamping flange and the rear face and replace it if any wear, cracking or other damage is evident.

f. Inspect the spring for functionality and replace it if necessary.

g. Inspect the clamps, screws and nuts for wear or damage and replace them if any damage exists.

NOTE

It is good practice to replace the diaphragm during overhaul if possible. Do not refit an old diaphragm if it is not fit for use.

h. Inspect the diaphragm for any signs of perishing or other damage. Inspect the outer edge for build up of rust and scale, remove the rust and scale if the diaphragm is otherwise usable, and replace the diaphragm if any flaws are found.

68. Reassembly. Reassemble the service brake chamber as follows (Figure 20):

a. Apply a light film of XG–315 grease to the adapter pushrod and the edge of the diaphragm.

b. Fit the service brake diaphragm (Item 7) into the spring brake chamber.

NOTE

Ensure that a light film of lubricant has been applied to the outer edge of the diaphragm.

c. Place the pushrod (Item 8) in position on the diaphragm and slide the service brake return spring (Item 9) in position on the pushrod.

d. Slide the service brake housing (Item 10) over the pushrod and align it with the spring brake chamber.

e. Fit the clamp (Item 6) in position ensuring that it is correctly aligned and secure using the clamp screws (Item 5) and clamp screw nuts (Item 4). Tighten the clamp screw nuts to 35 N.m.

f. Fit the hexagon nut (Item 11) and the clevis (Item 12) to the pushrod.

g. Fit the vent tube elbows (Item 2) and the vent tube (Item 3).

Wheel Brake Assemblies

WARNING

ASBESTOS HAZARD. If there is any doubt that asbestos free brake shoes are fitted, all handling and repairs are to be as directed in the Defence Safety Manual.

All replacement brake shoes are to be asbestos free.

Wheel Brake Assembly (Early Build)

69. Early Build Brake Shoe Removal. Remove the brake shoes as follows (Figure 21):

NOTE

This procedure applies to trailers with serial numbers up to 10228.

a. Remove the brake chambers as detailed in Para 64.

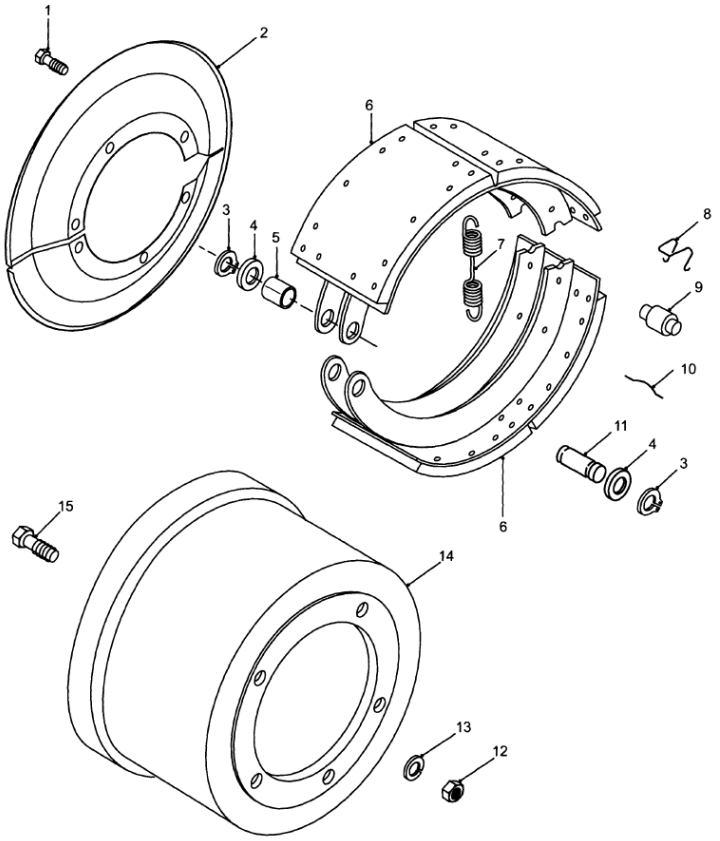
b. Remove the wheel hub and brake drum assembly as detailed in Para 28.

c. Move the slack adjuster and camshaft into the fully released position.

d. Remove the two circlips (Item 3) and flat washers (Item 4) securing the brake shoe anchor pin (Item 11).

e. Slide the anchor pin from the brake shoe mountings.

f. Remove the brake shoes (Item 6) and separate them from the return spring (Item 7).



1	Screw	5	Anchor bushing	9	Camshaft roller	13	Lock washer
2	Backing plate	6	Brake shoe	10	Retaining pin	14	Brake drum
3	Circlip	7	Return spring	11	Anchor pin	15	Hex bolt
4	Flat washer	8	Retaining clip	12	Hex nut		

Figure 21 Wheel Brake Assembly – Early Build

70. Installation. Install the brake shoes as follows (Figure 21):

a. Fit the return spring (Item 7) to the two brake shoes (Item 6) and slide the replacement brake shoes onto the mounting plates.

b. Fit the brake shoe anchor pins (Item 11), flat washers (Item 4), and circlips (Item 3).

c. Fit the brake drum and hub assembly as detailed in Para 35.

d. Fit the spring brake chamber as detailed in Para 65.

e. Adjust and test the brakes as detailed in Para 22.

Brake Camshaft and Mountings

71. Removal. Removal of the brake camshaft and mountings is as follows:

NOTE

This procedure applies to trailers with serial numbers up to 10228.

a. Remove the brake shoes as detailed in Para 69.

b. Remove the cam rollers (Figure 21, Item 9) and retaining clips (Item 8) from the brake shoes.

c. Remove the slack adjuster retaining circlip (Figure 22, Item 1) and the flat washer (Item 2) from the inner end of the camshaft (Item 17).

d. Slide the slack adjuster (Item 3) from the camshaft splines.

e. Remove the circlip (Item 1 near Item 13) from the groove in the camshaft.

f. Slide the camshaft from its mountings whilst sliding the circlip and flat washer (Item 2) from the camshaft.

g. Remove the four hexagon headed bolts (Item 5), nuts (Item 11) and lock washers (Item 10) securing the two camshaft housing (Item 6) to the camshaft bracket (Item 12).

h. Remove the housing, nylon bushing (Item 8) and the two O rings (Item 7).

i. Remove the two camshaft seals (Item 13) from the brake mounting plate.

j. If worn, the bronze bushing (Item 14) may be removed from the brake and discarded.

72. Cleaning and inspection. Clean and inspect the brake assembly as follows:

a. Remove all grease nipples, noting their location. Refit them after cleaning.

b. Thoroughly wash all the metal components in a suitable solvent and blow them dry with compressed air.

c. Inspect all parts for wear or damage and replace where necessary.

73. Reassembly. Reassemble the wheel brake assembly as follows (Figure 22):

a. Fit the new bronze bushing (item 14) to the brake mounting plate.

NOTE

Ensure that the seals are correctly fitted and facing in the correct direction. The lip of the outer seal faces into the brake mounting plate to prevent grease entering the brake assembly. The lip of the inner seal faces towards the centre line of the trailer. This allows excess grease to escape thus preventing dirt and moisture ingress.

b. Fit the two camshaft seals (Item 13) to the brake mounting plate.

NOTE

Do not tighten the nylon bush mounting nuts until instructed.

c. Install the nylon bush (Item 8), the two O rings (Item 7) and the two housing (Item 6) to the camshaft bracket and hold them in place with the bolts (Item 5), lock washers (Item 10) and nuts (Item 11).

d. Fit the camshaft (Item 17) through the bronze bushing (Item 14) in the brake mounting plate.

e. Slide the flat washer (Item 2) and circlip (Item 1) onto the camshaft as it passes through the bronze bushing.

f. Fit the camshaft through the nylon bushing (Item 8).

g. Ensure the circlip is seated correctly in the groove in the camshaft.

h. Tighten the four nylon bush mounting nuts and check for free rotation of the camshaft.

i. Fit the slack adjuster (Item 3) on to the camshaft, ensuring that the adjusting screw is facing away from the spring brake mounting plate.

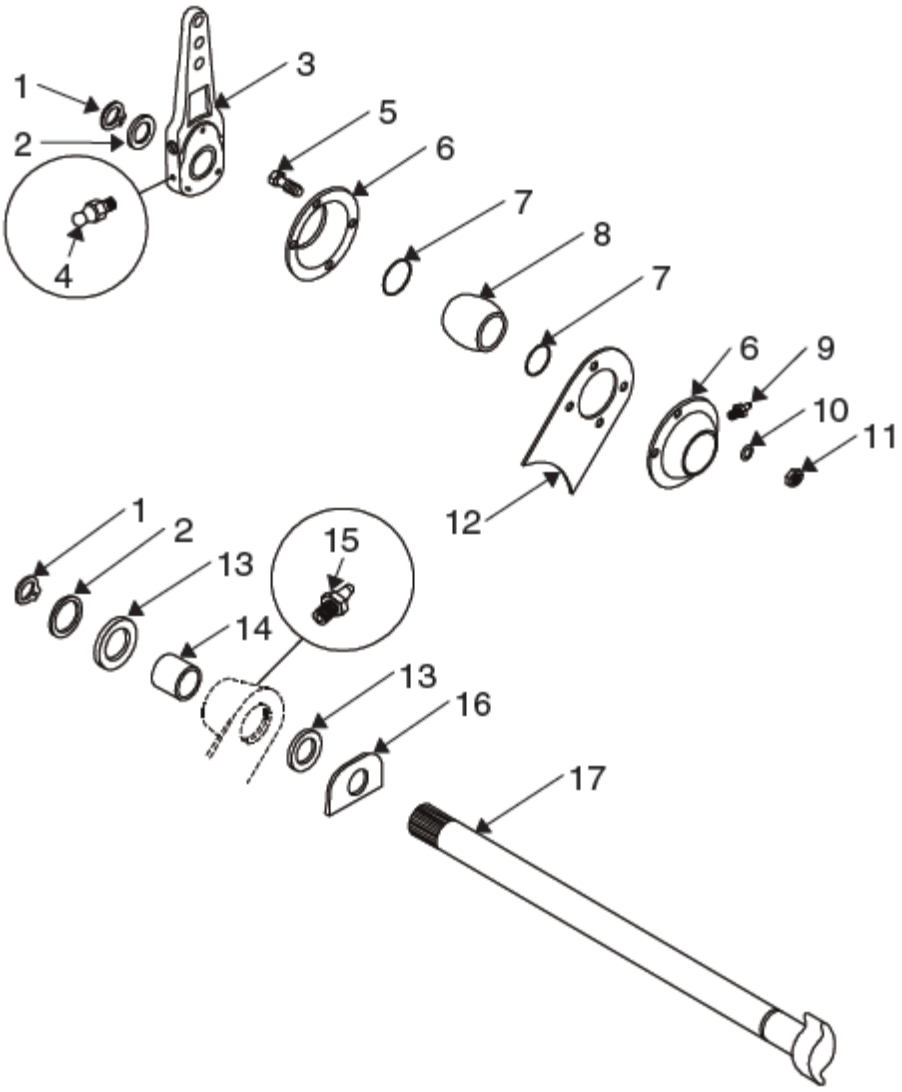
j. Fit the flat washer (Item 2) and the retaining circlip (Item 1) to the inner end of the camshaft.

k. Lubricate all grease nipples and ensure that the camshaft operates freely.

l. Rotate the camshaft to the fully released position.

m. Fit the camshaft rollers (Figure 21, Item 9) and the retaining clips (Item 8) to the brake shoes.

n. Install the brake shoes, wheel hub, brake drum assembly, spring brake chamber and test and adjust the brake system as detailed in Para 70.



1	Circlip	6	Housing	11	Hex nut	16	Camshaft Plate
2	Flat washer	7	O rings	12	Camshaft bracket	17	Camshaft
3	Slack adjuster	8	Nylon bushing	13	Seal		
4	Grease nipple	9	Grease nipple	14	Bronze bushing		
5	Hex bolt	10	Lock washer	15	Grease nipple		

Figure 22 Brake Camshaft and Mountings – Early Build

Wheel Brake Assembly (Late Build)

NOTE

This procedure applies to trailers with serial numbers from 12371.

74. Late Build Brake Shoes Removal. Remove the brake shoes as follows (Figure 23):

a. Remove the spring brake chamber as detailed in Para 64.

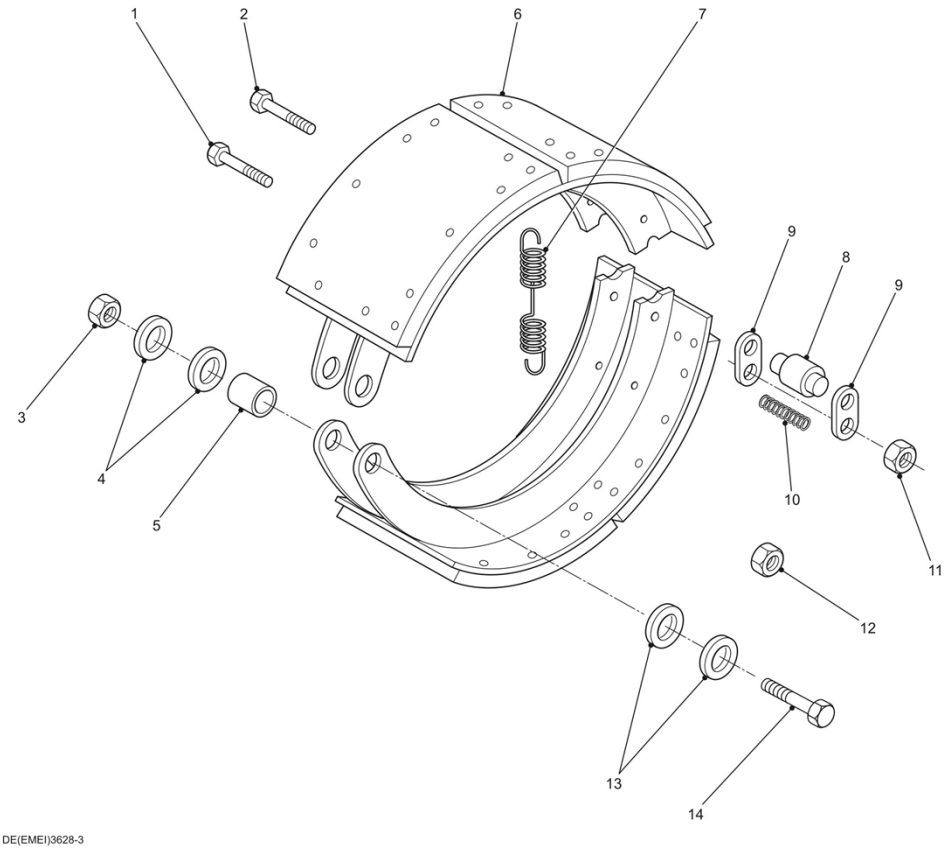
b. Remove the wheel hub and brake drum assembly as detailed in Para 28.

c. Move the slack adjuster and camshaft into the fully released position.

d. Remove the nut (Item 3), flat washers (Item 4), bolt (Item 14) and flat washers (Item 13) securing the brake shoe anchor pin (Item 5).

e. Slide the anchor pin from the brake shoe mountings.

f. Remove the brake shoes (Item 6) and separate them from the return spring (Item 7).



1	Hex bolt	5	Anchor pin	9	Retaining plate	13	Flat washer
2	Hex bolt	6	Brake shoe	10	Compression Spring	14	Hex bolt
3	Nyloc hex nut	7	Return spring	11	Self locking nut		
4	Flat Washer	8	Camshaft roller	12	Nyloc hex nut		

Figure 23 Wheel Brake Assembly – Late Build

75. Installation. Install the brake shoes as follows (Figure 23):

a. Fit the return spring (Item 7) to the brake shoes (Item 6) and slide the replacement brake shoes onto the mounting plates.

b. Fit the brake shoe anchor pin (Item 5) and secure it with the bolt (Item 14), flat washers (Item 4 and Item 13) and nut (Item 3).

c. Fit the brake drum and hub assembly as detailed in Para 35.

d. Fit the spring brake chamber as detailed in Para 65.

e. Check the brake adjustment and adjust as required (Para 22).

Brake Camshaft and Mountings

76. Disassembly. Disassemble the brake camshaft and mountings as follows:

NOTE

This procedure applies to trailers with serial numbers from 12371.

a. Remove the wheel brake shoes as detailed in Para 74.

b. Disassemble the cam roller mechanisms as follows (Figure 21):

(1) remove the two bolts (Items 1 and 2) and nuts (Items 11 and 12) ;

(2) remove the retaining plates (Item 9), compression spring (Item 10), and camshaft roller (Item 8).

c. Disassemble the camshaft as follows (Figure 24):

(1) Remove the slack adjuster circlip (Item 1) and the washer (Item 2) from the inner end of the camshaft (Item 15).

(2) Slide the slack adjuster (Item 4) from the camshaft splines.

(3) Remove the circlip (Item 22) securing the camshaft to the camshaft pivot in the brake anchor plate from its groove.

(4) Slide the camshaft from its mountings whilst sliding the circlip and washers (Items 16 and 21) from the camshaft.

(5) Remove the four hexagon headed bolts (Item 6) securing the housing plates (Items 7 and 13) to the mounting bracket (Item 14).

(6) Remove the camshaft housings and the nylon bushing (Item 27), bush (Item 10), seals (Items 8 and 12), and O rings (Items 9 and 11).

(7) Remove the two camshaft seals (Items 17 and 20) from the brake mounting plate.

(8) If worn, press the bush (Item 19) from the brake mounting plate and discard it.

77. Cleaning and inspection. Clean and inspect the brake assembly as follows:

a. Remove all grease nipples, noting their location, and install them after cleaning.

b. Thoroughly wash all the metal components in a suitable solvent and blow them dry with compressed air.

c. Inspect all parts for wear or damage and replace where necessary.

78. Reassembly. Reassemble the brake camshaft and mountings as follows (Figure 24):

a. If removed, press the new bush (Item 19) into the brake mounting plate.

NOTE

The lip of the outer seal faces into the brake mounting plate to prevent grease entering the brake assembly. The lip of the inner seal faces towards the centre line of the trailer. This allows excess grease to escape preventing dirt and moisture ingress.

b. Fit new camshaft seals (Items 17 and 20) to the camshaft pivot in the brake mounting plate.

c. Install the nylon bushing (Item 10), seals (Items 8 and 12) and O rings (Items 9 and 11) into the housing plates (Items 7 and 13).

NOTE

Do not tighten the bolts until instructed.

d. Fit the housing plates to the mounting bracket (Item 14) and loosely fit the four bolts (Item 6).

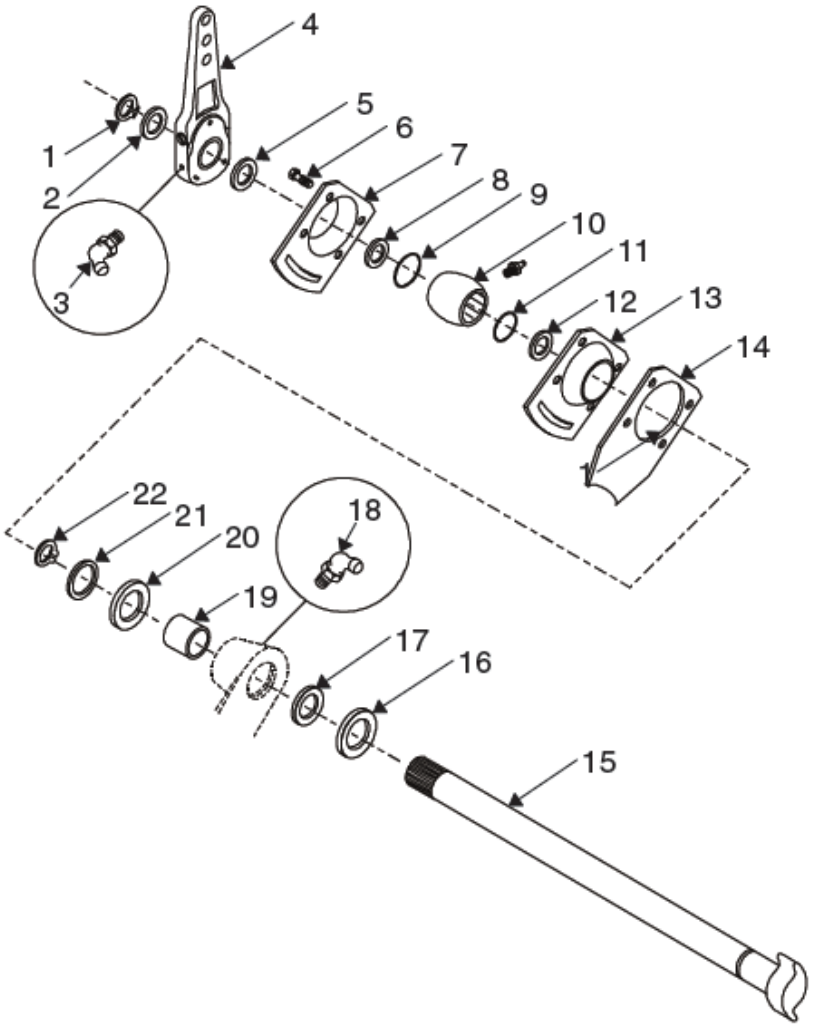
e. Fit the washer (Item 16) to the camshaft (Item 15).

f. Fit the camshaft through the bushing (Item 19) in the brake mounting plate.

g. Fit the flat washer (Item 21) and the circlip (Item 22) to secure the camshaft to the brake mounting plate.

h. Fit the camshaft through the nylon bushing (Item 10).

i. Ensure the circlip (Item 22) is seated correctly in the groove in the camshaft.



1	Circlip	7	Plate	13	Plate	19	Bush
2	Washer	8	Seal	14	Mounting bracket	20	Seal
3	Grease nipple	9	O ring	15	Camshaft	21	Washer
4	Slack adjuster	10	Bush	16	Washer	22	Circlip
5	Washer	11	O ring	17	Seal		
6	Bolt	12	Seal	18	Grease nipple		

Figure 24 Brake Camshaft And Mountings – Late Build

j. Tighten the four bolts and check for free rotation of the camshaft.

NOTE

Ensure that the adjusting screw is facing away from the spring brake mounting plate.

k. Fit the washer (Item 5) and the slack adjuster (Item 4) to the camshaft.

NOTE

Ensure that the circlip locates correctly in its groove in the camshaft.

l. Fit the washer (Item 2) and the circlip (Item 1) on the camshaft.

m. Lubricate all grease nipples and ensure that the camshaft operates freely.

n. Rotate the camshaft to the fully released position.

o. Reassemble the cam roller mechanisms to the brake shoes by installing the rollers, retaining plates, springs, nuts and bolts as shown in Figure 23.

p. Install the brake shoes, the wheel hub, brake drum assembly, the spring brake chamber, and adjust and test the brakes as detailed in Para 75.

Brake System Fault Finding

79. Table 3 details common faults and rectifications for the brake system.

Table 4 Brake System Fault Finding

Serial	Symptom	Probable Cause	Action
1	Insufficient braking	Mechanical components damaged	Check for damaged parts, replace as required
		Worn brake linings	Replace brake linings
		Low pressure in the brake system	Check supply pressure from the towing vehicle
		Reservoir drain-cock open	Close drain-cock
2	Brakes apply too slowly	Brakes require adjusting or lubrication	Adjust brakes. Lubricate brake components
		Relay valve faulty	Replace valve
		Blocked or restricted air lines/hoses	Clear blockage. Replace air line or hose
		Leaking brake chamber diaphragm	Replace brake chamber
3	Brakes release too slowly	Brakes require adjusting or lubrication	Adjust brakes. Lubricate brake components
		Relay valve faulty	Replace valve
		Blocked or restricted air lines/hoses	Clear blockage. Replace air line or hose
4	Brakes do not release	Brake shoe return spring weak or broken	Replace spring
		Spring brake chamber diaphragm faulty	Replace brake chamber
		Faulty spring brake control valve or relay valve	Replace faulty valve
5	Brakes grab or are erratic	Oil on brake linings	Replace brake linings
		Faulty brake chambers	Replace faulty brake chambers
		Eccentric brake drum/s	Replace brake drum/s
		Loose brake lining	Replace brake shoes
		Brake shoe return spring broken or weak	Replace spring
6	Uneven braking	Oil or grease on brake linings	Replace brake linings and oil or grease seal
		Eccentric brake drum/s	Replace brake drum/s
		Brake chamber diaphragm leaking	Replace brake chamber
7	Spring brake does not hold	Power spring broken	Replace brake chamber
		Brakes require adjusting	Adjust brakes
		Faulty spring brake control valve	Replace valve
8	Brakes drag after spring brakes have been used	Low spring brake hold-off air pressure	Check air pressure in system
		Leaking air lines	Repair leaks
9	Spring brakes will not release	Insufficient air pressure	Check air pressure in system
		Faulty spring brake valve	Replace valve
		Spring brake chamber diaphragm faulty	Replace brake chamber
10	Rear brakes locking	Check valve on proportioning valve faulty	Overhaul or replace check valve

ELECTRICAL

Repairs

80. An electrical wiring diagram is shown in Figure 25.

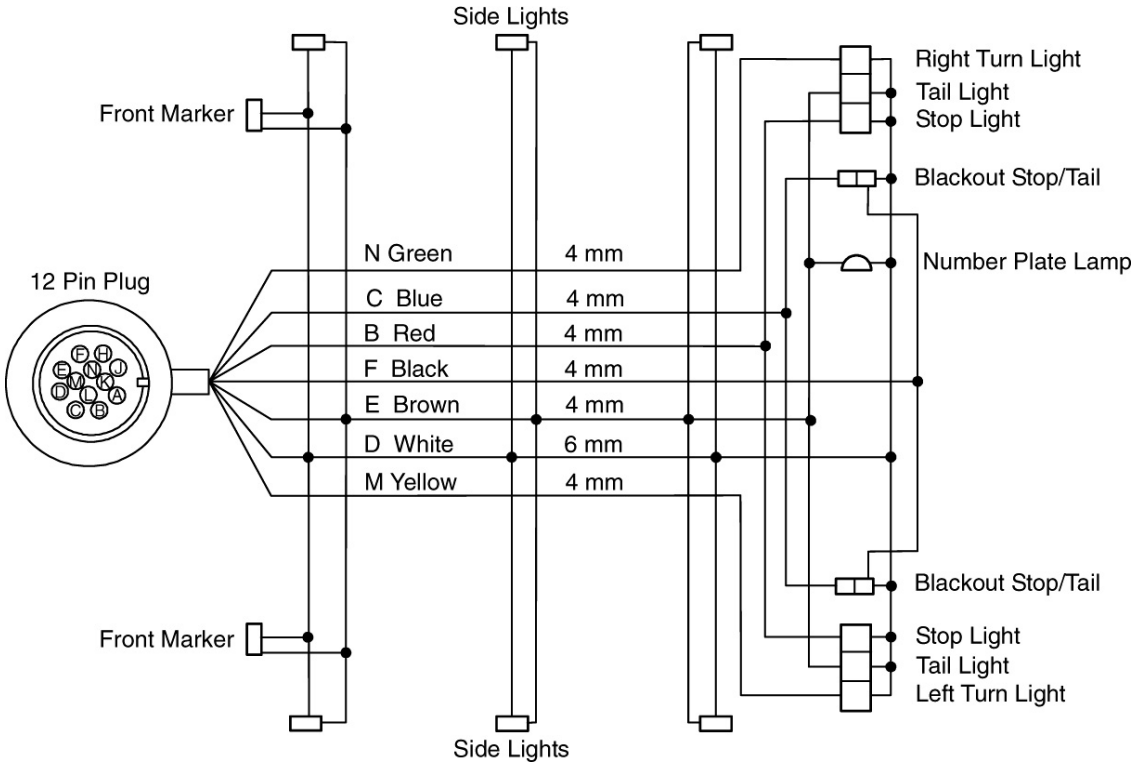


Figure 25 Electrical Wiring Diagram

81. When carrying out repairs to the electrical system ensure that the following points are observed:

a. A 6 mm white loop wire is to be fitted to plug pins D & L.

b. A 4 mm blue loop wire is to be fitted to plug pins C & H.

c. All wiring is to be installed in soft conduit.

FRAME ASSEMBLY

Ballrace

82. **Removal.** Remove the ballrace as follows (Figure 26):

a. Release the dolly spring brakes using the release bolts.

b. Disconnect the brake air lines and electrical harness which pass through the centre of the ballrace (Item 6). Mark all items for identification and correct reassembly.

c. Place suitable stands beneath the main trailer frame.

NOTE

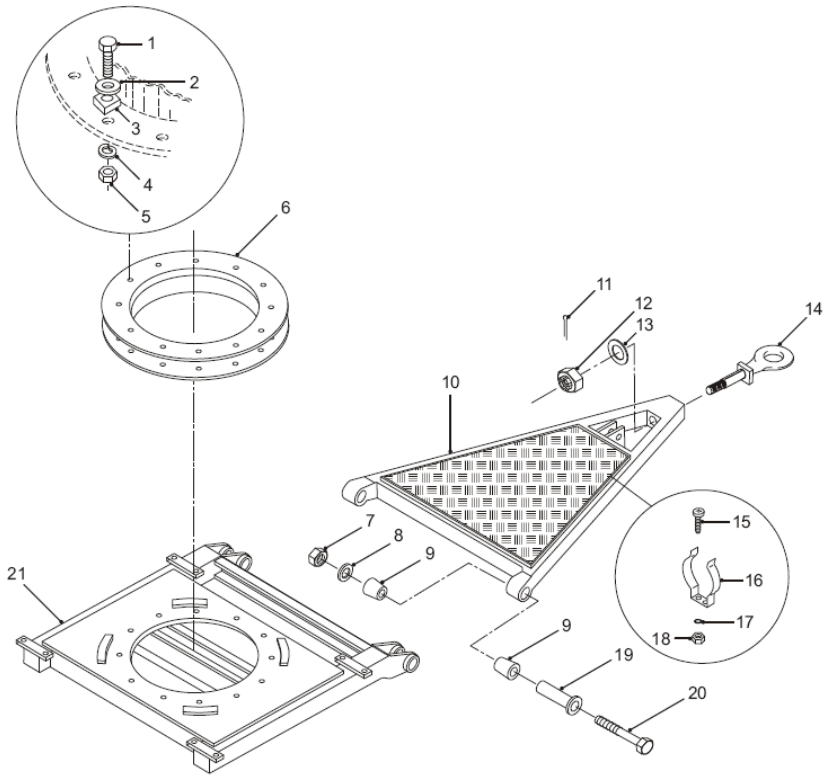
Support the main frame weight without lifting the trailer excessively.

d. Remove the bolts which secure the ballrace to the lower side of the main frame.

e. Lift the main trailer frame and roll the dolly from beneath the main frame.

NOTE

Support the dolly to prevent it tipping as it moves from under the main frame.



1	Bolt	6	Ballrace	11	Cotter pin	16	Spring clip	21	Dolly frame
2	Lock washer	7	Nyloc nut	12	Castellated nut	17	Lock washer		
3	Tapered washer	8	Flat washer	13	Flat washer	18	Nut		
4	Lock washer	9	Bush	14	Towing eye	19	Equaliser shaft		
5	Nut	10	Drawbar assy	15	Screw	20	Pivot bolt		

Figure 26 Towing Attachment – Dolly Frame – Exploded View

f. Lower the main frame onto the safety stands.

g. Chock the wheels of the dolly when clear.

h. Remove the bolts securing the ballrace to the dolly.

i. Lift the ballrace from the dolly frame.

83. Installation. Install the ballrace as follows:

NOTE

Trailers prior to serial 10228 have tapered washers, lock washers and nuts installed. Ensure that all parts are correct for the trailer.

Ensure that the tapered washers are used in positions relative to the tapered flanges in the cross-members.

a. Position and secure the ballrace assembly onto the dolly frame.

b. Lift the main frame and position the dolly beneath it.

c. Lower the main frame onto the dolly, ensuring that the mounting bolt holes are properly aligned.

d. Fit the mounting bolts and washers from the top. Fit the washers and nuts and tighten them to 100 N.m.

e. Connect the brake air lines and electrical harness.

f. Remove the release bolts from the dolly converter spring brakes.

g. Remove the stands from beneath the main frame.

Drawbar Assembly

84. Removal. Remove the drawbar assembly as follows (Figure 26):

- **a.** Disconnect the brake air lines and electrical harness from the drawbar assembly.
- **b.** Remove the drawbar support stand or fold it into the raised position.
- **c.** Remove the nyloc nuts (Item 7) and washers (Item 8) from the two pivot bolts (Item 20).
- **d.** Remove the two bolts and the equaliser shafts (Item 19).
- **e.** Remove the four tapered rubber bushes (Item 9) and lift the drawbar clear of the dolly.

85. Installation. Install the drawbar as follows (Figure 26):

- **a.** Position the drawbar pivots into the dolly frame and support in this position.
- **b.** Fit the four tapered bushes (Item 9).
- **c.** Fit the equaliser shaft (Item 19) and the pivot bolt from the outer side of each pivot.
- **d.** Fit the large flat washer (Item 8) with a new nyloc nut (Item 7) and tighten the nut to 200 N.m.

Spare Wheel Winch Assembly

86. Removal. Remove the spare wheel winch assembly as follows (Figure 27):

- **a.** Remove the spare wheel from the winch assembly.
- **b.** Remove the four nuts (Item 23) and lock washers (Item 22) securing the mounting bracket (Item 20) to the trailer frame.
- **c.** Lift the winch assembly clear of the bracket.

87. Disassembly. Disassemble the spare wheel winch assembly as follows (Figure 27):

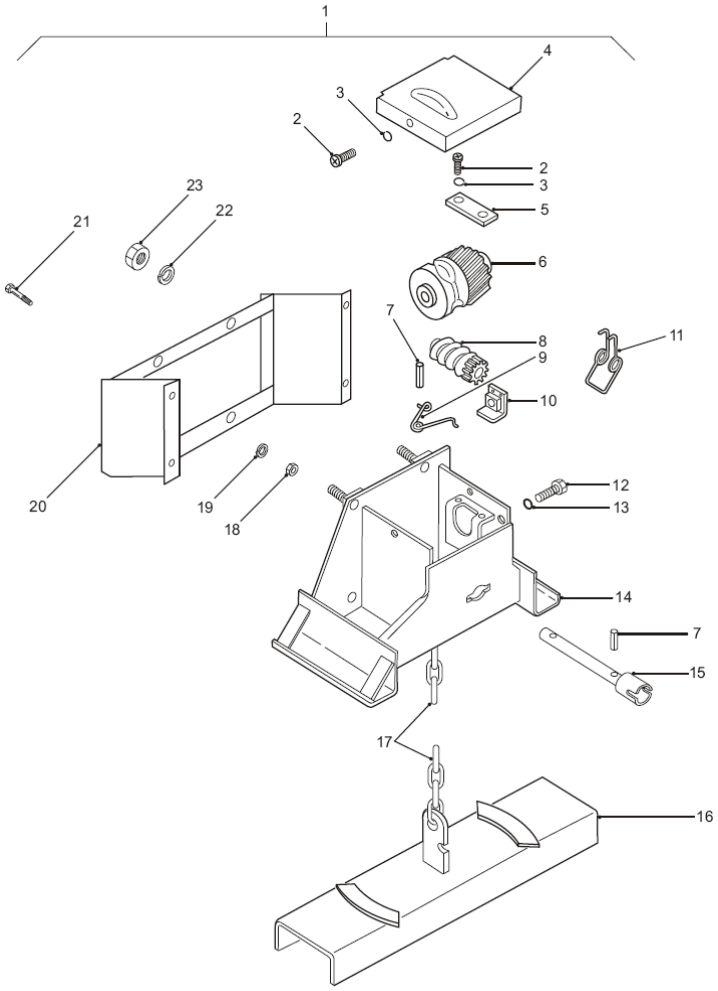
- **a.** Remove the two screws (Item 2) securing the top cover (Item 4).
- **b.** Remove the top cover.
- **c.** Spread the split link and disconnect the lift chain (Item 17) from the casing (Item 14).
- **d.** Remove the two screws (Item 2) securing the wheel gear retaining plate (Item 5) to the case.
- **e.** Remove the retaining plate.
- **f.** Lift the wheel gear (Item 6) from the casing and disengage the lift chain.
- **g.** Remove the hexagon headed screw (Item 12) securing the ratchet pawl (Item 10) to the casing (Item 14).
- **h.** Remove the ratchet spring (Item 11) and the ratchet pawl.
- **i.** Using a suitable parallel punch and hammer drive the two roll pins (Item 7) from the winch drive shaft (Item 15).
- **j.** Remove the drive shaft from the assembly.
- **k.** Remove the worm gear (Item 8) from the casing.
- **l.** Remove the locking spring (Item 9) from the locking pawl.

NOTE

The locking pawl is welded to the casing and should only be removed if absolutely necessary.

88. Cleaning and Inspection. Clean and inspect the winch assembly as follows:

- **a.** Clean all components in a suitable solvent and dry them.
- **b.** Inspect the worm and wheel gear for damage or wear to the gear teeth.
- **c.** Inspect the worm gear for damage or wear to the ratchet teeth.
- **d.** Inspect the two springs for evidence of wear or cracking.



1	Winch assy	7	Roll pin	13	Lock washer	19	Lock washer
2	Screw	8	Worm gear	14	Winch casing	20	Winch mounting bracket
3	Lock washer	9	Locking spring	15	Winch drive shaft	21	Hex bolt
4	Cover	10	Ratchet pawl	16	Spare wheel lift bracket	22	Lock washer
5	Gear retaining plate	11	Ratchet spring	17	Chain	23	Hex nut
6	Wheel gear	12	Screw	18	Hex nut		

Figure 27 Spare Wheel Winch – Exploded View

89. Reassembly. Reassemble the spare wheel winch assembly as follows (Figure 27):

a. If not already in place, fit the locking pawls and weld the pivot to the casing.

b. Fit the locking spring (Item 9).

c. Place the worm gear (Item 8) in position in the casing (Item 14).

d. Install the winch drive shaft (Item 15) and insert the two roll pins (Item 7) into the drive shaft.

e. Fit the ratchet pawl (Item 10) and secure it with the hexagon headed screw (Item 12) and lock washer (Item 13).

f. Fit the lift chain (Item 17) through the assembly leaving a loop large enough to fit the wheel gear (Item 6).

g. Position the wheel gear through the chain loop and fit it into the casing.

h. Fit the retaining plate (Item 5) and secure it with the two screws (Item 2) and lock washers (Item 3).

i. Place sufficient lubricant into the casing and around the gears to ensure proper lubrication.

NOTE

Use suitable multipurpose grease (Ref EMEI Vehicle H 629).

j. Fit the lift chain into the winch assembly and secure it to the casing with the split link.

k. Fit the top cover (Item 4) and secure it with the two screws (Item 2) and lock washers (Item 3).

90. Installation. Install the spare wheel winch assembly as follows (Figure 27):

a. Mount the winch assembly into the mounting bracket (Item 20) and secure it with the four mounting nuts (Item 23) and lock washers (Item 22).

b. Fit the winch and mounting bracket assembly in position on the trailer frame and secure in place.

c. Fit the spare wheel to the lifting frame.

d. Wind the spare wheel up and secure it in position.

Drawbar Coupler Eye

91. Inspection Standard. Inspect the drawbar eye as follows:

a. Measure the inside diameter of the bush insert and the thickness of the drawbar eye tongue to determine whether they have worn beyond the limits specified in Table 5.

Table 5 Drawbar Coupler Eye Limits

Serial	Description	Limit
1	Drawbar maximum allowable end float	Nil
2	Drawbar maximum allowable side movement	Nil
3	Drawbar eye nominal measurement	76 mm
4	Drawbar eye maximum allowable wear	6 mm

CAUTION

Drawbar eyes are not to be reclaimed by welding or straightening.

b. Replace the complete drawbar eye if either measurement is outside the allowable limits.

c. Inspect the drawbar eye for bending, cracking or any distortion.

d. Remove and discard the drawbar eye if necessary (Para 92.).

92. Replacement of Drawbar Coupler Eye. Replace the drawbar coupler eye as follows (Figure 28):

a. Park the trailer, apply the parking brakes and chock the wheels to prevent movement.

b. Place the drawbar assembly in a horizontal position and support with safety stands.

c. Remove the cotter pin (Item 5), castellated nut (Item 4) and washer (Item 1).

d. Remove the drawbar coupler eye (Item 2) from the drawbar.

NOTE

Use a new washer, nut and cotter pin when fitting a new drawbar eye.

e. Apply a light coat of anti-seize compound to the cylindrical body of the drawbar coupler eye.

f. Insert the drawbar coupler eye into the drawbar and fit the washer and castellated nut.

g. Rotate the drawbar coupler eye so that the hole is vertical.

h. Tighten the retaining nut to 500 N.m.

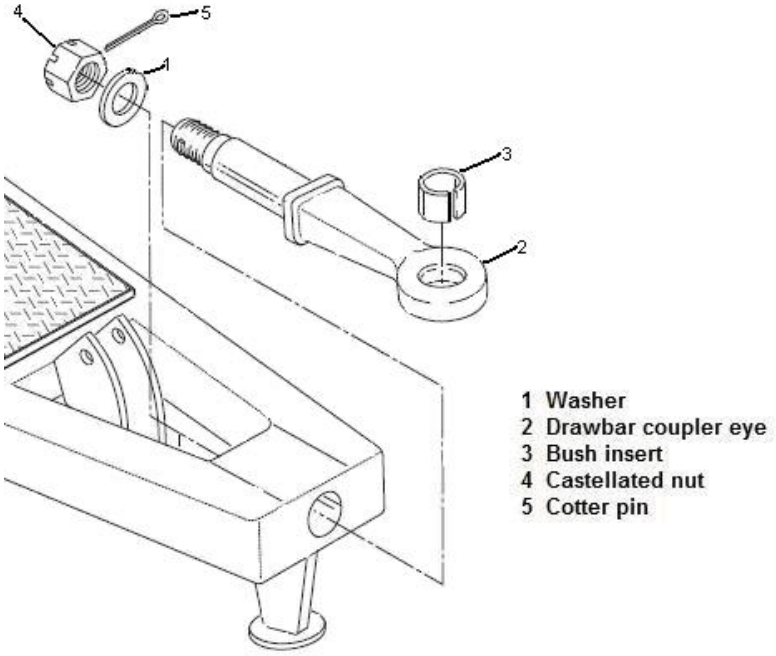


Figure 28 Drawbar Coupler

i. Align the cotter pin hole by tightening the nut further.

NOTE

Do not loosen the nut to align the cotter pin hole.

j. Insert and secure the cotter pin.

Rear Chassis Diagonal Cross-member

93. There have been instances of cracking on the rear diagonal cross-member.

94. Tradespersons authorised to conduct the repairs on the cross-member are as follows

a. Military – ECN 235-2 Metalsmith;

b. civilian – qualified in Certificate in:

(1) 1,3 or 5 in Manual Metal Arc Welding (MMAW); or

(2) Certificate 8 – Gas Metal Arc Welding (GMAW).

95. If the rear chassis diagonal cross-member is cracked, repair as follows:

WARNING

If the trailer is, or is suspected of being painted with polyurethane paint (PUP), instructions in EMEI Workshop D 701 and Workshop E 652 must be followed.

Ensure appropriate Personal Protective Equipment (PPE) is used and extreme caution is exercised when sanding in a confined dusty area with poor ventilation.

a. Grind or sand an area approximately 50 mm around the crack to remove surface contaminants including slag, paint, dirt and rust.

b. Conduct a non-destructive inspection of the cracked area using dye penetrant to confirm the full extent of the crack.

c. Stop drill the end of the crack, where possible, with a 3–4 mm drill.

d. Prepare the crack with a single 'V' preparation.

NOTE

Electrodes used for welding should be suitably conditioned, as per manufacturer's recommendations, and stored in an electrode oven at 120 degrees prior to and during use.

e. Tack weld at regular intervals if required. Weld using GMAW LW-1 wire or MMAW with a low hydrogen electrode.

f. On completion of the welding process, the welds are to be inspected visually. They are to be free from cracks, porosity, undercut and incomplete fusion.

g. All weld craters shall be filled to a minimum of 85 per cent of cross section.

h. Re-work is required if the welds fail any of the above.

96. Painting. On completion of the repair the area is to be prepared for painting. Patch paint the areas exposed with enamel (alkyd) paint.

END

Distribution List: **VEH H 04.0 – Code 2** (Maint Level)
(Sponsor: CGSVSPO, Mdm/Hvy B Veh)
(Authority: EC-005412)