KONE ECOMOD ESCALATOR

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1 GENERAL INFORMATION

1.1 Recommended tools

1.1.1 Standard tools

- Complete set of allen (hex) wrenches (sizes to 12 mm & 24 mm)
- Hammers (16 oz & 32 oz ball peen)
- Open end /box combination wrenches (spanners) (7 mm to 19 mm, 24 mm, 30 mm, & 36 mm
- Screwdrivers (cross tip & slotted types)
- Measuring tape (metric)
- Pry bars (small & large)
- Feeler/thickness gage set
- T-40 Torx wrench
- Step chain spreader bars (sized to width of escalator)
- Chain assembly tool KM1348767H01

1.1.2 Other tools

- Gear/bearing puller (for drive station outer bearing)
- Retaining ring pliers (large & small)
- Overhead lifting frame
- Hand operated hoist.
- Safety barricades.
- Step band holdbacks (nylon type ratcheting clamps, for chain replacement)
- Lifting strap/sling (nylon, chain, or wire rope)
- Anaerobic Single Fit Adhesive/Sealer
- Thread Retaining Compound (temporary grade)
- Oil level dip stick
- Clearance gauge (step to skirt & comb segment)
- DZ key for Moving Media steps

708-003 (2010-03)

2 SAFETY

2.1 General safety

2.1.1 General safety

Local safety codes and rules must be obeyed at all times.	
Do not take short cuts. There might be a potentially dangerous situation which you have not considered.	
Make sure the power to the main supply cable cannot be turned ON.	
A locking off system for main electric supply isolator or other system must be agreed with main contractor before installation begins. During installation procedures, whenever power is disconnected, the power disconnect box must be locked-out and tagged.	
Personal safety equipment must be available and used as required.	
CAUTION!When your safety harness is not secured to a life line or other approved fixing point, ensure the lanyard does not cause a catching or tripping hazard.	
Do not connect or disconnect any connectors when the power is ON.	
You must never work beneath a suspended load no matter how short the time period.	
Avoid pinch points when handling materials.	
Avoid sharp hazards when handling materials. Wear cut-resistant gloves when handling materials with sharp edges.	
Be aware of all tripping hazards. Make sure all temporary electrical cords and wires are securely taped to surfaces to avoid tripping hazards.	
Rigging and hoisting equipment must be inspected on a daily basis.	
Proper hand signals must be followed when using a crane.	

Cranes or chainfalls used to hoist must be rated for the load that will be put on them.	
Only one designated person should give directions to the crane operator, if a crane is used.	
Make sure slings are positioned and secured in a manner that will prevent the load from shifting or slipping during hoisting.	
Never stand or walk beneath a suspended load.	
Use proper lifting techniques and hoisting equipment when moving heavy equipment.	
Hard hats must be worn at all times when on a construction site.	
Approved footwear must be worn.	
Wear a face shield whenever using power tools which create flying objects.	
Use approved safety equipment when welding, cutting, grinding and drilling.	
Use safety goggles when using power tools.	
Wear appropriate eye protection when cleaning, cutting, and welding.	
Wear hearing protections when drilling and grinding.	
Safety circuits must be kept in operation.	
Use a circuit tester on circuits prior to working on them (Fluke 179 or equivalent).	
Make sure safety earth (ground) is verified before turning the power ON.	
To reduce the danger of electrical shock, always make sure electrical connections are secure. Also, make sure no bare wires are exposed after pulling electrical cable.	
Use properly grounded electrical cords and power equipment.	
Working area must NOT be wet, to avoid the risk of electrocution.	
Turning the main power supply OFF will not necessarily disconnect all electrical power. Be aware of other power sources in controller when the main power supply is turned OFF.	
Take precautions to prevent static discharge when handling, transporting, and storing electrical circuit boards.	
Place adequate barricades at each landing to prevent non-authorized persons from entering the work area.	

Prevent unauthorized persons from entering work and storage areas. Make sure suitable restrictive barricades and signs are posted.	
Never allow equipment or tools to be used by anyone other than qualified company personnel.	
Always use the correct tool for the specific job.	
Clear installation sites of any unnecessary materials or equipment to avoid fire hazards.	
Do not ride the unit with the combplates removed.	
Never allow anyone to ride equipment while work is being performed.	
Never start a unit with anyone on the step band or pallet band.	
Always clean-up any excess oil, and dispose of properly in accordance with governing regulations.	
Inspect construction site and equipment on a regular basis, for unsafe conditions.	
Make sure you are aware of all potential hazards related to various tasks.	
Make sure you are provided with all the necessary safety equipment.	
Always make sure your clothing cannot become caught in rotating equipment. Keep your shirt sleeves buttoned and your shirt tucked into your trousers. Also, always remove loose rags from your pockets.	
Make sure the unit cannot start when access covers are removed. Access cover switches must be operational.	
Before entering step band opening make sure the unit cannot move by engaging the step band lock.	

7-002047 (2009-10)

2.1.2 Danger and operator safety signs

Danger and operator safety signs					
Description	**Sign**	**Description**	**Sign**	**Description**	**Sign**
Electric shock		No entry		Hard hat	
Risk of falling		Do not transport		Safety harness	

Magnetic field		Dispose of oil properly		Safety gloves	
Risk of fire		Lifting hazard		Face protection	
Tripping hazard		Safety goggles		Overalls	
Rotating equipment hazard		Dust mask		Respirator	
Suspended load		Safety shoes		Safety lock and tag out procedure	
Pinch point hazard		Hearing protection		Barricade	
General hazard warning		Cut-resistant gloves			

The words WARNING and CAUTION are used in different kinds of hazardous situations to protect persons or equipment parts in the following way:

WARNING

This is to warn of the most serious hazards where there is a risk to a person's safety.

CAUTION

This is to warn of the risk of an equipment component being damaged, which also may cause risk to a person's safety.

7-000220 (2010-02)

2.2 Method safety

2.2.1 Safety check prior to start-up

In case the unit is stopped, complete the following safety check procedures prior to start-up.

Step	Action	Note
1.	Make sure unit is barricaded.	
2.	Check fault display on the deck or in the controller.	
3.	Check the truss and step band for the following. • Check truss for any obstructions • Check for any foreign objects • Check for switches that may be loose • Check for any loose wires	
4.	Reset the fault message from the controller using reset button.	
5.	Start unit in the DOWN direction using pendant control handset.	
6.	Check incoming voltage. Confirm that voltage is the same as stated on controller.	
7.	Check inspect mode. (Optional: Check pendant control handset for correct operation.) • If the unit fails to continue to run automatically, observe display for fault and follow the fault code corrective actions for that fault.	

Step	Action	Note
8.	Stop the unit using the emergency stop button, and repeat the same procedure in the UP direction. • If the unit fails to continue to run automatically, observe display for fault and follow the fault code corrective actions for that fault.	
9.	Remove pendant control handset if connected.	
10.	Switch to normal run operation.	
11.	Start unit with key start.	
12.	Ride unit and check for smooth operation of the step band before returning unit to service.	

7-002048 (2009-10)

2.2.2 Location of electrical safety devices

Electrical safety devices are located as follows.

1. Upper/lower end key switch
2. Emergency stop button/switch
3. Handrail inlet switch
4. Deteriorated roller sensor
5. Inspection switch (in lower junction box)
6. Lower pit stop switch
7. Upper/lower junction box
8. Broken step-chain switch
9. Motor stop switch
10. Missing step detector
11. Step demarcation lights
12. Upper/lower end skirt switch
13. Step upthrust safety switch
14. Out-of-level step detector
15. Permanent magnet brake
16. Tachometer
17. Handrail speed sensor
18. Combplate impact device

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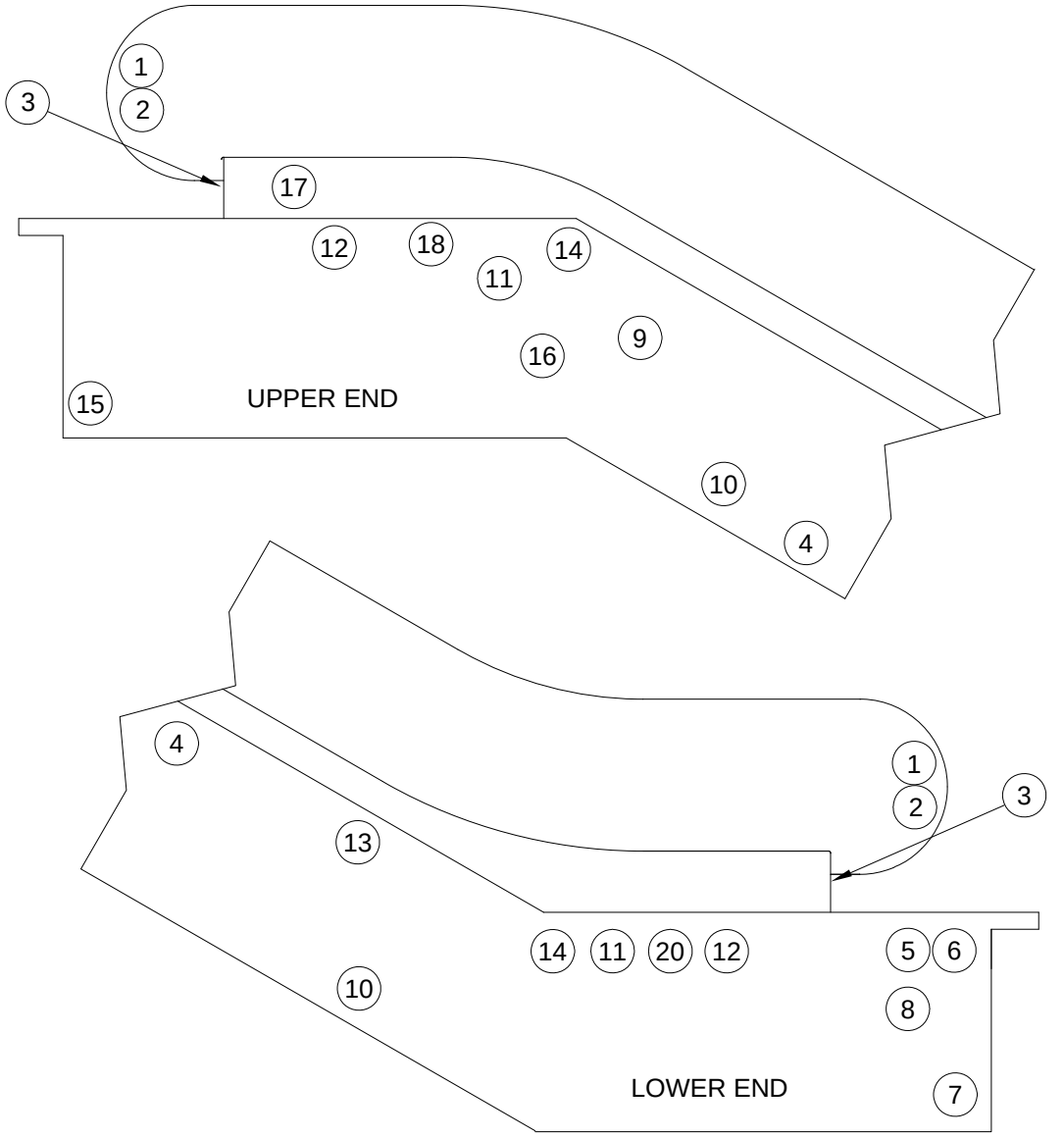


5024530(2011-02)
5021549(2010-02)

3 PREVENTIVE MAINTENANCE GUIDELINES

The schedule frequency of the following preventive maintenance modules is dependent upon escalator use (12 hours/24 hours), environmental conditions (indoor/outdoor, excessive moisture, excessive dust) and technical characteristics (vertical rise, standard or lube-free chain, presence of automatic chain oilers).

- Basic Module = Six to twelve times per year
- Brake Module = One to two times per year
- Combplate Module = One to two times per year
- Drive Module = One to two times per year
- Guide Module = One to two times per year
- Step chain Module = One to six times per year
- Handrail Module = One to two times per year

3.1 Basic Maintenance Module

6 hours per unit per month

Preventive Maintenance Guidelines	
Basic Maintenance Module	
1. Preparations	Travel to site, check, and install safety barriers
2. Make a visual observation of equipment	
Finishes on balustrade and decks	Check skirts for scratches; rebuff or refinish as required
	Check inner decks for scratches and dents; if scratched, rebuff as required; if dented, repair or replace as required
	Check solid inner panels for scratches and dents; if scratched, rebuff or replace as required; if dented, repair or replace as required
	Check glass inner panels for excessive scratching, chipping, or cracks; replace glass inner panel as required
	Check for missing, worn, or damaged handrail inlet brushes; replace handrail inlet brush as required
	Check frontplate for damages or cracking; replace frontplate as required
	Check for missing, loose, or damaged screws; tighten or replace screws
	Check step demarcation strips for damage; replace step demarcation strips as required
	Check handrail base for loose or misaligned sections; repair or replace handrail base section as required
	Check safety signs (pictographs). Replace as required worn, damaged, or missing safety signs (pictographs).
Lighting	Visually check lighting operation; replace bulbs or lighting elements as required

Preventive Maintenance Guidelines	
Handrail condition externally	Check exterior of handrail for cracks, splits, or deterioration; replace handrail as required
Comb segment condition	Check for warping, broken teeth or loose bolts; tighten bolts and replace comb segment as required. Check function.
Ride comfort	Ride escalator and check for roughness or vibration; determine cause of roughness or vibration and correct cause
3. Check clearances	
Step-to-step clearance	The gap between any two consecutive steps must not exceed 6 mm [15/64 in.}
Step-to-skirt clearance	Nominal gap between step and skirt should be 2 mm [5/64 in.]
Comb segment-to-step clearance	Clearance between comb segment and step should be approximately 4 mm [5/32 in.]
Coverplates	Check for damage, tight DZUS fasteners, and cleanliness.
4. Check external safety devices	
Stop button (emergency stop switch)	Check operation
Handrail inlet switch	Check operation; switch should actuate with 5 mm - 8 mm [3/16 in. - 5/16 in.] movement of handrail brush guard
Combplate impact device	Check function. *For more information on combplate impact device, refer to Preventive Maintenance Modules>Combplate Maintenance Module.*
Skirt brushes	Check for worn or damaged skirt brushes, and remove any foreign material found in skirt brushes. Replace, as required.
Skirt switches	Check operation; skirt switch should actuate with 1.5 mm [1/16 in.] movement of skirt button.
Access cover switch	Check operation each time a cover is removed; escalator should not run with cover removed unless actuator is depressed
Pit stop switches	Check operation
Inspection switches	Check operation
5. Check controller cabinet	Clean, visually check for burn marks and discoloration, tighten any loose connections
6. Check brake stopping distance (brake with brake lever	• If brake stopping distance is between 200 mm [7-7/8 in.] and 350 mm [13-3/4 in.] maximum there is no need to adjust. If adjustment is needed, then the brake should be set to the nominal values. Nominal values are 220 mm [8-11/16 in.]: 0.4 m/s [80 fpm] and 270 mm [10-5/8 in.]: 0.5 m/s [100 fpm]. • **Visual check:** escalator should stop within the length of one half to one step.
7. Clean pits (light cleaning)	Clean pits; there should be no oil or trash in pits (recommended each service)
8. Step chains	Lubricate if necessary *For more information on lubricating step chains, refer to Preventive Maintenance Modules>Step Chain Maintenance Module.*

Preventive Maintenance Guidelines	
9. Automatic oiler	Check and fill reservoir; check brushes for correct adjustment and function *For more information on automatic oiler filling and adjustments, refer to Preventive Maintenance Modules>Step Chain Maintenance Module.*

7-002031-20265053 (2011-02)

3.2 Brake Maintenance Module

Preventive Maintenance Guidelines	
Brake Maintenance Module	
1. Remove steps.	
2. Check brake setting (brake-arm brake)	
Brake lining	Check brake lining thickness; If brake lining thickness is less than 3 mm [1/8 in.], replace the brake arm and lining
Brake arm	Check that brake arm has free up and down movement.
Brake surface	Check brake surface; brake surface should be clear of grease and oil
Stopping distance	If brake stopping distance is between 200 mm [7-7/8 in.] and 350 mm [13-3/4 in.] maximum there is no need to adjust. If adjustment is needed, then the brake should be set to the nominal values. Nominal values are 220 mm [8-11/16 in.]: 0.4 m/s [80 fpm] and 270 mm [10-5/8 in.]: 0.5 m/s [100 fpm].
Brake wear	Check the brake wear reserve by adjusting the space between brake lever and pin to a 2 mm [5/64 in.] air gap.

7-002041 (2009-10)

3.3 Combplate Maintenance Module

Preventive Maintenance Guidelines	
Combplate Maintenance Module	
1. Check combplate impact device	Check operation of combplate impact device according to design of device and version of escalator. *For information on combplate impact devices used with various versions of the escalator, refer to Combplate Maintenance Module.*
2. Check gap between combplate impact device switch and trip arm adjustment screw.	Gap should be approximately 1 mm [1/32 in.].
3. Check for any broken comb segment teeth.	Replace as required.
4. Check clearance between comb segments and steps.	Clearance should be 4 mm (5/32 in.) maximum.

7-002032 (2009-10)

3.4 Drive Maintenance Module

Preventive Maintenance Guidelines	
Drive Maintenance Module	
1. Remove steps.	
2. Check drive machinery	
– Quiet operation	If operation not quiet, investigate and correct as required. If cause cannot be corrected, contact supervisor with all details.
– Oil leaks	Report oil leaks to supervisor
– Air breather	Clean as required
– Drive unit mounting bolts	Check torque once a year- torque for main shaft bolts is 350 Nm [258 lbf-ft]
– Motor	Check motor couplings/grommets.
– Reversing device	Check operation of reversing device.
– Governor over-speed switch	Check operation of governor over-speed switch. Device should actuate in accordance with manufacturer's specifications. Adjust, if required.
– Broken drive chain switch	Check operation of broken drive chain switch. Device should actuate in accordance with manufacturer's specifications. Adjust, if required

Preventive Maintenance Guidelines	
3. Lubricate machinery	
– Step chain sprocket	Grease outboard bearings; must be lubricated with approved grease (Rivolta adhesive lubricant-DEE1479081). Grease indoor escalator once a year
– Gear box	Check oil level; fill if necessary with approved gear box oil
– Ring gear	Check oil level; fill if necessary with approved oil.
– Upper station main bearings	Lubricate per manufacturer's specifications.
– Motor	Lubricate per manufacturer's specifications.
– Handrail drive bearings	Lubricate handrail drive sheave bearings.

7-002033-20265053 (2011-02)

3.5 Guide Maintenance Module

Preventive Maintenance Guidelines	
Guide Maintenance Module	
1. Preparations	Remove and record the step number for five adjacent steps (check numbers on steps and remove different steps every time).
2. Check steps for acceptable & unacceptable conditions	Check step for warp, cracks, loose or damaged rollers, loose or damaged step demarcation strips, and loose hardware; repair or replace as required.
3. Check step band lock switch	Check operation; switch should actuate when handle is lifted and step band lock is engaged with sprocket
4. Check internal safety devices	
Step lift switch	Check operation; switch should actuate after step lift track is lifted approximately 5 mm [3/16 inch], and should reset when step lift track is released
Step upthrust switch	Check operation; switch should actuate after step upthrust track is lifted approximately 5 mm [3/16 in.], and should reset when step upthrust switch track is released.
Step sag switch	Check operation; trip levers must actuate limit switch if a step rises or lowers by more than 5 mm (3/16 inch)
Out-of-level step detectors	Check operation; switch should actuate when a 3.2 mm [1/8 inch] shim is placed between the step riser and switch wand actuator.
Missing step detector	Check operation; sensor should be centered and approximately 6.4 mm [1/4 inch] from tapered flat head screw of trailing wheel.
5. Check step system	
Tracks	Check for any worn, damaged, or misaligned tracks

Preventive Maintenance Guidelines	
Tracks and cross members	Make sure tracks and cross members are free of oil, dirt, and debris (clean)
Bridges and lower reversing station	Check bridges for wear - repair or replace bridges as required. Check lower reversing station for movement - grease sliding parts if necessary
Step guidance button	Check; replace if step guidance buttons are worn past wear indicator
6. Clean - (light cleaning)	
Pits	Clean pits; there should be no oil or trash in pits

7-002042 (2009-10)

3.6 Step Chain Maintenance Module

Preventive Maintenance Guidelines	
Step Chain Maintenance Module	
1. Lubricate step chain	
Automatic oiler	Check & fill; brushes adjusted correctly; oil filled; connections tight with no leaks
Lube-free step chain	If required, the step chain lip track may be moistened by a spray in the running surface area. Use only a high pressure semi-synthetic grease (Rivotta SKD 3602), based on metal soap without solid additives for initial application.
2. Check step chain rollers	Check for wear or damage. Replace as required.
3. Check broken step chain switch	Check operation; switch actuator should be in center of trip bar, and should just touch trip bar surface
4. Step chain tension	Check compressed spring length; spring should be approximately 192 mm +/- 3 mm [7-9/16 in. +/- 1/8 in.] long.

7-002036 (2009-10)

3.7 Handrail Maintenance Module

Preventive Maintenance Guidelines
Handrail Maintenance Module

Preventive Maintenance Guidelines	
1. Clean and check handrail guides	• Vacuum and clean all handrail guides and newel ends • Check alignment of joints, and excessive wear of guides. Adjust and repair as required.
2. Check handrail drive (drive area)	
Handrail drive spring upper end pit	Check compressed spring length; upper spring length should be approximately 47 mm [1-7/8 in.], and lower spring length should be 40 mm [1-9/16 in.] If adjustment is required, make sure handrail does not slip after adjustment.
Handrail drive wheel rubber	Clean any grease and oil from rubber; check for cracks, splits, damaged or worn rubber, replace as required
3. Adjust handrail tension	
Adjust handrail tension - with take-up rollers in drive area	Lift handrail off lower curve handrail guide up to first incline inner panel joint, handrail should be 1 mm [1-32 in.] above handrail guide at lower curve, adjust as required
4. Check handrail speed sensor	Check operation: gap between proximity sensor and roller should be approximately 0.3-0.5 mm [1/64 in.]
5. Check broken handrail monitor	Check operation; remove handrail in lower curve - escalator should not run when broken handrail monitor roller is no longer supported by handrail.
6. Check handrail drive pressure rollers	Check the handrail drive pressure rollers. Adjust to manufacturer's specifications, if required.
7. Clean handrails	After cleaning handrail guides and adjusting handrail tension, clean outer surface of handrails.

7-002034 (2009-10)

3.8 Cleaning Module

Preventive Maintenance Guidelines	
Cleaning Module	
1. Preparing	Remove five steps and insert spreader bars (check numbers on steps and remove different steps every time)
2. Clean pits and step band	Clean upper and lower end pits and anything that can be reached easily within the step band using the five step hole in the step band.
3.	Clean remote control rooms.

7-002035 (2009-10)

4 BASIC MAINTENANCE MODULE

Suggested maintenance schedule for Basic Module is six to twelve times per year, dependent upon escalator use.

4.1 Travel to site and check-in

After traveling to the site, check in with the Customer or Building Representative.

- If your visit is the result of a call out, carefully listen to the Customer or Building Representative explanation of their concerns, and assure them you will investigate. Listen actively, and resolve problems professionally.
- Before you leave the building, re-visit the Customer or authorized Building Representative. Make sure all appropriate paperwork is completed and signed.
- Always thank our Customer for their business.

708-006 (11/99)

4.2 Make visual observation

Check the following equipment with a visual observation.

Condition	Action
Check finishes on balustrade and decks	
Check skirts for scratches.	Rebuff or refinish skirt as required.
Check inner decks for scratches and dents.	If scratched, rebuff or replace inner deck as required. If dented, repair or replace inner deck as required.
Check solid inner panels (if equipped) for scratches and dents.	If scratched, rebuff or replace inner panel as required. If dented, repair or replace inner panel as required.
Check glass inner panels (if equipped) for excessive scratching, chipping, or cracks.	Replace glass inner panel as required.
Check for missing, worn, or damaged handrail inlet brushes.	Replace handrail inlet brush as required.
Check frontplate for damages or cracking.	Replace frontplate as required.
Check for missing, loose, or damaged screws.	Tighten or replace screws.
Check step demarcation strips for damage.	Replace step demarcation strips as required.
Check handrail base for loose or misaligned sections.	Repair or replace handrail base section as required.

Check lighting	
Visually check lighting operation.	Replace bulbs or lighting elements as required.
Check handrail condition externally	
Check exterior of handrail for cracks, splits, or deterioration.	Replace handrail as required.
Check comb segment condition	
Check for warping, broken teeth or loose bolts.	Tighten bolts and replace comb segment as required.
Check ride comfort	
Ride escalator and check for roughness or vibration.	Determine cause of roughness or vibration and correct cause. Some causes may be misaligned or loose track, defective step, defective or stretched step chain, damaged or worn step rollers, or dirt on the tracks.
Check safety signs (pictographs)	
Check safety signs for wear or damage.	If worn or damaged, replace with a new safety sign as required. If safety sign is missing, replace with correct safety sign as required.

708-015 (4/2002)

4.3 Check clearances

Complete the following to check clearances for:

- Step-to-step clearance
- Step-to-skirt clearance
- Comb segment-to-step clearance

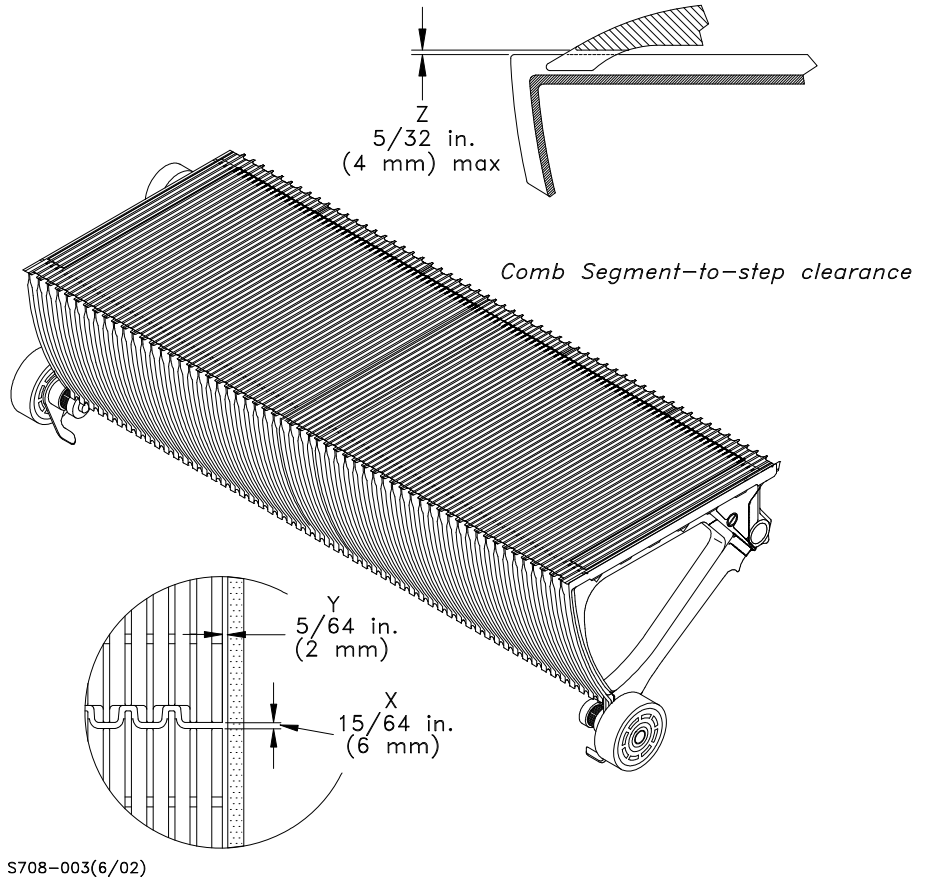
Step	Action	Note
Step-to-step clearance		
1.	Check gap (X) between consecutive steps.	NOTE!The gap between any two consecutive steps must not exceed 6 mm [15/64 in.]. There is no adjustment. If gap is greater than 6 mm [15/64 in.] a thorough inspection of the step chain is needed to determine if step chain must be replaced.

Step	Action	Note
Step-to-skirt clearance		
1.	Check the step to skirt gap (Y) with a step gage tool.	Nominal gap between step and skirt should be 2 mm [5/64 in.].

Step	Action	Note
2.	If nominal gap is not correct, check step guidance buttons on step for wear.	*For more information on step guidance buttons, refer to Step, Brake, Drive, and Chain Module>Checking Step System.*

Step	Action	Note
Comb segment-to-step clearance NOTE! Step riser end of step must be positioned near or under comb segment teeth.		
1.	Insert step gage tool in groove of step and check clearance (Z) between comb segment and step.	• **EN 115:** Clearance between comb segment and step should be 4 mm [5/32 in.]. • **ANSI:** Clearance between comb segment and step should be approximately 4 mm [5/32 in.].
2.	If clearance must be adjusted, adjust combplate up or down until clearance is correct.	

708-014 (5/2002)



4.4 Check external safety devices

Complete the following to check and adjust (if necessary) external safety devices.

NOTE! The procedures in this module describe checking and adjusting procedures. Complete adjusting procedures only when the primary checking procedures indicate an adjustment is necessary.

708-007 (2009-02)

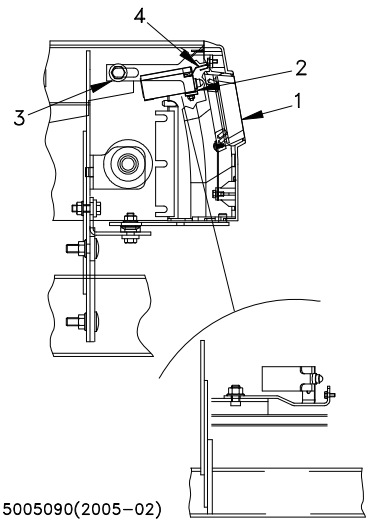
4.5 Check stop button (emergency stop switch)

Step	Action	Note
1.	With the escalator running in DOWN direction, press the stop button. NOTE!Make sure the escalator stops.	
2.	If the emergency stop switch has a plastic cover with an alarm, make sure alarm sounds when plastic cover is lifted.	
3.	Repeat the procedure with the escalator running in UP direction.	

708-008 (2006-08)

4.6 Check and adjust handrail inlet switch

Complete the following to check and adjust handrail inlet switch.

Step	Action	Note
1.	With main power supply OFF, press handrail inlet brush (1) in towards escalator.	
2.	Listen for audible click when switch (2) is tripped, and note the amount of travel for handrail inlet brush (1). — Switch should actuate with 5 mm - 8 mm [3/16 in. - 5/16 in.] movement of handrail inlet brush (1).	
3.	If switch must be adjusted, loosen mounting bolts (3) on switch bracket.	
4.	Adjust switch bracket until switch actuates with 5 mm - 8 mm [3/16 in. - 5/16 in.] movement of handrail inlet brush (1).	
5.	Make sure latch mechanism (4) engages and holds inlet brush (1) when inlet brush is pushed in fully (hits the stop).	
6.	Release latch mechanism (4).	
7.	Make sure step band is clear of personnel and equipment, and turn main power supply ON.	**WARNING!**Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.
8.	Press handrail inlet brush (1) in towards escalator until it latches, and try to run the escalator in BOTH directions on INSPECT. — The escalator should not start.	
9.	Repeat procedure for handrail inlet switch on opposite side of the escalator.	

7-000402 (2005-02)

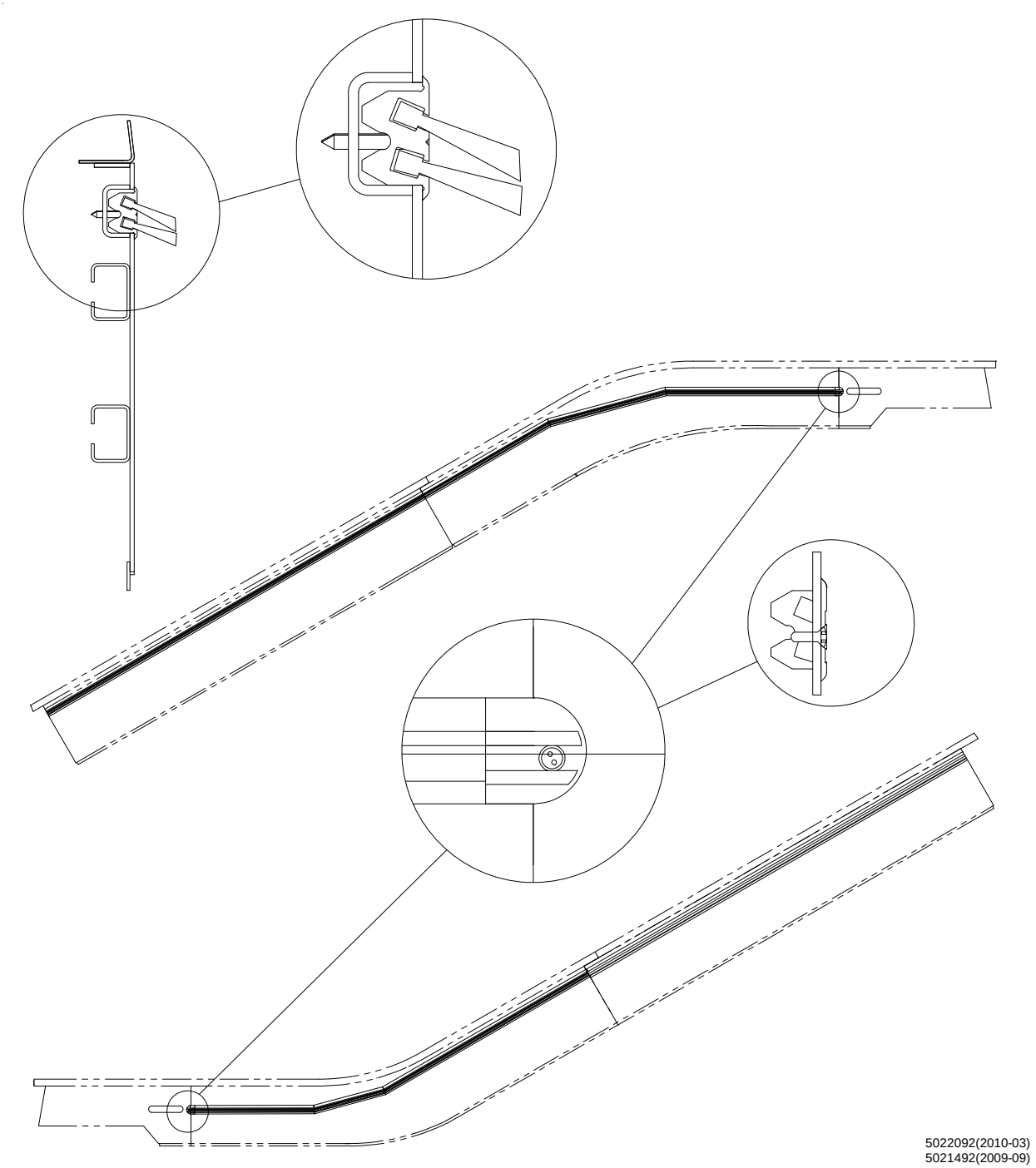
4.7 Check skirt brushes

Check for worn or damaged skirt brushes, and remove any foreign material found in skirt brushes. Replace as required, if worn or damaged.

Skirt brushes should be replaced when the brush material is missing or damaged to the extent that a passenger's leg can easily contact the skirt panel while the unit is in motion, or when missing or damaged skirt brush components present a pinching, cutting, tearing or tripping hazard.

For more information on replacing skirt brushes, refer to Minor Repairs/Replacing skirt brushes.

7-002038 (2010-03)



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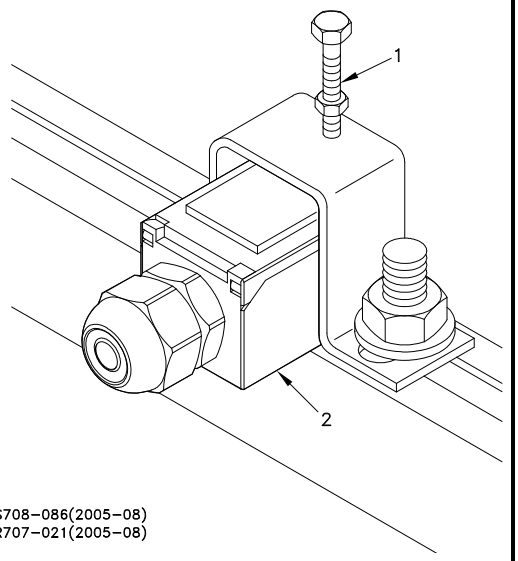
5021492(2009-09)

4.8 Check and adjust skirt switches

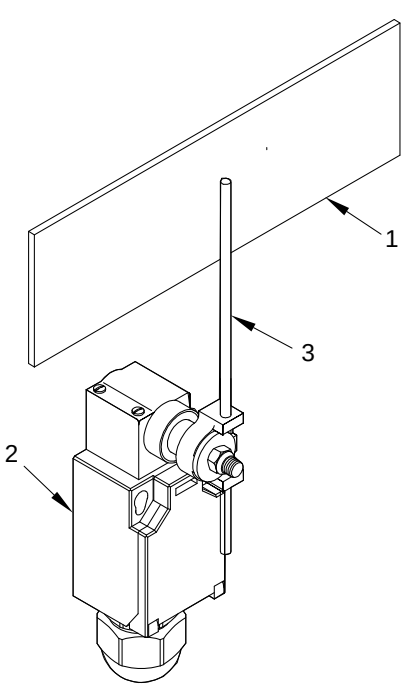
Complete the following to check and adjust skirt switches.

Step	Action	Note
1.	Make sure main power supply is OFF.	 S708–086(2005–08) R707–021(2005–08)
2.	Gently pry skirt button inwards at location of skirt switch. Adjust switch until switch actuates with 1.5 mm [1/16 inch] movement of skirt. Take care to not damage step or skirt.	
3.	If skirt switch must be adjusted, remove inner deck at location of skirt switch.	
4.	Loosen switch hardware (1), and adjust switch (2) in or out to the skirt until switch actuates with 1.5 mm [1/16 inch] movement of skirt button.	
5.	Make sure step band is clear of personnel and equipment, and turn main power supply ON. **WARNING!** Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.	
6.	Place screw driver between SKIRT BUTTON and switch actuator so switch actuates. NOTE!Do not place screwdriver on step side of skirt.	
7.	Try to run the escalator in BOTH directions on INSPECT. • The escalator should not start.	
8.	Replace inner deck.	
9.	Repeat procedure for opposite side of escalator.	

7-002039 (2009-10)

4.9 Check and adjust access cover switches

Complete the following to check and adjust access cover switches.

Step	Action	Note
1.	Check access cover switch operation. • Escalator should not run with cover removed unless actuator is manually depressed.	 C707-157(2006-07)
2.	If switch must be adjusted, loosen switch mounting screws.	
3.	Place straight edge (1) across access frame, next to access cover switch (2).	
4.	Adjust switch so actuator wand (3) is above bottom edge of straight edge (1).	
5.	Tighten switch mounting screws.	

7-002049 (2009-10)

4.10 Check pit stop switches

Turn the key start switch to start unit running in UP or DOWN direction. With the unit running, actuate pit stop switch. The unit should stop. Release pit stop switch by turning it.

707-225 (2007-07)

4.11 Check inspection switches/hand held pendant control

Inspection switches: Before starting the escalator, make sure that no one is in the escalator or on the step band. Check the inspect mode at both ends of the escalator, and verify the proper operation of the following.

- Both upper and lower key start switches are disabled if handset control is used.
- The lower key start switch is disabled when the upper Inspect switch is in the INSPECT position.
- The upper key start switch is disabled when the lower Inspect switch is in the INSPECT position.
- When started, the escalator DOES NOT achieve a holding circuit. Also, the escalator stops when the key start switch is released.

NOTE! When escalator is in inspect mode, the missing step detector, handrail speed sensor, and encoder is disabled.

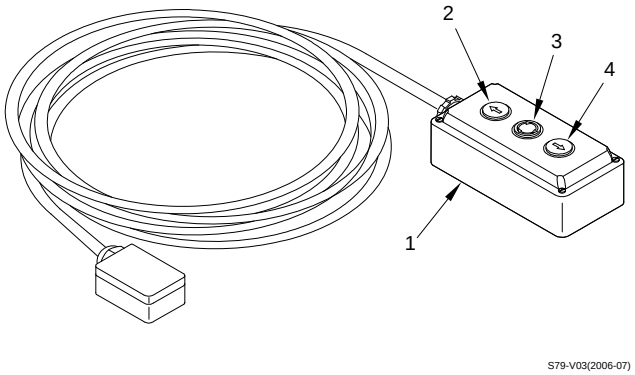
Hand held pendant control: Before starting the escalator, make sure that no one is in the escalator or on the step band. Remove blind plug, and plug pendant control (1) into receptacle at both ends of the escalator in turn, and verify:

- escalator runs by pressing push button up/down (2,4).
- escalator stops when push button up/down (2,4) is released.
- control circuit is interrupted by actuating push button switch (3). Switch locks when actuated.

Verify the proper operation of the following.

- When blind plug is removed from the receptacle, the escalator is placed into inspection mode, and "I _" is indicated on CPU Board display.
- Key switch control and start relay are interrupted.
- Start sequence is interrupted until blind plug is plugged-in again

7-002050 (2009-10)



4.12 Check controller cabinet

Complete the following to check controller cabinet.

Step	Action	Note
1.	Make sure main power supply is OFF.	
2.	Visually inspect controller for any burn marks or discoloration of components.	
3.	Check for any loose wires and tighten any loose connections.	NOTE! Check for power before touching any components in the controller. Make sure power is OFF.
4.	Remove dust from controller using an aerosol container (air dispenser such as used for cleaning keyboards) to blow the dust from the controller.	

708-026-20265053 (2011-02)

5 BRAKE MAINTENANCE MODULE

Suggested maintenance schedule for Brake Module is one to two times per year, dependent upon escalator use.

5.1 Remove steps

Remove steps to form a hole in the step band.

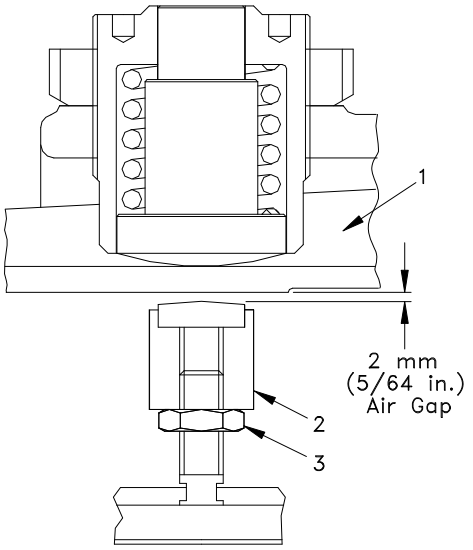
For more information on removing steps, refer to section titled: Guide Maintenance Module>Remove and Replace Steps.

5.2 Check and adjust brake (brake with brake lever)

Check and adjust brake wear

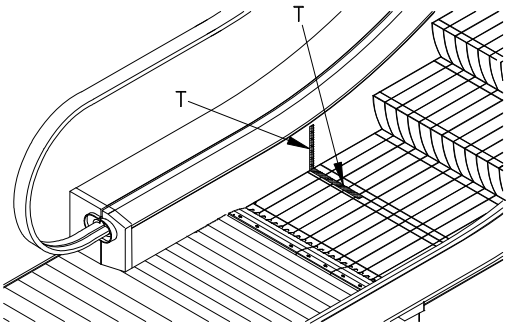
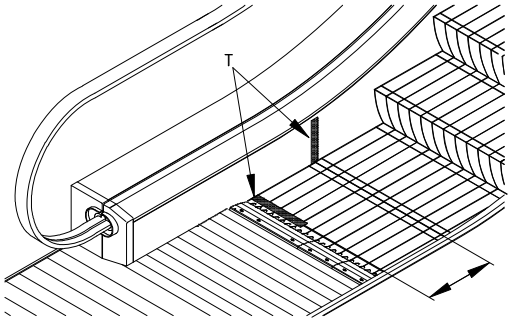
Adjust the brake wear reserve by adjusting the space between brake lever (1) and pin (2) to an air gap as follows.

Step	Action	Note
1.	Move hole in step band above the brake, turn main power supply OFF, and engage step band lock.	
2.	Check brake arm movement and brake lining thickness. • Check that brake arm has free up and down movement. • If brake lining thickness is less than 3 mm [1/8 in.], replace brake arm and lining. *For more information on replacing brake arm and lining, refer to Minor Repairs>Replace brake arm.*	
3.	If brake lining thickness is acceptable, loosen lock nut (3).	
4.	Adjust spacing for an air gap at pin (2). NOTE!It is very important that there is a 2 mm [5/64 in.] air gap spacing at pin (2).	
5.	After adjusting spacing, lock pin (2) with nut (3).	
6.	Check spacing again and readjust if necessary.	

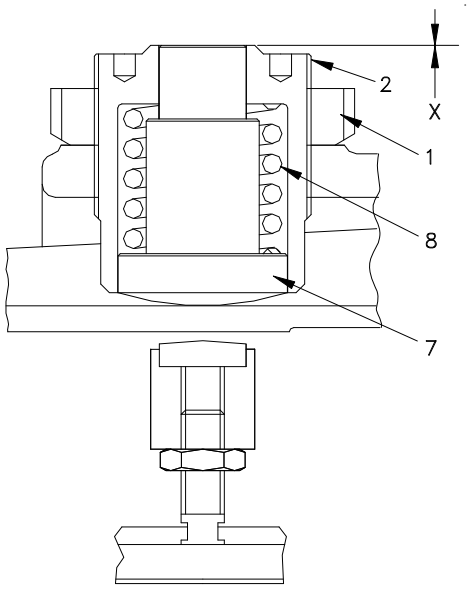


S708–113(2002–10)

Check and adjust brake stopping distance

Step	Action	Note
1.	Check braking surfaces for oil and grease, and remove any impurities with degreasing agents.	 5009170(2005−01)  5009172(2005−01)
2.	Place a piece of tape (T) on step and skirt (aligned with each other) as reference mark.	
3.	Clear the step band of all personnel and tools, disengage step band lock, and turn main power supply ON.	
4.	Using pendant control (or inspect switch), run the escalator in the up and then down direction. Press the stop button when reference marks (tape) on skirt and step are aligned, and measure the stopping distance (distance between tape on skirt and tape on step) when the step band stops. • If brake stopping distance is between 200 mm [7-7/8 in.] and 350 mm [13-3/4 in.] maximum there is no need to adjust. If adjustment is needed, then the brake should be set to the nominal values. Nominal values are 220 mm [8-11/16 in.]: 0.4 m/s [80 fpm] and 270 mm [10-5/8 in.]: 0.5 m/s [100 fpm]. • **Visual check:** escalator should stop within the length of one half to one step. *For more information on brake stopping distance, refer to table titled: Full Load and No Load Stopping Distances.*	
If brake stopping distance must be adjusted, complete the following.		
1.	Loosen groove nut (1).	
2.	Turn in adjusting ring (2) until pin (7) is flush with adjusting ring (dimension x = 0 mm).	

Step	Action	Note
3.	When the maximum brake setting is achieved, lock adjusting ring (2) with groove nut (1).	
4.	Clear the step band of all personnel and tools, disengage step band lock, and turn main power supply ON.	
5.	Start the escalator in the down direction, press stop button, and measure the stopping distance. • If the minimum braking distance cannot be achieved, reduce the braking moment (the pressure exerted by the spring on the pin).	
6.	Carry out stopping distance checks with the escalator unloaded until the minimum stopping distance is achieved. • If dimension X reaches 15.5 mm [5/8 in.], the compression spring (8) is completely relieved and the braking moment is equal to zero. • The smaller dimension X is, the greater the braking moment. The smaller the braking moment is increases the braking distance.	



S708−114(2002−10)

Full load and no load stopping distances		
Speed max.	**Full load down direction**	**Min. no load down direction**
0.4 m/s [80 fpm]	800 mm [32 in.]	200 mm [7-7/8 in.]
0.5 m/s [100 fpm]	1000 mm [40 in.]	200 mm [7-7/8 in.]
0.6 m/s [120 fpm]	1200 mm [48 in.]	250 mm [9-7/8 in.]
0.65 m/s [128 fpm]	1300 mm [52 in.]	300 mm [11-13/16 in.]
0.75 m/s [147 fpm]	1500 mm [60 in.]	350 mm [13-3/4 in.]

708-251 (2005-01)

6 COMBPLATE MAINTENANCE MODULE

Suggested maintenance schedule for Combplate Module is one to two times per year, dependent upon escalator use.

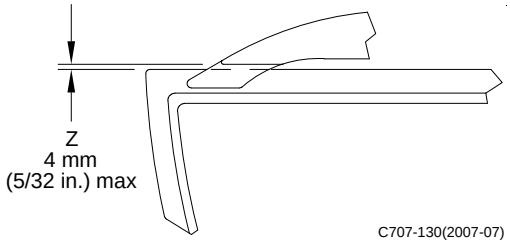
6.1 Check and adjust combplate impact device

Complete the following to check combplate impact device.

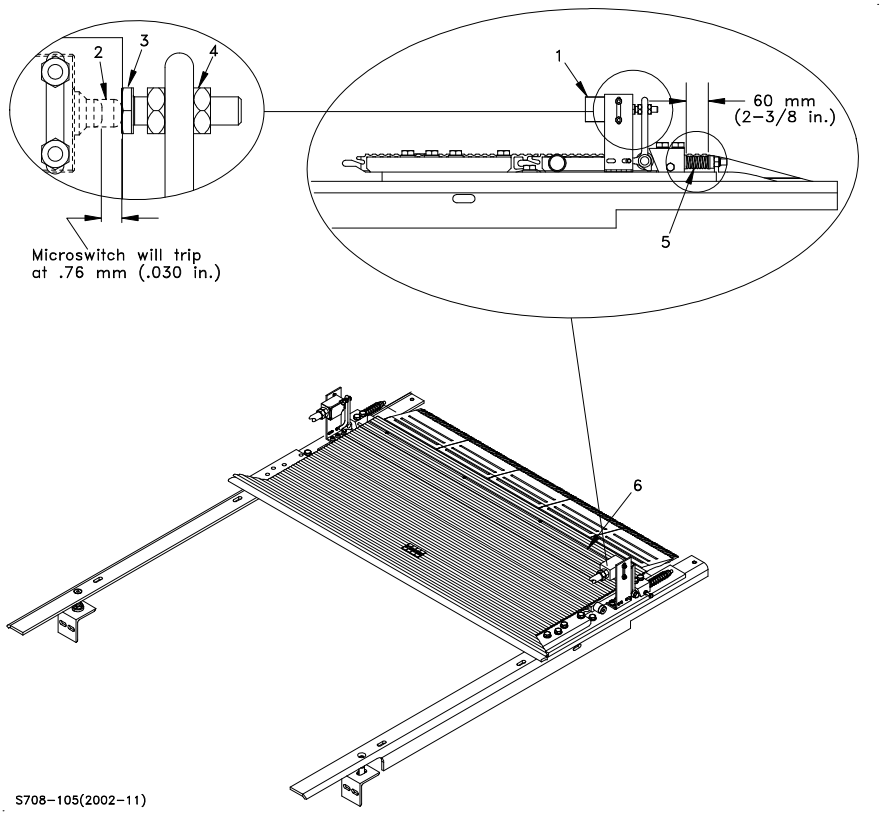
Step	Action	Note
1.	Turn mainline disconnect OFF, and remove end inner decks (left and right) located above the combplate. Store them in a clean and dry area.	
2.	Check initial spring (5) compression setting, and set at 60 mm [2-3/8 in.].	
3.	If necessary, position switch (1) for approximately 1 mm [1/32 in.] gap between switch actuator (2) and trip arm adjustment screw (3).	
4.	Lock adjustment screw in position with 1/4 inch nut (4).	
5.	Position the step band hole approximately 50 mm [2 in.] from the combplate using hand held pendant control or inspection switch.	
6.	Position a wooden hammer handle on the left side of the hole (between step and combplate).	
7.	Make a lever movement with the hammer handle so that an audible click is heard when switch trips as the combplate moves (horizontally and vertically).	
8.	Repeat this procedure with the hammer handle on the right side of the step band hole. **WARNING!**Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.	
9.	Carefully place a screwdriver between switch (2) and screw (3) on the left side to simulate an impact has actuated the switch.	
10.	Turn ON power and try to run escalator. • The escalator should not run.	
11.	Carefully place a screwdriver on right side switch, and repeat this procedure for the right side.	
12.	Turn power OFF.	
13.	If combplate impact device is set, then reinstall the comb segments in the right order, and tighten the comb segment screws. • Check for any broken teeth on comb segment as comb segments are installed. Replace comb segment as necessary. NOTE!Apply screw locking compound on comb segment screws only. NOTE!Apply grease to mounting holes for cover plate (6) before installing cover plate and mounting screws.	

Step	Action	Note
14.	Make sure the clearance between comb segments and steps is correct by inserting a step gauge tool in groove of step. Check the clearance (Z) between comb segment and step (make this check at every comb segment). • Clearance between comb segment and step should be 4 mm [5/32 in.]. • If clearance must be adjusted, adjust combplate up or down until clearance is 4 mm [5/32 in.].	
15.	Using hand held pendant control or inspection switch, run the escalator for one revolution in both directions (up and down directions). Make sure steps do not scrape comb segments.	

7-002051 (2009-10)



Comb segment-to-step clearance

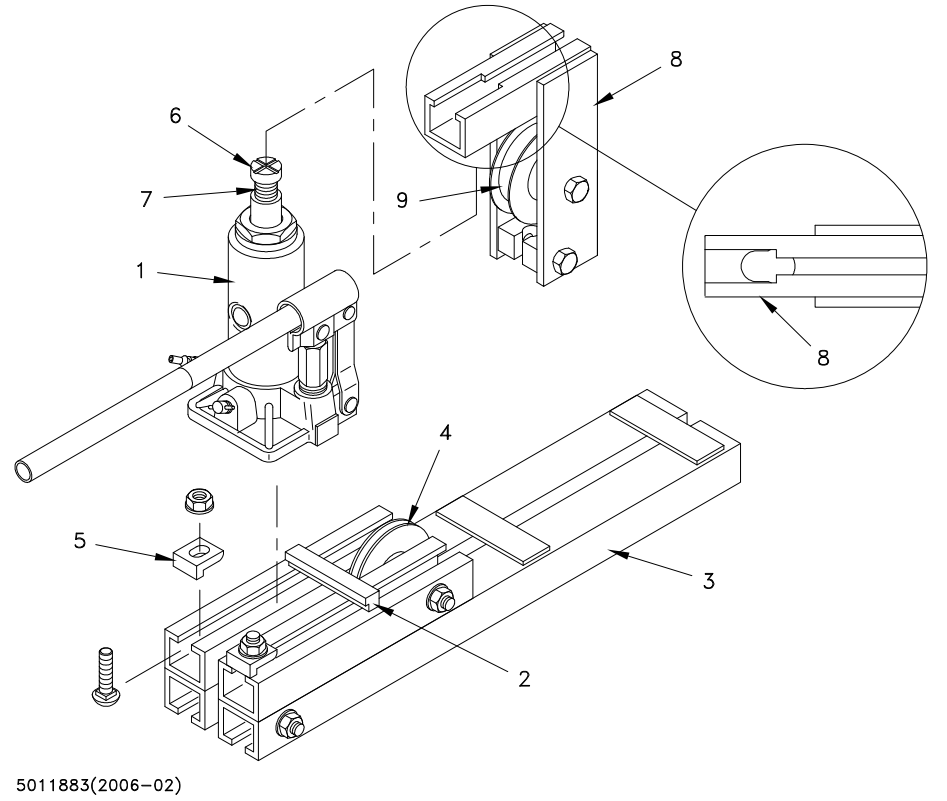


6.2 Check and adjust combplate impact device trip load (ANSI/B44)

NOTE! Combplate impact device tool kit (US521054) **must** be used with KONE Pressure Gauge Kit (US520926).

Assemble combplate impact device kit (US521054)

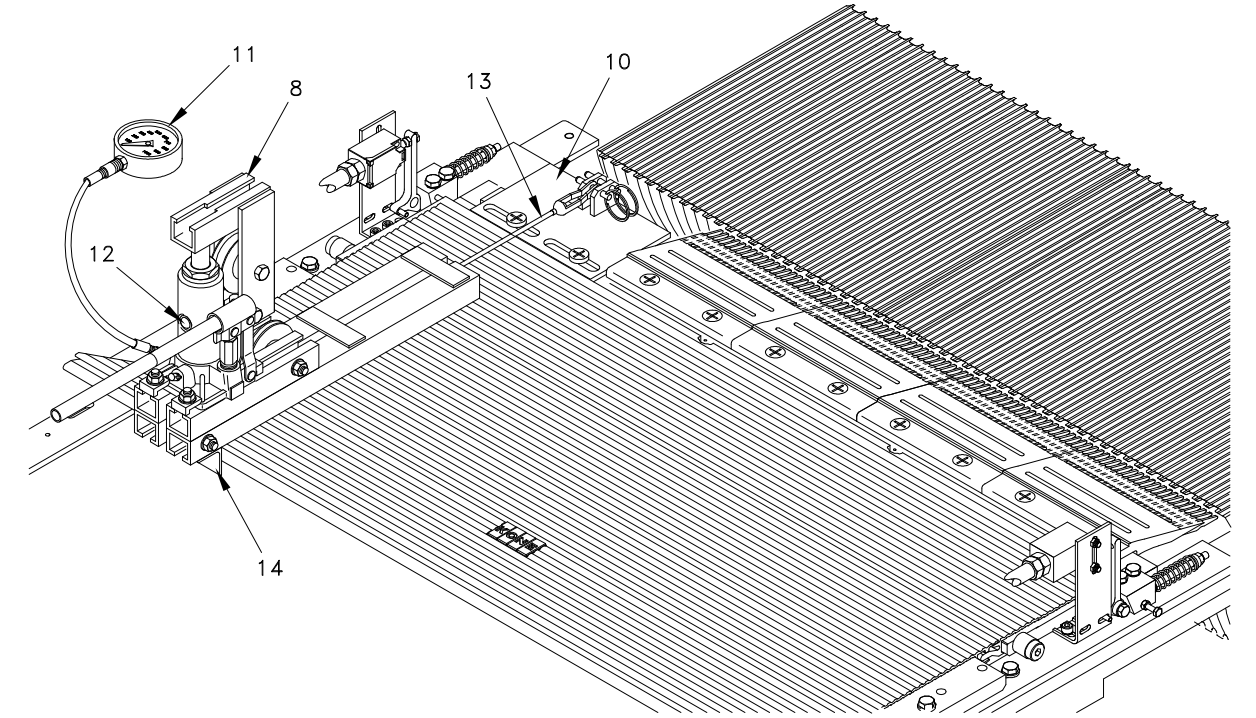
Step	Action	Note
1.	Slide hydraulic jack (1) into rear bracket (2) on base assembly (3). • Position jack with quick connect port and jack handle facing away from sheave (4).	
2.	Install and tighten front retainer clips (5).	
3.	Turn jack extension head (6) out from jack piston (7).	
4.	Slide jack piston extension head (6) through slotted hole in top of lift assembly (8).	
5.	Hand tighten jack piston extension head (6). • Roller (9) on lift assembly rolls on side of jack during use.	



Adjust horizontal combplate impact device switch

Step	Action	Note
1.	Remove left or right side comb segment, and mount comb segment weldment assembly (10).	
2.	Connect pressure gauge (11) to hydraulic jack quick connect port. NOTE!Pressure gauge used **must** be KONE Pressure Gauge Kit (US520926).	NOTE!When a new pressure gauge is used, oil from the hydraulic jack will fill the hose and may deplete the jack hydraulic oil reserve. If necessary, remove rubber plug (12) in hydraulic jack and add hydraulic jack oil (Dexron II) to the jack.
3.	Connect horizontal pull cable (13) to comb segment weldment assembly (10) with clevis and pin. • Horizontal pull cable is approximately 584 mm [23 in.] long. • For units where cable may be too short, use the cable adaptor plate to extend cable length as required.	
4.	Mount ball end of horizontal pull cable (13) to lift assembly (8).	
5.	Position combplate impact device kit on combplate with end angle bracket (14) against end of combplate.	
6.	Take hydraulic pressure readings while slowly and evenly increasing jack pressure. • Refer to table titled Horizontal Force for calibrating values of the horizontal combplate impact device switch.	NOTE!Set trip loads for combplate impact device switches according to local governing Codes.

Horizontal force	
Force (lbs)	**Hydraulic pressure**
112	210
200	375
250	465
300	560
350	655
400	750



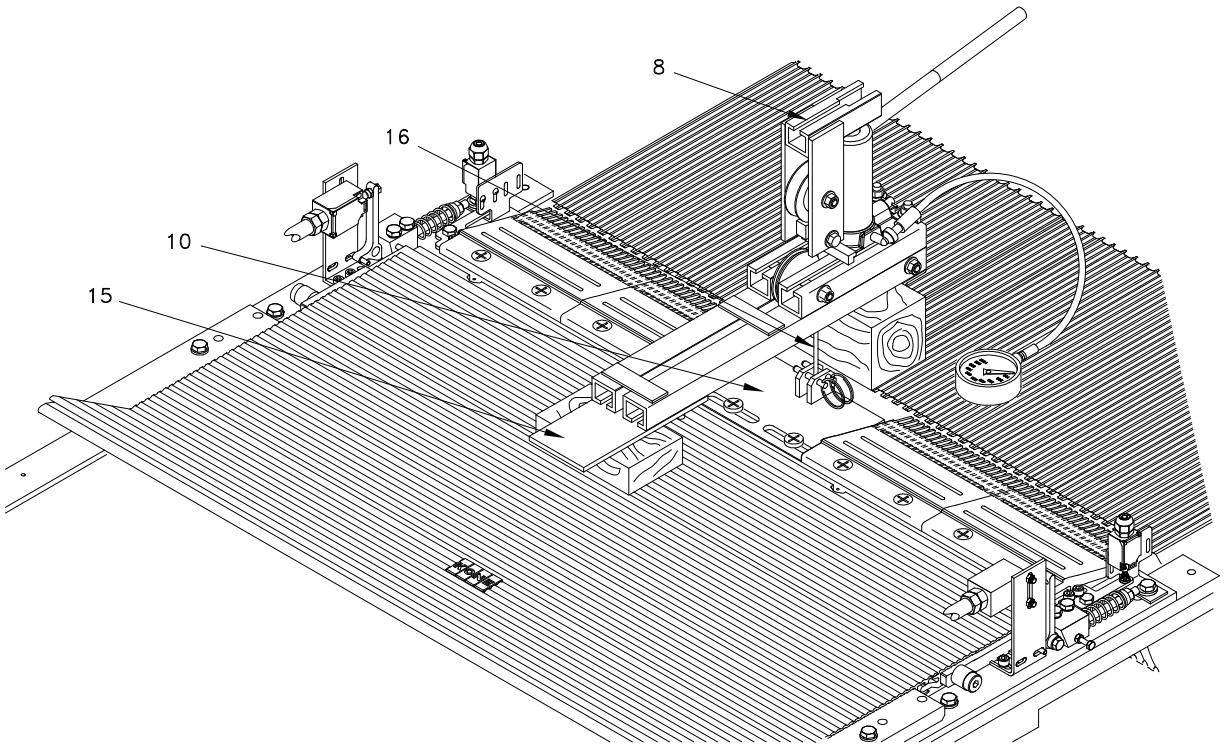
5011884(2006–02)

Adjust vertical combplate impact device switch

Step	Action	Note
1.	Mount end plate extender (15) on base assembly.	
2.	Remove center comb segment, and mount comb segment weldment assembly (10).	
3.	Connect vertical pull cable (16) to comb segment weldment assembly (10) with clevis and pins and lift assembly (8). • Vertical pull cable is approximately 178 mm [7 in.] long. NOTE! Make sure vertical pull cable is located in comb segment weldment assembly (10) bracket between the two pins.	
4.	Connect opposite end of vertical pull cable (16) to lift assembly (8).	
5.	Position combplate impact device kit on combplate. • Block up extender plate end (15) with a small wood block located on combplate. • Block up jack end on large wood block located on step.	
6.	Take hydraulic pressure readings while slowly and evenly increasing jack pressure. • Refer to table titled Vertical Force for calibrating values of the vertical combplate impact device switch.	NOTE!Set trip loads for combplate impact device switches according to local governing Codes.

Vertical force	
Force (lbs)	**Hydraulic pressure**
100	200
110	215
120	235
130	250
140	270
150	285
160	305

7-000641 (2007-05)



5011885(2006–02)

7 DRIVE MAINTENANCE MODULE

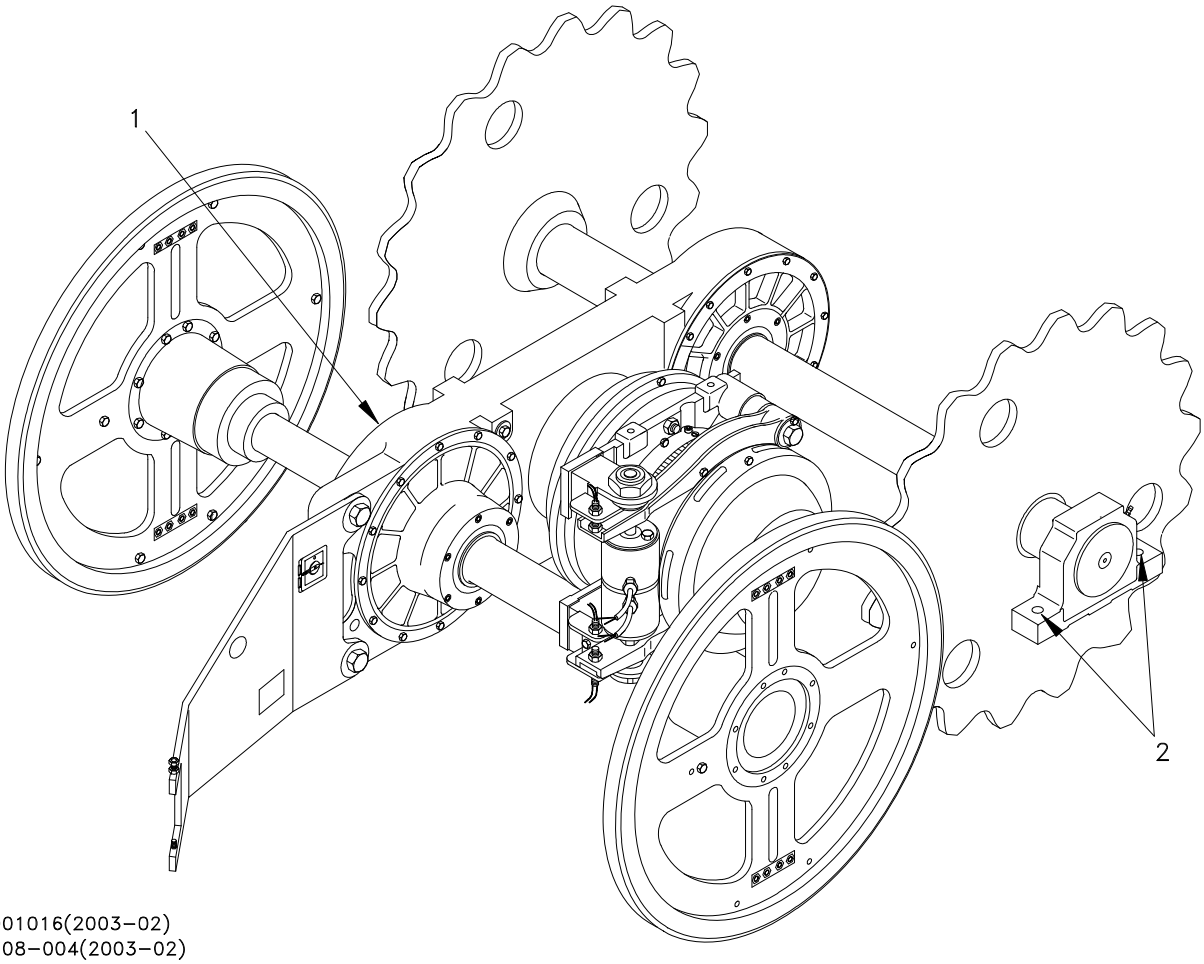
Suggested maintenance schedule for Drive Module is one to two times per year, dependent upon escalator use.

7.1 Check drive unit

Complete the following to check drive station

Step	Action	Note
1.	Check drive unit for quiet operation. • If drive operation is not quiet, investigate cause of the noise and correct as required. • If noise cannot be corrected, contact your supervisor with all details.	
2.	Check drive unit for oil leaks. • Report any leaks to your supervisor.	
3.	Check gear box oil level. For more information on checking gear box oil level, refer to section titled: Lubricate machinery.	
4.	Lubricate drive unit. *For more information on checking gear box oil level, refer to section titled: Lubricate machinery.*	
5.	Clean air breather (1).	
6.	Check drive unit mounting bolts (2). • Torque for main shaft bolts is 350 Nm [258 lbf-ft]	NOTE!Check drive unit mounting bolts once a year.

7-002064 (2009-10)



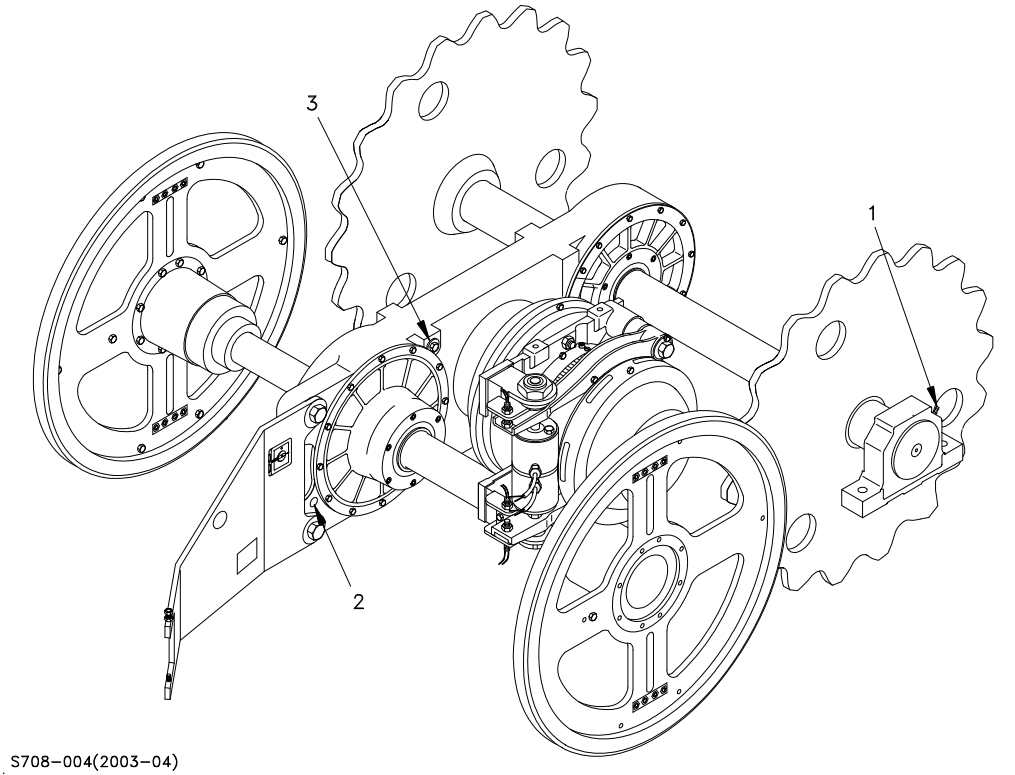
5001016(2003–02)
S708–004(2003–02)

7.2 Lubricate machinery

Step	Action	Note
1.	With the step band hole above the drive machinery, make sure the step band lock is engaged and main power supply is OFF.	
2.	Grease outboard bearings (1) of step chain sprockets. Lubricate until grease weeps.	NOTE! Grease outboard bearings once a year for indoor escalators.

Step	Action	Note
3.	Check oil level at sight glass (2) on bottom right side of drive station. • Oil level should be in the middle of sight glass (2).	NOTE! Gear box capacity is as follows: • **1 drive motor:** Gear box capacity is 7 liters [7.4 quarts] • **2 drive motors:** Gear box capacity is 8 liters [8.5 quarts]
4.	Remove filler cap (3), and add oil using one of the following synthetic oils • Synthetic oil CLPPG 680 (DEE2213667). • Synthetic oil Mobil SHC 634 (US69887003)	
5.	Replace filler cap using a new oil seal.	

708-025 -20265053 (2011-02)



S708–004(2003–04)

8 GUIDE MAINTENANCE MODULE

Suggested maintenance schedule for Guide Module is one to two times per year, dependent upon escalator use

8.1 Preparing

Remove and record the step number for five adjacent steps. Remove five different steps each time this module is completed. Complete the following in preparation for procedures in this module.

- Remove and replace steps
- Check steps for acceptable and unacceptable conditions

708-020 (11/2001)

8.2 Remove and replace steps

The following describes the procedure to remove and replace steps.

NOTE! Steps can be removed at EITHER the upper end or lower end, however, in MOST CASES the steps are removed at the LOWER END.

NOTE! A spreader bar (bar with step pins inserted on ends to simulate width of step) must be inserted in place of a step at every fifth step removed.

WARNING

Personal injury or death can be caused by moving components of the step band. Use extreme care when working near the step band.

The escalator is equipped with inspection switches and hand held pendant control. The following describes moving the escalator on inspection mode and opening and closing the safety circuit.

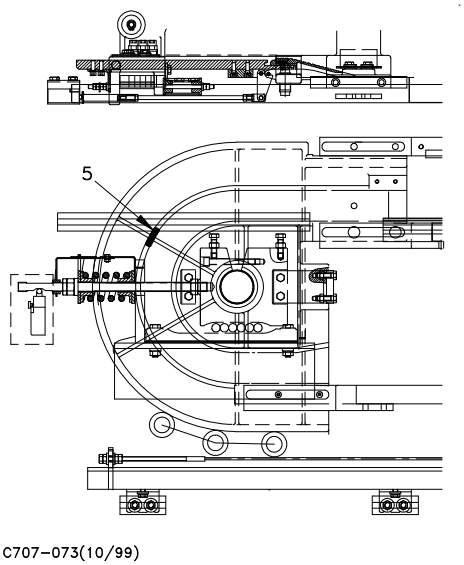
- Pendant control: Use the up/down buttons to move the step band on inspection mode, and use the stop button to open and close the safety circuit.
- inspection switches: Move the escalator on inspection mode using the inspection switch. Open and close the safety circuit using the pit stop switch.

If the escalator is equipped with hand held pendant control, use the up/down buttons to move the step band on inspection mode, and use the stop button to open and close the safety circuit.

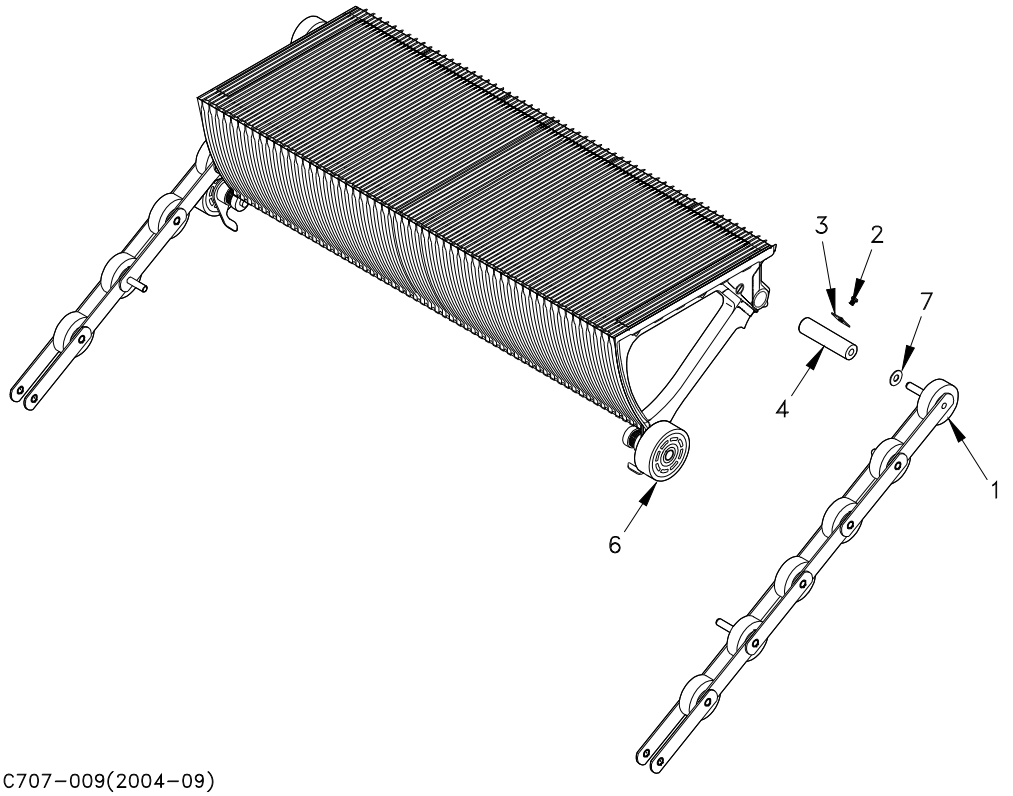
If the escalator is equipped with inspection switches, move the escalator on inspection mode using the inspection switch. Open and close the safety circuit using the pit stop switch.

Step	Action	Note
1.	Loosen fixing (mounting hardware) and remove step guard.	
2.	Move the step band on inspection mode, and position step band with step roller (6) located in a convenient position close to track cutout (5) to gain easy access to step fixing.	
3.	Open the safety circuit.	
4.	Straighten tab washer (3), and loosen screws (2).	
5.	Close the safety circuit, and move the step band on inspection mode until step roller (6) is located at track cut-out (5) in the upper or lower end.	
6.	Open the safety circuit, and slide step connector (4) towards the center of the step.	
7.	Remove step by lifting step and guiding step roller (6) out of track cut-out. NOTE! Make sure step chain pin washer (7) is retained.	
8.	Remove desired amount of steps in the same manner. NOTE! A spreader bar (bar with step pins inserted on ends to simulate width of step) must be inserted in place of a step at every fifth step removed.	
9.	Replace steps in reverse order. NOTE! Always use a new tab washer (3) for the screws (2). Secure the screws by bending up the tab washers. • Tightening torque for screws (2): MA = 25 Am [18.75 ft/lbs].	

7-002052 (2009-10)



Removing step from track cut-out



C707–009(2004–09)

Disconnecting step

8.3 Check steps for acceptable and unacceptable conditions

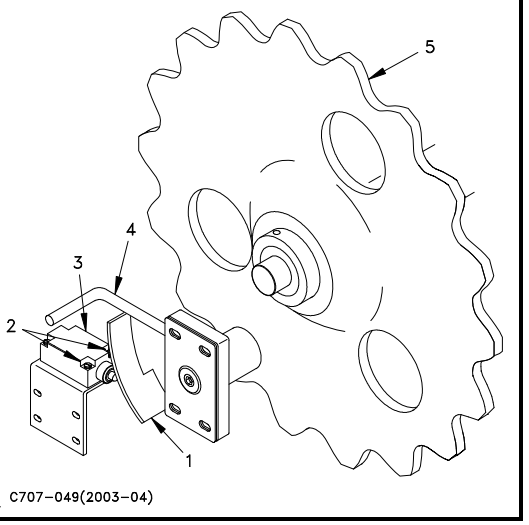
As steps are removed check them for the following.

- Check step for warp, cracks, loose or damaged rollers, loose or damaged step demarcation strips, and loose hardware. Check for damaged ribs and broken rib ends.
- If warped or cracked, replace with new step as required.
- If rollers are loose, tighten hardware. If worn or damaged rollers, replace as required with new rollers.
- If step demarcation strip is loose, tighten mounting hardware. If damaged, replace as required with new step demarcation strip.
- If hardware is loose, tighten hardware.

708-021 (2005-01)

8.4 Check and adjust step band lock

Complete the following to check and adjust step band lock.

Step	Action	Note
1.	Turn main power supply OFF.	
2.	Engage step band lock and make sure actuator (1) actuates the switch (3).	
3.	If switch (3) must be adjusted, loosen mounting hardware (2) on switch.	
4.	Adjust switch in or out to actuator (1) for the following condition. — Switch is actuated when step band lock is engaged with opening in drive sprocket (5) and handle (4) is lowered into locked position.	

7-002053 (2009-10)

8.5 Check internal safety devices

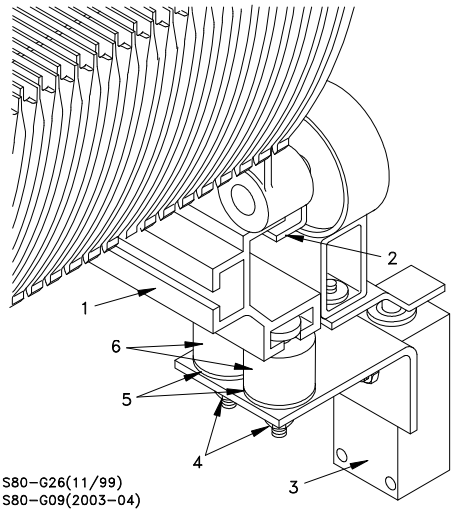
Complete the following to check and adjust (if necessary) the following internal safety devices.

NOTE! The procedures in this module describe checking and adjusting procedures. Complete adjusting procedures only when the primary checking procedures indicate an adjustment is necessary.

708-022 (2009-02)

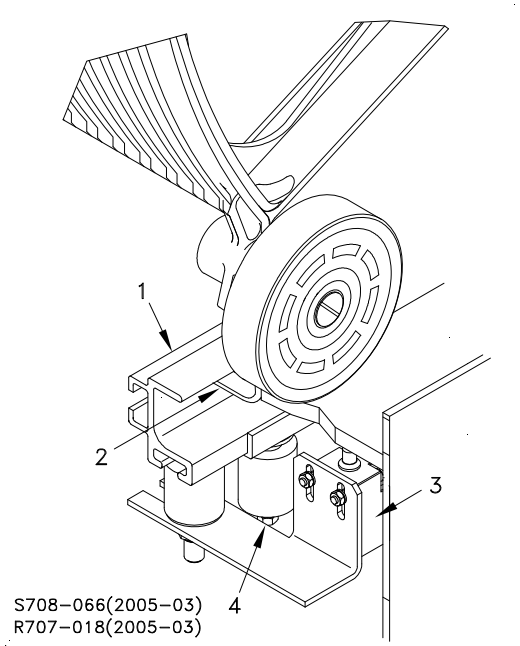
8.6 Check and adjust step lift switch

Complete the following to check and adjust step lift switch.

Step	Action	Note
1.	With one step removed, position opening in step band in lower curve area above step lift switch.	
2.	Turn main power supply OFF, and engage step band lock.	
3.	Check clearance between step lift track (1) and counterguide lug (2), and adjust track if necessary. • Adjust step lift track if clearance is greater than 5 mm [3/16 inch].	
4.	If step lift track is adjusted correctly, manually lift step lift track (1) and check limit switch (3) for the following conditions. • Switch should actuate after step lift track is lifted approximately 6 mm [1/4 inch], and should reset when step lift track is released.	
5.	If switch must be adjusted, loosen nut (4), and add or remove shims (5) under spacer block (6).	

7-002054 (2009-10)

8.7 Check and adjust step upthrust switch

Step	Action	Note
1.	With three steps removed, position hole in step band in lower curve area above step upthrust switch and track.	 S708–066(2005–03) R707–018(2005–03)
2.	Turn main power supply OFF, and engage step band lock.	
3.	Check clearance between step upthrust track (1) and counterguide lug (2), and adjust track if necessary. • Adjust step upthrust track if clearance is greater than 5 mm [3/16 inch].	
4.	If step upthrust track is adjusted correctly, manually lift step upthrust track, and check for the following conditions. • Switch (3) should actuate after step upthrust track is lifted approximately 5 mm [3/16 in.], and should reset when step upthrust switch track is released.	
5.	If track must be adjusted, adjust bolts (4) until switch actuates and resets correctly. • Step upthrust track has adjustment bolts located in three locations - at each end and in the middle of the track.	
6.	Disengage step band lock, and turn main power supply ON.	

708-108 (2007-06)

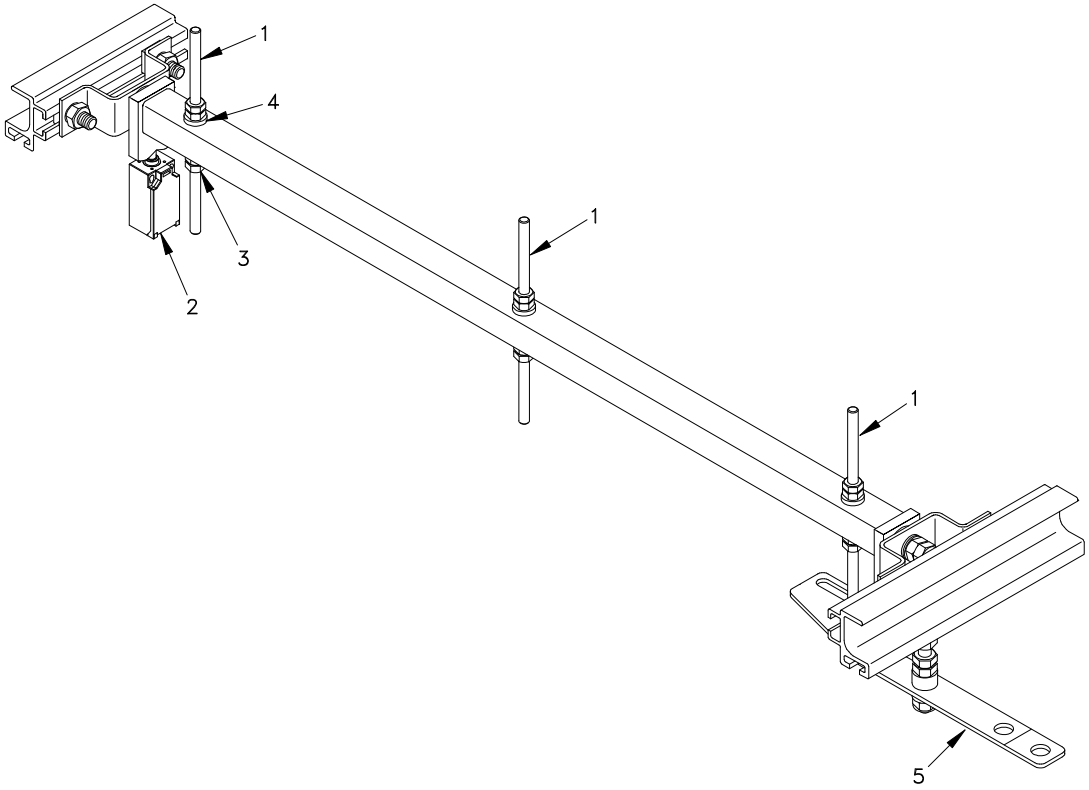
8.8 Check and adjust step sag device

Complete the following to check step sag switch.

Step	Action	Note
1.	Position hole in step band over lower step sag device.	
2.	Turn main power supply OFF, and engage step band lock.	

Step	Action	Note
3.	Measure clearance from trip levers (1) to steps. • Trip levers must actuate limit switch (2) if a step rises or lowers by more than 5 mm (3/16 inch).	
4.	If necessary, adjust for correct clearance between trip levers and step. • To adjust, loosen nuts (3 and 4) and adjust trip levers up or down until clearance to step is 4 mm (5/32 inch).	
5.	Check limit switch (2) operation by actuating limit switch by hand.	
6.	Make sure step band is clear of all personnel and equipment. **WARNING!**Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.	
7.	Disengage step band lock, switch ON main power supply, and try to run the escalator in both directions. • The escalator should NOT run.	
8.	Switch OFF the main power supply, and engage step band lock.	
9.	Reposition reset lever (5) to center position. NOTE!Reset lever is located behind the track sub, and contains a hole in the lever for use in moving lever back to center position.	
10.	Make sure step band is clear of all personnel and equipment.	
11.	With operator outside step band hole, disengage step band lock, and switch ON main power supply. Run the escalator until the step band hole is positioned at the upper step sag device.	
12.	Repeat the above procedure for upper step sag device.	

708-246 (2009-11)



S708–107(2002–11)

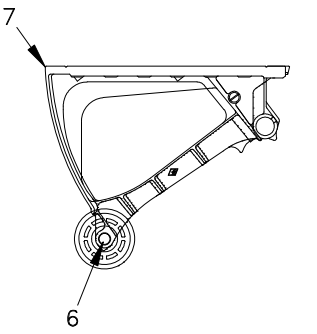
8.9 Adjust step sag device uphill and downhill

With three steps removed, the step sag device trip levers should actuate at the following two locations:

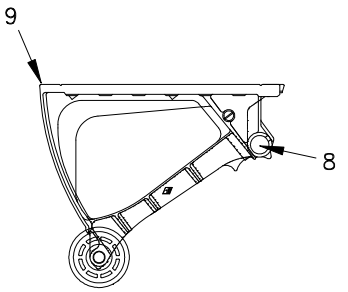
- at location of trailing roller (6) on uphill step (7)
- at location of step chain roller (8) of downhill step (9).

If step sag device does not actuate at these locations, adjust step sag device assembly uphill or downhill a small amount until switch actuates at both locations.

707-185 (2007-06)

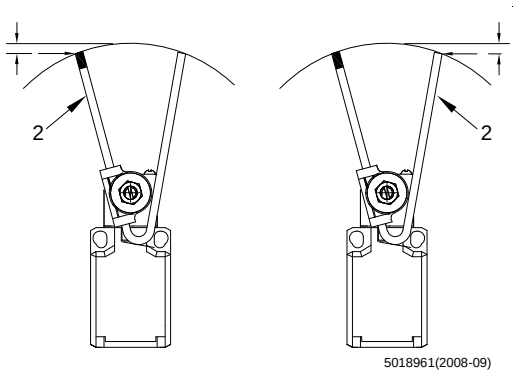
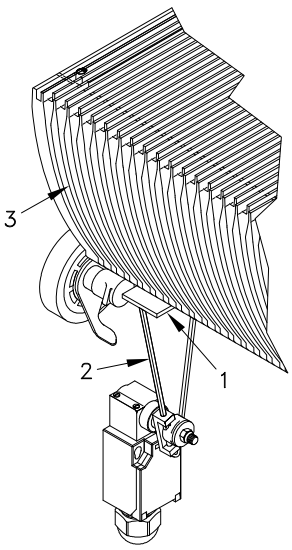


Three steps removed in step band



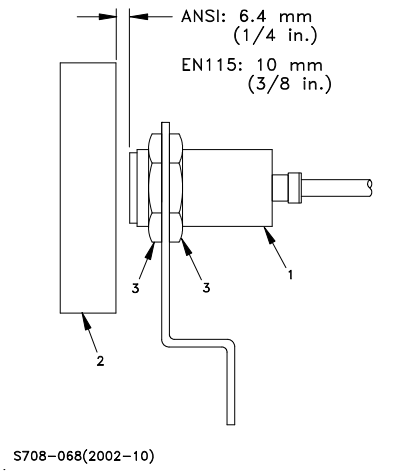
C707–156(6/02)

8.10 Check and adjust out-of-level step detectors

Step	Action	Note
1.	Place a 3.2 mm [1/8 inch] shim (1) between the switch wand actuator (2) and the step riser (3). • The switch should trip. If it does not, adjust in the following manner. NOTE!Contact with a step from either direction will cause the wand (2) to rotate in circular pattern and actuate the switch.	 5018961(2008-09)
2.	Loosen the switch mounting screws connecting the switch to the out-of-level step detector bracket.	
3.	Adjust the switch up or down to achieve a gap of 2.79 mm [7/64 inch] between the step riser and the switch wand actuator. • The switch should actuate when a 3.2 mm [1/8 inch] shim is placed between the step riser and switch wand actuator. If the switch does not actuate, move the switch upward slightly.	 S708–067(2005–07) R707–014(2005–07)
4.	Use same procedure to check and adjust the remaining out-of-level step detector in the same manner.	

708-109 (2008-09)

8.11 Check and adjust missing step detector

Step	Action	Note
1.	With three steps removed, position hole in step band above lower end missing step detector.	
2.	Turn main power supply OFF, and engage step band lock.	
3.	Check clearance between proximity sensor (1) and tapered flat head screw of trailing wheel (2). Sensor should be centered and approximately 6.4 mm [1/4 in.] from tapered flat head screw of trailing wheel.	
4.	If proximity sensor must be adjusted, loosen nuts (3) on sensor, and adjust until sensor is centered and approximately 6.4 mm [1/4 inch] from tapered flat head screw of trailing wheel.	
5.	Tighten nuts (3) on sensor.	
6.	Disengage step band lock, turn main power supply ON, and position hole in step band above the upper end missing step detector.	
7.	Turn main power supply OFF, and engage step band lock.	
8.	Use same procedure to examine and adjust the upper end missing step detector as was used for the lower end missing step detector.	
9.	Make sure step band is clear of personnel and equipment, disengage step band lock, and turn main power supply ON. **WARNING!**Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.	
10.	Run escalator on normal RUN with one step removed from step band, and make sure escalator stops when hole in step band passes each missing step detector.	

7-002040 (2009-10)

8.12 Check step system

Complete the following to check the step system.

Step	Action	Note
1.	Check for any worn, damaged, or misaligned tracks. • If tracks are worn or damaged, repair or replace track section. • If tracks are misaligned, realign and tighten. If necessary, repair or replace track section.	
2.	Make sure tracks and cross members are free of oil, dirt, and debris (clean).	
3.	Check that steps run free through step run-in guide. Adjust as required. • Steps should have approximately 1 mm [1/32 in.] clearance through step run-in guide.	
4.	Check bridges at lower end for wear, and free movement of reversing station. Repair or replace as required. • Repair or replace bridges as required. • If necessary apply grease to sliding surfaces of reversing station.	
5.	Visually check step guidance buttons on step. • If step guidance buttons are worn past wear indicator, replace step guidance buttons. *For more information on replacing step guidance buttons, refer to Minor Mechanical Repair/Replacing Step Guidance Buttons.*	

7-002043 (2009-10)

8.13 Cleaning (light cleaning)

Clean upper and lower end pits.

- There should be no oil or trash (rubbish) in pits.

NOTE! Dispose of oil in approved manner according to local governing codes.

708-016 (11/99)

9 STEP CHAIN MAINTENANCE MODULE

Suggested maintenance schedule for Step chain Module is one to six times per year, dependent upon escalator use.

9.1 Check and adjust automatic oiler

Step	Action	Note
1.	Check brushes (1) for correct position at lubricating points on step chain. Adjust brushes, if necessary.	
2.	Check oil level in reservoir (2). Fill with clean oil. NOTE!Make sure oil is absolutely clean when filling automatic oiler. Use escalator chain oil part number US505660032.	
3.	Check fitting connections for leakage. Tighten connections, if necessary.	
4.	Set pulse length and time delay between pulses.	

7-002057 (2010-02)

9.2 Setting pulse length and delay (501-B control system)

The pulse length and delay between pulses (for automatic oiler) are set by operational parameters in the controller.

Pulse length (lubrication pump on time)

- Set operational parameter 19 (MINUTES) to 00.
- Set operational parameter 20 (SECONDS) to 02.

Delay between pulses (lubrication pump off time)

Delay between pulses is dependent on rise and whether the escalator is indoors or outdoors.

NOTE! Values below are starting point values for an INDOOR escalator with a vertical rise of 4.5 m. Parameters must be checked after first maintenance is completed and adjusted accordingly.

NOTE! Values for escalators that are OUTDOORS and with different vertical rises may be different.

- Set operational parameter 21 (HOURS) to 01.
- Set operational parameter 22 (MINUTES) to 10.
- Set operational parameter 23 (SECONDS) to 00.

707-183 (2002-10)

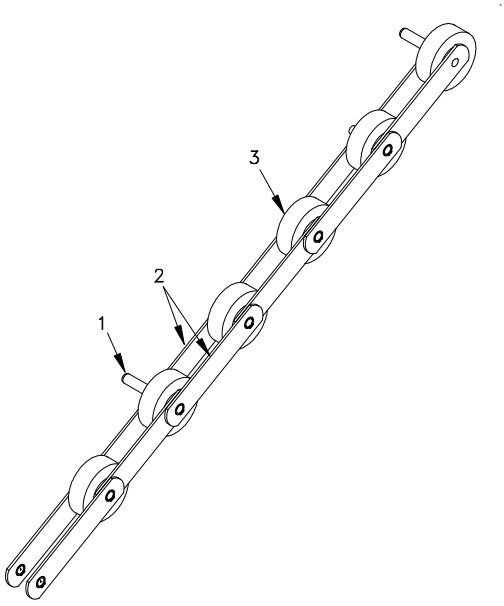
9.3 Lube-free step chain

If required, the step chain lip track may be moistened by a spray in the running surface area.

- Spray application may be required if noise is generated between step chain roller (3) and lip track.
- Spray application may be along the entire length of lip track.
- Spray application should be done once before putting the unit into operation.

NOTE! Use only a high pressure semi-synthetic grease (Rivotta SKD 3602), based on metal soap without solid additives for initial application.

7-002058 (2009-10)



C707–027(7/99)

9.4 Check step chain rollers

Complete the following to check step chain rollers.

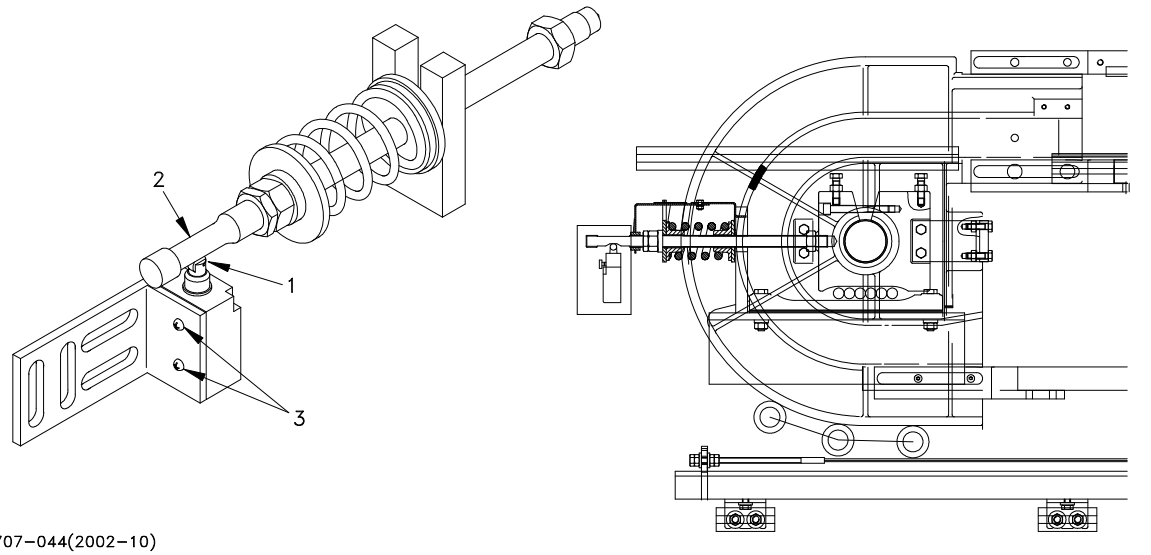
Step	Action	Note
1.	Make sure step band is clear of all personnel and equipment. **WARNING!**Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.	
2.	Disengage step band lock, switch ON main power supply, and run the escalator with hand held pendant control or inspection switch.	
3.	Check for any damage or wear of step chain rollers. Replace as required.	

7-002065 (2009-10)

9.5 Check and adjust broken step-chain switches

Step	Action	Note
1.	With main power supply OFF, physically depress switch actuator (1). Listen for audible click of switch.	
2.	Check location of switch actuator (1) to trip bar (2). • Switch actuator (1) should be in center of trip bar (2), and should just touch trip bar surface.	
3.	If switch must be adjusted, loosen mounting screws (3) and adjust switch actuator until actuator (1) is centered and just touches trip bar (2).	
4.	Tighten mounting screws (3).	
5.	Make sure step band is clear of personnel and equipment, and turn main power supply ON. **WARNING!**Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.	
6.	Place a screw driver between switch actuator (1) and trip bar (2) so switch actuates.	
7.	Try to run the escalator in BOTH directions using hand held pendant control or inspect switch. • The escalator should not start.	

7-002055 (2009-10)



C707–044(2002–10)

9.6 Check and adjust step chain tension (spring pack)

Check and adjust step chain tension as follows.

NOTE! Make sure step chain tension is adjusted uniformly on both sides of the escalator.

1. Position barricades, and remove access covers.
2. Turn main power supply OFF.
3. Engage step band lock.
4. In lower end pit, loosen outer jam nut (1).
5. Loosen inner jam nut (2) to remove spring pack compression and allow washer (3) to be spun freely.
6. Turn inner jam nut (2) until washer (3) touches spring washers (4) (actual dimension of spring pack without compression).
   – Spring washers must lie together backlash-free without any pretension.
7. Measure and record the spring pack length (H) between washer (3) and washer (5).
8. Turn jam nut (2) until the correct tension dimension is set for chain type used.
   – Determine the reduction dimension for chain type being set.
   – Subtract reduction dimension from spring pack length (H) to determine correct tension dimension.

   For more information on reduction dimensions, refer to table titled: Reduction Dimension.

Example only:

The following dimension for (H) is theoretical only.

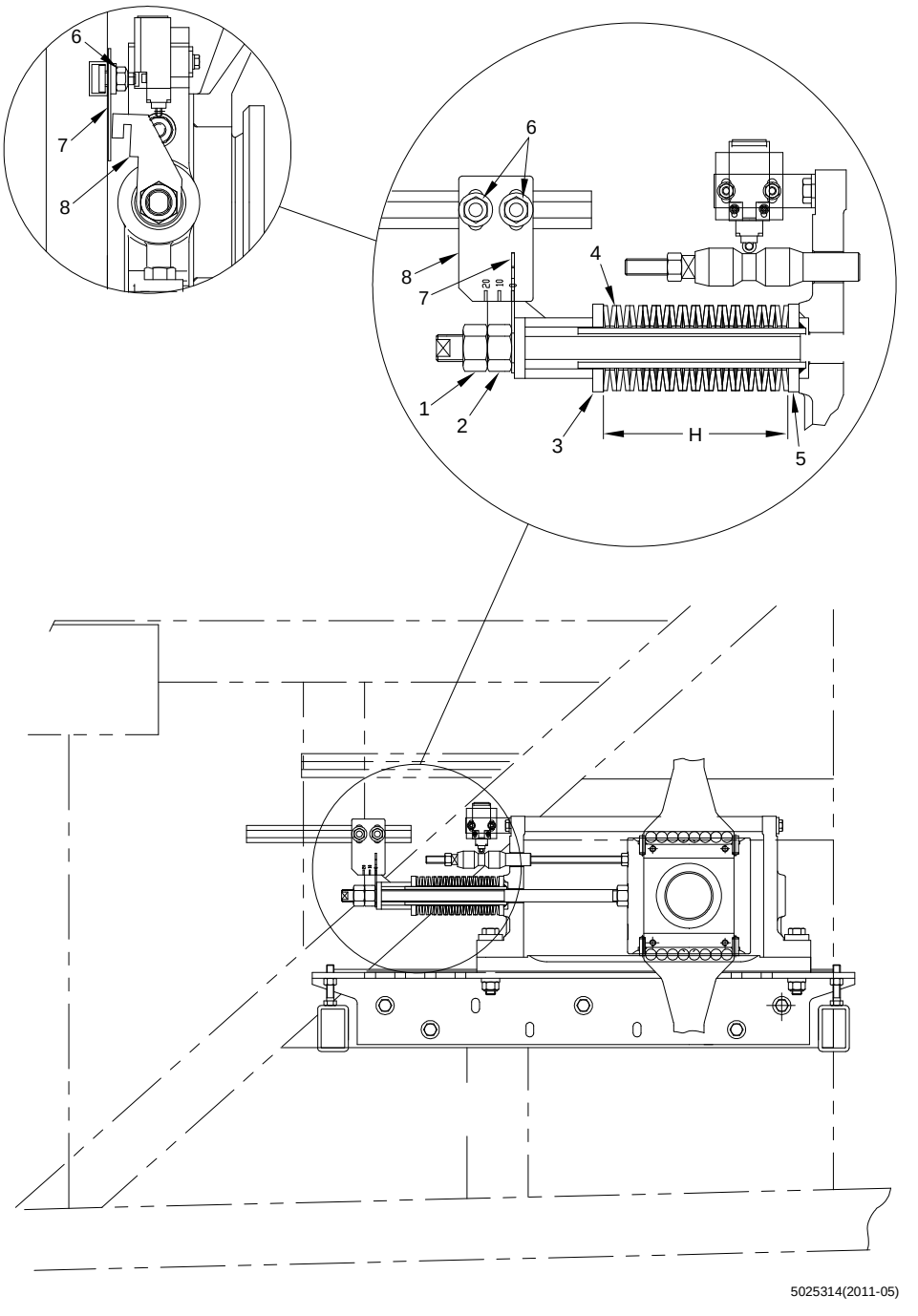
Spring length (H) - reduction dimension = tension dimension

140 mm - 5 mm = 135 mm

9. Tighten outer jam nut (1) to secure inner jam nut (2).
10. Repeat tension procedure for opposite side step chain.
11. Measure and record spring length (H) for both step chains (spring pack under tension dimension).
12. Run the step band for one revolution.
13. Check spring length (H) for both step chains.
    – If spring length differs from recorded dimension (spring pack under tension dimension), reset spring length to recorded dimension.
14. Adjust step chain tension on opposite side of the escalator in the same manner.
15. Loosen hardware (6) and reposition the spring scale (7) so the pointer (8) is set to zero.
16. Disengage step band lock, turn main power supply ON, and replace access covers.
17. Run escalator for at least two revolutions, and make a visual check of the escalator before returning the escalator to service.
18. Remove barricades, and return escalator to service.

Reduction dimension	
Chain type	**Reduction dimension**
16HDV	5 mm
22HDV	6.5 mm
30HDV	8 mm

5025314 (2011-05)



10 HANDRAIL MAINTENANCE MODULE

Suggested maintenance schedule for Handrail Module is one to two times per year, dependent upon escalator use.

10.1 Clean and check handrail guides

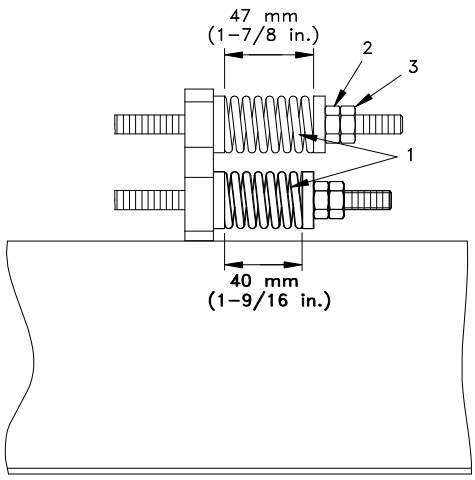
Complete the following to clean handrail guides and newel roller guides.

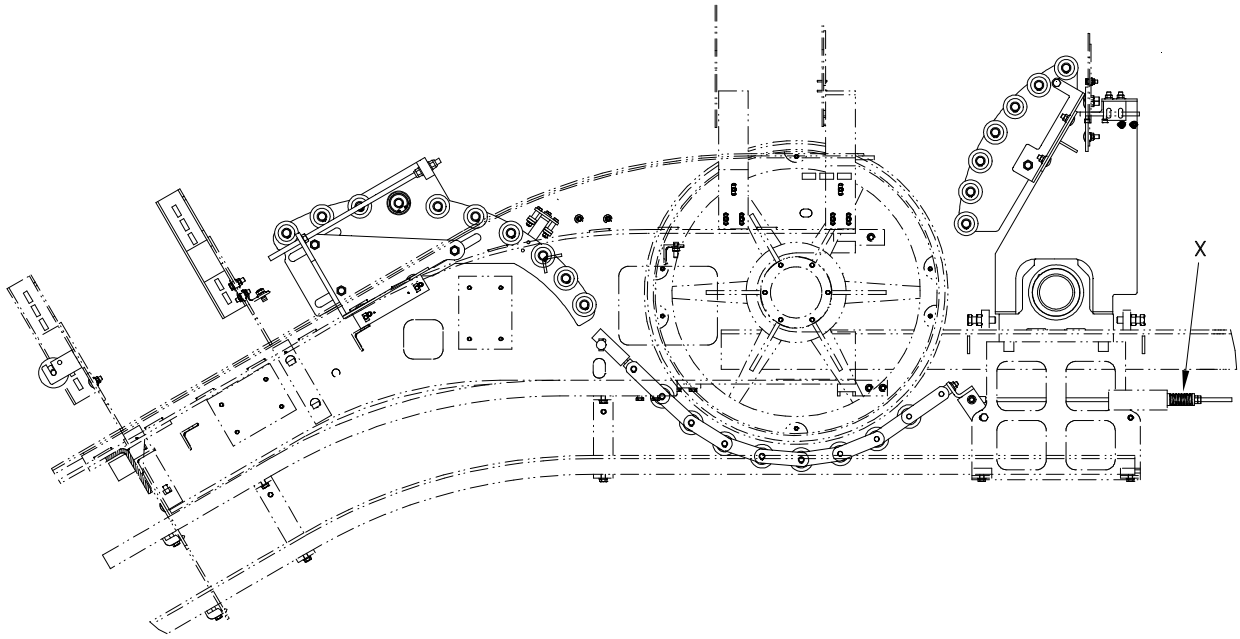
Step	Action	Note
1.	Starting at the lower end, tilt handrail up on one side and remove handrail from handrail guide and newel ends.	
2.	Vacuum and clean exposed section of handrail guide and newel ends.	
3.	Check joints between handrail guide sections. Adjust as required. • Handrail guide joints should be aligned without gaps.	
4.	Check handrail guides for excessive wear. Replace as required. NOTE!Pay special attention to underside of lower end curve and top surface at upper end curve.	
5.	Replace handrail on handrail guide.	

708-030 (2003-02)

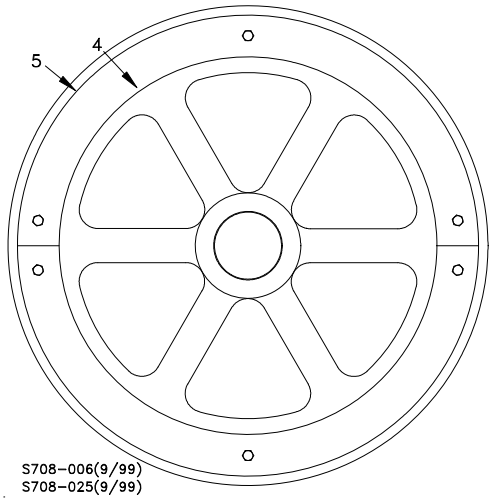
10.2 Check handrail drive pressure rollers (drive area)

Complete the following to check the handrail drive in the drive area.

Step	Action	Note
1.	Check length of handrail drive springs (1) located in upper end pit and adjust if necessary. Upper spring length should be approximately 47 mm [1-7/8 in.], and lower spring length should be 40 mm [1-9/16 in.]	
2.	Adjust spring length by loosening lock nut (2) and adjusting nut (3) until compressed spring length is correct. NOTE!Make sure handrail does not slip after adjusting spring length.	



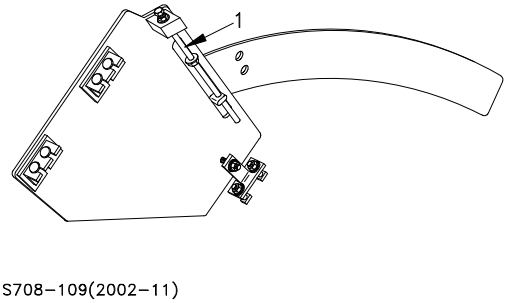
FuReX (ECOMOD): *Set spring length (X) for handrail pressure rollers to 32 mm [1-1/4 in.]*

Step	Action	Note
3.	Remove inner deck in area of handrail drive wheel (4).	
4.	Clean any grease or oil from handrail drive wheel rubber. NOTE!Escalators with inclined solid balustrades have only V-type handrails. The V-type handrail drive wheel does not have have a rubber surface.	
5.	Check rubber (5) on handrail drive wheel for damage, cracks or splits, and wear. • If rubber is damaged, cracked or split, replace handrail drive wheel as required. • If rubber thickness is less than 3 mm [1/8 in.], replace handrail drive wheel segments as required.	

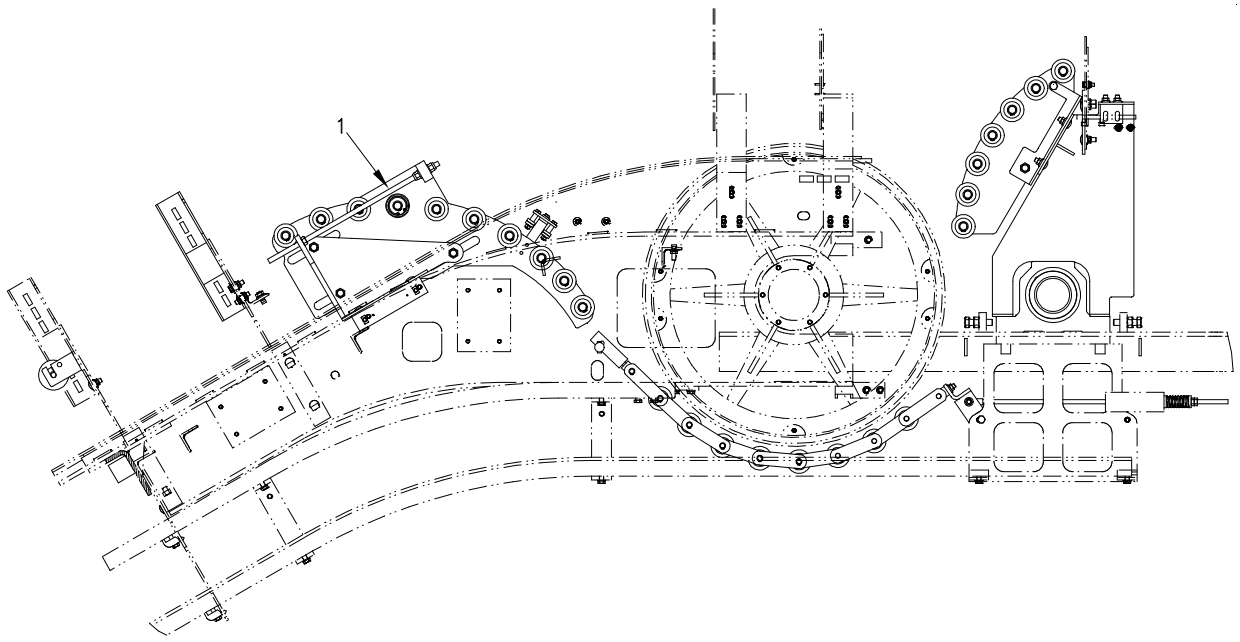
7-002045 (2009-10)

10.3 Adjust handrail tension (with take-up roller in drive area)

Complete the following to check and adjust handrail tension.

Step	Action	Note
1.	To check handrail tension, lift handrail off lower curve handrail guide. • Remove handrail in lower curve up to first incline inner panel joint. • Handrail should be 1 mm [1/32 in.] above handrail guide at lower curve.	
2.	If handrail tension must be adjusted, adjust take-up rollers (1) at upper end handrail drive until handrail raises 1 mm [1/32 in.] above handrail guide at lower curve.	

7-002046 (2009-10)



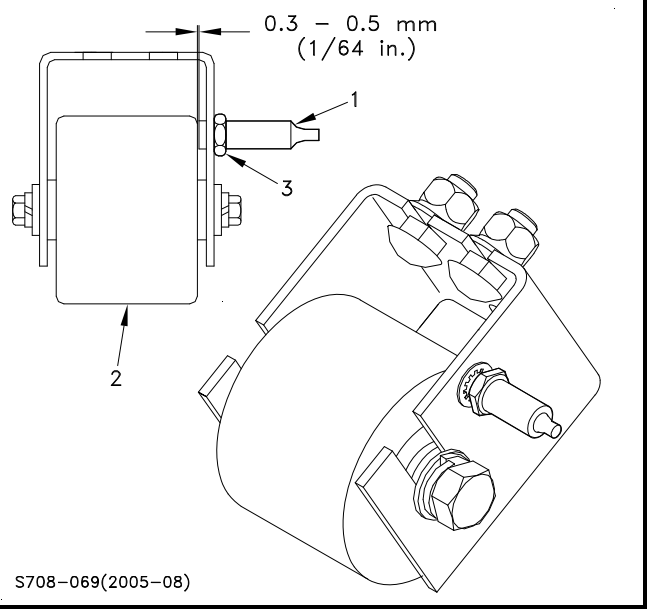
10.4 Clean handrails

After cleaning handrail guides and adjusting handrail tension, clean outer surface of handrails.

Wipe handrail with a cloth dampened with Handrail Cleaner or a mild hand soap and warm water. Then, dry with a cloth.

708-107 (10/2001)

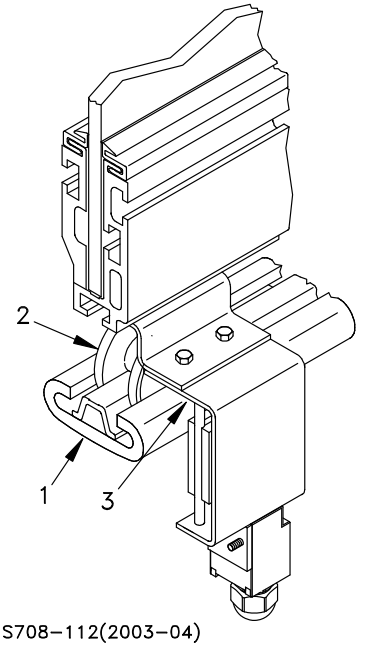
10.5 Check and adjust handrail speed sensor

Step	Action	Note
1.	Remove inner deck over handrail speed sensor area.	
2.	Turn mainline disconnect OFF, and engage step band lock.	
3.	Check gap between proximity sensor (1) and roller (2). • Gap should be approximately 0.3 - 0.5 mm [1/64 in.].	
4.	Adjust gap, if necessary, by loosening nut (3) and adjusting sensor (1) for correct gap.	

708-111 (2003-01)

10.6 Check and adjust broken handrail monitor

Complete the following to check the broken handrail monitor.

Step	Action	Note
1.	Remove handrail (1) from lower curve.	 S708–112(2003–04)
2.	Make sure step band is clear of personnel and equipment, disengage step band lock, and turn main power supply ON. **WARNING!**Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.	
3.	Start escalator in UP direction. • When handrail no longer supports roller (2), the roller will drop and shut the escalator OFF.	
4.	If adjustment must be made, adjust screws (3) for the following. • Roller (2) is supported by handrail, and does not deflect handrail by more than 5 mm [3/16 in.]. NOTE!Handrail tension must be set correctly before adjusting handrail brake monitor. *For more information on handrail tension, refer to Handrail Maintenance Module>Adjust handrail tension (with take-up in drive area).*	

7-002059 (2009-10)

11 CLEANING MODULE

11.1 Clean pits and step band

Complete the following to clean pits and step band with five steps removed.

NOTE! A step spreader bar must be inserted every fifth step that is removed.

WARNING

Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before attempting to start escalator.

Step	Action	Note
1.	Place barricades at both ends of the escalator.	
2.	Remove and check five steps in preparation for cleaning. • Remove five different steps each time this module is completed.	*For more information on removing steps refer to section Guide Maintenance Module>Preparing>Remove and Replace steps.*
3.	Turn main power supply OFF, and engage step band lock.	
4.	Clean anything inside step band that can be easily reached with a five step opening in the step band.	
5.	Turn main power supply ON, and disengage step band lock.	
6.	Reposition step band hole at either the upper or lower end.	
7.	Turn main power supply OFF, and engage step band lock.	
8.	Clean pit with vacuum and approved cleaners. • There should be no oil or trash (rubbish) in pits.	NOTE!Dispose of oil in approved manner according to local governing codes.
9.	Move step band hole to opposite end of the escalator, and clean that pit in the same manner.	

708-053 (11/2001)

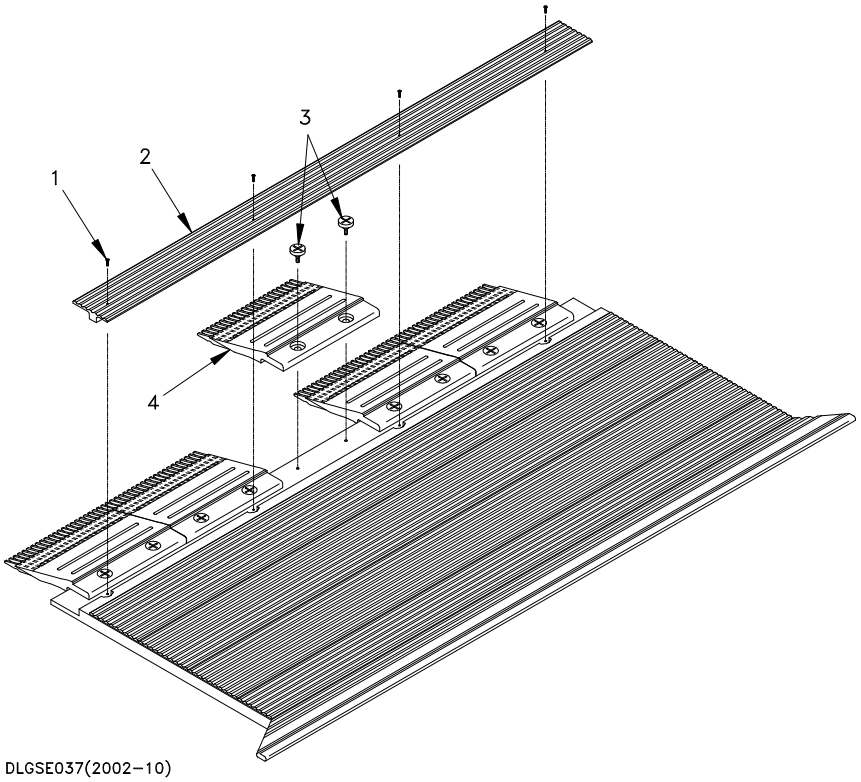
12 MINOR REPAIRS

12.1 Replace comb segments

Complete the following to replace comb segments.

Step	Action	Note
1.	Place barricades at both ends of the unit.	
2.	Remove upper end access cover, turn main power supply OFF.	
3.	Remove mounting screws (1) from cover plate (2), and lift the cover upward, using gentle pressure from a small screw driver.	
4.	Remove mounting screws (3) from comb segment (4), and remove comb segment from combplate.	
5.	Replace comb segment, and complete replacement procedure in reverse order of removal.	

708-033 (3/2002)

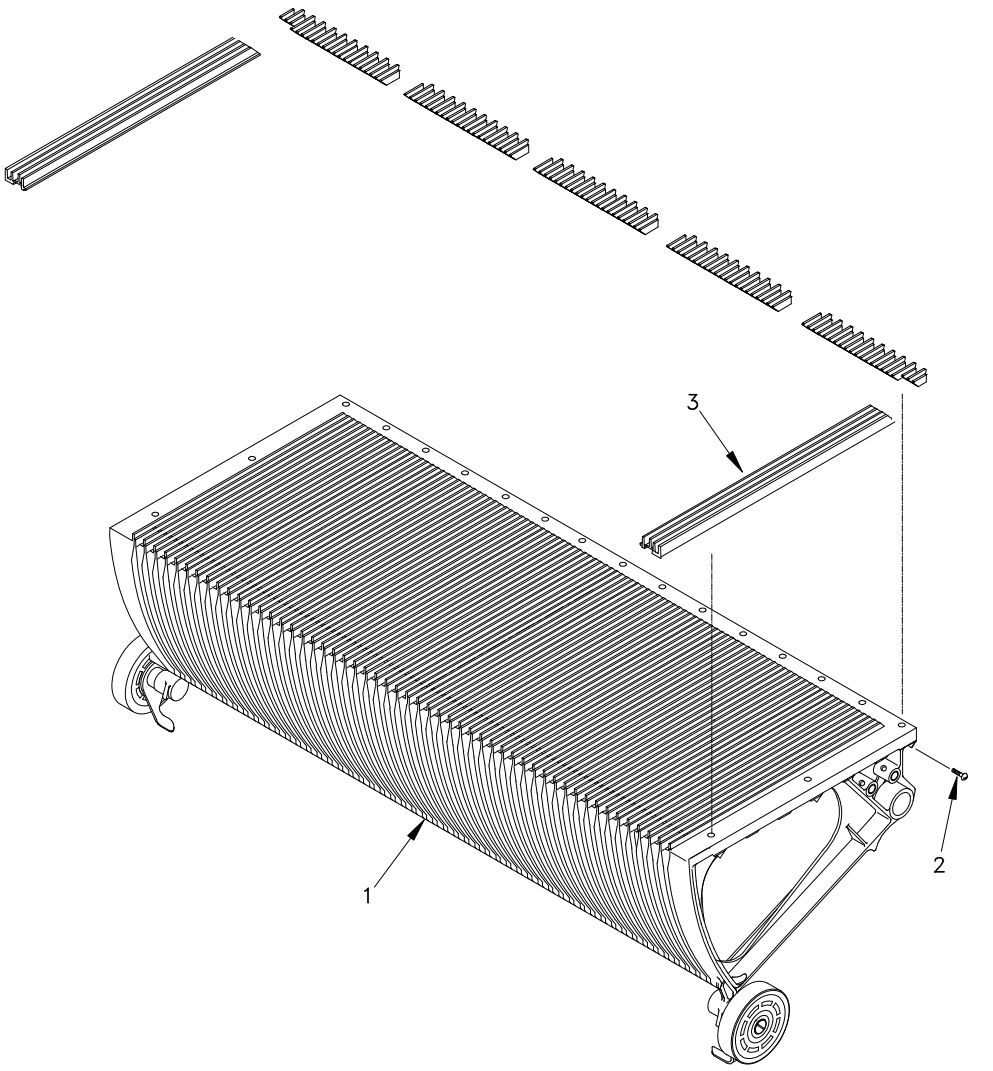


12.2 Replace step demarcation inserts

Complete the following to replace step demarcation inserts.

Step	Action	Note
1.	Remove each step(s) containing step demarcation insert(s) to be replaced.	
2.	Turn the step (1) over, and remove all the fasteners (2) on each insert (3) being removed.	
3.	Remove the insert, and discard if necessary. The fasteners can be reused.	
4.	Position insert on step, and attach to step with screws. NOTE!The screws should be tightened with just enough force to hold the insert securely. Excessive over tightening will cause the insert to fail.	
5.	Replace the step(s) and return the unit to service.	

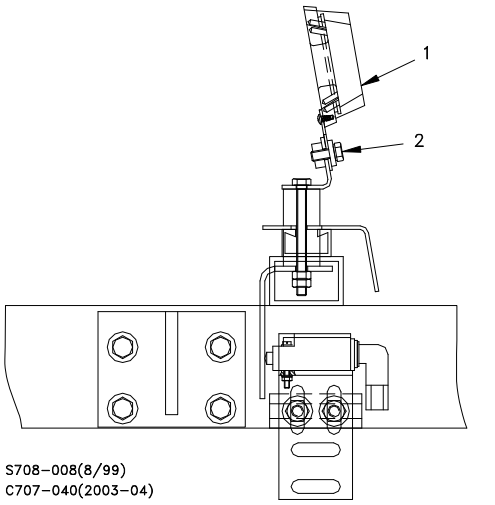
708-035 (2006-11)



S708–070(2005–01)
P707–035(2003–10)

12.3 Change handrail inlet brush guard

Complete the following to replace handrail inlet brush guard.

Step	Action	Note
1.	Place barricades at both ends of the escalator.	
2.	Remove upper end access cover, turn main power supply OFF, and engage step band lock.	
3.	Remove inner deck at location of brush guard being removed.	
4.	Remove frontplates.	
5.	Remove mounting bolts (2) on brush assembly (1) and remove brush.	

708-034 (1/2002)

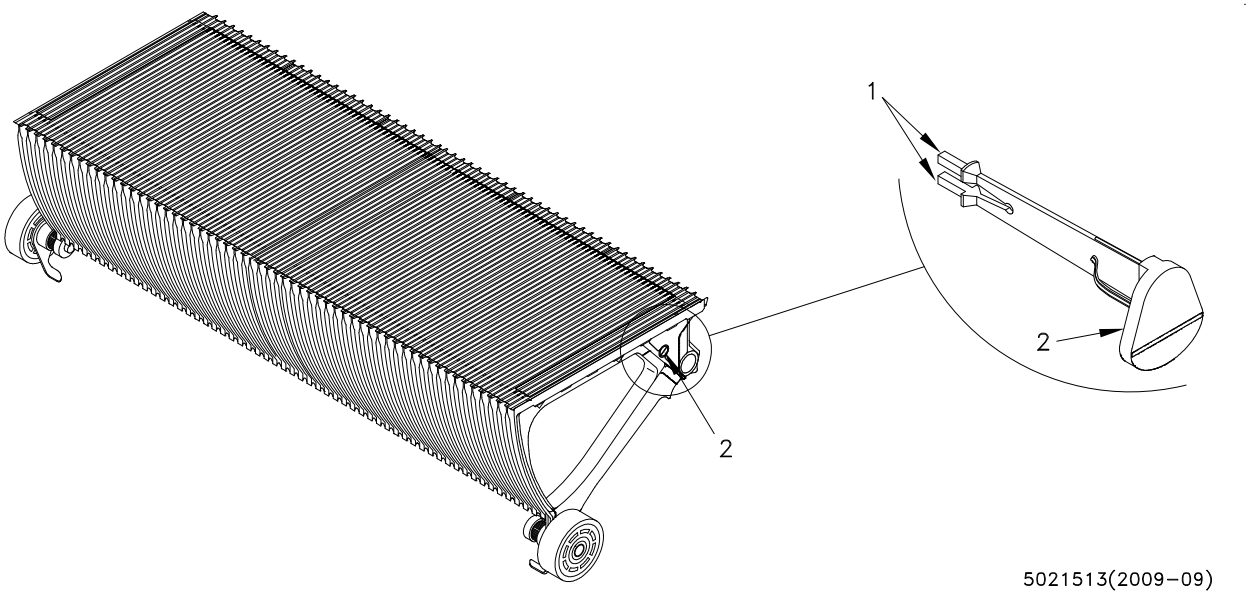
12.4 Replace step guidance buttons

The step guidance button contains a wear indicator groove on the face of the button. After the groove disappears, the step guidance button should be replaced. It is recommended that when replacing step guidance buttons, all buttons should be changed at one time. Complete the following to replace step guidance buttons.

NOTE! The step guidance button can be replaced in either the upper or lower end pits. However, due to space restrictions, it is simpler to replace step guidance buttons in the lower end pit.

Step	Action	Note
1.	Place barricades at both ends of the escalator.	
2.	Remove access covers, and position step containing step guidance button to be replaced in a convenient position.	
3.	Turn main power supply OFF, and engage step band lock.	
4.	Insert screw driver into small slot on side of step guidance button, and pry step guidance button out of step. **ALTERNATE METHOD:** Squeeze the extended tabs (1) toward each other, and push the step guidance button (2) out of the step.	
5.	Push a new step guidance button into position on the step to complete the replacement procedure.	

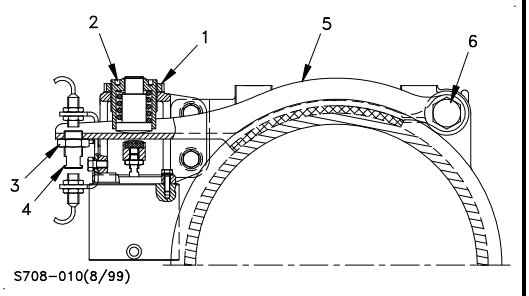
7-002063 (2009-10)



5021513(2009–09)

12.5 Replace brake arm

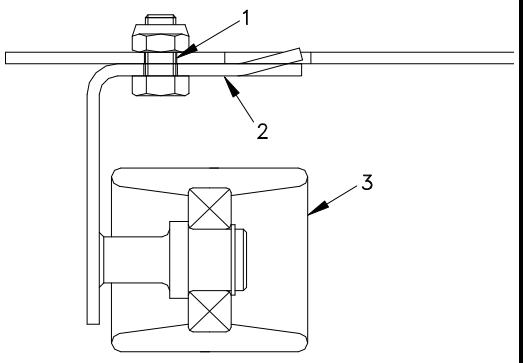
Complete the following to replace brake arm.

Step	Action	Note
1.	Place barricades at both ends of the escalator, and remove both access covers.	
2.	Remove five steps, and position step band hole at the drive area above the brake. NOTE!Make sure a spacer bar is inserted for a step at every fifth step chain pin.	
3.	Turn main power supply OFF, and engage step band lock.	
4.	Disconnect electrical plug connector from the brake assembly.	
5.	Remove groove nut (1) and loosen set collar (2) to relieve spring pressure of plunger on brake arm (5).	
6.	Loosen nut (3) and turn bolt (4) out of brake arm (5).	
7.	Remove pivot bolt (6) and remove brake arm (5).	
8.	Replace brake arm in reverse order of removal. NOTE!Use a thread locking compound (temporary grade) on pivot bolt (6), to prevent it from loosening due to vibration.	
9.	Adjust brake.	

708-037 (2006-11)

12.6 Replace handrail return guide roller

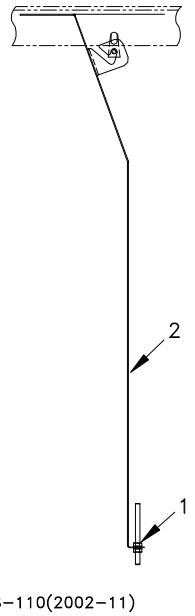
Complete the following to replace handrail return guide roller located along the incline.

Step	Action	Note
1.	Place barricades at both ends of the escalator, remove access cover, and turn main power supply OFF.	
2.	Remove inner deck at location of roller being removed.	
3.	Remove fastening bolt (1) from the roller mounting bracket (2).	
4.	Replace the roller assembly (3).	
5.	Replace the inner deck, and return escalator to service.	

708-038 (10/2001)

12.7 Replace step guards

Complete the following to replace step guards.

Step	Action	Note
1.	Place barricades at both ends of the escalator, and remove access cover.	 S708–110(2002–11)
2.	Turn main power supply OFF.	
3.	Remove fasteners (1) and lift guard (2) from pit.	
4.	Replace in reverse order.	

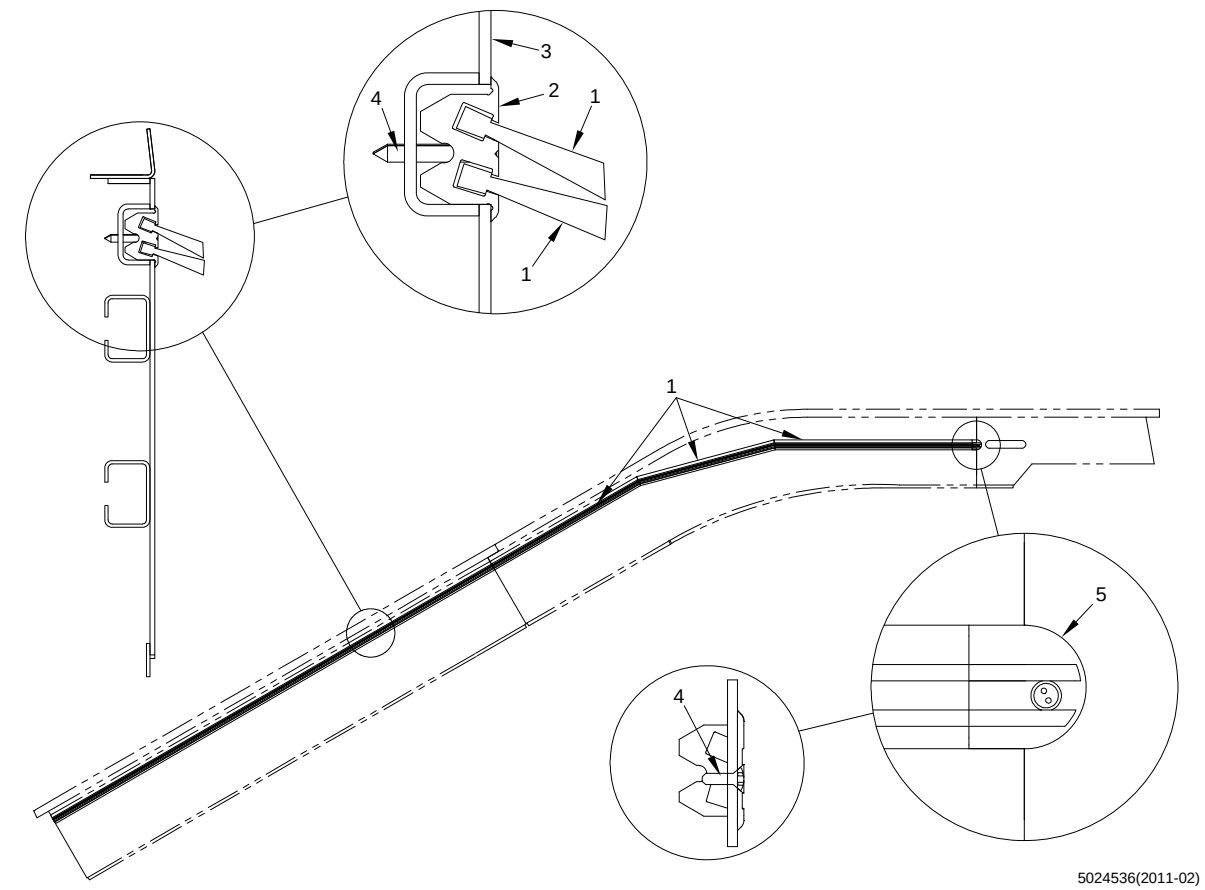
708-039 (11/99)

12.8 Replace skirt brush guards

Skirt brushes (1) are mounted to a plastic profile (2) that is mounted to the skirt (3) with self-tapping screws (4). Complete the following to replace skirt brushes.

Step	Action	Note
1.	Place barricades at both ends of the escalator, and remove upper end access cover.	
2.	Turn main power supply OFF.	
3.	Remove screws (4) from end cap (5) closest to skirt brush being replaced.	
4.	Slide skirt brush out from profile, and slide in new skirt brush.	
5.	Replace end cap (5), turn main power supply ON, replace access cover, and remove barricades.	

7-002060 (2009-10)



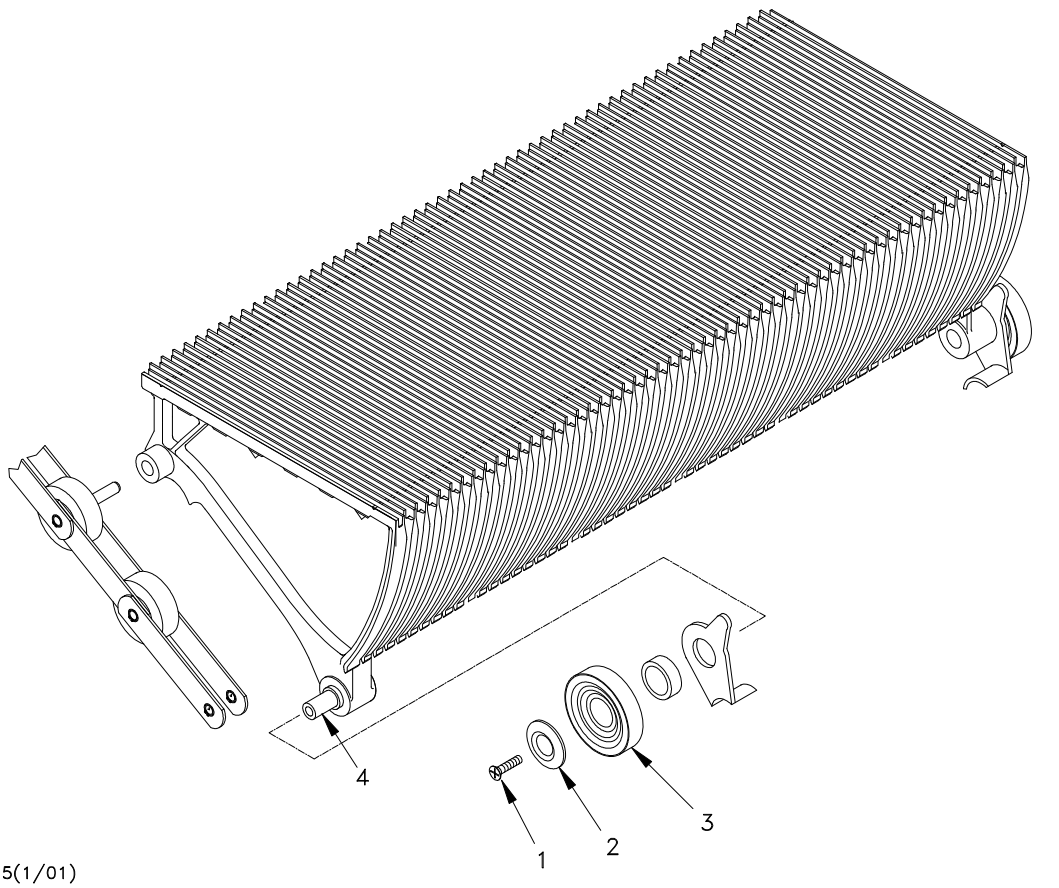
5024536(2011-02)

12.9 Replace step rollers

Complete the following to replace step rollers.

Step	Action	Note
1.	Remove screw (1). NOTE!Always use a new screw (1) when replacing step rollers.	
2.	Remove retaining ring (2).	
3.	Pull wheel (3) off pin (4).	
4.	Replace in reverse order of removal, and tighten screw (1) to 16-17 Nm [11.8-12.5 ft/lbf]. NOTE!Use a thread locking compound (temporary grade) on screw (1).	

708-044 (2003-03)



S708–015(1/01)

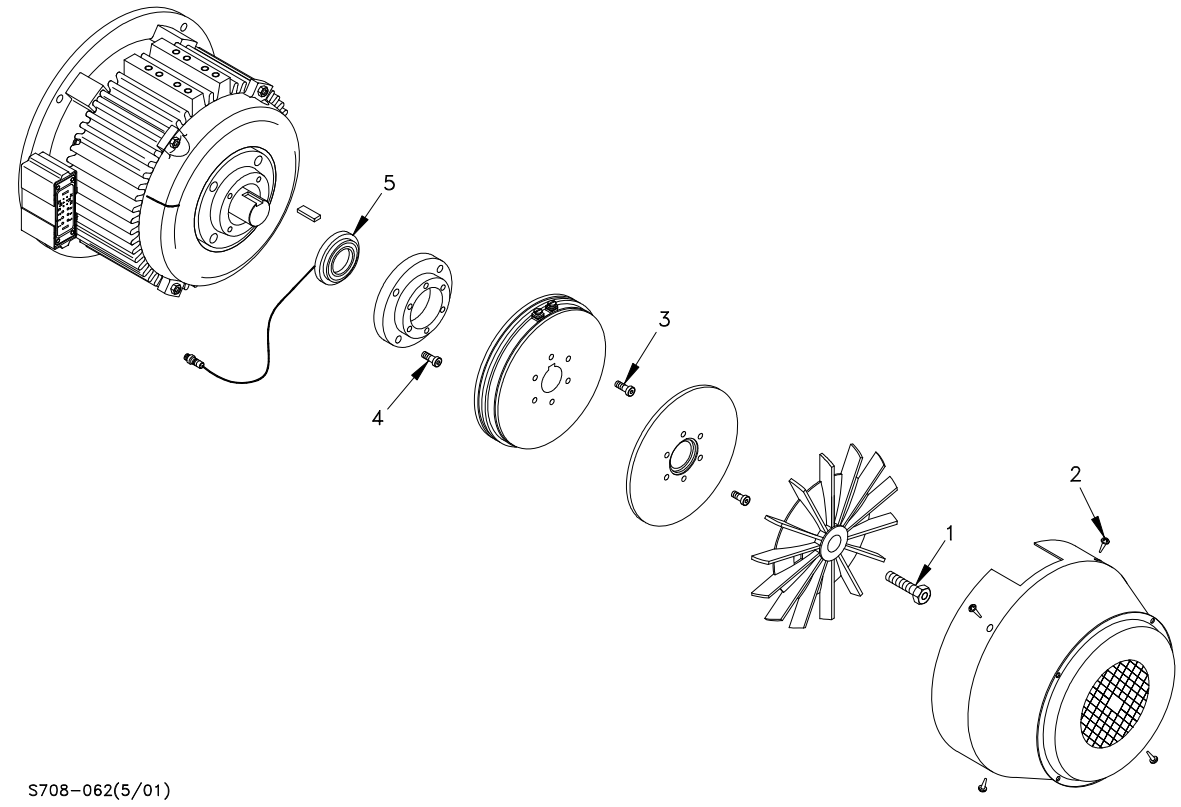
12.10 Replace encoder bearing (permanent magnet brake)

Complete the following to replace encoder bearing (5) located on end of drive motor.

Step	Action	Note
1.	Place barricades at both ends of the escalator.	
2.	Remove access covers at both ends of the escalator.	
3.	Move inspect switch to INSPECTION.	
4.	Remove three steps and move hole in step band to drive motor area at the upper end.	
5.	Turn main power supply OFF, and engage step band lock.	
6.	Remove mounting bolts from air shroud (2), and remove shroud.	
7.	Remove bolt in center of brake armature (1). **WARNING!**Serious injury or death can occur from rotating step band. Make sure step band is clear of all personnel and equipment before turning main power supply ON.	
8.	Make sure step band is clear of equipment and personnel, and turn main power supply ON.	
9.	Turn CONSTRUCT switch ON in the controller to release the brake.	
10.	Remove armature from shaft. • Armature is mounted to shaft with a key. Make sure key does not fall from keyway when armature is removed.	
11.	Turn main power supply OFF.	
12.	Remove wiring to brake. • If wire is sufficient to move brake out of the way without damaging wiring, wiring may not need to be removed.	
13.	Remove bolts (3) connecting brake coil to motor, and remove brake coil.	
14.	Drain gear box oil.	
15.	Remove mounting bolts for motor, and remove motor.	

Step	Action	Note
16.	Install new motor. **Optional method:** Take original motor to machine shop for encoder bearing replacement, and reinstall original motor.	
17.	Check encoder wiring. NOTE!Make sure encoder wiring is correct.	
18.	Refill gear box with oil, and complete replacement procedure in reverse order of removal.	

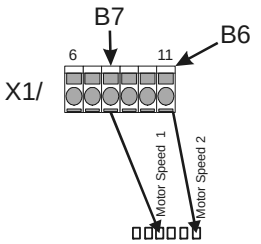
707-123 (1/2002)



S708–062(5/01)

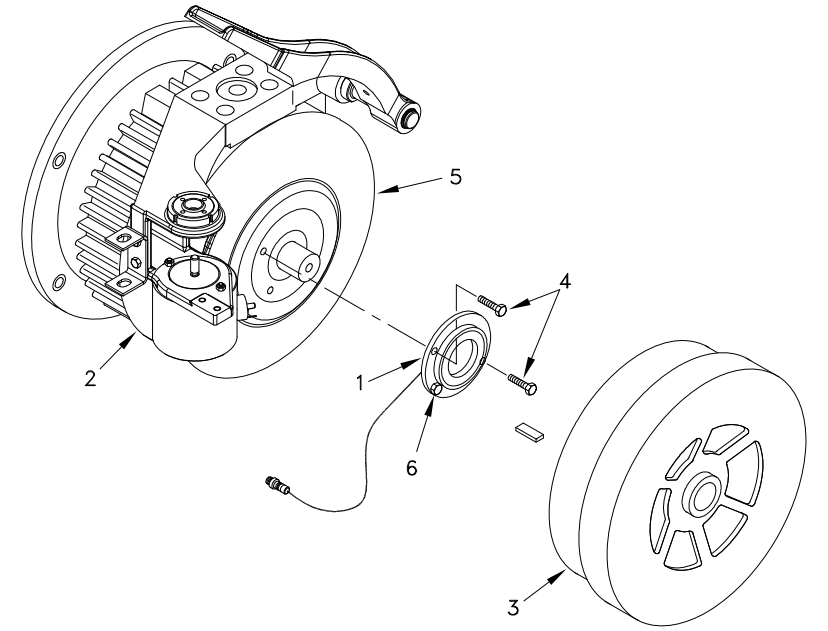
12.11 Replace encoder bearing (brake with brake-arm)

Complete the following to replace encoder bearing (1) located on drive motor.

Step	Action	Note
1.	Place barricades at both ends of the escalator.	
2.	Remove access covers at both ends of the escalator.	
3.	Remove 10 steps, and move hole in step band above drive motor area. NOTE! Insert a spacer bar in step band after five steps are removed.	
4.	Turn main power supply OFF, and engage step band lock.	
5.	Drain gear box oil. Gear box capacity is as follows: • **1 drive motor:** Gear box capacity is 7 liters [7.4 quarts] • **2 drive motors:** Gear box capacity is 8 liters [8.5 quarts]	
6.	Remove drive motor (2).	
7.	Remove brake drum (3) using a gear puller.	
8.	Remove screws (4) mounting encoder bearing (1) to drive motor end plate (5), and remove encoder bearing. NOTE! Remove only the two opposing screws (4). Do not remove third screw (6).	
9.	Place sealant on drive motor end plate (5) where outer mounting surface of encoder bearing will be. • Use sealant DEE0917016.	
10.	Install encoder bearing, and secure with screws (4).	
11.	Install brake drum (3) and secure with M16x10 hardware.	
12.	Install drive motor, and fill gear box with oil.	
13.	Turn motor by hand, and check that green LEDs for Motor Speed 1 and Motor Speed 2 on ECO Main Board flicker.	 S708-117 (2002-11)
14.	Adjust brake.	
15	Install steps.	

Step	Action	Note
16.	Make sure step band is clear of personnel and equipment, and check for correct operation. • If Fault 42 appears, switch wires from terminal X1/8 and X1/11. NOTE! Terminals X1/8 and X1/11 are located on ECO Main Board (EMB 501)	

708-248-20265053 (2011-02)



S708−116(2009−01)

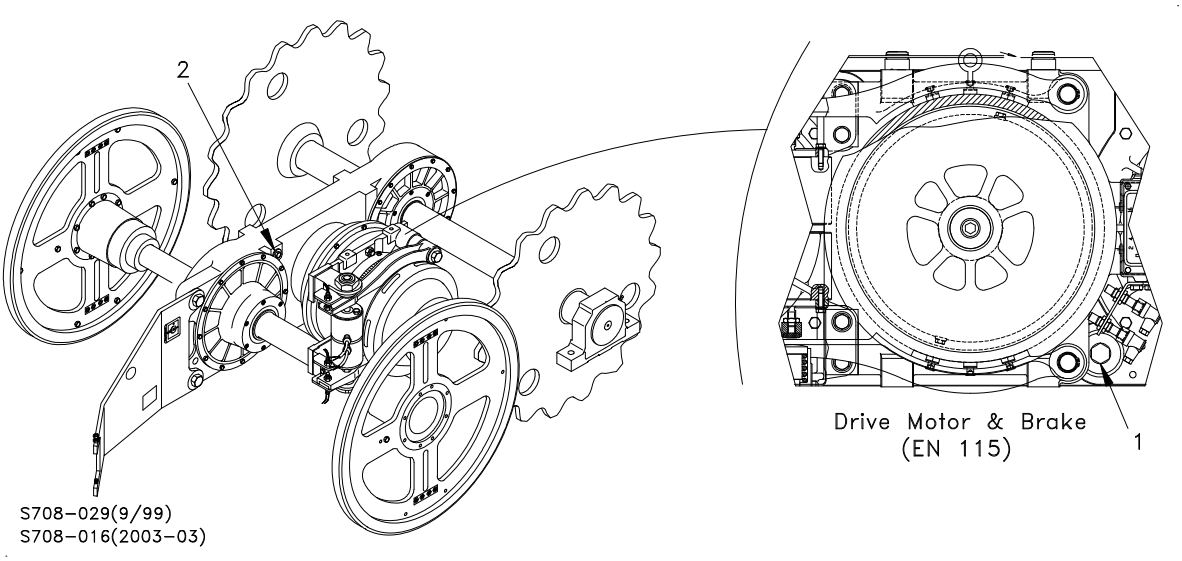
12.12 Change gear box oil

Complete the following to change gear box oil every five years or 25000 hours.

NOTE! If optional chip contact sensor is installed, change gear box oil every five years or 40000 hours.

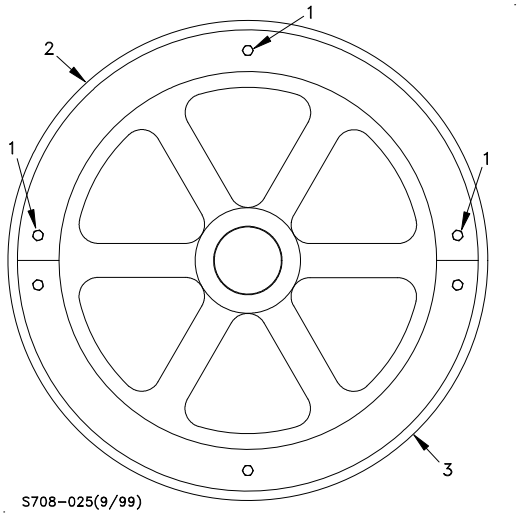
Step	Action	Note
1.	Place barricades at both ends of the escalator.	
2.	Remove four steps, engage step band lock, and turn main power supply OFF.	
3.	Position container that is large enough to hold gear box oil beneath drain plug (1). • Gear box capacity is 7 liters [7.4 quarts].	
4.	Remove drain plug (1), drain gear box oil from gear box, and replace drain plug. NOTE! Dispose of oil according to local governing codes.	
5.	Remove filler plug (2) and fill gear box to proper level with one of the following approved gear box oils. • Use synthetic oil CLPPG 680 (DEE2213667) or • Use synthetic oil Mobil SHC 634 (US69887003) NOTE! Gear box capacity is as follows: • **1 drive motor:** Gear box capacity is 7 liters [7.4 quarts] • **2 drive motors:** Gear box capacity is 8 liters [8.5 quarts]	

708-054-20265053 (2011-02-10)



12.13 Replace handrail drive wheel rim half

Complete the following to replace handrail drive wheel rim half.

Step	Action	Note
1.	Place barricades at both ends of the escalator, and remove inner deck at the upper end curve of the escalator.	
2.	Remove upper end access cover, and rotate step band to position handrail drive wheel. • Position handrail drive wheel so three mounting bolts (1) are accessible.	
3.	Turn OFF main power supply, and remove three mounting bolts (1).	
4.	Rotate the rim half (2) until it will clear the glass support brackets, and remove rim half from the escalator.	
5.	Install new rim half (2). • Tightening torque for bolts (1) is 55 Nm [40.5 lbf ft].	
6.	Rotate handrail drive wheel 180 degrees, and remove second rim half (3).	
7.	Install new rim half (3), and complete replacement procedure in reverse order of removal.	

708-047 (2003-03)

13 APPROVALS AND VERSION HISTORY

Compiled by: Training & Product Information / Moline

Checked by: Escalator Manufacturing / Charles Banks

Approved by: Escalator Manufacturing / Charles Banks

Issue	Date	Description of change	Ref CR	Approved by
-	2009-11-24	First release		Charles Banks
-	2010-03-05	Revisions per owner feedback		Charles Banks
A	2011-02-10	Revisions per owner feedback		Charles Banks
B	2011-05-25	Revisions per owner feedback		Charles Banks