

TRUCK, CARGO, MEDIUM, MC2 - UNIMOG

OVERHAUL OF BRAKE CALIPER ASSEMBLIES

MISCELLANEOUS INSTRUCTION

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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INTRODUCTION

1. The Unimog brake caliper assemblies are manufactured in two halves and are clearly different in design between the two parts. Each caliper is orientated with a large piston to the front of the assembly with a small piston to the rear. There have been reported instances of calipers being found with the incorrect orientation of its pistons, i.e. the large piston in one half being opposite a small piston. This scenario can only be possible when caliper halves have been mismatched.
2. The brake caliper assemblies fitted to the Unimog family of vehicles are rotatable items and can be overhauled by the fitting of an overhaul kit. This instruction details the complete procedure to refurbish each type of Unimog brake caliper. This procedure includes controlled splitting of the caliper which facilitates a more thorough overhaul.

Associated Publications

3. Reference may be necessary to the latest issue of the following documents:
 - a. EMEI Workshop D 700 – Painting of Army Equipment, Basic Painting Principles;
 - b. EMEI Workshop E 410 – Occupational Health and Safety Instruction – Asbestos;
 - c. Defence Safety Manual (SAFETYMAN);
 - d. Material Safety Data Sheet (MSDS) – product information sheet;
 - e. Technical Regulation of ADF Materiel Manual – Land (TRAMM-L);
 - f. EMEI Vehicle G 603 – Truck Cargo Medium, MC2 – UNIMOG - Light Grade Repair;
 - g. EMEI Vehicle G 604 – Truck Cargo Medium, MC2 – UNIMOG - Medium Grade Repair;
 - h. EMEI Vehicle G 604-1 – Truck Cargo Medium, MC2 – UNIMOG - Heavy Grade Repair;
 - i. Electronic Supply Chain Manual (ESCM); and
 - j. DEF (AUST) 1000C – ADF Packaging Standard.

Authority

4. The following, full procedure to overhaul Unimog calipers is only to be performed by JLU-V (Bandiana) to ensure stringent control measures are maintained during splitting and re-assembly. Authority may be granted to other regions only after a formal request is made through the NFM, CGSVSPO (Defence Materiel Organisation).
5. All work must only be performed by suitably qualified military or civilian tradespersons who have received adequate training.

Items Affected

6. The following caliper types can be overhauled using the detail of this EMEI:
 - a. Left Hand Front (LHF) – NIIN: 12-315-0109 and NIIN: 12-344-1364;
 - b. Left Hand Rear (LHR) – NIIN: 66-112-9601 and NIIN: 12-367-0193;
 - c. Right Hand Front (RHF) – NIIN: 66-112-9603 and NIIN: 12-366-9030; and
 - d. Right Hand Rear (RHR) – NIIN: 66-112-9600 and NIIN: 12-339-7448.

Parts Required

7. The parts required for the complete overhaul of each caliper type are detailed at Table 1 and are shown at Figure 1 and Figure 2.

Table 1 Parts Required

Serial	Designation	NIIN	MPN	LHF	RHF	LHR	RHR
1	Valve, Bleeder, Hydraulic	12-301-0090	0004203155	1	1	1	1
2	Cover, Brake Caliper	12-301-0079	0004210720	1	1	1	1
3	Spring, Flat, Disc Brake	12-305-7775	00044213191	1	1	1	1
4	Clip, Spring Tension	12-169-9083	0009881678	1	1	1	1
5	Pin, Shoulder, Headless	12-300-7829	0009913160	2	2	2	2
6	Part Kit, Caliper	12-311-5138	0004202544	1	1	1	1
7	Piston, Large (front 57mm)	12-301-0091	0004214983	2	2	0	0
8	Piston, Small (all 48mm)	12-301-2930	0004214883	2	2	2	2
9	Piston, Large (rear 57mm)	12-305-7776	0004215683	0	0	2	2
10	Parts Kit, Brake Adjuster	12-321-1322	0004230619	0	0	1	1
11	Adjuster, Brake Shoe	12-332-6314	0004230819	0	0	1	1
12	Packing Assortment Preformed	12-322-6312	0004206938	0	0	1	1
13	Square Section O-ring (between halves)	TBA	P4807 – Albury Brake and Clutch Pty Ltd.	2	2	2	2
14	Blanking Plug – mounting bolts	TBA	TBA	2	2	2	2
15	Blanking Plug – bleeder size	TBA	TBA	1	1	1	1
16	I.D. Plates (sequentially numbered pair)	As issued	In-house manufacture	1pr	1pr	1pr	1pr



Figure 1 Complete Overhaul Kit – Front Caliper



Figure 2 Complete Overhaul Kit - Rear Caliper

Specialist Tooling and Test Equipment (ST and TE)

8. The ST and TE required for the complete overhaul of Unimog brake calipers are listed as follows:
- a. Bench Hydraulic Pressure Tester – capable of 2000 psi system pressure.
 - b. Basic hand tools and workshop access.
 - c. Multi function tool – e.g. Dremel for detailed cleaning.
 - d. Unimog specialist brake tooling.
 - e. Caustic Bath – capable of thorough paint removal of up to 20 calipers at a time.
 - f. Paint Shop – capable of batch painting up to 20 calipers at a time.

Consumables

9. The consumables required for the complete overhaul of Unimog brake calipers are listed as follows:
- a. Rubber grease;
 - b. Dot 4 brake fluid;
 - c. Sikaflex;
 - d. Scotchbrite;
 - e. Aerosol contact cleaner – e.g. Brakeclean;
 - f. Loctite – high strength thread locker 272; and
 - g. A paint pen.

OVERHAUL PROCEDURE

10. The following paragraphs detail the complete process to recondition a Unimog brake caliper. At the completion of this process, calipers can be classified as being “Fully Functional - FF” and returned to category “SV (Serviceable) stock.
11. This instruction has been broken down into the logical steps to detail the complete overhaul process. The following broad topics are covered:
- a. Initial Inspection.
 - b. I.D. Stamping.

- c. Stripping.
- d. Cleaning Preparation Prior to Overhaul.
- e. Fitting of Overhaul Kits – Front Calipers.
- f. Fitting of Overhaul Kits – Rear Calipers.
- g. Post Overhaul Testing.
- h. Painting and Preservation.
- i. Tagging and Documentation.

Initial Inspection

12. Prior to conducting complete overhaul of a Unimog brake caliper the assembly must first be inspected to determine whether the assembly is suitable for repair. A caliper can be overhauled only after inspection of the following:

- a. free from body damage;
- b. free from visual cracks;
- c. threaded bleeder and brake line holes are serviceable;
- d. threaded mounting holes are serviceable;
- e. orientation of pistons in each half is correct (i.e. large pistons to the front, small pistons to the rear); and
- f. machined flats are present for banjo fittings on brake line threads (as detailed at Paragraph 17 b).

I.D. Stamping

13. To ensure Unimog brake caliper halves are not mismatched, each half is initially stamped prior to strip down (see Figure 3). These stamped markings provide assurance the caliper remains matched throughout the overhaul process, including caustic bath cleaning of paint and contaminants. To prepare the surface for stamping, it may be necessary to lightly remove some of the casting texture as shown below. If several calipers are to be overhauled at the same time, the initial i.d. stamps are to be different between each caliper (i.e. AA, BB, CC, etc). Following overhaul and prior to painting, a unique i.d. tag set is affixed to each caliper which is detailed at Paragraph 21.



Figure 3 Initial I.D. Stamping Prior to Caliper Splitting

Stripping

14. During the overall process, all internal components are discarded with the exception of the caliper pistons. Each piston must be assessed as being in a serviceable condition prior to reuse.

15. **Front Calipers.** Front calipers are stripped as follows:
- a. Remove the brake pads from the caliper (refer to EMEI Vehicle G 604).

NOTE

The removal procedure requires the use of Special Tool No. 17, a G-clamp of suitable size and a piece of metal plate about 5 mm thick and large enough to cover the bore of the large diameter pistons.

- b. Fit Special Tool No. 17 into the caliper so that the large pistons are held in place.
- c. Position the metal plate over one of the smaller pistons and secure it using the G-clamp.
- d. Place a piece of wood about 10 mm thick into the caliper between both sets of pistons.

WARNING

Eye Hazard. Ensure safety glasses are worn to prevent the possibility of eye injury as a result of brake fluid under pressure being sprayed into the face of the tradesperson.

- e. Ensure the bleed screw is tight, using compressed air, blow the free piston out of its bore.
- f. Remove the G-clamp and plate and place them over the empty piston bore and secure.
- g. Repeat step e, to remove other piston then remove the special tool, G-clamp and plate.
- h. Place the special tool into the caliper so that the two small piston bores are blocked off.
- i. Position the metal plate over one of the large pistons and secure it using the G-clamp.
- j. Repeat the same procedure to remove remaining large piston.
- k. Remove and discard square section o-rings from the piston bores.
- l. At this time the caliper can now be split.
- m. Following caliper stripping, the caliper is to be loosely assembled and placed into a caustic bath.

16. Rear Calipers. The rear calipers are stripped as follows:

- a. Remove the brake pads from the caliper (refer to EMEI Vehicle G 604).

NOTE

The removal procedure requires the use of Special Tool No. 17, a G-clamp of suitable size and a piece of metal plate about 5 mm thick and large enough to cover the bore of the large diameter pistons.

- b. Fit Special Tool No. 17 into the caliper so that the large pistons are held in place.
- c. Position the metal plate over one of the smaller pistons and secure it using the G-clamp.
- d. Place a piece of wood about 10 mm thick into the caliper between both sets of pistons.

WARNING

Eye Hazard. Ensure safety glasses are worn to prevent the possibility of eye injury as a result of brake fluid under pressure being sprayed into the face of the tradesperson.

- e. Ensure the bleed screw is tight, using compressed air, blow the free piston out of its bore.
- f. Remove the G-clamp and plate and place them over the empty piston bore and secure.
- g. Repeat step e, to remove other piston then remove the special tool, G-clamp and plate.
- h. Remove the inner adjuster blanking plug, and using a hex key wind the adjuster pinion in the direction of the cast arrow (clockwise).
- i. Continue to wind the pinion until the inner piston can be removed.

- j. Remove the self-locking nut from the outside adjuster, and using a hex key wind the adjuster in the direction of the cast arrow (clockwise).
- k. Continue to wind the adjuster until the outer piston can be removed.
- l. Remove and discard square section o-rings from the piston bores.
- m. At this time the caliper can now be split.
- n. Mount the inner caliper half into a vice fitted with soft jaws and remove the guide plate and circlip.
- o. Following caliper stripping, the caliper is to be loosely assembled and placed into a caustic bath.

Cleaning Preparation Prior to Overhaul

17. Following up to 24 hours in a caustic bath, the caliper is to be thoroughly steam cleaned or pressure washed and then air dried. It is suggested to mount each caliper half in a vice fitted with soft jaws to aid handling while fully cleaning following steam/pressure washing. The following aspects of cleaning must be performed to properly prepare a caliper for overhaul. These include:

WARNING

Currently, the repairing of caliper threads, other than by use of a tap, is not to occur. This includes; the use of helicoil or insert type thread repair methods. Calipers with damaged threads are to remain at category 'RP' and classified as "Do Not Use – XX". Future consideration may be made to develop an approved thread repair technique if necessary.

- a. The condition of all threaded holes are to be confirmed with suitable taps (as shown in Figure 4), including:
 - (1) mounting bolt holes,
 - (2) caliper body through bolts, and
 - (3) bleeder and brake line threads.



Figure 4 Confirming Threaded Holes with Suitable Taps

NOTE

Early caliper design of the bleeder and brake line bores was a drilled and tapped hole directly into the cast caliper body. This configuration was designed for fitted brake lines to be screwed directly into the thread. Later caliper design incorporated machined flats for the bleeder and brake line holes to provide a seat for banjo style brake lines to be used. Later banjo brake lines can not be used with early style un-machined threaded holes.

- b. **Machined flats.** Bleeder and brake line threaded holes are to have machined flats to standardise the build state of all brake calipers. Any calipers found without the machined flats are to have this work undertaken prior to completing the overhaul process.

- c. Piston bore cavities are to be thoroughly cleaned of all residual corrosion (as shown in Figure 5).



Figure 5 Piston Bores Cleaned of Residual Corrosion

NOTE

Scotchbrite strips and/or use of a multi-tool (such as a Dremel) with small wire wheel attachment can provide a useful means for thorough cleaning of intricate detail of each caliper half.

- d. All o-ring grooves are free from contaminant build up.
e. All bores and drillings are cleared with compressed air.
f. All pistons being reused are to be cleaned of contaminants.
g. Each body half is lightly surface finished on a truing table (as shown in Figure 6).



Figure 6 Surface Finishing of Machined Caliper Halves

Fitting of Overhaul Kits – Front Calipers

18. Once a caliper has been initially inspected, stamped, stripped and cleaned it is now ready to have the overhaul kit fitted. The front caliper is overhauled as follows:

- a. **Square Section O-rings.** Coat the square section o-rings with rubber grease and install them in the appropriate grooves in the piston bores. Ensure the o-rings are not twisted and are correctly seated in the groove (as shown in Figure 7).



Figure 7 Fitting Square Section O-ring into Piston Bore

- b. **Piston Seals.** Coat the piston seals with rubber grease and fit them carefully over the piston (as shown in Figure 8).
- (1) Repeat process for all four pistons.

NOTE

To ensure piston seal is correctly fitted into the piston groove pull down on the seal skirt until the seal is fully located into the groove. The seal can then be rolled upwards to be in the normal position for piston installation.



Figure 8 Fitting Piston Seals

- c. **Fitting Pistons.** Apply a light smear of rubber grease around the base of the piston prior to installation into the caliper body. After aligning the piston squarely with the bore, apply steady firm pressure to insert each piston into the bores. Each piston must be orientated with the cut-out portion of the top lip towards the top. This cut-out allows fitting of the anodised piston cups which permit brake pad installation.

NOTE

The upper most face of each piston has a cut-out portion which corresponds to the anodised piston cup. This cut-out must be upper most in the caliper and aligned prior to full piston fitting as rotation of the piston after fitting is difficult.



Figure 9 Positioning Piston Into Caliper Body

- d. **Tapping Piston Seals into Place.** After the pistons (with piston seals fitted) are pushed carefully into the respective bores, the piston seals are tapped fully home. Using the Unimog specialist seal insertion tools and a dead blow hammer, firmly tap the seals home until fully seated flush with caliper body face (as shown in Figure 10).



Figure 10 Tapping In Piston Seals

- e. **Fitting Piston Cups.** The anodised piston cups are fitted over the piston seals using a dead blow hammer until flush with caliper face. The profile of the piston cup orients with the cut-out towards the top leaving the step in the cup towards its lower edge (as shown in Figure 11).



Figure 11 Fitting Piston Cups

- f. **Fitting O-rings Between Caliper Halves.** Mount the caliper half in a vice (fitted with soft jaws) with the o-ring recess upwards. Ensuring the recess is spotlessly clean, lubricate the two new o-rings with rubber grease and fit into caliper body (as shown in Figure 12).



Figure 12 Fitting Caliper Half O-Rings

- g. **Joining Caliper Body Halves.** Leaving the caliper half with body o-rings fitted mounted in the vice fit the other half of the caliper in the following method:
- (1) physically check to ensure both initial i.d. stamps match on each caliper half;
 - (2) ensure both mounting faces are spotlessly clean;
 - (3) lower the other caliper half into position;
 - (4) apply a bead of Loctite 272 to each wire wheel cleaned body bolts (as shown in Figure 13);



Figure 13 Applying Loctite 272 to Caliper Bolts

- (5) fit all four body caliper through the caliper halves; and
- (6) using a suitable torque wrench and Allen key socket (as shown in Figure 14), tension the bolts in the following sequence;
 - (a) the two in-board bolts first, then the two outer bolts in the following stages:
 - i. Stage one – 100 Nm.
 - ii. Stage two – 200 Nm.

- iii. Stage three – 300 Nm.



Figure 14 Applying Torque to Caliper Body Bolts

- (b) Apply witness marks on each caliper bolt once fully tightened (as shown in Figure 15).



Figure 15 Witness Marking Caliper Bolts

19. The overhauled front caliper can now be pressure tested in accordance with Paragraph 21.

Fitting of Overhaul Kits – Rear Calipers

20. Once a caliper has been initially inspected, stamped, stripped and cleaned it is now ready to have the overhaul kit fitted. The rear caliper is overhauled as follows:

- a. **Square Section O-ring.** The rear caliper square section o-rings are fitted into the piston bores as detailed at Paragraph 18 a.
- b. **Piston Seals.** The rear caliper piston seals are fitted over the pistons as detailed at Paragraph 18 b.
- c. **Fitting Pistons.** The rear caliper small pistons are identical to those fitted to the front caliper and are installed as detailed at Paragraph 18 c. The large pistons however, must be wound into each bore using their adjusters. This differs from the front caliper pistons which can be pressed in as for the small pistons. The large pistons are fitted as follows:

- (1) **Outer Adjuster.** The outer adjuster components, as shown at Figure 16, are installed as follows:



Figure 16 Outer Adjuster Components

- (a) lightly grease the o-ring and carefully roll it across the narrow thread and first groove into the second groove (as shown at Figure 17);



Figure 17 Outer Adjuster O-Ring

- (b) install the outer adjuster through the caliper body from the inside;
- (c) secure the adjuster into position by fitting the e-clip (as shown at Figure 18); and



Figure 18 Outer Adjuster fitted with E-Clip

- (d) while holding the adjuster with a hex key, fit the self-locking nut several turns onto the thread (as shown in Figure 19).



Figure 19 Fitting Self-Locking Nut to Outer Adjuster

- (2) **Winding in the Outer Piston.** After installation of the outer adjuster assembly, the outer piston can be wound in. The back of the piston has a corresponding threaded hole which mates with the large thread of the adjuster. The piston is fitted as follows:

NOTE

To draw the piston into the bore, the adjuster is wound in the opposite direction to that shown by the cast arrow (as shown in Figure 20).



Figure 20 Cast Arrow Indicates Direction to Wind Piston out of Bore

- (a) Apply a light smear of rubber grease around the base of the piston.
- (b) Align the piston squarely with the bore and apply steady firm pressure to start the piston.
- (c) At the same time, start to wind the adjuster in an anti-clockwise direction using a hex key (as shown in Figure 21).



Figure 21 Winding in the Outer Piston Using Adjuster

- (d) After the large thread engages with the adjuster the piston will start to be drawn into the piston bore.
 - (e) Continue to wind the piston in until it is fully home.
- (3) **Inner Adjuster.** The inner adjuster components, shown at Figure 22, are installed as follows:



Figure 22 Rear Inner Piston Adjuster Components

- (a) Prior to fitting the rear adjuster components, the guide plate and circlip is fitted into the large inner piston cavity (as shown in Figure 23).



Figure 23 Guide Plate and Circlip Being Fitted

- (b) Assemble the adjuster spline by lightly coating the o-ring and retainer with rubber grease and carefully fitting these items into the corresponding groove (as shown in Figure 24).

NOTE

The white o-ring retainer is orientated nearest to the splined end of the adjuster.



Figure 24 Rear Adjuster Spline Assembled

- (c) Lightly grease the pinion o-ring with rubber grease and fit to the pinion groove (as shown in Figure 25).



Figure 25 Rear Adjuster Pinion with O-Ring Fitted

- (d) Lightly grease the inside of the caliper bore with rubber grease prior to the adjuster spline being fitted (as shown in Figure 26).



Figure 26 Adjuster Bore Prior to Fitting Spline Adjuster

- (e) Fit the spline spring over the spline adjuster and offer into the bore from the outside (as shown in Figure 27).

NOTE

A guide tool, such as that shown in Figure 26, will assist the adjuster spline assembly to locate squarely into the corresponding bore.



Figure 27 Spline Adjuster Fitted

- (f) Wind in the adjuster compression tool to compress the spline adjuster spring (as shown in Figure 28).

NOTE

The adjuster compression tool compresses the spline adjuster spring to locate the spline adjuster into its normal position. In this position, the pinion adjuster can mate with the corresponding teeth of the adjuster pinion.



Figure 28 Adjuster Compression Tool

- (g) Using a suitable hex key, wind the adjuster pinion down into its groove until the teeth of the pinion engage the teeth of the adjuster spline (as shown in Figure 29).



Figure 29 Rear Adjuster Pinion Being Fitted

- (h) Fit the adjuster pinion retainer and firmly tighten (as shown in Figure 30).



Figure 30 Adjuster Pinion Retainer Being Fitted

- (4) **Winding in Inner Piston.** After installation of the inner adjuster components, the inner piston can be wound in. The back of the piston has a corresponding threaded hole which mates with the large thread of the adjuster. The piston is fitted as follows:
- (a) Apply a light smear of rubber grease around the base of the piston.
 - (b) Align the piston squarely with the bore and apply steady firm pressure to start the piston.
 - (c) At the same time, start to wind the adjuster in an anti-clockwise direction using a hex key (as shown in Figure 31).

NOTE

To draw the piston into the bore, the adjuster is wound in the opposite direction to that shown by the cast arrow (as shown in Figure 20).

- (d) After the large thread engages with the adjuster the piston will start to be drawn into the piston bore.
- (e) Continue to wind the piston in until it is fully home.



Figure 31 Winding in the Inner Piston Using Adjuster

- (f) Fit the blanking plug and washer and firmly tighten.
- d. **Tapping Piston Seals into Place.** The rear caliper piston seals are tapped into place as detailed at Paragraph 18 d.
 - e. **Fitting Piston Cups.** The anodised piston cups are fitted over the piston seals using a dead blow hammer until flush with caliper face. The profile of the small piston cup orients with the cut-out towards the top leaving the step in the cup towards its lower edge. The large piston cup is a plain circular design and is not orientated a specific way (as shown in Figure 32).



Figure 32 Rear Piston Cups Shown Fitted

- f. **Fitting O-rings Between Caliper Halves.** As detailed for front calipers at Paragraph 18 f.
- g. **Joining Caliper Body Halves.** As detailed for front calipers at Paragraph 18 g.

Post Overhaul Testing

21. Every rebuilt caliper must be pressure tested on a suitable bench testing device such as that shown at Figure 33. Testing ensures the integrity of each rebuilt caliper prior to it being returned to serviceable stock. Each caliper is pressure tested as follows:

- a. Fit a donor set of brake pads and dummy spacer block to the caliper.

NOTE

The dummy spacer block acts in the absence of the disc rotor.

- b. Fit the pressure line to the caliper.
- c. Fit the bleeder fitting and drain hose to the caliper.
- d. Elevate the bleeder end of the caliper using a spacer block.

NOTE

During bench testing of a rear brake caliper it is necessary to fit either a park brake actuator or adjuster compression tool as shown in Figure 34.

- e. Top-up brake master cylinder reservoir as required.
- f. Pressure bleed caliper until clear fluid (i.e. without air bubbles) is passing from the bleeder line.
- g. Close off the bleeder fitting.

WARNING

Eye Hazard. Ensure safety glasses are worn to prevent the possibility of eye injury as a result of brake fluid under pressure being sprayed into the face of the tradesperson.

- h. Turn the pressure tester on and off to cycle system pressure.
- i. Cycle pressure until both pads are seated against the spacer block and pressure starts to build.
- j. Continue to monitor pressure gauge until 2000 psi is achieved (adjust pressure regulator on tester as necessary).
- k. Leaving the system charged at 2000 psi, monitor gauge needle for 3 minutes:
 - (1) A caliper is deemed to have passed the test, if 2000 psi is maintained for a minimum of 3 minutes without any brake fluid loss.
- l. Turn off the pressure tester and carefully loosen the bleeder fitting to relieve all system pressure.
- m. Remove the pressure line from the caliper and fit the pneumatic blower adapter (as shown in Figure 34).

WARNING

Eye Hazard. Ensure when using compressed air safety glasses are worn to prevent the possibility of eye injury.

- n. Using compressed air, clear caliper of all brake fluid via bleeder fitting.
- o. Remove bleeder fitting and pneumatic blower adapter and fit plastic blanking plugs.
- p. Remove donor pad set and spacer block.
- q. Remove the adjuster compression tool (if fitted).
- r. Clean brake caliper thoroughly to remove any residual brake fluid and contaminants in readiness for painting.



Figure 33 Pressure Testing of Brake Caliper (Front Shown)



Figure 34 Pneumatic Blower Adapter and Adjuster Compression Tool (Rear Shown)

Painting and Preservation

22. All overhauled calipers are to be painted in accordance with EMEI Workshop D 700. All calipers are to be painted in olive drab. New brake pads, pad retaining pins and brake bleeders should be fitted after the paint process to ensure that no paint is applied to these items.

WARNING

Vehicle Accident Hazard. Do not apply paint to any part of the brake pads. Painting of the friction material of the pad could have adverse effect on the braking efficiency of the vehicle which could result in vehicle accident and injury to personnel.

Tagging and Documentation

23. Unique I.D. Plates. A unique i.d. plate set is affixed to all overhauled calipers using Sikaflex and is positioned directly over the initial i.d. stamping discussed at Paragraph 13 (as shown at Figure 35). The plates are metal, measure 20 mm x 20 mm in size, and are engraved with the caliper type, the repair agency and are numbered sequentially. The information on the plate serves several purposes including:

- a. **Easy Identification.** The caliper type can be instantly identified due to the numbering sequence which includes the caliper type; i.e. LHF, RHF, LHR and RHR.
- b. **Traceability.** Rebuilt calipers are traceable in-service by being linked to a work order and ultimately the tradesperson originally conducting the overhaul.
- c. **Quality Assurance.** The maintainer fitting an overhauled caliper has assurance that the item has been overhauled in a thorough method in accordance with this EMEI.

- d. **Monitoring.** The reliability of overhauled calipers can be monitored as they are returned for future repair or overhaul. During subsequent overhaul, the i.d. plates are removed and the caliper is issued with a new numbered set on completion from the register as shown in Table 2.



Figure 35 I.D. Plates Fitted to an Overhauled Caliper

24. **I.D. Plate Register.** An i.d. plate register is to be maintained by JLU-V (Bandiana). The register is to be divided into four parts (one part for each caliper type). The register provides a means to issue an i.d. plate set to each respective caliper type following overhaul. An example of two parts of the i.d. plate register is shown at Table 2 and Table 3.

Table 2 Unimog Caliper I.D. Plate Register (Part 1 - LHF)

I.D. Plate Number	Date of Issue	Work Order Number	Tradesperson	2 nd Rebuild Date	I.D. Plate Number 2 nd Rebuild
JLU-V LHF001	02 May 10	00123456	J. Bloggs (BAE)	30 Jun 12	**see LHF003**
JLU-V LHF002	03 May 10	00123457	J. Bloggs (BAE)		
JLU-V LHF003	07 Jul 12	00125123	J. Bloggs (Transfield)		

Table 3 Unimog Caliper I.D. Plate Register (Part 2 - RHF)

I.D. Plate Number	Date of Issue	Work Order Number	Tradesperson	2 nd Rebuild Date	I.D. Plate Number 2 nd Rebuild
JLU-V RHF001	01 Jan 10	00123200	J. Bloggs (BAE)		
JLU-V RHF002	03 Feb 11	00123285	F. Smith (Defence)		
JLU-V RHF003	16 May 13	00127200	F. Smith (Defence)		

25. **Useability Tags.** Following painting, the newly overhauled caliper is to be classified 'Fully Functional – FF' in accordance with TRAMM-L and an AD 199 (Tag – Fully Functional) tied to it. The caliper can then be returned to the Defence Supply Chain as a 'SV-serviceable' item and issued as required.

END

Distribution List: **VEH G 25.0 – Code 3** (Maint Level)
(Sponsor: CGSV SPO, Medium Heavy B Vehicle Section)
(Authority: EC-004448)