General Bus, AC and Lift Maintenance

Kenny Krych
Must Do’s to get the Most from Your Bus AC
Get into the Comfort Zone

![Temperature and Humidity Comfort Zone Chart]

- Uncomfortable
- Comfortable
- Still comfortable
Bus Air Conditioning

What is bus air conditioning?

Goal of Air Conditioning

- Reduce Temperature
- Filter Air
- Dehumidify
- Circulate Air
Top 10 Actions

Must Do’s to Get the Most from Your Bus AC

#1

Register your bus a/c system for warranty. This is important for several reasons...

- If you call for help the manufacturer can know what you have in your bus
- Occasionally there are product improvements or service bulletins that can affect reliability or performance
- In some rare cases a Safety Campaign is necessary and it is critical to get in touch with the affected bus operators
Top 10 Actions

Must Do’s to Get the Most from Your Bus AC

Do a delivery Inspection to ensure the system is operating properly

✓ Check the sight glass to ensure the system is dry when delivered – if this is not addressed a compressor failure is in your future
Top 10 Actions

Must Do’s to Get the Most from Your Bus AC

#3

Train drivers on proper operation of the system controls, this will alleviate service write ups

✓ In colder temps below 65 degrees the system will generally not engage the compressor

✓ Percentage of service calls are from not turning on the system
Top 10 Actions

Must Do’s to Get the Most from Your Bus AC

#4

Do a pre-season check-up

Bus Air Conditioning
Preventative Maintenance Schedule & Guidelines

Use extreme caution around engine compartment and any other moving parts. Have system maintenance and service performed by a Qualified Technician.

1. Refrigerant Charge
2. Evaporator Coils
3. Evaporator Drain Lines
4. Evaporator Blower(s)
5. Condenser
6. Compressor
7. Cutoff Switch
8. Pressure Switch
9. Low Pressure Switch
10. High Pressure Switch

Bus Air Conditioning
Preventative Maintenance Schedule & Guidelines

1. Check system for leaks.
2. Check for proper refrigerant charge.
3. Check for proper operation of compressor.
4. Check for proper operation of evaporator blower(s).
5. Check for proper operation of condenser fan(s).
6. Check for proper operation of cutoff switch.
7. Check for proper operation of pressure switch.
8. Check for proper operation of low pressure switch.
9. Check for proper operation of high pressure switch.
10. Check for proper operation of refrigerant lines.

Bus Air Conditioning
Preventative Maintenance Schedule & Guidelines

1. Check system for leaks.
2. Check for proper refrigerant charge.
3. Check for proper operation of compressor.
4. Check for proper operation of evaporator blower(s).
5. Check for proper operation of condenser fan(s).
6. Check for proper operation of cutoff switch.
7. Check for proper operation of pressure switch.
8. Check for proper operation of low pressure switch.
9. Check for proper operation of high pressure switch.
10. Check for proper operation of refrigerant lines.
Top 10 Actions

**Must Do’s to Get the Most from Your Bus AC**

If during your check out you find a leak...

#5

Do not just add refrigerant

- A leak of refrigerant also leaks lubricant
- Over time just topping off the refrigerant will reduce the lubricant to a level where you will have the equivalent of running an engine without oil
Top 10 Actions

Must Do’s to Get the Most from Your Bus AC

#6

If you have a compressor failure it is generally a symptom not a cause

You must find the reason it failed before putting another compressor on the bus

✓ Clutch – low voltage, alternator failure, bad ground, lubricant leaked out, cross wired systems, cycling from Low Pressure or high pressure, etc.

✓ Must properly flush and clean system or you will be replacing many compressors on this system

✓ Be sensitive to lubricant levels – too much or too little is an issue
Top 10 Actions

*Must Do’s to Get the Most from Your Bus AC*

#7

**Clean Coils Cool!**

- Clean evaporator inlet filters – in extreme cases can cause compressor failure or reduced performance
- Condenser coils cleaned with non-caustic cleaner
Top 10 Actions

Must Do’s to Get the Most from Your Bus AC

#8

Electrical connections must be checked occasionally for evidence of heat, corrosion, or chaffing.
Top 10 Actions

**Must Do's to Get the Most from Your Bus AC**

#9

Listen for noisy motors or squealing belts
WE CARE!
Do not hesitate to inform someone if you are having an issue with your A/C system
Bus Air Conditioning

What is bus air conditioning?

General System Operation

Refrigeration Cycle
Bus Air Conditioning

What is bus air conditioning?

1. Engine driven compressor pumps hot gas refrigerant through discharge line to condenser.

2. Hot gas refrigerant condenses or undergoes a change of state into a liquid.

3. Condenser rejects heat transferred to the refrigerant by the evaporator to the outside air.

4. Compressor moves liquid refrigerant through the filter drier to the expansion valve which meters the liquid into the evaporator.

5. Liquid refrigerant changes from high pressure to low pressure, evaporates or undergoes a change of state into a gas.

6. Evaporator transfers heat from the passenger compartment into the refrigerant.

7. Low pressure, superheated gas returns to the compressor through the suction line.

8. The cycle is repeated.
Evaporator (Inside the Vehicle)
Absorbs Heat by Change of State from Liquid to Gas

Expansion Valve (Inside the Evaporator)
Meters Refrigerant

Suction Line
Low Pressure Gas (Cool)

Liquid Line
Warm Liquid

Evaporator

Discharge Line
High Pressure Gas (Hot)

Compressor
(Mounted on the Engine)
Pumps Refrigerant

Sight Glass
(On the Filter Drier)
Allows for Visual Inspection of Moisture Level

Condenser
(Outside the Vehicle)
Rejects Heat by Change of State from Gas to Liquid

Filter Drier
(Inside the Condenser)
Removes Moisture and Impurities From Refrigerant
Preventative Maintenance Check List

Bus #_________ Date: _________

Engine Compartment
   Tension and inspect belts
   Inspect hoses and fittings for leaks and wear
   Check compressor mount

Condenser (s)
   Clean condenser coil
   Check condenser coil for damage
   Check operation of condenser fans
   Inspect hoses & fittings for leaks and wear
   Check sight glass for moisture indicator

Evaporator (s)
   Clean filter
   Check operation of evaporator blowers
   Inspect hoses & fittings for leaks and wear
   Check condensate drain lines
Bus Air Conditioning
Preventative Maintenance Schedule & Guidelines

Use extreme caution around engine compartment and any other moving parts. Have system maintenance and service performed by a Qualified Technician.

<table>
<thead>
<tr>
<th>#</th>
<th>Maintenance Item</th>
<th>What to Check / Do</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System General Awareness</td>
<td>Remove system from TransAir for warranty</td>
<td>At Delivery</td>
</tr>
<tr>
<td>2</td>
<td>Charge Level / Pressure / Temperature Chart</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Evaporator Filter(s)</td>
<td>Cleanliness</td>
<td>Weekly</td>
</tr>
<tr>
<td>4</td>
<td>Evaporator Coils(s)</td>
<td>Cleanliness</td>
<td>Monthly</td>
</tr>
<tr>
<td>5</td>
<td>Evaporator Block(s)</td>
<td>General Function</td>
<td>Monthly</td>
</tr>
<tr>
<td>6</td>
<td>Evaporator Drain Line(s)</td>
<td>Drain lines</td>
<td>Yearly</td>
</tr>
<tr>
<td>7</td>
<td>Sight Glass / Moisture Indicator(s)</td>
<td>Color</td>
<td>Monthly</td>
</tr>
<tr>
<td>8</td>
<td>Condenser Coil(s)</td>
<td>Cleanliness</td>
<td>Monthly</td>
</tr>
<tr>
<td>9</td>
<td>Condenser Fan(s)</td>
<td>General Function</td>
<td>Monthly</td>
</tr>
<tr>
<td>10</td>
<td>Moisture Block</td>
<td>Cleanliness</td>
<td>Monthly</td>
</tr>
<tr>
<td>11</td>
<td>Wire Harnesses</td>
<td>Secured and protected</td>
<td>Monthly</td>
</tr>
<tr>
<td>12</td>
<td>Compressor Belt(s)</td>
<td>Tension and wear</td>
<td>Monthly</td>
</tr>
</tbody>
</table>

This document is subject to change and is intended as a guide only. It is the responsibility of the installer, owner and user to ensure that the system is properly maintained and serviced. For complete system maintenance and service, please contact Trans/Air.
The following conditions require immediate service by a Qualified Technician:

- Vibration and/or noise from engine compartment
- Oil around refrigeration hose connections
- Water dripping in passenger area from Evaporator/Ducts
- Vibration and/or noise from evaporator area
- Noticeable decrease in system performance
- Reduced air flow
Evaporator Filter

- Large filter medium
Key Condenser Components

SMC3L Skirt Mounted Condenser (front view)

- Coil (Behind Screen)
- Filter Drier
Wheelchair lifts
Switch and Sensor Locations

- **Up Limit Microswitch**: 975-8121A
- **Unload Microswitch**: 975-8121A
- **Occupied Microswitch**: 32514A
- **Occupied & Slow Interlock Microswitch**: 32514A
- **Threshold Strip Switch**: 33337A
- **Threshold / Alarm & Partial Fold Microswitch Assy**: 975-4121A
- **Partial Fold Microswitch**: 33337A
- **Ding Microswitch**: 33404A
- **Rear Guard Raised Microswitch**: 33434A
- **NOTE**: Mirror image for left (rear) pump lifts.
Maintenance and Lubrication

All listed inspection, lubrication and maintenance procedures should be repeated at 750 cycle intervals following the scheduled 4500 cycle maintenance procedures. These intervals are a general guideline for scheduling maintenance procedures and will vary according to lift use and conditions. Lifts exposed to severe conditions (weather, environment, contamination, heavy usage, etc.) may require inspection and maintenance procedures to be performed more often than specified.

**Cycle Counter:** NL-2 Series lift models are equipped with a cycle counter located on the top of the pump module. This cycle counter allows the lift attendant/operator to easily track the number of cycles during daily inspections of the lift.

Discontinue lift use immediately if maintenance and lubrication procedures are not properly performed, or if there is any sign of wear, damage or improper operation. Contact your sales representative or call The Braun Corporation at 1-800-THE LIFT®. One of our national Product Support representatives will direct you to an authorized service technician who will inspect your lift.

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See the Maintenance/Lubrication Schedule for recommended applications per number of cycles.

<table>
<thead>
<tr>
<th>Lubricant</th>
<th>Type</th>
<th>Specified (recommended) Lubricant</th>
<th>Available Amount</th>
<th>Braun Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO - Light Oil</td>
<td>Light Penetrating Oil (30 weight or equivalent)</td>
<td>LPS2, General Purpose Penetrating Oil</td>
<td>16 oz. Aerosol Can</td>
<td>15807</td>
</tr>
<tr>
<td>DE - Door-Ease</td>
<td>Stainless Stick Style (tube)</td>
<td>Door-Ease Stick (tube)</td>
<td>1.68 oz.</td>
<td>15806</td>
</tr>
<tr>
<td>LG - Light Grease</td>
<td>Light Grease (Multipurpose)</td>
<td>Lubriplate</td>
<td>14 oz. Can</td>
<td>15805</td>
</tr>
<tr>
<td>750 Cycles</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>---</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer barrier pivot points (2)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer barrier latch pivot point</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer barrier latch slot</td>
<td>Apply Light Grease to both sides of slot. See Lubrication Diagram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer barrier lever bearings (2)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lift-Tite™ latches (tower pivot points - 2)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lift-Tite™ latch gas (dampening) spring pivot points (2 springs - 4 points)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect Lift-Tite™ latches and gas springs for wear or damage (bent, deformed or misaligned), positive securement (external snap rings) and proper operation</td>
<td>Resecure, replace damaged parts or otherwise correct as needed. Note: Apply Light Grease to Lift-Tite™ latch tower pivot point if replacing latch.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect outer barrier for proper operation</td>
<td>Correct or replace damaged parts.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect outer barrier latch for proper operation, positive securement, and detached or missing spring</td>
<td>Correct or replace damaged parts and/or relubricate. See Lubrication Diagram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjust fold pressure and outer barrier fold pressure (if applicable)</td>
<td>See applicable service manual</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Maintenance and Lubrication Schedule

| 750 Cycles |
|-----------------|--------------------------------------------------|
| Verify NHTSA Operations Checklist | See NHTSA Operations Checklist |
| Inspect lift for wear, damage, or any abnormal condition | Correct as needed |
| Inspect lift for rattles | Correct as needed |

| 1500 Cycles |
|----------------|--------------------------------------------------|
| Perform all procedures listed in previous section also |

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner/outer fold arms (2)</td>
<td>Apply grease (synthetic) to contact areas between inner/outer fold arms. See Lubrication Diagram.</td>
</tr>
<tr>
<td>Platform pivot pin bearings (4)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
</tr>
<tr>
<td>Outer fold arm bearings (8)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
</tr>
<tr>
<td>Inner roll stop pivot bearings (2)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
</tr>
<tr>
<td>Inner roll stop lever bearings (2)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
</tr>
<tr>
<td>Inner roll stop lever slot (2)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
</tr>
<tr>
<td>Saddle support bearings (8)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
</tr>
<tr>
<td>Inner fold arm roller pin bearings (4)</td>
<td>Apply Light Oil - See Lubrication Diagram</td>
</tr>
</tbody>
</table>

[continued]
Maintenance and Lubrication Schedule

1500 Cycles

- Inner fold arm cam followers (4) - Apply Light Oil - See Lubrication Diagram
- Parallel arm pivot pin bearings (16) - Apply Light Oil - See Lubrication Diagram
- Handrail pivot pin bearings (4) - Apply Light Oil - See Lubrication Diagram
- Hydraulic cylinder pivot bushings (8) - Apply Light Oil - See Lubrication Diagram
- Outer barrier lever guide slot - Apply Light Grease to both sides of slot. See Lubrication Diagram.

Inspect Lift-Tite™ latch rollers for wear or damage, positive securement and proper operation (2)

- Correct, replace damaged parts and/or relubricate.

Inspect inner roll stop for:
- Wear or damage
- Proper operation. Roll stop should just rest on top surface of the threshold plate.
- Positive securement (both ends)

- Resecure, replace or correct as needed. See Platform Angle Instructions and Tower Microswitch Adjustment Instructions.

Inspect handrail components for wear or damage, and for proper operation

- Replace damaged parts

Inspect microswitches for securement and proper adjustment.

- Resecure, replace or adjust as needed. See Microswitch Adjustment Instructions.
## Maintenance and Lubrication Schedule

### 1500 Cycles

<table>
<thead>
<tr>
<th>Maintenance Task</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure lift operates smoothly</td>
<td></td>
</tr>
<tr>
<td>Inspect external snap rings:</td>
<td></td>
</tr>
<tr>
<td>• Outer fold arm (6)</td>
<td></td>
</tr>
<tr>
<td>• Lift-Tite™ latch roller (2)</td>
<td></td>
</tr>
<tr>
<td>• Lift-Tite™ latch gas (dampening) spring (4)</td>
<td></td>
</tr>
<tr>
<td>• Inner fold arm cam followers (4)</td>
<td></td>
</tr>
<tr>
<td>• Inner fold arm roller pins (4)</td>
<td></td>
</tr>
<tr>
<td>• Outer barrier hydraulic cylinder mounting pin (2)</td>
<td></td>
</tr>
<tr>
<td>• Inner roll stop lever bracket pins (2)</td>
<td></td>
</tr>
<tr>
<td>Inspect inner roll stop locks (2) and torsion springs (2) for wear or damage and for proper operation.</td>
<td></td>
</tr>
<tr>
<td>Inspect outer fold arm pins (2), axies (2) and bearings (8) for wear or damage and positive securement</td>
<td></td>
</tr>
<tr>
<td>Remove pump module cover and inspect:</td>
<td></td>
</tr>
<tr>
<td>• Hydraulic hoses, fittings and connections for wear or leaks</td>
<td></td>
</tr>
<tr>
<td>• Harness cables, wires, terminals and connections for securement or damage</td>
<td></td>
</tr>
<tr>
<td>• Relays, fuses, power switch and lights for securement or damage</td>
<td></td>
</tr>
</tbody>
</table>

- Replace damaged parts and resecure as needed.
- Apply Light Oil.
- Realign towers and vertical arms. Lubricate or correct as needed.
- Resecure or replace if needed.
- Remove pump module cover and inspect:
# Maintenance and Lubrication Schedule

<table>
<thead>
<tr>
<th>4500 Cycles</th>
<th>Perform all procedures listed in previous section also</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inspect cotter pins on platform pivot pin (2)</strong></td>
<td>Resecure, replace or correct as needed</td>
</tr>
<tr>
<td><strong>Hydraulic Fluid (Pump) - Check level. Note: Fluid should be changed if there is visible contamination. Inspect the hydraulic system (cylinder, hoses, fittings, seals, etc.) for leaks if fluid level is low.</strong></td>
<td>Use Braun 32840-QT hydraulic fluid (Exxon® Univis HVI 28). Do not mix with Dextron III or other hydraulic fluids. Check fluid level with platform lowered fully. Fill to maximum fluid level indicated on reservoir (specified on decal). Do not overfill. If fluid level decal is not present - measure 1-3/8&quot; from the fill port to locate fluid level.</td>
</tr>
<tr>
<td><strong>Inspect cylinders, fittings and hydraulic connections for wear, damage or leaks</strong></td>
<td>Tighten, repair or replace if needed.</td>
</tr>
<tr>
<td><strong>Inspect outer barrier cylinder hose assembly (hose, fasteners, connections, etc.) for wear, damage or leakage</strong></td>
<td>Tighten, repair or replace if needed.</td>
</tr>
<tr>
<td><strong>Inspect parallel arms, bearings and pivot pins for visible wear or damage</strong></td>
<td>Replace if needed.</td>
</tr>
<tr>
<td><strong>Inspect parallel arm pivot pin mounting bolts (8)</strong></td>
<td>Tighten or replace if needed.</td>
</tr>
<tr>
<td><strong>Inspect platform pivot pins, bearings and vertical arms for wear, damage and positive securement</strong></td>
<td>Replace damaged parts and resecure as needed. Apply Light Grease during reassembly procedures.</td>
</tr>
</tbody>
</table>

*continued*
# Maintenance and Lubrication Schedule

<table>
<thead>
<tr>
<th>4500 Cycles</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect inner/outer fold arms, saddle, saddle support and associated pivot pins and bearings for visible wear or damage</td>
<td>Replace if needed.</td>
</tr>
<tr>
<td>Inspect gas springs (cylinders) for wear or damage, proper operation and positive securement</td>
<td>Tighten, replace or correct as needed</td>
</tr>
<tr>
<td>Inspect saddle bearing (UHMW - 2)</td>
<td>Apply Door-Ease or replace if needed. See Lubrication Diagram.</td>
</tr>
<tr>
<td>Inspect vertical arm plastic covers</td>
<td>Resecure or replace if needed.</td>
</tr>
<tr>
<td>Inspect power cable</td>
<td>Resecure, repair or replace if needed.</td>
</tr>
<tr>
<td>Mounting</td>
<td>Check to see that the lift is securely anchored to the vehicle and there are no loose bolts, broken welds, or stress fractures.</td>
</tr>
<tr>
<td>Decals and Antiskid</td>
<td>Replace decals if worn, missing or illegible. Replace antiskid if worn or missing. See Decals and Antiskid section on pages 38-40.</td>
</tr>
</tbody>
</table>

| Consecutive 750 Cycle Intervals | Repeat all previously listed inspection, lubrication and maintenance procedures at 750 cycle intervals. |
Braun and Ricon websites


• https://www.riconcorp.com/support_techdocs_manuals.asp
W/C tie down storage
Clean floor
W/C lift door lubrication points
Drivers' door
Entrance door
Door retainers and supports
Body seams
Corrosion
Sealing preparation
Sikaflex 221

Sealant used on body seam
Discussion points

- Step treads
- Flooring
- Paint finish
- Windows
- Under body
- Batteries and Electrical system
- Seat belts
- Wipers and washer system
- Maintenance program