



Andhra Pradesh State Road Transport Corporation  
Mechanical Engineering Department  
Office of the VC& MD, Bus Bhavan, Hyderabad - 624

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***Sub: MAINTENANCE - Introduction of Automatic slack Adjuster in place of the existing Manual slack adjuster - Certain Instructions issued - Stocking of required spares - Reg.,***

I. Complying with the CMVR regulations, M/s Ashok Leyland & Tata Motors have introduced **Automatic Slack Adjusters** on their vehicles. Unlike the manual slack adjuster, the brake adjustment is done automatically in the automatic slack adjuster, uniformly in all the wheels, as and when the gap between the liners and brake drums increases due to wear. This ensures effective braking at all the times and avoids brake pulling & brake rolling.

II. At present Ashok Leyland chassis are fitted with Madras Engineering Industries (MEI) and HALDEX and TATA chassis are fitted with MEI, HALDEX and KNORR BREMSE make. The operating principle of all the slack adjusters is similar, except some minor changes in the components and all can be interchangeable.

**Automatic slack adjusters on the vehicles can be identified by the presence of control arm and anchor bracket for control arm, which are not present with manual slack adjusters.**

**III. ADVANTAGES OF USING AUTOMATIC SLACK ADJUSTERS:**

- a) No need for periodical brake adjustments. Hence vehicle downtime for brake adjustment is eliminated.
- b) Increases safety of operation of vehicle since consistent stopping distance is maintained through out the lining life.
- c) Brake setting is required only during initial fitment and also every time brake liners are replaced.

To create awareness among the Mechanical Supervisors and the maintenance staff about the introduction of new ASA and to maintain this ASA properly, the salient features of the ASA are furnished below. An exploded view of the Auto slack adjuster is given at **Annexure - I**.

**IV. WORKING PRINCIPLE OF AUTO SLACK ADJUSTER :**

- The self setting automatic slack adjuster functions basically by clearance sensing between the liner and the drum during return stroke of the brake application.

- When brake is applied, control arm fixed on to the anchor bracket permits the mechanism to rotate through the clearance angle and shoe contacts the drum. On further application the torque increases and worm shaft moves axially, causing heavy coil spring to compress & disengagement of the clutch wheel. Thus only the stroke related to the clearance between lining and drum is sensed by the ASA.
- During the brake release, the torque decreases and the clutch mechanism advances, reducing the sensed excess clearance by rotation of worm shaft in small increments.
- An automatic adjustment takes place during brake release. (During retraction of chamber push rod)

## V. FITMENT & REMOVAL PROCEDURE

### A) INSTALLATION PROCEDURE:

#### STEP-1:

1. Block the wheels from rolling.
2. Ensure air pressure is above 7.0 Kg/cm<sup>2</sup>.
3. Ensure the push rod in fully released position.
4. Install anchor bracket loosely on brake chamber/actuator mounting bolt.
5. **DO NOT TIGHTEN ANCHOR BRACKET.**

#### STEP-2:

1. Clean the foundation brake camshaft splines with wire brush to remove contamination / rust.
2. Apply grease on camshaft splines.
3. Fit inner washer to maintain at least 1 mm clearance between adjuster sides and chamber mounting bracket face.
4. Fit the auto adjuster on to the camshaft with the 12 mm adjusting HEX screw in the opposite side of Brake chamber. **The arrow on the slack adjuster should point away from the brake chamber.**
5. Fit outer washer with shims as necessary to ensure that endplay of slack adjuster on camshaft is more than 0.5 mm by adding or removing the shims.
6. Secure the circlip.
7. Rotate 12 mm adjusting HEX clockwise and align clevis hole to match push rod hole.
8. **DO NOT pull the slack adjuster or the clevis to align the holes.**
9. Fix the clevis pin/bolt and secure.

#### STEP-3:

1. Rotate the control arm until the screw aligns with Anchor bracket slot.
2. Tighten chamber side and control arm side anchor bracket fasteners by applying 210 Nm and 20 Nm torque respectively.
3. **Do not bend anchor bracket while fastening to control arm. This affects the proper functioning of slack adjuster.**

#### **STE-4: INITIAL SETTING PROCEDURE**

1. Jack up the wheels and ensure free rotation of wheels for initial brake setting.
2. Rotate the 12 mm adjusting HEX screw clockwise by ring spanner until lining contacts drum and wheels get locked.
3. Back off 270<sup>0</sup> by turning the 12 mm adjusting HEX screw counter clockwise and ensure free rotation of wheels without any grabbing.
4. While backing off in counter clockwise direction, ratcheting sound will be heard to overcome internal clutch resistance, which indicated healthy functioning of the clutch system.
5. Never use D.E.spanner or power wrench.

#### **STEP-5: SELF-ADJUSTING**

1. Operate the service brake for 50 to 60 applications to complete the automatic adjustment and to stabilize at optimum lining to drum clearance (between 0.3 to 1.2 mm).
2. Sufficient time shall be allowed for brake to fully retract during release of every application.
3. No further adjustment of brake adjuster is required.

#### **B) REMOVAL PROCEDURE:**

1. Delink anchor bracket and reference arm by removing nut and screw.
2. Remove split pin and yoke pin from chamber push rod-Auto adjuster assembly.
3. Rotate manual adjustment hex in counter-clockwise direction until Auto adjuster is clear of the brake actuator push rod for easy removal of auto adjuster.
4. Remove circlip and washers that may be present from S-Cam shaft-slack adjuster assembly.
5. Remove slack adjuster from S-cam shaft.

#### **VI. OPERATIONAL CHECK OF AUTOMATIC BRAKE ADJUSTERS:**

Operational check of the brake adjuster can be performed on the vehicle by using the procedure given below:

- Block wheels to prevent vehicle from rolling.
- Ensure tank pressure is above 7 bar.
- Check that the push rod is fully retracted, apply air pressure to release spring brake. If air is not available spring brake must be manually caged back.
- Brake setting with self-adjusting slack adjusters should not be disturbed.
- Clearance between brake drum and brake lining will get set to 0.3 to 1.2 mm. With any wear of brake lining during vehicle operation the increase in shoe clearance will automatically get adjusted within above limits.
- Hence clearance of 0.3 to 1.2 mm with self adjusting slack adjusters is normal and should not be considered as excessive and tamper with as it may adversely affect brake efficiency and liner life.

- Driver will not find any difference in brake pedal travel even with shoe clearance of 0.3 to 1.2 mm.
- Manually de-adjust brakes to increase lining clearance. Turn adjustment hex counter clockwise one full turn to create an excessive drum to lining clearance condition. **(A ratcheting sound should occur. This ratcheting sound indicates healthy condition of the clutch mechanism)**
- Apply the service brake for 10 to 15 times. On release allow sufficient time for brake to fully retract.
- During the brake release, observe rotation of the adjustment hex.
- This rotation indicates that the brake adjustor has sensed an excessive clearance condition and it is making an adjustment to compensate. On each subsequent brake release, the amount of adjustment and the push rod travel will be reduced until desired clearance is achieved.
- If rotation of the adjustment hex, is not observed, refer to the foundation brake operational check and trouble shooting procedures given at the **Annexure II**. If foundation brake assembly checks out to be OK and hex still does not turn, replace the adjustor.

#### **VII. PREVENTIVE MAINTENANCE OF AUTOMATIC BRAKE ADJUSTOR:**

Carry out the following preventive maintenance during every **Schedule IV**.

1. Remove the adjuster and apply the grease on S-Cam shaft splines.
2. Check S cam Bush play and replace the bush, if necessary. **(Radial clearance should not exceed 0.5 mm)**
3. Check the tightness of anchor brackets nuts and retighten to specification if necessary.
4. Check for correct axial play (0.5 to 1.5 mm) of adjuster on 'S' camshaft and adjust if necessary.
5. Lubricate the slack adjuster through the grease nipple.

**Note: In case of adjusters of MEI make, no greasing is required for the adjusters.**

- Since with auto brake adjusters there will be no need for periodical brake setting and hence the condition of brake lining wear has to be checked during every Schedule III maintenance to avoid consequential damage to brake drum in case linings are excessively worn out.

#### **VIII. PRECAUTIONS TO BE TAKEN FOR EFFECTIVE FUNCTIONING OF ASA:**

- i) IMPORTANT: The control Arm of the SASA shall always be connected firmly to the Anchor bracket slot. If the bolt (in front) or the nut (in rear) is missed or loosened, the automatic adjustment is not possible. There is likelihood of poor braking in such instances***
- ii) Drum run out and ovality are to be strictly maintained to specification.
- iii) Matching of Lining and Drum size is essential (Never use different size of lining and brake drum)

- iv) Condition of Foundation brake is to be strictly maintained to specification (Excess wear in Camshaft bush, defective shoe return Spring and improper shimming for positioning the ASA are to be avoided)
- v) Misalignment of the control arm with the anchor bracket will lead to sluggish return of ASA during brake release causing overheating of brake drum

All the Dy.CMEs are advised to educate the Supervisors & maintenance staff for effective functioning of the ASAs duly ensuring the stocking of essential spares at the depots, given at **Annexure - 3**.

The COSs are advised for stocking of required spares Duly fixing the limits in consultation with the Dy.CMEs and ensure to supply to the depots as per the requirement.

All DMs & Garage In charges are advised to note the above modifications and educate the staff about the changes to maintain the vehicles properly.

**EXECUTIVE DIRECTOR (E&IT)**

**TO**

**ALL DEPOT MANAGERS**

**COPY to: VC&MD for favour of information**

Copy to: Dir(V&S), ED(O), ED(A), ED(IT&MS),ED(HRD),ED(P&AM) & FA&CO for information

Copy to: All EDs (zones) for information & necessary action

Copy to: CCOS for information & necessary action

Copy to: All RMs for information.

Copy to: CME(C&B) for information

Copy to: COS(C)-II, Dy.CME(C&B), Dy.CME (IEU)& Dy.CME (P) for Information

Copy to: All Dy.CMEs for information & necessary action

Copy to: All Controllers of Stores for information & necessary action.

Copy to: All Works Managers for information & necessary action.

Copy to: All Dy.CAOs & AOs for information

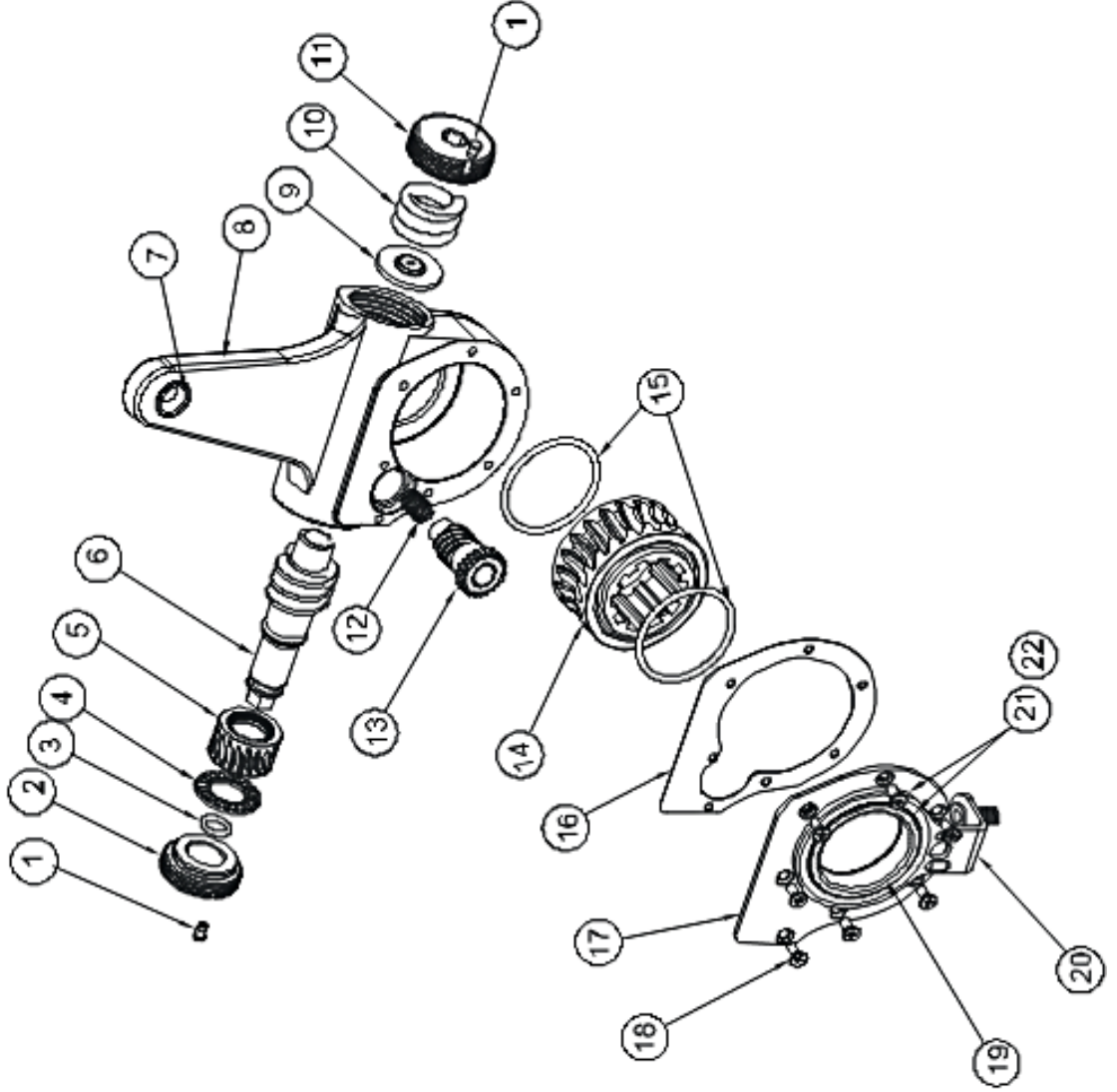
Copy to: All Principals, ZSTCs & Principal, and TA/HPT for Information

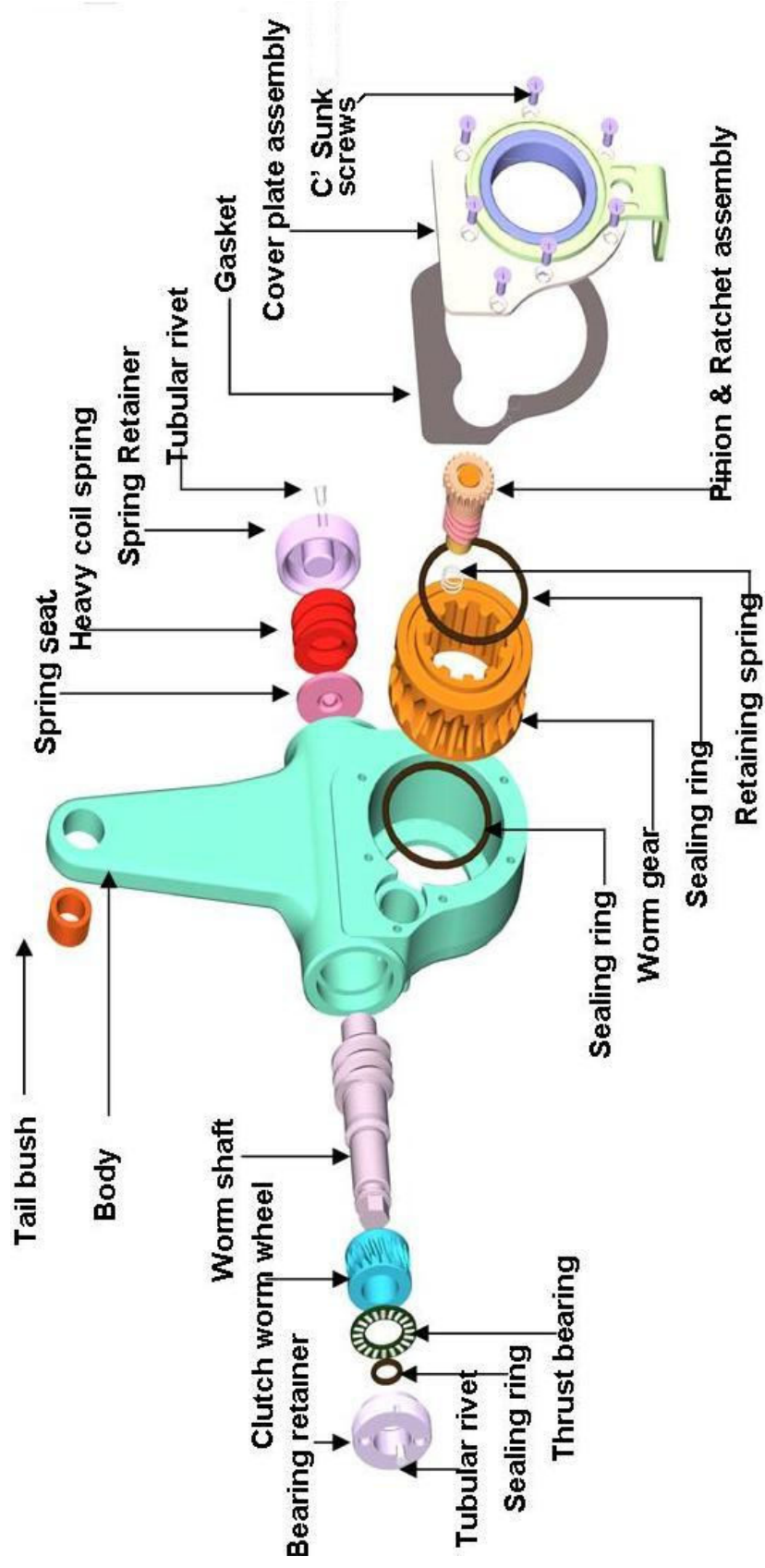
Copy to: All Maintenance in charges for necessary action.

SELF SETTING AUTOMATIC SLACK ADJUSTER

PARTS LIST

1. Rivet
2. Bearing Retainer
3. Sealing Ring
4. Thrust Bearing
5. Clutch Worm Wheel
6. Worm Shaft
7. Bush (tail Hole)
8. Body
9. Spring Seat
10. Heavy Coil Spring
11. Spring Retainer
12. Retainer Spring
13. Pinion Assembly
14. Worm Wheel
15. Sealing Ring
16. Gasket
17. Cover Plate
18. C' Sunk Head Screw
19. Control Gear Wheel
20. Control Arm
21. Sealing Ring
22. Sealing Rin





**ANNEXURE – II**

PROBLEM	CAUSES	METHOD OF CHECKING	ACTION
Poor Braking	No brake adjustment	<p>Rotate worm shaft in the anti clockwise direction to increase the lining clearance to slightly more than 1.0mm.            During this rotation a ratcheting sound will be heard which indicates healthy functioning of the clutch mechanism.            Apply the brake around 10 to 15 times.            Observe for worm shaft rotation, during every application and release. The worm shaft should rotate and lining clearance should keep reducing. This operation will confirm satisfactory working of the SASA.</p>	If any of the above is not met Replace the Slack adjuster
Poor braking	Control arm fixing on the anchor bracket loose / or control arm broken	Looseness due to inadequate tightening/ missing fastener. Control arm breakage due to Anchor bracket misaligned with control arm and stretched during fitment.	Tighten / fit a new fastener / Replace Assembly if broken
Excessive wear of brake lining / brake drum over heating	<p>Sluggish return of Slack Adjuster during brake release.            This could be due to</p> <ul style="list-style-type: none"> <li>• Slack Adjuster tight on the Cam Shaft due to end play between Slack Adjuster and Cam Shaft</li> <li>• Control arm rotation tight which could be due to</li> </ul> <p>i) Control arm misalignment with the anchor bracket and stretched during fixing.            ii) Control arm bent and rubbing with the body.</p>	<ul style="list-style-type: none"> <li>• Check for end play by moving the slack adjuster. It should be minimum 0.5mm</li> <li>• Remove the clevis pin from the clevis and pull the slack adjuster manually and release. The Slack Adjuster should return fast. If it is sluggish then it could be due to control arm rotation tight.</li> </ul>	For correcting end play remove excess washers. For misalignment ensure proper alignment.



PART NUMBERS:

**TATA**

UNIT	AUTOMATIC SLACK ADJUSTOR		
	M/S MEI	M/S HALDEX	M/S KNORR BREMSE
FRONT	2778 4210 0140	2778 4210 0101	2778 4210 0159
108 RR AXLE - RHS	2778 4230 0116	2778 4230 0102	---
108 RR AXLE - LHS	2778 4230 0125	2778 4230 0101	---
Major Repair Kit	MEI-RK-002		
Minor Repair Kit	MEI-RK-001		

**ASHOK LEYLAND**

UNIT	M/S MEI
FRONT	F8850600
REAR	F8377800
MAJOR REPAIR KIT	MEI-RK-002
MINOR REPAIR KIT	MEI-RK-001

### TOOLS REQUIRED FOR FITMENT

S.no	LOCATION	TATA	ASHOK LEYLAND
1	BRAKE CHAMBER BRACKET NUT	24 mm Ring Spanner	24 mm Ring Spanner
2	FOR ADJUSTER NUT	12 mm Ring Spanner	12 mm Ring Spanner
3	FOR CONTROL ARM NUT	13 mm Ring Spanner	13 mm Ring Spanner
4	FOR REMOVING & FIXING CIRCLIP	CIRCLIP PLIER EXTERNAL	CIRCLIP PLIER EXTERNAL
5	FOR SPLIT PIN REMOVAL	CUTING PLIER	
6	FOR REMOVING CLEVIS NUT	----	15 mm Ring Spanner
7	FOR HOLDING CLEVIS BOLD HEAD	----	23 mm DE Spanner