**Lift and Escalator Industry Association**

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27 July 2001

To: Contractor Members

Dear Member

**BRAKE MAINTENANCE ON EXPRESS GEARED MACHINES**

I enclose a letter from Otis Ltd dated 24 July 2001 and Engineering Data covering maintenance procedures for brakes manufactured by the Express Lift Company.

I trust this is self-explanatory, please be guided accordingly.

Yours faithfully

David M Fazakerley
Managing Director

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Lift and Escalator Industry Association
33-34 Devonshire Street
London
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24 July 2001

Dear Sirs

Brake Maintenance on Express Geared Machines

We would like to inform you that not all lift companies might be aware of essential maintenance requirements for the above brakes. In order to ensure proper and safe operation, Otis Ltd requests that regular inspections are carried out in line with the enclosed documentation.

For ease of reference I have highlighted the relevant paragraphs of Express Engineering Data for brake maintenance, recommended lubricants and copies of the safety related service circulars issued in December 1992.

Yours faithfully

M J Watts
Service Technical Manager

## 1. DESCRIPTION

These brakes are of the floating shoe type, that is the shoe can rock on its brake arm into alignment with the brake drum. Each brake arm has its own brake spring and the pair of brake arms are operated by a single magnet which is fixed to the gearbox. Energising the magnet causes plunger M to thrust on and rotate the levers G which push on thrust screws F and thus lift the shoes A from the drum (see Figure 1).

## 2. WORKS INSPECTION AND TEST

The brake mechanism must be assembled to its particular gear unit and if necessary, the shoes must be 'run in' and the brake adjusted so that the following points are fulfilled (Refer to Figure 1 throughout).

2.1 The brake drum must be true within 0.05mm.

2.2 The surface of the drum and shoes must be free from grease and oil.

2.3 The hinge pins T and U must be lubricated and the brake arms C and lever G rotate freely on them.

2.4 The shoes A must rock freely on the brake arms C but be held by springs B so that they do not fall by their own weight, after being positioned by contact with the brake drum.

2.5 The shoes must contact the drum substantially centrally and over three quarters of their area. In all other parts there must be no more than 0.075mm between the shoe and the drum. In obtaining this condition the thickness of the lining shall not be reduced below 5.8mm.

2.6 The inside surfaces of the bronze guide bush J and the steel K should be liberally treated with grease SLB5 before the plunger is inserted (see that the plunger assembly) MH can move up and down freely but not rotate. The guide tube J must engage with the fixed core K and spigot into the cover plate L. With the plunger M seated on the resilient washer S (thrust screws F withdrawn to allow levers G to fall clear from the push rod H). Check that the plunge M is substantially central in the hole in the cover plate L, and that when the magnet is energised with 100 volts minimum clearance between plunger M and cover plate L is not less than 0.45mm.

2.7 With thrust screws F screwed back so that the operating levers are clear of the push rod H, apply the shoes A to the drum by adjusting the brake spring D to the length shown in Table 1, and lock with nut E.

2.8 With the magnet energised see that the operating plate O is clear of the reducing switch P. Now screw in the thrust screws F until the levers G both just touch, but do not thrust on the plunger H, then further screw in each thrust screw F two thirds of a turn. This will give approximately 3mm plunger stroke for B, C D and E brakes and 5mm plunger stroke for the F brake.

2.9 With the magnet de-energised check that both levers G are in equal contact with the plunger H, and if not adjust the appropriate thrust screw F against the loose lever until the slack is just taken up.

2.10 With magnet energised check the operation of the reducing switch to the appropriate instructions.

Check that the plunger stroke is approximately 3mm for B, C, D and E brakes and 5mm for F. Check that the brake shoes are fitted clear of the drum.

2.11 Lock the thrust screws F with nuts N, and the operating plate O with nut R and re-check.

## 3. SITE ADJUSTMENT

After installation adjust as follows:- (Refer to Figure 1 throughout)

3.1 Provisionally set the springs to the length given in Table 1.

3.2 Run the machine and adjust the thrust screw F until the brake shoes are just heard to touch lightly on the drum. With the machine stationary and the brake de-energised check that the ends of both levers G support the weight of the plunger equally. If necessary re-adjust the screw of the side on which the lever is not touching the plunger.

Run the machine and check that the shoes can be rocked slightly by hand, which is generally an indication that there is sufficient running clearance to prevent heating of the drum. Slight rubbing of the shoes will not overheat the drum and the aim is to use the minimum possible stroke. After a period of running check that the drum is not in fact overheated.

3.3 As a guide it should be noted that the stroke of the plunger is approximately 3mm for B, C, D and E brakes and 5mm for F brakes.

3.4 Adjust the operating plate O of the brake reducing switch so that the minimum contact gap is obtained which will safely brake to arc (approximately 0.8mm).

3.5 If necessary the brake springs may be re-adjusted to give the required characteristic and the stop should be as soft as possible, consistent with obtaining the requisite accuracy. It is very important that the stop should not be so abrupt that rope slip results and experience has shown that this is particularly significant on 0.5m/s single speed lifts, which should be adjusted in accordance with Appendix A (Page 5).

Care should be taken to adjust each spring by the same amount so that their lengths remain equal.

## 4. MAINTENANCE

4.1 The brake plunger and bronze liner should be periodically checked for old grease build-up or dryness. In either case the plunger and inner should be wiped clean and fresh grease SLB5 applied sparingly and evenly over both surfaces.

4.2 The brake should be re-adjusted in accordance with paragraph 3.2 above, when the plunger stroke has increased to 5mm for B, C, D and E brakes and 7mm for F.

4.3 To replace brake linings, order lining and shoes as required from Table 2. Linings are then bonded to shoes as shown on Brake Shoe Assembly Drawing, Table 2. This work to be carried out in the Factory.

4.4 When new linings have been bonded to shoes they must be bedded in as outlined on Brake Shoe Assembly Drawing. This work again being carried out in the Factory.



(Continued...)

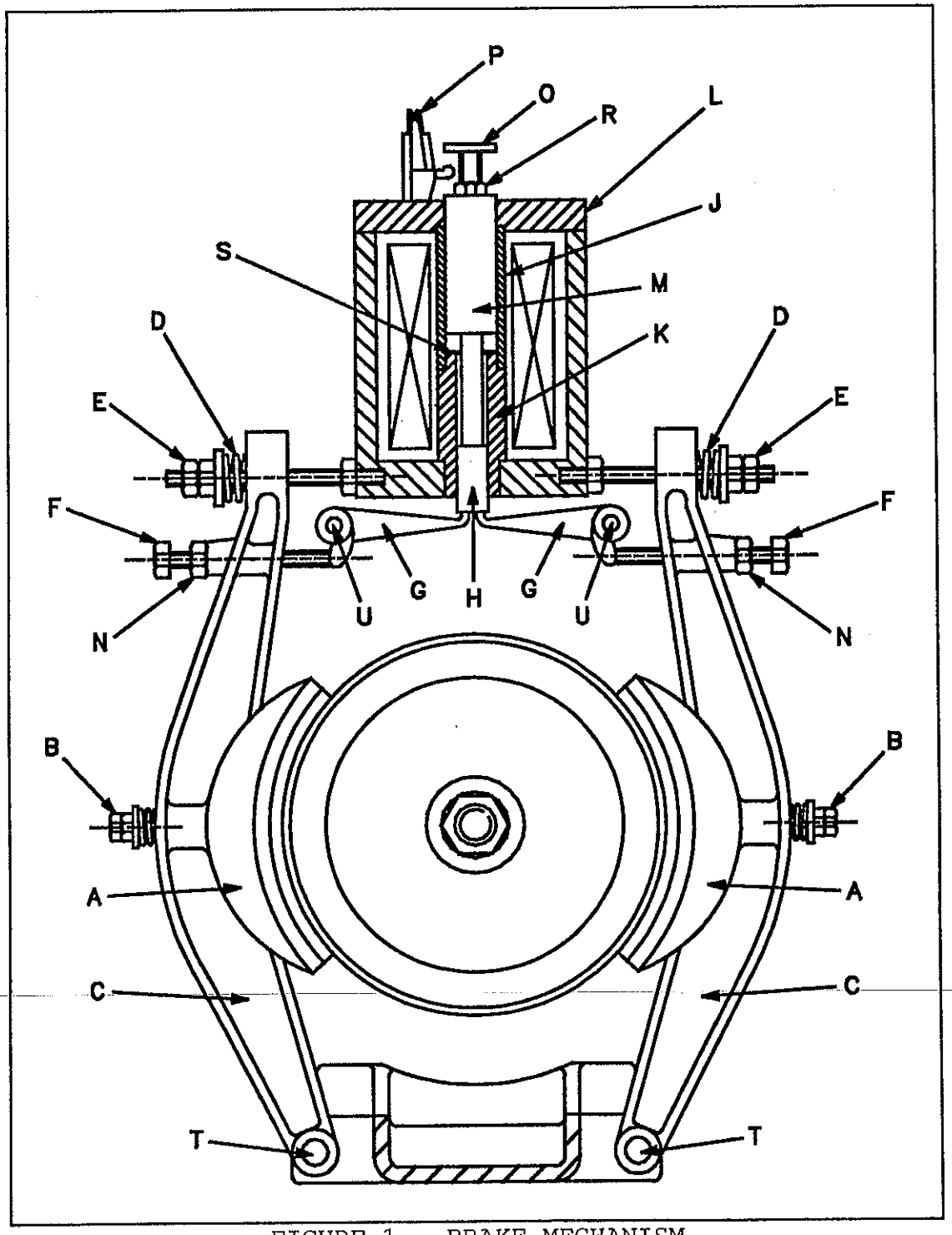


FIGURE 1 - BRAKE MECHANISM

SERVICE CIRCULAR 515A41

1ST DECEMBER 1992

## BRAKE PLUNGER STOP WASHER

It has been highlighted that the nitrile brake washer has a limited life and is to be replaced with a 2mm thick polyurethane washer.

Whenever the brake plunger and liner are checked in accordance with Data AG20-5M, please ensure that the washer is checked and replaced with the new polyurethane type. This check ~~should~~ MUST be carried out on an annual basis.

See 515A41A 9/12/92

G. HARRIS
Technical Manager
Scotland, North & Midlands

SERVICE CIRCULAR 515A41A

9TH DECEMBER 1992

## BRAKE PLUNGER STOP WASHER

Further to the Service Circular No.515A41, please be advised that the last sentence is to read:-

'This check **must** be carried out on an annual basis.'

G. HARRIS
Technical Manager
Scotland, North & Midlands

(Ref. Data Sheet NL1-6M & NL10-6M)

## 1. APPLICATION

1.1 This sheet has been coded for general distribution to include Works, Service Department and Installation Divisions.

TABLE 1 - Oils and Greases for use in Express Equipment

| Equipment | Lubricant | |
|---|---|---|
| | Oil | Grease |
| Geared Machines | | |
| Overdriven Gearbox | SLA 14 | |
| Pedestal Bearing used with Overdrive Gearbox | | SLB 6 |
| Underdriven Gearbox with VAC & VF Motors | SLA 14 | |
| Underdriven Gearbox with a.c. Motor | SLA 7 | |
| Brake Plunger Assemblies and Pivot Pins | | SLB 5 |
| Trulevel Clutch Bearings | | SLB 6 |
| Gearless Machines | | |
| Sleeve Bearings | SLA 3 | |
| Roller Bearings | | SLB 6 |
| Brake Plunger Assemblies and Pivot Pins | | SLB 5 |
| Motors | | |
| Sleeve Bearings (Bull Motors Except VAC) | SLA 8 | |
| Sleeve Bearings (Ziehl Abegg Motors and Bull VAC) | SLA 3 | |
| Ball Bearings | | SLB 6 |
| MG Sets | | |
| Motors and Generators with Sleeve Bearings | SLA 3 | |
| Ball Bearings | | SLB 6 |
| Sheaves and Pulleys * | | |
| Sleeve and Roller Bearings | | SLB 6 |
| Oil Buffers | | |
| Types H and J | SLA 3 | |
| Compensator and 'Q' Governor Tension Weight Guides | | SLB 6 |
| Governor Sheaves and Tension Weights | | |
| Ball and Roller Bearings | | SLB 6 |
| Guide Shoes | | |
| Fixed | | SLB 5 |
| Fixed with Oilers | SLA 3 | |
| Swivel with Oilers | SLA 3 | |
| Semi-Roller | | SLB 6 |
| Roller (for bearings only) | | SLB 6 |
| Fixed Carbon Lined | | |
| a) With Cast Iron Linings (Temporary) | | SLB 6 |
| b) With Carbon Linings | | Collodial Graphite Foliac A20 |
| Well Equipment | | |
| Limit Switches, Zone Switches and Slowdown Switches | SLA 3 | |
| CPS Unit Tape | **Triflon | |
| Gate Equipment | | |
| Switches, Locks and Cam Retiring Gear and Mechanisms | SLA 3 | |

* Gearless M/C Secondary Sheaves DA2-5M

N.G.

(Continued...)

Table 1 - Continued

| Equipment | Lubricant | | |
|---|---|---|---|
| | Oil | Grease | Dressings |
| Door Gear Equipment<br>Door Gear Mechanism, Cam Retiring Gear and Mechanism, Vane Campot, Drive Block<br>Worm Reduction Gear<br>Door Gear Rollers | SLA 3 | SLB 4<br>SLB 6 | |
| Risanfal Doors and Rising Car Gates<br>Chain and Mechanisms<br>Guides and Slippers<br>Worm Reduction Gear | SLA 3 | SLB 6<br>SLB 4 | |
| DMR Selector<br>Advanced Gearboxes | SLA 9 | | |
| Suspension Ropes | | | SLC 6 |

**Triflon is a synthesized lubricant used to eliminate `squeal' on CPS unit tape. Supplied by the TRI-FLOW Company.

Table 2 - Suppliers of Lubricants in Table 1

| Express Designation | Supplier and Suppliers Designation | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Oils | BP Oil | Shell | Mobil | Burmah Castrol | Esso | Lorco | Century | Q8 |
| SLA 3 | Energol HLP-HM68 | Tellus 68 | DTE 26 | Hyspin AWS68 | Nuto H68 | HT68 | Centrauli AF68 | Haydn 68 |
| SLA 7 | Energol GRXP220 | Omala 220 | Mobilgear 630 | Alpha SP220 | Spartan EP220 | Lorco FT220 | | |
| SLA 8 | Vanellus M30 | Rimula X30 | Delvac 1330 | Deusol RX Super 30 | Essolube XD3-30 | Super `F' SAE20/30 | | |
| SLA 9 | Autran DXII | Dexron Fluid II | ATF 220 | Deusol TFA Dexron RII | Esso Auto. Transmission Fluid | Dexron | | |
| *SLA 10 | Energol HLP-HM92 | Tellus 32 | DTE24 | Hyspin AWS32 | Nuto H32 | HT32 | Centraulic AF32 | Haydn 32 |
| SLA 12 | Energol GR-XP320 | Omala 320 | Mobilgear 632 | Alpha SP320 | Spartan EP320 | - | | |
| SLA 13 | Energol GR-XP100 | Omala 100 | Mobilgear 627 | Alpha 100 | Spartan EP100 | - | | |
| SLA 14 | Energol GRXP460 | Omala 460 | Mobilgear 634 | Alpha SP460 | Spartan EP460 | - | | |
| SLA15 | Energol HLP-HM46 | Tellus 46 | DTE 25 | Hyspin AWS 46 | Nuto H46 | HT 46 | Centraulic AF 46 | Haydn 46 |
| Greases<br>SLB 4 | Energrease CA | Retinax Grease T | Mobilus EPO | Impervia CL | Esso Fluid Grease | LG38P | | |
| SLB 5 | Energrease L21M | Retinax AM | Mobil Grease Special | Spheerol LMM | Beacon Q2 | LG28M | | |
| SLB 6 | Energrease LC2 | Retinax LX2 | Mobil Grease HP222 | | | | | |

*Note - SLA 11 is now combined with SLA 10 which is now used for both applications.
SLA 2 is replaced by SLA 14.

2.2 Grease

Table 4 - Grease Properties. Values given below are those of BP Oils only. For alternative Suppliers values, check with supplier concerned.

| Express Designation | SLB 4 | SLB 5 | SLB 6 |
|---|---|---|---|
| BP Designation | Energrease CA | Energrease L21M | Energrease LC2 |
| Worked Penetration (60 Strokes) | 355 / 385 W | 265 / 295 W | 270 / 308 W |
| N.L.G.I. No. | 0 | 2 | 2 |
| Drop Point °C | 85 | 185 | 278 |

2.2.1 General Description of Lubricants in Table 4

SLB 4 - A soft grease with high resistance to oxidation. For use in door operator worm gear units with fairly low speeds and operating temperatures.

SLB 5 - Multi-purpose, lithium base grease containing molybdenum disulphide (Mo $S_2$). For use where long term lubrication is required, sleeve bearing assemblies operating under arduous conditions, geared and gearless machine brake plunger and pivot pins. Also for use in other pivots which are infrequently operated or not fully rotational, (Guide Shoes).

SLB 6 - Multi-purpose high-performance grease, based on mineral oil and thickened with a lithium complex soap. Operating temperatures from - 30°C to +150°C. For use as a general purpose grease and in sealed-for-life bearings.

## 3. ORDERING OF LUBRICANTS (UK Contracts Including Eire)

Obtain a blank transparent paper order sheet, add Job Name, Number and Serial Number(s) then complete as follows:-

Order lubricants from paragraph 3.1 and 3.2.

The part numbers given in Table 5 include lubricating oil, gear oil, touching up paint and waste for one lift.

3.1 Lubricants Excluding Guide Lubricant

Figures within the circles refer to the notes below.

| Line No. | Description | Quantity Per Lift | Prefix | To Order Part No. |
|---|---|---|---|---|
| 1 | Master Operated Entrances<br>Lubricants and Paint | 1 | S | (1) |
| 1 | Manual Entrances<br>Lubricants and Paint | 1 | S | (1) |
| 1<br>2 | Risanfal Doors<br>Lubricants and Paint<br>Grease - SLB 4 (2) Kgs | 1<br>1 | S | (1)<br>NL0100104-VAR |
| 1<br>3 | DMR System<br>Lubricants and Paint<br>Oil SLA 9 0.25 (1/4) Litre | 1<br>1 | S | (1)<br>NL0010109-VAR |


(Continued...)