

Kennedy Derailment

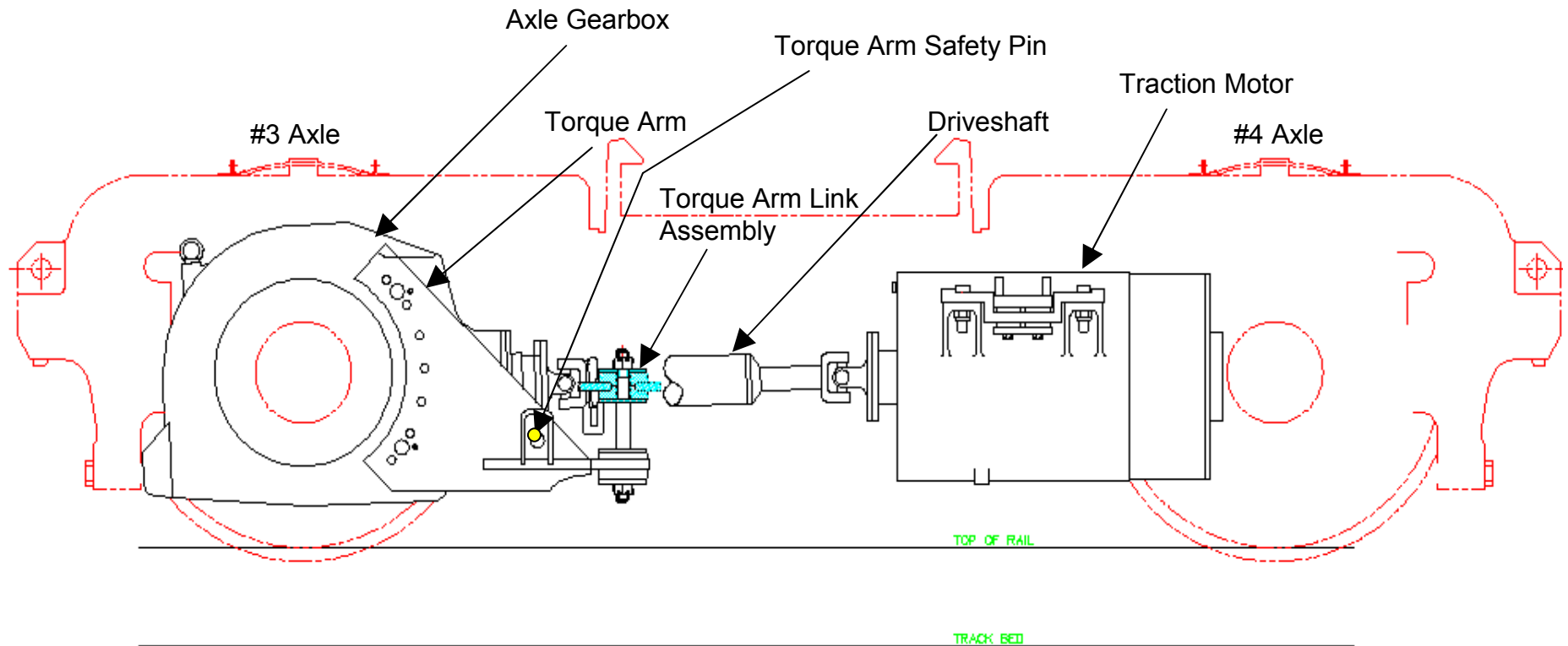
Commission Meeting

February 27, 2008

Kennedy Train Derailment Incident Summary

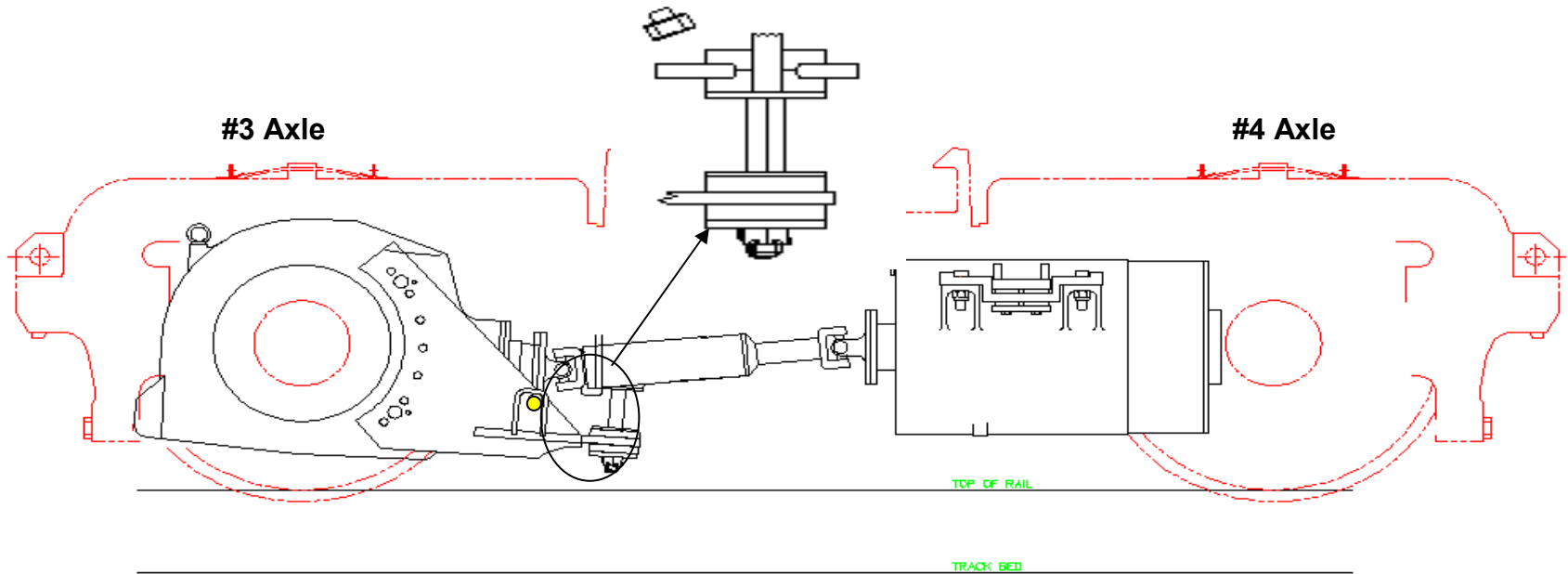
- Feb 4/08 , 12:59 AM – Run 270, H6 train leaving Kennedy Station westbound.
- 6th car, leading truck, second axle derailed at crossover.
- Dragged on track bed approximately 300 feet.
- Major damage to truck, car body/truck separation, track bed, switch and signal equipment.
- No injuries – 4 passengers and 2 crew.
- Recovery effort required Warden to Kennedy shut down on Feb 4 and morning of Feb 5; 15 - 55 shuttle buses utilized.
- 15 km slow order until Feb 29 to correct minor defects.

Driveline Configuration



- Torque arm link transfers force from torque arm to truck frame (blue).
- Torque arm safety pin (yellow) is secondary restraint limiting torque arm travel if torque arm link fails.

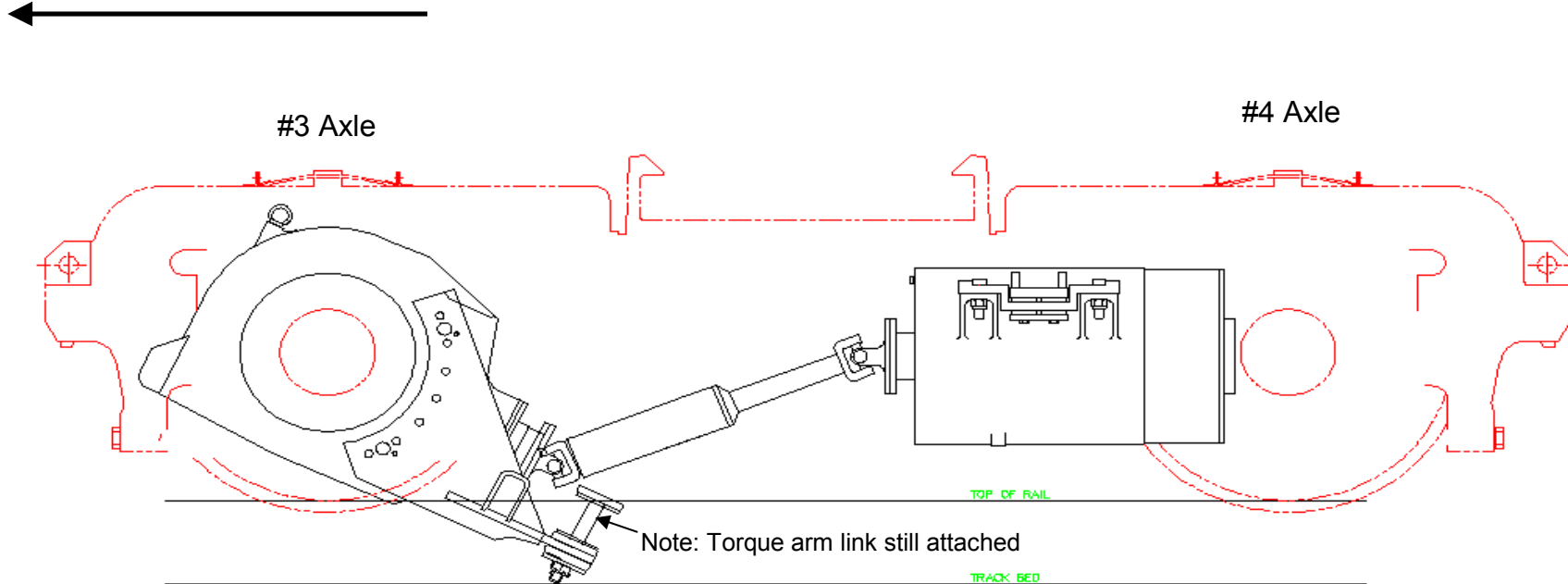
Failure of Torque Arm Link Location Undetermined



- **Upper threaded section failed just below nut.**
- **Torque arm dropped onto safety pin.**

Loss of Torque Arm Safety Pin Sherbourne – Castle Frank Vicinity

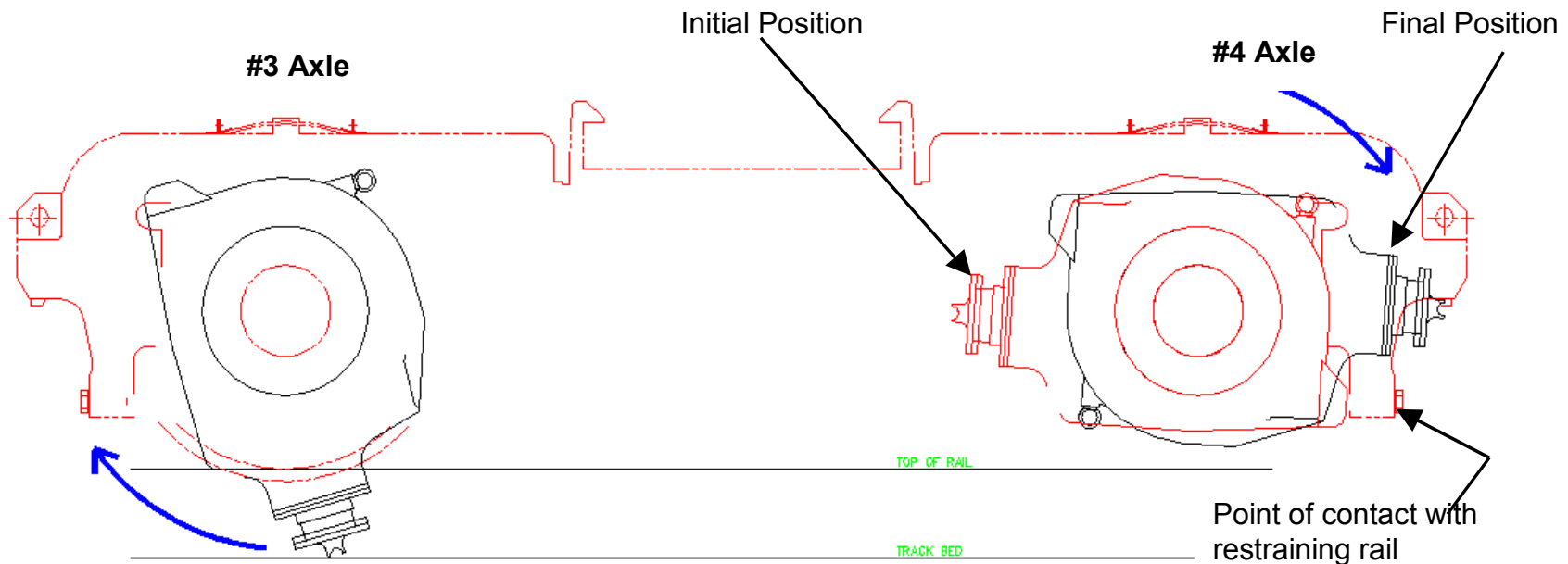
Direction of Travel: Eastbound



- **Safety pin falls out, torque arm drops on to track bed.**
- **Immediate catastrophic driveshaft failure occurs.**
- **Contact at track bed causes forward bending of link.**
- **Upward travel of torque arm cause link contact truck frame.**
- **Link falls off (Donlands), then torque arm (Victoria Park).**

Derailment Kennedy Crossover

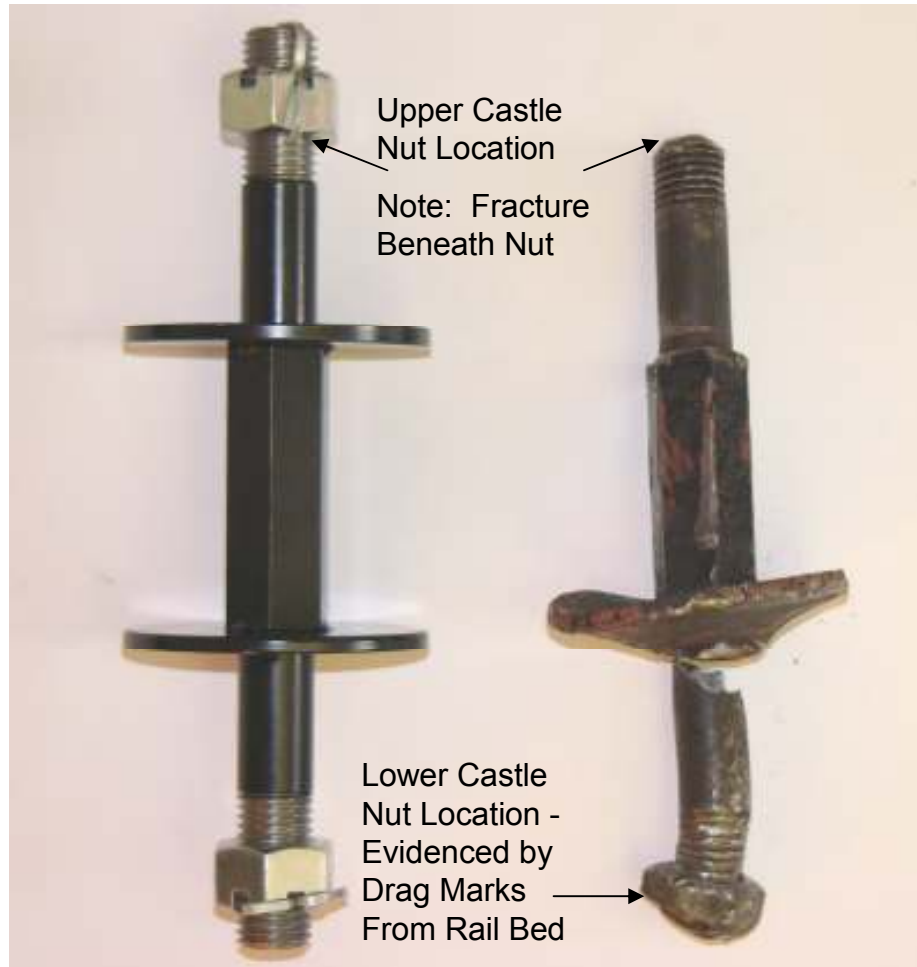
Direction of Travel: Westbound



- At Kennedy, train changes direction to Westbound, car 5857 was the trailing car.
- Gearbox #3 rotated down and struck track bed, vaulting & derailing truck.
- Axles riding on track bed and 12" to the South of the rails
- Gearbox #4 struck retaining rail.
- Impact caused gearbox #4 to rotate upwards ending 180° out of position.
- Center pin sheared, allowing car body to move forward approx. 2' on the #2 truck.
- Extensive damage to track bed, switch and signal equipment.

Primary Failure Mode

Fatigue Failure of Torque Arm Link



Secondary Failure Mode

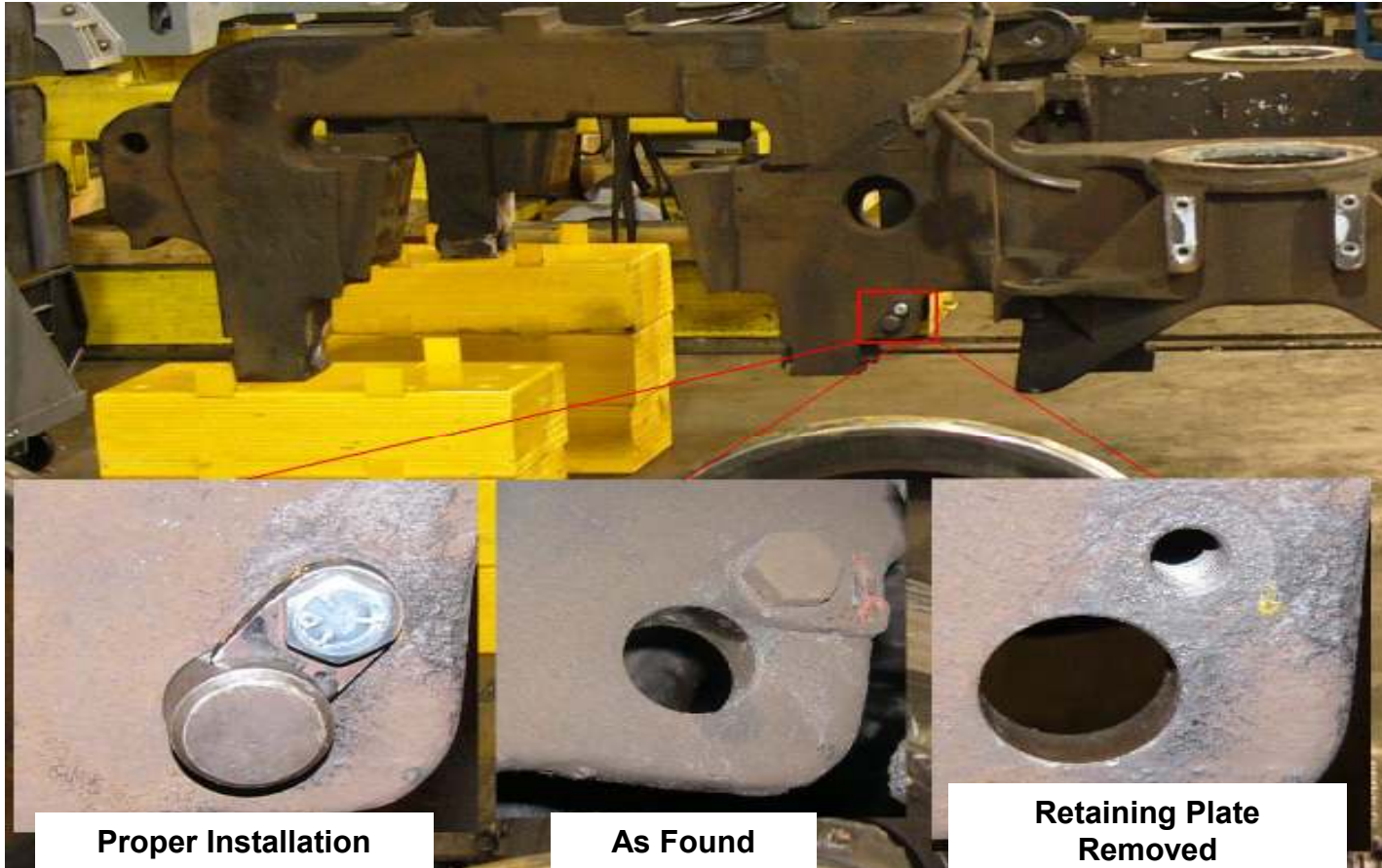
Safety Pin - Torque Arm



- Contact mark inside “U” bracket significant evidence of vertical impact of torque arm on safety pin.

Secondary Failure Mode

Safety Pin – Safety Retaining Plate



Redesigned Safety Retaining Plate



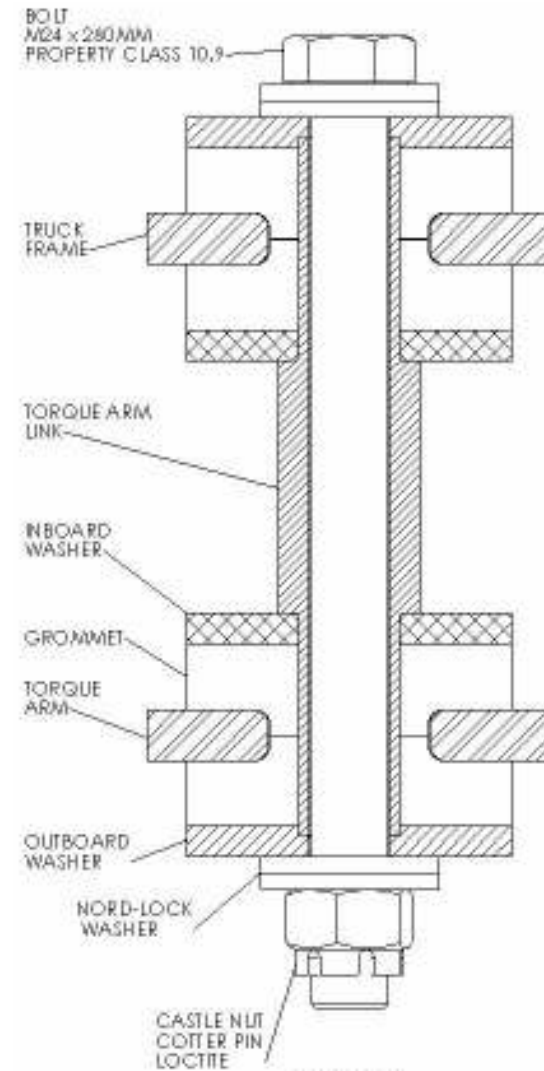
- New plate



- Installed

Torque Arm Link Redesign

- Increase assembly strength.
- Eliminate possible wear from metal washer to central bolt.



Action Plan

- Inspect entire H6 Fleet
- Redesign safety pin secondary restraint
 - All safety pin secondary restraints replaced by Feb 20
- Replace all torque arm links on H6 Fleet
 - Torque arm link redesigned.
 - Parts ordered.
 - Complete by Mid-June.

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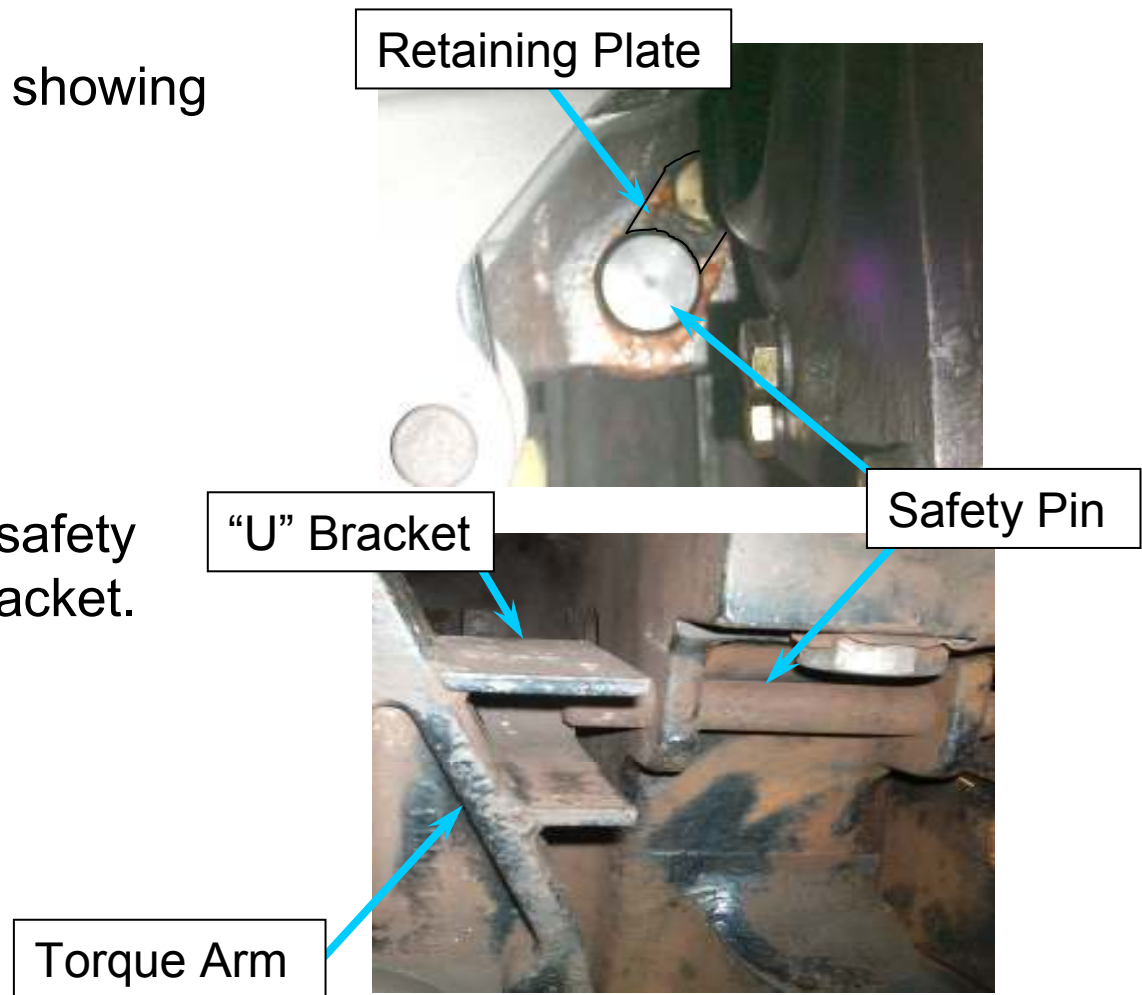
b5

update

bdougher, 08/02/2008

H6 Safety Pin Secondary Restraint

- End view of safety pin showing retaining plate
- Bottom view showing safety pin engaged in “U” bracket.



T1 Torque Arm Secondary Safety Support



- T1 torque arm supported by bolt not pin
- Bolt held at both ends by truck frame not cantilevered like H6

- T1 Torque arm safety bolt