INSTRUCTION TO SERVICE

ITS: 5785	
SECTION:	400 Structures
WRITTEN BY:	Jeff Kosheluk
SUBJECT:	Rework corrosion issues on the underbody and A/C compartment. This will include removing debris buildup on outer lower tubes, rust staining, lower impact panel bracket corrosion (depending on property) and applying Krown T-40 inside the tubes on the underbody chassis. This would include the use of Salt Eliminator.

ITS5785

PROCEDURE:

1. Turn the main battery disconnect switch to the “OFF” position.
2. Raise coach in accordance with the New Flyer Service Manual.
3. Once bus is raised, install stands below jacking pads at the 4 places on the underbody.

PART A: REMOVAL OF IMPACT PANELS (IF BUS IS EQUIPPED WITH IMPACT PANELS)

4. For buses that have impact panels, the impact panels will need to be removed and set aside. Remove hardware. Old mounting hardware will be discarded and new hardware applied. Remove on both sides of the buses.

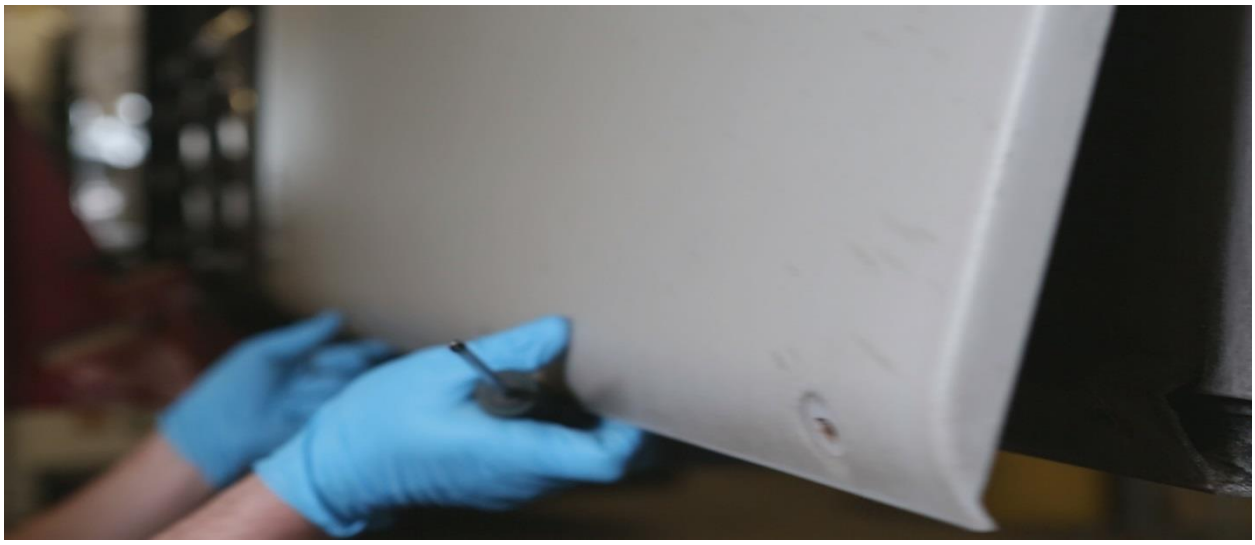


FIGURE 1: SHOWN IMPACT PANELS BEING REMOVED.

5. Once impact panels removed, inspect to see if debris is inside the channels of the impact brackets. See Figure 2 below showing a typical image with debris inside the channel.

FIGURE 2: TYPICAL VIEW OF DEBRIS INSIDE OF LOWER IMPACT MOUNTING CHANNEL.

6. Remove all loose scaling and debris on the outside of the lower mounting impact panel brackets – Figure 2A. Use an Air Needle De-Scaler on the outside surface to remove all loose scaling. Refer to Figure 2B showing tool. **Note:** Only brackets with heavy surface scaling will use the de-scaler tool.

FIGURE 2A: DEBRIS BUILDUP ON LOWER IMPACT PANEL BRACKET.

FIGURE 2B: AIR NEEDLE DE-SCALER USED ON OUTSIDE SURFACE OF LOWER IMPACT MOUNTING BRACKETS

7. Repeat step 6 on the outside of all lower impact mounting brackets. Only if heavy scaling exists as shown as per Figure 2a.
8. Turn the front tire to allow for access to gain access to allow for drilling the 1/2” hole. Tire will be rotated when working on the opposite hole at the wheel arch area. Refer to Figure 3.

FIGURE 3: SHOWN TIRE ROTATED FOR ACCESS

9. Using a ½” drill bit, using lubricant while drilling, use the pilot hole as a reference and drill through the structure tube at both sides of the fender wells. As well drill ½” diameter holes at the bottom of the outer tube at the locations shown on both the curbside and street side (6 per side). Use low speed drill with a ½” unibit. Pilot hole may be needed to be drilled. Do not remove any fender hardware. Fenders stay on and the hole can be drilled with the fenders on. Reference Figure 4.

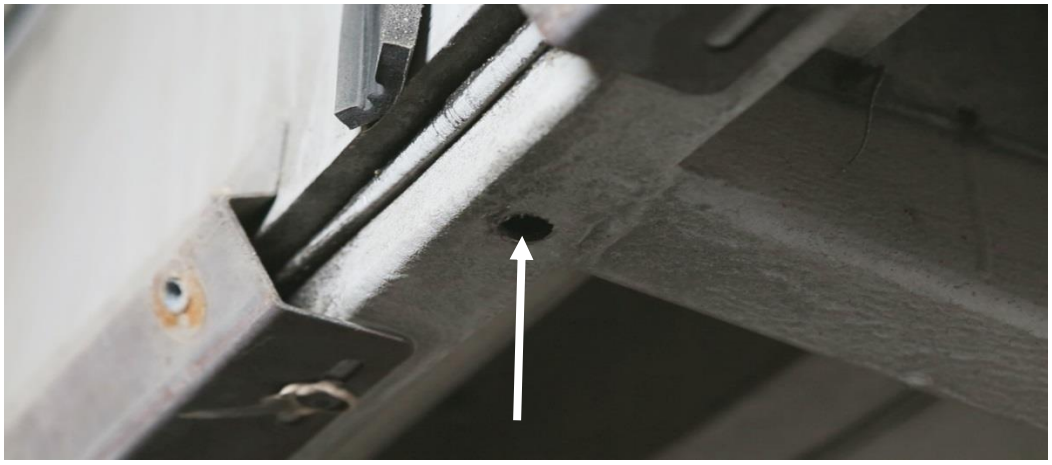
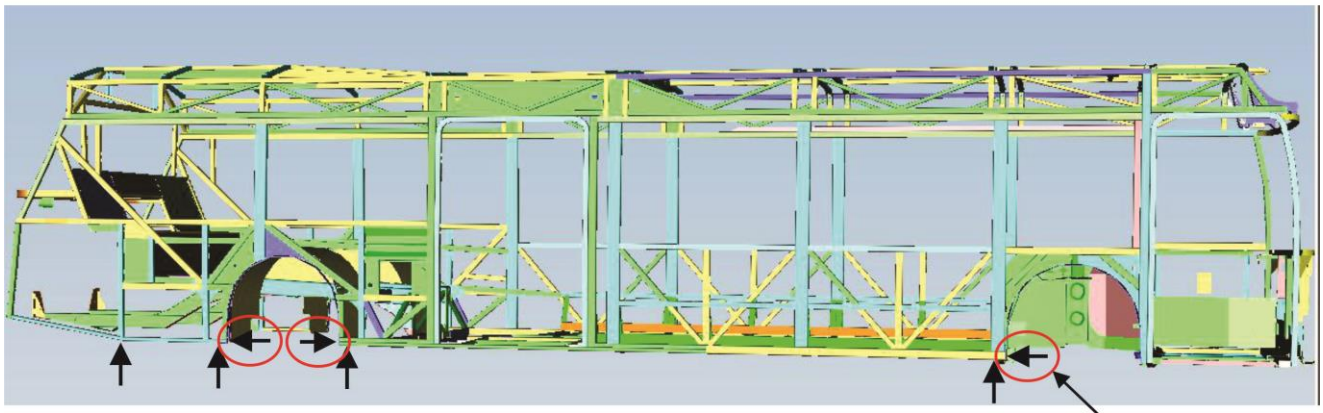


FIGURE 4: SHOWN ½" HOLE DRILLED AT THE BOTTOM OF THE TUBE DIRECTLY AT THE VERTICAL TUBE GOING UP.

Curbside View of Bus



Streetside of the bus

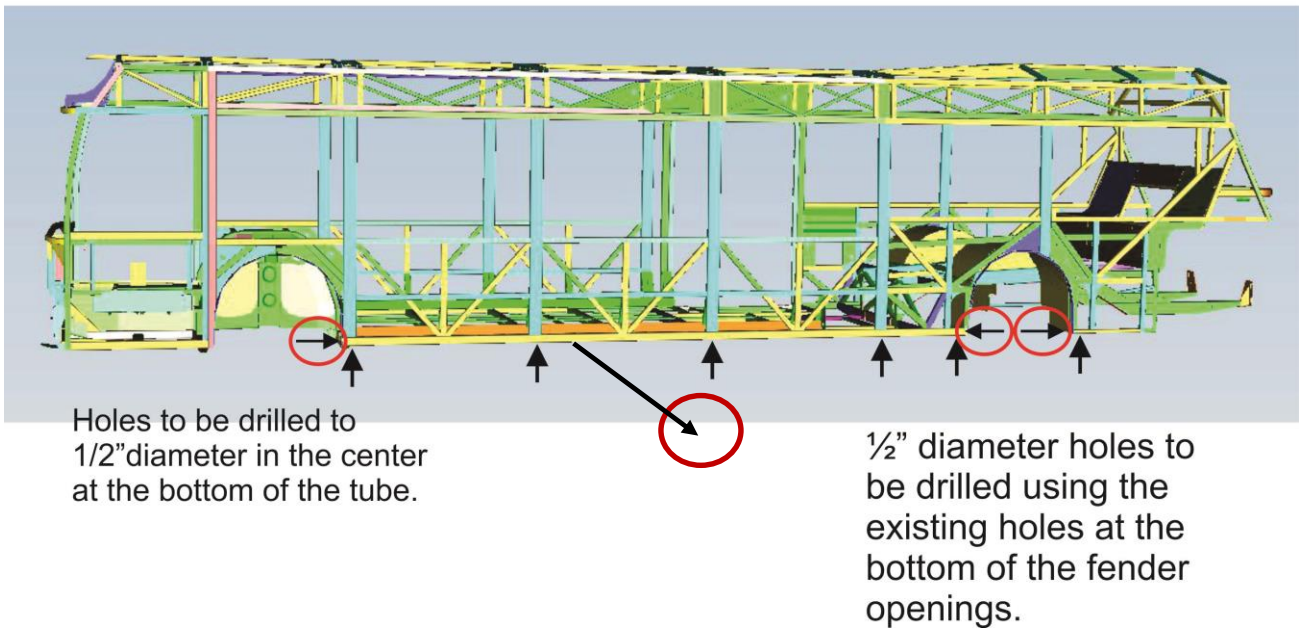


FIGURE 4A: SHOWN TYPICAL HOLE LOCATIONS ON THE STREET SIDE & CURBSIDE

FIGURE 4B: SHOWN THE PRE-DRILLED HOLE ON THE FACE OF THE TUBE THAT WILL BE DRILLED.

10. Blow off and remove all debris and road salt from the underbody. This also includes the area inside the engine compartment (underside only). Refer to Figure 5 showing some examples of debris to be removed. Pressure wash underbody chassis as well to remove heavy debris and dirt.

FIGURE 5: SHOWING TYPICAL EXAMPLES OF ROAD DEBRIS/SALT THAT NEEDS TO BE REMOVED.

11. On the underbody of the bus, inspect and ensure that all drain holes are cleaned out and allow for drainage.
Note: For application of the Krown Salt Eliminator, refer to Appendix A for application and MSDS sheets.
12. Clean the entire underside with Krown Salt Eliminator chloride cleaner. Can be sprayed with a foam cannon or sprayer that is attached to a pressure washer. The salt eliminator is to be foamed on and left for 10 minutes. It can then be rinsed off. See Figure 6.

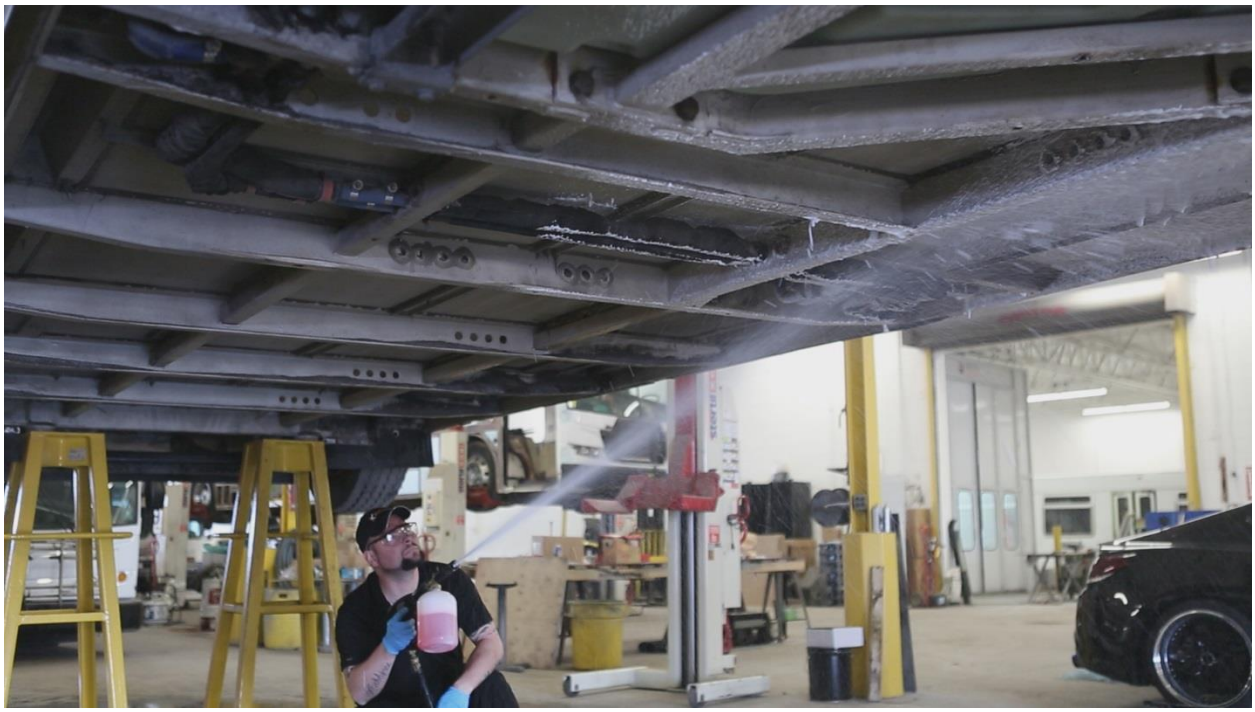


FIGURE 6: SALT ELIMINATOR APPLIED TO THE UNDERSIDE OF THE BUS.

13. Additional cleaning with a degreaser may be required in some areas depending upon the condition of the chassis. If a degreaser is used, it must be washed off and re-spray with salt eliminator. Refer to Figure 7.

FIGURE 7: WHEN HEAVY DEBRIS, GREASE OR OIL STAINING EXISTS, USE OF A DEGREASER MUST BE USED.

Clean side panels/lower impact panel brackets with Salt Eliminator

14. Foam the Salt Eliminator on to the panels and brackets/rails. Let sit for 10 minutes. Flush with water to remove chlorides, dirt and grease that has accumulated. Refer to Figure 8.

FIGURE 8: SHOWN THE APPLICATION OF THE SALT ELIMINATOR SPRAYED ON THE PANELS AND LOWER IMPACT PANEL BRACKETS/RAILS.

Flush tubes with Krown Salt Eliminator

15. Typically this is what you would see inside the tubes before they are cleaned out. This is seen when using a boroscope. Refer to Figure 9.

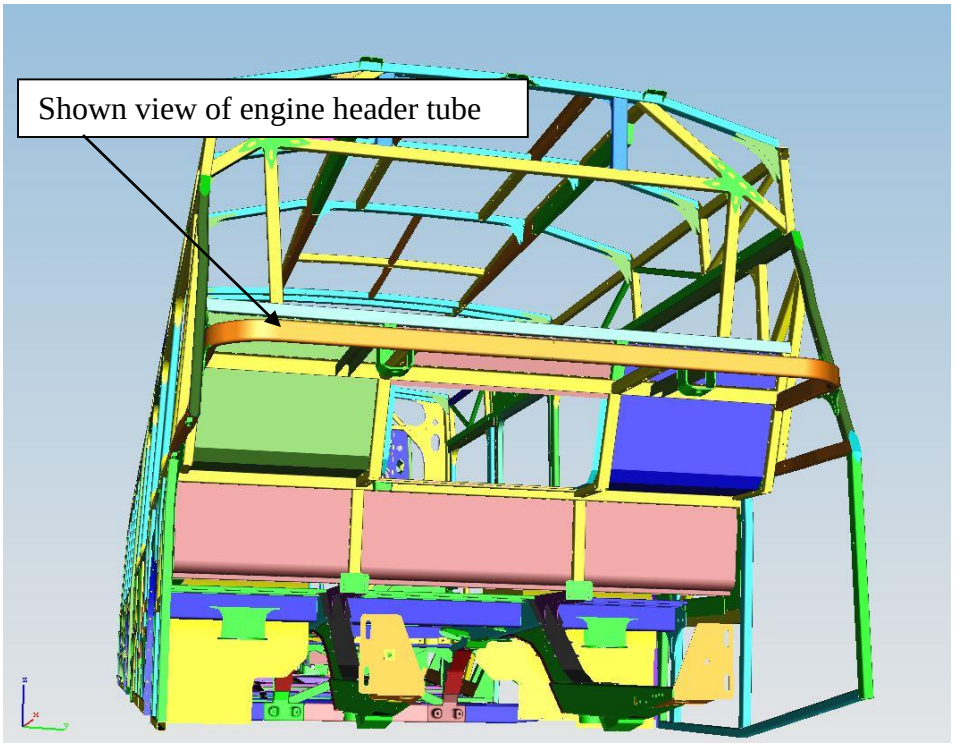
FIGURE 9: SHOWN THE DEBRIS/CORROSION INSIDE THE TUBES BEFORE TUBES ARE CLEANED AND FLUSHED OUT.

16. Flush the inside the tubes thoroughly with Krown Salt Eliminator (using a foam gun). This will be done to remove debris from the outer lower tube on both sides of the bus. This application maybe required to be completed a couple times till all debris is removed. All the inside tubes will only need this application done once. Refer to Figure 10.

    Note: This will also include the engine header tube in the engine compartment. This must be flushed out as well.

    Refer to Figure 11.

FIGURE 10: APPLICATION OF SALT ELIMINATOR BEING APPLIED INSIDE TUBES TO FLUSH OUT DEBRIS AND CALCIUM BUILDUP



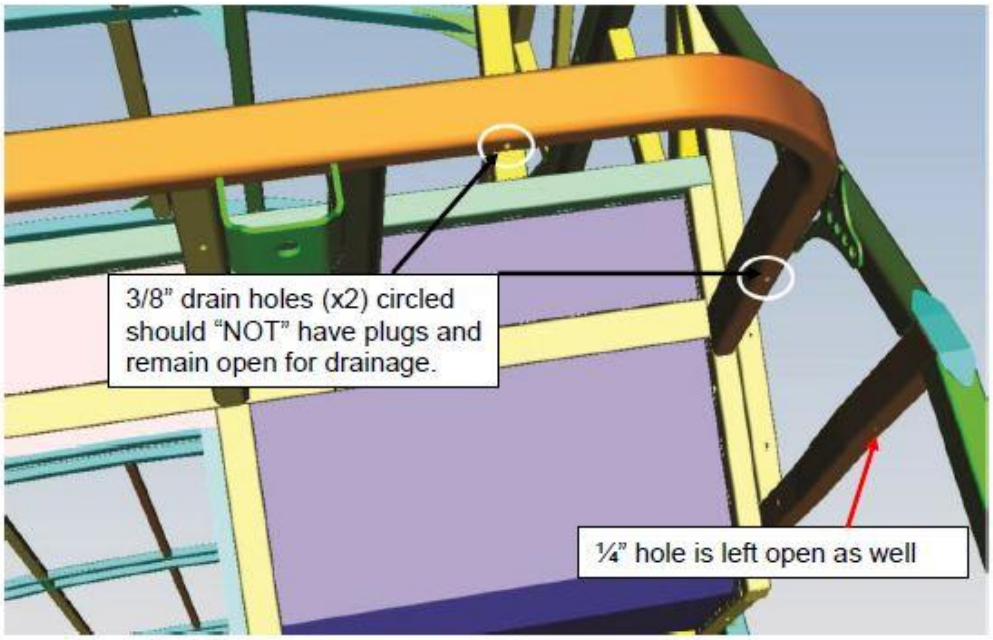


FIGURE 11: SHOWN (X4) DRAIN HOLES. TYPICAL ON BOTH SIDES. TUBE WILL BE FLUSHED OUT AND THEN APPLIED WITH T-40 KROWN.

17. As the material is flushed out you will see dirt, debris, rust scale etc. coming out of the tubes with the water. You will insert the plastic tubing into each hole and flush the material backwards and forwards multiple times to ensure proper cleaning. Refer to figure 12.

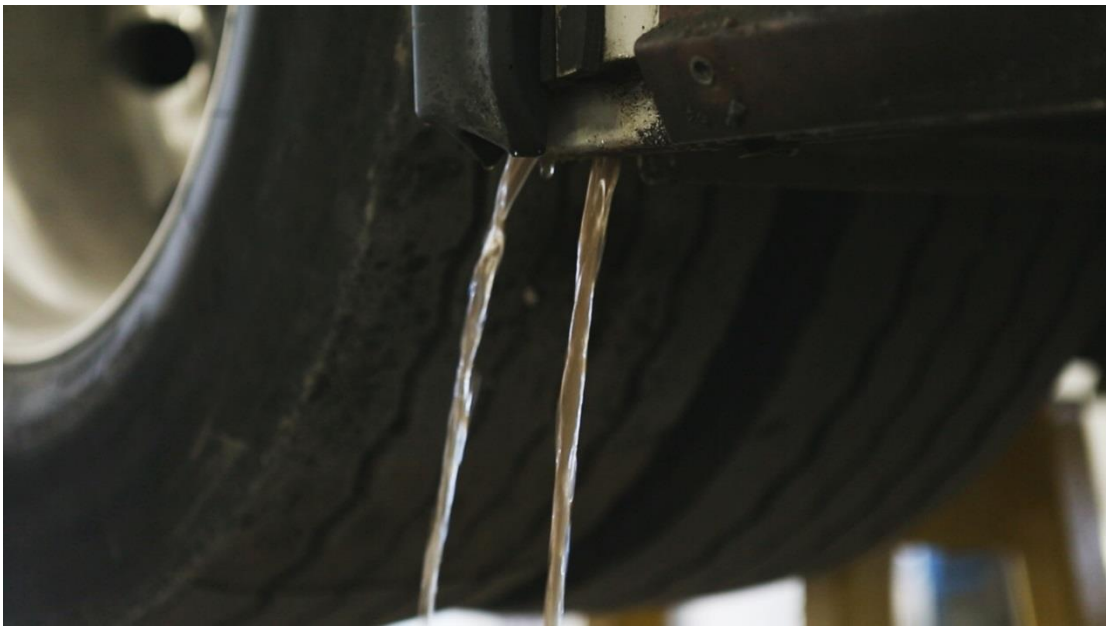


FIGURE 12: SHOWN DIRT AND DEBRIS COMING OUT WITH WATER WHEN FLUSHING OUT TUBES

18. You should expect to see clear water coming out from all of the holes once the application is of the salt eliminator is applied correctly and feel confident that the tubes are free from the dirt and other debris that was plugging them up. Refer to figure 13.

FIGURE 13: WHEN WATER COMES OUT CLEAR, THIS IS A GOOD INDICATION THAT DEBRIS AND CALCIUM HAS BEEN REMOVED FROM THE INSIDE OF THE TUBES.

FIGURE 13A: VIEW OF CLEAR WATER COMING OUT OF THE TUBE.

19. Shown picture views of what the tube surface will appear like once salt eliminator has been applied onto the surface and rinsed off. Refer to Figure 14.

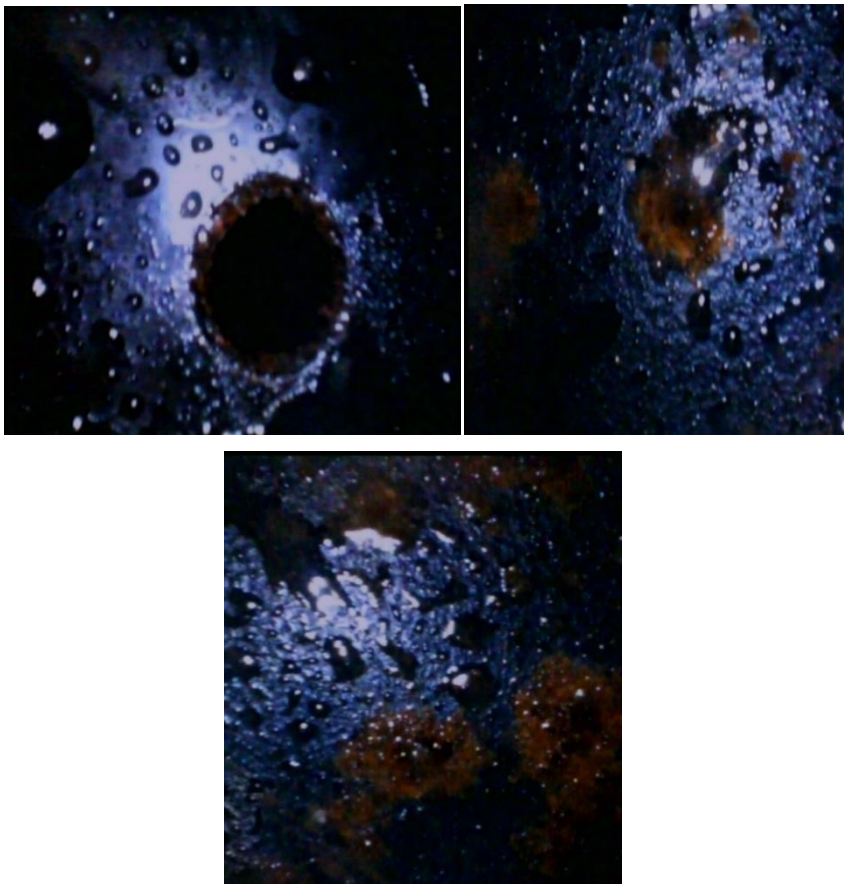


FIGURE 14: SHOWN SURFACE AFTER SALT ELIMINATOR APPLIED AND FLUSHED WITH WATER.

Rinse side rails/brackets and underside of bus

20. Wash the entire underside of the bus and inside of tubes as specified. Refer to figure 15.

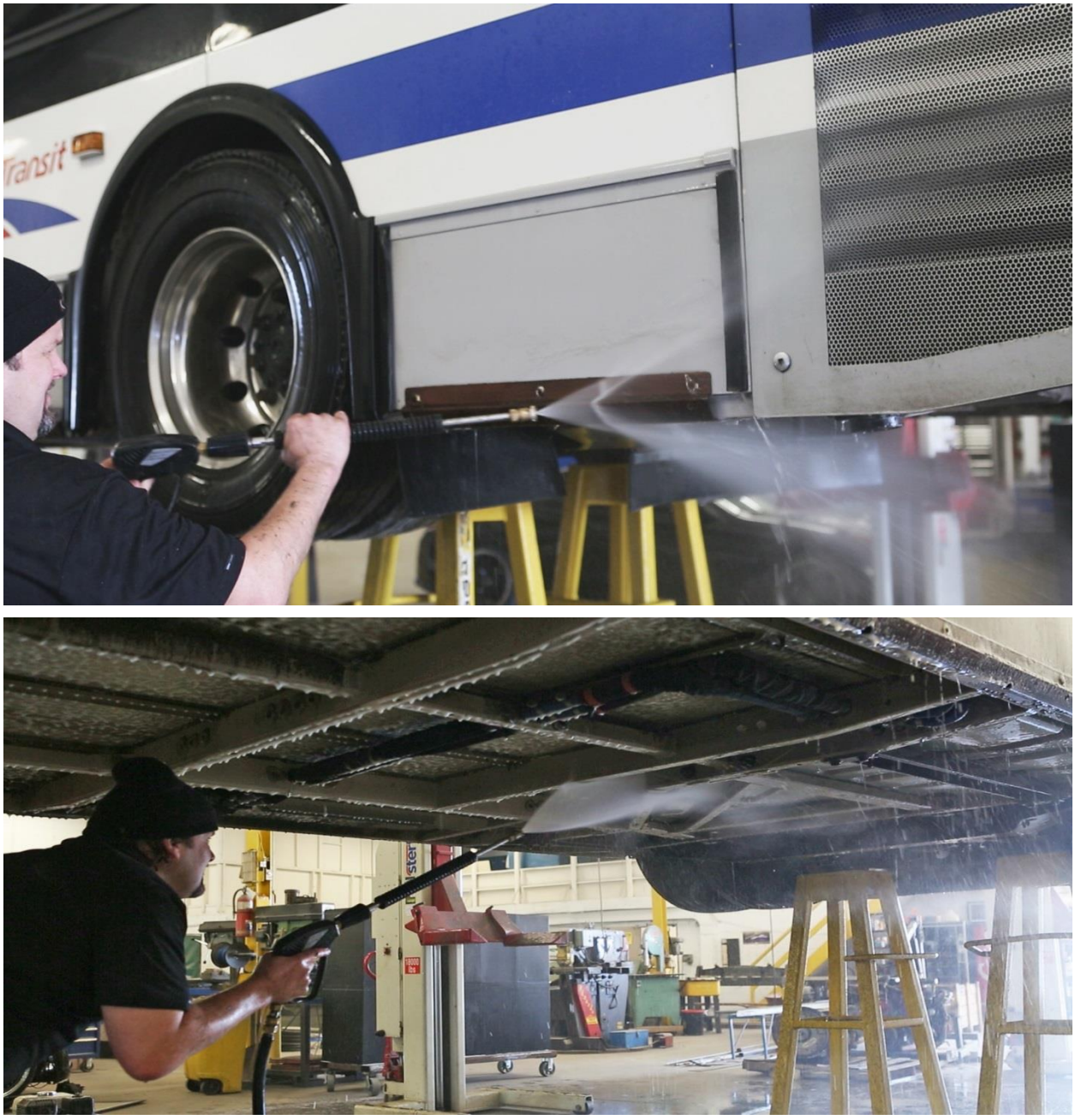


FIGURE 15: PRESSURE WASH UNDERSIDE OF BUS TO REMOVE SALT ELIMINATOR

Apply Krown Enviro Solve

Note: For application of the Krown Enviro Solve, refer to Appendix C for application and MSDS sheets.

21. For areas showing rust stains (around drain holes, bracket edges, etc), use a spray bottle to apply the Enviro Solve to the rust stain. Let sit for 60 seconds and scrub with a firm brush. The rust stain should come right off. If the rust is deep into the metal you may need to repeat this step a second time. Refer to Figure 16.

FIGURE 16: SHOWN APPLICATION OF THE KROWN ENVIRO SOLVE APPLIED, ABSORB FOR A 1 MINUTE AND THEN SCRUBBED OFF AS SHOWN. RINSE WITH WATER AND LET DRY.

Note: For application of the PPG Zinc Primer and Corashield, refer to Appendix D & E for application and MSDS sheets.

Apply zinc primer and corashield at affected areas (when dry)

22. Inspect the plastic plugs on the underbody chassis. Check to see if cracked, shrunk or missing. If so, the plugs need to be replaced. Seal around plug before installing and then final seal once installed. If new plugs are required, 1.5" plug **(PN: 116507)** or 1" plug **(PN: 116511)**.

    If you see plugs that are full of debris, they must be blown and cleaned out. Ensure there is no cracks in the plug. See below for example.

Plug to be cleaned out & inspected for cracks

Shown example of cracked or broken plug

23. For areas that have bare metal or have been cleaned off with Enviro solve, zinc primer should be re-applied. Brush on and let dry. After zinc primer applied and dry, apply corashield over top. Apply 2 light coats. Other areas that corashield has come off due to road wear must be touched up as well. Refer to Figure 17.

FIGURE 17: SHOWING PPG ZINC PRIMER APPLIED

FIGURE 17A: SHOWING CORASHIELD APPLIED (WHITE AREAS)

Note: For application of the Krown T-40 Corrosion Inhibitor, refer to Appendix B for application and MSDS sheets.

Krown T-40 Corrosion Inhibitor application

24. Using a Krown spray system (see the appendix for equipment) the corrosion inhibitor is to be sprayed into all of the tubing on the chassis of the bus. The product will be “fogged” into the tubular sections. The tubes do not need to be dry to apply the corrosion inhibitor as it will displace the moisture. Refer to Figure 18.

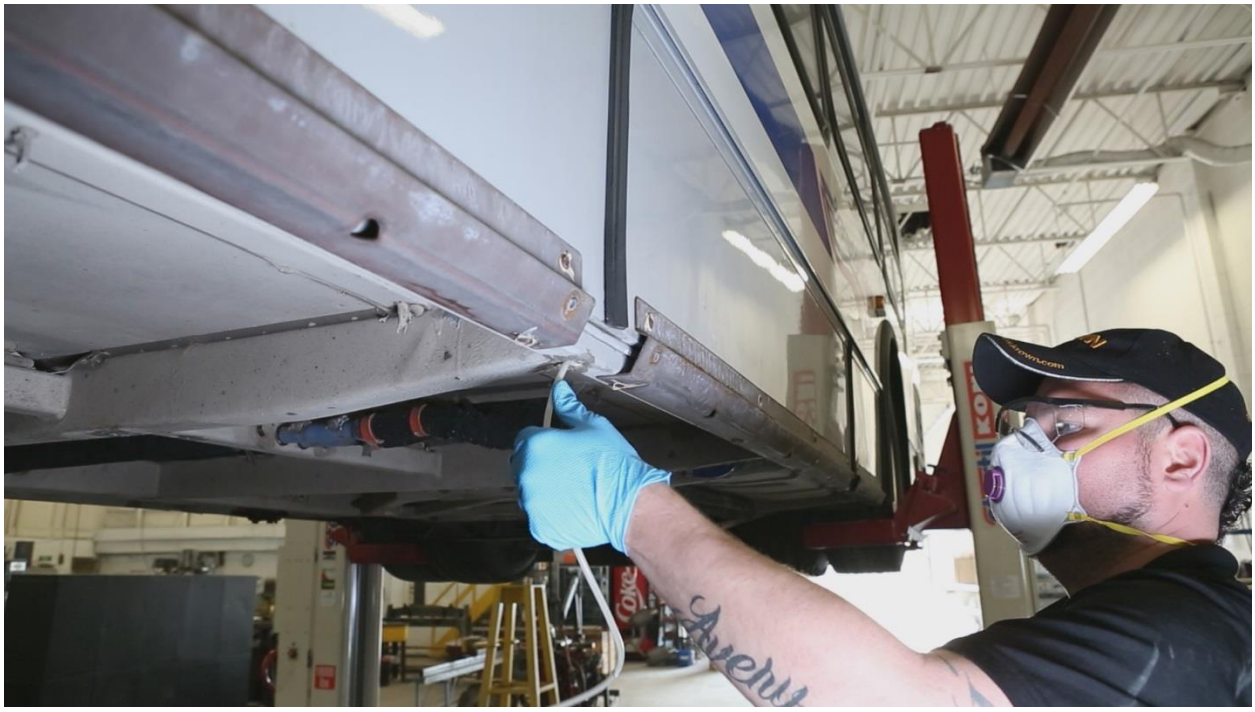


FIGURE 18: SHOWN APPLICATION OF THE T-40 INTO THE TUBES

25. Once the product is applied, the product will not dry up or cure. It is designed to remain viscous so as to repel moisture. The foam will dissipate and it will penetrate any rust scale to create a thin barrier on the metal to protect it. Refer to figure 19.

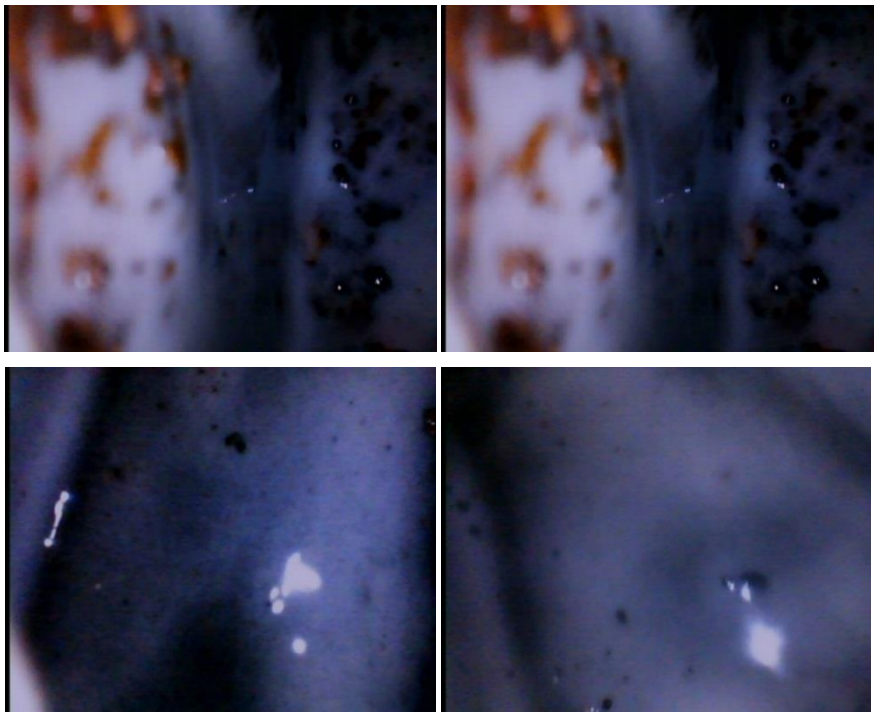


FIGURE 19: ONCE COMPLETED THIS IS WHAT THE TUBES WILL LOOK LIKE INSIDE

On fittings and electrical connections

26. Spray Krown T-40 on all fittings and electrical connections. Refer to Figure 20.

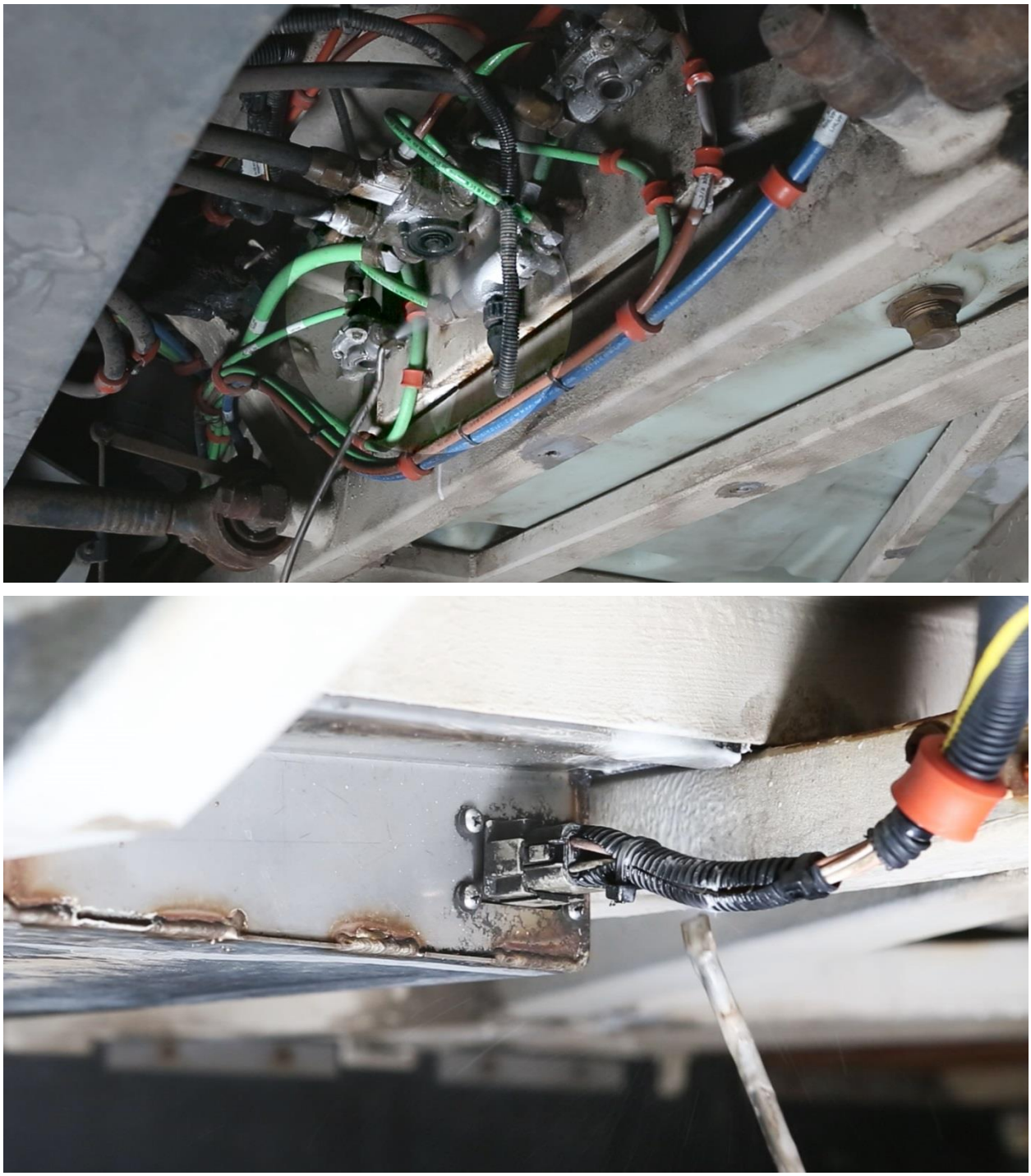


FIGURE 20: SHOWN ELECTRICAL CONNECTIONS AND FITTINGS SPRAYED WITH KROWN T-40

27. Spray side rails/brackets at the lower impact panels. Refer to Figure 21.

FIGURE 21: SHOWN T-40 SPRAYED AT THE LOWER IMPACT PANEL RAILS/BRACKETS

28. Spray the entire chassis/underside of the bus and the engine door header tube. Refer to Figure 22.

FIGURE 22: SPRAY T-40 ON THE UNDERSIDE OF THE BUS.

Note: Once the T-40 is applied on the chassis it will look “wet”. It will not cover up or hide anything that is there. It will displace the moisture, protect the fittings and electrical connections as well as supplement/support the corashield. Refer to Figure 23.

FIGURE 23: SHOWN VIEW OF THE UNDERSIDE SPRAYED WITH T-40. "WET" LOOK IS THE FINAL PRODUCT SHOWN ON THE UNDERSIDE.

29. Using the blue plastic plug **(PN: 116508)** with a dab of lithium grease, install at holes that were enlarged at the fender wells (x2 per) and the ½" holes that were drilled toward the end of the tubes. Refer to Figure 24.
    Note: **"DO NOT PLUG"** the (x4) holes on the engine header tube. They must remain open.

FIGURE 24: SHOWN THE ½" HOLES PLUGGED WITH LITHIUM GREASE & BLUE PLUG

Note: Only complete steps 29 & 30 if the buses have impact panels. Otherwise skip to step 31.

30. Install closeouts **(PN: 597554)** at the end of each impact panel bracket. Typical 18 places. Ensure the area is dry and clean for proper adhesion.
31. For buses that had impact panels removed, install new hardware **(PN: 34S00024 & 30W00000)** with never seize. Tighten all hardware.
32. Turn the main battery disconnect switch to the "ON" position.

APPENDIX A

KROWN SALT ELIMINATOR – APPLICATION SHEET

KROWN Salt Eliminator

The Krown Salt Eliminator chloride wash is a cleaner designed to help fight corrosion that is caused by magnesium, calcium, and sodium chloride salts. Its unique formula allows the product to break the bond formed between the chloride and the metal. Salt Eliminator creates a water repelling surface that not only leaves a beading shine to the vehicle but also helps slow salt from reforming on the surface. Salt Eliminator doesn't contain any phosphates or petroleum solvents and is safe to use to remove salt stains from carpets, upholstery, plastic, leather and vinyl. Krown Salt Eliminator is an environmentally friendly product.

The product can be applied using the following methods:

- Foam Cannon/Gun
- Pressure Washer
- Trigger or Pump Sprayers
- Automatic Bus Wash Systems
- Underbody Wash Systems

For specifics of the application and dilution rates, as it relates to the equipment used to apply the product, please contact Krown's Technical department for assistance.

Areas of Application

- Interior desalting of bus floors
- Exterior washing of equipment
- Underbody de-salting
- Interior tube cleaning
- Chloride removal form radiators and electrical components

Directions for Use

Salt Eliminator is to be foamed on to the surface using any of the above mentioned methods. The Salt Eliminator will dwell on the surface for at least 1 minute (*more time will be needed depending upon the application requirement.*) The product will then be rinsed off with water.

The product can be used with either hot or cold water. No special personal safety equipment is required for use.

Further product information and a current MSDS is available on Krown's web site at www.krown.com

KROWN CORPORATE
35 Magnum Drive, Schomberg, Ontario (Canada) L0G 1T0
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www.krown.com

NEW FLYER

APPENDIX A

KROWN SALT ELIMINATOR – MSDS SHEET

MATERIAL SAFETY DATA SHEET
KROWN SALT ELIMINATOR

1. PRODUCT AND COMPANY INFORMATION

Krown
35 Magnum Drive
Schomberg, ON L0G 1T0

USE: Salt Remover
PHONE: 1 800-267-5744
CHEMICAL FAMILY: Blended Product

2. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENT	%W/W	PIN/CAS#	LD50/LC50	ROUTE/SPECIES
Ethylene glycol monobutyl	1-5	111-76-2	LD50 1746 mg/kg	oral, rat ether

3. HAZARDS IDENTIFICATION

EFFECTS OF ACUTE EXPOSURE TO MATERIAL: EYES: Concentrate can cause irritation to eye tissue SKIN: Can cause skin irritation. May cause drying of skin. INGESTION: Harmful if ingested

EFFECTS OF CHRONIC EXPOSURE TO MATERIAL: May cause drying of skin
PRIMARY ROUTE OF ENTRY: [ ]-Inhalation [X]-Ingestion [ ]-Absorption
OTHER TOXIC EFFECTS: None known

4. FIRST AID MEASURES

EYES: Flush eyes with plenty of water for at least 15 minutes. Hold eyelids open while rinsing. Contact a physician immediately
SKIN: Flush affected area thoroughly with water. Seek medical attention if irritation persists
INGESTION: Rinse mouth with water. Drink large volumes of water. Do not induce vomiting. Never give anything by mouth to an unconscious patient. Contact a physician immediately
INHALATION: Remove patient to fresh air.

5. FIRE FIGHTING MEASURES

FLAMMABLE: NO
FLASH POINT, CELSIUS: Not Applicable
AUTO IGNITION TEMPERATURE, CELSIUS: Not Applicable
EXTINGUISHING MEDIA: Water Fog, Dry Chemical, CO_2 , Foam
SPECIAL FIRE FIGHTING PROCEDURES: appropriate to surrounding fire
HAZARDOUS COMBUSTION PRODUCTS: Oxides of carbon, hazardous fumes
EXPLOSIVE SENSITIVITY TO: Not Applicable

6. ACCIDENTAL RELEASE MEASURES

SPILL PROCEDURE: SMALL: Hose down with water
LARGE: Soak up with absorbent material and hold for disposal

7. HANDLING AND STORAGE

SPECIAL HANDLING PROCEDURES AND EQUIPMENT: Wear gloves if handling concentrated product. Avoid contact with skin and eyes. Do not take internally.
STORAGE REQUIREMENT: Avoid freezing. Store in a cool dry area in a closed container.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT:
GLOVES: Impermeable Gloves EYE PROTECTION: Safety Goggles
FOOTWEAR: Water Resistant OTHER: Not required
RESPIRATORY PROTECTION: Not required for normal use
VENTILATION REQUIREMENTS: Local Ventilation

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	orange/red product; fruity/citrus odour	S.G. / DENSITY (g/cc):	1.017
PH: (Concentrate):	4.1	VAPOUR PRESSURE (mmHg):	not established
VAPOUR DENSITY (air=1):	not established	BOILING POINT:	100°C
FREEZING POINT:	0°C	EVAPORATION RATE (water=1):	>1

SOLUBILITY IN WATER: Excellent

10. STABILITY AND REACTIVITY

INCOMPATIBILITY (Material to Avoid): Sodium Hypochlorite; Peroxide
STABILITY: Stable INCOMPATIBILITY: Strong acids and oxidizing materials
HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of carbon, hazardous fumes
HAZARDOUS POLYMERIZATION: Not applicable REACTIVITY: Not dangerously reactive

11. TOXICOLOGICAL INFORMATION

LD50 (Calculated): 3860 mg/kg (Oral/Rat) LC50 (Calculated): Not established

12. ECOLOGICAL INFORMATION

SPILL PROCEDURE: Pick up with mop or wet-vac.
WASTE DISPOSAL: Dispose according to municipal, provincial, and federal regulations

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Dispose according to municipal, provincial, and federal regulations

14. TRANSPORT INFORMATION

TDG: Not Regulated

15. REGULATORY INFORMATION

WHMIS CLASS: Not a WHMIS controlled product
CPR Compliance: This product has been classified in accordance with hazard criteria of the CPR and this MSDS contains all the information required by the CPR

16. OTHER INFORMATION

PREPARED BY: J. Brideau (800)267-5744
PREPARATION DATE: February 17, 2012
AMMENDED: February 13, 2015

Notice:

To the best of our knowledge, the information contained in this document is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Some of the information presented in this document is from sources other than direct test data on the substance itself. As the methods of storage and handling, use, and disposal of the product are beyond our control, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with storage and handling, use, or disposal of this product.

Final determination of suitability of this material is the sole responsibility of the user. Materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

APPENDIX B

KROWN T-40 CORROSION INHIBITOR – APPLICATION SHEET

KROWN T- 40 CORROSION INHIBITOR

The Krown T-40 is an Industrial strength Corrosion Inhibitor/Lubricant designed to protect metal surfaces and tubing. It is safe for use on electrical components and is an environmentally friendly product. The product is non-toxic and contains no solvents.

The product can be applied using the following methods:

- Aerosol can
- Pot Spray System
- Pressure Pot System
- Pumping System

For specifics of the application, as it relates to the equipment used to apply the product, please contact Krown's Technical department for assistance.

Krown T-40 is best applied when the product is heated. It is optimal to have the product at a temperature of 140 degrees F.

Make sure the surface is clean prior to application of Krown T-40. It is preferable to clean the surface with Krown Salt Eliminator (*Chloride cleaner*) prior to application. The surface does not need to be dry prior to the T-40 application as the product will displace moisture. The product when applied will remain wet and is not intended to "set up". It will create a thin barrier to repel moisture.

It is recommended that an approved NIOSH mask be worn when applying the product (in any mode, with the exception of an aerosol.)

After application any excess product (overspray) or product that may be left on the shop floor can easily be cleaned up using a degreaser.

Further product information and a current MSDS is available on Krown's web site at www.krown.com

KROWN CORPORATE
35 Magnum Drive, Schomberg, Ontario (Canada) L0G 1T0
(905) 939-8750 tel (905) 939-8710 fax

APPENDIX B

KROWN T-40 CORROSION INHIBITOR – MSDS SHEET

CANADIAN KROWN DEALERS INC.
MATERIAL SAFETY DATA SHEET

KROWN T-40

Date Prepared: January 5, 2015
Supersedes: January 3, 2012

1. PRODUCT INFORMATION

Product Identifier: Krown T-40

Application and Use: Rust Inhibitor, lubricant

Product Description: Rust Inhibitor

REGULATORY CLASSIFICATION

WHMIS Information:
Not Controlled

TDG Information: Rail/Road
Not Regulated in Canada.

Canadian Environmental Protection Act (CEPA)
All components of this product are either on the Domestic Substances List (DSL) or exempt

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EMERGENCY TELEPHONE NUMBER

800-267-5744
(905) 939-8750

MANUFACTURER/SUPPLIER

Canadian Krown Dealers Inc.
35 Magnum Drive
Schomberg, ON LOG 1T0

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2. REGULATED COMPONENTS

The following component data is defined in accordance with sub-paragraph 13 (a) (I) to (iv) of the Hazardous Products Act.

NAME	% (v/v)	CAS
None		

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3. TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Density: (g/cc)	0.9
Vapour Pressure: (mm)	N.D.
Solubility in Water:	Nil
Boiling Point:	N.D.
Freezing/Melting Point:	-20°C
Vapour Density: (air=1)	Heavier than air
Evaporation Rate, n-Butyl Acetate = 1:	N.D.
pH:	N/A
Appearance:	Viscous oil; no odour

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4. HEALTH HAZARD INFORMATION

NATURE OF HAZARD

INHALATION:
High vapour/aerosol concentrations (greater than approximately 1000 ppm) are irritating to the eyes and respiratory tract, and may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness and other central nervous system effects, including death.

EYE CONTACT:
Slightly irritating, but will not injure eye tissue.

SKIN CONTACT:
Low toxicity.
Frequent or prolonged contact may irritate the skin and cause a skin rash (dermatitis).
Skin contact may aggravate an existing dermatitis condition.

INGESTION:

Small amounts of liquid aspirated into the respiratory system during ingestion or from vomiting may cause mild to severe pulmonary injury and possibly death.
Minimal toxicity.

CHRONIC:
At very high oral doses, this product caused reversible damage to the stomach, liver, and kidney (male only) of rats. These effects are not relevant to humans at occupational levels of exposure.

SPECIAL HEALTH PRECAUTIONS:
Health studies have shown that many petroleum hydrocarbons pose potential human health risks, which may very from person to person. As a precaution, exposure to liquids, vapours, mists or fumes should be minimized.

OCCUPATIONAL EXPOSURE LIMIT
5 mg/m3

MANUFACTURER RECOMMENDS:

Local Regulated limits may vary.

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5. FIRST AID MEASURES

INHALATION:
In emergency situations use proper respiratory protection to immediately remove the affected victim from exposure. Administer artificial respiration if breathing has stopped. Keep at rest. Call for prompt medical attention.

EYE CONTECT:
Flush eyes with large amounts of water until irritation subsides. If irritation persists, get medical attention.

SKIN CONTACT:
Immediately flush with large amounts of water. Use soap if available. Remove contaminated clothing, including shoes, after flushing has begun.

INGESTION:
If swallowed, **DO NOT** induce vomiting. Keep at rest. Get prompt medical attention.

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6. PREVENTATIVE AND CORRECTIVE MEASURES

PERSONAL PROTECTION:
The selection of personal protective equipment varies depending upon conditions of use.

Where prolonged and/or repeated eye contact is likely to occur, wear safety glasses and side shields, long sleeves, and chemical resistant gloves.
Where eye contact is unlikely, but may occur as a result of short and/or periodic exposures, wear safety glasses with side shields.
Where concentrations in the air may exceed the occupational exposure limits given in Section 4 and where engineering, work practices or other means of exposure reduction are not adequate, approved respirators may be necessary to prevent overexposure by inhalation.

ENGINEERING CONTROLS:
The use of local exhaust ventilation is recommended to control emissions near the source. Provide mechanical ventilation of confined spaces.

ELECTROSTATIC ACCUMULATION HAZARD:
Use proper ground procedure.
Additional information regarding safe handling of products with static accumulation potential can be ordered by contacting the American Petroleum Institute (API) for API Recommended Practice 2003, entitled "Protection Against Ignitions Arising Out of Static, Lighting and Stray Currents" (American Petroleum Institute, 1220 L Street Northwest, Washington, DC, 20005), or the National Fire Protection Association, 1 Batterymarch Park, P.O. Box #9101, Quincy, MA, 02269-9101)

HANDLING, STORAGE AND SHIPPING
Keep container closed. Handle and open containers with care. Store in a cool, well ventilated place

away from incompatible materials.

DO NOT handle or store near an open flame, heat, or other sources of ignition.
Material will accumulate static charges which may cause an electrical spark (ignition source). Use proper grounding procedures.
DO NOT pressurize, cut, heat or weld containers. Empty product containers may contain product residue.
DO NOT reuse empty containers without commercial cleaning or reconditioning.

SPILL CONTROL AND DISPOSAL
Dyke and Recover. Use absorbent material. Consult an expert on the disposal of recovered material. Ensure disposal in compliance with government regulations and ensure conformity to local disposal regulations. Notify the appropriate authorities immediately. Take all additional action necessary to prevent and remedy the adverse effects of the spill.

LAND SPILL
Eliminate sources of ignition. Keep public away. Prevent additional discharge of material, if possible to do so without hazard.
Prevent spills from entering sewers, watercourses or low areas. Contain spilled liquid with sand or earth. Do not use combustible materials such as sawdust.
Recover by pumping (use an explosion proof motor or hand pump), or by using a suitable absorbent.

WATER SPILL

Remove from surface by skimming or suitable absorbents. If allowed by local authorities and environmental agencies, sinking and/or suitable dispersants may be used in unconfined waters.

7. FIRE AND EXPLOSION HAZARD

Flash Point and Method:	>185°C COC
Autoignition Temperature:	N.D.
Flammable Limits (Upper):	N.D.
Flammable Limits (Lower):	N.D.

GENERAL HAZARDS:
Combustible Liquid; may form combustible mixtures at or above the flash point.

FIRE FIGHTING:
Use water spray to cool fire exposed surfaces and to protect personnel.
Shut off fuel to fire.
Use foam, dry chemical or water spray to extinguish fire.
Avoid spraying water directly into storage containers due to danger of boil over.
A self-contained breathing apparatus (SCBA) is recommended for indoor fires and any significant outdoor fires. For small outdoor fires, which may easily by extinguished with a portable fire extinguisher, use of an SCBA is optional.
The liquid may travel some distance along the ground or surface to ignition sources where it may ignite.

HAZARDOUS COMBUSTION PRODCUTS:
No unusual products

APPENDIX C

KROWN ENVIRO SOLVE – APPLICATION SHEET

KROWN Enviro Solve

Krown Enviro Solve is a Citrus Solvent Based Cleaner/Degreaser. Made from a combination of citrus solvent, emulsifiers, and additives it is biodegradable and environmentally safe. Enviro Solve is a versatile cleaner that can be used for dissolving tar, adhesives and heavy grease. Enviro Solve contains no Petroleum Distillates.

The product can be applied using the following methods:

- Apply with a cloth
- Trigger or Pump up Sprayers

For specifics of the application and dilution rates, as it relates to the equipment used to apply the product, please contact Krown's Technical department for assistance.

Areas of Application

- Asphalt & Tar Removal
- Liquefying Crude Oil
- Metal Cleaning/rust stain removing
- Parts Washing
- Brake Cleaning
- Wall Cleaning
- Fire & Smoke Cleanup
- Adhesive Removal
- Decal Removal
- Oil Stain Removal from Fabric/Carpets
- Chewing Gum Removal

Directions for Use

1. Test product in an inconspicuous area before using.
2. Spray or Wipe on. Let stand for up to 10 minutes. *(It is preferable that product not be allowed to dry on surface.)*
3. Agitate with firm scrub brush in the case of rust staining.

Remove using one of the following methods:

1. Wipe product off with a wash mitt or cloth
2. Rinse with water

Further product information and a current MSDS is available on Krown's web site at www.krown.com

KROWN CORPORATE
35 Magnum Drive, Schomberg, Ontario (Canada) L0G 1T0
(905) 939-8750 tel (905) 939-8710 fax
www.krown.com

NEW FLYER

APPENDIX C

KROWN ENVIRO SOLVE – MSDS SHEET

MATERIAL SAFETY DATA SHEET

ENVIROSOLVE

1. PRODUCT AND COMPANY INFORMATION

Krown
35 Magnum Drive
Schomberg, ON L0G 1T0

USE: D'limonene Solvent Cleaner/Degreaser
PHONE: 1 800-267-5744
CHEMICAL FAMILY: Blended Product

2. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENT %W/W PIN/CAS# LD50/LC50 ROUTE/SPECIES D'Limonene 60-100 5989-27-5 LD50 >5000mg/kg dermal/rabbit

3. HAZARDS IDENTIFICATION

EFFECTS OF ACUTE EXPOSURE TO MATERIAL: EYES: May cause severe eye irritation. May cause temporary or permanent damage if not treated promptly.
SKIN: Can cause skin irritation. May cause drying of skin.
INGESTION: Harmful if ingested

EFFECTS OF CHRONIC EXPOSURE TO MATERIAL: May cause drying of skin
PRIMARY ROUTE OF ENTRY: [X]-Inhalation [X]-Ingestion [ ]-Absorption
OTHER TOXIC EFFECTS: None known

4. FIRST AID MEASURES

EYES: Flush eyes with plenty of water for at least 15 minutes. Hold eyelids open while rinsing. Contact a physician immediately
SKIN: Flush affected area thoroughly with water. Seek medical attention if irritation persists
INGESTION: Rinse mouth with water. Drink large volumes of water. Do not induce vomiting. Never give anything by mouth to an unconscious patient. Contact a physician immediately. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. INHALATION: Remove patient to fresh air.

5. FIRE FIGHTING MEASURES

FLAMMABLE: Combustible liquid.
FLASH POINT, CELSIUS: 46°C
AUTO IGNITION TEMPERATURE, CELSIUS: not available
EXTINGUISHING MEDIA: Dry Chemical, Carbon Dioxide, Foam (Water is unsuitable for use on burning material, but may be used to cool containers exposed to heat.)
SPECIAL FIRE FIGHTING PROCEDURES: appropriate to surrounding fire
HAZARDOUS COMBUSTION PRODUCTS: CO, CO_2, Smoke and unidentified organic compounds may be formed during combustion. EXPLOSIVE SENSITIVITY TO: Not Applicable

6. ACCIDENTAL RELEASE MEASURES

SPILL PROCEDURE: SMALL: Hose down with water
LARGE: Soak up with absorbent material and hold for disposal

7. HANDLING AND STORAGE

SPECIAL HANDLING PROCEDURES AND EQUIPMENT: Wear gloves if handling concentrated product. Avoid contact with skin and eyes. Do not take internally.
STORAGE REQUIREMENT: Avoid freezing. Store in a cool dry area in a closed container.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT:
GLOVES: Impermeable Gloves EYE PROTECTION: Safety Goggles
FOOTWEAR: Water Resistant OTHER: Not required
RESPIRATORY PROTECTION: Not required for normal use
VENTILATION REQUIREMENTS: Local Ventilation

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Light Orange Colour/Citrus Aroma	S.G. / DENSITY (g/cc):	0.86

PH: (Concentrate):	not applicable	VAPOUR PRESSURE (mmHg):	not established
VAPOUR DENSITY (air=1):	not established	BOILING POINT:	>160°C
FREEZING POINT:	not available	EVAPORATION RATE (water=1):	<1
SOLUBILITY IN WATER:	not soluble		

10. STABILITY AND REACTIVITY

INCOMPATIBILITY (Material to Avoid): Strong oxidizing agents
STABILITY: Stable
HAZARDOUS DECOMPOSITION PRODUCTS: CO, CO_2, Smoke and unidentified organic compounds may be formed during combustion.
HAZARDOUS POLYMERIZATION: Not applicable REACTIVITY: Not dangerously reactive

11. TOXICOLOGICAL INFORMATION

LD50 (Calculated): >5000 mg/kg (dermal/rabbit) LC50 (Calculated): Not established

12. ECOLOGICAL INFORMATION

SPILL PROCEDURE: Pick up with mop or wet-vac.
WASTE DISPOSAL: Dispose according to municipal, provincial, and federal regulations

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Dispose according to municipal, provincial, and federal regulations

14. TRANSPORT INFORMATION

TDG: Not Regulated

15. REGULATORY INFORMATION

WHMIS CLASS: Not a WHMIS controlled product
CPR Compliance: This product has been classified in accordance with hazard criteria of the CPR and this MSDS contains all the information required by the CPR

16. OTHER INFORMATION

PREPARED BY: J. Brideau (800)267-5744
PREPARATION DATE: February 17, 2012
AMMENDED: February 9, 2015

Notice:
To the best of our knowledge, the information contained in this document is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Some of the information presented in this document is from sources other than direct test data on the substance itself. As the methods of storage and handling, use, and disposal of the product are beyond our control, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with storage and handling, use, or disposal of this product.
Final determination of suitability of this material is the sole responsibility of the user. Materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

APPENDIX D

ZINC PRIMER APPLICATION INSTRUCTIONS

Primer Mixing Instructions

I. Clean area to be primed per painting and priming procedures in the New Flyer Service Manual under section: Chassis and Structure.

II. Mix 1 part of PPG Catalyst S28079 (NFIL P/N 108936) with 2 parts of PPG Green Zinc Powdercoat S28080 (NFIL P/N 115956). Mixture to be applied by brush. No Varsol (thinner) is required. Mix thoroughly.

Cure time is 4 hours at 77°F (25°C).

Pot life of mixture is approx. 3 to 4 hours, BUT is significantly reduced with exposure to air (moisture).

APPENDIX E

CORA SHIELD APPLICATION INSTRUCTIONS

Cora shield Protective Coating Application

I. Remove excess dirt, dust and debris from substrate using clean, dry cloth or air stream.
II. Coating to be applied at ambient air temperature between 50 to 99°F (10 to 32°C).
III. Substrate temperature must not exceed 212°F (100°C) during application.
IV. Keep parts above freezing within first 24 hours after application.
V. Using a 50:1 ratio or higher stainless steel pump, Reverse-A-Clean tungsten carbide tipped (0.021" to 0.027" in diameter) stainless steel airless spray gun and disposable brush or trowel, apply a single coating of Corashield (NFIL P/N 080288). Spray distance 12 to 15" (30 to 38cm). **ALTERNATELY:** Apply Corashield by brush.
VI. Allow to air dry at room temperature.

APPENDIX F

INSPECTION REQUIREMENTS

- Inspected and completed. Name: _____ Date: _____
- Coach # _____
- Mileage _____
- Seal all voids as required
- Zinc Primer/Corashield Re-Applied as required
- Salt Eliminator application
- Krown T-40 application
    - Underbody _____
    - Engine Header tube _____
    - Impact panel brackets (if applicable) _____
    - CNG racks (if applicable) _____

☞ **NOTE: Inspect coach underbody and note any damage before starting rework.**

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

APPENDIX G

TOOLS & PRODUCT ITEMS FOR KROWN APPLICATION

BUS

SALT ELIMINATOR™

An advanced formula designed to break the bond formed between metals and road salts or deicing chemicals.

Features & Benefits

Helps Fight Corrosion
Calcium. magnesium, and sodium chlorides greatly accelerate the corrosion process. Salt Eliminator is specifically formulated to remove these harmful chlorides from vehicles and equipment.

Repels Moisture
Salt Eliminator creates a water repelling surface that not only leaves a beading shine to the vehicle but also helps slow salt from reforming on the surface.

Environmentally Friendly
Salt Eliminator doesn't contain any phosphates or petroleum solvents.

Safe on any Surface
Salt Eliminator can be used to remove salt stains from carpets, upholstery, plastic, leather and vinyl.

*All Krown products are NPE/APE free.

Areas of Application

- Vehicle & equipment salt removal
- Salt-spreading equipment
- Automatic and self-serve carwashes
- Interior Desalting
- Equipment washing

Methods of Application

- Foam Guns*
- High Pressure Wands
- Pressure Washing
- Vehicle Wash Systems
- Wash Bucket
- Trigger & pump-up sprayers

** Ask about Krown's High Pressure Foaming Cannon.*

Directions For Use

1. Dilute Equipment Wash to the desired ratio.

Foaming Presoak:	Dilute 50:1 - 75:1
Underbody Wash:	Dilute 20:1 – 45:1
High Pressure Wand:	Dilute 50:1 - 75:1
Wash Bucket:	Dilute 200:1 – 250:1
Trigger Sprayer:	Dilute 3:1 – 5:1

Order Number & Sizes
Aerosol 6465146 **4L** 6465147
20L 6465148 **205L** 6465149

Automatic Bus Wash Systems

Foam Gun *#6465156*

Foam Cannon *#6465157*

Soap Dispenser
1 Gal. per sec. *#6465158*
4 Gal. per sec. *#6465159*

Trigger Sprayer *#6465160*

Foam Brush *#6465161*

The highlighted accessories are designed to work along with Krown Salt Eliminator to save time and provide unparalleled results. Please use all Krown products with the appropriate safety gear.

Contact Krown At:
sales@krown.com

MSDS information available at www.krown.com

BUS

CITRUS POWERED

ENVIRO SOLVE

A versatile and user-friendly citrus-solvent cleaner/degreaser.

Features & Benefits

Biodegradable and Environmentally safe
Made from a combination of citrus solvents, emulsifiers and additives. Contains no petroleum distillates.

Powerful Cleaning
Enviro Solve is a versatile cleaner that can be used for dissolving tar, adhesives and heavy grease.

Safe on Most Surfaces
Enviro Solve can be used on many different surfaces including fabrics.

Floating Degreaser
Liquify crude oil and greases that are floating on the water's surface by adding Enviro Solve.

*All Krown products are NPE/APE free.

Areas of Application

- Asphalt & Tar Removal
- Liquefying Crude Oil
- Metal Cleaning
- Parts Washing
- Brake Cleaning
- Wall Cleaning
- Fire & Smoke Cleanup
- Adhesive Removal
- Decal Removal
- Oil Stain Removal from Fabric/Carpets
- Chewing Gum Removal
- Removes rust bleeding and stains

Methods of Application

- Apply with Rag
- Pump up and Trigger Sprayers

Directions For Use

1. *Always test product in an inconspicuous area before using.*
2. Spray or wipe on.
3. Let stand for up to 10 minutes. (It is preferable that the product not be allowed to dry on the surface.)
4. Remove using one of the following methods: ***a)*** Wipe product off with a wash mitt or rag. ***b)*** Rinse with water

Order Number & Sizes

4L 6465150 **20L** 6465151 **205L** 6465152

Contact Krown At:

sales@krown.com

MSDS information available at www.krown.com

BUS

RUST PROTECTION & LUBRICANT

A petroleum-based corrosion inhibitor designed to create a long-lasting, self-healing barrier between metal and water.

Krown is a manufacturer of Penetrants, Lubricants, Corrosion Inhibitors and Cleaning Maintenance Products. We manufacture products for agriculture, automotive, bus, and trucking OEMs. Krown's products are used annually as part of preventative maintenance programs with municipal and private fleets across North America

Features & Benefits

Displaces Moisture
When applied to a metal surface, Krown bonds to the metal, lifting water off the surface and creating a strong, self-healing barrier. This creates a lasting protection against rust.

Protects Electrical Components
With a dialectric strength that exceeds 50Kv, Krown can be directly applied to electrical componets, sealing out water and preventing corrosion.

Environmentally Friendly
Krown's Rust Protection formula is not WHMIS controlled and contains no solvents or VOCs.

Areas of Application

- Steel Frame and Tubing
- Electrical Wiring & Connections
- Hinges & Locks
- Moving Parts
- Chains

Methods of Application

- Pump & Gun System
- Aerosol Can
- Pressure Pot System
- Portable Pot System

Directions For Use

1. Throughly clean area of application to remove chlorides and salts with ***Krown Salt Eliminator.***
2. Krown Rust Protection is best applied when the product is heated to 140 degrees F.
3. It is recommended that an approved NIOSH mask be worn when applying the product (in any mode, with the exception of an aerosol.)
4. Mist product evenly over surface, until it appears "wet", too much overspray will lead to excessive dripping and product loss.
5. Clean up excess product (overspray) from shop floor with a degreaser.

Order Number & Sizes
Aerosol 6465138 **4L** 6465139
20L 6465140 **205L** 6465141

Contact Krown At:
sales@krown.com
www.krown.com

These accessories are designed to work along with Krown Rust Protection to save time and provide unparalleled results. Please use all Krown products with the appropriate safety gear.

Aerosol Can *#6465138*

Pump & Gun System *#6465153*

Pot Spray System *#6465154*

Pressure Pot System *#6465155*

Krown Rust Protection is designed to protect the bus chassis, tubular structure and electrical components.

MSDS information available at www.krown.com

LABOUR ESTIMATE

	Operation	Men	Hours	Labour Time M X HR
1	Disconnect and connect electrical. Lift bus.	1	1	1
2	Remove impact panels and apply corrosion protection on impact panel mounting brackets. (Only if required).	1	1	*1
3	Drill holes along the bottom of the tube.	1	1	1
4	Apply salt eliminator, wash out debris from lower horizontal tubes along the bottom of bus and entire underside.	1	3	3
5	Remove staining on underbody. Including cleaning drain holes.	1	1	1
6	Touch up sealant, zinc primer & corashield.	1	1	1
7	Apply Krown T-40 inside structure tubes.	1	2	2
8	Apply lithium grease, plug the holes and clean up of the bus (include lowering bus).	1	1	1

Total: 10 hours

* With impact panels: 11 hours

(*) This labor time will only be applicable if the bus has lower impact panels.

PARTS REQUIRED

Item	Part Number	Description	Qty. per Coach	Units	Notes
1	235584	Undercoat – PPG 7972 W	0.25	GA	
3	055701	Sealant 221 White	0.5	EA	
4	108936	Urethane PPG Catalyst S28079	0.2	GA	
5	115956	PPG Green Zinc Powdercoat S28080	0.4	GA	
6	116508	Plastic plugs	20	EA	
7	34S00024	Screw – No.10-24 x 1.5	32	EA	*1
8	30W00000	Washer Lock No. 10	32	EA	*1
9	6465141	Krown T-40	12	L	
10	6465149	Krown Salt Eliminator	5	L	
11	6465150	Enviro Solve	0.5	L	
12	597554	Foam-Impact Panel Plug	18	EA	*1
13	116507	11/2” Plastic plug	1	EA	As req’d
14	116511	1” Plastic plug	1	EA	As req’d

- 1) Only order if buses have impact panels.

SPECIAL TOOLS REQUIRED					
Item	Part Number	Description	Qty. per Coach	Units	Notes
1		***See all info on tools and products from Krown on Appendix G.***			