

TECHTIPS



www.hendrickson-intl.com

Keep It Straight, Keep It Rolling: Suspension Performance and Total Vehicle Alignment

This publication summarizes Hendrickson Truck Commercial Vehicle Suspension recommendations for the service and maintenance of Hendrickson truck suspension and axle systems and components. For detailed service, maintenance, and repair procedures, refer to the applicable Technical Procedures available at www.hendrickson-intl.com. Always follow the vehicle manufacturer's service recommendations, as other vehicle components can affect overall performance.

NOTE: Some procedures in this publication are based on recommendations developed by the Technology & Maintenance Council (TMC), TMC's Guidelines for Total Vehicle Alignment.

Start with the Basics

- **Use the 3 C's of Diagnostics** to guide the alignment process
 1. Complaint: Road test the vehicle before making adjustments to recreate and confirm the reported condition
 2. Cause: Inspect the complete vehicle and identify the condition affecting alignment or handling
 3. Correction: Make only one adjustment at a time, then road test again to verify the result. **NOTE:** *Changing one setting at a time makes it easier to identify the cause and confirm the correction.*

Inspect before Wheel End Alignment Adjustment

- Check tire condition, proper inflation, and wheel-end condition
- Confirm suspension and axle components, bushings, fasteners, pinion angles and ride height are within specifications
- Check fifth wheel and steer axle kingpin lubrication
- Confirm the alignment equipment is calibrated
- Follow the vehicle manufacturer's procedures for non-Hendrickson components

Benefits of Proper Suspension Maintenance

The suspension system absorbs road shocks and helps keep the tires in consistent contact with the road. Proper maintenance and wheel end alignment help:

- Distribute vehicle weight evenly across all tires
- Reduce stress on suspension components
- Maintain the intended suspension geometry
- Prevent premature wear of suspension parts

Benefits of Proper Wheel End Alignment

Steering and Control

- Improves steering response, precision, and directional stability
- Supports proper steering wheel return after turns
- Helps prevent wandering, pulling, and instability caused by incorrect camber, caster, or toe settings

Stability and Handling

- Enhances cornering stability, traction, and road grip
- Improves overall vehicle predictability
- Reduces the need for frequent steering corrections
- Helps maintain stability at higher speeds

Tire Life and Vehicle Efficiency

- Maximizes tire contact with the road
- Promotes even tread wear and extends tire life
- Improves braking performance
- Increases fuel efficiency
- Helps prevent uneven tire wear patterns caused by misalignment





Front Suspensions and Steer Axle Systems

AIRTEK® • SOFTEK® • AIRTEK® NXT • SOFTEK® NXT • STEERTEK™ NXT • STEERTEK™ NXT High-capacity

LUBRICATION



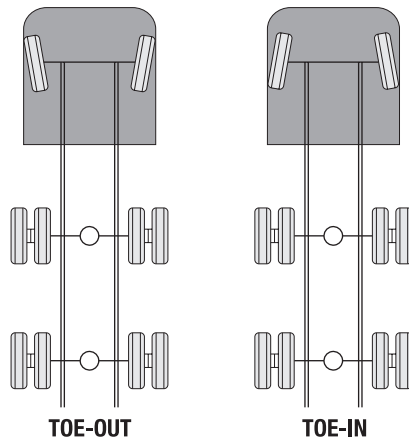
FIFTH WHEEL: Maintain proper lubrication. Lack of grease on fifth wheel can increase wear, affect steering and handling, and add strain to the fifth wheel plate and truck. Regular lubrication is essential to ensure a smooth and secure connection between the truck and trailer.



KINGPINS: Lubricate as specified in the applicable publication (see page 5) for your vehicle. Lack of grease on the steer axle kingpins increases friction and steering stiffness, and wear that may contribute to shimmy or clunking noises while driving.

TOE SPECIFICATIONS

TOTAL TOE



TOE: Set and adjust toe-in with the vehicle in its normal unladen configuration at actual curb weight on the ground. Toe has the most direct effect on tire wear, so confirm vehicle attitude before measuring.

In most instances total toe is set by the vehicle manufacturer or body builder. Consult the vehicle manufacturer for specifications.

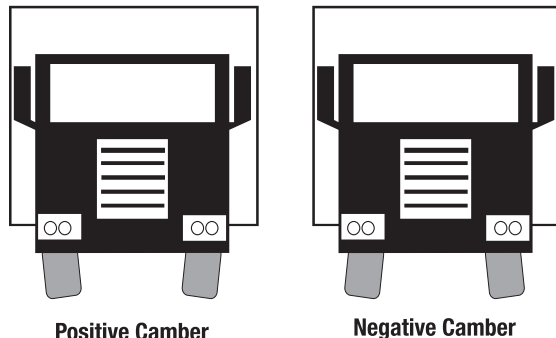
Hendrickson recommends the following Total Toe specification as per TMC standards for its above-referenced front suspension and steer axle systems:

	Design Specification	Range	
		Minimum	Maximum
TOTAL TOE	$\frac{1}{16}'' \pm \frac{1}{32}'' (0.06'' \pm 0.03'')$	$\frac{1}{32}'' (0.03'')$	$\frac{3}{32}'' (0.09'')$

CAMBER SPECIFICATIONS

The camber angle is not adjustable. **DO NOT** bend axle or otherwise try to adjust camber. If found out of specification, notify Hendrickson Tech Services for further information.

CAMBER



- AIRTEK
- STEERTEK NXT
- SOFTEK
- AIRTEK NXT
- SOFTEK NXT
- STEERTEK NXT High-capacity

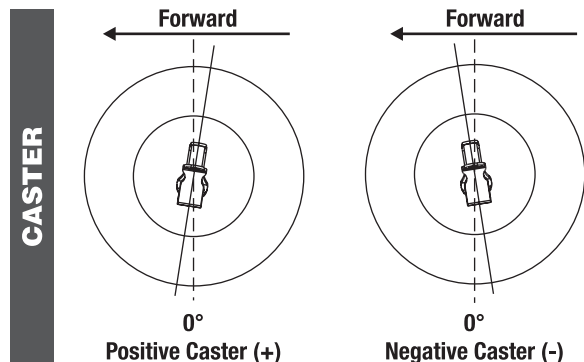
Camber	Design Specification	Range	
		Minimum	Maximum
Left	$0.00^\circ \pm 1.00^\circ$	-1.00°	+1.00°
Right	$-0.25^\circ \pm 1.00^\circ$	-1.25°	+0.75°
Cross	$0.25^\circ \pm 1.00^\circ$	-0.75°	+1.25°
Left	$0.00^\circ \pm 1.00^\circ$	-1.00°	+1.25°
Right	$-0.25^\circ \pm 1.00^\circ$	-1.25°	+0.75°
Cross	0.00°	—	+2.00°



Front Suspensions and Steer Axle Systems

AIRTEK® • SOFTEK® • AIRTEK® NXT • SOFTEK® NXT • STEERTEK™ NXT • STEERTEK™ NXT High-capacity

CASTER SPECIFICATIONS

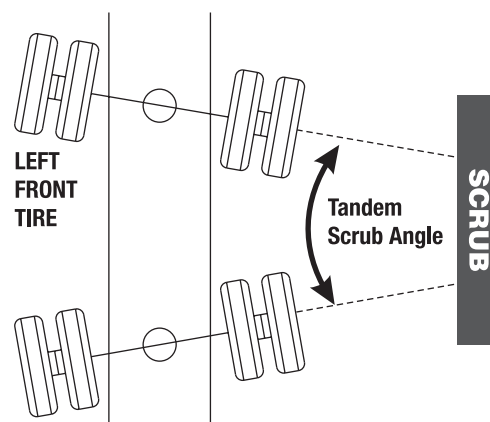
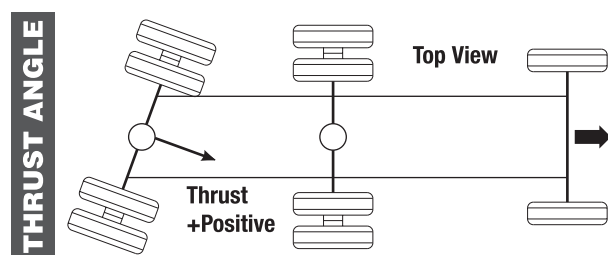


Caster Measurement and Adjustment

1. Measure caster with the vehicle at the specified ride height (air suspension) or rated load (mechanical suspension). Verify front and rear ride heights are within specification before measuring or adjusting caster. Refer to Hendrickson ride height procedures.
2. Actual caster is typically based on level frame rails. For vehicles with positive frame rake (rear higher than front), add the frame slope (degrees) to the caster reading to determine true caster.
3. **Cross caster is not adjustable. DO NOT** bend the axle or attempt other adjustments. If out of specification, contact Hendrickson Tech Services.
4. Adjust caster using approved shims only. Install the same shim angle on both sides. Unequal shims will not correct cross caster and may cause uneven suspension loading.
5. **Example:** A reading of 4.5° RH / 5.0° LH can be increased to 5.5° RH / 6.0° LH by installing one 1.0° shim on each side. **DO NOT** use unequal shims.

	Caster	Design Specification	Range	
			Minimum	Maximum
• AIRTEK • SOFTEK	Refer to the applicable publication for your vehicle on Page 5, available online www.hendrickson-intl.com			
• AIRTEK NXT	Left	4.00° ± 1.00°	+3.50°	+5.00°
	Right	4.00° ± 1.00°	+3.50°	+5.00°
	Cross	0.00°	—	+1.50°
• SOFTEK NXT	Left	3.50° ± 1.00°	+2.50°	+4.50°
	Right	3.50° ± 1.00°	+2.50°	+4.50°
	Cross	0.00°	—	+1.50°
• STEERTEK NXT High-capacity	Left	3.75° ± 1.00°	+2.75°	+4.75°
	Right	3.75° ± 1.00°	+2.75°	+4.75°
	Cross	0.00°	—	+1.50°

THRUST AND SCRUB ANGLE



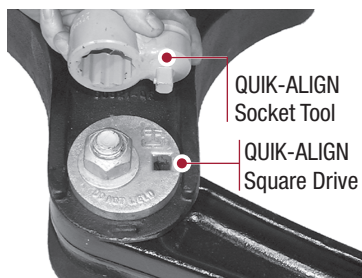
- Target both thrust and scrub angles as close to **0°** as possible
- If 0° thrust is not achievable, set thrust slightly **positive (+)**, toward the right, for example, ≤ +0.03°.
- If 0° scrub is not achievable, set scrub slightly **negative (-)**, toward the left, for example, ≤ -0.03°.
- Offset the values equally to help keep the axles square under the frame rails.
Example: Thrust +0.03° and Scrub -0.03°
- Also verify trailer and lift axle alignment



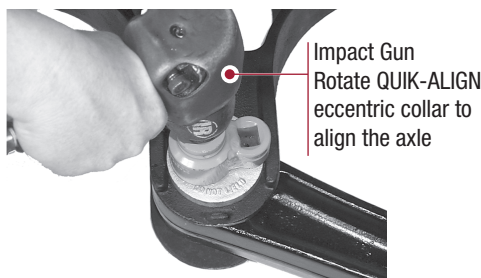
Rear Suspension Systems • Trailer • Lift Axle Systems

QUIK-ALIGN® ALIGNMENT

PRIMAAX® EX • FIREMAAX® EX • COMFORT AIR® – Rear Air Suspensions



QUIK-ALIGN
Socket Tool
QUIK-ALIGN
Square Drive



Impact Gun
Rotate QUIK-ALIGN
eccentric collar to
align the axle

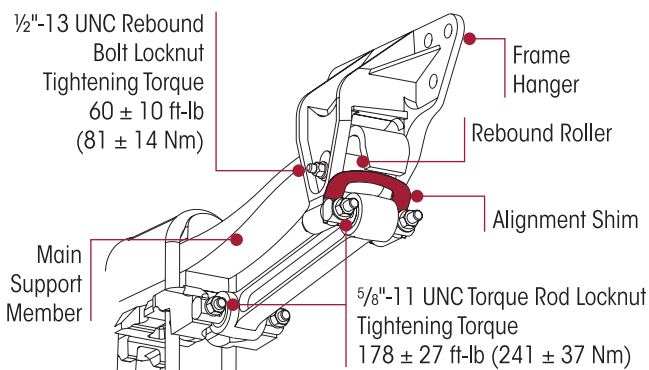
Suspensions equipped with eccentric QUIK-ALIGN collars on both sides of the axle are adjustable on both sides. If only one eccentric collar is installed, adjustment is limited to that side. Refer to the vehicle manufacturer's specifications.

The eccentric collars (with the square drive feature) are located on the outboard side of the frame hangers with the concentric collars on the inboard side. The total range of fore / aft axle adjustment is $1" \pm \frac{1}{2}"$.

AXLE ALIGNMENT

HAS™ – Rear Air Suspension

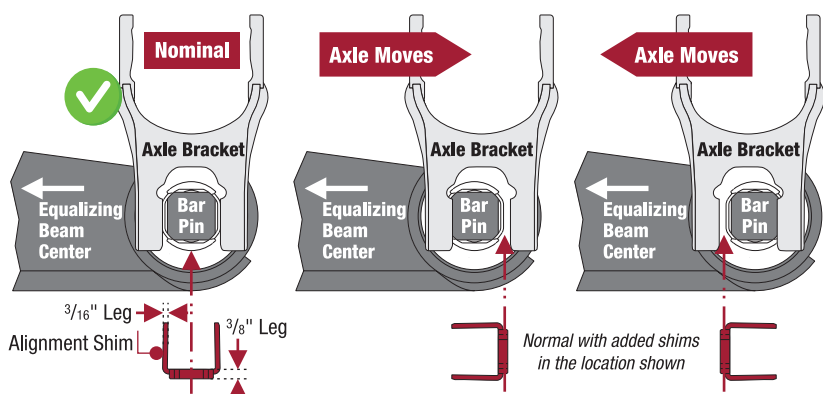
Thrust and Scrub Angle Adjustment



- Follow the Drive Axle Alignment Inspection Procedure. If alignment is out of specification, adjust as follows:
- Loosen the rebound bolt locknut on the side being adjusted.
- Loosen the torque rod bar pin locknuts and add or remove alignment shims as needed. **Do not** exceed four (4) shims ($\frac{1}{4}"$ total thickness) at one rod end. Snug fasteners only.
- Recheck alignment and repeat as necessary until within specification.
- Tighten the torque rod-to-frame hanger fastener to 178 ± 27 foot pounds.
- Tighten the rebound bolt locknut to 60 ± 10 foot pounds.

BAR PIN END BUSHING ALIGNMENT

Walking Beam Suspensions
HAULMAAX® • HAULMAAX® EX • ULTIMAAX® • R™ • RS™ • RT™/RTE™ • HN®



Alignment & Axle Movement

- Nominal clearance: $\frac{3}{16}"$ (4.8 mm).
- Excess axle movement may indicate worn bushings or incorrect installation.
- Inspect for damaged or missing alignment shims.

HENDRICKSON TRAILER SUSPENSION AND AXLE ALIGNMENT

Refer to Hendrickson Literature No. L579

Properly aligned Hendrickson trailer suspension and axle assemblies optimize fuel economy, driveability and help prevent excessive tire wear.

HENDRICKSON LIFT AXLE SUSPENSION ALIGNMENT

Refer to Hendrickson Literature No. H785

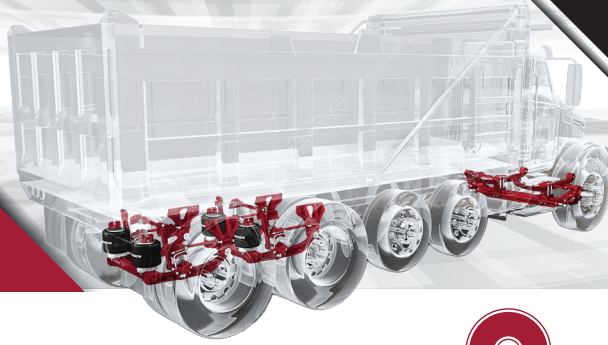
Hendrickson lift axle suspension alignment is crucial for maintaining proper weight distribution and handling in commercial trucks. It ensures that the additional axle works in sync with the primary axles, preventing steering issues and abnormal tire wear.

Hendrickson Reference @ www.hendrickson-intl.com

FRONT SUSPENSION	REFERENCE LITERATURE	REAR SUSPENSION	REFERENCE LITERATURE
AIRTEK	17730-243 Freightliner • Western Star 17730-247 Volvo 17730-248 Blue Bird Buses 17730-250 Mack 17730-252 International 17730-253 FCCC Motorhome Chassis 17730-259 Spartan Motorhome Chassis 17730-268 IC Bus 17730-319 Tiffin Motorhome Chassis 17730-352 Thomas Built Buses	PRIMAAX EX	17730-238 PRIMAAX EX • PRIMAAX 17730-254 Volvo 17730-263 Kenworth 17730-279 Mack 17730-283 International 17730-284 Caterpillar 17730-323 Gillig 17730-329 Mack Heavy Dump Truck 17730-342 Spartan
		FIREMAAX EX	17730-337 FIREMAAX EX
SOFTEK	17730-248 Blue Bird Buses 17730-253 FCCC Motorhome Chassis 17730-312 Lion Buses 17730-343 XOS Step Vans 17730-349 Shyft Blue Arc Vans 17730-356 Workhorse W56 Step Vans 17730-366 Blue Bird Step Vans 17730-367 Peterbilt 17730-369 Ride Buses	COMFORT AIR	17730-245 Hino 17730-246 Blue Bird Buses 17730-295 Thomas Built Buses 17730-304 Arboc 17730-333 Lion Trucks 17730-351 Lion Type D Buses
		HAS	17730-212 HAS
		ROADMAAX	17730-322 Fire and Rescue 17730-325 Link-Belt Crane 17730-357 Tadano Crane
AIRTEK NXT	17730-307 Freightliner • Western Star 17730-324 Link-Belt Cranes 17730-358 Tadano Cranes 17730-362 Pierce TDA Fire Trucks	HAULMAAX EX HAULMAAX	17730-328 HAULMAAX EX 17730-244 HAULMAAX
SOFTEK NXT	17730-289 Peterbilt	ULTIMAAX	17730-298 Western Star 17730-299 Fire and Rescue 17730-301 Kenworth • Peterbilt 17730-317 International
STEERTEK NXT	17730-345 Kenworth 17730-346 Peterbilt		
STEERTEK NXT High-capacity	17730-297 Autocar 17730-311 Fire and Rescue 17730-348 Lion Type D Buses	Additional Walking Beams	17730-064 RS 17730-070 RT • RTE 17730-227 HN

Technology & Maintenance Council (TMC) @ tmc.trucking.org

LITERATURE NO.	REFERENCE LITERATURE
TMC RP 642	Guidelines for Total Vehicle Alignment
TMC RP 230	Tire Test Procedures for Tread Wear, Serviceability, and Fuel Economy



There is only one way to ensure the system's original performance... ask for Hendrickson genuine parts by name.



Key Alignment Angles

Angle	What it affects	Key check
Toe	Controls whether the steer tires point inward or outward, affecting straight-ahead tracking and tire wear	Set with the vehicle at normal unladen curb weight and on the ground
Camber	Identifies inward or outward wheel tilt, affecting tread contact and wear across the tire	Compare readings with the specification for the applicable suspension model
Caster	Describes the steering-axis tilt, affecting steering effort, directional stability, and wheel return	Verify ride height and suspension condition before measuring caster
Thrust	Indicates the drive axle's direction relative to the vehicle centerline, affecting tracking and steering correction	Target 0°; if unattainable, use a small positive (+) value toward the right
Scrub	Measures the directional difference between tandem axles, which can cause tire scrub and vehicle dog-tracking	Target 0°; if unattainable, use a small negative (-) value toward the left

Final Verification

- Confirm all readings are within the applicable Hendrickson and vehicle manufacturer specifications
- Verify fasteners disturbed during service are tightened to the specified torque
- Road test the vehicle after the final adjustment
- Confirm the original complaint has been corrected and no new handling condition is present
- Carefully read and understand all recommended service, maintenance, and repair procedures in applicable Hendrickson Technical Procedures, available at www.hendrickson-intl.com, as well as all such materials provided by the respective vehicle manufacturers.

ORIGINAL PARTS / **ORIGINAL FIT** / **ORIGINAL PERFORMANCE**

Call Hendrickson at 630.910.2800 or 855.RIDERED (855.743.3733) for additional information.



www.hendrickson-intl.com

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12463-047 Rev A 10-26

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