The Ultimate Checklist

or

TUNING A 'T' FOR DURABLE TOURING

By Milton Webb
Elk Grove, California

Ed. Note: Milt Webb titled this article,"Tuning A 'T' For Durable Touring" but I believe "The Ultimate Checklist" is more fitting. Milt offers a step-by-step approach to bringing a Model T out of storage and methodically preparing it for dependable driving. Whether your T has been in storage for several years or just over the winter, this checklist should be a valuable guide in readying your T for the upcoming season.

Yep, it takes more than a can of gas and a new battery for tuning a T, getting it out of mothballs [10-50 years in storage], and getting it ready to go on the road!

You always hear, "It ran OK 10 years ago, it ought to start right up, or Let's get an eight-volt battery so she'll crank!"

In my experience, it takes all the checks, cleaning, repairs, and adjustments outlined below to get through the first mile!

Here's how to tune it up so it will start easily, and go on tour with few breakdowns!

STARTING SYSTEM

Battery and Ground: If the battery is over two years old, install a new 6-volt battery, negative to ground. Full charge is 6.3 volts

Remove and clean the ground strap bolt on the frame. Install a heavy-duty [one- or two-gauge] ground strap from the bolt at the emergency brake control shaft bracket to the bottom U-joint cover bolt on the crankcase. Use a heavy, woven-style cable or a #1 gauge cable with flat ends. See Photo 1.

Starter: Loosen any one of the four bolts on the starter and re-tighten. This breaks the corrosion, if any.

Remove and disassemble the starter button. Sand the contacts to shiny clean.

Remove the starter cable nut at the starter. Tighten bottom nut to just snug. The stud is pinned and soldered inside the starter. Sometimes the solder joint inside breaks loose and the pin pulls out easily if over-tightened. Re-install the cable and top nut. See Photo 2.

Cables: Install new #1 gauge cables from the battery to the starter button and from the starter button to the starter. Old cables are usually corroded even when you cannot see the green and build resistance over long periods. Old cables result in excess voltage loss to the starter during cranking.

Install a quick disconnect on the ground circuit near the battery (-) terminal. See Photo 3.

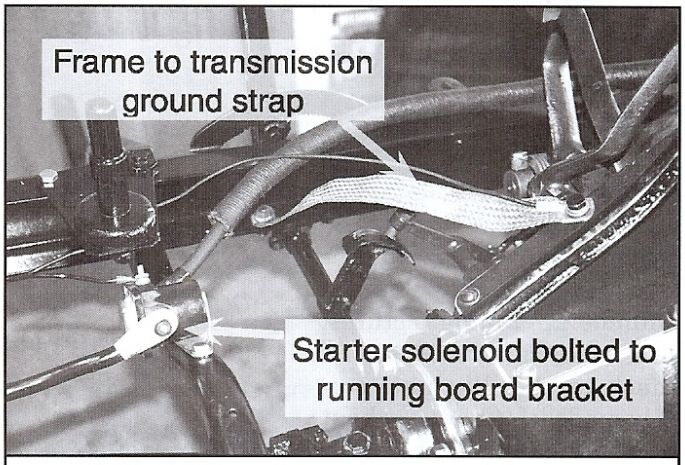


Photo 1 – Extra Ground Strap and Solenoid
Ground Strap: Install a #1 gauge or larger cable from the frame rail to the transmission. This eliminates all those rust problems at the frame and motor mount joints and/or on those re-painted surfaces.

Solenoid Installation: Reduce starter button maintenance by installing a '48 Ford V8 solenoid and using the original starter switch as a starter button to ground. This will save the original starter button and help maintain good cranking performance. Review text and Figure 2 for solenoid electrical installation.

In-line Fuse: Install an in-line 30-amp fuse in the main battery wire [yellow] feeding the terminal block near the solenoid. This prevents fires in case of short(s).

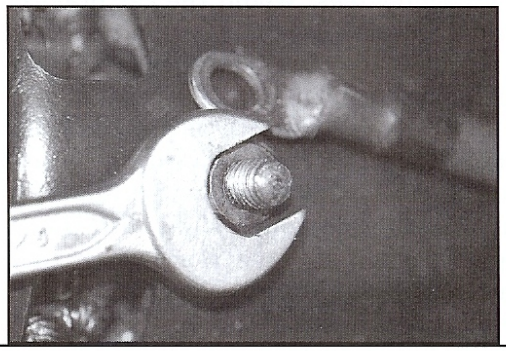


Photo 2 – Starter Nut
Remove outer nut and cable. Tighten lower nut firmly. Do not over-tighten; stud may pull out! Re-install the cable and upper nut. Jamb tight.

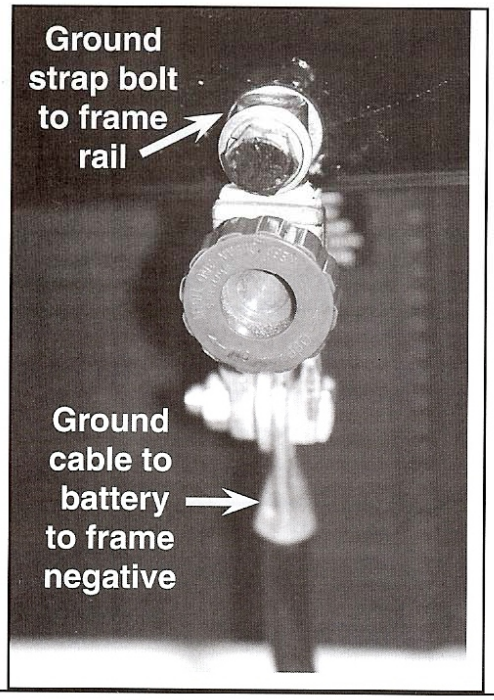


Photo 3 – Negative Ground Disconnect
Install a quick disconnect on the ground circuit outside the frame rail. Make it convenient to disconnect during storage.
Wiring shorts start fires.

Caution: Do not use 12-volt cables [number 4-or 6-gauge]. Twelve-volt cables will get warm or hot during crank, plus the cranking may be very slow.

Voltage Drop Tests: It is best to test the starting system with a digital voltmeter. For best results, acceptable voltage drops during cranking are:

- Cable, batt. to starter button ..... 0.2-volt max
- Starter button, post-post ..... 0.2-volt max
- Cable, starter button to starter ..... 0.2-volt max
- Cable, batt. neg. [-] to engine ..... 0.2-volt max
- Batt. pos. [+] to neg. [-] ..... 4.5 min [cold starting]
- Battery, pos. [+] to neg. [-] ....5.0 min [hot, after warm-up]
- Starter draw ..... 400 amps max

See Figure 1 on How to Make Voltage Drop Measurements.

Tip: For better starter button durability and cranking performance, install a '48 Ford starter, 6-volt solenoid. Use the 'T' starter button for the solenoid 'control' switch to ground. See Photo 1 and Figure 2 on Hooking up a Solenoid.

Starter Tests on the Car: If the starter is 'sluggish' at this point, try spraying some electronic or motor cleaner on the starter commutator during crank.

If the current draw is over 400 amps on the car, have the starter re-built.

During re-build, install a seal in the end of the starter mount housing. This will prevent massive oil leaks out of the starter. See Photos 4, 5, & 6. Install a new gasket on the Bendix cover using gasket maker RTV [orange stuff].

Starter Tests on the Bench: Test the starter after re-build by hooking the starter post to a 6-volt battery plus (+) terminal with heavy jumper cables. Hold the starter on the floor. Connect the negative (-) terminal to the starter at the

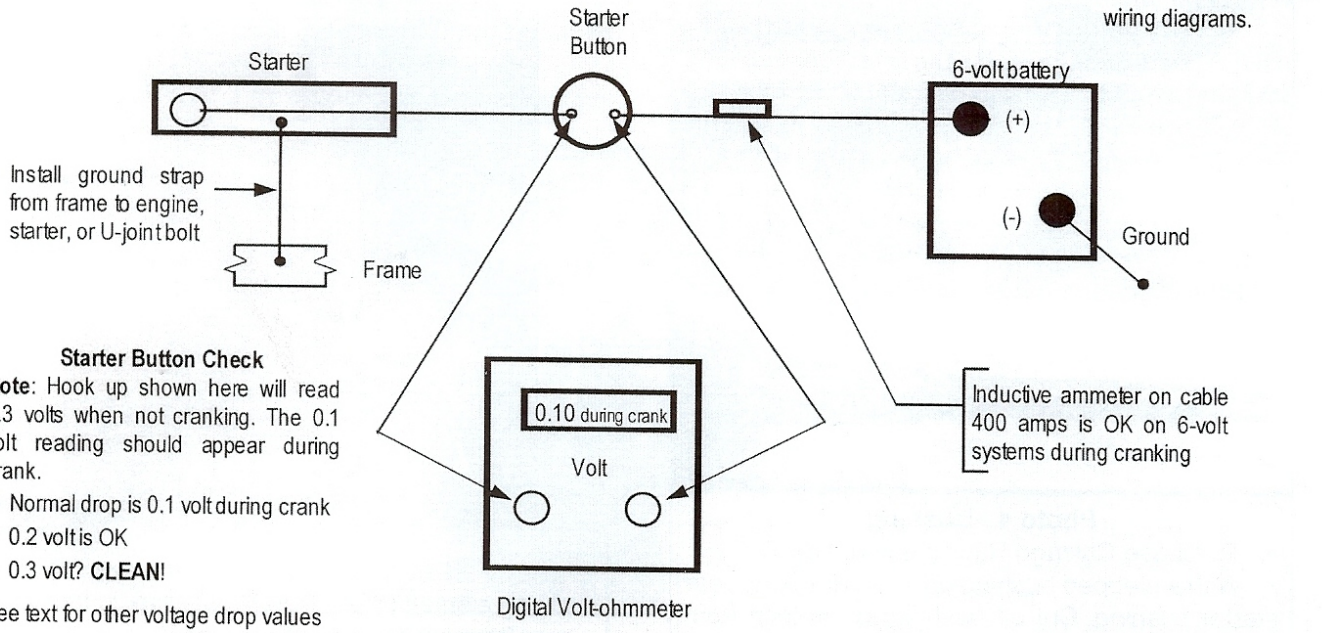


Figure 1: Measuring voltage drop during cranking.

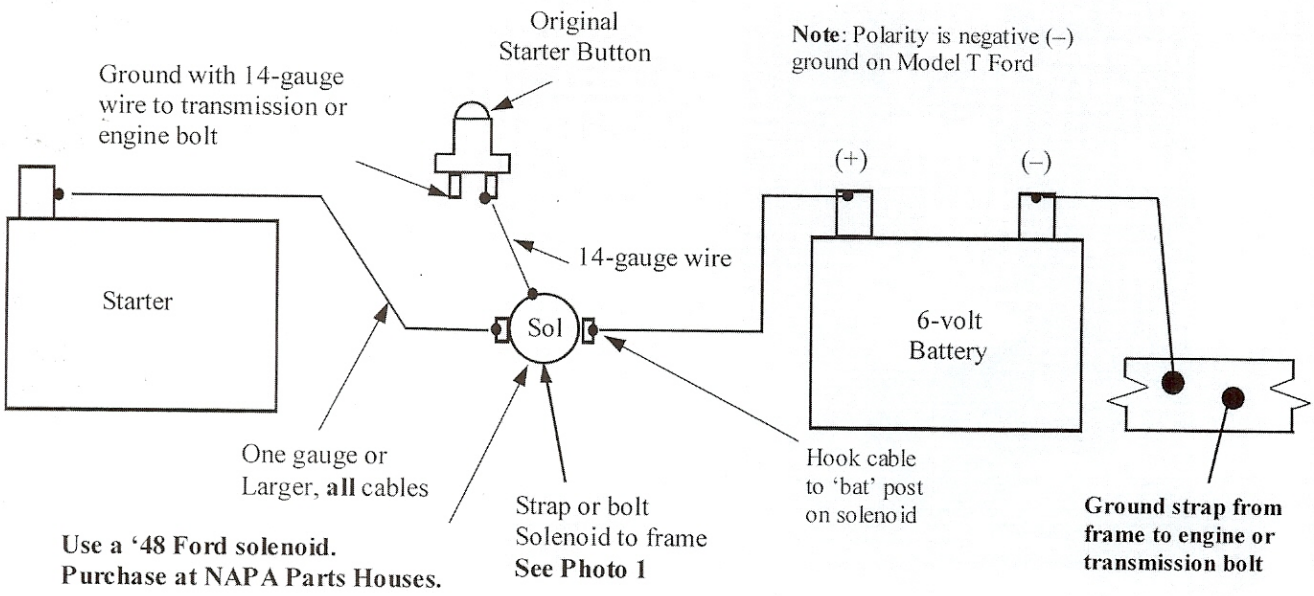


Figure 2 Solenoid wiring diagram for Starter System.

mounting bolt flange. Run starter motor [no load]. Grasp the starter shaft and hold to slow down the shaft. If you can slow it down some, but can't stop it, the starter is good. If you can stop it [shaft], it won't crank the engine. During this bench test, the amps will go up to 75 at around 4.3 volts. *Caution: Use heavy gloves when conducting starter tests.*

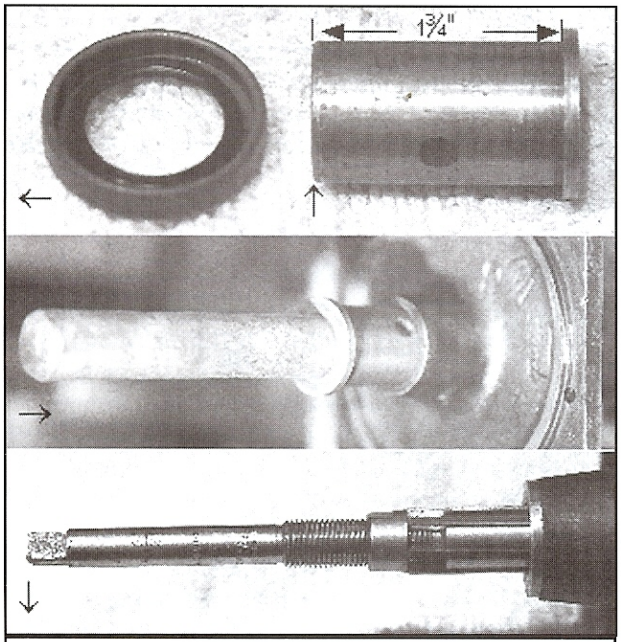


Photo 4 –Bushing

- Purchase Chicago Rawhide seal #6720
- With a stepped bushing driver, remove the rear starter bushing. Cut off bushing to 1¾ inch from flange. Deburr.
- Re-install bushing
- Check starter shaft fit. Ream burrs in bushing.

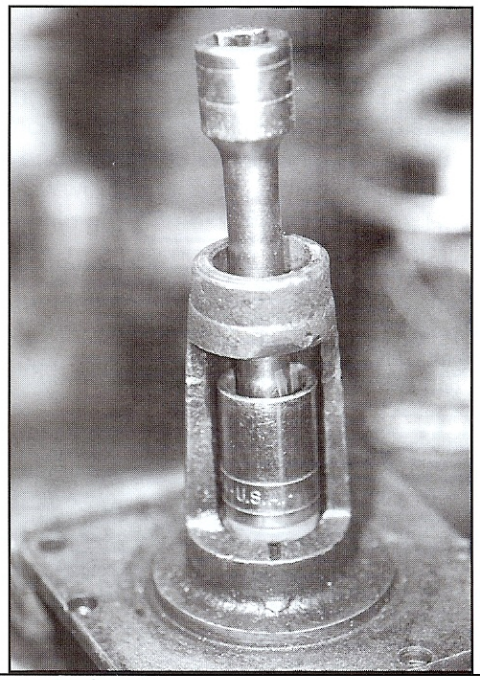


Photo 5 – Installing Seal

Using a small press, install seal with lip facing rear [towards transmission]. Use a socket with o.d. slightly larger than seal o.d. Seal will seat on bushing end.

Opinion on Eight- or 12-volt Battery

In my experience, eight- or 12-volt batteries ruin starters and generators. All this does is hide real problems caused by lack of maintenance! Eight- or 12-volt batteries will damage the starter Bendix drive. They break! The Bendix body cracks, the square slot cracks and becomes 'Y'-shaped, the bolts get loose and fall out, and/or the Bendix spring breaks or gets distorted!

Eight- or 12-volt batteries are unnecessary if all six-volt systems, cables, and the battery are serviced properly.

I want my car to start regularly, without damage to the starter and Bendix drive! I prefer six-volt systems on a six-volt designed car!

Continue tune-up: Do not start your car unless you have conducted the engine, ignition and fuel system checks. If you do try to start it without these checks, you may crank all day and ruin the battery and starter.

ENGINE CHECKS [before start-up]

Compression: Remove all four spark plugs and measure the compression. Continually crank the engine until the compression pressure has built up four times. Record the compression pressure of each cylinder.

A good 'T' engine [cold] will crank 50 psi on each cylinder. Forty-five psi is OK.

Twenty-five psi indicates worn engine rings or burned valves. This is not enough compression to start the engine.

If the compression pressure varies over five psi from cylinder to cylinder, grind the valves and set the tappet clearance to around 0.012 inch.

If any cylinders are zero [0] compression, you know what you need to do next! Head gasket, sticky valves or burned valves are suspect. In extreme cases, the piston may have a hole in the top, broken rings, and/or broken ring glands.

If there's no starter, remove all four plugs. Crank each cylinder through compression with your thumb covering the plughole. If the pressure is about equal in all cylinders, the valves are probably OK.

Visually look down each plug hole at the top of the valves. If they are the same color, the odds are they're good enough to start the engine.

Oil the crank handle bushing first. You won't be hand cranking against the rust!

Drain the oil: As you remove the oil drain plug, try and catch the first part of the drain in a coffee can. Note if any water or strange metal comes out during the first part of the draining. A couple of tablespoons of water is OK. If you get a cupful, additional engine analysis is in order. One or two very small pieces of metal or wire are OK. Watch for additional metal at the next oil change.

If there is lots of metal or babbit in the drain oil, you may want to have a 'look see' in the transmission or inside the rod inspection plate.

If the old oil is 'jelly' or 'syrup' let it drain overnight; then install new oil. *Do not install any flush oil or diesel oil: 'Plain ol' oil is the best cleaner!*

Install the pan plug using a small amount of RTV gasket maker on the washer.

Install four quarts of 20-50 weight oil. Check for dripping out of the top oil level petcock.

Install an external oiler, available at T parts houses. It will guarantee oil to the front main bearing!

Why 20-50 oil? Viscosity will adjust to oil temperature. Oil temperature will rise up to 275-300° F on hot days [100°F] going up long hills in low gear! The detergent will clean the bearings and the rings, gradually.

Coolant: Drain the water and re-fill with water for now. We'll test for overheating after start-up.

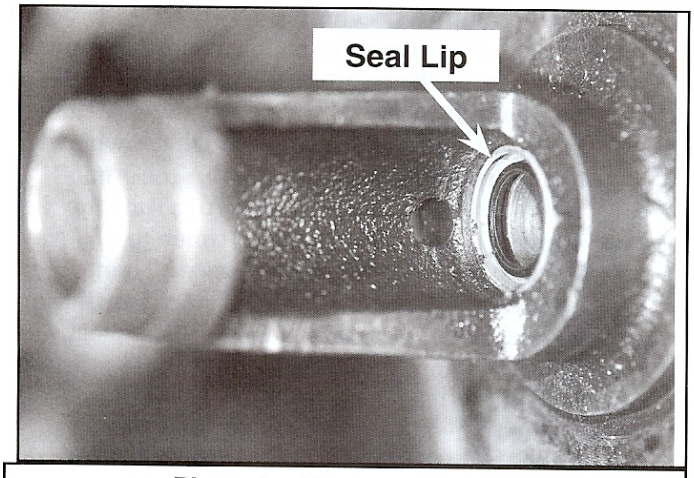


Photo 6 – No More Oil Leak
Finished modification; seal lip facing rear

Use gasket maker RTV [orange stuff] on starter housing and Bendix cover gaskets.

WIRING

Condition: If the insulation is cracking, old, or falling off the wire, replace all wiring looms. Use the *Ford Service Manual* as a reference for correct wiring color-coding.

Tip **In-line fuse:** Install a 30-amp inline fuse in the main battery wire [yellow] feeding the terminal block near the solenoid battery [bat] terminal. This prevents fires in case of short(s). See Photo 1.

STANDARD T MAGNETO IGNITION

Commutator: The commutator [timer], coils, and coil box are usually in need of cleaning, adjusting, and tightening. Corrosion takes its toll from sitting and the coil box wood collapses, leaving loose connections.

Clean the timer and roller [or brush] with solvent and sand the grounding bars to shiny clean. Sand the roller or brush tip. Sand the brush-type commutator bars and clean with solvent, again. Use 100 grit sandpaper.

Replace the wiring loom from the commutator to the coil box. Use #14-gauge wire. Re-install new wires to the commutator, routing them so they will not touch metal bolts or kink when advancing or retarding the spark.

On roller-type commutators, oil roller and commutator bars liberally with motor oil upon re-assembly.

On brush-type commutators, I recommend leaving the brush and commutator strips dry.

See Photo 7 for commutator wire routing firing order, and color-coding.

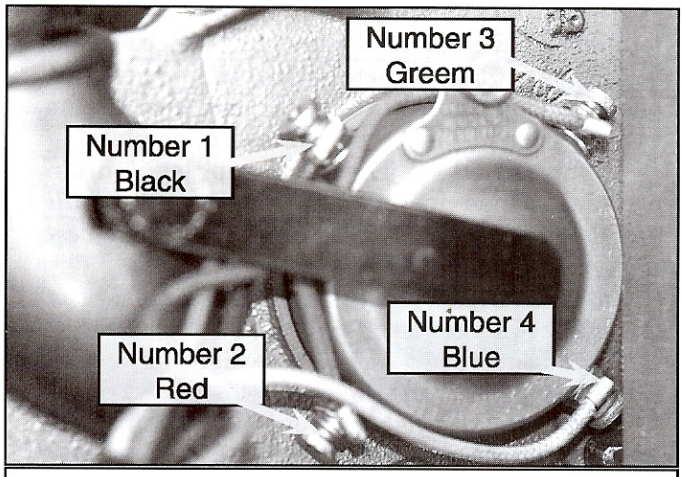


Photo 7 – Timer and Wiring
Install a new timer wire loom from the timer to the coil box. Install wiring so it will not kink and/or the connections won't flex when advancing the timing.

Check #2 terminal to make sure it doesn't touch the crankcase bolt in the advance or retard position. Install crankcase bolt facing downward with nut on the bottom.

Coil Box: Disassemble the coil box connectors. Clean all the hardware in muriatic swimming pool acid [goggles and gloves]. Neutralize with soda water. It is best to solder the contacts to the small carriage bolts. Install new wood [kit from 'T' parts suppliers]. Treat the wood with water sealer. See Photo 8.

Caution: Do not paint the wood, especially with black paint. Painting may cause shorts. Black paint has charcoal, a conductor! Use a wood water sealer

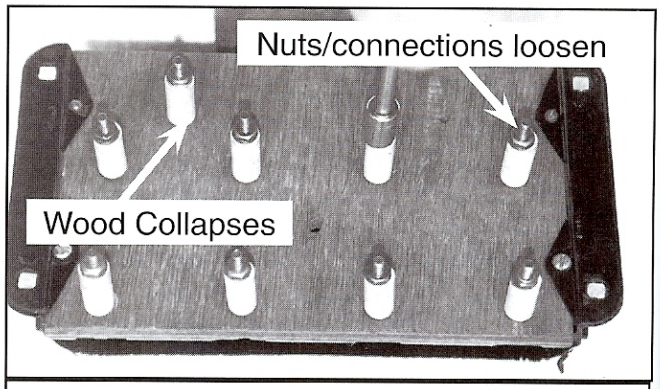


Photo 8 – Coil Box Maintenance
Wood collapses. Bolts, nuts, and porcelain work loose resulting in bad electrical connections.

- Remove and clean all the bolts and connectors.
- Clean the switch [older models] and install silicone dielectric grease.
- Install and solder multi-strand wires to all primary, switch and magneto post connections. Single strand original wires in coil box will break and your beloved 'T' will stop on a tour.
- Paint wood with a wood sealer. **Do not paint wood with black paint. Secondary spark arcing will happen.**

I strongly recommend you let a professional restore the coils, installing new points and modern condensers, and adjusting to the correct current draw using a bench crank magneto. You will more than likely have reasonable trouble-free coil operation.

Adjusting the coil gap to a 'strong buzz' does not guarantee a good spark.

Timing the Commutator: Retard the spark lever. Remove number 1 spark plug, hand crank the engine to top dead center [TDC] of the compression stroke on number 1 cylinder. Use a screwdriver in the plughole to feel the piston coming up on #1 TDC. Then, continue cranking past TDC until the piston just barely starts going down. This is about 5º past TDC into the power stroke or when the piston is around ⅜ inch past TDC.

Remove the advance rod. Turn on the key to buzz #1 coil. Rotate the timer both ways until number one coil box buzzes. Then rotate commutator counter-clockwise [retard] until there is no buzz. Then, rotate the commutator clockwise [advance, key on] until the coil buzz just starts in the coil. Now, it's timed!

Do not move the commutator [timer cover].

Turn off the key and adjust [bend] the spark advance rod to fit the length between the commutator and the retarded position spark lever arm on the bottom end of the steering.

Re-install the number 1 spark plug.

During start-up [later in this article], note if it 'kicks back' during crank, retard commutator rod another ¼ inch. If it 'starts hard', advance commutator lever about ½ inch at steering wheel. You can 'fine tune' it later. But the above procedure will get your car started – provided all other tune-up stuff is correct!

The ***Ford Service Manual*** procedure is slightly different using a gauge to set the initial timing for the roller-style timer. In my experience, there is much variation in the various after-market timers. The above procedure will work on any timer – original or after-market.

Test the magneto after start-up.

Spark Plugs: Replace the spark plugs with the gap adjusted to 0.025 inch. Install the plugs with 'Never Seize' on the threads.

Spark Test: Position number one cylinder at TDC, power stroke. Retard the spark. Turn on the key. Continue crank just past TDC to start spark buzzing. Short number one cylinder spark plug to ground using a screwdriver. Move the screwdriver blade to $^{1}/_{16}$ inch away from plug top connector. There should be a buzz and a nice sharp blue spark

Then, hand crank until number two spark plug starts to buzz. Re-check the spark. Then test number four and three spark plugs in the same manner.

DISTRIBUTOR IGNITION

Benefits: You may want to compare the cost of a distributor to 'T' coil repair. If you're showing your 'T', stay with the original coils and timer to maintain authenticity.

If you want a driver [durability and smoother acceleration] purchase a distributor, 6-volt coil, and plug wires. My car is set up to convert either way. Your choice.

If using a distributor, disconnect the 'T' coil box primary wire and connect it to the new 6-volt coil [+] terminal. Connect the coil [–] terminal to the distributor. Use number 14-gauge wire for all primary wire hook-up.

Point Gap: Adjust the distributor point gap to 0.020 inch if no specification is provided.

Distributor Timing: The after-market distributors turn clockwise, in most applications. Remove number one plug. Position number one piston to TDC on the compression stroke. Retard the spark lever, turn the distributor body in the counter-clockwise direction until the points just start to open with the rotor pointing to number one in the distributor cap. This is the spark firing position on number one cylinder just as the points start to open.

Install the advance linkage and adjust the spark lever rod length with the spark control lever in the retard position to match the number one cylinder spark firing position of the distributor. Tighten distributor housing clamp bolt.

Check advance linkage for binding.

If your new distributor has advance weights, retard the spark to start the engine, then advance the spark by moving the lever down one-half (½) inch from the retard position. The automatic advance will take care of additional distributor advance at higher rpm.

If your distributor turns counter-clockwise, reverse the above procedure to set the initial timing.

Spark Test: Retard the timing. Remove the coil wire at the distributor end. Hold the coil wire ¼ inch from ground. Turn on the key. Crank the engine. You should get a nice crisp blue spark.

FUEL SYSTEM

The fuel system checks include the fuel tank, fuel lines, sediment bowl, carburetor, and intake manifold leaks.

Fuel Tank: Start at the fuel tank. If it's full of flaky rust inside, or there is 'algae' and/or it has rust holes in the bottom, have it cleaned and restored professionally or replace the tank.

Sediment Bowl: Disassemble the fuel sediment bowl, clean in muriatic acid, and replace the filter screen. *Use goggles and rubber gloves.*

Set up sediment bowl in a vice. Loosen front fitting. Use a propane torch to heat bowl casting. Use gloves.

Clean the sediment bowl in carburetor cleaner. Reassemble and install the sediment bowl into the tank. Use aviation, gas-resistant sealant on the threads. Do not get sealant inside gas passages.

Do not use 'Teflon' tape. Gasoline will dissolve the tape, and it may get inside, causing fuel flow restriction and carburetor flooding problems.

Test Gas Tank: Pour in one gallon of gas and test for leaks and flow out the sediment bowl.

Fuel Line: Install a new ¼ inch copper fuel line over the frame rail. Route the fuel line under the splash shield parallel to the frame rail. Route the fuel line between the firewall and frame rail adjacent to firewall to frame bracket. This routing will minimize heat transfer into the fuel line. Other routings may cause fuel foaming ['vapor lock'].

With today's gas, you may try insulating the fuel line with aluminum tubing.

An electric fuel pump with a pressure regulator at 1½ psi is a better, more durable choice for touring on hot days to minimize fuel foaming.

Carburetor: Disassemble carburetor and clean in carburetor cleaner. If the float needle valve seat is 'frozen' in the carburetor top, leave it alone. Use the old needle valve.

If the needle valve seat can be removed, replace it with a new needle and seat.

Test the float [brass] in hot water. If small bubbles escape while immersed, the float is defective. Replace it! See Photo 9.

Photo 9 – Test Float
Hold the float in a saucepan of hot water. If bubbles appear, after one minute, replace float.

The hot water causes air expansion and pressure inside float. If the float is leaking, a bubble stream will appear just like testing a tire inner tube in water.

The older carburetors use a cork float. If intact, and the needle seat brackets are tight, sand the cork lightly with 320 grit sand paper. Coat with gas-resistant epoxy [Hobby Poxy #1]. Wipe off excess before the epoxy cures. Coat a second time. Wipe again.

Using an ounce scale, check weight before and after each coating. Less than 0.1 ounce increase in weight is OK. If more, start again with a new cork float [available from 'T' parts suppliers].

A new cork float must be coated with very light coats of gas-resistant epoxy. The same technique discussed above applies to new cork floats.

Gas-resistant? Try it out; soak a small amount of cured epoxy in gas. It if softens, try another epoxy brand.

If the float gets too heavy, it will sink, causing flooding!

Sand the float tang until the needle seat 'dimple' is removed. This minimizes any possibility of the float needle valve hanging up during operation.

Adjust the float to specification. Turn carburetor upside-down. Adjust the level to $^{5}/_{8}$ inch from the seam to the top surface [inverted].

Usually, if the float is 'level' with the top surface of carburetor, the float level is OK.

Re-assemble and install the carburetor. Adjust the needle valve to one and a half (1½) turns open from the seat. Most 'Ts' run at around one (1) turn to one and a half (1½) turns open.

With the fuel line disconnected at the carburetor, let the gasoline flow into a plastic bottle. Make sure the gas is clean. Turn off the gas. Then connect the gas line to the carburetor. Turn the gas on. Wait one minute. There should be no wetness on the carburetor bowl or dripping out the air inlet.

If the carburetor bowl is wet, replace the float needle valve again and re-check the float level. Sometimes new needle valves leak!

Opinion: A Holley NH carburetor is the best choice for durable touring.

TRANSMISSION

Lining: Remove the transmission cover. The ends of the bands should be around $^{3}/_{16}$ inch thick. If the band lining is thin, replace the lining as described in the ***Model T Ford Service Manual***. If you re-line the bands, check the band arch, fit to old drum and soak in automatic transmission oil before installing.

Neutral: By now, you know if 'neutral' has a slight drag, which is normal, when cold. In some cases, long storage and some oils may cause the clutch disks to 'seize up', caused by 'congealing' or 'shellac' from the dirty old oil. If this occurs, jack up one rear wheel so a 'neutral' will be available for easy start up.

To test for neutral [before start up] pull the emergency brake lever all the way back [neutral and rear wheel brake]. If it cranks with the starter, neutral is OK. If not, pull the engine through with the hand crank. If no neutral, then try and free up after start up [see 'Start up' later in this text].

Low Band: If neutral is OK, check the pedal adjustments next. Low gear pedal should tighten the band when the low pedal feels firm about two inches before hitting the floorboard.

High Gear: The high gear lever should begin to engage the control shaft lever cam for neutral about midway between all the way down and the vertical position [ten or eleven o'clock].

The rear wheel brakes should not drag with the emergency brake lever in neutral position. Pull the brake lever to vertical position; both rear wheels should have an equal heavy drag [see Rear Axle Drive Shaft and Brake Adjustment].

Transmission Brake: The transmission brake pedal should engage [feel firm] about two inches above the floorboard.

Reverse Band: The reverse band should engage about halfway between full up and the floorboard.

Oil Screen: Install an oil screen [Part #3300 OS] using two gaskets [3379B].

Re-line Bands: If the band pedals do not 'feel right' review the ***Model T Ford Service Manual*** or the ***Transmission Manual [MTFCA]*** for relining and adjustment procedures, before start-up!

STEERING AND FRONT AXLE

Steering: Start with the steering gear. Remove the steering wheel and steering gear cover. Pack with moly chassis lube or wheel bearing grease. Lube steering collar bracket [lower part] with grease in the cup.

Check the steering quadrant for a slot in the upper part. This is the 'steering stop'. The steering shaft stop pin must be engaged in the slot.

I believe this benefit was installed beginning around October 1921. Older 'Ts' did not have this pin; and the steering would go 'over center' on a sharp turn. This slot is critical in preventing accidents. Review Paragraph 747 – 771 in the ***Model T Ford Service Manual*** for correct assembly procedures!

Obtain a 21, or later, steering column. The internal gear case has the slot. It is interchangeable with the earlier gear cases. Purchase the steering gear pinion pin set [3518BS]. Make sure this pin set has one longer pin. Assemble steering as referenced above.

Check the pitman arm on the steering shaft. Many times this nut and arm are loose on the steering shaft. Check woodruff key for slop. Oil threads. Tighten the castellated nut to around 75 lb. ft. torque. Re-install the cotter pin.

Drag Link: Test the drag link ball caps for looseness by turning the steering wheel to check for free play [wheels on ground]. Put your finger between the cap and the steering arm. If there is any 'slop' [more than one-thirty second ($^1/_{32}$) inch], remove cap and grind flat face. Re-install the cap and re-check for zero clearance and no binding. If OK, disassemble, grease with moly lube, tighten bolts and jamb nuts. Insert cotter pins. Test for binding (lock to lock) with wheels off the ground.

You can also obtain a copper penny and make a shim to take up excess slop. Place the penny in a socket, punch the penny to form a cup. Install in drag link ball cap with grease. Tighten bolts to smash penny. Loosen till you can just rotate the drag link. Install jamb nuts and cotter pins. See Photos 10 & 11.

If the drag link binds, loosen bolts slightly, tighten jamb nuts, and insert new cotter pins. Check for binding again. Repeat drag link cap check on the right end.

Tie Rod Link: Check and oil the tie rod ends. If there is slop, replace pins and bushings [See ***Model T Ford Service Manual*** for procedures]. Rebuild kits are available from the 'T' parts supply houses.

Radius Rod Ball Cap: Check the radius rod 'wishbone' ball and cap. If there is side-to-side slop when turning the steering wheel [front wheels on ground], grease wishbone ball cap, tighten and /or replace studs, spring, and nuts. The wishbone ball must be tight in the socket with no side-to-side play.

If the wishbone ball has slop after tightening, use a copper penny to take up the slop. Follow the same process as described for drag link discussed above. See Photos 10 & 11.

If the wishbone ball is left loose, front wheel wobble will occur at slow speeds. This is very unsafe!

Safety-wire both wishbone studs to each other – aircraft-style, as specified in paragraph 696 ***Model T Ford Service Manual***. Do not use cotter pins. The ball joint studs may work loose and unscrew if not safety-wired to each other.

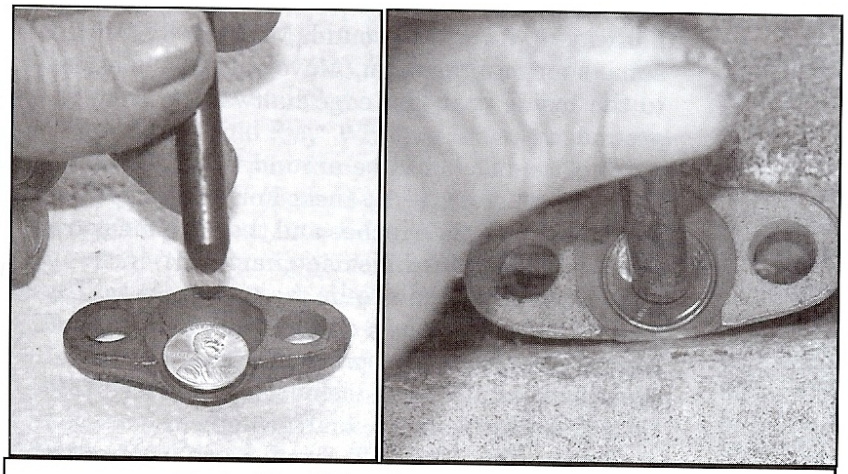


Photo 10 – Shim, Connection [Drag] Link
Place a copper penny in the end ball cap. With a ⅜" blunt round nose punch, pound the penny into a cup shape.

Grease all joint surfaces with moly grease. Insert penny shim, assemble joint, tighten to a bind to form penny.

Adjust bolts and jamb nuts for no bind.

Spring Perches: Make sure the spring perches are installed as specified in paragraph 684 of the ***Model T Ford Service Manual***. The 'raised boss' must be on the backside of the axle centerline [towards the rear] for correct caster.

Oil and tighten the castellated nuts on the front axle spring perches to 100 ft. lbs. Install new cotter pins.

Front Wheel Bearings: Remove and inspect the front wheel bearings and grease seals. Clean the bearings in solvent ['paint thinner', not lacquer thinner]. Blow dry with air and then wash in solvent, again. If rollers are pitted, replace bearings and cups [races].

Grease bearings using heavy duty drum wheel-bearing grease. Install inner wheel bearing and seal. Install wheel on spindle shaft and screw on

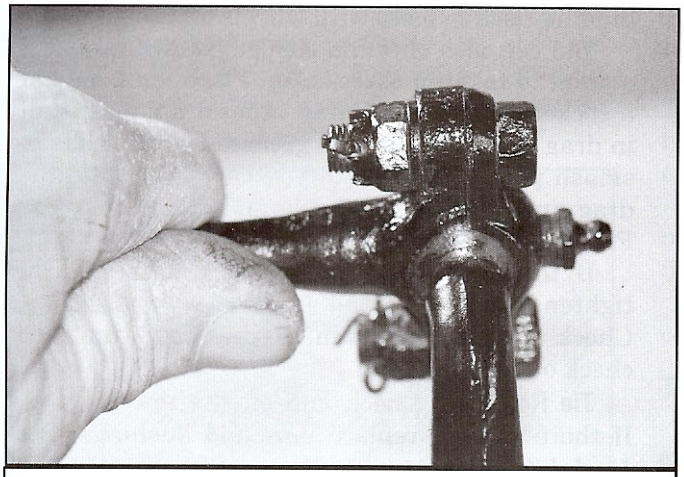


Photo 11– Bind Test Connecting [Drag Link] After greasing and tightening bolts in jamb nuts, test for binding by making sure the joint rotates easily on steering arm ball. Review paragraphs 693 and 694 in the *Model T Ford Service Manual*. Install cotter pins.

outer wheel bearing.

The right spindle axle nut and bearing should be a left-hand [counterclockwise] thread. The left side is a right-hand thread.

Tighten outer bearing thread until snug and back off until light-bearing play exists. Install a washer with convex tab and jamb nut. Tighten jamb nut to line up cotter pin slots. Bearing play should be just snug with out binding. Turn wheel [off ground]. If it stops abruptly, loosen jamb nut, loosen bearing nut one-eighth (⅛) turn, re-tighten jamb nut. If the wheel turns freely, adjustment is OK.

Spindle Bushings: Lastly, test the spindle and kingpin bushings for end [up and down] play and for vertical plane play.

In the vertical plane check [wheels off ground], grab the top and bottom of the tire and wiggle in and out. If the outer rim moves in and out more than one-half inch (½) with tight wood spokes and the wheel bearing is properly adjusted, look at spindle bushings [spoke looseness checks in 'wheels' section]. If in and out movement at spindle [king pin] if sloppy, the spindle pin bushings are very loose and should be replaced.

Next, test the spindle bushing end play [up and down movement in the vertical plane]. The endplay clearance should be zero. Test by placing a tire iron under the tire [wheels off the ground] and move the spindle up and down [end play]. If there is any endplay, remove the cotter pin, loosen the jamb nut, tighten the spindle bolt one-quarter (¼) turn, and re-tighten the jamb nut. Re-test for endplay.

During this procedure, you should remove the spindle bolt to clean the oil cup slot and hole. Most of the time this oil hole is plugged up with 80-year-old dirt!

Re-assemble the spindle and spindle bolt. Oil the caps at the top of spindle bolt with motor oil. If oil drips to ground out of bottom bushing, oil holes are open. Test for spindle bolt endplay, align jamb nut to castellation slot, and install the cotter pin.

The bottom portion of the axle has a thread for the spindle bolt. If it's stripped, tighten jamb nut to take up endplay. Install the cotter pin.

The ***Model T Ford Service Manual*** [paragraph 689] specifies tightening the spindle bolt until 'resistance' to turning exists. Do not over-tighten!

To avoid wheel wobble at low speed, tighten spindle bolt to just zero endplay, as outlined above. If left tight [resistance] steering will be hard and the car will steer you and you will be constantly correcting as you travel down the road.

Alignment, Front Axle: Test for camber, caster, and toe-in ['gather']. Make a 'plumb bob' with a string and a nut tied to one end. Measure the camber by holding the string at the top outer surface of the tire. Move forward until the string clears the hubcap. The horizontal measurement [½ inch camber pitch] must be equal on both wheels, as specified in the ***Model T Ford Service Manual,*** paragraph 153.

Test the caster [pitch] by holding a carpenter square perpendicular to the floor and touching the front surface of bottom spindle/axle area. Measure the distance from the square to upper edge of spindle/axle area. This measurement should be the specified one-quarter (¼) inch on both spindles. [***Model T Ford Service Manual***, paragraph 148].

Measure the 'gather' [toe-in] by holding a tape measure to the inside front rim edge about halfway up from the ground. Measure distance to same spot on other rim. Move the tape measure to the inside rear rim edge halfway up from the ground.

The 'toe-in' should be around three-sixteenths to one-quarter ($^3/_{16}$ – ¼) inch. For example, if the front measures 53½ inches and the back measures 53¾ inches, the toe-in is one-quarter (¼) inch.

Many times, the toe-in measurement will be one-half (½) inch toe-in or up to one-half (½) inch toe-out! Needless to say, the car will wander all over the road if excess toe-out exists, or scuff the tires if excess toe-in exists. Unsafe!

Review the ***Model T Ford Service Manual*** [paragraphs 146-153] for detailed procedures to measure camber, caster, and toe [gather]. The toe is adjustable.

WHEELS

Wheels: In 2003, the wheels and tires with 21-inch demountable split rims may be up to 76 years

old! Wood felloe and clincher rim wheels may be 89 years old! That's old!

If the spokes are loose in any way, consider having them re-spoked by a professional wheelwright advertised in the hobby magazines. Also, new 'clincher' rims [30 x 3½"] and 21" split demountable rims are available. The original rims crack from fatigue. Very unsafe! See Photo 12 and 13.

Tighten the front and rear hub nuts. Re-stake nuts.

The wheel(s) may be slightly out of true in the vertical plane. A one-eighth (⅛) inch out of true or vertical plane wobble is OK; but if greater, consider re-spoking the wheel.

Tires: If the tires are hard and/or cracked, replace the tires, tubes and flaps. The MTFCA has excellent videotapes on installing clincher and demountable split rim-style tires. Use lots of rubber lube and talcum powder!

Do not try shimming, installing wood screws, epoxy, resin, or 'fording the creek' to 'tighten' up the spokes. They may still collapse on a curve!

You have read about wood spoke wheels folding up on curves on tour causing accidents. It's worth the price to your family, friends, relates, in-laws, and outlaws to make safety a top issue! Be safe!

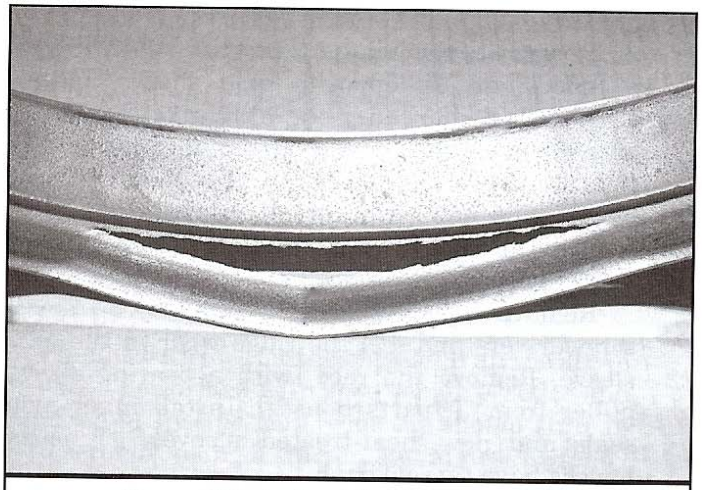
REAR AXLE, DRIVE SHAFT AND BRAKE CHECKS

Drive shaft Front Bushing: Test the drive shaft front bushing by removing the drive shaft top and bottom housing plugs. Insert a small screwdriver and push up. If it pushes up a lot, the front bushing clearance is barely acceptable. The clearance spec for the front bushing is 0.002 - 0.006 inch. If the front drive shaft bushing clearance is over one-sixty fourth ($^1/_{64}$) inch, it's very loose! This measurement excess may indicate other rear axle wear and excess end play.

Drive shaft End Play: With a screwdriver, move the drive shaft pin fore and aft to check drive shaft end play. If there is perceptible fore and aft movement, it's way too loose. Although loose, one can drive the car. Consider re-building the drive shaft assembly. Check the ***Model T Ford Service Manual*** for overhaul procedures.

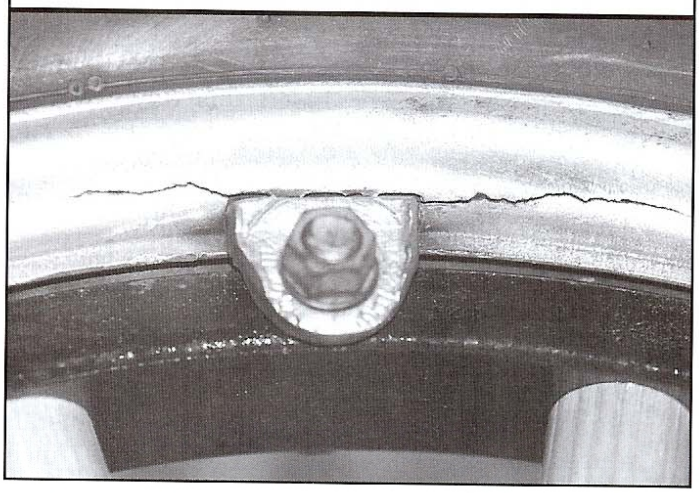
The drive shaft bushing front flange clearance controls the differential ring and pinion gear lash. If allowed to get way loose, ring gear damage and whine results.

Drive shaft U-joint Pin: If the drive shaft/U-joint pin is loose, support the bottom of pin with a three-eighths (⅜) punch and blocks [hardwood on cement] to the floor. Peen the top of pin with a one-quarter (¼) inch punch and a two-pound hammer. Turn drive shaft 180°, and peen the other end. The pin is quite soft.



Above: Photo 12– Rim Crack, Fatigue
Note the fatigue crack 'pooched out'. The tire was ready to blow during a tour! Replace!

Below: Photo 13– Rim Lug Nut Cracks
Cracks are also evident around rim lug bolts. Check carefully. **I would not weld these cracks. For safety, replace cracked rims.**



Drive shaft Lubrication: Grease the drive shaft bushing cup with moly grease, and turn it in one-half (½) turn for every trip. The front drive shaft bushing without grease is a 'high wear' item on a 'T'!

U-Joint Lubrication: Fill the u-joint grease cup five times and screw it all the way in.

Rear Axle Bearings and Seals: Test the rear axle outer bearings up and down play with the wheels off the ground. Use axle stands. Any play up and down up to 0.005 inch is OK. NOTE: 0.005" is barely perceptible up and down play. Test the axle bearings with a tire iron on the bottom side of the tire using the iron as a lever. Lift it up and down. If there is lots of up and down movement between the brake backing plat and the brake drum edge, it's loose! The wear is usually in the bearing axle sleeve upper outside edge [Part #2509].

Many times, there is over one-sixty fourth ($^1/_{64}$) inch up and down play! That's 0.015 inch!

To remove wheel hubs, jack up one side. Install a 'knock-out' on opposite axle shaft. Tighten knock-out. Strike heavy blows on end of knock-out with a three-pound 'sledge' hammer. If it is really tight, re-check the knock-out. If, after five hard blows, it is not loose, install a 'wheel puller' to remove the hub. Most wheel hubs fall off or come loose with a couple of firm blows.

Remove the bearing with two small screwdrivers and feel the ridge wear in the axle sleeve. Remove the race [with a bearing sleeve puller from 'T' parts houses]. Install inner axle seals and new 'heat-treated' sleeves. ['T' parts houses have these parts].

Measure the rear axle roller bearing diameter with a micrometer. The standard diameter size of the roller bearing is 0.500 inch. If it measures 0.495 or more, it's OK. If it less than 0.495 inch, replace the bearing.

I personally prefer a bearing 0.002 to 0.003 inch under 0.500 inch.

The looser it is, the faster the car will go up to an acceptable wear limit of 0.005 inch!

While the bearing is out, check the axle endplay. If over one-thirty second ($^1/_{32}$) inch [0.031"], it's excessive. If left this way, the axle may shift in and out causing the drum to rub the brake lining edges. It may squeal! Check the ***Model T Ford Service Manual*** for correct set up when re-building the rear axle assembly.

Many times, the inside diameter of the axle housing in the bearing sleeve area varies enough to cause the bearing sleeve inside diameter to change excessively. In some cases, a new bearing with a 0.500 roller diameter must be 'hammered' in to fit. In this case, it is much easier to install a used, undersized bearing of 0.495 – 0.497 inch roller diameter.

After installing a new sleeve, try different roller bearings, without grease, until one will slide in and out using a wire hook. Select one until you can barely feel bearing up-down play. Then remove the sleeve, install the inner seal, re-install the sleeve. Grease the bearing as described below.

Install inner Neoprene grease seals [Part #2511AS] with the seal lip pointing inward.

Smear a light coat of RTV gasket maker [orange stuff] around seal inner surface edge. Install an axle shim over axle taper surface. Grease seal and axle surface. Slide seal into the axle tube and seat on axle tube end.

The shim will prevent cutting the seal lip. The gasket maker will seal the outer edge and prevent possible turning in the tube after curing.

Install the bearing sleeves [there is a left and right sleeve; grease holes must line up!].

Grease the rear axle bearing with heavy-duty wheel bearing grease. Install bearings. Slide the bearings in turning the cage back and forth. With old bearings, they will slip in easily.

With new, reproduction bearings, a light tap with a hammer is OK. If you cannot push the bearing in by hand, I recommend worn, used axle bearings.

When all the way in, the bearings should rotate easily, because the axle is usually worn from 0.003 to 0.005 inch on the bearing surface area.

If in doubt about the above, review the ***Model T Ford Service Manual*** for overhaul procedures.

Brake Checks: Check the brake shoe lining. The small 9-inch brakes with lining is inadequate for hill country, but may be OK for flat country [a personal opinion]. You may want to consider 'rocky mountain' brakes.

The 11-inch brakes [1926-27] are much better and adequate for mountain driving. 'Fade' may still be a problem.

In 1997, I had my 11-inch brakes relined with a 'molded Kevlar' lining used in industrial brake applications. The brand name is Redco Heavy Duty Woven Lining. This lining will withstand higher temperatures before fade than Model T brake lining. If it fades, the brakes will recover faster upon cooling. The Redco lining is not the transmission 'woven Kevlar' stuff.

After 100 miles, the brakes seated and stopping power is superb, compared to standard available lining, with minimum fade.

In either case, have the lining professionally drilled and riveted with brake machinery. Don't skimp and do it 'by hand'! It will work loose! There goes your safety factor!

Oil brake arm cam lever bushings. Put a thin film of moly grease on the brake cam surface [top and bottom]. Install lining.

Hubs-Drums: Tighten and re-stake the hub nuts.

Prepare rear axles. Remove axle burrs and shine taper surfaces with 80 grit-type sand paper. Peen the outer end of the axle keyway. Insert the axle key by tapping into the burr. You don't want this to move when installing the wheel hub. Clean axle threads with a five-eights (⅝) x 18 [National Fine] die. Tap nut to clean thread. See Photo 14.

Oil axle surface, axle thread, and nut for a better torque.

Slip on hub drum. Rotate wheel. If you hear a metal scraping, it may be the brake lining edge rubbing the drum. Remove hub and install an axle shim [Part #2505 SH] coated with oil. Re-check for scraping sound. See Photo 14.

The oiled axle shaft surfaces will provide a better seating of the hub on the axle. Install a thin, flat washer and the nut. Snug lightly [for now]. Re-install brake rods, oil clevis pins, and install cotter pins.

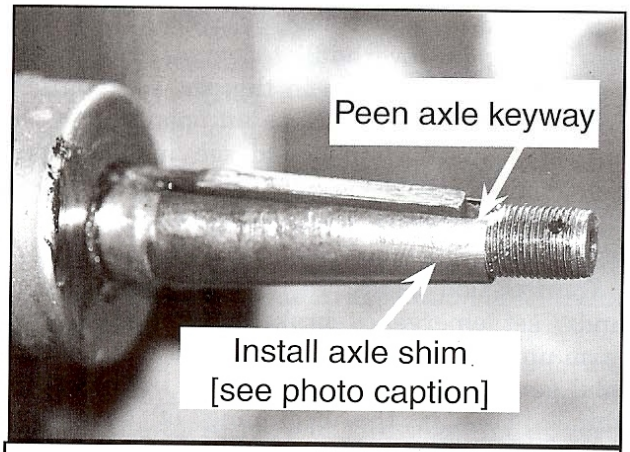


Photo 14– Axle Key Installation
Peen the axle keyway at the outer end of slot. Tap axle key into slot. This prevents key movement inward on axle as you install hub-wheel.

If the key is allowed to slide inward, outer grease seal will fail.

Axle shims are useful for moving a drum outward slightly to avoid brake edges rubbing drum and squealing.

Also, a shim will help to seat a badly worn axle shaft taper surface.

Clean axle and nut threads with die and tap [x 18 NF].

Oil axle threads shaft lightly. Torque axle nut to 75-ft. lbs. Torque axle nut to next castellation slot. Install cotter pin.

Brake Adjustment: Adjust the brakes for equal drag. Pull the emergency brake handle to the vertical position. Test for equal drag on both wheels.

Move brake lever to neutral with no brake. Test for free-wheeling at rear wheels. The trick is to have the wheels free in neutral with little or no brake drag, then pull lever to vertical. The wheels should have a heavy equal drag to almost locked up with brake lever in the vertical position.

Make sure the emergency brake lever and locking pawl doesn't slip. If it does, replace it [pawl].

In my experience, the rear brakes are, quite often, adjusted too tight. If too tight, the emergency brake applies the instant you pull the high gear lever into the neutral position.

As new brake lining high spots wear in, re-adjust rear brakes for equal drag as outlined above.

Tighten brake rod clevis jam nuts and install cotter pins in clevis pins.

Rear Axle Nut Torque: Torque the axle nuts to 75-foot pounds, align the cotter pin slots towards the next castellation slot, and install the cotter pin.

Differential Gear Oil: Fill the differential case to bottom edge of fill plughole with 85-140 wt. gear oil.

If it is 'foamy', suck out old gear oil; install 85-140 wt. gear oil.

START UP

Pre-Checks: Now, for the big test! If all the above has been performed with good repair practice and adjusted to specification, your car should start in 5-10 seconds, using a starter, and almost be ready to drive on tour! The order of start up and drive events are as follows:

Pre-set mixture, engine off
Crank and start on 'bat' ignition
Adjust fuel mixture and spark advance
Test for rod knocks
Test magneto
Test transmission band adjustment
Drive car, test shifting
Drive car, test brakes
Drive car, test for 'wobble'
Test for overheating
Drive car on tour!

Adjust Mixture: Turn on the gas and adjust mixture rod to one and a half [1½] turns open from seated position. Hook up battery.

NOTE: In my experience, the mixture will be correct with the mixture rod open around one (1) turn from the seated position at one-half (½) throttle. Idle mixture setting for a long idle usually requires about one-quarter (¼) turn more rich [counter-clockwise] than at one-half (½) throttle in neutral.

Starter, Crank to Start: With gas at half throttle and spark in the full-retarded position, crank the engine for five seconds. During crank, choke for up to two seconds.

Hand Crank: On hand crank models, open the throttle halfway and retard spark. With ignition off, pull crank through two times with full choke. Release choke.

Turn on ignition, leave spark retarded, and crank to start.

Note: On cars without a starter, you [an experienced 'T' driver] may have to push it to start. I recommend you have three helpers hand push your car. This is safe!

If it don't start, re-check all tune-up, then have five helpers push.

Engage high gear, let out clutch [foot off clutch-low pedal]. After start-up, pull hand brake lever to neutral and then stop car with brake pedal.

After Start-up: Upon start up, be prepared to choke slightly as the engine begins to rev up. If it's 'sputtering', open choke [no choke] to let it rev up

more. Advance spark to half way on 'Ts' equipped with four coils and timer. To lean the mixture, turn mixture knob clockwise until the engine 'smoothes out'.

Return to idle slowly. Adjust idle throttle screw and mixture rod to maintain good idle smoothness.

If adjustment is a lot different than this on an NH carburetor, something may be wrong with the carburetor or float. Review the ***Model T Ford Service Manual*** or the ***Carburetor Manual*** published by the MTFCA.

If you cannot get your engine to run good with the old carburetor or stop it from flooding, consider a professionally re-built or new 'NH' carburetor, usually available from your 'T' parts supplier. NH, in my experience is best for touring with the least amount of problems.

Test For Rod Knocks: During warm up, rev engine to around 1200 rpm. Leave it at a steady rpm. Listen for knock(s).

Short [with a screwdriver], one spark plug at a time. That cylinder will drop in rpm. Simultaneously, listen for knock while the plug is shorted. If the knock goes away while shorting out the cylinder, the rod is loose.

Perform the same test on the remaining cylinders.

After a long warm up, perform the same rod knock test, again. If it still knocks, the rod(s) is/(are) very loose.

In addition, test for center main bearing knock by holding rpm at one-third (⅓) throttle and spark advanced halfway. Short number two and three spark plug simultaneously. If the knock goes away, adjust the center main after you adjust the rods.

If you have any doubt about adjusting the rod bearings, review the ***MTFCA Engine Manual*** for testing and adjustment procedures.

Test magneto: After the engine is running smooth on the battery ignition, turn the key switch to 'mag'. The rpm should increase slightly due to more voltage to the primary circuit in the coil box.

If the rpm drops off slightly when switching from 'batt' to 'mag' or if the engine dies, disconnect the magneto output wire. Re-start the engine using the battery ignition. Measure the a.c. [alternating current] voltage at the magneto post. It should be around six to 10 volts a.c. at idle and increase up to over 25 volts a.c. with the engine revved up. Use a needle-type [analog] voltmeter.

Re-check the coils for correct current draw and spark on a bench-type magneto/coil tester.

Clean the magneto outlet, check the fibre insulation, and the contact spring tension. Replace all these external parts if there is any doubt. Then conduct running tests, again.

If the 'old mag' just ain't puttin' out, the next step is magneto overhaul! I do not recommend re-charging the magnets in the car. You can bet the mag field coils may have an open circuit, or short to ground caused by old age and/or failing magneto field insulation.

A good alternative solution for a failing mag is a distributor!

Transmission Bands: To test the transmission bands, set emergency brake and start engine. Warm up. With emergency brake set, push in low pedal gently. Listen for a changing transmission 'whine'. This is the beginning of low band engagement. This point should be around one – two inches up from the floorboard surface.

Next, push in reverse pedal with emergency brake set. The pedal should travel about half-way to the floorboard surface. At this point, you should hear a minor whine as the reverse band begins to engage.

With new, or old transmission bands, start with the above suggested adjustments.

The real test is on the road. The adjustments may seem on the 'loose' side to you. However, the loose adjustments will minimize premature failure due to excessive drag. Review the ***MTFCA Transmission Manual*** for adjustment procedures.

If the bands are too tight, they will already be partially engaged. They may work against each other, and the transmission may sound like it's binding up. Further, the bands may burn and fail prematurely due to lack of oil [cooling].

Clutch disks: Sometimes the clutch disks will not allow a neutral.

First, make sure the high gear lever bolt and cam to rotates the clutch arm up one-quarter (¼) inch. This is the clutch release position.

Neutral Check: Block front wheels. To test for neutral while running with one wheel jacked up, pull brake lever back slowly to neutral. Note rpm change, if any. Then continue to pull increasing brake drag. Engine rpm should not change. If no change in rpm, transmission neutral is OK. NOTE: A slight rpm decrease is OK during this check.

If engine slows down, a lot, during this maneuver, the clutch disks are hung up and/or the oil may be congealed on the disks' surfaces. Try this high gear—emergency brake on/off procedure for 10 minutes.

If it [neutral] still does not work, change crankcase oil again. Repeat above steps. If it still hangs up, remove, disassemble engine and transmission to repair clutch. Do not use engine flush or additives.

READY FOR ROAD TEST

Initial Drive Tests: Now the big plunge! You're ready for the road!

If you are not experienced, ask an experienced friend who regularly drives 'Ts' on tours to drive your car the first time.

Reverse Gear: Slowly, slowly, engage reverse pedal gently and back out of the driveway. Leave emergency brake in neutral position to hold clutch pedal in place, while backing up.

Low Gear: Push in low pedal to move forward. Leave emergency brake lever in neutral. Accelerate to 10 mph in low, then, let up on the throttle and low pedal.

Let the car coast. Then apply the foot brake pedal, gently. No chatter during stop?

High Gear Test: Next accelerate to 10 mph in low. With your foot still on low pedal set the brake lever into high gear position [all the way down]. At 10 mph, let throttle off slightly and simultaneously let clutch [high gear] engage by slowly letting up low pedal.

Note how smooth the shift is! If it chatters, the clutch disks may still be 'hanging up' on the inside of the transmission brake drum guides.

If the clutch slips in high gear during acceleration, tighten the clutch adjusting screws one-half turn inward [clockwise]. Install cotter pin.

Change Oil Again: After 50 miles or so, change the crankcase oil, again. When bringing your car out of mothballs, the old syrupy oil could cause the hang-up and rough shift. New oil may minimize the rough shift, and/or clutch slippage may be reduced.

Again, do not add engine flush or oil additives. If neutral does not work with correct adjustment, you know what comes next!

Emergency Brake: This test applies to '26-'27 T brakes [11-inch], or 'rocky mountain' brakes. You may also apply this test to early style brakes [9-inch].

Apply the emergency brake gently, noting pull. At 30 mph in high gear, let up on throttle and pull emergency brake to lock the rear wheels [panic stop]. Be prepared for a pull to right or left.

If it pulls to right ['26-'27 T-style], adjust the left clevis pin one turn tighter and re-install clevis pin and the cotter pin. Try panic stop again. If you cannot get equal pull, re-line emergency brakes as discussed in the BRAKE section.

Rocky Mountain Brakes: If they don't work, disconnect brake rods. Center and adjust band to $^{1}/_{32}$ inch clearance all around the drum circumference. Adjust the brake rod length to fit pedal actuating arm. Check emergency brake activation. Ensure the pedal does not prematurely apply the transmission brake. Both rear wheels must rotate only with a very slight drag with high gear emergency brake lever in neutral. Refer to rocky mountain brake suppliers for adjustment procedures.

Front End Test: Test for 'Wabble':

Proceed over chuckholes slowly [5 mph]. If a heavy shaking develops, re-check front-end looseness and alignment checks, as outlined in the 'Front Axle' section.

A 'snubber' shock on the steering linkage is unnecessary. They only hide looseness and alignment problems.

Radiator: Test the radiator. If it boils on a cool day during these pre-tour tests, try some radiator flush. If it still boils, consider a 'flat tube' radiator re-core or a new reproduction radiator.

If the tubes are rusted on the top end, or it boils within five minutes after every start-up, remove radiator and have it professionally re-cored, or purchase a reproduction 'flat tube' radiator.

In a good Model T radiator system, water pumps are unnecessary, even on hot days!

If you try to figure out 'why' it's a boilin', the reason is – it's 75 years old or older [2002]! Fix it right, [new core, flat tube], and your touring may be free of overheating!

Coolant: In mild weather [above 32°F], I prefer to use water plus one cup of soluble oil [NAPA parts houses].

The soluble oil promotes 'wetting' of internal tubes and improves heat transfer to the fins. How do I know? I use less coolant on long trips with this mixture than using 50% water and anti-freeze coolant. Soluble oil will also reduce corrosion.

In colder climates anti-freeze is necessary!

Professional radiator personnel report two major reasons for cooling failures: [1] Rust and plugging of tubes; [2] the mechanical bond between the fins and tubes [usually solder] breaks. Effective heat transfer is lost and the radiator boils over. Remember, these radiators may be up to 75 years or older.

Both my 'Ts' go 100 miles using one quart of coolant on a 100°F day at 50 mph! They are equipped with modern-style flat tube cores without water pumps.

If your car boils over with a new radiator, re-check the tune-up. Then, you know what's next [a stripped block in the 'hot-tank' at the machine shop]!

READY FOR TOUR

If all the above works as outlined above, you're now ready for a durable tour.

Before every tour:

- Fill radiator up to two inches from full
- Check oil drip out of top petcock
- Clean timer

- Fill tank with gas
- Turn front drive shaft bushing grease cup one turn.
- Lube, lube, lube, lube! Oil & and grease cups!
- Start, warm up, and go on tour!

Spare Parts: Review Table 1 for touring spare parts. This list will help keep your car off the trouble trailer.

The further you are away from home, and/or there is no trouble truck on tour, you decide what you need to carry in spare parts.

Tools: Based on the parts you need for tour, select the tools to install, replace and/or adjust each system.

Enjoy! Are we having fun yet? You bet!

REFERENCES

Model T Ford Service Manual: Available through Model T parts houses.

Model T Ford Club of America [MTFCA] Repair Manuals and Videotapes advertised in the ***Vintage Ford*** magazine: http://www.mtfca.com

MILT THE INSTRUCTOR

Milton Webb is a long time member of the Model T Ford Club of America and has submitted numerous technical articles that have been published in the *Vintage Ford*. Milt has also been a contributor the *Restorer* (Model A Restorer's Club) and *Skinned Knuckles*.

Milt has been repairing cars of all years and makes for nearly 59 years, ever since his father started him at age 10 scraping carbon from cylinder heads and cleaning sludge from oil pans.

He continued repairing cars through high school, the army and college. He earned a BSME in Mechanical Engineering. He was an Automotive Test Engineer, instructed technicians on tune-up and smog controls, and prepared technicians for licensing. He has also taught technicians on diagnosing and repairing computer controlled and fuel injection cars.

His restoration of his 1925 Model T coupe was documented in this magazine, along with several other articles. He received the MTFCA's Ted Aschman Award for the best technical article in 2001.

Milt volunteers at the Towe Auto Museum in Sacramento.

An accomplished author, Milt has published a comprehensive book on diagnosing problems and tuning up modern cars and trucks. If you need some help with your modern car, you might want to contact him and get his book.

PUBLICATIONS AVAILABLE

THE MODEL T ENGINE

A 54-page manual providing helpful information for the enthusiast when rebuilding, repairing, and maintaining the Model T engine.

THE MODEL T TRANSMISSION

A 50-page manual detailing the rebuilding, adjustment, and care of the Model T planetary transmission.

THE ELECTRICAL SYSTEM

A 48-page manual covering all phases of the ModelT Ford electrical system: generator, starter, magneto, coils, wiring, etc. The most comprehensive guide available.

THE FORD CARBURETOR

A 50-page manual covering the repairs, adjustment, and evolution of the carburetors supplied by the factory on the Model T Ford. This manual also includes information on some of the more popular aftermarket carburetors.

THE RUCKSTELL AXLE

Updated 2002. Completely rewritten, including new pictures and diagrams and now includes a section on truck Ruckstells. 61 pages.

SPEEDOMETERS

A 64-page manual identifying the speedometer and components installed by Ford on Model Ts at the factory up until 1915 and after-market units available for Ford owners through 1927. The manual also offers sections on repairing, restoring, and installing the speedometer.

COST INFORMATION

The cost of each manual is $8.00, plus postage and handling.

When ordered singly, the cost of postage and handling is $1.80. Cost of postage and handling for orders up to three manuals in one shipment is $3.95. The cost of postage and handling for four to six manuals is $5.40.

Postage to Canada is $2.50 per manual (mailed as printed matter).

Foreign surface mail is $3.00 per copy. Air mail to Europe is $4.50 per copy; to Australia and New Zealand, $5.50 per copy.

Order from:

The Model T Ford Club of America
P.O. Box 126
Centerville, IN 47330-0126

TABLE 1

MODEL T FORD PARTS LIST

Items That Might Be Needed While Touring

by Milt Webb
8737 Lodestone Cir., Elk Grove, CA 95624
916.685.4527 [phone & fax]
e-mail: miltinstr@pacbell.net

Engine System

3002S	Motor Gasket Set
3024	Connecting Rod, bolts, nuts [specify]
3052SS	Valve, Stainless Steel [specify]
3021	Piston [specify type and size]
3022	Wrist pin
3023	Rings [aluminum pistons, specify]
3047	Large timing gear [specify] AL, BR, FIBRE
3030	Crankshaft [specify undersize and balanced]
3019	Freeze plugs [3]
3060	Exhaust manifold
3061	Exhaust pack nut
3063/64	Manifold gasket set [glands and copper rings]
3056	Valve spring seat retainer, [specify 2]
3057	Spring seat pin [specify 2]
3054	Valve spring [2]
3081	Magneto contact oil line kit [specify]
3012C	Crankshaft front seal set, rope
3003	Head bolts [specify 2]
3050B	Cam gear lock nut
3177B	Timer seal [modern neoprene]

Starter System

5099	Starter motor re-built
5018	Bendix assembly, complete
5022	Bendix spring [2]
5023/25	Bendix drive screw and washer set
5104S	Starter brush set
5014	Starter switch
	Solenoid [if equipped, '48 Ford-type]
5106B	Starter shaft bearing & spacer
5105	Starter shaft bushing, rear [drive end]
5105S	Starter shaft seal, neoprene

Generator System

5119	Generator and gear [6-volt]
5125S	Generator brushes [set]
5055	Generator cutout
5133	Generator terminal, outer insulator
5121	Generator sealed bearing, rear
5122	Generator sealed bearing, front
5141B	Generator third brush holder adjustment screw
5131B	Generator brush holder, small
5131A	Generator brush holder, large
5132I	Generator brush holder insulator [pair]

Ignition System / timer, Magneto-type

3221	Timer [roller or brush, specify]
3207	Timer brush pin
3206	Timer brush washer
5007	Coil [specify]
5008	Coil points [specify]
5201	Spark plugs [Champion X, Motorcraft F- 11, Champion A-25] and plug wires

Ignition System / Distributor

	Distributor [specify]
	Points [specify]
	Condenser [specify]
	Dropping resistor [12-volt]
	Coil [6- or 12-volt]
	Spark plugs and plug wires [listed above]
	Distributor cap and rotor [specify]

Fuel System

6200	Carburetor re-built [specify]
6212	Needle and seat [specify]
6200	Gaskets [specify]
6201	Float [specify]
	Fuel pump, electric [specify]
	Pressure regulator [Filt-o-Reg]
2902	Sediment bulb [specify]
	Fuel Line [tubing size, rubber fuel line, fittings, clamps -specify]
6273	Heating plate [Holley, 1926-27 type]

Transmission System

3413	Transmission band set [specify]
3416	Band lining set [specify]
3425S	Band spring, nut and washer set
3369	Ball cap [4th main, specify]

Drive shaft Assembly

2595B	Drive shaft
2596	Pinion bearing sleeve
2595	Pinion sleeve housing
2587	Pinion bearing [roller]
2591/91B	Thrust bearing set
2598B	DS pinion key
2598	DS castle nut
2574	U Joint pin [2]
2581	Front drive shaft bushing

NOTE: 'Specify' means you tailor the Ford parts number and or size [over or under] to fit your year model or modifications [aftermarket versus original].