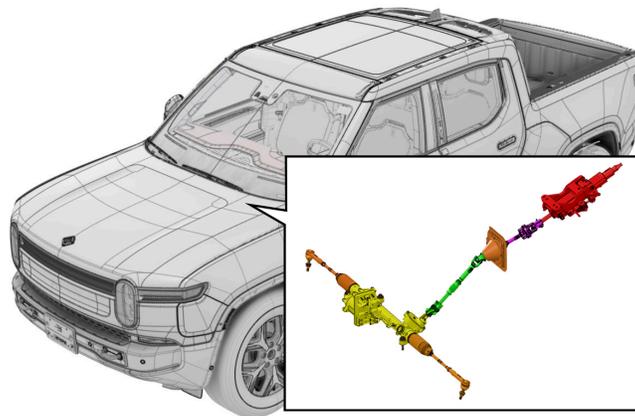


RCI-10-23-002-1: Steering System Overview and Servicing Guideline

Rivian Automotive, LLC - Service Guideline

Document Type	Collision Repair Information Document
Date	March 2, 2023
Affected Region(s)	USA
Affected Model(s)	R1T
Model Year(s)	2022+
Vehicle System	10 - Steering



! **Important:** This document is intended as a general steering system component overview and servicing guideline. Always refer to the Rivian Service Manual for vehicle specific information when servicing or replacing steering system components.

! **Attention:** Rivian highly recommends that only Factory Certified Service Technicians inspect and repair the steering system in Rivian vehicles. Please contact your regional Rivian Collision/Service Team to request more information or assistance with repairs.

General Information

In an effort to promote and maintain its rigorous standards of quality and safety, Rivian Automotive provides the collision industry with important information regarding the identification, inspection, and diagnosis of the various components that make up the steering system of a Rivian vehicle.

Steering System Inspection

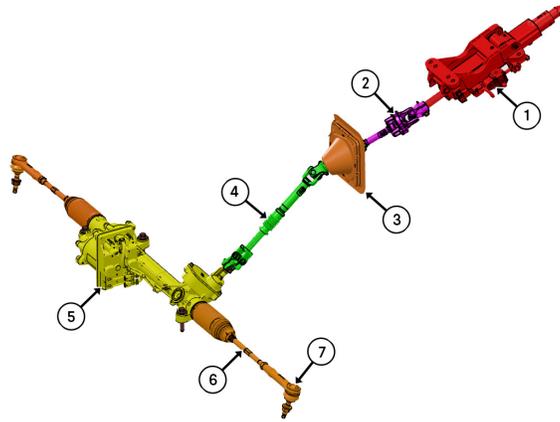
Inspection of the steering system is a step-by-step process that should start from the tie rod end and finish at the steering column. As the inspection progresses, if no further damage is present on the next step, there is no need for further inspection.

! **Attention:**



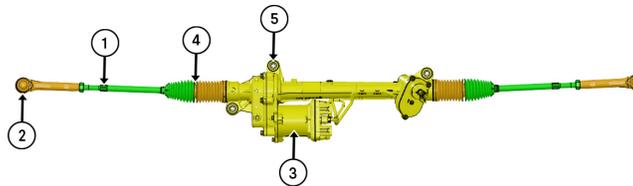
- Always refer to the service manual for additional information and specifications.
- If suspected impact/damage has occurred to the steering or suspension components, perform a 4-wheel alignment on the vehicle, prior to inspecting components. If wheel alignment specifications are beyond permissible specifications, further inspection of the suspension and steering components is necessary.
- For safety reasons, the specific steering system components (individual or as an assembly) highlighted in this document must be replaced if components of the front axle, steering gear, or any part of the steering linkage suffer deformation during a collision event.
- Deployment of Steering wheel airbag requires replacement of the steering column, clock spring, and steering wheel.

Component Identification



Number	Component
1	Steering Column Assembly
2	Intermediate Shaft, Upper
3	Steering Shaft Closeout Panel
4	Intermediate Shaft, Lower
5	Steering Rack Motor Module
6	Tie Rod, Inner
7	Tie Rod, Outer

Steering Gear and Steering Rack Inspection



Number	Inspection Point	Inspect For	Action
1	Tie Rod, Inner	Bends, cracks, fractures, evidence of fluid leaks	Check steering rack for binding or audible noises. Replace if damage is present. If inner Tie rod is bent, replace both inner/outer tie rods.
2	Tie Rod, Outer	Bends, cracks, fractures	Check steering rack for binding or audible noises. Replace if damage is present. If outer tie rod is bent, replace both inner/outer tie rods.
3	Steering Rack Motor	Motor or wiring harness damage	Any visible external damage to the motor or harness of the steering rack will require steering rack replacement.
4	Boot(s)	Tears, fluid leaks	Replace boot(s)
5	Mounting Bracket/Bolt	Fractures, cracks, bent bolts	Damaged mounting brackets require Steering Rack assembly replacement

Additional Inspection Steps:

1. Inspect steering rack assembly for any leaks that may indicate internal damage to the steering gear.



Attention: At this time, steering rack seals are not serviceable. If steering rack seals are damaged, the steering rack assembly must be replaced.

2. Inspect steering rack coupler receiver to steering shaft assembly for excessive movement and/or external damage.



Tip:

- No vertical movement on the coupler/joint shaft should be visible.
- No damage to the splines on the receiver should be present.
- Damage to the guide tab that locates the steering rack receiver to the steering shaft assembly will require replacement of the steering rack assembly.
- Always perform a 4-wheel alignment, ADAS calibration, and steering angle sensor reset after component replacement.
- Always use new fasteners when replacing steering, brake, and suspension components.

3. Inspect both Inner/Outer Tie Rods, at the same time, for evidence of damage. If there is visible damage present to either of them, and no evidence of Noise, Vibration, Harshness (NVH), binding issues, or exterior damage to housing, mounting or electrical components present on the steering rack assembly, both Inner/Outer Tie Rods will require replacement.

Steering Shaft Alignment Guide to Pinion Housing Alignment Inspection

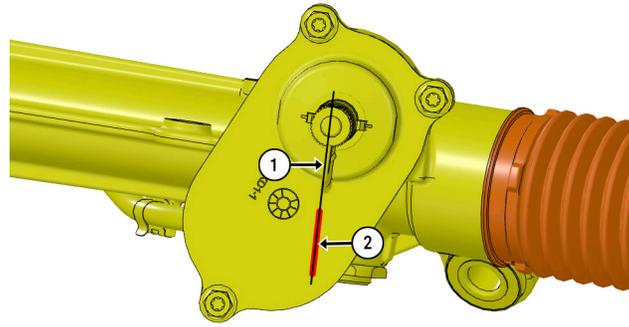
If steering rack assembly is to be replaced, inspect the new steering rack to ensure the steering shaft alignment guide is properly aligned with the paint mark on the pinion housing.



CAUTION: To prevent damage to the clock spring and steering angle sensor, prior to removal of old steering rack assembly, lock steering wheel in the straight-ahead position (0°) with steering wheel holder tool.

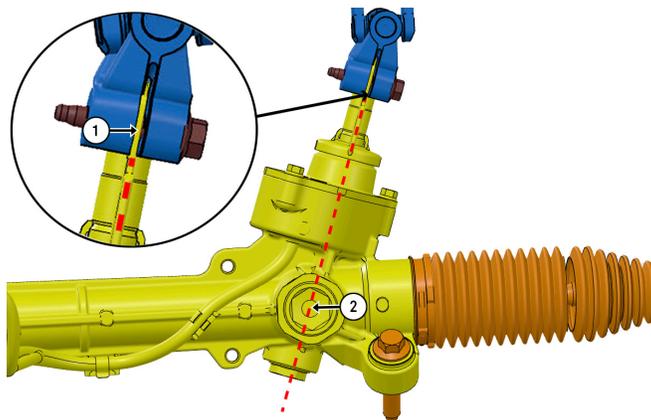


Tip: The new steering gear assembly should already be oriented in the straight-ahead (0°) position.



Number	Inspection Point	Inspect For	Action
1	Steering Shaft Alignment Guide	Alignment mark on Pinion Housing	Align the Steering Shaft Alignment Guide with paint mark on Pinion Housing prior to installation
2	Pinion Housing		

Steering Shaft Alignment Guide to Steering Rack Centerline Alignment Inspection



Number	Inspection Point	Inspect For	Action
1	Steering Shaft Alignment Guide/ Lower Shaft Slot	Proper alignment	Align Steering Shaft Alignment Guide with centerline on steering rack
2	Steering Rack	Alignment w/Steering Rack Centerline	

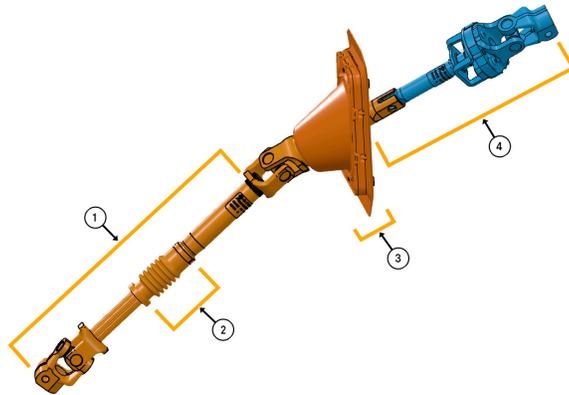
Intermediate Steering Shaft Assembly Inspection

The Intermediate steering shaft assembly is the connection between the steering rack assembly and the steering column. The Intermediate steering shaft assembly consist of two sections: a lower section and an upper section, with a close out panel between them to separate the vehicle interior from the vehicle exterior. A thorough Inspection of the steering coupler/joint, as well as the steering shaft, is critical after any collision event.

 **Attention:**



- Any damage to these components cannot be repaired and will require replacement of the steering shaft assembly.
- Deployment of Steering wheel airbag requires replacement of the steering column, clock spring, and steering wheel.



Number	Inspection Point	Inspect For	Action
1	Lower Intermediate Shaft	External damage, binding or excessive play	Replace the Lower Intermediate Shaft
2		Compression Damage	
3	Steering Shaft Closeout Panel	Bends, deformations	Replace the closeout panel
4	Intermediate Shaft, Upper	Tears, fluid leaks	Replace the Intermediate Shaft, Upper

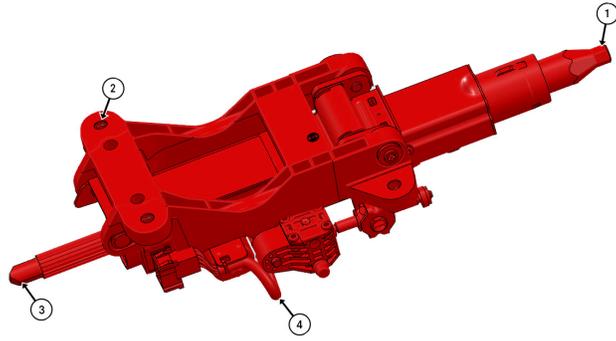
Steering Column Inspection

The steering column assembly is a one-piece unit located under the dash panel of the vehicle. It serves as the connection point between the steering wheel and the steering shaft. The steering column contains multiple motors and sensors that are not individually serviceable.



Attention:

- Damage to the steering column assembly will always require further diagnosis of the surrounding steering components. After a collision event, perform a diagnostic scan on the vehicle and perform all necessary test procedures on the steering column to ensure smooth operation, as well as proper motor/sensor function
- Any damage to the steering column assembly, wiring harnesses, or modules requires a complete replacement of the unit.
- After replacement of the steering column, always perform a 4-wheel alignment, as well as ADAS calibration and a steering angle sensor reset operation, to ensure the vehicle operates in a safe and consistent manner.
- Steering wheel air bag deployment requires replacement of the steering column assembly, clock spring, and steering wheel. Airbag deployment may affect sensors, modules, and motors within the steering column which may lead to a delay in response time from the steering column and an unsafe driving environment.
- Always use new fasteners, when installing replacement steering system components.



Number	Inspection Point	Inspect For	Action
1	Steering Column	Movement (In and Out), Spline damage	If damage is present, replace the Steering Column assembly.
2	Mounting Bracket/Bolts	Fractures, cracks, bent bolts	
3	Steering Column to Steering Wheel	Evidence of collapse, excessive binding, or play	
4	Wiring Harness	Frays, burns, or broken connectors	Replace damaged components as needed

Additional Inspection Points

Operate the Steering Column and check for the following:

- Verify the steering column will reach desired length and height adjustment points without binding, resistance, or delays.
- Binding or slow operation during adjustment.
- Inconsistent motor noise during operation.
- Rubbing of steering wheel on column panels.

Steering Wheel Inspection

A thorough inspection the steering wheel **MUST** be performed after a collision event.

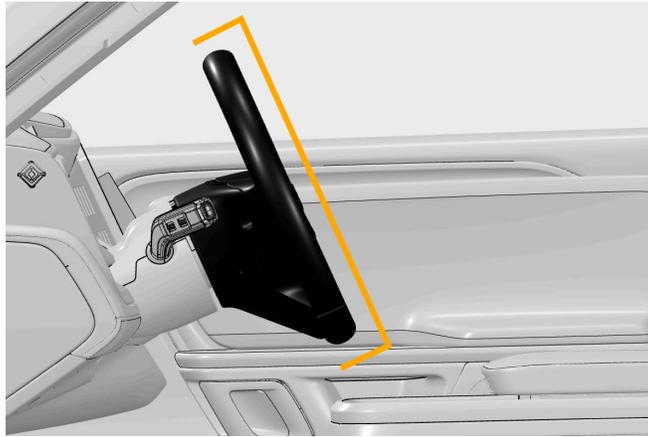
Check the following:

1. The function of all steering wheel adjustment controls.
2. The overall shape of the steering wheel.
3. The attachment point between the steering wheel and the steering column.



Tip:

- Deployment of Steering wheel airbag requires replacement of the steering column, clock spring, and steering wheel.
- Always perform a 4-wheel alignment, ADAS calibration, and steering angle sensor reset after component replacement.



Steering Lash/Permissible Steering Play

When a vehicle has suffered an impact to a suspension or chassis component, check the following:

1. Inspect the steering and suspension system components for damage.
2. Inspect the steering system for excess play from left to right.
3. Check steering angle value in **RiDE > Vehicle Diagnostic**. The value should be calibrated to 0° within $\pm 1^\circ$ of the actual 0° , when the wheels are pointing straight ahead.
4. Maximum total permissible play (total of both left and right lash measure) at steering wheel is $<6.54\text{mm}$ ($<2^\circ$ total).
5. Maximum allowable tolerance is $<1^\circ$ (3.27mm) when rotating the steering wheel to one side (left or right) before perceptible movement of the rack/outside wheel.
6. If the allowable tolerances are exceeded, this may have a negative effect on the performance of the Advanced Driver Assistance (ADAS) system, Electronic Stability Program (ESP), and the Vehicle Dynamics System (VDS).
7. Replace components that are worn or damaged, as needed.

Permissible Play Inspection Guidelines

Attention:

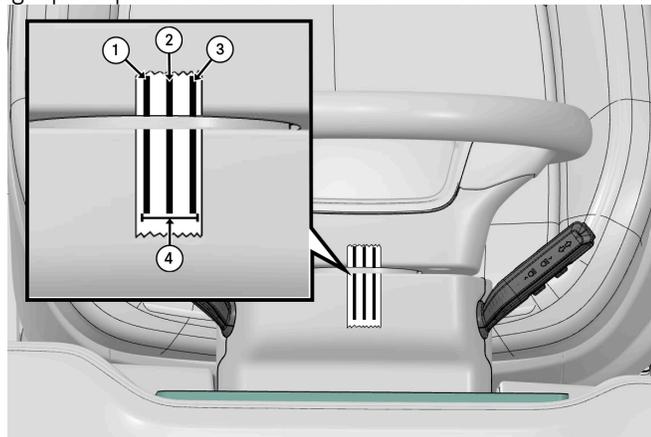
- This manual inspection procedure should be performed after running associated RiDE routines for the steering and suspension system.
 - This inspection will ensure all mechanical linkages and gears of the steering system are within Rivian specifications.
 - Performing this inspection will help to determine if there are worn/damaged steering and suspension components on the vehicle.
1. Place the vehicle on flat ground.
 2. Set the front wheels and steering wheel in the straight-ahead position
 3. Apply masking tape to the steering column upper cover and steering wheel.
 4. Draw a straight line that indicates steering position at center on both masking tapes.



5. With vehicle in the “ON” position, perform steering wheel lash inspection
6. Turn steering wheel to the left and right until the front wheels move.

i Tip: If necessary, stand outside of vehicle with driver's window down to inspect wheel movement, or secure the assistance of a second person.

7. Place a mark on masking tape at point at which tires start to move on both left and right sweeps.



Number	Steering Wheel Deflection	Measurement
1	Right	N/A
2	Center	
3	Left	
4	N/A	Distance between the marks is the steering wheel lash/play value

8. Refer to the table below to compare the observed steering wheel lash/play value to the specification.

Lash/Play Value	Specification
If combined lash/play is < (less than) 6.54mm/ 0.25 in/2°	Vehicle is within Permissible limit
If combined lash/play is > (greater than) 6.54mm/0.25 in/2°	Excessive lash/play is present. Further inspection of steering and suspension components is required.