Driveline Debrief - KS8E

Sunday, June 29, 2025 7:13 PM

Throughout Build and Testing:

- Pulling out bearings in the motor plate
- Varying chain tension
    - Radial sprocket alignment, different bolting
- Bearing carrier press fits
- Rear Sprocket bolt and chain clearances
- Could not fit larger rear sprocket, wrong final drive
- Axle misalignment in the rear
- Tri pod binding in housings

Problems throughout:

- Front sprocket mating
    - The press fit
- Teeth shearing on front sprocket

Problems during Design:

- I only had the misalignment as a constraint
- No good idea of motor load casing in driveline(Dynamic's Stuff)
- Contact Stresses of sprocket teeth(Chordal Action)
- Not a problem but note, torque steer
    - Axle lengths are too different
- Sweeping axle misalignments with pitch and bump

Stuff to change going into this year

- Packaging for differential
- Sprocket mounting to differential
    - https://autotech.com/i-30499383-spare-drexler-fsae-sprocket-adapter-blank-t6-7075-dsd-240-500-0002.html
    - Bolted rear sprocket with adapter mating to the teeth of the differential
- KS8E Dif integration
  Join the motor plate and bearing carrier
    - Eccentric tensioning

info

Friday, September 12, 2025 2:00 PM

https://www.blocklayer.com/chain-sprocket	

Calculating Driveline Equations

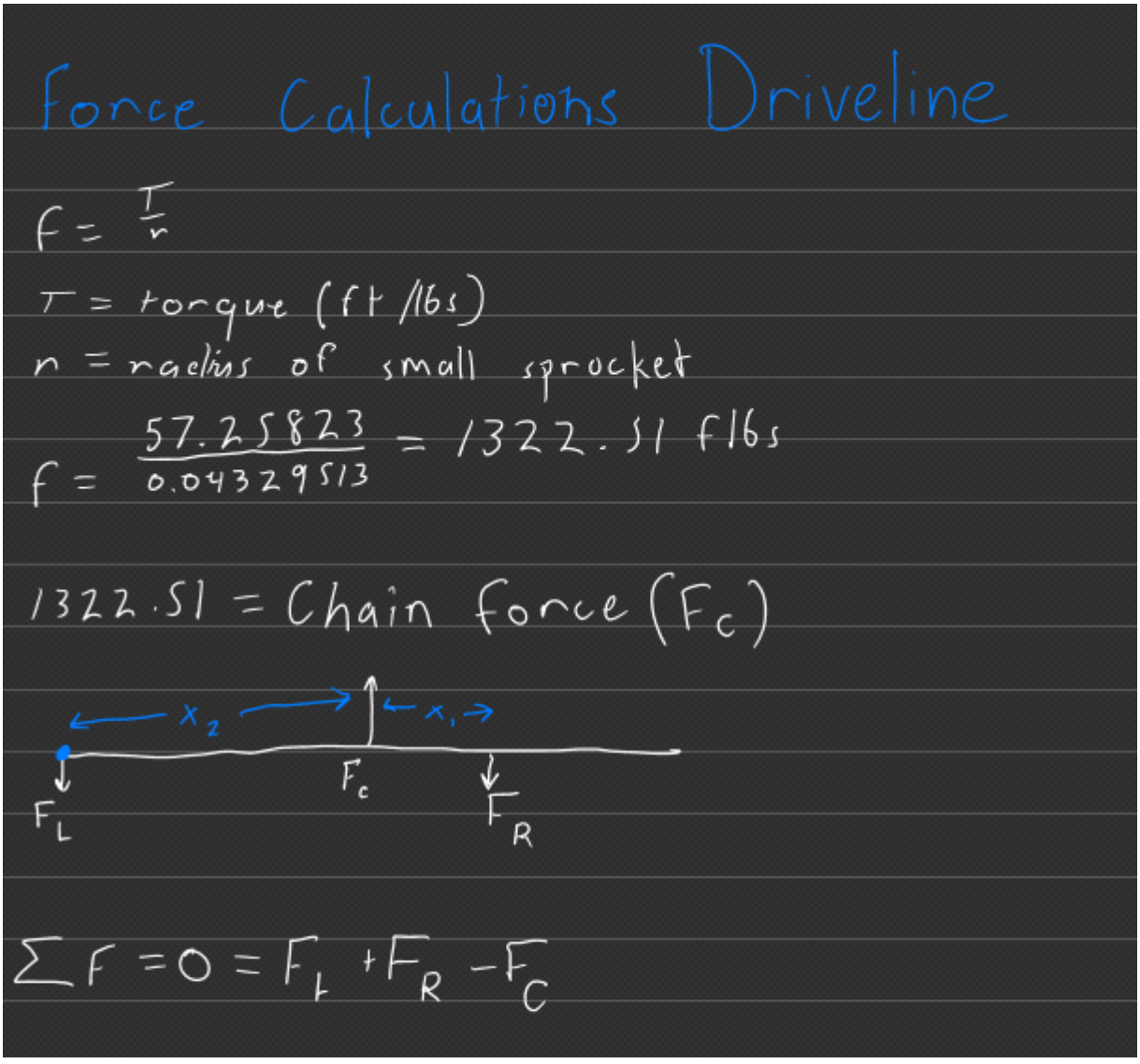
Monday, August 25, 2025 7:02 PM

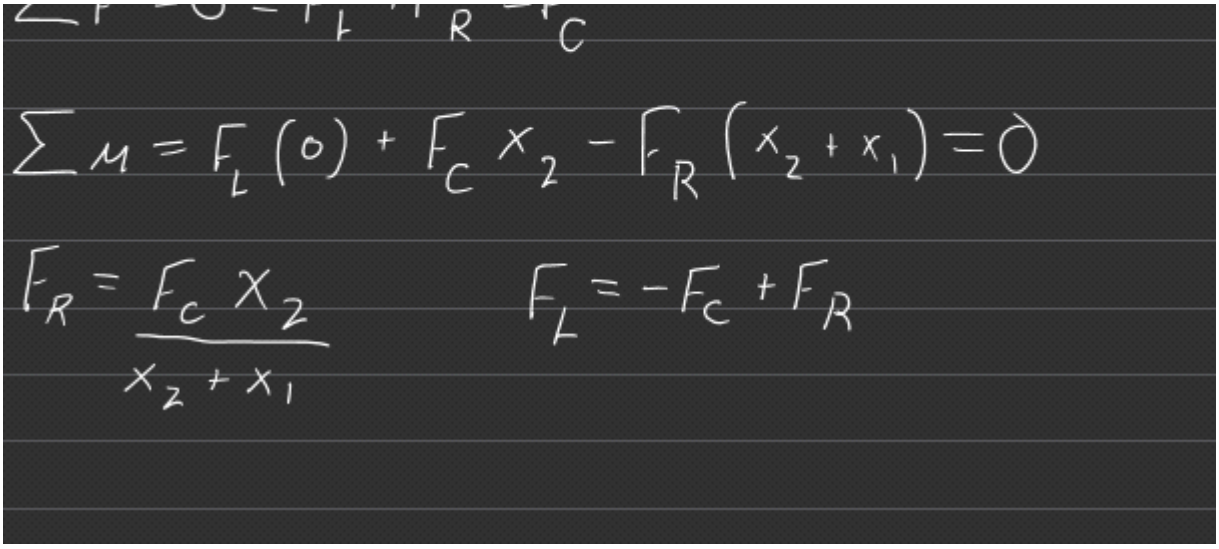
$$T = f * r \Rightarrow f = \frac{T}{r}$$

Where t is torque, f is force, and r is radius

Peak Torque = 78.699nm = 57.25824ft/lbs
Radius of sprocket 11 tooth= 0.51954161 in = 0.04329513 ft

625c32dd-6f39-4fda...





F_R = 1202.09 flbs
F_L = 120.42 flbs

Sum of forces symbols are opposite which is why the FL comes out negative and FR comes out positive even though they are in the same direction

Also something is wrong probably with your measurements I just did the math and got
F_R = 847.23
F_L = 475.27

~Paddy

List of things to think about

Wednesday, July 23, 2025 7:02 PM

In this list I have been taking some notes I have found from previous mock designs for things to be thinking about while trying to design the driveline of the KS9.

Drive Line

- How was the sprocket ratio determined?
- Why do you tie the drexler housing back to the motor?
- Explain why the carbon plates are bonded here?
- Why not carbon axles?
- Why does the force of the sprocket travel through the bolts?
    - Is does not there are shear pins
- Do you manufacture your own axles?
- Why do they curve down after the splines?
- Why did you pick this chain type?
- What have you done to eliminate slop in the drive line
- Why internal CV joints?
- How are you using sims to validate driveline data?
- How well is it packaged and integrated into the rest of the car ?

Lily's Sprocket Project Proposal was good for some things to show for sprocket design.

Driveline analysis of previous issue

Saturday, August 16, 2025 8:57 AM

Dynamic Chain Tensioning-Previously on the KS8E we had a issue of dynamic chain tensioning with our chain.The reason why this was happening was because of our tolerancing on our rear sprocket to our rear sprocket adapter. This tolerance was a tolerance of (Need to measure what it actually is on the car.) In Cad it's a hole diameter of .257

Update 8/16/25Go to EV Powertrain from aprill 2025 and they have the results of this issue.Be sure to look back on this before doing stuff with the rear sprocket so we don't re-run into this issue

List of rules regarding drivetrain

Monday, August 18, 2025 10:48 PM

Diff Carrier rules

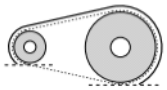
electric motors, must be fitted with scatter shields intended to contain drivetrain parts in case of radial failure

T.5.2.2 The final drivetrain shield must:

a. Be made with solid material (not perforated)

b. Cover the chain or belt from the drive sprocket to the driven sprocket/chain wheel/belt or pulley

c. Start and end no higher than parallel to the lowest point of the chain wheel/belt/pulley:



d. Cover the bottom of the chain or belt or rotating component when fuel, brake lines **T.3.1.8**, control, pressurized, electrical components are located below

T.5.2.3 Body panels or other existing covers are acceptable when constructed per **T.5.2.7 / T.5.2.8**

T.5.2.4 Frame Members or existing components that exceed the scatter shield material requirements may be used as part of the shield.

T.5.2.5 Scatter shields may have multiple pieces. Any gaps must be small (< 3 mm)

T.5.2.6 If equipped, the engine drive sprocket cover may be used as part of the scatter shield system.

T.5.2.7 Chain Drive - Scatter shields for chains must:

a. Be made of 2.66 mm (0.105 inch) minimum thickness steel (no alternatives are allowed)

b. Have a minimum width equal to three times the width of the chain

c. Be centered on the center line of the chain

d. Stay aligned with the chain under all conditions

t.5.3

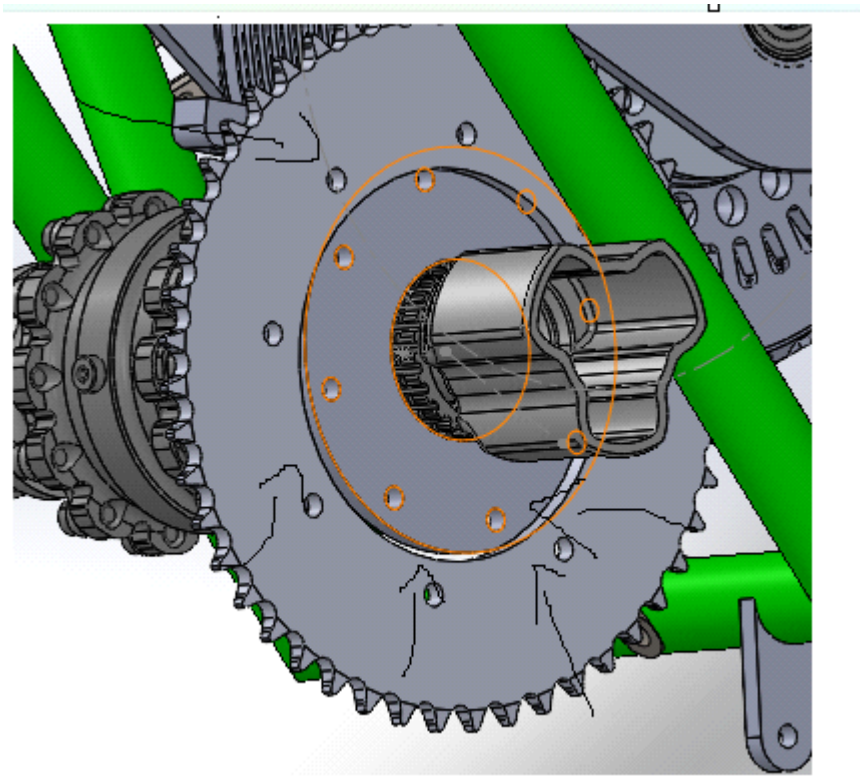
Helpfull websites

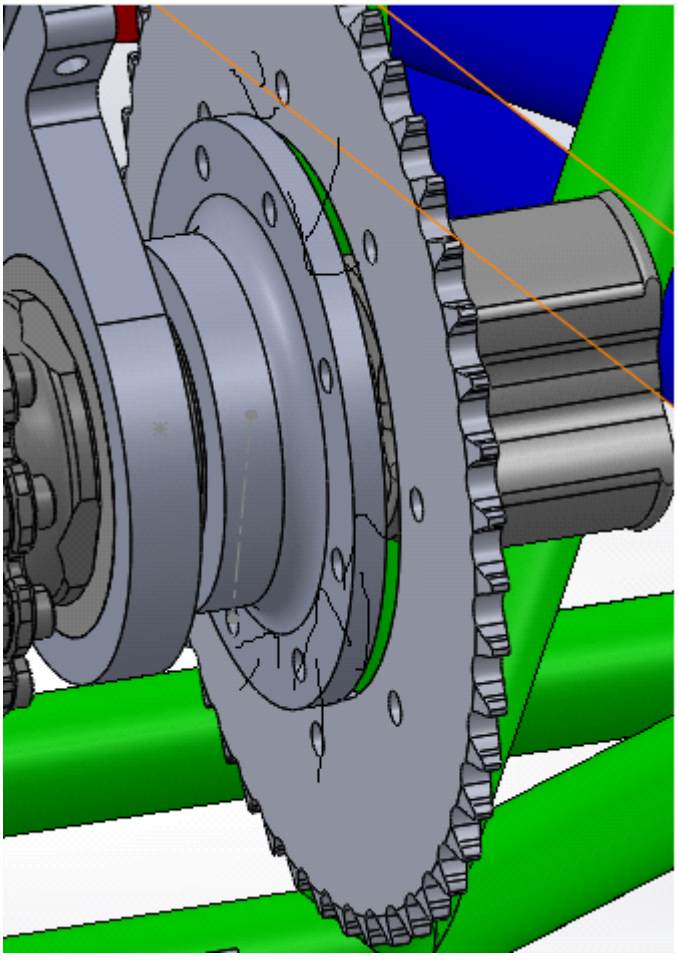
Thursday, August 28, 2025 9:43 PM

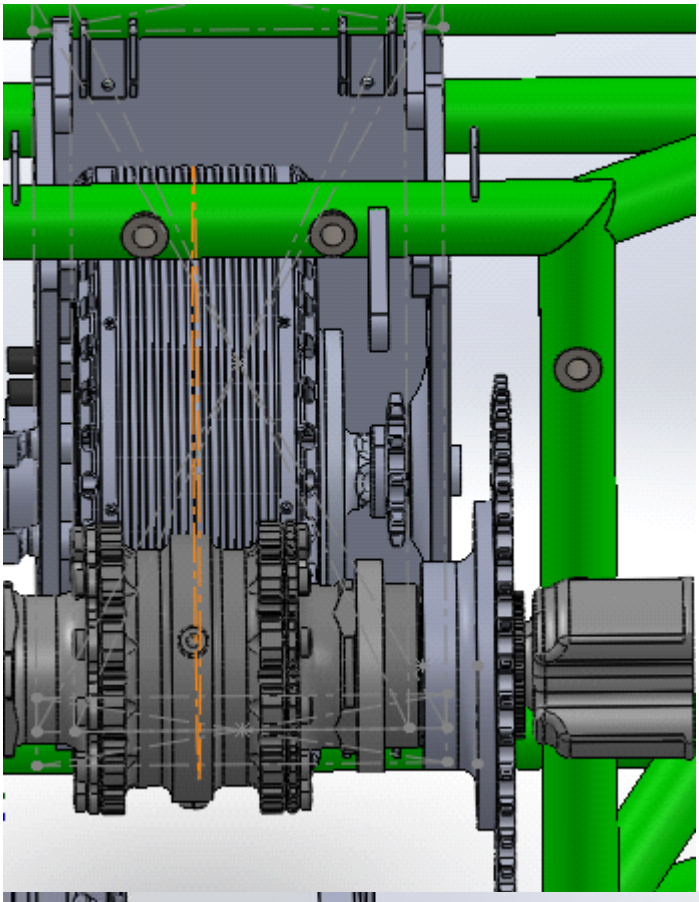
Good website for sprocket sizing https://www.nitrochain.com/sprocket-diameters?srsltid=AfmBOopEjOhaFrpWCYR2xxGiZePs_25qHWQPr0DOq509KoALGu7TIqMa	

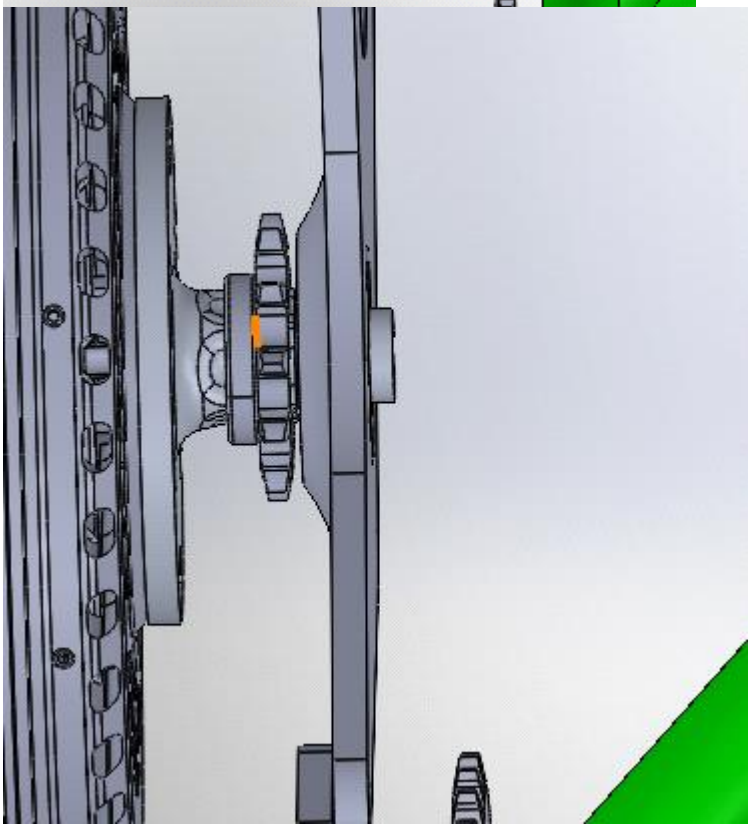
To do List for Eccentric diff mounts

Wednesday, September 03, 2025 12:42 AM









- (Dt)*9/3/25 Eccentric Diff carriers
  - ☐ ○ Diff carriers go straight to frame (Need to be cadded still)
  - ☐ ○ Need to make tabs (Currently using the motor mount tabs for reference at the moment

- [ ] Need to remake front sprocket output shaft and front sprocket depending which final drive we go for, Needs to be remade anyway to fit the splined rear sprocket.
- [ ] Rear Sprocket adapter needs to be remade, Make it similar to ic with the splines just need to change diameters so that things match up
- [ ] Main carriers with eccentric feature in the middle for chain tensioning
- [ ] Needs a new rear sprocket

- [ ] Need to add surclip for keeping the sprocket adapter in place
- [ ] Need a feature to keep the bearing in place
- [ ] Need to check correct press fits for bearings so we don't much anymore bearings
- [ ]

Driveline Bolts Check

Tuesday, October 14, 2025 10:49 AM

EV Driveline checklist

Each main item should be checked off if it is present and ready to go. If any sub-checks apply when inspecting, also check off. It is assumed that if any of the sub-checks apply, they are written in the blank below and corrected before checking off the main item. Pictures of failures/more information beyond a basic description is not required, but recommended.

Example: Left emrax plate has a loose bolt on the top rear and bottom rear. Technician tightens the bolt and moves on.

- [ ] **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
    - Top rear bolt
    - Bottom rear bolt

Bolt tightness (PUT A WRENCH ON IT)

- [ ] **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?

- [ ] ***Right emrax bearing mounting plate***
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?

- [ ] **Yoke plate bolts (6x 3/8)**
  - 6x 3/8
  - _ Hex and 1/2 wrench
  - [ ] Loose?

- [ ] **Left bearing carrier**
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?

- [ ] ***Right bearing carrier***
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?

- [ ] **Rear sprocket bolts**
  - 8x 10-32
  - _ Hex and 5/16 wrench
  - [ ] Loose?

Bolt inspection (VISUALLY CHECK SAFETY WIRE)

- [ ] **Emrax mounting bolts**
  - 6x M8
  - [ ] Loose/missing safety wire?

- [ ] **Emrax sprocket adapter bolts**
  - 6x M8
  - [ ] Loose/missing safety wire?

- [ ] **Inner/spool left tension cap**
  - 3x 10-24
  - [ ] Loose/missing safety wire?

- [ ] ***Inner/spool right tension cap***
  - 3x 10-24
  - [ ] Loose/missing safety wire?

- [ ] **Outer/hub left tension cap**
  - 3x 10-24
  - [ ] Loose/missing safety wire?

- [ ] ***Outer/hub right tension cap***
  - 3x 10-24
  - [ ] Loose/missing safety wire?

Visual inspection items (LOOK AT ITEMS TO CONFIRM PRESENCE AND OTHER ASPECTS)

- [ ] **Left emrax mounting plate**
  - [ ] Bent?

- [ ] ***Right emrax bearing mounting plate***
  - [ ] Bent?

- [ ] **Front sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?

- [ ] **Front sprocket spacer**

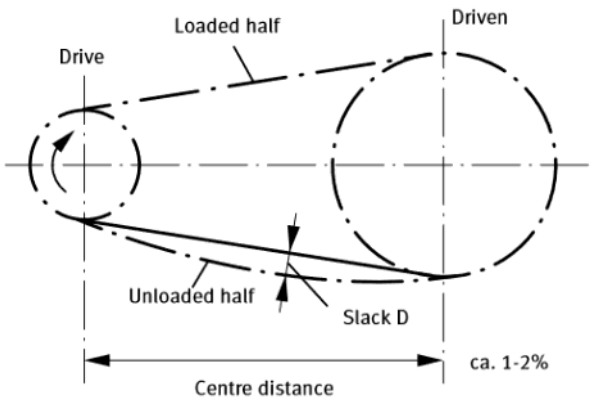
- [ ] **Rear sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?

- [ ] **Chain misalignment** - looking from rear of car straight towards both sprockets, record estimate below appropriate checkbox
  - [ ] < +/- 1/4th chain width
  - [ ] > +/- 1/4th chain width

- [ ] **Chain tension-** check as using the image below (note flipped drive direction from our car), a straight edge placed on top tangent to both sprockets, and a small measurement device. Pull the

chain upwards and measure the distance, recording it below appropriate checkbox

- ☐ < x inches
- ☐ > x inches



- ☐ Left bearing carrier
  - ☐ Installed in correct direction (bearing retained)
  - ☐ Bearing fully seated and in working order
- ☐ *Right bearing carrier*
  - ☐ Installed in correct direction (bearing retained)
  - ☐ Bearing fully seated and in working order