

FORD: 1982-95 CROWN VICTORIA, ESCORT, MUSTANG, THUNDERBIRD
1984-94 TEMPO
1986-95 TAURUS
1988-93 FESTIVA
1989-95 PROBE
1994-95 ASPIRE
1995 CONTOUR

LINCOLN-MERCURY: 1982-86 CAPRI
1982-87 LYNX
1982-95 CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR
1984-92 MARK VII
1984-94 TOPAZ
1986-95 SABLE
1987-89 TRACER
1991-94 CAPRI
1991-95 TRACER
1993-95 MARK VIII
1995 MYSTIQUE

MERKUR: 1985-88 XR4TI
1988-89 SCORPIO

ISSUE: Early replacement of the brake components, rotors and pads due to brake roughness concern, is lowering customer's view of quality. The cause of brake roughness is due to small changes in braking torque when the brake is applied. The following are the major reasons for the brake torque variation:

- Runout of disc rotor
- Rusted rotor surface
- Warped rotor due to improper wheel lug nut tightening (torque too high or uneven)
- Varied rotor thickness around the disk
- Transferred patches of lining material on the rotor surface
- Uneven tire wear and balance

ACTION: Diagnose brake roughness by referring to the following procedure for service details.

SERVICE PROCEDURE/DIAGNOSIS STEPS

NOTE: BEGIN WITH STEP 1 AND FINISH WITH STEP 6.

1. Check the Condition of Tires and Their Balance

Sometimes the brake roughness concern is not brake roughness at all. In fact, some complaints are due to the out-of-round and out-of-balance tires or broken steel cord (for steel belted radial tires) in the tires. The effects of these problems show up at all conditions of driving, but may seem worse when braking. That fact can be used to correctly determine that the customer is not experiencing brake-caused roughness. If however, there is brake roughness in addition to tire problems, then both problems must be repaired. If the inspection shows that tires are contributing to roughness (vibration or roughness present in all driving conditions, not just braking) they should first be balanced and rotated using normal maintenance procedures then follow the steps below to correct the brake roughness.

2. Check the Wheel Lug Nut Tightening Torque

Uneven and/or out of specification torque on the wheel lug nuts will cause the brake rotors to warp. Up to 0.005 inch rotor runout can occur due to improper lug nut tightening. The first thing to check for is the consistency of torque of the lug nuts on each wheel. If the torque readings are not within 20% of each other, that gives an indication of a cause of the concern of brake roughness.

Improper lug nut tightening can have the following order of effects:

1. Rotor runout
2. Rotor thickness variation
3. Brake torque variation
4. Brake roughness

Ultimately, the rotor may be damaged and must be resurfaced. Follow the procedure in the Service Manual for resurfacing the rotors. Proper torque must be used when a resurfaced or new rotor is installed. Use of a torque wrench is again stressed, or as an alternative, the Rotunda "ACCUTORQ" 164-R0314 or equivalent must be used. When installing a new rotor, do not machine the rotor on a bench lathe. Any surface contamination can be removed with grease solvents or with very light hand sanding. Refer to #3, CHECK FOR RUST/CONTAMINATION...

3. Check for Rust/Contamination on Mounting Surfaces

Surface rust or contaminations on the wheel-to-rotor and rotor-to-hub flange surfaces should be cleaned with very light hand sanding. Use garnet paper 100A or aluminum oxide 150J grit. **DO NOT USE HARSH, ABRASIVE TOOLS.** If the cleaning is not done, it will contribute to the runout of the rotor when assembled, which will cause brake roughness later on.

Any removal of rust on the rotor braking surfaces using harsh abrasive tools is not approved by Ford. The on-car turning procedure is the only sanctioned method at this time to deal with repairing rusty rotors. Since the thickness of the rotors are manufactured to less than 0.0004 inch tolerance, using hand held tools on the rotor surfaces can not guarantee maintaining the tolerance. Concerns will occur of brake roughness with rotor thickness variation of 0.0008 inch or less on certain very sensitive vehicles.

4. Check for Runout of the Front Rotor on the Car and Front Hub Mount

Runout of the rotor mounted on car should not exceed 0.003 inch. With the wheel off, fasten the lug nuts back on to hold the rotor onto the hub. The fastening torque should not exceed 81 N-m (60 lb-ft) and should be even. With the dial indicator attached to the spindle, slowly rotate the rotor to get the total indicated runout. This value should not exceed the Total Indicated Runout (TIR) as specified in the appropriate Service Manual. If it exceeds specification, first index the rotor one (1) wheel stud at a time. If the readings still exceed 0.003 inch, then the hub face runout should be checked. Repeat the runout check procedure on the hub face. If the runout exceeds 0.002 inch, the hub must be replaced, otherwise the rotor must be resurfaced on the vehicle or replaced.

5. Check for Rear Brake Roughness

Except for the vehicles with separate drum in disc parking brake (e.g., Crown Victoria, Grand Marquis and Town Car) the rear brake can be actuated by actuating the parking brake. Attempt to slow down the vehicle from 48 km/h (30 mph) with the transmission in neutral using the parking brake. If roughness is present, then the rear brakes need to be serviced. If roughness is not present, then front brakes need servicing. To service the rear brakes follow the procedure above for servicing the front brakes.

BRAKES—ROUGHNESS CONCERN DURING BRAKE APPLICATION

**Article No.
95-6-2
Cont'd.**

6. Check for Proper Caliper Operation

Inspect the calipers for leaks and brake fluid contamination. Any leaks from the wheel cylinders and seals must be repaired per the Service Manual. Also, inspect for glazing of the brake pads which may indicate a seized caliper piston, frequent severe or unintentional brake dragging by the customer. Repair as specified in the Service Manual.

OTHER APPLICABLE ARTICLES: 92-12-4, 92-19-2,
92-4-3, 93-16-2,
93-26-2, 93-6-3,
94-25-1, 94-25-2,
95-6-4

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 301000