

**The Model A Ford Front End**  
**Presented At Hershey, PA October 8-10, 2014**  
**By Alex Janke**

The front end of the Model A Ford and the condition of its components is critical to safe operation and driving pleasure. The front end provides the vehicle's steering, supports half the vehicle's weight, and provides a significant portion of the stopping ability. The condition of your front end will determine how well the car handles and how comfortable the ride. The front end consists of the axle, spindles, spindle bolts, steering gear, radius rod, spring perches, steering arms, tie rod, drag link, front spring, spring shackles and bushings – it should be considered on assembly.

## **FRONT END INSPECTION**

### **Tie-Rod/Drag Link End Plugs**

This is best done with a partner – your spouse can sit in the car and turn the wheel while you are inspecting. Move the steering wheel enough to turn the front wheels. While moving, observe the movement of the pitman arm in the drag link. The arm should not move in the link. You can place your hand on the link while it is moving – if you feel a “clunk” or see it move it is too loose and must be tightened. The same procedure is used for both ends of the tie-rod and the drag link. There should be very little to no movement at each end connection.

If the ends are loose, remove the cotter and tighten them ½ turn and test again. If ok, install a new cotter. You will need to adjust the toe-end. To be discussed later.

## **Tie-Rod/Drag Link Wear**

Check the wear on both the tie-rod and the drag link where the drag link crosses over the tie-rod. Turn the front wheels to the right most turning position. There should be 1/8" to 1/4" clearance between the two rods. The tie rod is hollow and if wear is excessive the tie rod can be weakened and cause serious problems by bending or breaking. The wear between the two rods is caused by a weak front spring. This must be corrected. At this point your spouse can leave the garage.

## **Front Spring**

Check the clearance between the spring shackle and the axle. There should be about 1/4" clearance. If the shackle is sitting on the axle, the spring is weak and sagging. This condition must be corrected. Take a good look at your spring and shackles, if they have been properly lubed the shackle should fit firmly in the bushing and the bushings should not be worn. If they are worn, this condition must be corrected.

## **Front Wheel Bearings**

Check the front wheel bearings for correct adjustment. With the front wheels off the ground grasp the wheel at the top and bottom and try to move it while watching the backing plate. If the wheel moves back and forth and the backing plate does not move, the bearings are too loose. This must be fixed. I prefer to repack the wheel bearings as part of the adjustment. See Les Andrews Model A Mechanics Handbook for the procedure.

Remove the wheel and spin the front hub while tightening the axle nut. Tighten the axle nut until a drag is felt on the hub. Turn the axle nut back one castle position and insert the cotter. There should be no binding when the hub is rotated

and no side-to-side movement. [It may be necessary to back off the brake adjustment to feel the wheel bearing adjustment. It is better to be too a little loose than too tight. More wheel bearings are ruined by over tightening than anything else.]

### **King Pin Thrust Bearing and Bushings**

With the front wheels off the ground [not jacked up high] try rotating the king pin thrust bearing with our fingers. No try rotating the felt washer cup. To top thrust bearing should move with the wheel off the ground. With the wheel on the ground it should not move as the weight of the car is on the bearing. If it can be rotated corrective action is necessary – shims. Likewise the felt washer cup should be free and tunable with weight on the wheel.

Check wear on the king pin bushing by gripping the wheel at the top and rocking it back and forth. There should be no to very little movement at the king pin. Place a finger across the joint between the axle and the spindle, where the king pin [spindle bolt] goes through. Move the wheel back and forth and check for movement between the spindle and axle. If more than .003-.004” the bushings are worn and should be replaced. Spindle bolts seldom where if properly lubricated, but bushings do over time.

### **Spindle Ball Studs**

The three spindle arm ball studs and pitman arm balls should all be checked for roundness. Flat spots on the balls will cause maladjustment of the tie-rod/drag link. To check the balls is it is necessary to remove the tie-rod/drag link ends from the ball. When you were checking the tie-rod/drag link end plugs and if you were unable to get a smooth tight connection as the wheel was turned, check the balls.

## **Toe-In Measurement**

The front end of the Model A has three different angles that make going down the road smooth – they are camber, caster, and toe-in. Toe-in is how much the wheels point in.

Ideal toe-in is between 1/8” to 1/4”. There are many ways to measure toe-in. It is adjusted by losing the locking bolts on both end of the tire rod and then turning the tie rod to obtain the correct measurement.

Jack up the front end so the tires just clear the ground. I use a “fixture” made scrap wood with a couple of pieces of tape. Using a pen or other marker make a line on both tires all the way around. It must be clearly visible in the front and the back. Take your fixture and tape and mark where the lines are on the front. Move the fixture to the backside of the wheels and match one mark. Then go to the other side and make a second mark. Measure the distance between the marks – adjust as necessary and repeat measurement to verify. Once you have the correct measurement, tighten the locking bolts and install new cotters.

## **Caster**

Caster is the forward (negative) or backward (positive) tilt of the steering spindle axis. Caster allows vehicles to self-center or track. On the Model A caster is positive by five degrees. Think about a bicycle, the front forks have a rearward tilt towards the handlebars giving the wheel a positive castor. This causes the bicycle to track or self-center and is why you can ride one with no hands (not a safe practice, but we all did it as kids). Caster provides a distinct center point for the steering; a point where it is clear the vehicle is going in a straight line. It is also why the Model A will continue down the road if you remove your hands from the

wheel. The Model A caster is determined by the axle and the radius rods. The axle and radius rods must be straight and the ball on the end of the radius rods must be in good condition and properly attached to the flywheel housing.

Caster is the backward tilt of the axle which pushes the wheel slightly forward. To measure place the car on a level surface. Use a plumb bob and line over the center of the axle and make a mark on where the plumb bob comes to rest [point A]. The distance from the axle to the ground should be 11" to 12" depending on wheel size. Take a straight edge and lay it on the axle I-beam and make a second mark [Point B]. Measure the distance between point A and B – it should be about 1" which is the equivalent to 5 degrees caster. If the caster is off, inspect the radius rod, it must be straight, the ball should not be excessively worn, it should be installed correctly, and tight. If all these conditions are met the axle is likely bent.

## **Camber**

Camber is the tilt of the top of a wheel inwards or outwards (negative or positive). Proper camber makes sure that the tire tread surface is as flat as possible on the road. If your camber is out, you'll get tire wear. Too much negative camber (wheels tilt inwards) causes wear on the inside edge of the tire. Consequently, too much positive camber causes wear on the outside edge.

Negative camber is what counteracts the tendency of the inside wheel during a turn to lean out from the center of the vehicle. Zero or Negative camber is necessary in the Model A. Positive camber would create handling problems. Ford built camber into the front axle by fixing the angle of the spindle bolt. When the axle is straight there are 2 ½ degrees of negative camber. When you look at a good running Model A from the front you will notice top of the wheels are tilted out

slightly. If the camber is uneven, excessive, or going the wrong direction, the front axle is bent.

### **Front Axle**

To inspect the axle you can run a string around each end with the car jacked up and on stands. The string should lay flat across the entire surface of the axle. If it does not the axle is bent. Further inspection of the axle requires disassembly of the front end. Refer to Les Andrews Model A Mechanics Handbook for the process.

Lay the axle down and take a straight edge along the front and back of the axle check that it is straight. If there are waves or a bow in the axle it must be sent to a shop equipped to straighten axles or be replaced. Axle shops use very large hydraulic presses to cold form the axle back into shape. Check the ends of the axle where the spindles ride, they should be straight across each load-bearing surface. Check the holes for the locking bolt; they should be straight and uniform. The front axle is the same for all model years with only minor changes to the spindle bolt locking pin, castellated nuts, and stampings on the axle. The axle is the single key component to getting a good front end.

When restoring a vehicle front end, starting with a straight axle with the right angles will make your job much easier.

Please direct questions to: Technical Director at [MAFCA.com](http://MAFCA.com)

#####