



Elevators Escalators

March 12, 2015

Re: E5000 Gearbox

KONE Inc.

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Dear Colleagues and Industry Members:

KONE is sending this letter to advise you of potential issues that have been identified in KONE E5000 escalators, which have been in service for approximately 15 to 20 years. KONE has found that on some units the intermediate gear hub retaining bolts inside the gearbox may loosen over time causing an increase in gearbox backlash during operation. If this occurs, the escalator gearbox may eventually fail, and passenger safety may be compromised. Our Life Cycle Management team details these potential issues and the actions needed to address these issues in the attached product bulletin.

The length of time before any of these issues develop is dependent upon the equipment operating hours, unit operating speed, loading on the equipment, environmental and building conditions, and the service care provided.

While the attached product bulletin clearly lays out the inspection instructions and criteria for continued use, replacement or repair of the gearbox, we encourage you to consider replacing the unit due to its age. If you have any questions, please do not hesitate to contact me.

Sincerely,
KONE Inc.

A handwritten signature in black ink, appearing to read "Mario Jones", with a horizontal line underneath.

Mario Jones
Manager, Life Cycle Management and Product Reliability

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Attn: Non-KONE Escalator
Personnel

File: KS-15-06

Date: 2015-04-06

Subject: Gearbox Inspection Instructions for
E5000 Escalators

Gearbox Inspection Instructions for E5000 Escalators

Product Affected

All E-Series 5000 escalators.

Issue

All E-Series 5000 escalators must be inspected every two years to determine if the gearbox backlash is acceptable for continued use.

Corrective Action

The following instructions outline the required tools and method for inspecting the E5000 gearbox backlash. After determining the backlash angle measurement, follow the instructions based on the measurements.



A. Instructions for Performing the Inspection

The general steps to be followed in making this inspection are as follows:

- Secure the unit to ensure that safe operating practices may be followed.
- Install the Gearbox Mounting Plate and Gearbox Gear Torque Plate Assembly kit (see tools required) to prevent drive shaft from rotating.
- Place protractor tool on the motor shaft at back of motor to measure amount of backlash.
- Perform backlash measurement.
- Record results.
- Remove protractor and sprocket clamp tools.
- Review measurements following the service guidelines provided in this bulletin for returning the unit to service.

B. Tools Required

The following special tools and parts are required:

- Gearbox Torque Plate Assembly Kit (used during inspection) – US521245001
- Gearbox Mounting Plate (to be mounted and remain on gearbox) – US521262
- Torque Gauge Protractor Tool (part of kit) – US521245001
- Sockets – ½" and ¾" with 3/8" drive

C. Inspection Procedure

1. Prepare to check the gearbox backlash by taking the following steps:
 - Install barricades.
 - Remove upper access cover.
 - Turn mainline disconnect OFF to remove power from the escalator.
 - Remove 4 or more steps.
 - Turn mainline disconnect ON to restore power to the escalator.
 - Place escalator in inspection mode at upper junction box.
 - Position hole in step band to allow access to the motor and upper station area.
 - Turn mainline disconnect OFF to remove power from the escalator.
2. Install the Gearbox Torque Plate to prevent the drive sprocket from moving
 - The Gearbox Torque Plate is a manufactured bracket assembly which must be bolted to the gearbox. After bolting the assembly onto the gearbox, the step chain drive sprocket can be secured to the torque plate bracket with an expanding bushing which locks into a sprocket hole. (See Fig 1 which shows the Torque Plate assembly.)
 - Review the figures below to locate and mount the Gearbox Torque Plate assembly.
 - Item 1, the gearbox mounting plate, bolts to the gearbox by removing two (2) bolts from the gearbox at approximately the 10 o'clock position, as shown in FIG 2. The mounting plate is notched to allow the threaded support rod shown in FIG 2 to remain in place.
 - During installation of the Torque Plate assembly, the step band may have to be moved to align a sprocket hole with the retainer bolt. **Follow proper safety rules when operating the escalator to move the step band.** Run the escalator on inspection to jog the drive sprocket to the correct position. Final positioning may require hand rotation of the motor to line up the sprocket hole with the bracket.

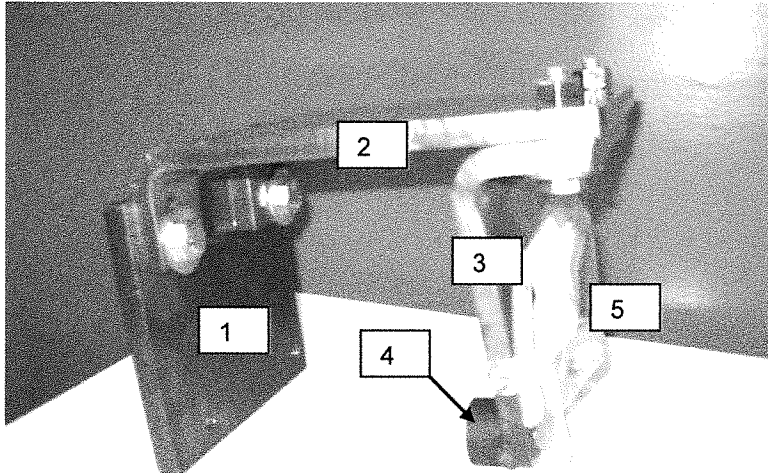


FIG 1 – Gearbox Torque Plate Assembly

Torque Plate Assembly Parts

- 1 – Gearbox mounting plate
- 2 – Standoff Plate
- 3 – Torque Plate
- 4 – Sprocket hole locking bushing
- 5 – Additional bushing and hardware in plastic bag

Note: Mounting plate 1 will remain bolted to the escalator gearbox on completion of the check. Additional mounting plates and bolts are available as part number US521262

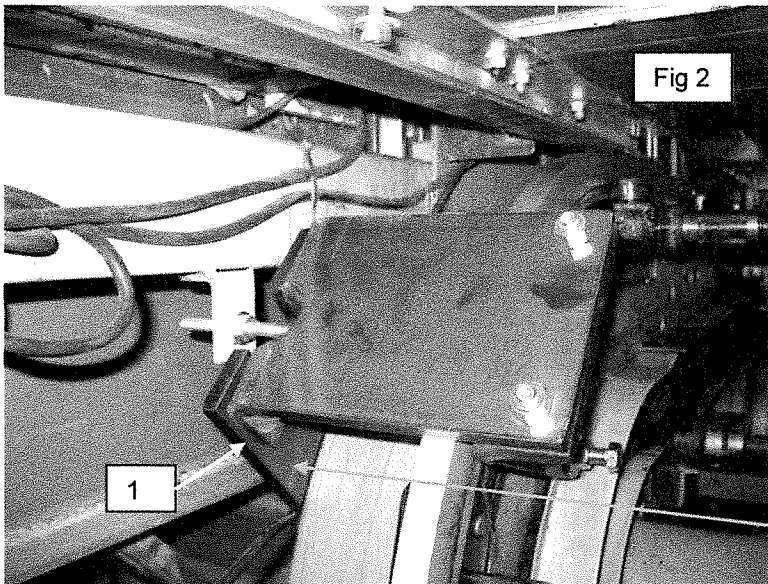
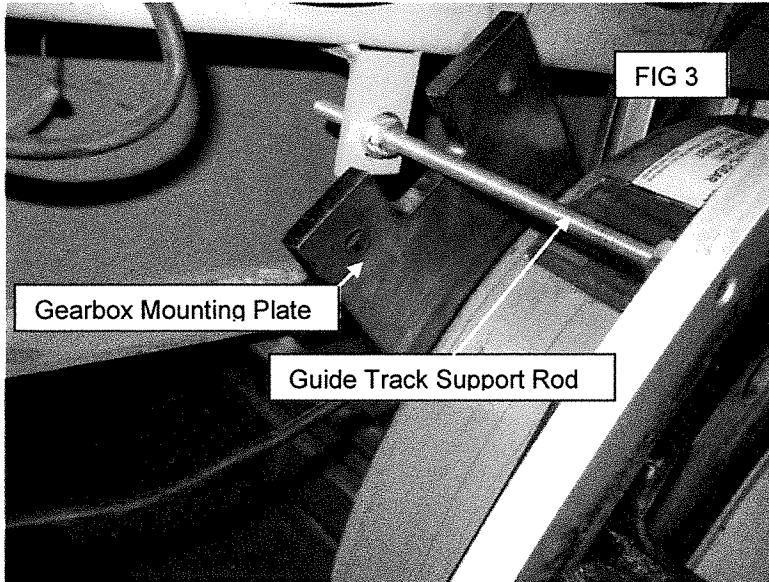


FIG 2: Location of the Gearbox Torque Plate Assembly when mounted to the gearbox.

The gearbox mounting plate (1) bolts to the gearbox at approximately the 10 o'clock position when viewed from the inside of the truss

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Location and bolting of the gearbox mounting plate

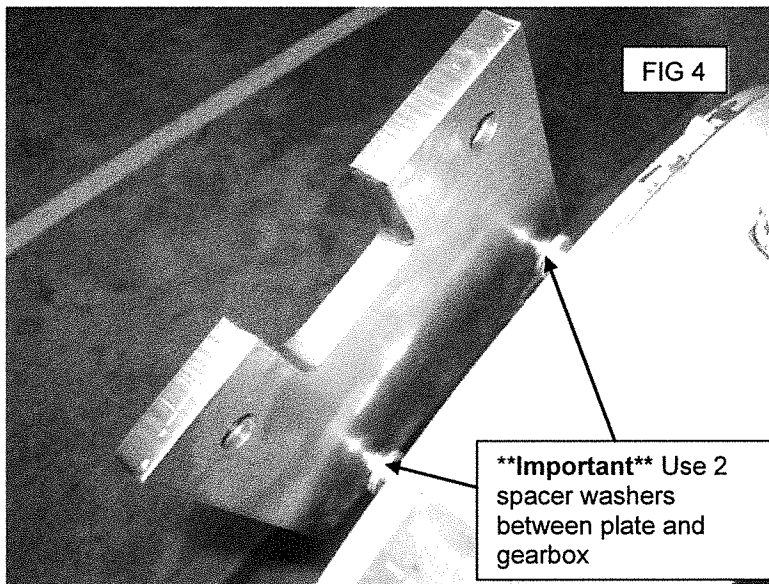
Locate and remove the 2 correct gearbox cover plate retention bolts to position the mounting plate as shown in FIG 2 above, and FIG 3.

Using the hardware provided, bolt the mounting plate to the gearbox using the 2 bolt holes in the mounting plate, which match the bolt hole spacing in the gearbox.

The mounting plate must be spaced off from the gearbox using 2 washers between the gearbox and the plate, as shown in FIG 4. These are provided with the mounting bolts in the hardware bag with the assembly.

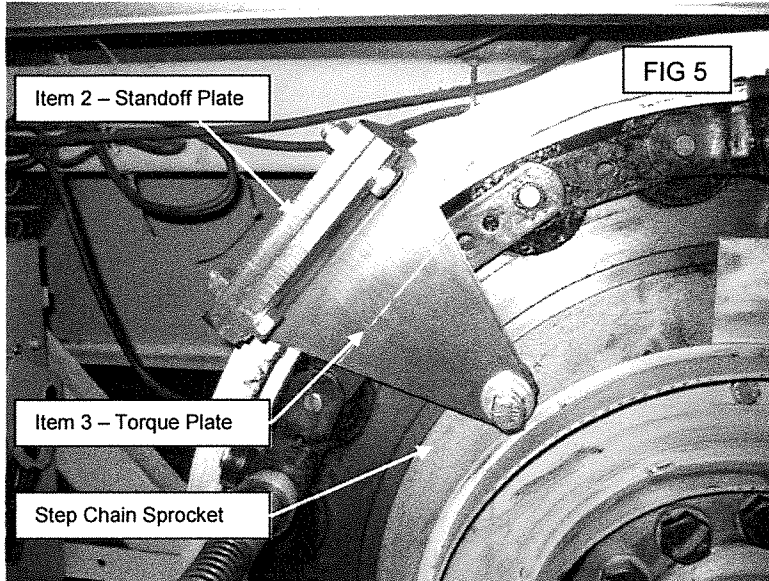
Note: Mounting plate will be left on gearbox after inspection for future use.

After tightening the mounting bolts, attach the standoff plate (item 2) identified in FIG 1, tightening the bolts by fingers only, so the plate may be positioned as required.



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Mounting the Torque Plate and securing the Step Chain Sprocket

- The Standoff Plate (2) will extend over the sprocket and chain, after it has been loosely mounted.
- The Torque Plate (3) may now be mounted. The step chain sprocket must be moved around to a point where one of the sprocket holes lines up with the Torque Plate and the locking bushing can be inserted into the hole. Use Construction mode on the controller for final positioning, where the motor may be rotated by hand with the brake lifted.

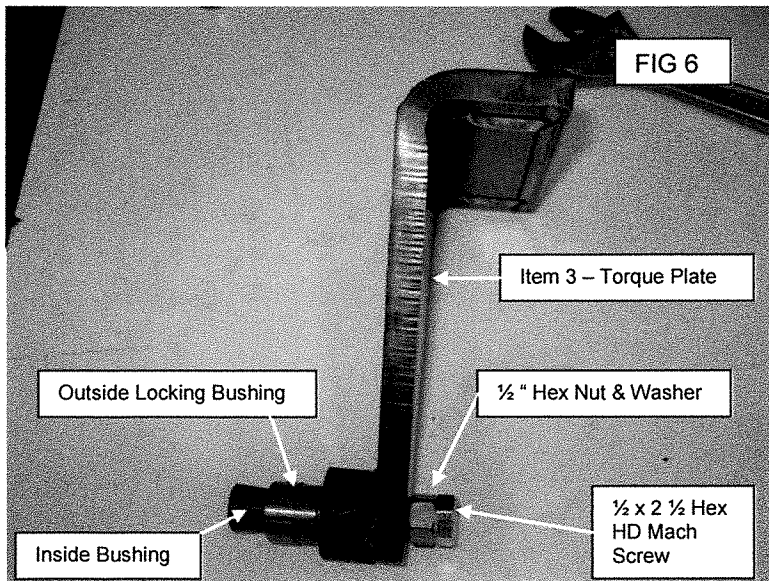


Fig 6 gives details of the Torque Plate and locking bushing.

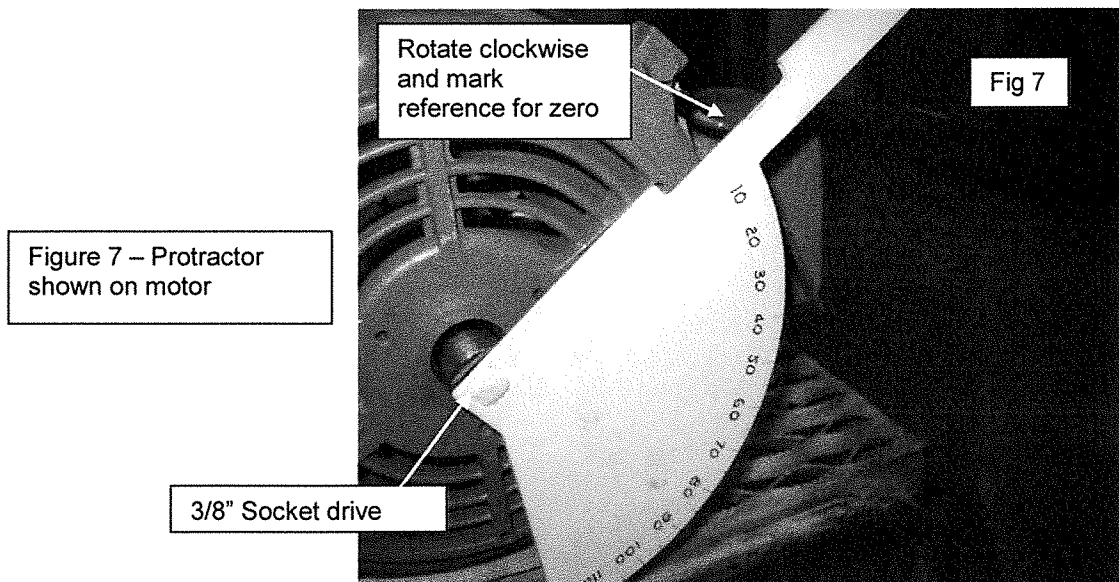
- A 2 1/2" Hex Head machine screw is used to retain a tapered locking bushing shown. Two sizes of split outside bushings are provided. Choose one to fit the sprocket hole.
- After loosely installing the torque plate, make sure the locking bushing has been inserted into the sprocket. All bolts may then be tightened.
- Secure the sprocket by tightening the hex nut on the retainer bolt. This draws the inside bushing into the outside bushing, causing the split outside bushing to tighten in the sprocket hole.

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3. Complete installation of the Gearbox Torque Plate
 - Turn mainline disconnect OFF to remove power from the escalator.
4. Remove the motor leads from the starter panel in the controller. Make sure leads are labeled so that they can be properly reconnected later in the process. (For dual drive units the motor leads must be disconnected on both motors.)
5. Turn mainline disconnect ON to restore power to the escalator.
6. Move the construction switch on the controller to the CONSTRUCTION position to release the brake(s).
7. Check the Backlash
 - Place the protractor tool on the nut at the back of the motor, in a position that allows the desired rotation of the tool for the test. The tool has a 3/8" drive post on the end that allows standard sockets to be used as required for the motor shaft end. (Usually a 1/2" or 3/4" socket is required.) See FIG 7 which shows the protractor tool details.



- Turn the protractor tool clockwise until the gearbox gearing tightens up – this will require no more than about one foot pound of torque, so don't apply too much force. Place a mark on the motor at this location for reference of zero degrees. The tool has a cut out on the handle next to the degree scale that may be used as a guide edge when scribing a mark on the motor for the zero reference.
- Now using the protractor tool, turn the motor counterclockwise until the gearbox tightens up again on the other side of the gears. Again, this will not require a lot of force. One foot pound is sufficient. (See Fig 8)

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- Using the degree marks on the protractor, read where the previously made mark on the motor lines up with the degree scale on the tool. Note that value for future verification.

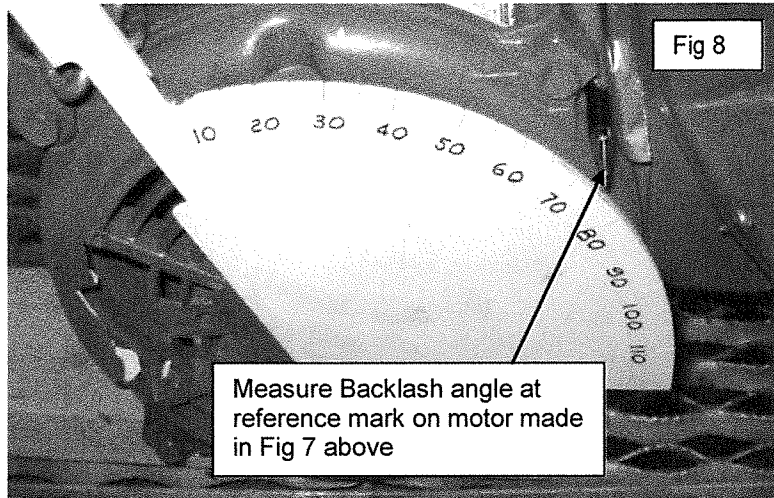


Figure 8 – Protractor rotated counterclockwise

Measure Backlash angle at reference mark on motor made in Fig 7 above

- To ensure that the backlash has been measured correctly it may be measured again, and verified with previous reading.
- If this is a dual drive unit, perform the backlash measurement on the second gearbox, following the instructions above.
- Now measure the “slop” in the motor coupling, sockets, and protractor tool. Drop the brake by turning off power at the disconnect. With the brake set, check the backlash of the motor coupling and tools by using the protractor tool and following the steps above. This should be much less than the gearbox measurement. Note that “slop” value for future verification.
- The actual value of backlash in the gearbox may now be determined by subtracting the “slop” measurement from the original backlash measurement taken.

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8. Return Escalator to Service
 - Remove the protractor tool and motor end socket.
 - Remove the Gearbox Torque Plate assembly items 2 and 3 (Standoff Plate and Torque Plate), leaving the gearbox mounting plate attached to the unit. This may be used for future backlash measurements.
 - Make sure power is OFF. Reinstall motor leads to escalator starter panel.
 - Place Construct switch in the "Run" position
 - Turn power back ON. Run the escalator down the incline to a convenient location to install the steps.
 - Close up the unit and return it to service.
9. Before returning the escalator to service, review the measurements taken for actual gearbox backlash.

If the ACTUAL backlash is 100 degrees or more, take the unit out of service and replace the gearbox prior to returning the unit to service.

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Approvals & Version History

Checked by: Alan Clarke Date: 2015-04-06

Approved by: Mario Jones Date: 2015-04-06

Issue	Date	Description of Change	Ref. CR	Approved by
R0	2015-04-06	Initial release	-	Mario Jones