TIRES/WHEELS

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TIRES/WHEELS

DIAGNOSIS AND TESTING - TIRE AND WHEEL VIBRATION

Tire and wheel imbalance, runout and force variation can cause vehicles to exhibit steering wheel vibration.

VISUAL INSPECTION

Visual inspection of the vehicle is recommended prior to road testing or performing any other procedure. Raise vehicle on a suitable hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

Inspect for the following:

- Verify correct (OEM) wheel and tire, as well as correct wheel weights. Aluminum wheels require

unique wheel weights. They are designed to fit the contour of the wheel (Fig. 1).

- Inspect tires and wheels for damage, mud packing and unusual wear; correct as necessary.
- Check and adjust tire air pressure to the pressure listed on the label attached to the rear face of the driver's door.

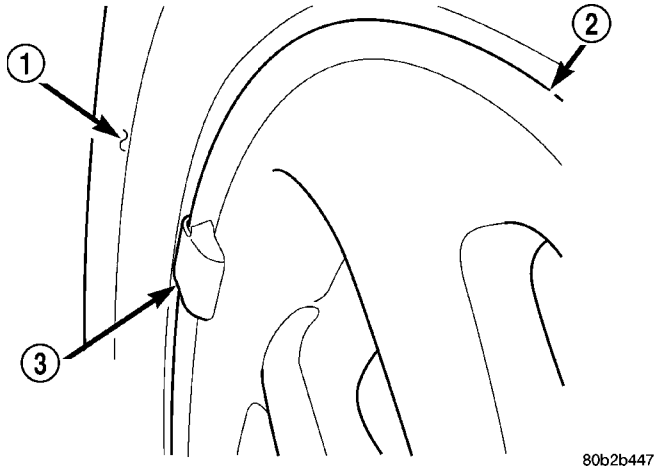


Fig. 1 Aluminum Wheel Weight

1 - TIRE
2 - WHEEL
3 - WHEEL WEIGHT

ROAD TEST

Road test vehicle on a smooth road for a least five miles to warm tires (remove any flat spots). Lightly place hands on steering wheel at the 10:00 and 2:00 positions while slowly sweeping up and down from 90 to 110 km/h (55 to 70 mph) where legal speed limits allow.

Observe the steering wheel for:

- Visual Nibble (oscillation: clockwise/counterclockwise, usually due to tire imbalance)
- Visual Buzziness (high frequency, rapid vibration up and down)

To rule out vibrations due to brakes or powertrain:

- Lightly apply brakes at speed; if vibration occurs or is enhanced, vibration is likely due to causes other than tire and wheel assemblies.
- Shift transmission into neutral while vibration is occurring; if vibration is eliminated, vibration is likely due to causes other than tire and wheel assemblies.

For brake vibrations, (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

For powertrain vibrations, (Refer to 3 - DIFFERENTIAL & DRIVELINE - DIAGNOSIS AND TESTING).

For tire and wheel assembly vibrations, continue with this diagnosis and testing procedure.

TIRE AND WHEEL BALANCE

(1) Balance the tire and wheel assemblies as necessary following the wheel balancer manufacturer's instructions and using the information listed in Standard Procedure - Tire And Wheel Balance. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)

(2) Road test the vehicle for at least 5 miles, following the format described in Road Test.

(3) If the vibration persists, continue with this diagnosis and testing procedure.

TIRE AND WHEEL RUNOUT/MATCH MOUNTING

(1) **System Radial Runout.** This on-the-vehicle system check will measure the radial runout including the hub, wheel and tire.

(a) Raise vehicle so tires clear floor. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(b) Apply masking tape around the circumference of the tire in the locations to be measured (Fig. 2). Do not overlap the tape.

(c) Check system runout using Dial Indicator Set, Special Tool C-3339A with 25-W wheel, or equivalent. Place the end of the indicator against each taped area (one at a time) (Fig. 2) and rotate the tire and wheel. System radial runout should not exceed 0.76 mm (0.030 inch) with no tread “dips” or “steps.” Tread “dips” and “steps” can be identified by spikes of the dial indicator gauge.

- Tread ″dips″; Rapid decrease then increase in dial indicator reading over 101.6 mm (4.0 inch) of tread circumference.
- Tread ″steps″; Rapid decrease or increase in dial indicator reading over 101.6 mm (4.0 inch) of tread circumference.

(d) If system runout is excessive, re-index the tire and wheel assembly on the hub. Remove assembly from vehicle and install it back on the hub two studs over from original mounting position. If re-indexing the tire and wheel assembly corrects or reduces system runout, check hub runout and repair as necessary (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

(e) If system runout is still excessive, continue with this diagnosis and testing procedure.

(2) **Tire and Wheel Assembly Radial Runout.** This radial runout check is performed with the tire and wheel assembly off the vehicle.

(a) Remove tire and wheel assembly from vehicle and install it on a suitable wheel balancer.

(b) Check system runout using Dial Indicator Set, Special Tool C-3339A with 25-W wheel, or equivalent. Place the end of the indicator against each taped area (one at a time) (Fig. 2) and rotate the tire and wheel. Radial runout should not

TIRES/WHEELS (Continued)

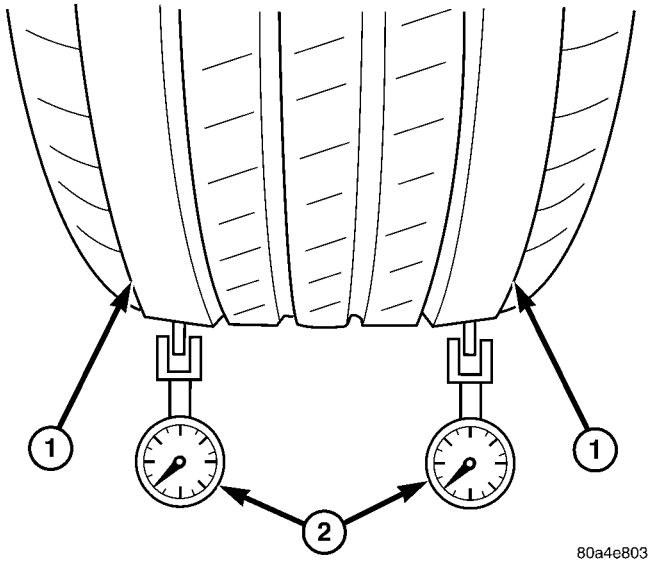


Fig. 2 Radial Runout Measurement

1 - MASKING TAPE
2 - DIAL INDICATOR

exceed 0.76 mm (0.030 inch) with no tread “dips” or “steps.” Tread “dips” and “steps” can be identified by spikes of the dial indicator gauge.

(c) If runout exceeds limits, mark the original location of the tire on the wheel at the valve stem (Fig. 3). Also, mark the tire and wheel to indicate the original high spot of the assembly and record the runout measurement.

(d) If runout exceeds limits, the tire will need to be dismounted from the wheel to verify wheel vs. tire contribution. Refer to Wheel Runout below.

(3) **Lateral Runout.** Lateral runout for the vehicle system as well as the tire and wheel assembly should be less than 0.76 mm (0.030 inch). The same procedure and theory described for radial runout can also be applied to identify and reduce lateral runout.

(4) **Wheel Runout.** This runout check is performed as follows:

(a) Dismount the tire from the wheel.

(b) Mount the wheel back on the wheel balancer.

(c) Measure radial runout of the wheel at the tire bead seat (Fig. 4). Runout should not exceed 0.254 mm (0.010 inch) for aluminum wheels and 0.508 mm (.020 inch) for steel wheels. Replace the wheel if it exceeds the limit.

(d) Measure lateral runout of the wheel at the tire bead seat (Fig. 5). Runout should not exceed 0.762 mm (0.030 inch) for all wheels. Replace the wheel if it exceeds the limit.

(5) **Match Mounting.** If the wheel runout is within specifications, tire and wheel assembly runout can be improved by re-indexing (match mounting) the tire to the wheel as described below.

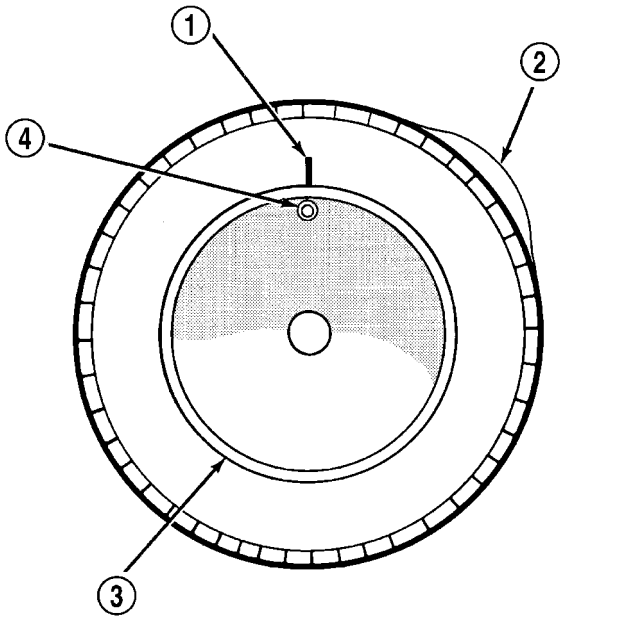


Fig. 3 Marking Tire

1 - REFERENCE MARK
2 - EXAMPLE HIGH SPOT ON TIRE
3 - WHEEL
4 - VALVE STEM

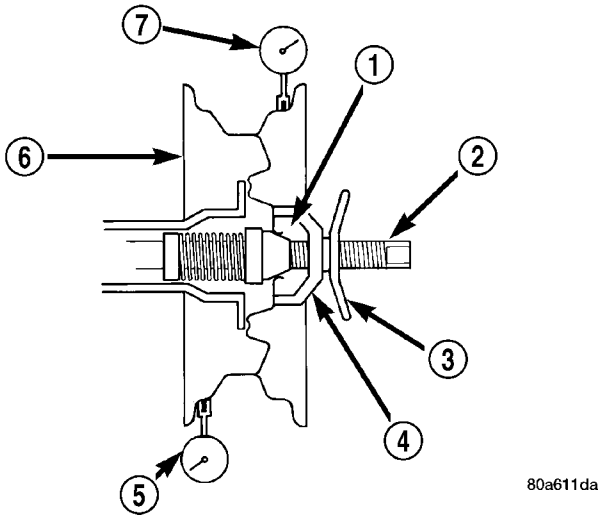


Fig. 4 Checking Radial Runout Of Wheel

1 - MOUNTING CONE
2 - SPINDLE SHAFT
3 - WING NUT
4 - PLASTIC CUP
5 - DIAL INDICATOR
6 - WHEEL
7 - DIAL INDICATOR

(a) Remount the tire on the rim 180 degrees from its original location (Fig. 6). Ensure the tire bead is properly seated.

(b) Re-measure the total runout. Mark the tire at the high spot and record the measurement.

TIRES/WHEELS (Continued)

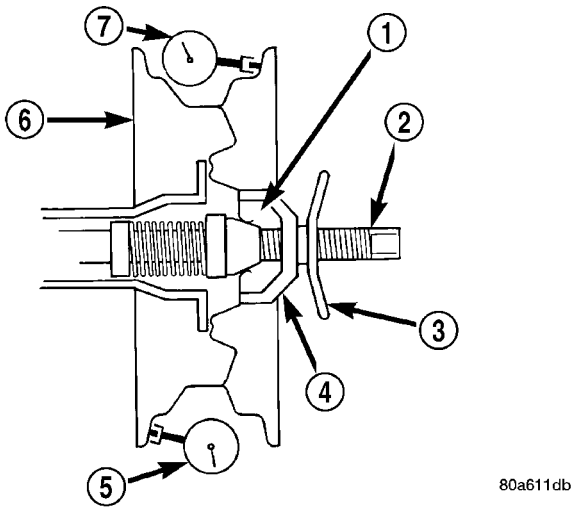


Fig. 5 Checking Lateral Runout Of Wheel

1 - MOUNTING CONE
2 - SPINDLE SHAFT
3 - WING NUT
4 - PLASTIC CUP
5 - DIAL INDICATOR
6 - WHEEL
7 - DIAL INDICATOR

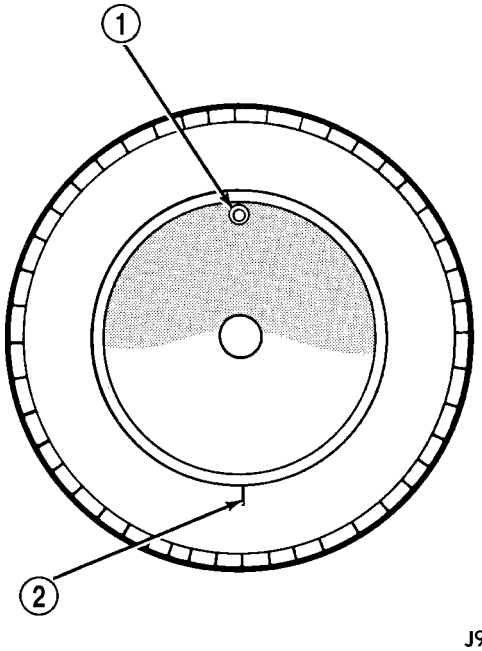


Fig. 6 Remount Tire 180 Degrees

1 - VALVE STEM
2 - REFERENCE MARK

If runout is still excessive, perform the following:

- If the new high spot is within 102 mm (4.0 inch) of the first high spot on the tire, replace the tire.
- If the new high spot is within 102 mm (4.0 inch) of the first high spot on the wheel, the wheel may be out of specification. Refer to Wheel Runout above.
- If the new high spot is NOT within 102 mm (4.0 inch) of either high spot, draw an arrow on the tread from new high spot toward the original (Fig. 7). Break down the tire and remount it 90 degrees on rim in that direction, then re-measure runout. This will normally reduce the runout to an acceptable amount.

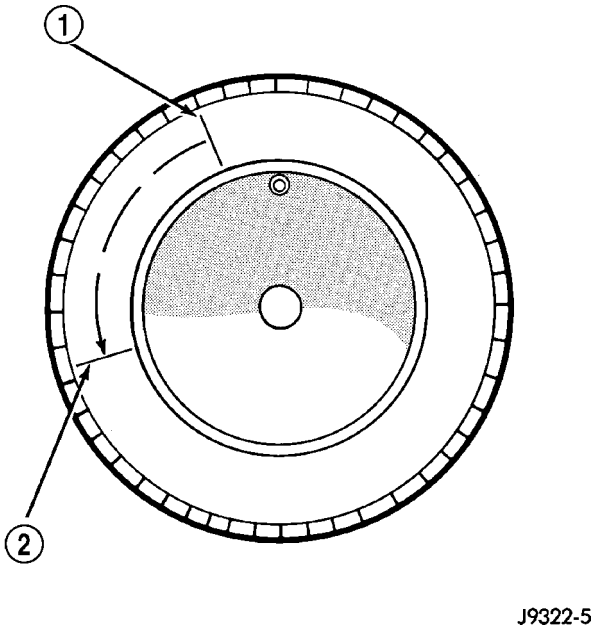


Fig. 7 Remount Tire 90 Degrees In Direction of Arrow

1 - 2ND HIGH SPOT ON TIRE
2 - 1ST HIGH SPOT ON TIRE

(6) Once back together, road test the vehicle for at least 5 miles, following the format described in Road Test. If vibration persists, and all components tested are within specification, the tires may have an excessive radial force condition. Radial force variation can only be checked as indicated below. If this equipment is not available, consult with the tire manufacturer.

RADIAL FORCE VARIATION

Radial Force Variation can be checked using the Hunter GSP 9700 Vibration Control System (Wheel Balancer) or equivalent, if available. This type of equipment helps to correct ride disturbances by reducing the radial force variation of an assembly through re-indexing of the tire to wheel.

The equipment manufacturer or DaimlerChrysler Corporation may supply reference values as guidelines. Radial force measurements above the reference value may not always result in a ride disturbance, nor do they automatically mean the assembly components are out of specification. Do not replace components based on radial force values alone. Balancing, runout diagnosis, re-indexing, and subjective road

testing must be performed as outlined in previous sections of this diagnosis and testing procedure.

Use the Radial Force equipment to identify suspect assemblies and minimize the radial forces. After all suspect assemblies are optimized, reinstall the assemblies and road test the vehicle. If a disturbance still exists and all other vibration diagnostic procedures have been completed, replace one tire or one wheel at a time, starting with the assembly having the highest force variation. Be sure to minimize each new assembly. Road test the vehicle following each replacement. Continue this process until the disturbance is resolved.

NOTE: When using Radial Force equipment, it is critically important to set proper tire inflation pressure and ensure centering of the wheel on the equipment spindle.

RADIAL FORCE VARIATION REFERENCE VALUES

DESCRIPTION	SPECIFICATION
Total Radial Force Variation (RFV)	Less Than 22 Lbs. ± 2 Lbs.
Radial First Harmonic (R1H)	Less Than 16 Lbs. ± 2 Lbs.
Radial Second Harmonic (R2H)	Less Than 12 Lbs. ± 2 Lbs.

STANDARD PROCEDURE

STANDARD PROCEDURE - TIRE AND WHEEL BALANCE

NOTE: Balance equipment must be calibrated and maintained per equipment manufacturer's specifications.

Wheel balancing can be accomplished with either on-vehicle or off-vehicle equipment.

NOTE: If using on-vehicle balancing equipment, on the driving axle, remove the opposite wheel and tire assembly.

It is recommended that a two-plane dynamic balancer be used when a wheel and tire assembly requires balancing. A static balancer should only be used when a two-plane balancer is not available.

Balance wheel and tire assemblies dynamically and statically to less than 0.25 (¼) ounce.

For static balancing, find location of heavy spot causing imbalance. Counter balance wheel directly opposite the heavy spot. Determine weight required to counterbalance the area of imbalance. Place half of this weight on the **inner** rim flange and the other half on the **outer** rim flange (Fig. 8).

For dynamic balancing, the balance equipment is designed to indicate the location and amount of weight to be applied to both the inner and outer rim flanges (Fig. 9).

The aluminum wheels on this vehicle use a unique wheel weight (Fig. 10). This wheel weight is designed to fit the contoured surface of the wheel (Fig. 10). When balancing an aluminum wheel, this wheel weight must be used. Do not use any other type of wheel weight. It will not properly fit the contour of the wheel.

Always verify the Balance. When using off-vehicle equipment, rotate assembly 180 degrees on balance equipment to verify balance. Variation should not be more than 0.125 (⅛) ounce. If variation is more than 0.125 ounce, balancing equipment could be malfunctioning.

If difficult to balance, break down the wheel and tire assembly and check for loose debris inside tire. Prior to disassembly, mark (index) the tire at the valve stem. Use this mark in order to remount the tire in its original orientation with respect to the wheel.

TIRES/WHEELS (Continued)

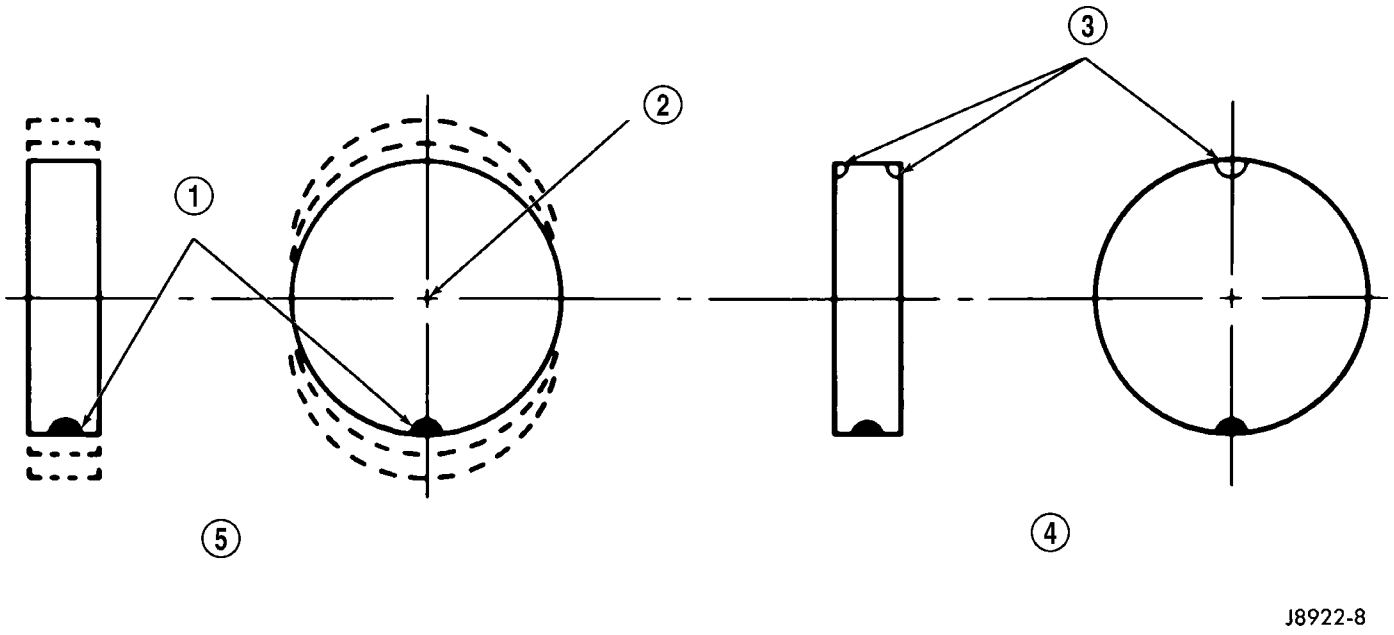


Fig. 8 Static Unbalance & Balance

1 - HEAVY SPOT
2 - CENTER LINE OF SPINDLE
3 - ADD BALANCE WEIGHTS HERE
4 - CORRECTIVE WEIGHT LOCATION
5 - TIRE OR WHEEL TRAMP, OR WHEEL HOP

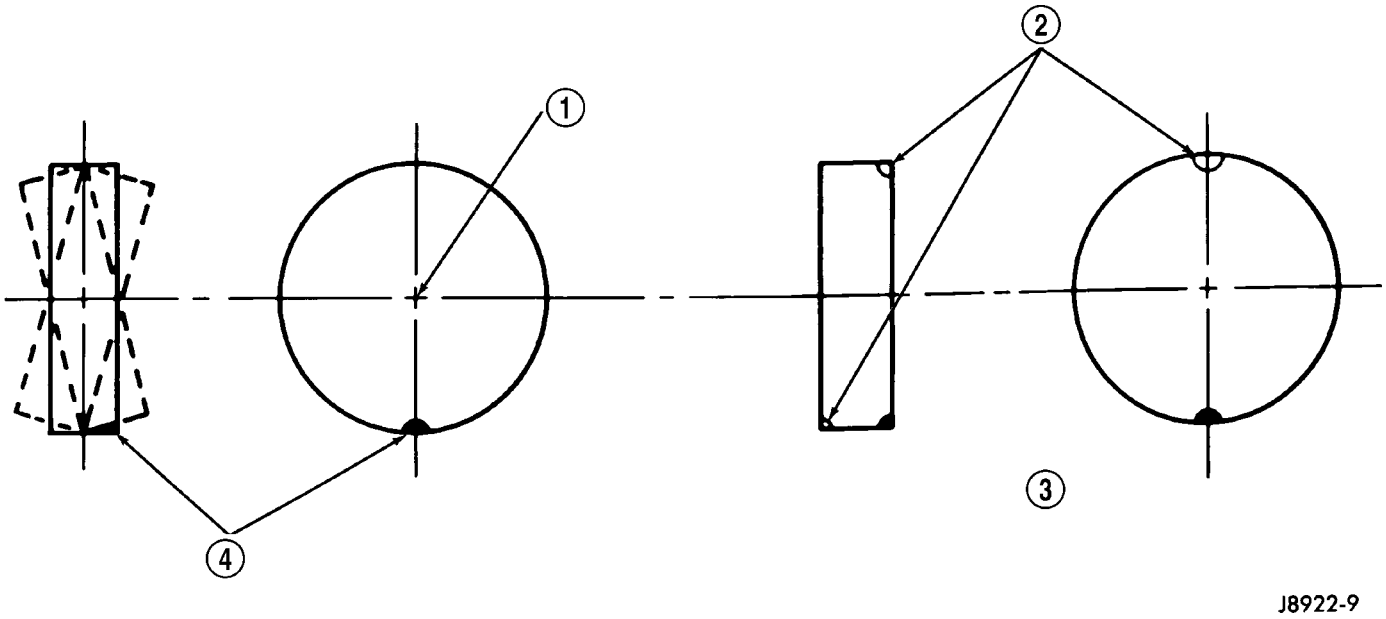


Fig. 9 Dynamic Unbalance & Balance

1 - CENTER LINE OF SPINDLE
2 - ADD BALANCE WEIGHTS HERE
3 - CORRECTIVE WEIGHT LOCATION
4 - HEAVY SPOT WHEEL SHIMMY AND VIBRATION

TIRES/WHEELS (Continued)

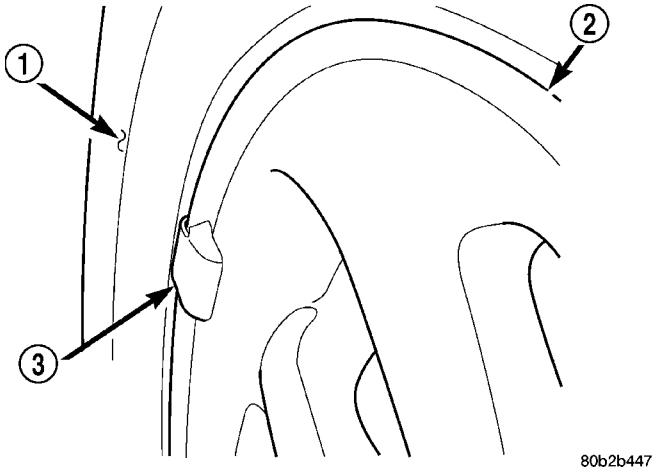


Fig. 10 Aluminum Wheel Weight

1 - TIRE
2 - WHEEL
3 - WHEEL WEIGHT

STANDARD PROCEDURE - TIRE AND WHEEL MATCH MOUNTING

Wheels and tires are match mounted at the factory. This means that the high spot of the tire is matched to the low spot on the wheel rim. This technique is used to reduce runout in the wheel and tire assembly. The high spot on the tire is marked with a paint mark or a bright colored adhesive label on the outboard sidewall. The low spot on the wheel is identified with a label on the outside of the rim and a dot or line in the drop well area of the rim (inside where the tire mounts). If the outside label has been removed, the tire will have to be removed to locate the dot or line on the inside of the rim. The tire can then be match mounted to the tire.

Information on match mounting the tire to the wheel can be found in Tire and Wheel Runout/Match Mounting, items (2) through (5), within Diagnosis And Testing - Tire And Wheel Vibration. (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING)

STANDARD PROCEDURE - TIRE AND WHEEL ROTATION

NON-DIRECTIONAL TREAD PATTERN TIRES

Tires on the front and rear axles operate at different loads and perform different functions. For these reasons, they wear at unequal rates, and tend to develop irregular wear patterns. These effects can be reduced by timely rotation of tires. The benefits of rotation are especially worthwhile. Rotation will increase tread life, help to maintain mud, snow, and wet traction levels, and contribute to a smooth, quiet ride.

The suggested rotation method is the forward-cross tire rotation method (Fig. 11). This method takes advantage of current tire industry practice which allows rotation of radial-ply tires. Other rotation methods may be used, but may not have all the benefits of the recommended method.

NOTE: Only the 4 tire rotation method may be used if the vehicle is equipped with a low mileage or temporary spare tire.

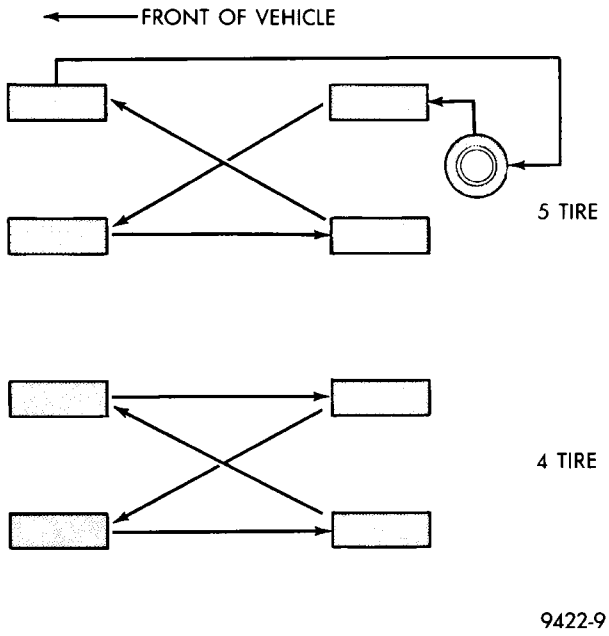


Fig. 11 Forward-Cross Tire Rotation Method

DIRECTIONAL TREAD PATTERN TIRES

Some vehicles are fitted with special high-performance tires having a directional tread pattern. These tires are designed to improve traction on wet pavement. To obtain the full benefits of this design, the tires must be installed so that they rotate in the correct direction. This is indicated by arrows on the tire sidewalls.

When wheels and tires are being installed, extra care is needed to ensure that this direction of rotation is maintained.

Refer to Owner's Manual for rotation schedule.

REMOVAL

REMOVAL - TIRE AND WHEEL ASSEMBLY (ALUMINUM WHEEL)

(1) Raise the vehicle so the tire and wheel assembly clears ground level.

(2) Remove the 5 wheel mounting nuts from the studs.

(3) Remove the tire and wheel from the hub.

TIRES/WHEELS (Continued)

REMOVAL - TIRE AND WHEEL ASSEMBLY (STEEL WHEEL)

(1) Raise the vehicle so the tire and wheel assembly clears ground level.

(2) Noting the location of the valve stem in relationship to the wheel mounting nuts, remove the three wheel mounting nuts securing the wheel cover to the wheel and hub (Fig. 12).

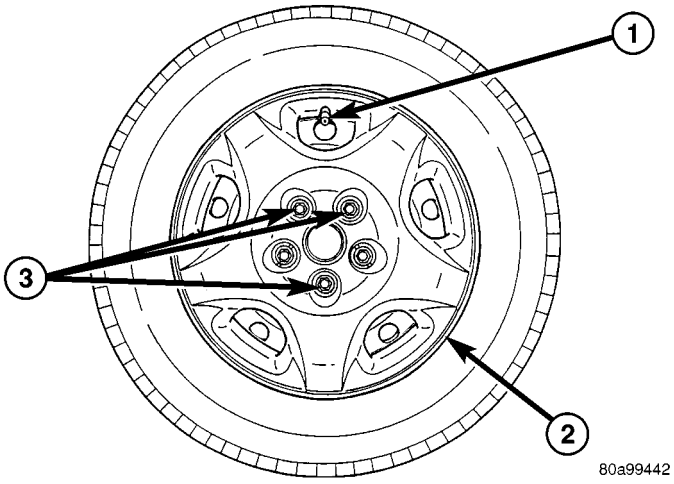


Fig. 12 NUTS SECURING WHEEL COVER

1 - VALVE STEM
2 - BOLT-ON WHEEL COVER
3 - NUTS SECURING WHEEL COVER

CAUTION: When removing the wheel cover, do not pry the wheel cover from the wheel. This can result in damage to the wheel cover. The wheel cover is removed by pulling it off the wheel by hand.

(3) Grasp the wheel cover at the edges in line with the remaining installed wheel mounting nuts and pull straight outward from the wheel. This will pop the wheel cover retaining tabs over the two remaining wheel nuts, removing the wheel cover from the vehicle.

(4) Remove the two remaining wheel mounting nuts from the hub's studs.

(5) Remove the wheel and tire from the hub.

INSTALLATION

INSTALLATION - TIRE AND WHEEL ASSEMBLY (ALUMINUM WHEEL)

NOTE: Never use oil or grease on studs or wheel mounting nuts.

(1) Position the tire and wheel assembly on the wheel mounting studs using the hub pilot as a guide. Place and hold the wheel flush up against the mounting surface.

(2) Loosely install all 5 wheel mounting nuts. Lightly snug the wheel nuts, then progressively tighten them in the proper sequence (Fig. 13). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.).

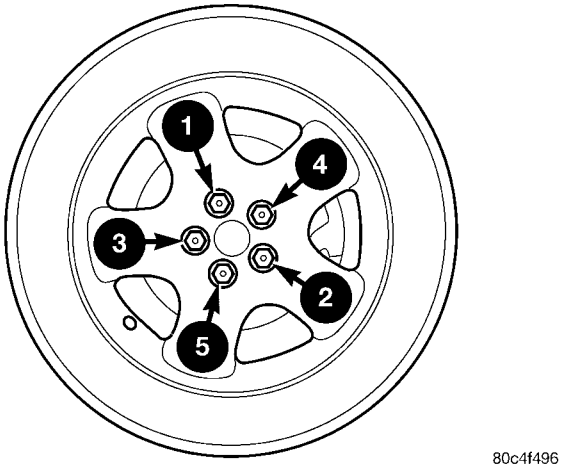


Fig. 13 Tightening Sequence

(3) Lower the vehicle.

INSTALLATION - TIRE AND WHEEL ASSEMBLY (STEEL WHEEL)

NOTE: Never use oil or grease on studs or wheel mounting nuts.

(1) Position the tire and wheel assembly on the wheel mounting studs using the hub pilot as a guide. Place and hold the wheel flush up against the mounting surface.

NOTE: Wheel mounting nuts must be installed on the studs as shown (Fig. 14) to allow proper installation of the wheel cover.

(2) Using the valve stem as an index placed at the 12 O'clock position, install and **lightly tighten** two wheel mounting nuts on the studs located at the 4 O'clock and 8 O'clock positions as shown (Fig. 14).

(3) Place the wheel cover on the wheel in the following fashion:

(a) Align the valve notch in the wheel cover with the valve stem on the wheel.

(b) At the same time, align the two holes in the wheel cover having the retaining tabs with the two installed wheel nuts (Fig. 15).

(c) Press in on center of wheel cover until wheel cover retaining tabs push past and engage rear of previously installed wheel mounting nuts (Fig. 15). This will hold the wheel cover in place.

TIRES/WHEELS (Continued)

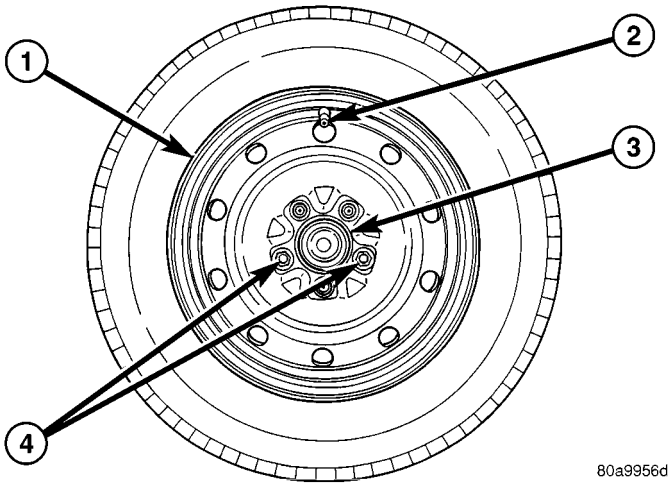


Fig. 14 TWO WHEEL MOUNTING NUTS INSTALLED

1 - WHEEL
2 - VALVE STEM
3 - HUB PILOT
4 - NUTS

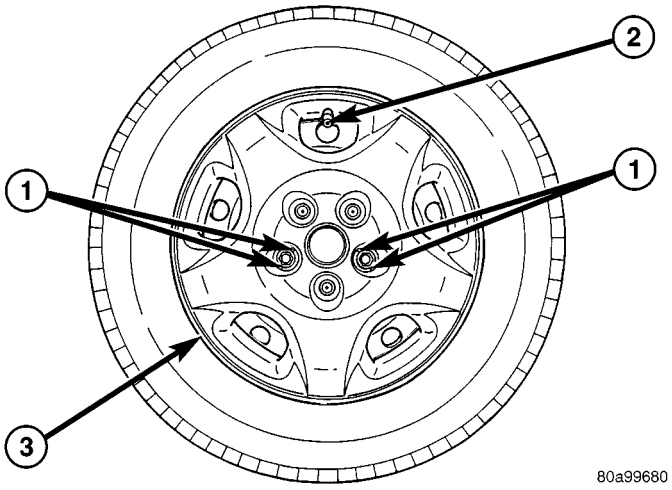


Fig. 15 WHEEL COVER INSTALLATION OVER TWO NUTS

1 - RETAINING TABS
2 - VALVE STEM
3 - BOLT-ON WHEEL COVER

(4) Install and **lightly tighten** the three remaining wheel mounting nuts, securing the wheel cover in place (Fig. 12).

(5) Progressively tighten all five wheel mounting nuts in the proper sequence (Fig. 16). Tighten wheel nuts to a torque of 135 N·m (100 ft. lbs.).

(6) Lower the vehicle.

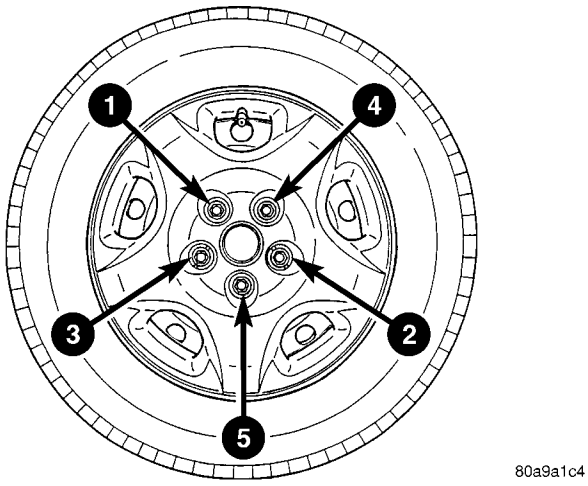


Fig. 16 NUT TIGHTENING SEQUENCE

TIRE PRESSURE MONITORING

DESCRIPTION

Some versions of this vehicle are equipped with a Tire Pressure Monitoring (TPM) system. It monitors air pressure in the four road tires (excludes spare). Pressure in the spare tire is not monitored.

There is a sensor (transmitter) in each of the vehicle's four road wheels. The system alerts the driver when tire pressure falls outside predetermined thresholds (pressure too low or too high). A message is then displayed on the Electronic Vehicle Information Center (EVIC) located in the overhead console.

For further information, refer to the Owners Manual or the appropriate diagnostic information.

OPERATION

The Tire Pressure Monitoring (TPM) system uses radio and sensor technology to monitor tire air pressure levels. Sensors, mounted to each road wheel as part of the valve stem, transmit tire pressure readings to a receiver located in the overhead console. These transmissions occur once every minute at speeds over 20 mph (32 km/h). The Tire Pressure Monitoring system remains active even if no tire pressure related message is displayed in the EVIC.

If any road tire pressure has exceeded the low or high pressure threshold (refer to chart below), the TPM system will display a message in the EVIC and sound a chime. This message will be displayed for the rest of the ignition cycle, or until either the Low/High Tire pressure condition has been corrected. If the C/T, MENU, STEP or RESET button is pressed, the message is replaced by the new message requested; however, if the Low/High Tire condition has not been corrected, the Low/High Tire pressure message will again be displayed.

TIRE PRESSURE MONITORING (Continued)

If a road tire is replaced by the spare, the TPM system will detect the swap and the message ″SPARE TIRE IN USE? Y/N″ (along with a chime) will be displayed.

For further information, refer to the Owners Manual or the Appropriate Diagnostic Information.

TPM THRESHOLD PRESSURES

High Pressure ON Threshold	48 PSI (331 kPa)
High Pressure OFF Threshold	43 PSI (296 kPa)
Placard Pressure (Cold)	36 PSI (248 kPa)
Low Pressure OFF Threshold	33 PSI (228 kPa)
Low Pressure ON Threshold	28 PSI (193 kPa)

SENSOR - TPM

DESCRIPTION

On vehicles equipped with Tire Pressure Monitoring, one tire pressure sensor is mounted to each wheel (Fig. 19). Each sensor has an internal battery that lasts up to 10 years. The battery is not serviceable. At the time of battery failure, the sensor must be replaced. The serviceable components of the tire pressure sensor are:

- Sensor-To-Wheel Grommet
- Valve Stem Cap
- Valve Stem Core

Valve stem caps and cores are specifically designed for the tire pressure monitoring sensors. Although similar to standard valve stem caps and cores, they are different.

CAUTION: Do not use a standard valve stem cap or core in a tire pressure sensor. Always use the original equipment style sensor cap and core.

CAUTION: Do not reuse the Sensor-To Wheel Grommet. Always use a new grommet when installing a pressure sensor and properly torque the sensor nut.

CAUTION: Do not try to install a tire pressure sensor in a steel wheel or aftermarket wheel. Use only in original style factory wheels.

OPERATION

Tire pressure sensors are battery operated. They transmit tire pressure data once every minute at speeds above 20 mph (32 km/h) or up to once every hour when stationary (parked). For additional information, refer to Appropriate Diagnostic Information.

CAUTION

CAUTION: The use of tire sealants is strictly prohibited for vehicles equipped with the Tire Pressure Monitoring system. Tire sealants can clog tire pressure sensors.

CAUTION: Tire pressure sensor valve stem caps and cores are specially designed for the sensors. Due to risk of corrosion, do not use a standard valve stem cap or core in a tire pressure sensor in place of the original equipment style sensor cap and core.

CAUTION: Do not attempt to install a tire pressure sensor in a steel wheel or aftermarket wheel. Use tire pressure sensors in original style factory wheels only.

NOTE: TPM thresholds have been established for the original tire size equipped on the vehicle. Use original size tires only to maintain system accuracy.

DIAGNOSIS AND TESTING - TIRE PRESSURE SENSOR

NOTE: Tire pressure may increase from 2 to 6 psi (14 to 41 kPa) during normal driving conditions. Do NOT reduce this normal pressure build up.

If a fault in the system is detected, always check air pressure in the tires first with a known accurate air gauge and correct the inflation pressure. If any tire is low, inspect **all** tires.

If gauge-read pressure in the tires does not reflect the reading on the EVIC, retrain the sensors, then reevaluate (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE). Refer to the appropriate diagnostic information for complete diagnosis of the Tire Pressure Monitoring System.

STANDARD PROCEDURE - TIRE PRESSURE SENSOR RETRAIN

WARNING: DEATH OR SERIOUS INJURY CAN OCCUR IF MAGNETICALLY SENSITIVE DEVICES ARE EXPOSED TO THE RELEARN MAGNET. MAGNETS CAN AFFECT PACEMAKERS.

SENSOR - TPM (Continued)

CAUTION: Never attempt to train more than one vehicle at a time. System is capable of reading tire pressure sensor transmissions from other near-by vehicles.

Each time a wheel rotation or tire pressure sensor replacement occurs the tire pressure sensors must be retrained. This is necessary to inform the Electronic Vehicle Information Center (EVIC) that a sensor change was made and where. Retraining is accomplished through the EVIC used in conjunction with a Re-learn Magnet, Special Tool 8821.

NOTE: Use the following procedure to retrain all four (4) road wheel tire pressure sensors. No attempt should be made to retrain individual sensors.

(1) Retrieve Re-learn Magnet, Special Tool 8821.
(2) Press MENU Button on EVIC until ″RETRAIN TIRE SENSORS - NO″ is displayed.
(3) Press STEP button to select ″YES″.

NOTE: There is a 60 second timer for training the first sensor and a 60 second timer between training the remaining sensors. If any of these timers expire, the EVIC will abort the training procedure.

NOTE: If at any time the EVIC display reads ″TRAINING ABORTED″, move the vehicle ahead at least one foot and repeat the entire retraining procedure.

(4) Press MENU button to start retraining. Display will read ″TRAIN LEFT FRONT TIRE″

NOTE: The order for retraining all four sensors is:
- **Left Front**
- **Right Front**
- **Right Rear**
- **Left Rear**

(5) Starting at left front tire, place Re-learn Magnet over valve stem (Fig. 17). Within approximately 5 seconds, vehicle horn will chirp indicating training complete at that particular sensor. Remove the magnet.
(6) Repeat step (5) on remaining sensors as indicated by EVIC until all four TPM sensors positions are trained.
(7) Once EVIC displays ″TRAINING COMPLETE″, pressing either STEP, C/T, RESET or MENU button will exit training routine.

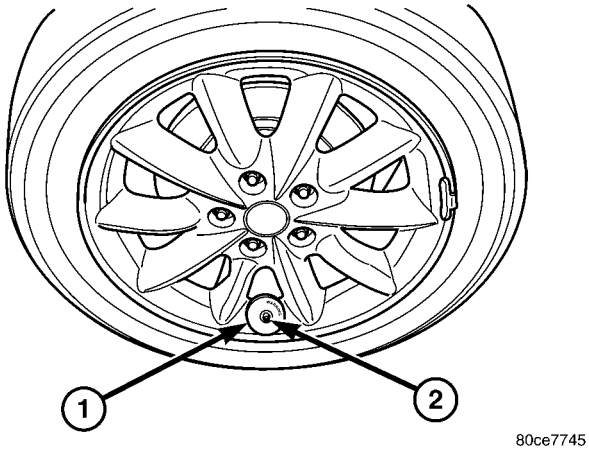


Fig. 17 Magnet Placement Over Valve Stem

1 - RE-LEARN MAGNET
2 - VALVE STEM

REMOVAL

(1) Remove tire and wheel assembly from vehicle. (Refer to 22 - TIRES/WHEELS - REMOVAL)

CAUTION: The cap used on this valve stem contains an O-ring seal to prevent contamination and moisture from entering the valve stem. Retain this valve stem cap for reuse. Do not substitute a regular valve stem cap in its place.

CAUTION: The valve stem used on this vehicle is made of aluminum and the core is nickel plated brass. The original valve stem core must be reinstalled and not substituted with a valve stem core made of a different material. This is required to prevent corrosion in the valve stem caused by the different metals.

(2) Dismount tire from wheel following tire changer manufacturers instructions while paying special attention to the following to avoid damaging the pressure sensor:
(a) When breaking the tire bead loose from the wheel rim, avoid using the Bead Breaker in the area of the sensor. That includes both front and rear beads of the tire.
(b) When preparing to dismount the tire from the wheel, carefully insert the mounting/dimounting tool at the valve stem ± 10° (Fig. 18), then proceed to dismount the tire from the wheel. Use this process on both the upper and lower tire beads.
(3) Using a thin wall socket, remove special nut retaining sensor to wheel (Fig. 19).
(4) Remove sensor from wheel (Fig. 19).

SENSOR - TPM (Continued)

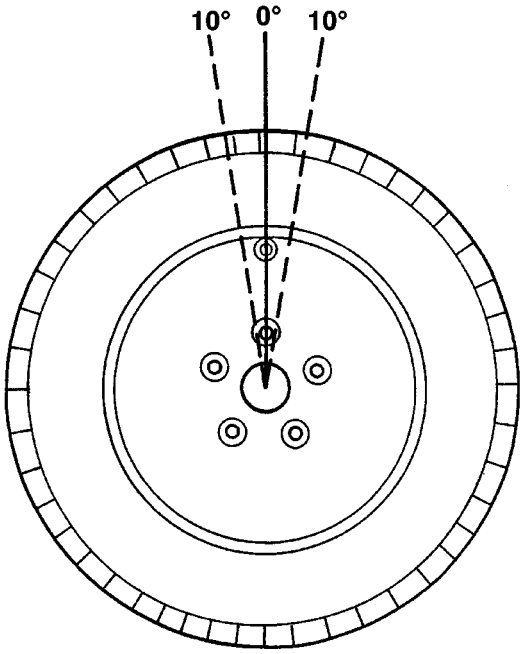


Fig. 18 Start Mount/Dismount Tool Within 10 Degrees Of Valve Stem

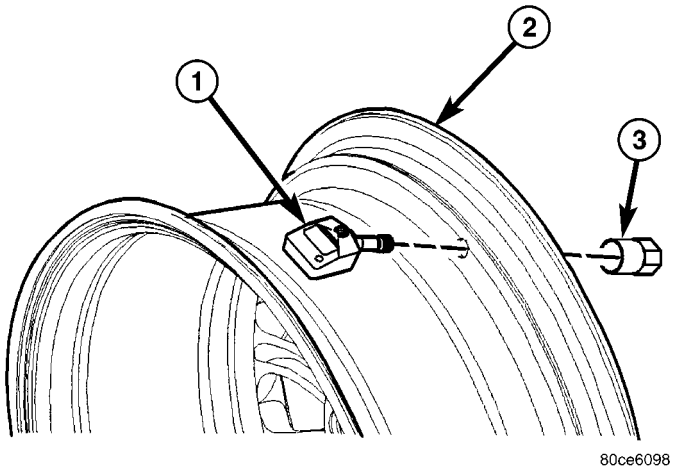


Fig. 19 Sensor Mounting To Wheel

1 - TIRE PRESSURE SENSOR
2 - WHEEL
3 - NUT

INSTALLATION

NOTE: Before reinstalling a tire pressure sensor, replace sealing grommet at base of valve stem.

(1) Wipe area clean where sensor sealing grommet contacts wheel. Make sure surface of wheel is not damaged.

(2) Install sensor in wheel as shown (Fig. 19). Do not attempt to mount sensor otherwise, damage may occur.

(3) Using a thin wall socket, install special sensor nut (Fig. 19). Tighten nut to 4 N·m (35 in. lbs.) torque.

CAUTION: Over-torquing the sensor nut by as little as 12 N·m (106 in. lbs.) may result in sensor separation from the valve stem. Under this condition, the sensor may still function, however, the condition should be corrected immediately.

(4) Mount tire on wheel following tire changer manufacturers instructions, paying special attention to the following to avoid damaging tire pressure sensor:

(a) Rotating Wheel Tire Changers - Once the wheel is mounted to the changer, position the sensor valve stem approximately 210° from the head of the changer in a clockwise direction before rotating the wheel (also in a clockwise direction) to mount the tire (Fig. 20). Use this procedure on both the upper and lower tire beads.

(b) Rotating Tool Tire Changers - Position the wheel on the changer so that the sensor valve stem is approximately 210° from the head of the changer in a clockwise direction from the mounting end of the tool (Fig. 21) Make sure the sensor is clear of the lower bead breaker area to avoid damaging the sensor when the breaker rises (Fig. 21). Rotate the tool in a counterclockwise direction to mount the tire. Use this procedure on both the upper and lower tire beads.

(5) Install wheel and tire assembly on vehicle. (Refer to 22 - TIRES/WHEELS - INSTALLATION)

(6) Retrain tire pressure sensors. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/ SENSOR - STANDARD PROCEDURE)

SENSOR - TPM (Continued)

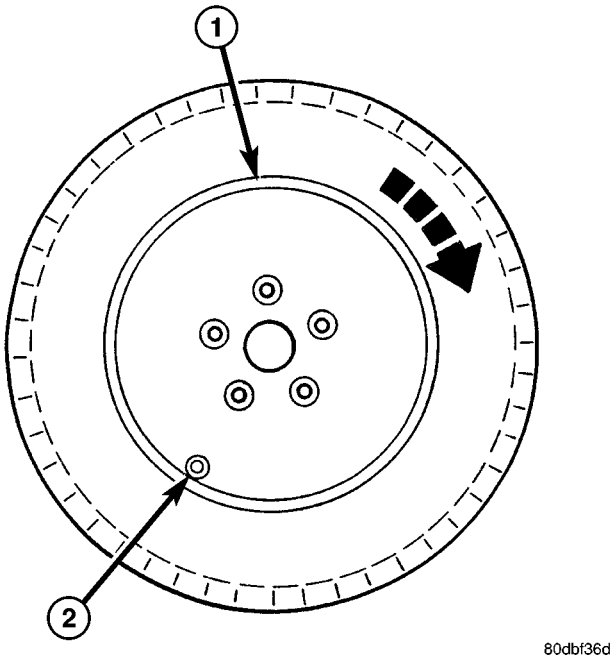


Fig. 20 Mounting Tire Using Rotating Wheel Machine

1 - HEAD OF CHANGER LOCATED HERE
2 - VALVE STEM

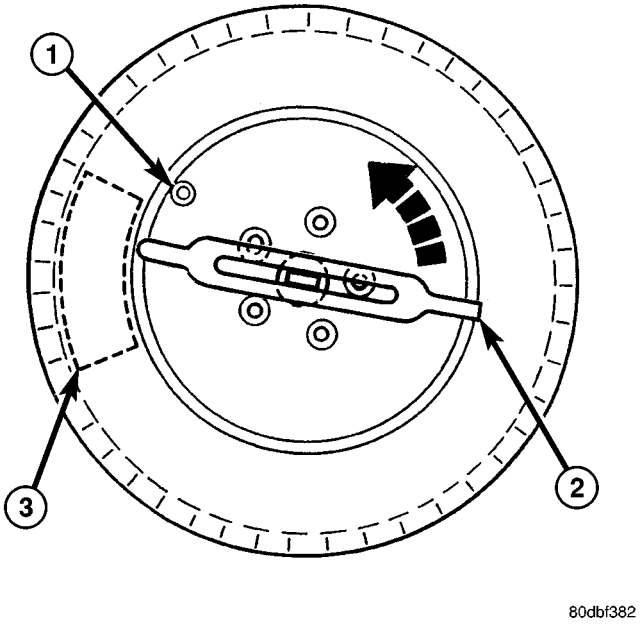


Fig. 21 Mounting Tire Using Rotating Tool Machine

1 - VALVE STEM
2 - MOUNTING END OF TOOL
3 - BEAD BREAKER (KEEP CLEAR OF SENSOR)

TIRES

DESCRIPTION

DESCRIPTION - TIRE

Tires are designed and engineered for each specific vehicle. They provide the best overall performance for normal operation. The ride and handling characteristics match the vehicle's requirements. With proper care they will give excellent reliability, traction, skid resistance, and tread life.

Driving habits have more effect on tire life than any other factor. Careful drivers will obtain, in most cases, much greater mileage than severe use or careless drivers. A few of the driving habits which will shorten the life of any tire are:

- Rapid acceleration
- Severe application of brakes
- High-speed driving
- Taking turns at excessive speeds
- Striking curbs and other obstacles
- Operating vehicle with over or under inflated tire pressures

Radial ply tires are more prone to irregular tread wear. It is important to follow the tire rotation interval shown in the section on Tire Rotation. This will help to achieve a greater tread-life potential.

TIRE IDENTIFICATION

Tire type, size, load index and speed rating are encoded in the letters and numbers imprinted on the side wall of the tire. Refer to the Tire Identification chart to decipher the code. For example purposes, the tire size P225/60 R 16 97 T is used in the chart. An All Season type tire will also have either M + S, M & S or M - S (indicating mud and snow traction) imprinted on the side wall. An Extra or Light Load marking “XL” or “LL” may also be listed on the sidewall. The absence of an “XL” or “LL” marking infers a standard load tire.

TIRE IDENTIFICATION

P	TIRE TYPE (Not present on all tires)	P - Passenger T - Temporary C - Commercial LT - Light Truck
225	SECTIONAL WIDTH	SHOWN IN MILLIMETERS
60	ASPECT RATIO	SECTIONAL HEIGHT ÷ SECTIONAL WIDTH (Refer to Aspect Ratio Figure 22)

TIRES (Continued)

R	CONSTRUCTION TYPE	R - RADIAL B - BIAS BELTED D - DIAGONAL (BIAS)
16	WHEEL DIAMETER	SHOWN IN INCHES
97	LOAD INDEX	*
T	SPEED RATING	*

*** NOTE: Consult the tire manufacturer regarding any questions on tire specifications or capabilities.**

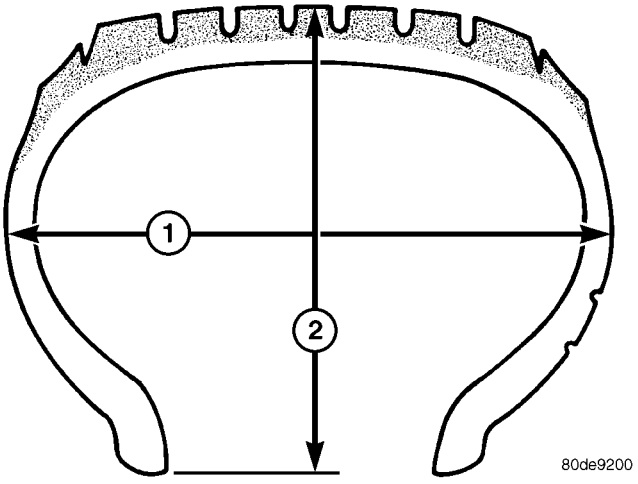


Fig. 22 Tire Aspect Ratio

1 - SECTIONAL WIDTH
2 - SECTIONAL HEIGHT

TIRE CHAINS

Refer to the owners manual supplied with the vehicle to determine whether the use of tire chains is permitted on this vehicle.

DESCRIPTION - RADIAL-PLY TIRES

Radial-ply tires improve handling, tread life, ride quality and decrease rolling resistance.

Radial-ply tires must always be used in sets of four and under no circumstances should they be used on the front only. It is recommended that tires from different manufacturers NOT be mixed. They may be mixed with a temporary spare tire when necessary. A maximum speed of 80 km/h (50 mph) is recommended while a temporary spare is in use.

Radial-ply tires have the same load-carrying capacity as other types of tires of the same size. They also use the same recommended inflation pressures.

DESCRIPTION - REPLACEMENT TIRES

WARNING: FAILURE TO EQUIP THE VEHICLE WITH TIRES HAVING ADEQUATE SPEED CAPABILITY CAN RESULT IN SUDDEN TIRE FAILURE.

It is recommended that tires equivalent to the original equipment tires be used when replacement is needed.

Failure to use equivalent replacement tires may adversely affect the safety and handling of the vehicle.

The original equipment tires provide a proper combination of many characteristics such as:

- Ride
- Noise
- Handling
- Durability
- Tread life
- Traction
- Rolling resistance
- Speed capability

The use of tires smaller than the minimum tire size approved for the vehicle can result in tire overloading and failure.

Use tires that have the approved load rating for the vehicle and never overload them. Failure to equip the vehicle with tires having adequate speed capability can result in sudden tire failure and loss of vehicle control.

The use of oversize tires may cause interference with vehicle components. Under extremes of suspension and steering travel, interference with vehicle components may cause tire damage.

DESCRIPTION - SPARE TIRE (TEMPORARY)

The temporary (convenience) spare tire is designed for emergency use only. The original tire should be repaired and reinstalled, or replaced with a new, at the first opportunity.

The temporary (convenience) spare tire should be inflated to the pressure listed on its sidewall. Do not exceed speeds of 80 km/h (50 mph) when the temporary spare tire is in use on the vehicle. Refer to the Owner's Manual for more details.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - TIRE NOISE

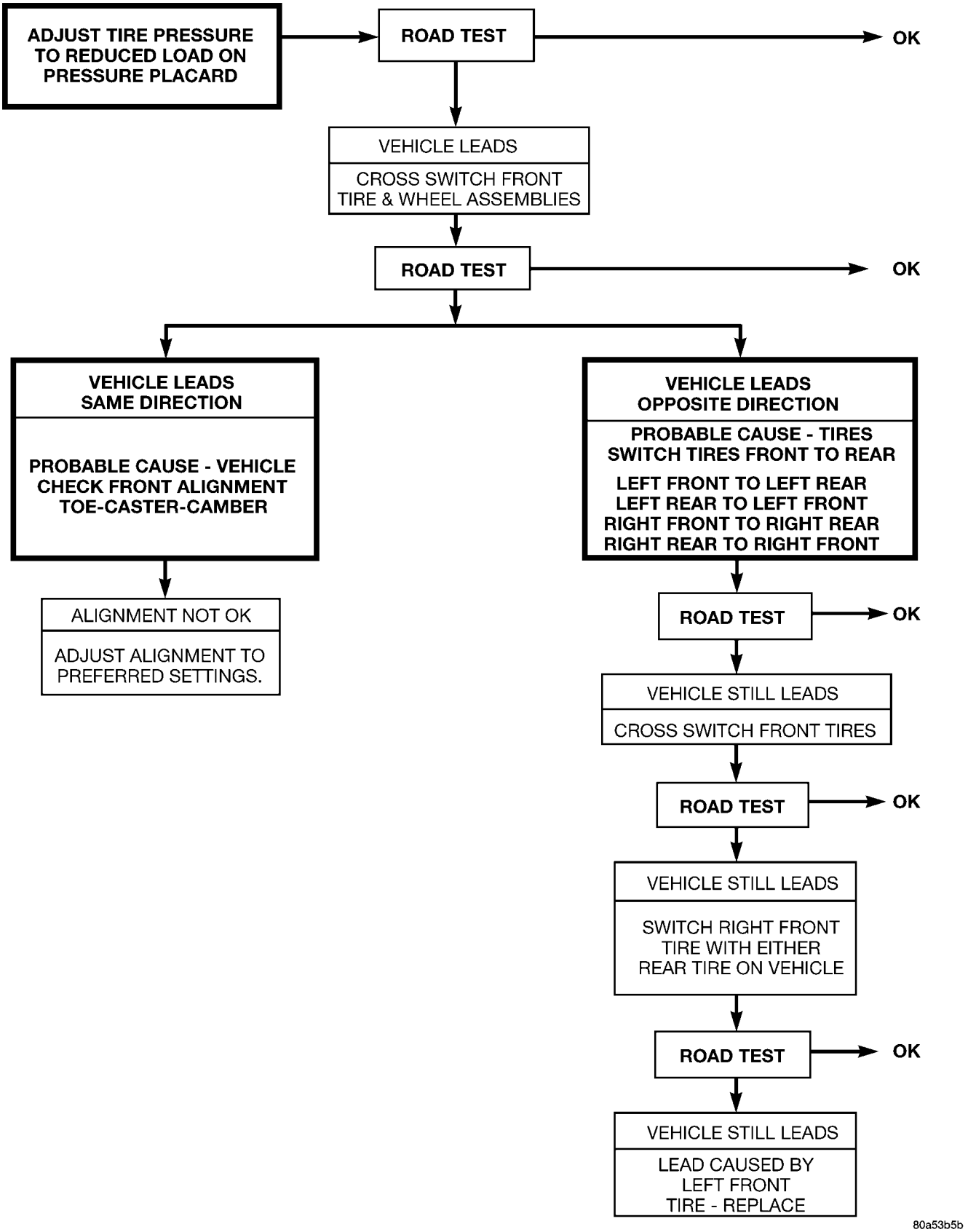
Unusual tire noise can be associated with tire and wheel vibration or irregular tire wear. For vibration, (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING). For irregular tire wear, (Refer to 22 - TIRES/WHEELS/TIRES - DIAGNOSIS AND TESTING).

DIAGNOSIS AND TESTING - TIRE/VEHICLE LEAD

Use the following Vehicle Lead Diagnosis And Correction Chart to diagnose and correct a vehicle lead or drift problem.

TIRES (Continued)

VEHICLE LEAD DIAGNOSIS AND CORRECTION CHART



TIRES (Continued)

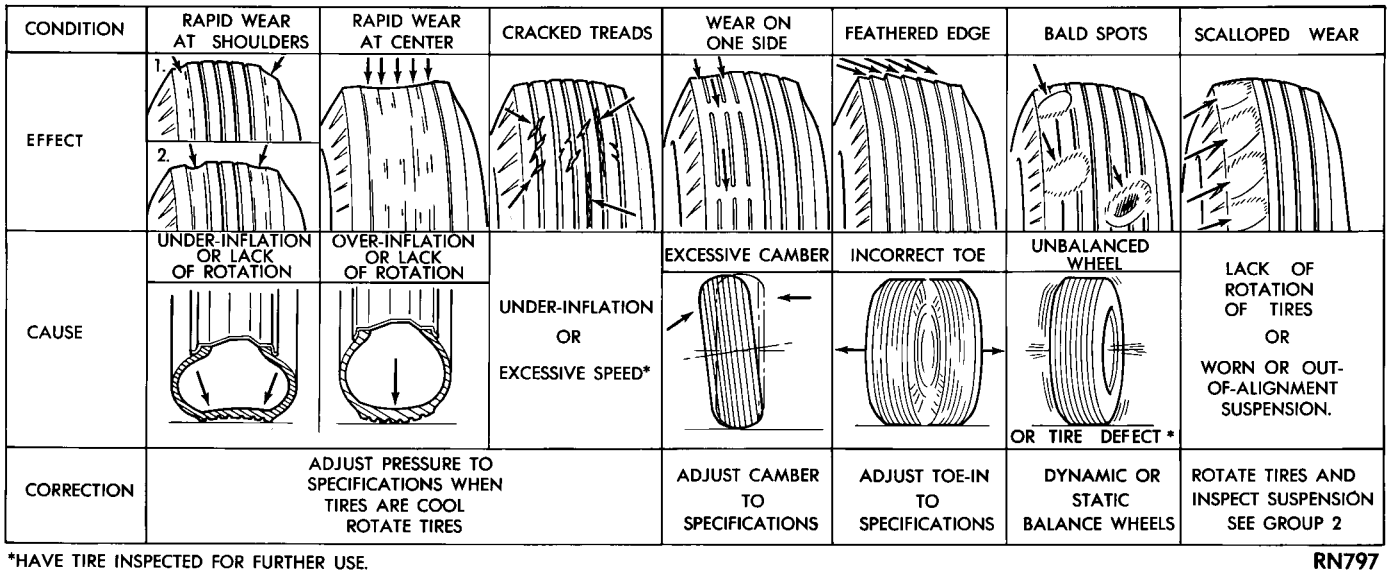


Fig. 23 Tire Wear Patterns

DIAGNOSIS AND TESTING - TIRE WEAR PATTERNS

Under inflation will cause wear on the shoulders of tire. Over inflation will cause wear at the center of tire.

Excessive camber causes the tire to run at an angle to the road. One side of tread is then worn more than the other (Fig. 23).

Excessive toe-in or toe-out causes wear on the tread edges and a feathered effect across the tread (Fig. 23).

DIAGNOSIS AND TESTING - TREAD WEAR INDICATORS

Tread wear indicators are molded into the bottom of the tread grooves. When tread depth is 1.6 mm (1/16 in.), the tread wear indicators will appear as a 13 mm (1/2 in.) band (Fig. 24).

Tire replacement is necessary when indicators appear in two or more grooves or if localized balding occurs.

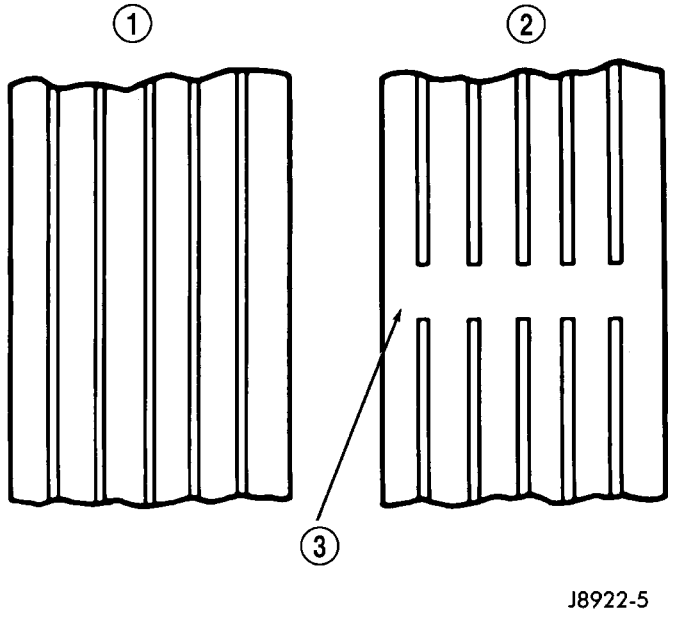


Fig. 24 Tread Wear Indicators

1 - TREAD ACCEPTABLE
2 - TREAD UNACCEPTABLE
3 - WEAR INDICATOR

STANDARD PROCEDURE

STANDARD PROCEDURE - TIRE INFLATION PRESSURES

The specified tire pressures have been chosen to provide safe operation, vehicle stability, and a smooth ride. The proper tire pressure specification can be found on the Tire Inflation Pressure Label provided with the vehicle (usually on the rear face of the driver's door).

A quality air pressure gauge is recommended to check tire air pressure. Tire pressure should be checked cold once per month. Check tire pressure more frequently when the weather temperature varies widely. Tire pressure will decrease when the outdoor temperature drops. After checking the air pressure, replace valve cap finger tight.

Inflation pressures specified on the Tire Inflation Pressure Label are always the cold inflation pressure of the tire. Cold inflation pressure is obtained after the vehicle has not been operated for at least 3 hours, or the vehicle is driven less than one mile after being inoperative for 3 hours. Tire inflation

TIRES (Continued)

pressures may increase from 2 to 6 pounds per square inch (psi) (14 to 41 kPa) during operation. Do not reduce this normal pressure buildup.

Improper inflation can cause:

- Uneven wear patterns
- Reduced tread life
- Reduced fuel economy
- Unsatisfactory ride
- The vehicle to drift.

WARNING: OVER OR UNDER INFLATED TIRES CAN AFFECT VEHICLE HANDLING. THE TIRE CAN FAIL SUDDENLY, RESULTING IN LOSS OF VEHICLE CONTROL.

Under inflation causes rapid shoulder wear, tire flexing, and can result in tire failure (Fig. 25).

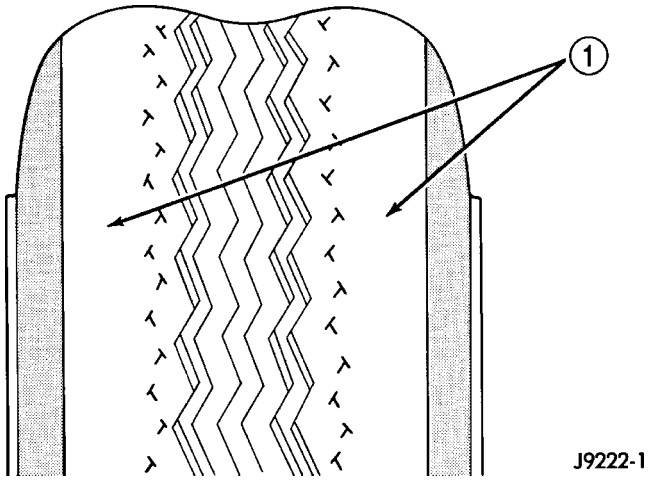


Fig. 25 Under Inflation Wear

1 - THIN TIRE TREAD AREAS

Over inflation causes rapid center wear and loss of the tire's ability to cushion shocks (Fig. 26).

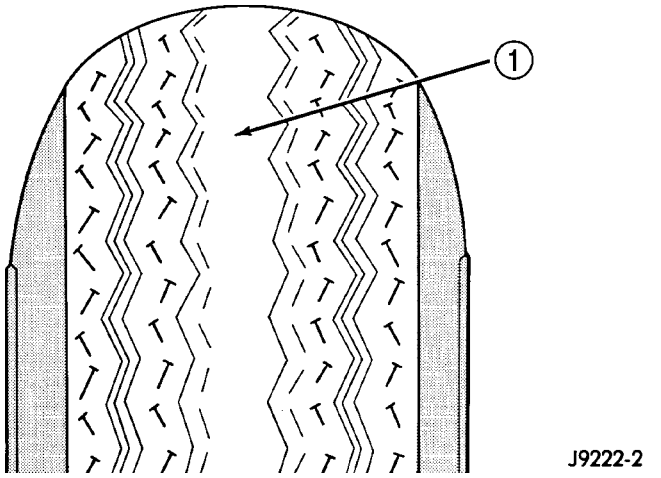


Fig. 26 Over Inflation Wear

1 - THIN TIRE TREAD AREA

STANDARD PROCEDURE - TIRE PRESSURE FOR HIGH SPEED OPERATION

DaimlerChrysler Corporation advocates driving at safe speeds within posted speed limits. Where speed limits allow the vehicle to be driven at high speeds, correct tire inflation pressure is very important. Vehicles loaded to maximum capacity should not be driven at continuous speeds over 120 km/h (75 mph). Never exceed the maximum speed capacity of the tire. For information on tire identification and speed ratings, (Refer to 22 - TIRES/WHEELS/TIRES - DESCRIPTION).

STANDARD PROCEDURE - TIRE LEAK REPAIRING

For proper repairing, a radial tire must be removed from the wheel. Repairs should only be made if the defect, or puncture, is in the tread area (Fig. 27). The tire should be replaced if the puncture is located in the sidewall.

Deflate tire completely before attempting to dismount the tire from the wheel. **Use a lubricant such as a mild soap solution when dismounting or mounting tire.** Use tools free of burrs or sharp edges which could damage the tire or wheel rim.

Before mounting tire on wheel, make sure all rust is removed from the rim bead and repaint if necessary.

Install wheel on vehicle, and progressively tighten the 5 wheel nuts to a torque of 135 N·m (100 ft. lbs.).

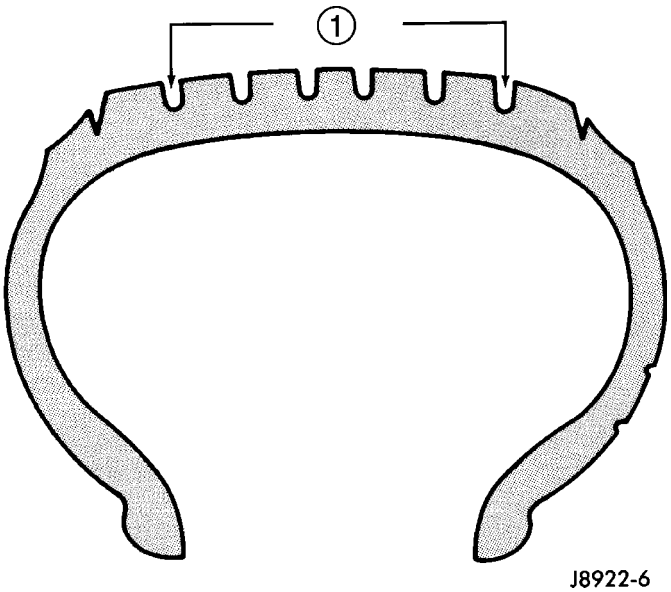


Fig. 27 Tire Repair Area

1 - REPAIRABLE AREA

CLEANING - TIRES

Before delivery of a vehicle, remove the protective coating on the tires with white sidewalls or raised

TIRES (Continued)

white letters. To remove the protective coating, apply warm water and let it soak for a few minutes. Afterwards, scrub the coating away with a soft bristle brush. Steam cleaning may also be used to remove the coating.

CAUTION: DO NOT use gasoline, mineral oil, oil-based solvent or a wire brush for cleaning.

WHEELS

DESCRIPTION - WHEEL

Original equipment wheels are designed for proper operation at all loads up to the specified maximum vehicle capacity.

All models use either steel or aluminum drop-center wheels. Every wheel has raised sections between the rim flanges and rim drop well called safety humps (Fig. 28). Initial inflation of the tires forces the bead over these raised sections. In case of air loss, the safety humps hold the tire in position on the wheel until the vehicle can be brought to a safe stop.

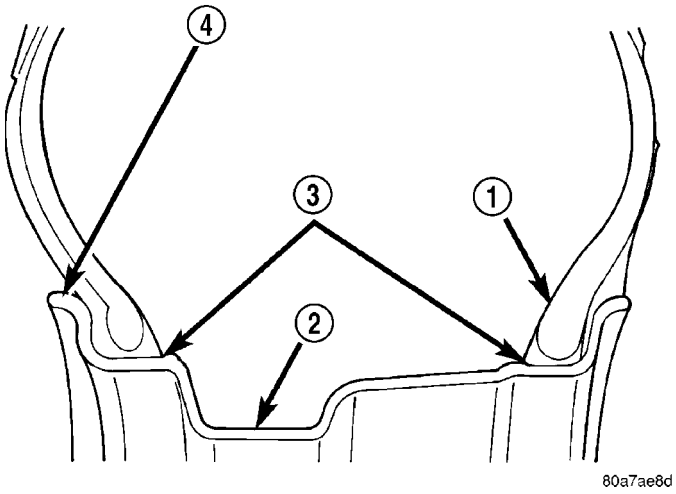


Fig. 28 Safety Rim

1 - TIRE
2 - WELL
3 - SAFETY HUMPS
4 - FLANGE

Cast aluminum wheels require special balance weights to fit on the flange of the rim (Fig. 29).

When wheel alignment is necessary on a vehicle with cast aluminum wheels, special wheel clamps are required to avoid damage to the wheel's finish.

The wheel studs and nuts are designed for specific wheel applications and must be replaced with equivalent parts.

All aluminum wheels have wheel mounting (lug) nuts with an enlarged nose. This enlarged nose is necessary to ensure proper retention of the wheels.

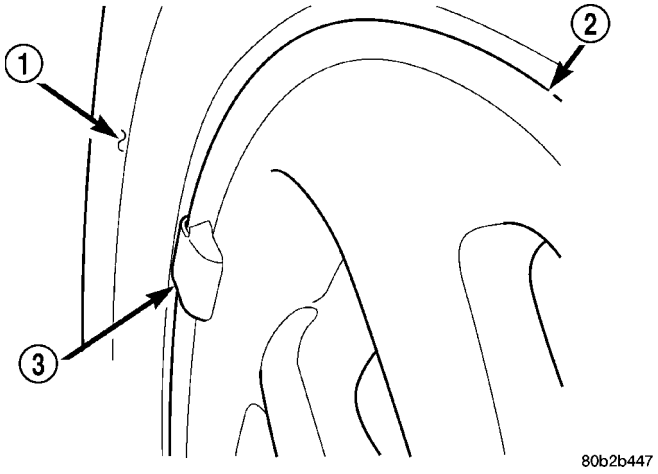


Fig. 29 Styled Aluminum Wheel Weight

1 - TIRE
2 - WHEEL
3 - STYLED WHEEL WEIGHT

DIAGNOSIS AND TESTING - WHEEL INSPECTION

Inspect wheels for:

- Excessive runout
- Dents, cracks or irregular bends
- Damaged wheel stud (lug) holes
- Air Leaks

NOTE: Do not attempt to repair a wheel by hammering, heating or welding.

If a wheel is damaged, an original equipment replacement wheel should be used. When obtaining replacement wheels, they must be equivalent in load carrying capacity. The diameter, width, offset, pilot hole and bolt circle of the wheel should be the same as the original wheel.

WARNING: FAILURE TO USE EQUIVALENT REPLACEMENT WHEELS MAY ADVERSELY AFFECT THE SAFETY AND HANDLING OF THE VEHICLE.

WARNING: REPLACEMENT WITH USED WHEELS IS NOT RECOMMENDED. THE SERVICE HISTORY OF THE WHEEL MAY HAVE INCLUDED SEVERE TREATMENT OR VERY HIGH MILEAGE. THE RIM COULD FAIL WITHOUT WARNING.

CLEANING - ALUMINUM WHEEL CARE

Chrome plated and painted aluminum wheels should be cleaned regularly using mild soap and water to maintain their luster and to prevent corrosion.

WHEELS (Continued)

Care must be taken in the selection of tire and wheel cleaning chemicals and equipment to prevent damage to the wheels. Any of the "DO NOT USE" items listed below WILL damage chrome plated and painted aluminum wheels.

DO NOT USE:

- any abrasive metal cleaner
- any abrasive cleaning pad or brush
- any cleaner that contains an acid (this will immediately react with and discolor the chromium surface)
- chrome polish (unless it is buffed off immediately after application)
- oven cleaner
- a car wash that uses carbide-tipped wheel cleaning brushes

SPECIFICATIONS

WHEEL

SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Wheel Mounting (Lug) Nut Hex Size	19 mm
Wheel Mounting Stud Size	M12 x 1.5 mm

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
TPM Sensor Mounting Nut	4	—	35
Wheel Mounting (Lug) Nut	135	100	—

WHEEL COVER

DESCRIPTION

This vehicle uses a bolt-on type wheel cover (Fig. 30).

This bolt-on wheel cover cannot be removed from the wheel until three of the five wheel mounting nuts shown are removed (Fig. 30). The bolt-on wheel cover can then be removed with the remaining two wheel nuts tightened in place.

REMOVAL

(1) Noting the location of the valve stem in relationship to the wheel mounting nuts, remove the three wheel mounting nuts securing the wheel cover to the wheel and hub (Fig. 30).

CAUTION: When removing the wheel cover, do not pry the wheel cover from the wheel. This can result in damage to the wheel cover. The wheel cover is removed by pulling it off the wheel by hand.

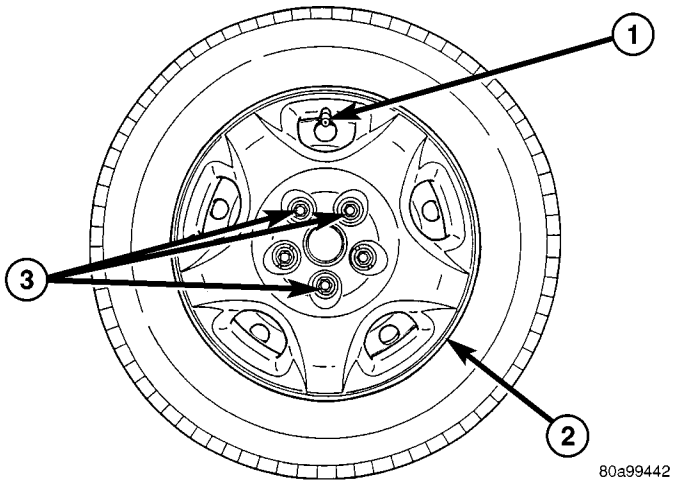


Fig. 30 Nuts Securing Wheel Cover

1 - VALVE STEM
2 - BOLT-ON WHEEL COVER
3 - NUTS SECURING WHEEL COVER

(2) Grasp the wheel cover at the edges in line with the remaining installed wheel nuts and pull straight outward from the wheel. This will pop the wheel cover retaining tabs over the two remaining wheel nuts, removing the wheel cover from the wheel.

INSTALLATION

NOTE: Wheel mounting nuts must be installed on the studs as shown to allow installation of the wheel cover (Fig. 31).

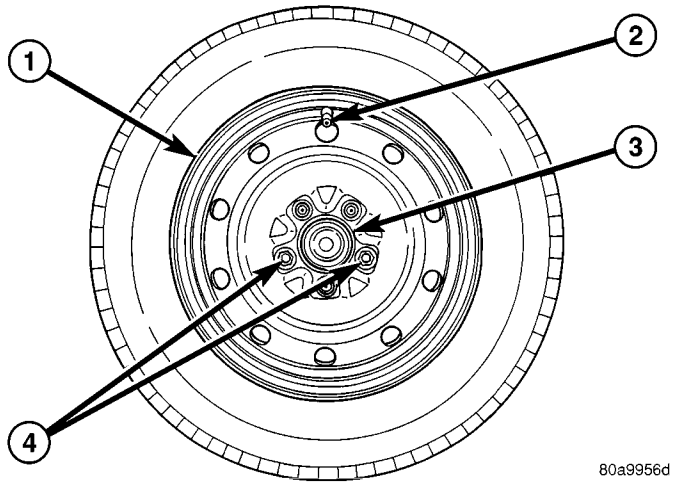


Fig. 31 Two Wheel Mounting Nuts Installed

1 - WHEEL
2 - VALVE STEM
3 - HUB PILOT
4 - NUTS

WHEEL COVER (Continued)

(1) Place the wheel cover on the wheel in the following fashion:

(a) Align the valve notch in the wheel cover with the valve stem on the wheel.

(b) At the same time, align the two holes in the wheel cover having the retaining tabs with the two installed wheel nuts (Fig. 32).

(c) Press in on center of wheel cover until wheel cover retaining tabs push past and engage rear of previously installed wheel mounting nuts (Fig. 32). This will hold the wheel cover in place.

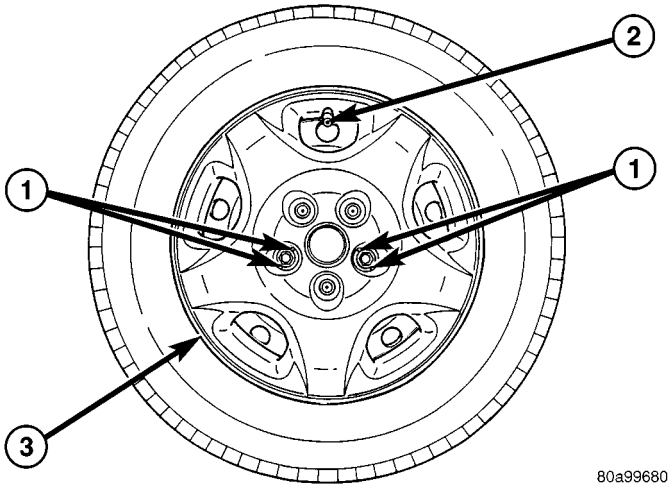


Fig. 32 Wheel Cover Installation Over Two Nuts

1 - RETAINING TABS
2 - VALVE STEM
3 - BOLT-ON WHEEL COVER

(2) Install and **lightly tighten** the three remaining wheel mounting nuts, securing the wheel cover in place (Fig. 30).

(3) Tighten all five wheel mounting nuts in the proper sequence (Fig. 33). Tighten wheel nuts to a torque of 135 N·m (100 ft. lbs.).

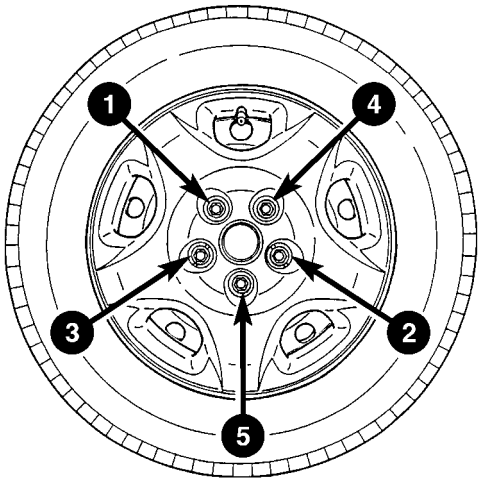


Fig. 33 Nut Tightening Sequence

WHEEL MOUNTING STUDS - FRONT

REMOVAL

CAUTION: If a wheel mounting stud needs to be replaced in the hub and bearing assembly, the studs MUST NOT be hammered out of the hub flange. If a stud is removed by hammering it out of the bearing flange, damage to the hub and bearing assembly will occur leading to premature bearing failure.

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the front wheel and tire assembly from the vehicle.

(3) Remove the two adapter mounting bolts securing both the disc brake caliper adapter to the steering knuckle (Fig. 34).

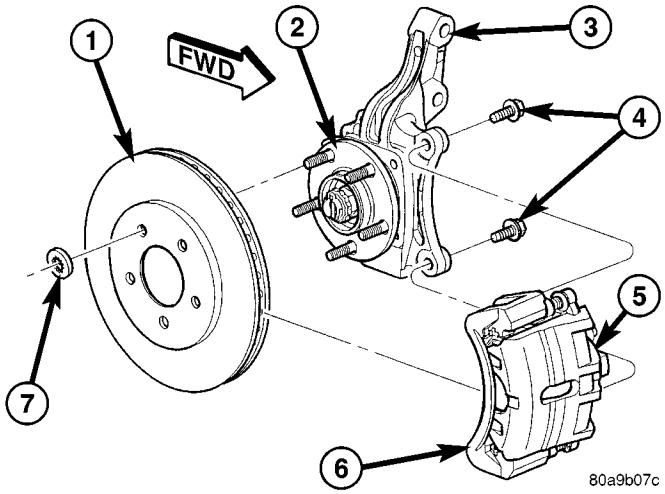


Fig. 34 Front Brake Mounting

1 - BRAKE ROTOR
2 - HUB AND BEARING
3 - STEERING KNUCKLE
4 - ADAPTER MOUNTING BOLTS
5 - BRAKE CALIPER
6 - ADAPTER
7 - CLIP

(4) Remove the disc brake caliper and adapter as an assembly from the steering knuckle (Fig. 34). Hang the assembly out of the way using wire or a bungee cord. Use care not to overextend the brake hose when doing this.

(5) Remove brake rotor from hub by pulling it straight off wheel mounting studs (Fig. 34).

(6) On the wheel mounting stud to be removed, install a wheel mounting (lug) nut far enough so the threads on the stud are even with end of nut. Install

WHEEL MOUNTING STUDS - FRONT (Continued)

Remover, Special Tool C-4150A on hub and bearing assembly flange and wheel stud (Fig. 35).

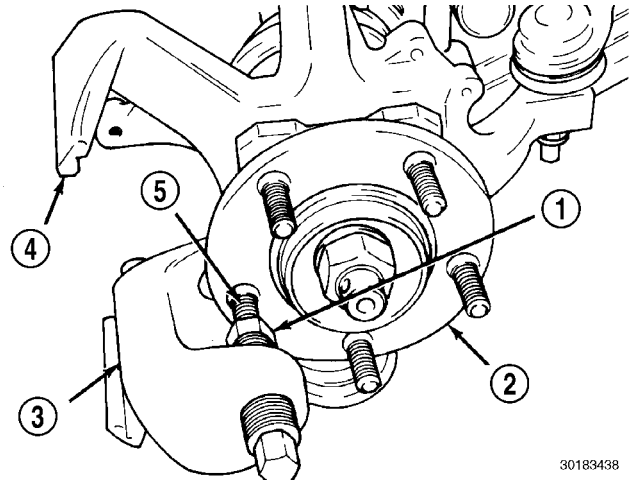


Fig. 35 Wheel Stud Removal (Typical)

1 - WHEEL MOUNTING (LUG) NUT
2 - HUB AND BEARING ASSEMBLY
3 - SPECIAL TOOL C-4150A
4 - STEERING KNUCKLE
5 - WHEEL STUD

(7) Tighten down on special tool, pushing wheel stud out of the hub flange. When shoulder of wheel stud is past flange, remove special tool from hub and bearing. Remove nut from stud and remove stud from hub flange.

INSTALLATION

(1) Install replacement wheel stud into flange of hub and bearing assembly. Install washers on wheel stud, then install a wheel mounting (lug) nut on stud with flat side of lug nut against washers as shown (Fig. 36).

(2) Tighten the nut, pulling the wheel stud into the flange of the hub and bearing. When the head of the stud is fully seated against the rear of the hub flange, remove nut and washers from stud.

(3) Install the brake rotor back on the hub and bearing (Fig. 34).

(4) Install brake caliper and adapter back over brake rotor aligning adapter with mounting holes on steering knuckle (Fig. 34).

(5) Install the two adapter mounting bolts securing the adapter to the steering knuckle. Tighten the mounting bolts to 169 N·m (125 ft. lbs.) torque.

(6) Install wheel and tire assembly on vehicle. Tighten the wheel mounting lug nuts in proper sequence until all nuts are torqued to half specification, then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(7) Lower vehicle to the ground.

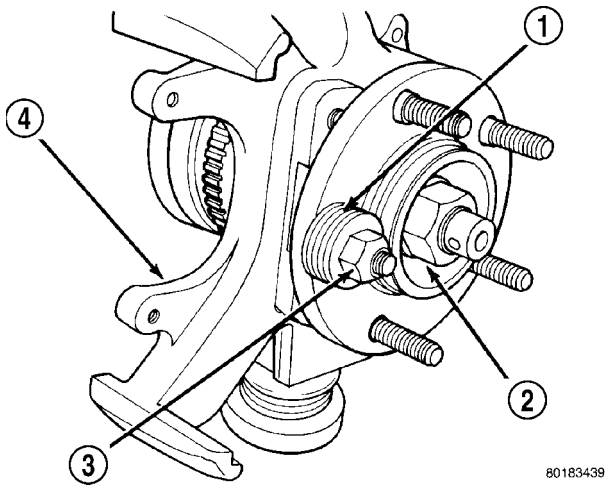


Fig. 36 Installing Wheel Stud (Typical)

1 - WASHERS
2 - HUB AND BEARING ASSEMBLY
3 - WHEEL MOUNTING (LUG) NUT
4 - STEERING KNUCKLE

WHEEL MOUNTING STUDS - REAR

REMOVAL

CAUTION: If a wheel attaching stud needs to be replaced in the hub and bearing assembly the studs MUST NOT be hammered out of the hub flange. If a stud is removed by hammering it out of the bearing flange, damage to the hub and bearing assembly will occur leading to premature hub and bearing failure.

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the rear wheel and tire assembly.

(3) Remove the brake drum or disc brake caliper and rotor. Refer to Brakes.

(4) Install a lug nut on the wheel stud to be removed from the hub and bearing assembly (Fig. 37) so the threads on stud are even with end of lug nut. Install Remover, Special Tool C-4150A on hub and bearing assembly flange and wheel stud (Fig. 37).

(5) Tightening down on special tool will push wheel stud out of the hub and bearing assembly flange.

(6) Remove lug nut from stud and remove wheel stud from flange.

WHEEL MOUNTING STUDS - REAR (Continued)

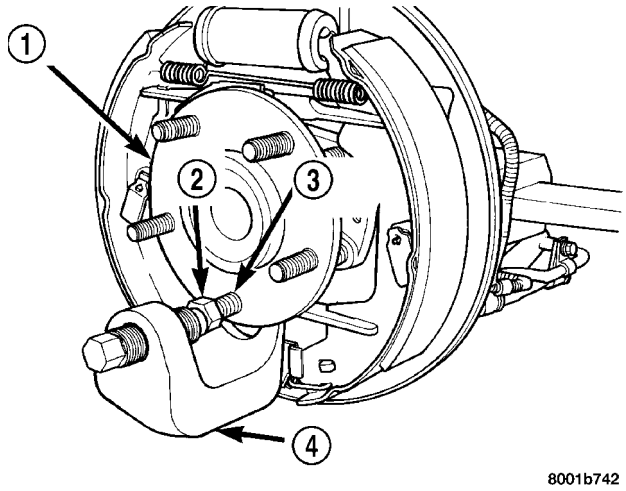


Fig. 37 Wheel Stud Removal From Hub And Bearing

1 - HUB AND BEARING ASSEMBLY
2 - WHEEL MOUNTING (LUG) NUT
3 - WHEEL STUD
4 - SPECIAL TOOL C-4150A

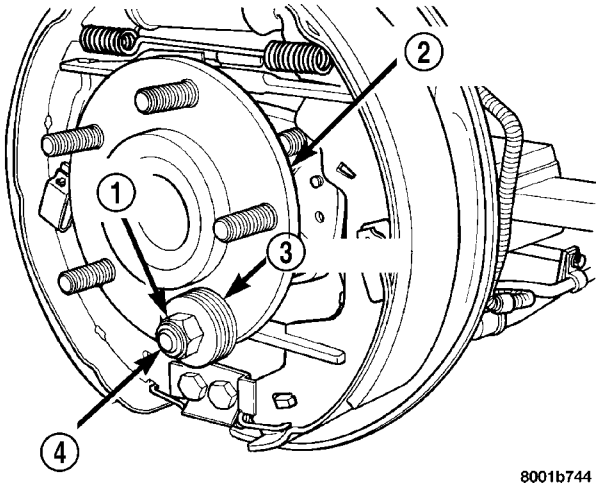


Fig. 38 Wheel Stud Installation

1 - WHEEL MOUNTING (LUG) NUT
2 - HUB AND BEARING ASSEMBLY
3 - WASHERS
4 - WHEEL STUD

INSTALLATION

(1) Install replacement wheel stud into flange of hub and bearing assembly. Install washers on wheel stud, then install a wheel lug nut on stud with flat side of lug nut against washers (Fig. 38).

(2) Tighten the wheel lug nut, pulling the wheel stud into the flange of the hub and bearing assembly. When the head of the stud is fully seated against the bearing flange, remove lug nut and washers from wheel stud.

(3) Install the brake drum or disc brake rotor and caliper on the hub and bearing assembly.

(4) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(5) Lower vehicle to the ground.

TIRES/WHEELS

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TIRE PRESSURE MONITORING

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TIRE PRESSURE MONITORING

DESCRIPTION

Some versions of this vehicle are equipped with a Tire Pressure Monitoring (TPM) system. It monitors air pressure in the four road tires. Pressure in the spare tire is not monitored.

There is a sensor (transmitter) in each of the vehicle's four road wheels that is built in to the valve stem. The system alerts the driver when tire pressure falls outside predetermined thresholds (pressure too low or too high). A message is then displayed on the Compass Mini Trip Computer (CMTC).

For further information, refer to the Owners Manual or the appropriate diagnostic information.

OPERATION

The Tire Pressure Monitoring (TPM) system uses radio and sensor technology to monitor tire air pressure levels. Sensors, mounted to each road wheel as part of the valve stem, transmit an RF frequency indicating their individual pressure to a receiver located in the Sentry Key Remote Entry Module (SKREEM). These transmissions occur approximately once every minute at speeds over 13 mph (20 km/h). The Tire Pressure Monitoring system remains active even if no tire pressure related message is displayed.

SENSOR - TPM

DESCRIPTION

On vehicles equipped with Tire Pressure Monitoring, one tire pressure sensor is mounted to each wheel (Fig. 2). Each sensor has an internal battery that lasts up to 10 years. The battery is not serviceable. At the time of battery failure, the sensor must be replaced. The serviceable components of the tire pressure sensor are:

- Sensor-To-Wheel Grommet
- Valve Stem Cap
- Valve Stem Core

Valve stem caps and cores are specifically designed for the tire pressure monitoring sensors. Although similar to standard valve stem caps and cores, they are different.

CAUTION: Do not use a standard valve stem cap or core in a tire pressure sensor. Always use the original equipment style sensor cap and core.

CAUTION: Do not reuse the Sensor-To Wheel Grommet. Always use a new grommet when installing a pressure sensor and properly torque the sensor nut.

SENSOR - TPM (Continued)

CAUTION: Do not try to install a tire pressure sensor in a steel wheel or aftermarket wheel. Use only in original style factory wheels.

OPERATION

The tire pressure sensors are battery operated. Each sensor transmits tire pressure data approximately once every minute at speeds above 13 mph (20 km/h). Each sensor's (transmitter) broadcast is uniquely coded so that the SKREEM can monitor the states of each individual sensor on the vehicle. Unlike prior model year TPM systems, a magnet is not required to retrain the system. The SKREEM automatically learns while driving after a sensor has been replaced. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

For additional information, refer to Appropriate Diagnostic Information.

CAUTION

CAUTION: The use of tire sealants is strictly prohibited for vehicles equipped with the Tire Pressure Monitoring system. Tire sealants can clog tire pressure sensors.

CAUTION: Tire pressure sensor valve stem caps and cores are specially designed for the sensors. Due to risk of corrosion, do not use a standard valve stem cap or core in a tire pressure sensor in place of the original equipment style sensor cap and core.

CAUTION: Do not attempt to install a tire pressure sensor in a steel wheel or aftermarket wheel. Use tire pressure sensors in original style factory wheels only.

NOTE: TPM thresholds have been established for the original tire size equipped on the vehicle. Use original size tires only to maintain system accuracy.

DIAGNOSIS AND TESTING - TIRE PRESSURE SENSOR

NOTE: Tire pressure may increase from 2 to 6 psi (14 to 41 kPa) during normal driving conditions. Do NOT reduce this normal pressure build up.

If a fault in the system is detected, always check air pressure in the tires first with a known accurate air gauge and correct the inflation pressure. If any tire is low, inspect **all** the tires.

If the gauge-read pressure in the tires does not indicate a tire pressure issue, refer to the appropriate diagnostic information.

STANDARD PROCEDURE - TIRE PRESSURE SENSOR RETRAIN

CAUTION: If a sensor is replaced, the vehicle must be parked for a minimum of 15 minutes for the system to be ready to learn the new sensor ID code.

(1) Park the car for a minimum of 15 minutes.

(2) Drive the vehicle for a minimum of five minutes while maintaining a continuous speed above 13 mph (20 km/h). During this time the system will learn the new sensor ID code and will clear any DTC's automatically.

NOTE: If a sensor cannot be trained, refer to appropriate diagnostic information.

REMOVAL

(1) Remove tire and wheel assembly from vehicle. (Refer to 22 - TIRES/WHEELS - REMOVAL)

CAUTION: The cap used on this valve stem contains an O-ring seal to prevent contamination and moisture from entering the valve stem. Retain this valve stem cap for reuse. Do not substitute a regular valve stem cap in its place.

CAUTION: The valve stem used on this vehicle is made of aluminum and the core is nickel plated brass. The original valve stem core must be reinstalled and not substituted with a valve stem core made of a different material. This is required to prevent corrosion in the valve stem caused by the different metals.

(2) Dismount tire from wheel following tire changer manufacturers instructions while paying special attention to the following to avoid damaging the pressure sensor:

(a) When breaking the tire bead loose from the wheel rim, avoid using the Bead Breaker in the area of the sensor. That includes both front and rear beads of the tire.

(b) When preparing to dismount the tire from the wheel, carefully insert the mounting/dimounting tool at the valve stem ± 10° (Fig. 1), then proceed to dismount the tire from the wheel. Use this process on both the upper and lower tire beads.

(3) Using a thin wall socket, remove special nut retaining sensor to wheel (Fig. 2).

(4) Remove sensor from wheel (Fig. 2).

SENSOR - TPM (Continued)

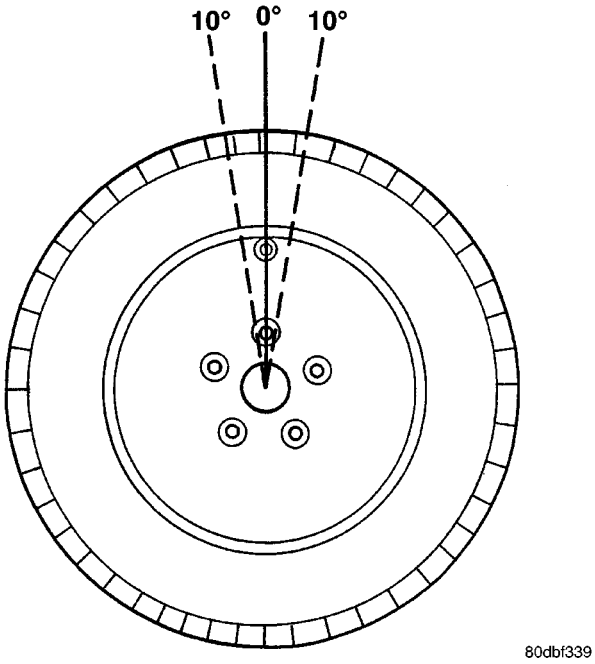

Fig. 1 Start Mount/Dismount Tool Within 10 Degrees Of Valve Stem

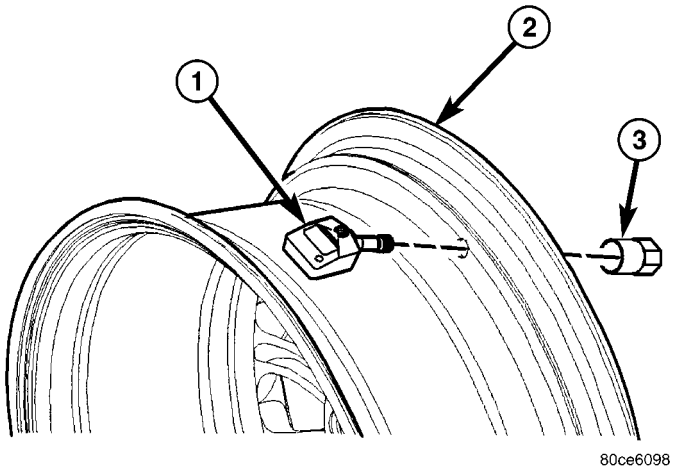

Fig. 2 Sensor Mounting To Wheel

1 - TIRE PRESSURE SENSOR
2 - WHEEL
3 - NUT

INSTALLATION

NOTE: Before reinstalling a tire pressure sensor, replace sealing grommet at base of valve stem.

(1) Wipe area clean where sensor sealing grommet contacts wheel. Make sure surface of wheel is not damaged.

(2) Install sensor in wheel as shown (Fig. 2). Do not attempt to mount sensor otherwise, damage may occur.

(3) Using a thin wall socket, install special sensor nut (Fig. 2). Tighten nut to 4 N·m (35 in. lbs.) torque.

CAUTION: Over-torquing the sensor nut by as little as 12 N·m (106 in. lbs.) may result in sensor separation from the valve stem. Under this condition, the sensor may still function, however, the condition should be corrected immediately.

(4) Mount tire on wheel following tire changer manufacturers instructions, paying special attention to the following to avoid damaging tire pressure sensor:

(a) Rotating Wheel Tire Changers - Once the wheel is mounted to the changer, position the sensor valve stem approximately 210° from the head of the changer in a clockwise direction before rotating the wheel (also in a clockwise direction) to mount the tire (Fig. 3). Use this procedure on both the upper and lower tire beads.

(b) Rotating Tool Tire Changers - Position the wheel on the changer so that the sensor valve stem is approximately 210° from the head of the changer in a clockwise direction from the mounting end of the tool (Fig. 4) Make sure the sensor is clear of the lower bead breaker area to avoid damaging the sensor when the breaker rises (Fig. 4). Rotate the tool in a counterclockwise direction to mount the tire. Use this procedure on both the upper and lower tire beads.

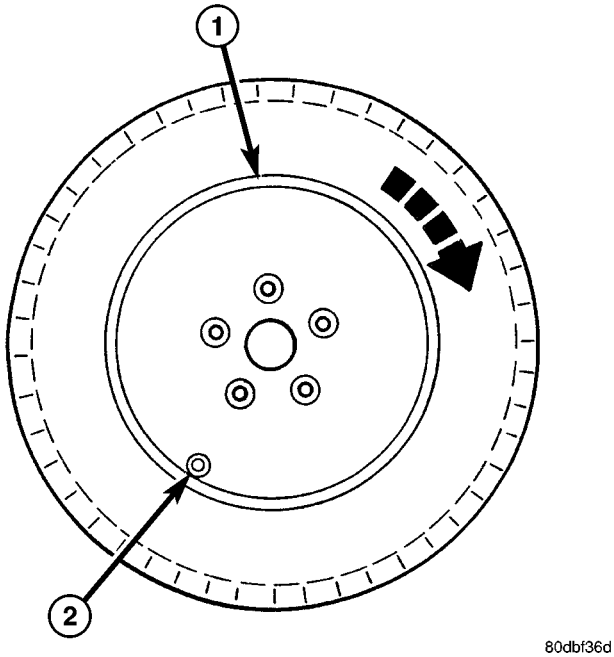

Fig. 3 Mounting Tire Using Rotating Wheel Machine

1 - HEAD OF CHANGER LOCATED HERE
2 - VALVE STEM

SENSOR - TPM (Continued)

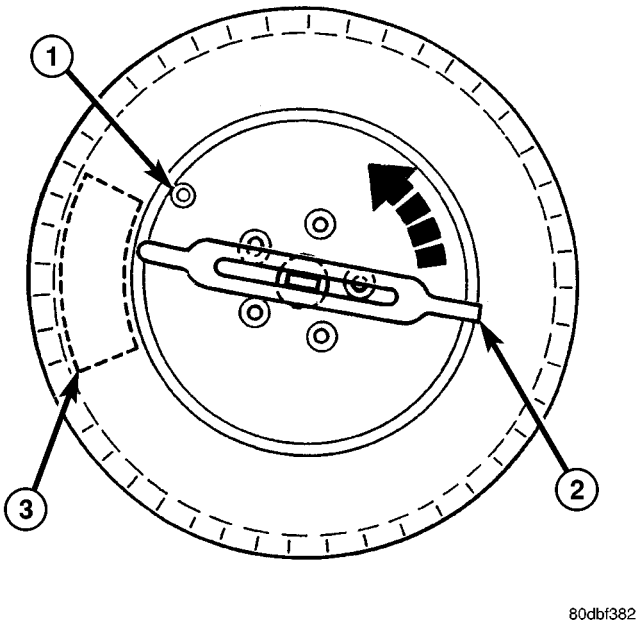

Fig. 4 Mounting Tire Using Rotating Tool Machine

1 - VALVE STEM
2 - MOUNTING END OF TOOL
3 - BEAD BREAKER (KEEP CLEAR OF SENSOR)

(5) Install wheel and tire assembly on vehicle. (Refer to 22 - TIRES/WHEELS - INSTALLATION)

(6) Retrain tire pressure sensors. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/ SENSOR - STANDARD PROCEDURE)

TIRES

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TIRES

DESCRIPTION

DESCRIPTION - TIRE

Tires are designed and engineered for each specific vehicle. They provide the best overall performance for normal operation. The ride and handling characteristics match the vehicle's requirements. With proper care they will give excellent reliability, traction, skid resistance, and tread life.

Driving habits have more effect on tire life than any other factor. Careful drivers will obtain, in most cases, much greater mileage than severe use or careless drivers. A few of the driving habits which will shorten the life of any tire are:

- Rapid acceleration
- Severe application of brakes
- High-speed driving
- Taking turns at excessive speeds
- Striking curbs and other obstacles
- Operating vehicle with over or under inflated tire pressures

Radial ply tires are more prone to irregular tread wear. It is important to follow the tire rotation interval shown in the section on Tire Rotation. This will help to achieve a greater tread-life potential.

TIRE IDENTIFICATION

Tire type, size, load index and speed rating are encoded in the letters and numbers imprinted on the side wall of the tire. Refer to the Tire Identification chart to decipher the code. For example purposes, the tire size P225/60 R 16 97 T is used in the chart. An All Season type tire will also have either M + S, M & S or M - S (indicating mud and snow traction) imprinted on the side wall. An Extra or Light Load marking "XL" or "LL" may also be listed on the sidewall. The absence of an "XL" or "LL" marking infers a standard load tire.

TIRE IDENTIFICATION

P	TIRE TYPE (Not present on all tires)	P - Passenger T - Temporary C - Commercial LT - Light Truck
225	SECTIONAL WIDTH	SHOWN IN MILLIMETERS
60	ASPECT RATIO	SECTIONAL HEIGHT ÷ SECTIONAL WIDTH (Refer to Aspect Ratio Figure 1)
R	CONSTRUCTION TYPE	R - RADIAL B - BIAS BELTED D - DIAGONAL (BIAS)
16	WHEEL DIAMETER	SHOWN IN INCHES
97	LOAD INDEX	*
T	SPEED RATING	*

*** NOTE: Consult the tire manufacturer regarding any questions on tire specifications or capabilities.**

TIRES (Continued)

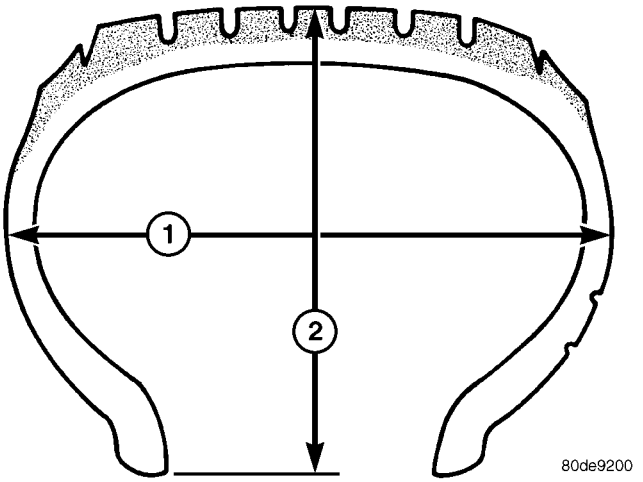


Fig. 1 Tire Aspect Ratio

1 - SECTIONAL WIDTH
2 - SECTIONAL HEIGHT

TIRE CHAINS

Refer to the owners manual supplied with the vehicle to determine whether the use of tire chains is permitted on this vehicle.

DESCRIPTION - RADIAL-PLY TIRES

Radial-ply tires improve handling, tread life, ride quality and decrease rolling resistance.

Radial-ply tires must always be used in sets of four and under no circumstances should they be used on the front only. It is recommended that tires from different manufacturers NOT be mixed. They may be mixed with a temporary spare tire when necessary. A maximum speed of 80 km/h (50 mph) is recommended while a temporary spare is in use.

Radial-ply tires have the same load-carrying capacity as other types of tires of the same size. They also use the same recommended inflation pressures.

DESCRIPTION - REPLACEMENT TIRES

WARNING: FAILURE TO EQUIP THE VEHICLE WITH TIRES HAVING ADEQUATE SPEED CAPABILITY CAN RESULT IN SUDDEN TIRE FAILURE.

WARNING: IN ORDER TO MAINTAIN THE SPEED CAPABILITY OF THE VEHICLE, REPLACEMENT TIRES MUST HAVE SPEED RATINGS EQUAL TO OR HIGHER THAN THOSE FITTED TO THE VEHICLE AS ORIGINAL EQUIPMENT. IF TIRES WITH LOWER SPEED RATINGS ARE FITTED, THE VEHICLE'S HANDLING MAY BE AFFECTED AND THE SPEED CAPABILITY OF THE VEHICLE MAY BE LOWERED TO THE MAXIMUM SPEED CAPABILITY OF THE REPLACEMENT TIRES. TO AVOID AN ACCIDENT RESULTING IN SEVERE OR FATAL INJURY, CONSULT THE TIRE MANUFACTURER IN REGARDS TO MAXIMUM SPEED RATINGS.

It is recommended that tires equivalent to the original equipment tires be used when replacement is needed.

Failure to use equivalent replacement tires may adversely affect the safety and handling of the vehicle.

The original equipment tires provide a proper combination of many characteristics such as:

- Ride
- Noise
- Handling
- Durability
- Tread life
- Traction
- Rolling resistance
- Speed capability

The use of tires smaller than the minimum tire size approved for the vehicle can result in tire overloading and failure.

Use tires that have the approved load rating for the vehicle and never overload them. Failure to equip the vehicle with tires having adequate speed capability can result in sudden tire failure and loss of vehicle control.

The use of oversize tires may cause interference with vehicle components. Under extremes of suspension and steering travel, interference with vehicle components may cause tire damage.

DESCRIPTION - SPARE TIRE (TEMPORARY)

The temporary (convenience) spare tire is designed for emergency use only. The original tire should be repaired and reinstalled, or replaced with a new, at the first opportunity.

The temporary (convenience) spare tire should be inflated to the pressure listed on its sidewall. Do not exceed speeds of 80 km/h (50 mph) when the temporary spare tire is in use on the vehicle. Refer to the Owner's Manual for more details.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - TIRE NOISE

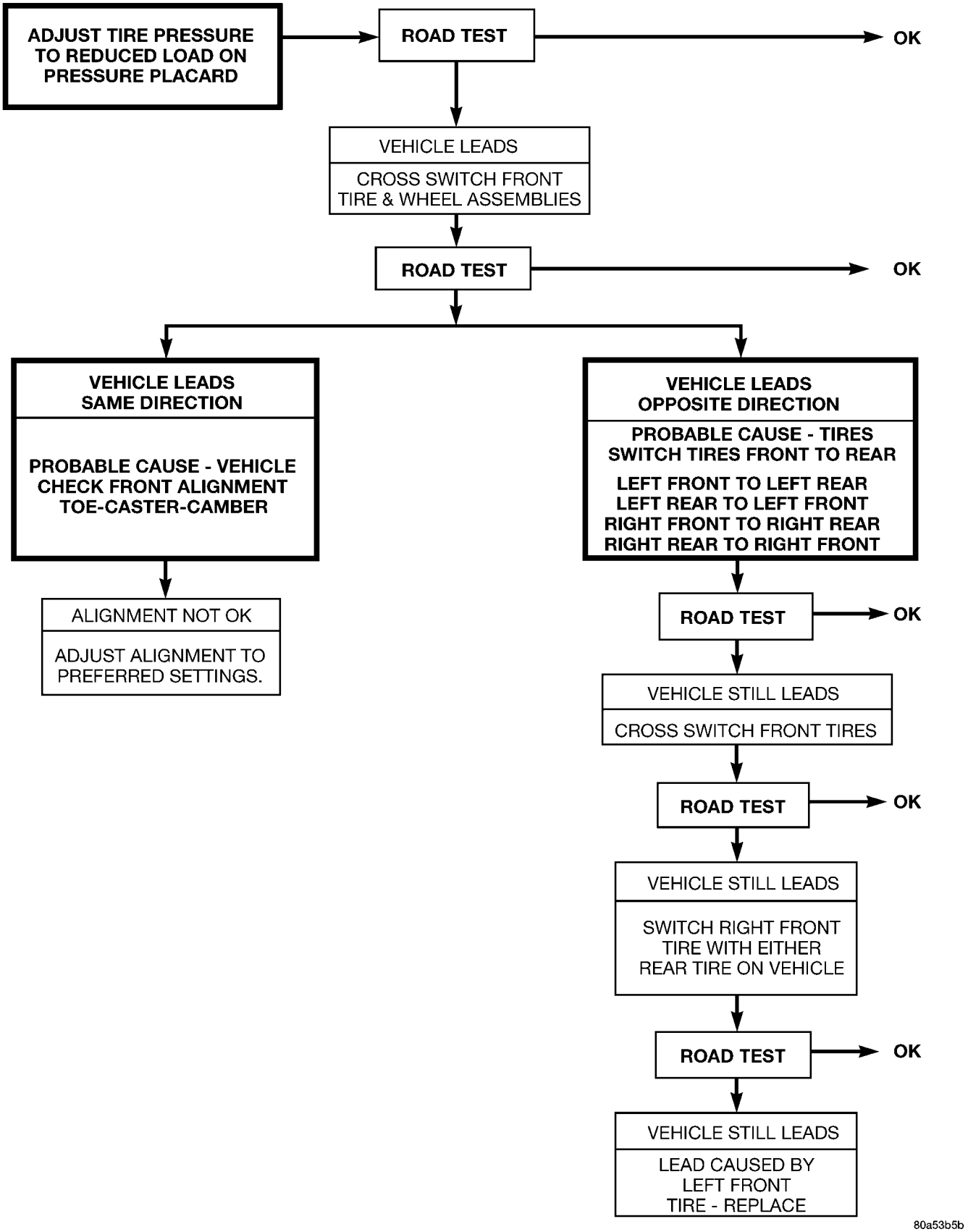
Unusual tire noise can be associated with tire and wheel vibration or irregular tire wear. For vibration, (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING). For irregular tire wear, (Refer to 22 - TIRES/WHEELS/TIRES - DIAGNOSIS AND TESTING).

DIAGNOSIS AND TESTING - TIRE/VEHICLE LEAD

Use the following Vehicle Lead Diagnosis And Correction Chart to diagnose and correct a vehicle lead or drift problem.

TIRES (Continued)

VEHICLE LEAD DIAGNOSIS AND CORRECTION CHART



TIRES (Continued)

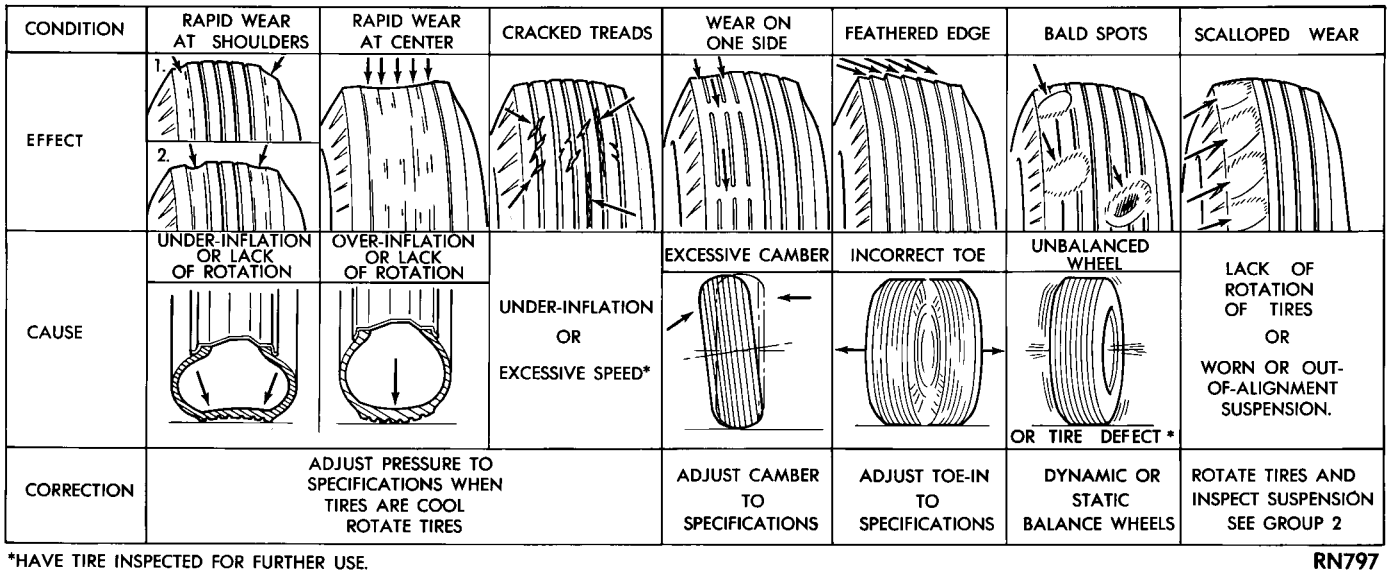


Fig. 2 Tire Wear Patterns

DIAGNOSIS AND TESTING - TIRE WEAR PATTERNS

Under inflation will cause wear on the shoulders of tire. Over inflation will cause wear at the center of tire.

Excessive camber causes the tire to run at an angle to the road. One side of tread is then worn more than the other (Fig. 2).

Excessive toe-in or toe-out causes wear on the tread edges and a feathered effect across the tread (Fig. 2).

DIAGNOSIS AND TESTING - TREAD WEAR INDICATORS

Tread wear indicators are molded into the bottom of the tread grooves. When tread depth is 1.6 mm (1/16 in.), the tread wear indicators will appear as a 13 mm (1/2 in.) band (Fig. 3).

Tire replacement is necessary when indicators appear in two or more grooves or if localized balding occurs.

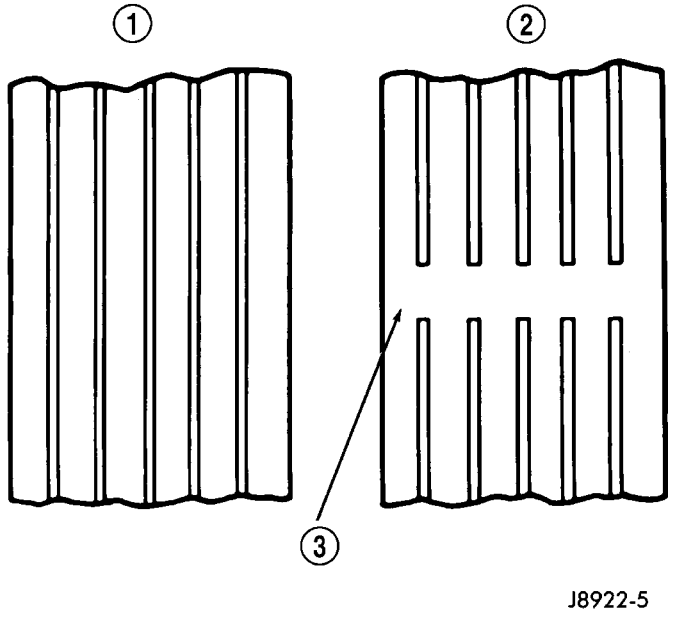


Fig. 3 Tread Wear Indicators

1 - TREAD ACCEPTABLE
2 - TREAD UNACCEPTABLE
3 - WEAR INDICATOR

STANDARD PROCEDURE

STANDARD PROCEDURE - TIRE INFLATION PRESSURES

The specified tire pressures have been chosen to provide safe operation, vehicle stability, and a smooth ride. The proper tire pressure specification can be found on the Tire Inflation Pressure Label provided with the vehicle (usually on the driver's side B-pillar).

A quality air pressure gauge is recommended to check tire air pressure. Tire pressure should be checked cold once per month. Check tire pressure more frequently when the weather temperature varies widely. Tire pressure will decrease when the outdoor temperature drops. After checking the air pressure, replace valve cap finger tight.

Inflation pressures specified on the Tire Inflation Pressure Label are always the cold inflation pressure of the tire. Cold inflation pressure is obtained after the vehicle has not been operated for at least 3 hours, or the vehicle is driven less than one mile after being inoperative for 3 hours. Tire inflation

TIRES (Continued)

pressures may increase from 2 to 6 pounds per square inch (psi) (14 to 41 kPa) during operation. Do not reduce this normal pressure buildup.

Improper inflation can cause:

- Uneven wear patterns
- Reduced tread life
- Reduced fuel economy
- Unsatisfactory ride
- The vehicle to drift.

WARNING: OVER OR UNDER INFLATED TIRES CAN AFFECT VEHICLE HANDLING. THE TIRE CAN FAIL SUDDENLY, RESULTING IN LOSS OF VEHICLE CONTROL.

Under inflation causes rapid shoulder wear, tire flexing, and can result in tire failure (Fig. 4).

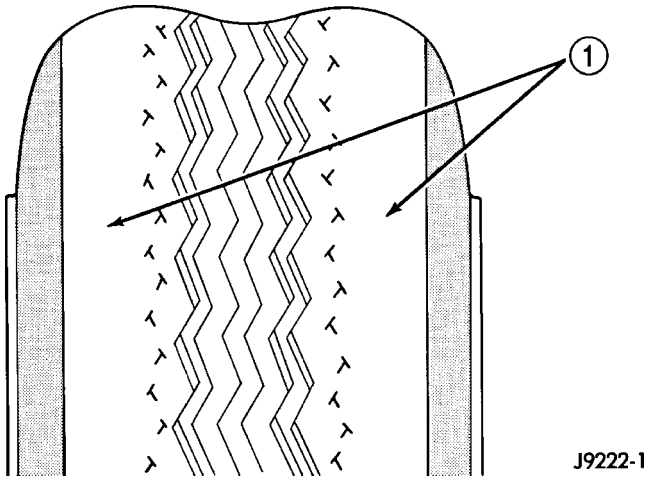


Fig. 4 Under Inflation Wear

1 - THIN TIRE TREAD AREAS

Over inflation causes rapid center wear and loss of the tire's ability to cushion shocks (Fig. 5).

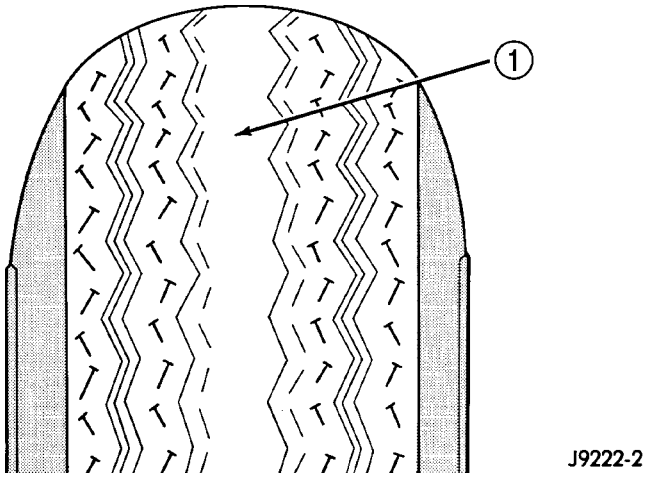


Fig. 5 Over Inflation Wear

1 - THIN TIRE TREAD AREA

STANDARD PROCEDURE - TIRE PRESSURE FOR HIGH SPEED OPERATION

DaimlerChrysler Corporation advocates driving at safe speeds within posted speed limits. Where speed limits allow the vehicle to be driven at high speeds, correct tire inflation pressure is very important. Vehicles loaded to maximum capacity should not be driven at continuous speeds over 120 km/h (75 mph). Never exceed the maximum speed capacity of the tire. For information on tire identification and speed ratings, (Refer to 22 - TIRES/WHEELS/TIRES - DESCRIPTION).

STANDARD PROCEDURE - TIRE LEAK REPAIRING

For proper repairing, a radial tire must be removed from the wheel. Repairs should only be made if the defect, or puncture, is in the tread area (Fig. 6). The tire should be replaced if the puncture is located in the sidewall.

Deflate tire completely before attempting to dismount the tire from the wheel. **Use a lubricant such as a mild soap solution when dismounting or mounting tire.** Use tools free of burrs or sharp edges which could damage the tire or wheel rim.

Before mounting tire on wheel, make sure all rust is removed from the rim bead and repaint if necessary.

Install wheel on vehicle, and progressively tighten the 5 wheel nuts to a torque of 135 N·m (100 ft. lbs.).

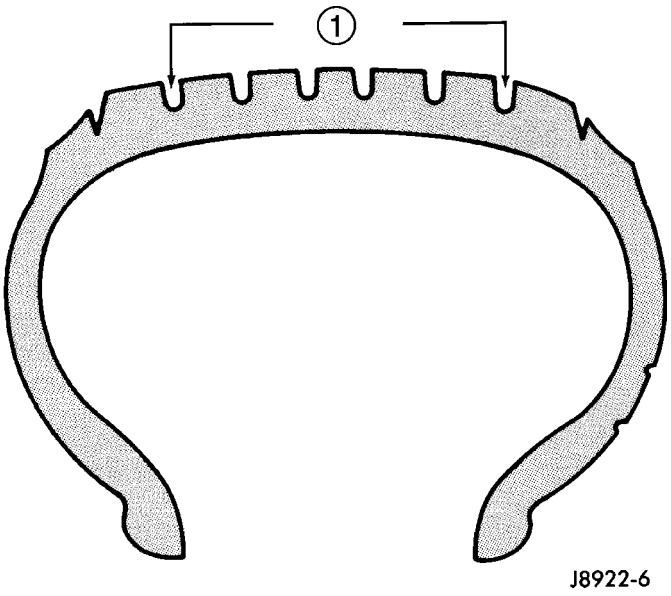


Fig. 6 Tire Repair Area

1 - REPAIRABLE AREA

TIRES (Continued)

CLEANING - TIRES

Before delivery of a vehicle, remove the protective coating on the tires with white sidewalls or raised white letters. To remove the protective coating, apply warm water and let it soak for a few minutes. Afterwards, scrub the coating away with a soft bristle brush. Steam cleaning may also be used to remove the coating.

CAUTION: DO NOT use gasoline, mineral oil, oil-based solvent or a wire brush for cleaning.