AYRO

VANISH

Low-Speed Electric Vehicle

SERVICE MANUAL

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1 INTRODUCTION

AYRO designs and produces all-electric vehicles and e-delivery systems that redefine the very nature of sustainability. We define sustainability as a ubiquitous construct. From tire tread, fuel cells, sound, and even discordant visuals, we apply engineering and artistry to every element of our product mix.

Your vehicle(s) reflect our company's commitment to advancing sustainable light electric solutions, the passion of our leadership to deliver clean energy transportation, and a better environment. These purpose-built and innovative EVs support a plurality of last-mile delivery, micro distribution, and campus / facility mobility needs.

The purpose of this Service Manual is to present information you require as an authorized AYRO service representative. This Manual provides the instructions and guidance needed for the maintenance or repair of the AYRO Vanish Low Speed Electric Vehicle models (LSV and Non-LSV).

Once you have read this Service Manual, you will:

- Be able to perform routine maintenance on the vehicle.
- Be able to find the information needed to service and support the vehicle.
- If so qualified, be able to perform service and maintenance on the vehicle's electrical and battery systems.

1.1 Applicability

This service manual applies to the following Model Years: **2023-2024**
Battery Module Configuration A applies to the following vehicle identification numbers:

4A9AA11U1RR050006
4A9AA11U2RR050001
4A9AA11U3RR050007
4A9AA11U4RR050002
4A9AA11U5RR050008
4A9AA11U6RR050003
4A9AA11U8RR050004
4A9AA11UXRR050005

Battery Module Configuration B applies to the following vehicle serial numbers and higher:

4A9AA11U7RR050009

1.2 AYRO Service Department

AYRO Service Department
Tel: +1 512.994.4917 Press 1 for Service Department (USA and International)
Email: support@ayro.com
Web: www.AYRO.com

1.3 For Reference Only

All information contained in this publication is based on the latest product information available at the time of publication. Product improvements or changes may result in differences between this Manual and the vehicle. Descriptions, depictions, and/or procedures in this document are intended for reference only.

No liability can be accepted for omissions or inaccuracies. AYRO, Inc. reserves the right to make changes at any time, without notice and without incurring any obligation to make the same or similar changes to vehicles previously manufactured. Any reprinting or reuse of these descriptions, depictions, and/or procedures, whether in whole or in part, is expressly prohibited.

1.4 Compliance (NHTSA)

This vehicle complies with the U.S. Department of Transportation National Highway Traffic Safety Administration (NHTSA) low-speed vehicle regulations and can be operated on many streets posted with lower speed limits. Please familiarize yourself with all laws and regulations concerning the operation of the vehicle in your area.

1.5 Applicability

This Manual applies to the following AYRO low-speed electric vehicles:

- AYRO Vanish LSV
- AYRO Vanish Non-LSV

2 GENERAL SAFETY

- Read your Owner's Manual before operating this vehicle.
- Do not operate this vehicle under the influence of alcohol, drugs, or medication.
- This vehicle is not intended to be driven at speeds exceeding 25 MPH (40 km/h).
- Never exceed the passenger and cargo limits of this vehicle.
- Avoid sharp turns on inclines and at high speeds (may cause rollover).
- Reduce speed on wet and slippery surfaces and in turns.
- Set the park brake before performing maintenance, service, or leaving the vehicle.
- Remove key when leaving vehicle unattended.
- Stop vehicle before reversing direction.
- Be aware of small children and objects behind you before reversing direction.
- ALWAYS DRIVE SAFELY. FAILURE TO FOLLOW THESE WARNINGS COULD RESULT IN SERIOUS OR FATAL INJURY.

WARNING: The voltage in the battery pack is enough to cause death by electrocution. Never attempt to perform service on the electric drive system, including the battery pack, unless you are properly trained to work on electrical systems.

3 CABIN

3.1 Fascia and Trim

Tools, Equipment, Materials:

- Metric Allen hex wrench
- Metric wrench (typically 10 mm)

3.1.1 Middle Front Fascia

Tools, Equipment, Materials:

- Metric Allen hex wrench (typically 2.5 mm)
- Metric wrench (typically 10 mm)

Removal

1. Remove the two (2) screws from the driver side trim panel using a metric Allen wrench and remove the panel. Repeat the step on the passenger side.
2. Remove the three (3) bolts that secure the driver side of the fascia to the cab frame using a wrench. The middle fascia side bracket will come off as well. Repeat the step on the passenger side.
3. Pop out the white front fascia.

Installation

1. Align the middle front fascia with the proper slots for the tabs on the top and bottom and pop the fascia into position.
2. Using the middle fascia side bracket and three (3) bolts, secure the middle fascia to the cab frame with a wrench. Repeat the step on the passenger side.
3. Install the driver side trim panel by aligning the tabs on the trim piece with the proper slots and secure with two (2) screws using a metric Allen wrench.

3.1.2 Upper Fascia

Tools, Equipment, Materials:

- Metric wrench (typically 10 mm)

Removal

1. Remove the middle front fascia (Ref. 3.1.1)
2. Remove the wiper arm (Ref. 3.1.8)
3. Remove the three (3) bolts that secure the upper fascia to the firewall bracket using a wrench.

4. Pop out the upper fascia and remove the windshield sprayer hose from the fitting on the inside of the fascia panel.

Installation

1. Attach the windshield sprayer hose to the fitting on the inside of the panel then insert the upper fascia into position by putting the top lip of the fascia under the windshield.
2. Secure the upper fascia to the firewall bracket with three (3) bolts using a wrench.

3.1.3 Lower Fascia

Tools, Equipment, Materials:

- Metric wrench (typically 10 mm)

Removal

1. Remove the middle front fascia (Ref. 3.1.1)
2. Remove the five (5) bolts that secure the lower fascia to the fire wall using a wrench.
3. Remove the lower fascia panel.

Installation

1. Hold the lower fascia in place and secure it to the firewall using five (5) bolts and a wrench.

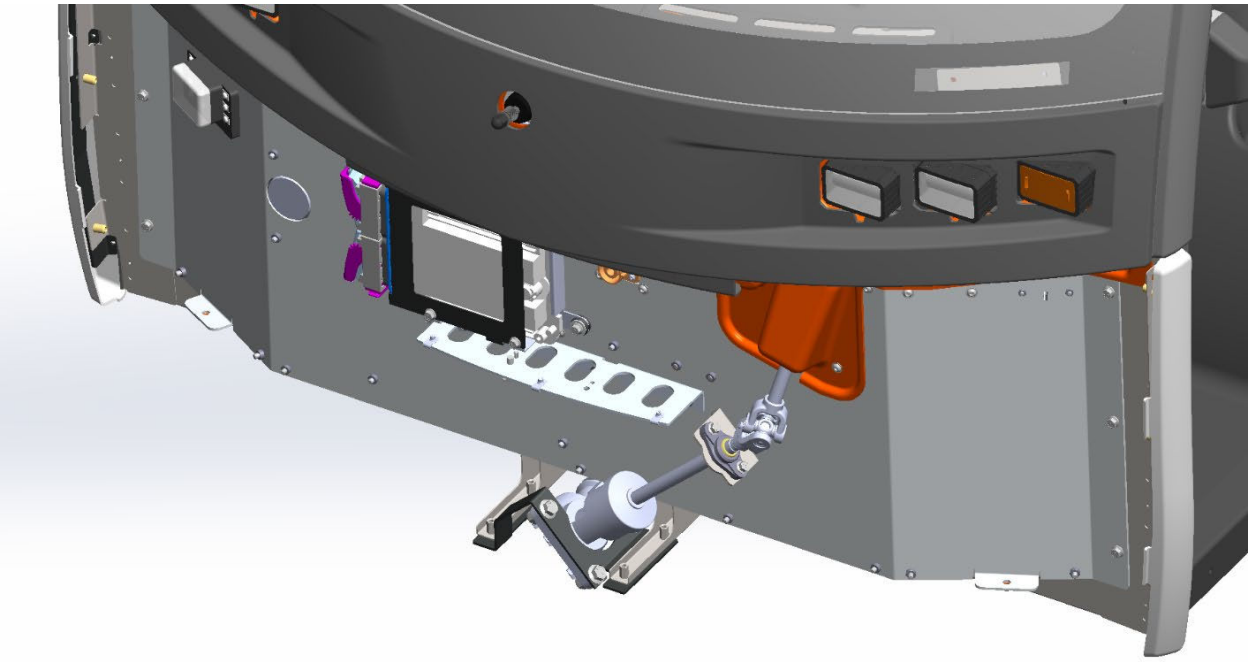


Figure 1: Firewall location of Lower Fascia

3.1.5 Interior Trim

Removal

1. Remove middle front fascia (Ref. 3.1.1).
2. Remove steering wheel (Ref. 4.3)
3. Remove upper column cover (Ref 3.2)
4. Remove Ignition switch. (Ref. 3.2.1)
5. Remove the four (4) nuts that secure the trim panel to the dash using a wrench; the outer two (2) nuts have a trim retaining bracket that will need to be removed as well. Secure the trim retaining brackets while removing the nuts so they do not get lost in the dash.
6. Remove the trim panel and trim insert.

Process is the same for driver and passenger side interior trim panels

3.1.6 Center Stack

Tools, Equipment, Materials:

- Metric Allen hex wrench (typically 2.5 mm)
- Metric wrench (typically 10 mm)

Removal

1. Remove the lower dash panel (Ref. 3.2.2).
2. Remove the pop-in cover behind the center stack.
3. Remove the two (2) bottom center stack bracket bolts using a metric Allen hex wrench. (Bottom bolts are in the middle of the center stack, behind it, threaded in up towards the roof of the cab)
4. Remove the top center stack bolts that secure the center stack to the upper dash frame using a wrench. (The top bolts are visible once the pop-in cover is removed from the back of the Center stack)
5. Remove the Center stack.

Installation

1. Hold the center stack in position and use two (2) bolts to mount the center stack to the upper dash frame using a wrench.
2. Using a metric Allen wrench install the two (2) bottom center stack bolts.
3. Install the pop-in cover behind the center stack.

3.1.7 Mirrors

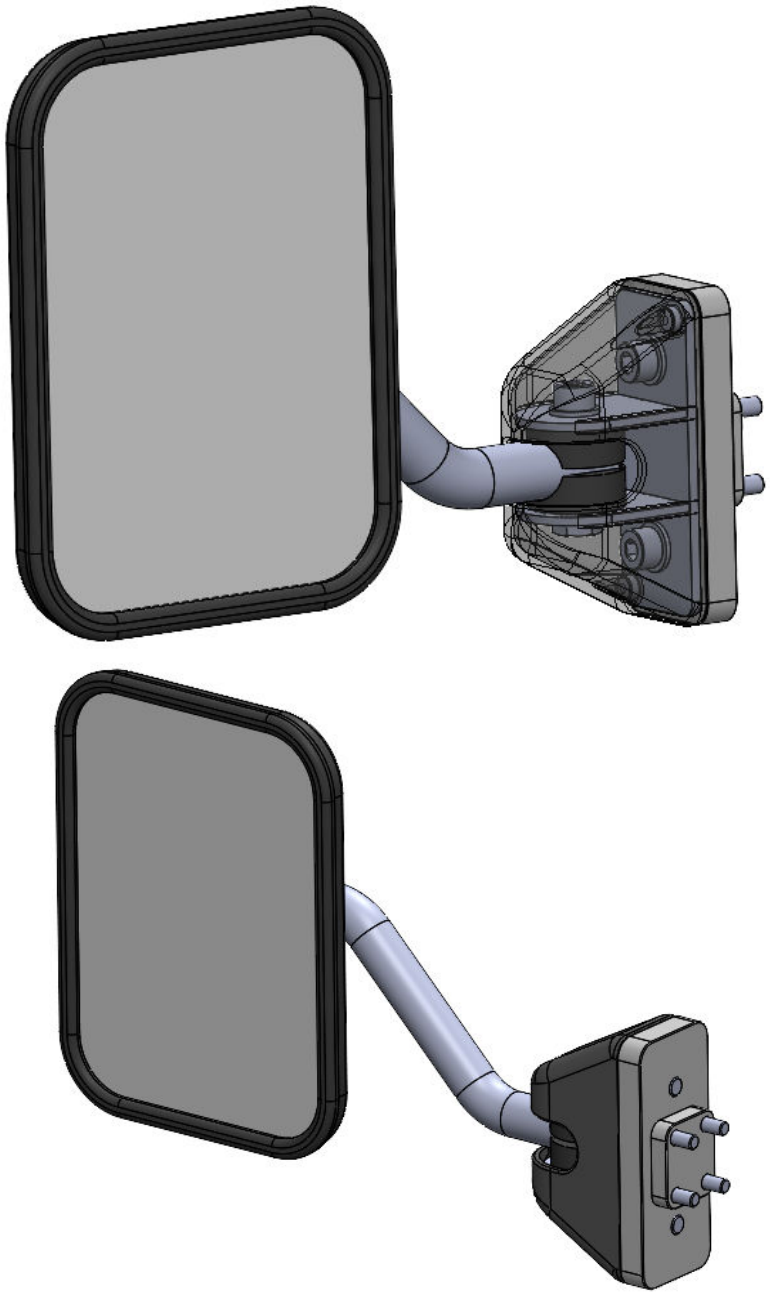


Figure 2: Mirrors with 2 Bolts

Tools, Equipment, Materials:

- Metric Allen hex wrench (typically 6 mm)

Removal

1. Remove magnetic cover from the mirror hinge.

2. Remove 2 mounting bolts securing the mirror hinge to the cab frame using a **6 mm** Allen wrench. Hold onto or secure the mirror so it does not fall or sustain damage when removing the last bolt.

Installation

1. Install the 2 mounting bolts that secure the mirror hinge to the cab frame using a **6 mm** Allen wrench.
2. Slide magnetic cover into place.

3.1.8 Wiper Arm

Tools, Equipment, Materials:

- Marker or Tape
- Metric wrench (typically 14 mm)

Removal

1. Mark the wiper arm angle.
2. Remove the wiper sprayer hose from the fascia fitting.
3. Remove the wiper arm nut using a metric wrench.
4. Remove the wiper arm.

3.1.9 Wiper Motor assembly

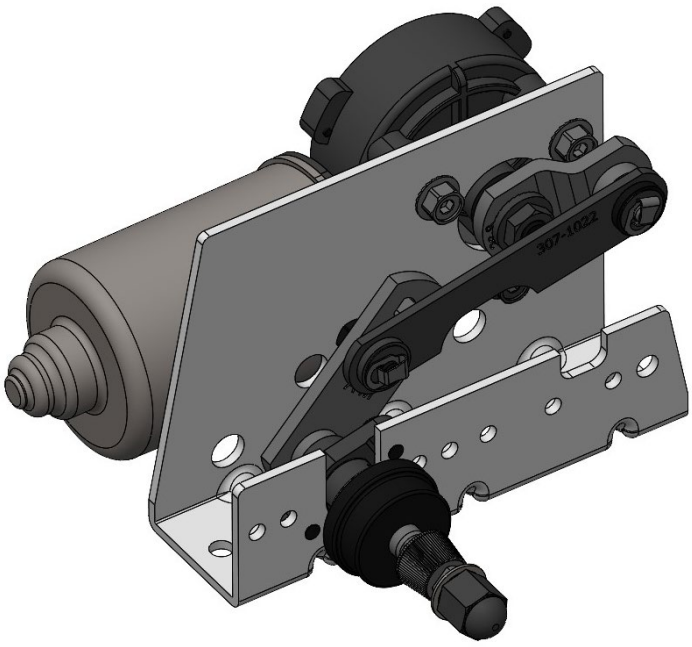


Figure 3: Wiper Motor Assembly

- Tools, Equipment, Materials:

- Metric Allen hex wrench (typically 5 mm)
- Metric wrench (typically 10 mm)

Removal

1. Remove upper fascia (Ref. 3.1.2)
2. Disconnect the wiper motor connectors from the cab harness.
3. Remove the two (2) bolts that secure the wiper motor assembly to the firewall bracket using an Allen wrench for the bolts and a metric wrench on the nut. (Ground wire secured to driver side bolt)

3.1.10 Wiper Motor/Wiper Mechanism

Removal

1. Remove wiper motor assembly (Ref. 3.2.2)
2. Remove the 3 bolts that secure the wiper motor to the wiper mechanism using a wrench.

3.2 Upper Column Cover

Tools, Equipment, Materials:

- **2.5 mm** Allen hex wrench
- **3 mm** Allen hex wrench

Removal

1. Remove the steering wheel. (Ref. 4.3)
2. Remove grommets for instrument levers from the cover.
3. Remove 4 screws from the top half of the cover using **2.5 mm** Allen wrench.
4. Remove the top cover.
5. Remove 3 bolts from the bottom cover using a **3 mm** Allen wrench.
6. Remove the bottom cover.

3.2.1 Ignition switch

Removal

1. Squeeze the retaining tabs on both sides of the switch and push it out of the bracket.
2. Pull the switch out far enough to remove the connector from the back of the switch.

3.2.2 Lower dash panel

Tools, Equipment, Materials:

- Metric Allen hex wrench (typically 4 mm)

Removal

1. Remove mirrors. (Ref. 3.1.7)
2. Remove four (4) screws from the lower dash using a metric Allen wrench.
3. Remove the lower dash.

3.3 Body

3.3.1 Long Side Skirt

Tools, Equipment, Materials:

- Extraction tool for plastic trim rivet clips
- Metric wrench (typically 10 mm)

Removal

1. Remove six (6) plastic push-in tree clips that secure the side skirt to the wheel wells using the proper removal tool. There are three (3) tree clips on each wheel well.
2. Remove the bolts that secure the side skirt to the front and middle skirt brackets using a wrench. Each skirt bracket has two (2) bolts.
3. Remove the side skirt.

3.3.2 Short Side Skirt

Tools, Equipment, Materials:

- Extraction tool for plastic trim rivet clips
- Metric wrench (typically 10 mm)

Removal

1. Remove the three (3) plastic push-in tree clips that secure the side skirt to the rear wheel well and two (2) tree clips that secure it to the rear bumper using the proper removal tool.
2. Remove the two (2) bolts that secure the skirt to the rear skirt bracket using a wrench.
3. Remove the side skirt.

3.3.3 Rear Bumper

Tools, Equipment, Materials:

- Extraction tool for plastic trim rivet clips
- Metric Allen hex wrench (typically 10 mm)

Removal

1. Remove the four (4) plastic push-in tree clips that secure the side skirts to the rear bumper (2 on each side) using the proper removal tool.

2. Disconnect the 6-pin Deutsch connector that joins the chassis harness to the bumper harness.
3. Disconnect the back-up camera cable connection.
4. Remove the two (2) bolts that secure the bumper bracket to the chassis on the driver side using a metric Allen hex wrench; repeat the step on the passenger side.
5. Remove the bumper.

4 STEERING SYSTEM

4.1 Electric Power Steering (EPS)

Tools, Equipment, Materials:

- Metric wrench (typically 14 mm)

Removal

1. Disconnect the two connectors that are inserted into the EPS motor.
2. Loosen the two u-joints that are attached to the input and output shafts of the EPS motor.
3. Remove the four mounting bolts that secure the EPS motor using a wrench.
4. Remove the EPS motor.

Installation

1. Install the EPS motor and secure with the four mounting bolts using a wrench. Tighten until seated.
2. Attach both the u-joints to the input and output shafts of the EPS motor.
3. Connect the two connectors that plug into the EPS motor.

4.2 Rack and Pinion assembly

Tools, Equipment, Materials:

- Jack stands
- Imperial wrench (typically ½-in)
- Metric wrenches (typically 13 and 17 mm)

Removal

1. Place the vehicle on jackstands so that the front suspension and tires off the ground.
2. Remove both front tires. (Ref. in 7.1)
3. Remove tie rod nut using a wrench. Remove tie rod from wheel hub.
4. Remove the u-joint from the rack and pinion using a wrench.
5. Remove the four bolts that secure the rack and pinion to the mounting bracket using a wrench on the bolt head and nut.
6. Remove the rack and pinion.
7. If the tie rod ends are still serviceable, remove them from the old rack and pinion and install them on the new rack and pinion.

Installation

1. Install the rack and pinion to the mounting bracket with the four bolts and nyloc nuts using a wrench on the bolt head and on the nut. Tighten until seated.

2. Insert the tie rod into the wheel hub and secure it with the tie rod nut using a wrench. Tighten until seated.
3. Attach the u-joint to the rack and pinion and tighten the u-joint bolt with a wrench.
4. Install the tire. (Ref. 8.1)
5. Perform wheel alignment. (Ref. 4.6)

4.3 Steering wheel

Tools, Equipment, Materials:

- Metric Allen hex wrench (typically 5 mm)
- Metric socket (typically 24 mm)
- Steering Wheel Puller, if necessary

Removal

1. Remove three (3) bolts that attach the center steering wheel plate to the steering wheel using a metric Allen.
2. Remove the steering wheel nut using a metric socket.
3. Remove the steering wheel. (Steering wheel puller may be necessary)

4.4 Steering Gearbox (90 degree)

Tools, Equipment, Materials:

- 13 mm wrenches (typically 13 and 15 mm)

Removal

1. Remove lower fascia (Ref. 3.1.3)
2. Remove the bolt that secures the u-joint to the gearbox output shaft using a **metric** wrench. Do the same with the u-joint on the input shaft.
3. Remove the four (4) bolts that secure the steering gearbox mounting bracket to the chassis using a wrench.
4. Remove the steering gearbox mounting bracket bolts from the steering gearbox using a wrench on the bolt and on the nut.

Installation

1. Attach the steering gear box bracket to the new steering gear box.
2. Install the gearbox with four (4) bolts using wrenches. Tighten until seated. Be sure to insert the input shaft of the gearbox into the carrier bearing that is mounted to the firewall.
3. Connect the u-joints for the input and output shaft of the steering gearbox using a wrench.

4.5 Tie Rods

Tools, Equipment, Materials:

- Metric wrench (typically 17 mm)
- Marker or tape

Removal

1. Lift the vehicle and place it on jackstands.
2. Remove the tire. (Ref. 8.1)
3. Loosen the jam nut on the tie rod.
4. Count the threads on the tie rod or mark the threads with a marker to indicate how far to thread the new tie rod end on.
5. Remove the tie rod nut that secures the tie rod end to the wheel hub using a wrench.
6. Remove the tie rod end from the tie rod by unthreading it from the tie rod.

Installation

1. Install the new tie rod end onto the tie rod by threading it on to the mark on the treads or to the thread count you took. (Do not tighten the jam nut)
2. Secure the tie rod to the wheel hub with the tie rod end nut using a wrench.
3. Install the tire. (Ref. 7.1)
4. Perform wheel alignment. (Ref. 4.5.1)
5. Tighten the jam nut on the tie rod.

4.6 Alignment

Tools, Equipment, Materials:

- Metric wrench (typically 14 mm)

1. Prepare the vehicle for an alignment using shop system setup.
2. Loosen the jam nut on both tie rods when ready to make the adjustments.
3. Turn the tie rod using a wrench to adjust the toe to get the correct alignment.
4. Tighten the jam nuts.

5 SUSPENSION

5.1 Front

5.1.1 Upper Control Arm

Tools, Equipment, Materials:

- Metric wrenches (typically 13, 17, and 18 mm)

Removal

1. Remove Wheel (Ref. 8.1)
2. Remove the coil-over shock. (Reference 5.1.3)
3. Disconnect brake line retaining mount bolt using a wrench.
4. Remove cotter pin from castle nut on upper ball joint.
5. Remove castle nut using a wrench and separate upper ball joint from wheel hub.
6. Remove upper control arm mounting bolts using wrenches on the bolt and nut.
7. Remove the upper control arm.

Installation

1. Install the upper control arm mounting bolts.
2. Insert the upper ball joint into the wheel hub and secure it with the castle nut using a wrench. (Tighten the castle nut until it is tight then back it off until you can pass a cotter pin through the castle nut and ball joint).
3. Insert a new cotter pin into the castle nut.
4. Secure the retaining bracket for the brake line onto the upper ball joint using a wrench.
5. Install the coil-over shock. (Ref. 5.1.3)

5.1.2 Lower Control Arm

Tools, Equipment, Materials:

- Metric wrenches (typically 16, 17, 18, and 21 mm)

Removal

1. Remove Wheel (8.1)
2. Remove the brake caliper and bracket. (Ref. 9.2.3)
3. Remove the tie rod end from the wheel hub using a wrench on the tie rod end nut.
4. Remove the lower shock mount bolt using wrenches on the bolt and nut.
5. Remove the lower ball joint nut using a wrench and separate the lower ball joint from the wheel hub.
6. Remove the two lower control arm bolts using a wrench on the nut and bolt.
7. Remove the lower control arm.

Installation

1. Install the lower control arm using the two mounting bolts, thread on the lock nuts finger tight. Do not tighten.
2. Attach the lower ball joint to the wheel hub and secure with the lower ball joint nut. Use wrench and tighten until seated.
3. Attach the lower shock mount with the shock mount bolt using a wrench on the bolt and **a** wrench on the nut. Tighten until seated.
4. Tighten the lower control arm mount bolts until seated.
5. Attach the tie rod end to the wheel hub and secure with a wrench. Tighten until seated.
6. Attach the brake caliper and bracket. (Ref. 8.2.3)
7. Install the wheel. (Ref. 7.1)

5.1.3 Coil-Over Shock

Tools, Equipment, Materials:

- Metric wrenches (typically 16 mm and 18 mm)

Removal

1. Remove Wheel (Ref. 8.1)
2. Remove lower shock mount bolt using wrenches on the bolt and nut.
3. Remove upper shock mount using wrenches on the bolt and nut.
4. Remove shock. (When removing the shock, secure from loss 2 each upper shock bushings and sleeves.)

Installation

1. Install the coil-over shock into the upper shock mount using the upper shock bolt. Tighten the bolt and nut using a wrench on both. Ensure the shock bushings and sleeves are correctly placed.
2. Secure the coil-over shock to the lower shock mount with the lower shock bolt using wrenches on the bolt and nut.

5.1.4 Wheel Hub

Tools, Equipment, Materials:

- Metric wrench (typically 18 mm)

Removal

1. Remove Caliper and caliper bracket (Ref. 9.2.3).
2. Remove rotor (Ref. 9.2.2).
3. Remove the cotter pin from the tie rod castle nut then remove the castle nut with a wrench and separate the tie rod from the wheel (Ref. 4.5).

4. Remove shock (Ref. 5.1.3)
5. Remove the cotter pin from the upper ball joint and remove the castle nut with a wrench.
6. Separate the ball joint from the wheel hub.
7. Remove the lower ball joint nut using a wrench and separate the lower ball joint from the wheel hub.
8. Remove the wheel hub.

5.2 Rear

5.2.1 Leaf Springs

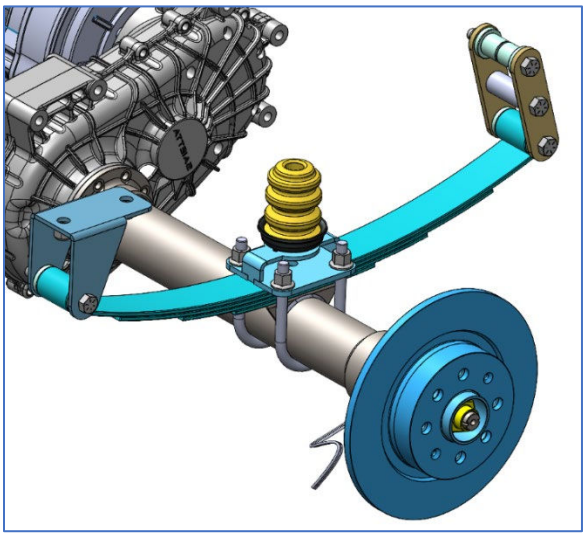


Figure 4: Leaf Spring

Tools, Equipment, Materials:

- Metric wrenches (typically 13, 18, and 19 mm)

Removal

1. Gather all tools, materials, and proper PPE.
2. Ensure Vehicle is on a flat, level surface.
3. Verify work and parts to be serviced (Correct wheel, correct replacement parts etc.)
4. Lift the vehicle and place jackstands on the frame; lift high enough to remove the tire.
5. Remove the tire. (Ref. 8.1)
6. Place a jack underneath the axle and raise the axle to relieve tension on the leaf spring.
7. Use a wrench to remove the two U-bolts that secure the leaf spring to the axle.
8. Remove the two U-bolts and bump-stop bracket.
9. Remove the retaining nut that secures the leaf spring to the leaf spring retaining bolt.
10. Use a wrench to remove the front and rear leaf spring hanger bolts.
11. Remove the leaf spring.

Installation

1. Install the new leaf spring using the leaf spring hanger bolts. Tighten with a wrench until the bushing starts to compress.
2. Align the leaf springs with the leaf spring retaining bolt and secure with the retaining nut. Tighten until the bushing starts to compress.
3. Install two U-bolts and bump stop bracket using a wrench. Tighten until the bushing starts to compress.
4. Install the tire. (Ref. 8.1)

5.2.2 Rear shock

Removal

1. Lift the vehicle and place jackstands on the frame, lift high enough to remove the tire.
2. Remove the tire. (Optional, Ref. 8.1)
3. Use a jack to raise the rear axle to relieve the tension on the shock.
4. Remove the lower shock mount bolt using a wrench on the bolt head and on the nut.
5. Remove the upper shock mount bolt using a wrench on the bolt head and on the nut.
6. Remove the shock.

Installation

1. Install the shock using the upper and lower shock mount bolts using a wrench. Tighten until seated.
2. Install the wheel & tire. (Ref. 8.1)DRIVETRAIN

5.3 Motor Specifications

1. Model: AFT140i-96V
2. Motor type: Yokeless dual-rotor axial-flux PMAC
3. Dry System mass: 59.9 lbs
4. Nominal voltage: 96 Vdc
5. Maximum operating voltage: 120 Vdc
6. Continuous power: 21 kW
7. Maximum power: 45 kW
8. Maximum torque: 99.5 lbs-ft
9. Rated Speed: 4700 rpm
10. Maximum operating speed: 8000 rpm
11. Coolant: 50/50 water:glycol mix

6 JACK POINTS

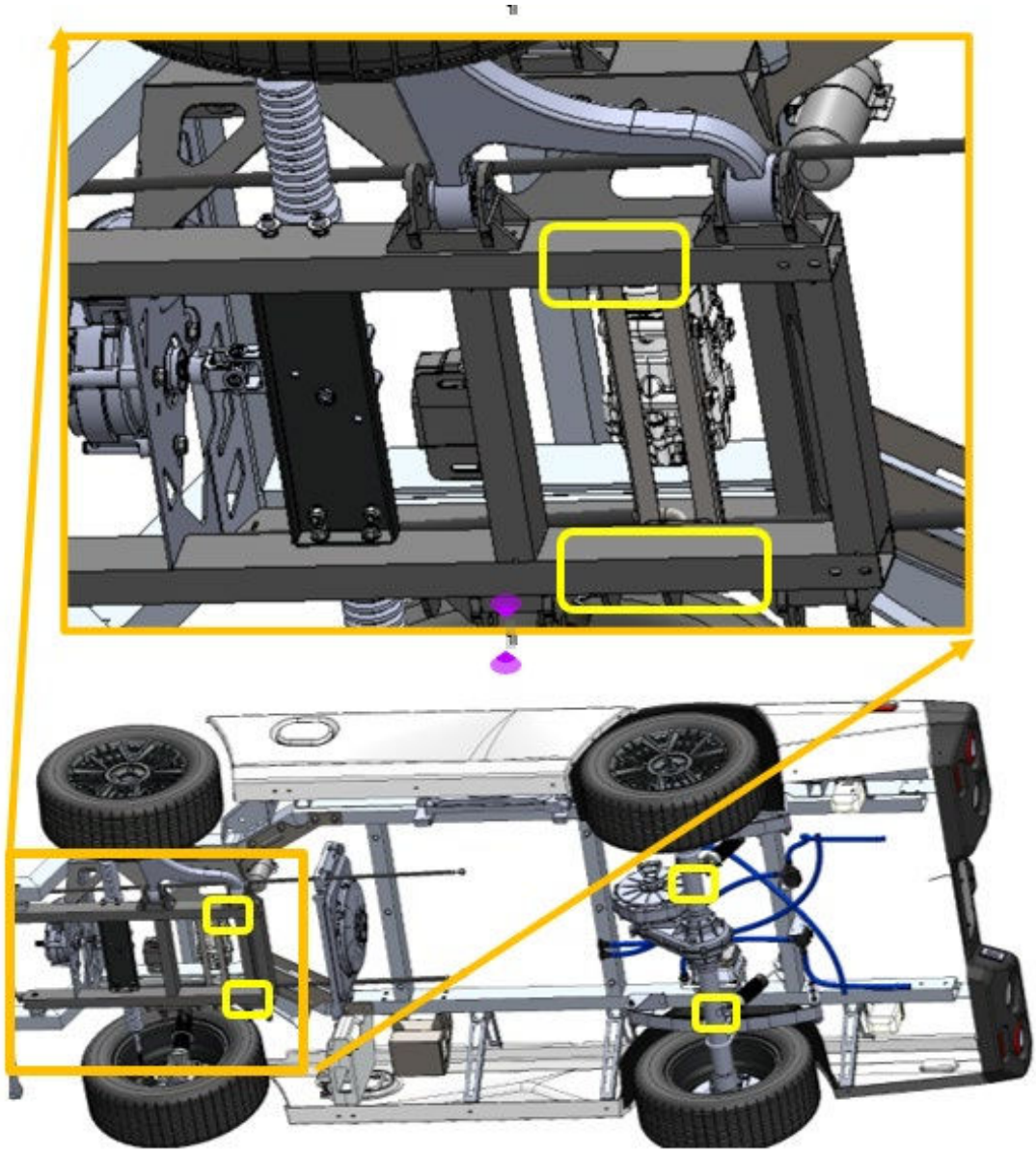


Figure 5: Jack Points under Subframe (front) and Axle (rear)

7 WHEELS/TIRES

7.1 Wheel Removal

Tools, Equipment, Materials:

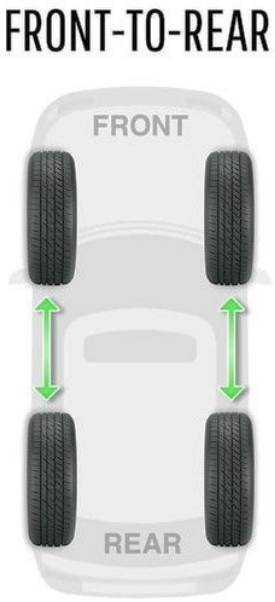
- Jack
- Jack stands
- Metric socket (typically 19 mm)

WARNING: A FALLING VEHICLE CAN CAUSE SERIOUS INJURY OR DEATH. NEVER PLACE ANY PART OF YOUR BODY UNDER AN ELEVATED VEHICLE. IF YOU NEED ACCESS TO THE BOTTOM OF THE VEHICLE, USE AUTOMOTIVE JACK STANDS TO SUPPORT THE VEHICLE ON A FIRM, LEVEL SURFACE.

1. Position the vehicle on a dry, firm, level surface.
2. Set the park brake.
3. Turn the key OFF.
4. Using a jack, lift the vehicle from the **chassis** or **crossmember**.
5. NOTICE: Jacking at any location other than the recommended lift points may cause damage to the vehicle frame and body and/or bodily injury. Jacks need to be certified to support the weight of the vehicle.
6. Remove the lug nuts using a metric socket.
7. Remove the wheel.

1.2 Tire rotation

The proprietary Vanish Schlägernull tires are directional, so the proper rotation procedure is to move the front driver tire to the rear driver side and move the rear driver side to the front driver side. Repeat the same rotation on the passenger side. Directional tires must **not** switch sides of the vehicle.



8 BRAKES

8.1 Verifying Brake Fluid Levels

Remove the front face cover of the vehicle to expose the brake fluid reservoir. The reservoir is located on the front driver's side. If the fluid level in the reservoir is less than MAX, remove the cap and add brake fluid. Replace the cap back onto the reservoir. Replace fascia panels.

8.2 Bleeding

Tools, Equipment, Materials:

- Metric wrench (typically 10 mm for front bleed valves)
- Imperial wrench (typically 7/16" for rear bleed valves)

The brake bleed process should be completed if brakes feel soft or the stopping distance has significantly increased.

NOTE: BRAKE BLEEDING IS A TWO-PERSON TASK.

CAUTION: THE USE OF BRAKE FLUIDS REQUIRES PROPER SAFETY GOGGLES AND PROTECTIVE VINYL GLOVES. THE BRAKE BLEEDING PROCESS TRANSFERS SIGNIFICANT PRESSURE TO BRAKE LINES, COUPLINGS, AND BLEED VALVES. PPE IS NEEDED TO REDUCE THE RISK OF EYE OR SKIN EXPOSURE.

1. Gather all necessary tools and PPE required.
2. Remove wheel(s) of brakes to be serviced (Ref. Wheel & Tires 8.1)
3. Verify Brake Fluid Levels - Remove the front face cover of the vehicle to expose the brake fluid reservoir. The reservoir is located on the front driver's side. If the fluid level in the reservoir is less than MAX, remove the cap and add brake fluid. Replace the cap back onto the reservoir.

CAUTION: USE EXTREME CAUTION WHEN ADDING BRAKE FLUID. ANY FLUID SPILLED OUTSIDE THE RESERVOIR MUST BE CLEANED UP IMMEDIATELY. EXPOSURE OF ANY PART OF THE VEHICLE CAB TO BRAKE FLUID WILL CAUSE MAJOR DAMAGE TO CAB SURFACES.

4. Locate Bleed Valves – Bleed valves are located on each wheel brake assembly. Access to bleed valves is easier if the vehicle is raised.
    a. Rear valves are behind the rear brake assemblies. Use **7/16-in** wrench to bleed.
    b. Front valves are in front of the front brake. Use **10 mm** wrench to bleed.

5. Bleed Valves- Beginning at the rear-passenger brake location, open the rubber cover of the bleed valve. Attach one end of the vinyl tube to the bleed valve and place the other end of the vinyl tube into the bottle/jar. Request that the 2nd person 'pump' the brakes 5-10x, and then hold in the fully pressed position. While brakes are being held, use the wrench, and loosen the bleed valve. Only use a wrench that is properly sized for the bleed valves, as an incorrect size may damage the valve.

   Observe brake fluid passing through the tube into the collection bottle. Watch for air bubbles in the fluid passing through the tube. Close the bleed valve.

   NOTE: DO NOT RELEASE PRESSURE ON THE BRAKE WHILE THE BLEED VALVE IS OPEN. RELEASING PRESSURE WILL REINTRODUCE AIR INTO THE BRAKE LINES.

   If air bubbles were noted in the fluid that was draining, repeat starting at step 5 until no air bubbles are seen. Once no air bubbles are observed, remove the tube from the valve, wipe the valve with a clean cloth and replace the cover. Check the fluid level in the reservoir. Add fluid as needed.

   CAUTION: USE EXTREME CAUTION WHEN ADDING FLUID. ANY FLUID SPILLED OUTSIDE THE RESERVOIR MUST BE CLEANED UP IMMEDIATELY. EXPOSURE OF ANY PART OF THE VEHICLE CAB TO BRAKE FLUID WILL CAUSE MAJOR DAMAGE TO CAB SURFACES.

6. Repeat the process on to the rear-driver brake assembly, then front passenger and then front-driver bleed valves.
7. Verify the brake reservoir level is full and add fluid as needed.
8. Perform brake test and test drive.

8.3 Brakes & Rotors

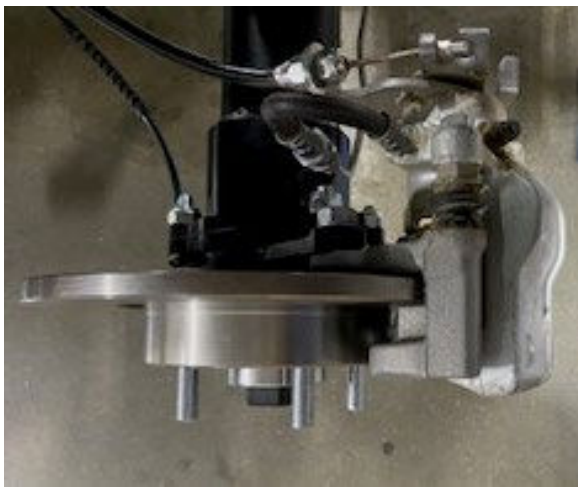


Figure 6: Brake Assembly, top view

Figure 7: Brake Assembly, outside view

8.3.1 Brake Pads

Tools, Equipment, Materials

- Metric wrenches (rear typically 13 mm, front typically 14 mm)
- C-clamp

Replacement

1. Remove Wheel(s) (Ref. 8.1) and master cylinder cap.
2. Remove (2) caliper housing bolts (**14 mm** front/**13 mm** rear), starting with the bottom, then the top.
3. Place the caliper aside, making sure it is properly secured. Do not let the calipers hang by brake line. Take care not to over bend/damage brake line.
4. Remove old brake pads.
5. After removal, compress caliper with C-Clamp, and verify the correct pads to be installed.
6. Install the brake pads, ensuring they are properly seated on the caliper bracket.
7. Reinstall calipers.
8. Reinstall Wheel.
9. Perform brake check.

8.3.2 Rotors

Tools, Equipment, Materials:

- Metric wrenches (typically 13 mm and 17 mm)
- Torx driver (typically T-30)

Installation and Replacement

Rear

1. Remove Wheel (Ref. Wheels & Tires 8.1).
2. Remove (2) **13 mm** caliper housing bolts, starting with the bottom, then the top.
3. Place the caliper aside, making sure it is properly secured. Do not let the calipers hang by brake line. Take care not to over bend/damage brake line.
4. Remove (2) **17 mm** caliper bracket bolts from Hub assembly.
5. Remove the two rotor mount screws using a **T-30** Torx driver.
6. Remove old rotor, verify proper new rotor part, and install new rotor.
7. Install (2) T-30 rotor mount screws.
8. Reinstall calipers.

8.3.3 Calipers

Tools, Equipment, Materials:

- Metric wrenches (rear typically 13 mm, front typically 14 mm)

Removal and Replacement

1. Remove Wheel(s) (Ref. 8.1)
2. Remove brake line from the caliper.
3. Remove (2) housing bolts (**14 mm** front caliper/**13 mm** rear caliper), starting with the bottom, then the top.
4. Remove old caliper.
5. Reinstall or replace brake pads.
6. Install new caliper with (2) caliper bolts.
7. Fill brake fluid to proper level and bleed the brake system (Ref. 8.1)
8. Reinstall wheel(s)
9. Perform brake test and test drive.

8.3 Master Cylinder

8.3.4 Tools, Equipment, Materials:

- Metric wrenches (typically 11, 13, and 14 mm)

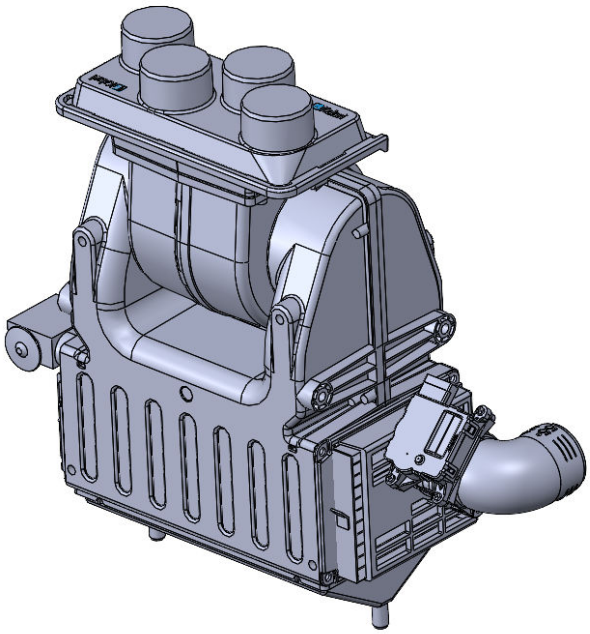
8.3.5 Removal

> NOTE: MASTER CYLINDER CONTAINS BRAKE FLUID; EITHER DRAIN THE BRAKE SYSTEM OR HAVE PLUGS FOR THE LINES AND FITTING. PROPER FLUID CONTAINMENT MATERIAL IS RECOMMENDED.

1. Remove the lower dash panel. (Ref. 3.2.2)

2. Remove connectors from the brake pressure sensor that is on the master cylinder.
3. Remove middle front fascia. (Ref. 3.1.1)
4. Remove upper fascia. (Ref. 3.1.2)
5. Remove the brake lines from the master cylinder using an **11 mm** wrench on the braided line fitting and a **14 mm** wrench on the union.
6. Remove the 2 nuts from the master cylinder studs using a **13 mm** wrench.
7. Remove the master cylinder.

9 CLIMATE CONTROL SYSTEM



9.1 A/C System

Inspect all components before servicing.

Follow best practices for troubleshooting the air conditioning system.

9.1.1 Compressor

Tools:

- Metric wrenches (typically 13, 14, 22, and 27 mm)
- Metric Allen hex wrench (typically 5 mm)

9.1.2 Refrigerant and Fluids

If so equipped, the optional air conditioning system uses **R-1234yf** refrigerant, which offers superior environmental performance. Required: 400 g of refrigerant.

Compressor lubricant: HVAC POE68

9.1.3 Condenser

Tools:

- Metric box wrenches (typically 13, 19, and 22 mm)

Removal/Installation

Remove the condenser from the mounting using a box wrench.

Remove hose fittings using box wrenches.

9.1.4 Manifold and Hoses

Tools:

- Metric wrench (typically 13 mm)

9.1.5 High/Low pressure switches

Tools, Equipment, Materials:

- Metric wrench (typically 22 mm)

Removal/Installation

Remove pressure switch with a wrench and disconnect wiring.

9.2 Heater System

9.2.1 Blower Unit

Tools, Equipment, Materials:

- Metric Allen hex wrenches (typically 4 mm and 6 mm)
- Metric box wrench (typically 10 mm)

Removal/Installation

Remove mirrors and spacer using hex wrenches (Ref. 3.1.7).

Remove lower dash and HVAC cover using an Allen hex wrench.

Remove blower/HVAC using Allen and box wrenches.

Remove hose fittings from side of HVAC using box wrenches.

9.2.2 Heating Element

The heating element is integrated into the blower housing and is non-serviceable.

9.3 Common Issues with AC system

- Undercharge
- Overcharge
- Non-Condensable in system (air, too much oil, contaminated refrigerant)

- Restricted expansion device or refrigerant charging hose
- Dirty or restricted air flow over condenser
- Restricted air flow over evaporator
- Clutch not engaging
- Failed compressor or compressor clutch
- Failed blower motor or blower motor resistor
- Damaged or failed condenser or evaporator
- Vacuum leaks
- Failed switch, fuse, relay, control module, blend door or solenoid

10 COOLING SYSTEM

Tools, Equipment, Materials

- Metric wrench (typically 13 mm)
- Metric Allen hex key (typically 10 mm)
- Metric Allen hex key (typically (4 mm)
- Pliers
- Drip pan

10.1 Radiator

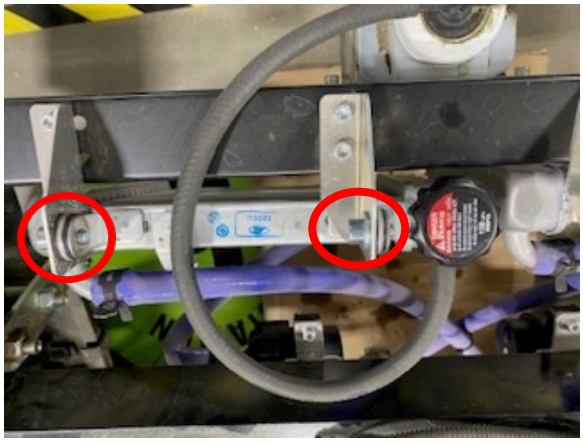


Figure 8: Radiator Top View

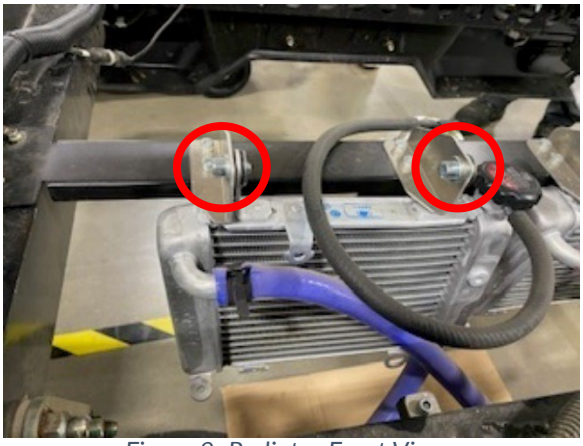
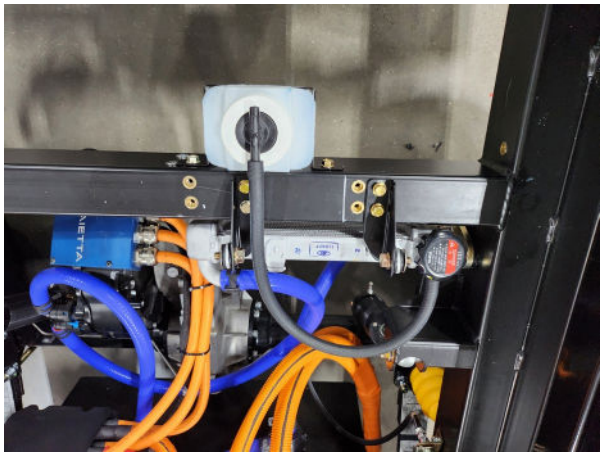


Figure 9: Radiator Front View



10.1.1 Removal

1. Remove the hose clamps for the upper and lower radiator hoses using pliers. Make sure to have a drip pan to collect the coolant as it drains out of the radiator. Be sure to plug or clamp the coolant hoses.
2. Remove two radiator mounting bolts from the radiator brackets using an Allen key and wrench.
3. Remove the radiator.

10.1.2 Installation

1. Install the radiator using the two radiator mounting bolts. Tighten with Allen key and wrench.
2. Attach the upper and lower radiator hoses and secure with hose clamps. Remove plugs/clamps from hoses.
3. Ensure the coolant is filled to the proper level. (You may need to burp the coolant system)

10.2 Cooling Pumps

10.1.3 Removal

1. Remove the hose clamps securing the input and output hoses on the coolant pump using pliers. Remove the hoses from the coolant pump. Make sure you have a drip pan to collect any coolant that may leak from the pump or hoses. Be sure to plug or clamp the coolant hoses.
2. Remove Allen bolts that secure the coolant pump to the pump bracket.
3. Remove the coolant pump.

10.1.4 Installation

1. Ensure the new pump is oriented correctly and secure it to the coolant pump bracket using Allen bolts.
2. Attach the input and output hoses to the coolant pump and secure the hose clamps using pliers.
3. Ensure the coolant is filled to the proper level. (You may need to burp the coolant system)

11 Battery Charging & Maintenance

11.1 Battery Handling Precautions

HIGH VOLTAGE will be present at the battery terminals and contactors.
High battery voltage is always present.
Do not touch the battery terminals.

Extreme temperatures can substantially affect battery performance and charging. Cold reduces battery capacity, increases internal resistance, and retards charging. Heat increases water usage and can result in overcharging/volting, which promotes faster breakdown inside the battery.

O.C.V (Open Circuit Voltage/no-load) is the most accurate voltage for the battery. OCV voltage may take 12+hrs to fully stabilize; fortunately, most of the stabilization happens in the first 2hrs after disconnecting a charger or a load.

Do not work in or near the battery compartment or on any other electrical component of the vehicle while charging the batteries.

Before servicing the vehicle's electrical system, always perform in the following order:

1. First disconnect the main power connector.
2. Then disconnect any electrical accessory connections.
3. Then disconnect the negative cable from the 12-volt battery (if equipped).
4. Then disconnect the negative terminal from the main battery pack.

11.2 CHARGING WARNING

	Do not attempt to charge frozen, leaking, or damaged batteries. Do not charge with vehicle weather cover on the vehicle, or with the cab enclosure doors closed as fire and explosion are possible. Hydrogen gas is generated during charging. Do not charge batteries in a non-ventilated enclosed area or near flammable materials.
	The lithium-ion batteries in your Vanish will not accept a charge unless internal battery temperatures are at or above 32 deg F (0 deg C). When the ambient temperature is at or below 32 deg F (0 deg C), the vehicle must be moved to a location where the battery pack can warm up to 32 deg F (0 deg C) or higher to receive a charge. Charging warms the battery. At temperatures below freezing, the batteries should always be kept at a minimum of 20% state of charge. It is recommended to keep the charger connected in low temperatures above 32 deg F (0 deg C) to maintain the charge.

11.1.3 On-Board Charger:

The on-board battery charger is located behind the driver side panel. The state of charge of the batteries is displayed in the vehicle's driver information display.

When the vehicle will not be used for an extended period, plug the charging cable into the vehicle. The on-board charger will monitor the state of charge of the batteries, and charging will be initialized automatically when needed. This will optimize charging performance and maintain the battery at an optimal condition during storage.

> NOTE: AVOID TEMPERATURE EXTREMES WHEN CHOOSING A STORAGE AREA.

Protective safety features in the on-board charger will not allow the charger to activate if the input power is over or under an acceptable range. If this occurs, please check that the vehicle is properly plugged into a standard 115V (20A) or 220V receptacle using the provided charging cable and that the connection is solid.

Lithium Battery Charging:

BATTERY CHARGING
Your vehicle is equipped with a standard charge receptacle (J1772). The battery charge receptacle is located on the driver's side of the vehicle behind the access door.

Using an incorrect or damaged charging cable could result in fire, heat damage or charger failure, which could result in serious injury or death. Always use UL-listed and/or ETL-listed cables and charging stations for EV charging (whether hard-wired or portable) to charge the batteries.

Charging from a circuit of lesser capacity and/or using an under-sized cable from the outlet to the vehicle could create a fire hazard.

Do not work in or near the battery compartment or on any other electrical component of the vehicle while charging the batteries.

Always follow these precautions when charging.

Position the vehicle on a level surface. Make sure the charging area is well ventilated.

Make sure the key is off.

Always use the recommended cord type. Inspect the cable for cracks, loose connections, and frayed wiring. NEVER use a damaged cable.

When charging the vehicle, always use the provided J1772 cable.

11.4 Charging Instructions (Standard 110/120VAC outlet):

Open the receptacle cover and prepare to engage the standard equipped charging cable that came with the vehicle.

A. **Plug the (J1772) plug interface into the charging receptacle (driver side access panel) and ensure a solid fit.**

B. **Plug the other end of the charging cable into the 110/120V outlet receptacle.**

C. **Check the charging meter to ensure that charging is in progress.**

D. **If there is no indication that charging is in progress, check the outlet to make sure there is power to the outlet.**

E. ***Charge time from 20% to full charge will typically take 7 hours or less on a 110VAC / 20-amp outlet.**

F. **Ventilation is essential for maintenance and storage areas for LSEVs to avoid fire hazards in accordance with applicable fire codes and ordinances. Consult applicable fire codes for specific levels of ventilation and any explosion-proof equipment that may be needed.**

G. **Ventilation for electric powered LSEVs shall be provided to remove the accumulation of flammable hydrogen gas emitted during the battery charging process. The amount of hydrogen gas emitted depends upon factors such as the condition of the batteries, the output rate of the battery charger and the amount of time the batteries are on charge. A minimum number of air changes per hour is required during charging (1 for one vehicle and up to 5 for multiple vehicles are recommended).**

12 PAYLOAD CONFIGURATIONS

- Flatbed
- Light Duty Pickup with Triple Fold-Down Gates
- Van Box
- Powered Van Box
- Roll-On / Roll-Off
- Trailer Hitch

13 DIAGRAMS/LAYOUTS (FUSES, WIRING)

13.1 Fuse Box

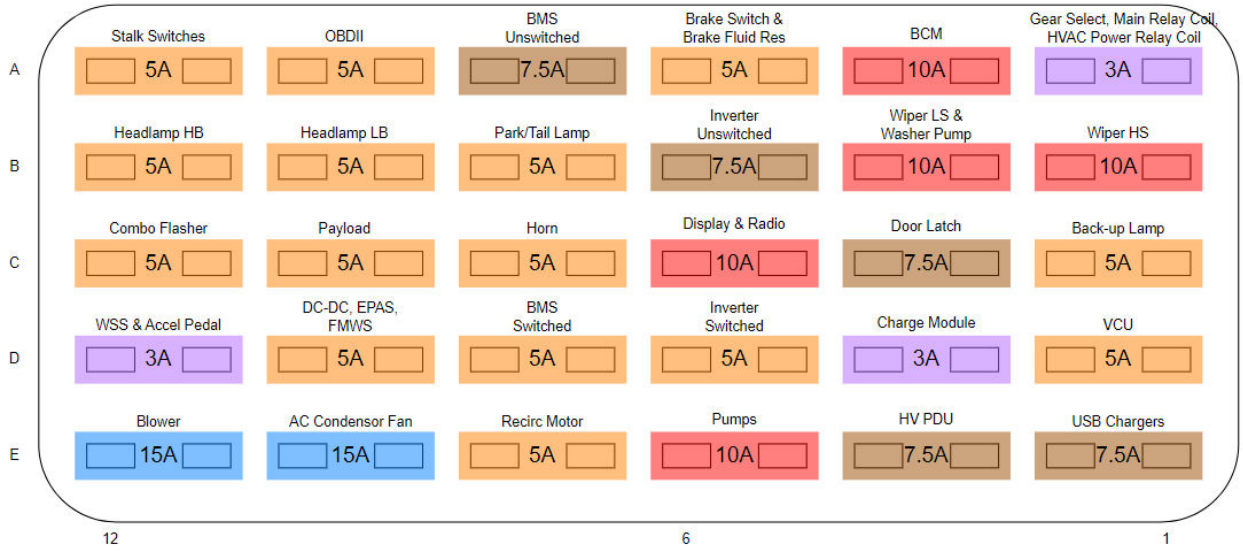


Figure 2 Vanish Fuse Box and Relay Layout

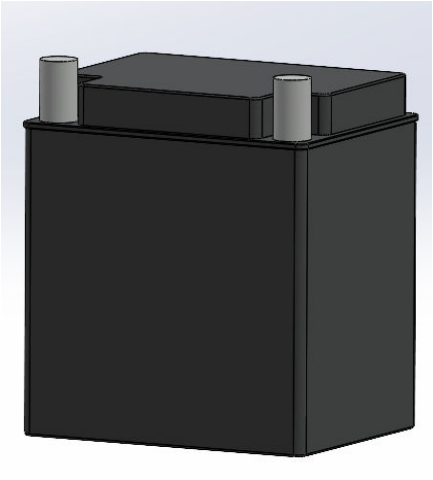
13.2 Wiring

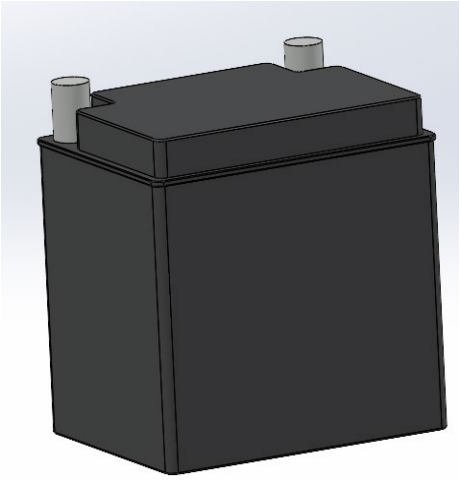
94-2000-0000 HARNESS, MOTOR
94-2001-0000 GEOTAB HARNESS, T-HARNESS
94-2002-0000 HARNESS, VANISH, CENTER STACK
94-2003-0000 HARNESS, VANISH, CHASSIS MAIN
94-2004-0000 HARNESS, VANISH, LV CHARGER
94-2005-0000 HARNESS, VANISH, CAB MAIN
94-2006-0000 HARNESS, VANISH, CAB HVAC
94-2007-0000 HARNESS, VANISH, DOOR LEFT
94-2008-0000 HARNESS, VANISH, DOOR RIGHT
94-2009-0000 HARNESS, VANISH, HV PDU TO OBC
94-2010-0000 HARNESS, VANISH, HV PDU TO DC-DC
94-2011-0000 HARNESS, VANISH, HV PDU TO INV POS
94-2012-0000 HARNESS, VANISH, HV PDU TO INV NEG
94-2013-0000 HARNESS, VANISH, HV PDU TO HVAC PTC HTR
94-2014-0000 HARNESS, VANISH, HV PDU TO HVAC COMP
94-2015-0000 HARNESS, VANISH, EPAS POWER
94-2016-0000 HARNESS, VANISH, LV BATT TO CHGND
94-2017-0000 HARNESS, VANISH, LV BATT TO DC-DC POS
94-2018-0000 HARNESS, VANISH, DC-DC TO CHGND
94-2019-0000 HARNESS, VANISH, AC COMP SPEED JMPR
94-2020-0000 HARNESS, VANISH, HEADLAMP
94-2021-0000 HARNESS, VANISH, TAILLAMP
94-2022-0000 HARNESS, VANISH, CHASSIS HVAC
94-2023-0000 HARNESS, VANISH, LV BATT TO PFH
94-2024-0000 HARNESS, VANISH, HV PDU TO BATT XTCH-2P, POS
94-2026-0000 HARNESS, VANISH, ACCELERATOR ADAPTER, WRX
94-2027-0000 HARNESS, VANISH, INVERTER ADAPTER, SEP
94-9025-0000 HARNESS, VANISH, HV PDU TO BATT XTCH-2P, NEG

14 SPARE PARTS LIST

14.1 Batteries and Charging System

BATTERY, 12V, 31 AH, BRAILLE (starting, cabin accessories)44-2007-0000

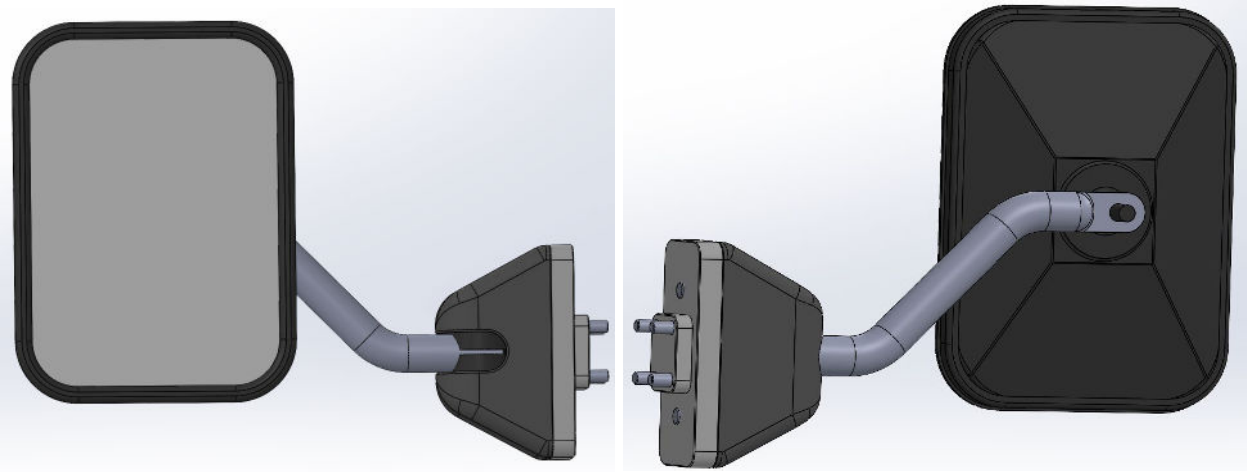




CABLE, CHARGING, DUOSIDA 41-2024-0000

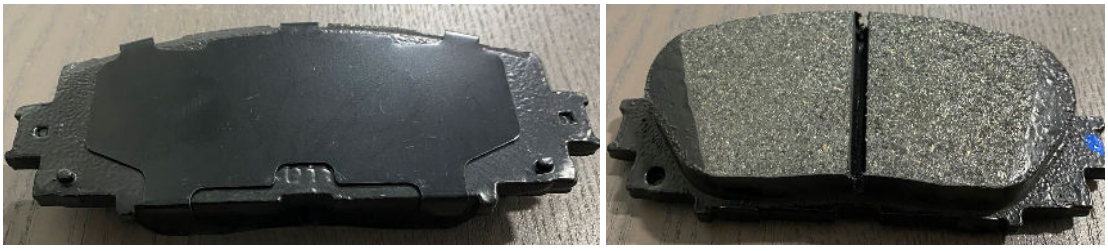
14.2 Body

SIDE MIRRORS 88-2041-7200



14.3 Brakes, Disc

BRAKE PADS (set) 88-2007-0030



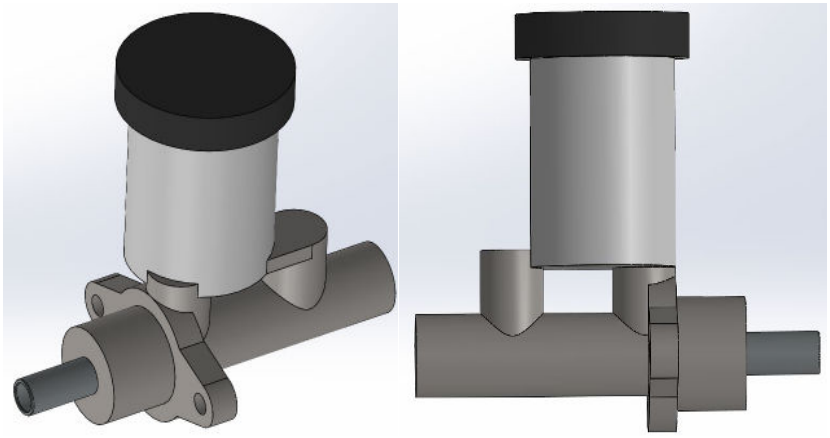
ROTOR 88-2007-0020

CALIPERS

Left 88-2007-000L

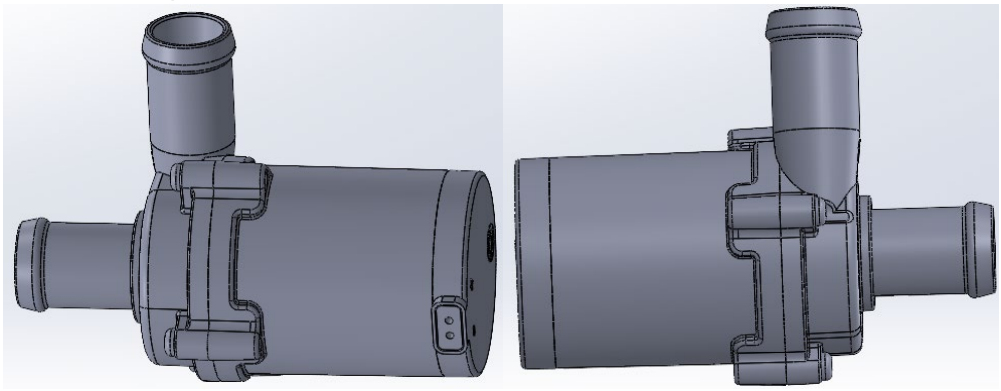
Right 88-2007-000R

MASTER CYLINDER, CENTRIC RIGHT, WITH FLUID SENSOR 88-2035-0003



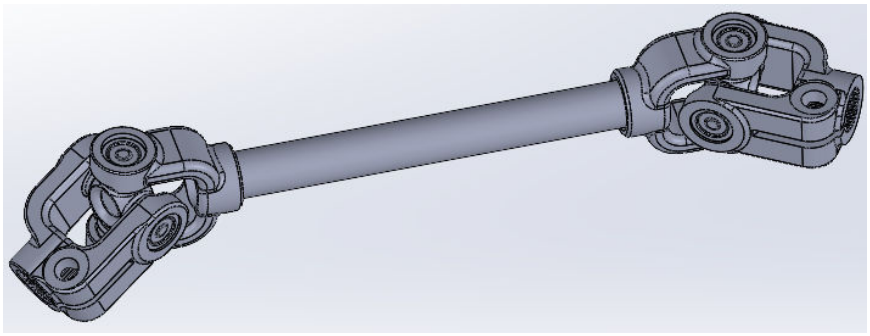
14.4 Coolant System

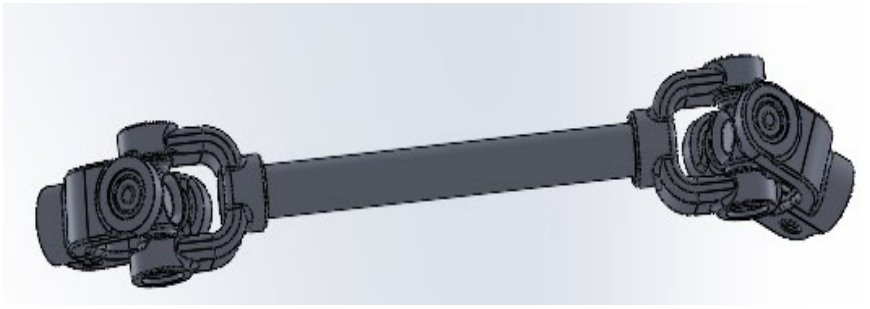
Coolant Pump 44-2037-0023



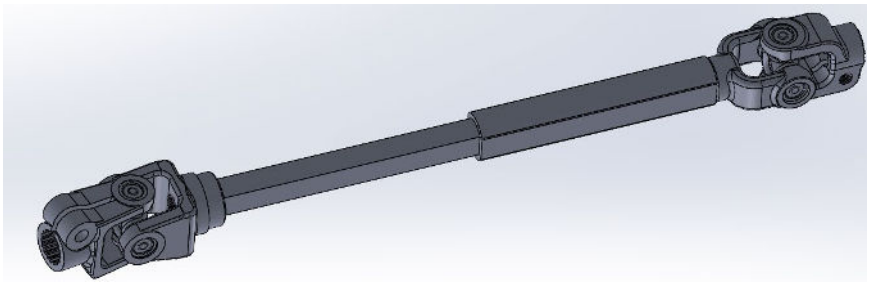
14.5 Suspension, Front & Rear

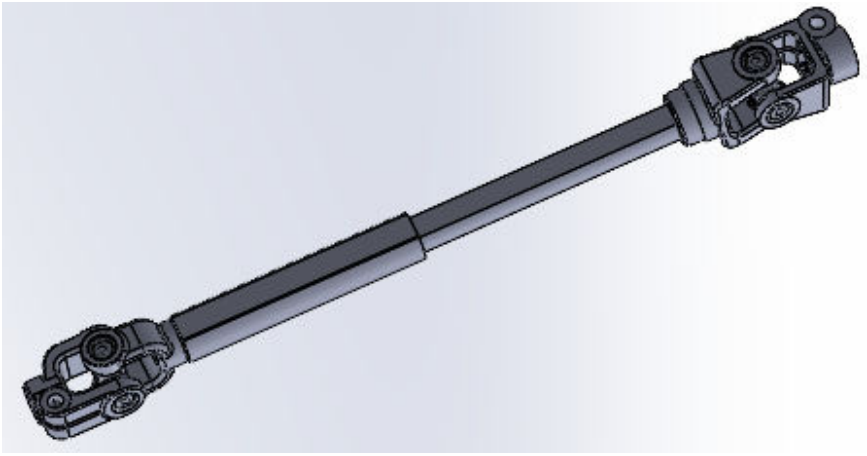
STEERING SHAFT, UPPER SHAFT ASSY 88-2006-7003



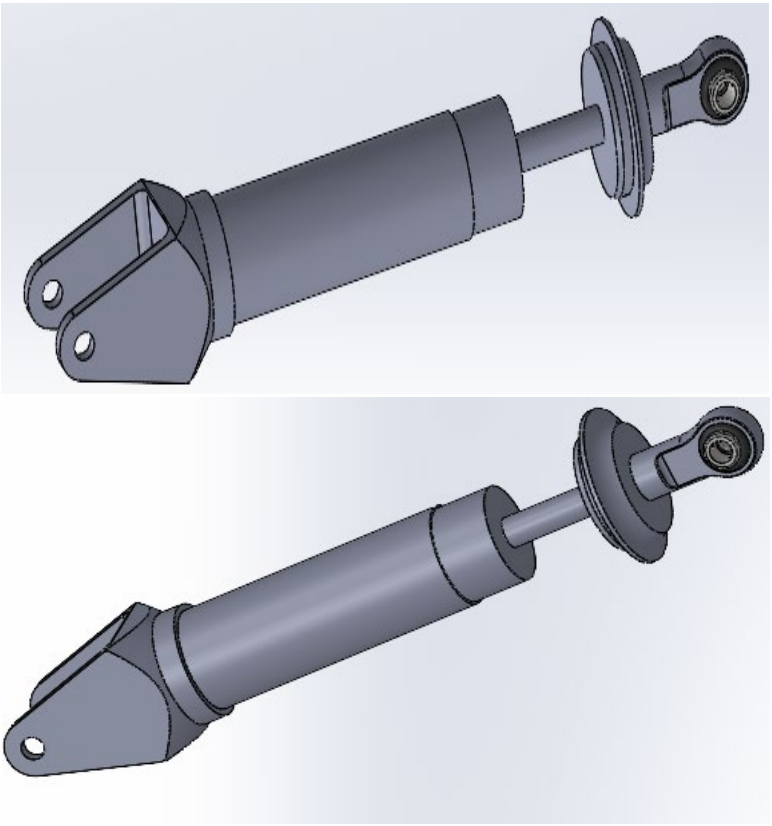


STEERING SHAFT, LOWER SHAFT ASSY 88-2006-7004





SHOCK, COILOVER, FRONT SUSPENSION, NON-ADJUST 88-2026-0001



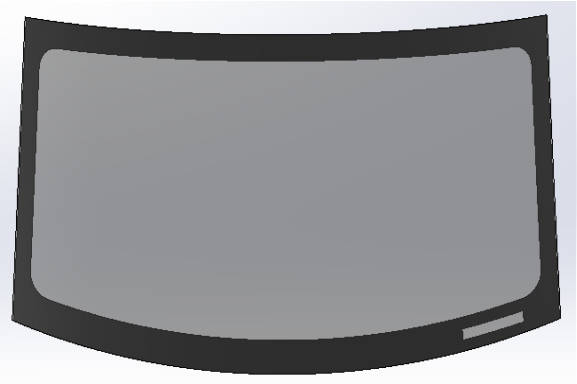
14.7 Wheel End Components

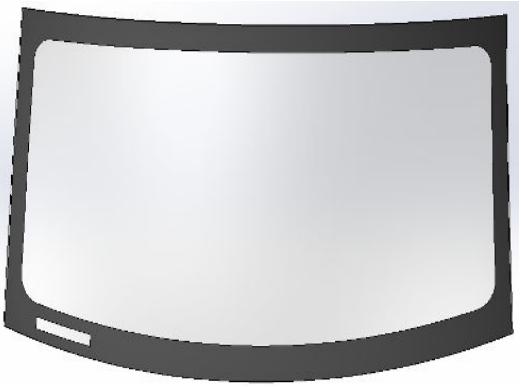
TIRES, AYRO SERIES X, SCHLAGERNULL 88-2040-0000

WHEEL, AYRO CUSTOM 88-2030-0000

14.8 Windshield

WINDSHIELD, FRONT, AYRO Z 68-2000-0000





14.9 Windshield Wiper & Washer system

WINDSHIELD WIPER BLADE 88-2060-0020

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Email support@ayro.com
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