

# MAINTENANCE OPERATIONS

# GROUP 20

## PART 20-1

### MAINTENANCE OPERATIONS

| Section               | Page | Section                             | Page  |
|-----------------------|------|-------------------------------------|-------|
| 1 Engine .....        | 20-1 | 3 Chassis .....                     | 20-5  |
| 2 Transmissions ..... | 20-4 | 4 Body Maintenance Operations ..... | 20-11 |

## 1 ENGINE

### CHANGE OIL AND FILTER

1. Raise the car.
2. Remove the oil pan drain plug and allow the engine oil to drain into a container.
3. Place a drip pan under the filter. Unscrew the filter from the adapter fitting.
4. Coat the gasket on the filter with oil. Place the filter in position on the adapter fitting. Hand tighten the filter until the gasket contacts the adapter face, then advance it ½ turn.
5. Replace the oil pan drain plug and tighten it securely.
6. Refill the crankcase with the proper amount and grade of oil.
7. Lower the car.
8. Operate the engine at fast idle and check for oil leaks. If oil leaks are evident, perform the necessary repairs to correct the leakage.

### ADJUST CARBURETOR—IDLE SPEED, IDLE MIXTURE, AND FAST (COLD) IDLE SPEED

1. Operate the engine for 30 minutes at 1200 rpm to stabilize engine temperatures. Be sure the dashpot is not interfering with the throttle lever, and make sure the choke fast idle cam is in the slow position (fast idle screw not contacting the fast idle cam).

**On a car with air conditioner, operate the air conditioner for 20 minutes before setting the engine idle speed. Adjust the idle speed with the air conditioner running.**

2. Attach a tachometer to the engine. Set the parking brake. **It is necessary to inactivate the vacuum power unit to keep the parking**

**brake engaged when the engine is running during the adjustment procedures.** Turn on the headlights. Place the transmission selector lever in drive range. Check the engine idle speed. Adjust the engine idle speed to specifications by turning the screw inward to increase the speed or by turning the screw outward to decrease the speed. **When performing this adjustment, be sure the dashpot is not interfering with the throttle lever or the fast idle adjusting screw is not contacting the fast idle cam.**

3. Turn each mixture screw (needle) in until the engine rpm begins to drop, due to the lean mixture. Turn the needles out until the engine rpm increases and then begins to drop, due to the rich mixture; then, turn the needles inward for maximum engine rpm and smoothness. The needles should be turned approximately the same amount. The final setting may vary about ½-turn difference between the needles. Always favor a slightly rich mixture rather than a lean mixture.

4. Check the final engine idle speed by manually opening and closing the throttle. Adjust the idle speed, if necessary.

Final engine idle speed may be varied to suit the conditions under which the car is to be operated.

**Engine Fast (Cold) Idle Speed.** The adjusting screw on the right side of the carburetor contacts one edge of the fast idle cam. The cam permits a faster engine idle speed for smoother running when the engine is cold during choke operation. As the choke plate is moved through its range of travel from the closed to the open position, the fast idle cam pick-up lever rotates the fast

idle cam. Each position on the fast idle cam permits a slower idle rpm as engine temperature rises and choking is reduced.

Manually rotate the fast idle cam until the fast idle adjusting screw rests on the next to highest (starting) step of the fast idle cam, adjacent to the shoulder (kickdown step).

Start the engine and turn the fast idle adjusting screw as required to obtain the specified fast idle rpm.

Remove the tachometer if the idle fuel mixture is not going to be adjusted. If the idle fuel mixture is to be adjusted, leave the tachometer installed so that the idle speed can be checked after the idle fuel mixture has been adjusted.

### CLEAN CARBURETOR AIR CLEANER AND PAPER TYPE FILTER

#### REMOVAL

1. Disconnect the positive crankcase ventilation inlet hose at the air cleaner.

2. Remove the wing nut retaining the air cleaner on the carburetor; then, lift the air cleaner off the carburetor. **To prevent dirt from entering the carburetor, the filter element must never be removed when the air cleaner body is mounted on the carburetor.**

3. Remove the cover and filter element. Discard the air cleaner mounting gasket on the carburetor if it is excessively worn or damaged.

#### FILTER ELEMENT

**The filter element must never be cleaned with a solvent or cleaning solution. Also, oil must not be added to the surfaces of the filter element or air cleaner body.**

There are two alternate proce-

dures that can be used to clean the air filter element. One method is performed with the use of compressed air. The other is performed by tapping the element on a smooth horizontal surface.

**Compressed Air Method.** Direct a stream of compressed air through the element in the direction opposite that of the intake air flow, that is from the inside outward. **Extreme care must be exercised to prevent rupture of the element material.**

**Tapping Method.** Hold the element in a vertical position and tap it lightly against a smooth, horizontal surface to shake the dust and dirt out. **Do not deform the element or damage the gasket surfaces by tapping too hard.** Rotate the filter after each tap until the entire outer surface has been cleaned.

**Inspection.** Hold the filter in front of a back-up light and carefully inspect it for any splits or cracks. If the filter is split or cracked, replace it.

#### BODY AND COVER

Clean the air cleaner body and the cover with a solvent or compressed air. **Probe the air cleaner body at the positive crankcase ventilation system inlet connection to assure removal of deposits.** Wipe the air cleaner dry if a solvent is used. Inspect the air cleaner body and cover for distortion or damage at the gasket mating surfaces. Replace the cover or body if they are damaged beyond repair.

#### INSTALLATION

1. Install the air cleaner mounting gasket on the carburetor. Install the air cleaner body on the carburetor so that the word "FRONT" faces the front of the car.

2. Place the element in the air cleaner body. Make sure the element gasket is properly seated. Install the cover and tighten the retaining wing nut.

3. Connect the crankcase ventilation inlet hose to the air cleaner body.

#### REPLACE CARBURETOR AIR CLEANER FILTER

##### REMOVAL

1. Remove the wing nuts retaining the air cleaner assembly.

2. Remove the air cleaner assembly from the carburetor. **To prevent dirt from entering the carburetor, the filter element must never be removed when the air cleaner body**

**is mounted on the carburetor.**

3. Remove the cover and filter element. Discard the filter element. Discard the air cleaner mounting gasket if it is excessively worn or damaged.

#### INSTALLATION

1. Install a new air cleaner mounting gasket on the carburetor, if necessary. Install the air cleaner body on the carburetor so that the word "FRONT" faces the front of the car.

2. Place the new element in the air cleaner body. **Make sure the element gasket is properly seated.** Install the cover. Tighten the retaining wing nut.

#### CLEAN CRANKCASE OIL FILLER BREATHER CAP

Wash the crankcase filler cap in solvent. **Do not oil the filter mesh.**

#### CHECK ENGINE ACCESSORY DRIVE BELTS

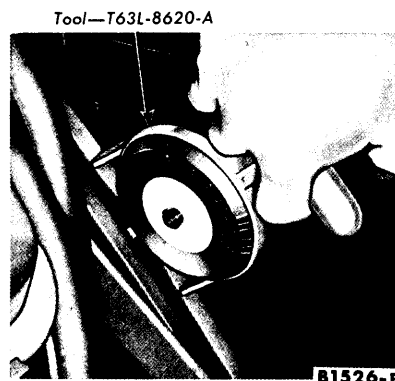
##### BELT TENSION

1. Install the belt tension tool on the drive belt (Fig. 1) and check the tension following the instructions of the tool manufacturer.

2. If adjustment is necessary, loosen the alternator mounting bolts and the alternator adjusting arm bolt. Move the alternator toward or away from the engine until the correct tension is obtained. Remove the gauge. Tighten the alternator adjusting arm bolt and the mounting bolts. Install the tension gauge and check the belt tension.

If the car is equipped with air conditioning:

1. Loosen the four compressor mounting bolts.



**FIG. 1—Checking Drive Belt Tension**

2. Adjust the belt tension by sliding the compressor towards the center of the car to decrease the tension, and towards the outside of the car to increase the tension.

3. Tighten the four mounting bolts to specification and check the belt tension.

If the car is equipped with power steering:

1. Loosen the mounting bolts incorporated on the front face of the pump cover plate (hub side) and the one nut at the rear.

2. Fix a  $\frac{1}{16}$ -inch open end wrench on the projecting  $\frac{1}{2}$ -inch boss and pry upward to correct tension. **Do not pry against the reservoir to obtain proper belt load as it can be deformed and cause a leak.**

3. Recheck the belt tension. When the tension has been correctly adjusted, tighten the bolts to specifications.

#### DRIVE BELT REPLACEMENT

1. On a car with power steering, loosen the pump mounting bolts and remove the drive belt.

On a car with an air conditioner, remove the compressor drive belt.

2. Loosen the alternator mounting bolts and the alternator adjusting arm bolt. Move the alternator or generator toward the engine. Remove the belt(s) from the alternator and crankshaft pulleys, and lift them over the fan.

3. Place the belt(s) over the fan. Insert the belt(s) in the water pump pulley, crankshaft pulley and alternator pulley grooves. Adjust the belt tension to specifications.

4. On a car with an air conditioner, install and adjust the compressor drive belt to specifications.

5. On a car with power steering, install the pump drive belt and tighten the mounting bolts. Adjust the drive belt tension to specifications.

#### CLEAN POSITIVE CRANKCASE VENTILATION SYSTEM AND REPLACE VALVE

1. Remove the carburetor air cleaner.

2. Grasp the crankcase ventilation regulator valve and pull it straight upwards and out of the grommet in the right valve rocker arm cover.

3. Use a hose clamp tool to slide both hose clamps off the ends of the inlet hose. Remove the inlet hose from the carburetor spacer, and sep-

arate the hose from the regulator valve.

4. Do not attempt to clean the crankcase regulator valve. The breather cap, located on the left valve rocker arm cover, should be cleaned at the proper mileage interval. Remove the cap and wash it in a low-volatility, petroleum-base solvent. Probe the breather hole(s) to assure removal of any accumulated deposits. Shake the cap dry and install it. **Do not dry with compressed air as air pressure may damage the filter element.**

Clean the crankcase ventilation system connection on the carburetor spacer by probing the inlet nipple with a flexible wire or bottle brush.

Clean the rubber hose with a low-volatility, petroleum-base solvent and dry with compressed air.

5. Install the inlet hose and hose clamp on the regulator valve. Position the hose clamp.

6. Install the inlet hose and hose clamp on the carburetor spacer inlet nipple. Position the hose clamp.

7. Install the crankcase ventilation regulator valve in the right valve rocker arm cover. Be sure the grommet is properly seated around the regulator valve and valve rocker arm cover.

### CHECK IGNITION TIMING AND ADJUST AS REQUIRED

1. Disconnect the vacuum line to the distributor. If necessary, clean and mark the desired timing mark (Fig. 2).

2. Attach a timing light to the number one spark plug.

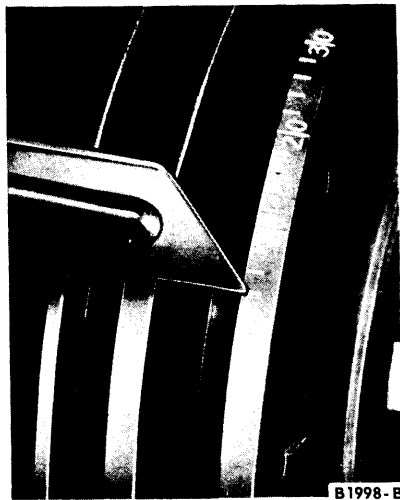


FIG. 2—Timing Marks

3. Connect a tachometer to the engine.

NOTE: When connecting a tachometer to a vehicle equipped with a transistorized ignition, connect the leads to the tachometer block (positive lead to red terminal, negative to black).

4. Start the engine and adjust the speed to the specified RPM for initial timing adjustment. Allow the engine to warm up.

5. Observe the timing with the light.

6. If the timing is not correct, loosen the hold down bolt and rotate the distributor clockwise to advance the timing or counterclockwise to retard it.

7. Tighten the hold down bolt and check the timing.

8. After the ignition timing has been properly set, connect the distributor vacuum line.

9. Check the distributor to determine if the advance mechanism is operating. To do this, hold the timing light so that the timing marks and the notch can be seen, and accelerate the engine.

### CHECK AND ADJUST OR REPLACE DISTRIBUTOR POINTS

Unsnap the distributor cap retaining clips, lift the distributor cap off the distributor housing, and position the cap out of the way (if necessary, remove the air cleaner and/or the high tension wire to gain access to the distributor).

Lift the rotor off the cam. Remove the dust cover (transistorized ignition).

### INSPECTION

Replace the distributor point assembly if the contacts are badly burned or excessive metal transfer between the points is evident. Metal transfer is considered excessive when it equals or exceeds the gap setting.

### REMOVAL

1. Remove the primary distributor-transistor lead and condenser wire (if equipped) from the breaker plate.

2. Remove the screw attaching the ground wire to the distributor point assembly.

3. Remove the screw nearest the distributor points, then remove the distributor point assembly.

### INSTALLATION

1. When installing new distributor points, reverse the procedure for removal and make sure that the ground wire is attached to the distributor point assembly attaching screw which is furthest from the distributor points.

2. If the used points are serviceable, set the gap using a dwell meter.

To set the gap with a dwell meter:

Connect the dwell meter following the manufacturer's instructions.

NOTE: In a car equipped with transistor ignition, make sure that the dwell meter is connected to the tachometer block rather than the coil.

Operate the engine at idle speed and note the reading on the dwell meter.

Stop the engine and adjust the gap (decreasing the gap increases the dwell). Now check the dwell again.

Repeat this procedure until the proper dwell is obtained.

If new points are installed, set the gap to specifications using a feeler gauge or a dwell meter.

3. Install the dust cover (transistorized ignition).

4. Install the rotor. Install the distributor cap on the distributor housing and snap the retaining clips in place.

5. Install the air cleaner and/or the high tension lead if either was removed.

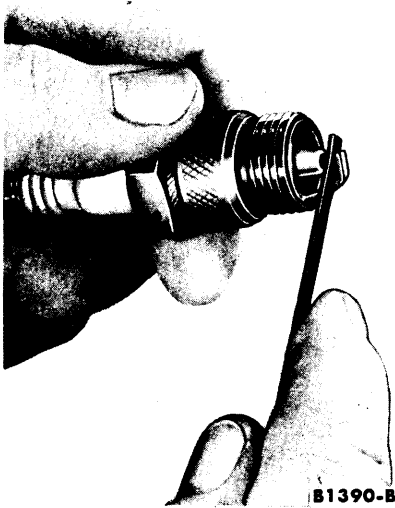
### CHECK AND ADJUST OR REPLACE SPARK PLUGS

#### REMOVAL

1. Remove the wire from each spark plug by grasping the moulded cap of the wire only. **Do not pull on the wire because the wire connection inside the cap may become separated or the weather seal may be damaged.**

2. Clean the area around each spark plug port with compressed air, then remove the spark plugs.

3. Clean the plugs on a sand blast cleaner, following the manufacturer's instructions. **Do not prolong the use of the abrasive blast as it will erode the insulator.** Remove carbon and other deposits from the threads with a stiff wire brush. Any deposits will retard the heat flow from the plug to the cylinder head causing



**FIG. 3—Cleaning Plug Electrode**

spark plug overheating and pre-ignition.

4. Clean the electrode surfaces with a small file (Fig. 3). Dress the electrodes to secure flat parallel surfaces on both the center and side electrode.

5. After cleaning, examine the plug carefully for cracked or broken insulators, badly pitted electrodes, and other signs of failure. Replace as required.

#### ADJUSTMENT

Set the spark plug gap to specifications by bending the ground electrode (Fig. 4).

#### INSTALLATION

1. Install the spark plugs and torque each plug to 15-20 ft-lbs.

When a new spark plug is installed in a new replacement cylinder head, torque the plug to 20-30 ft-lbs.

2. Connect the spark plug wires. Push all weather seals into position.



**FIG. 4—Gapping Spark Plug**

#### REPLACE FUEL FILTER

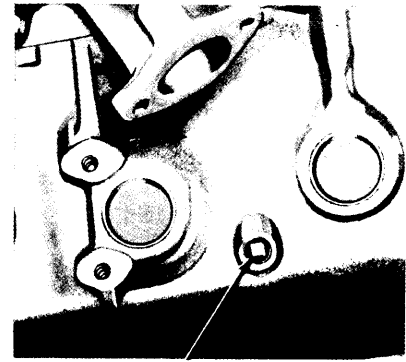
1. Remove the filter housing, gasket and filter element. Discard the filter element.

2. Place a new filter element over the spout in the valve housing cover. Lightly lubricate with oil and position the gasket, then screw the filter housing on to the pump. Hand-tighten the filter housing until the gasket contacts the pump, then advance it  $\frac{1}{8}$  turn.

#### ADJUST ACCELERATOR PUMP LEVER

The accelerating pump stroke adjustment is made with the carburetor air cleaner removed from the carburetor.

The over-travel lever has 4 holes and the accelerating pump link has 2 holes to control the accelerating pump stroke for various ambient temperatures and operating conditions of the engine. The correct position for the link operating rod for all climatic conditions is in the in-board hole (hole nearest the pump plunger). Refer to specifications, and insert the operating rod in the proper hole of the over travel lever to suit the climatic conditions in which the car is to be operated.



**FIG. 5—Typical Cylinder Block Drain Plug**

#### REPLACE ENGINE COOLANT

To drain the radiator, open the drain cock located at the bottom of the radiator. The cylinder block has drain plugs located on both sides of the block (Fig. 5).

To fill the cooling system, install the plugs in the block and close the radiator drain cock. Fill the system to just below the filler neck of the radiator supply tank. Disconnect the heater outlet hose at the water pump to bleed or release trapped air in the system. When the coolant begins to escape, connect the heater outlet hose. Operate the engine until normal operating temperature has been reached. After the initial fill, the coolant level will drop approximately one quart after the engine has been operated about 20 minutes at 2000 rpm. This is due to the displacement of entrapped air. Add more coolant to fill the radiator supply tank.

#### CHECK ENGINE COOLANT LEVEL

The coolant level should be kept just below the bottom of the filler neck.

## 2 TRANSMISSION

### ADJUST CRUISE-O-MATIC TRANSMISSION BANDS

#### FRONT BAND ADJUSTMENT

1. Disconnect the fluid filler tube from the oil pan, and drain the fluid from the transmission. If the same fluid is to be used again in the transmission after the band adjustment, filter the fluid through a 100-mesh screen as it drains from the transmission. Make sure that the container is clean. Re-use

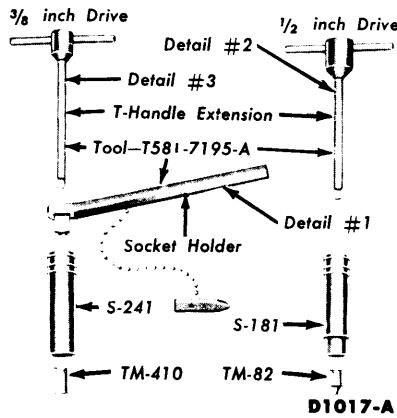
the fluid only if it is in good condition.

2. Remove and thoroughly clean the oil pan. Do not attempt to clean the filter. If dirty install a new one. Discard the oil pan gasket.

3. Loosen the front servo adjusting screw locknut two full turns with a  $\frac{1}{16}$ -inch wrench. Check the adjusting screw for free rotation in the actuating lever after the locknut is loosened, and free the screw if necessary.

4. Pull the adjusting screw end of the actuating lever away from the servo body, and insert the adjusting tool gauge block (Fig. 6) between the servo piston stem and the adjusting screw.

5. Install the socket handle on the  $\frac{1}{16}$ -inch socket. Insert the T-handle extension through the socket handle and socket, and install the screwdriver socket on the T-handle extension. Place the tool on the adjusting screw so that the screwdriver socket



**FIG. 6—Front and Rear Band Adjusting Tools**

engages the screw and the  $\frac{3}{16}$ -inch socket engages the locknut. With a torque wrench on the T-handle extension, tighten the adjusting screw to 10 in-lbs torque, and then back off the screw exactly one full turn. **Severe damage may result to the transmission if the adjusting screw is not backed off exactly one full turn.**

6. Hold the adjusting screw stationary, and torque the locknut to specification.

7. Remove the gauge block from the transmission.

8. Place a new gasket on the oil pan; install the filter and pan on the transmission.

9. Connect the filler tube to the oil pan and tighten to specifications.

10. Add 3 quarts of transmission fluid. Run the engine for 2 minutes. Place selector lever in P position and check fluid level. Add fluid if necessary.

### REAR BAND ADJUSTMENT

1. Working from under the right side of the instrument panel, lift enough carpet away from the console to gain access to the rear band adjustment opening.

2. Remove the plastic plug from the floor pan.

3. Wipe all dirt from the rear band adjusting screw threads, and oil the threads.

4. Place the socket holder on the  $\frac{3}{4}$ -inch socket (Fig. 6). Insert the T-handle extension through the handle and socket. Place the  $\frac{3}{16}$ -inch 8-point socket on the extension. Place a torque wrench on the T-handle extension.

5. Insert the assembled tool in the access hole so that it engages the adjusting screw and the locknut.

6. Loosen the adjusting screw locknut.

7. Torque the adjusting screw to specification.

8. Remove the torque wrench from the T-handle extension and back off the adjusting screw exactly  $1\frac{1}{2}$  turns. **Severe damage may result to the transmission if the adjusting screw is not backed off exactly  $1\frac{1}{2}$  turns.**

9. Hold the adjusting screw sta-

tionary, and torque the locknut to specification.

10. Install the plastic plug in the floor pan.

11. Fit the carpet into place on the console.

### CHECK TRANSMISSION FLUID LEVEL

1. Make sure that the car is standing level.

2. Run the engine at normal idle speed. If the transmission fluid is cold, run the engine at fast idle speed (about 1200 rpm) until the fluid reaches its normal operating temperature. When the fluid is warm, slow the engine down to normal idle speed.

3. Shift the selector lever through all positions, and place the lever at P. Do not turn off the engine during the fluid level checks. Firmly apply the parking brake.

4. Clean all dirt from the transmission fluid dipstick cap before removing the dipstick from the filler tube.

5. Pull the dipstick out of the tube, wipe it clean, and push it all the way back into the tube. Be sure it is properly seated.

6. Pull the dipstick out of the tube again, and check the fluid level. If necessary, add enough fluid to the transmission through the filler tube to raise the fluid level to the F (full) mark on the dipstick. **Do not overfill the transmission.**

## 3 CHASSIS

### INSPECT AND CROSS-SWITCH WHEELS AND TIRES AS REQUIRED

Switch the tires according to Fig. 7.

Tighten the wheel nuts to specified torque.

### CHECK POWER STEERING RESERVOIR FLUID LEVEL

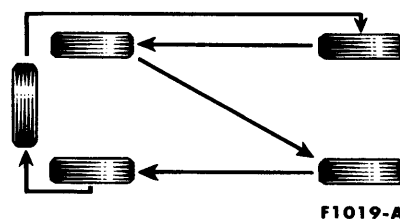
Run the engine until the fluid is at normal operating temperature. Then turn the steering wheel all the way to the left and right several times, and shut off the engine.

Check the fluid level in the reservoir. The level must be at the full mark on the dipstick. If the level is low, add enough fluid to raise the level to the F mark on the dipstick. **Do not overfill the reservoir.**

### CHECK BRAKE MASTER CYLINDER FLUID LEVEL

1. Remove the filler cap from the master cylinder. The diaphragm which seals the master cylinder should come off with the cap.

2. Fill the reservoir to  $\frac{3}{8}$  inch from the top.



**FIG. 7—Tire Cross Switching Diagram**

3. Install the filler cap, making sure that the diaphragm is properly seated in the cap.

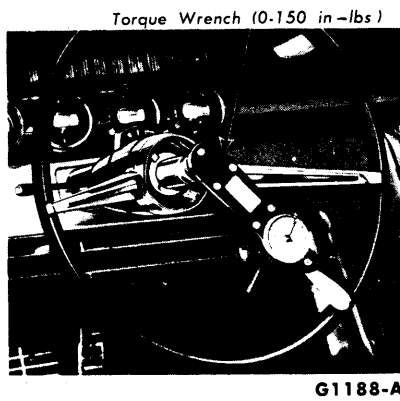
### CHECK REAR AXLE FLUID LEVEL

The lubricant level should be maintained at the bottom of the filler plug hole with the specified lubricant.

### CHECK STEERING GEAR OVER-CENTER MESH LOAD

Preload (thrust bearing adjustment) and worm to rack preload cannot be changed in service. (The only adjustment which can be performed is the total over-center position load, to eliminate excessive lash between the sector and rack teeth.)

1. Disconnect the pitman arm from the sector shaft.



**FIG. 8—Checking Steering Gear Over Center Mesh Load**

2. Disconnect the fluid return line at the reservoir, at the same time cap the reservoir return line pipe.

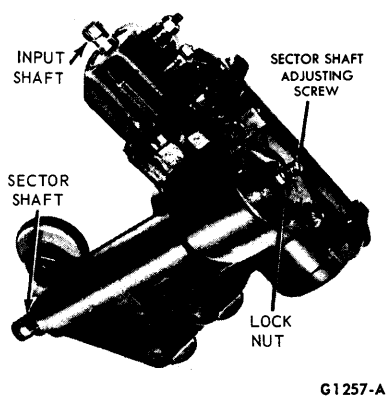
3. Place the end of the return line in a clean container and cycle the steering wheel in both directions as required, to discharge the fluid from the gear.

4. Remove the ornamental cover from the steering wheel hub and turn the steering wheel to 45° from the left stop.

5. Using an inch-pound torque wrench on the steering wheel nut, determine the torque required to rotate the shaft slowly through an approximately 1/8 turn from the 45° position (Fig. 8).

6. Turn the steering gear back to center, then determine the torque required to rotate the shaft back and forth across the center position. Loosen the adjuster nut, and turn the adjuster screw (Fig. 9) in until the reading is at specifications.

Retighten the lock nut while hold-



**FIG. 9—Steering Gear Adjustment**

ing the screw in place.

7. Recheck the readings and replace pitman arm and steering wheel hub cover.

8. Connect the fluid return line to the reservoir and fill the reservoir with specified lubricant to the proper level.

### CLEAN AND PACK FRONT WHEEL BEARINGS

1. Raise the car until the wheel and tire clear the floor.

2. Remove the wheel cover or hub cap from the wheel.

3. Remove the wheel and tire from the hub and rotor.

4. Remove 2 bolts and washers retaining the caliper to the spindle. Remove the caliper from the rotor and wire it to the underbody to prevent damage to the brake hose.

5. Remove the grease cap from the hub. Remove the cotter pin, nut lock, adjusting nut, and flat washer from the spindle. Remove the outer bearing cone and roller assembly.

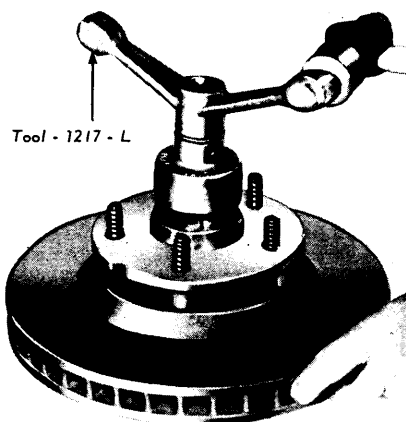
6. Pull the hub and rotor assembly off the wheel spindle.

7. Remove the grease retainer, (Fig. 10) and the inner bearing cone and roller assembly from the hub.

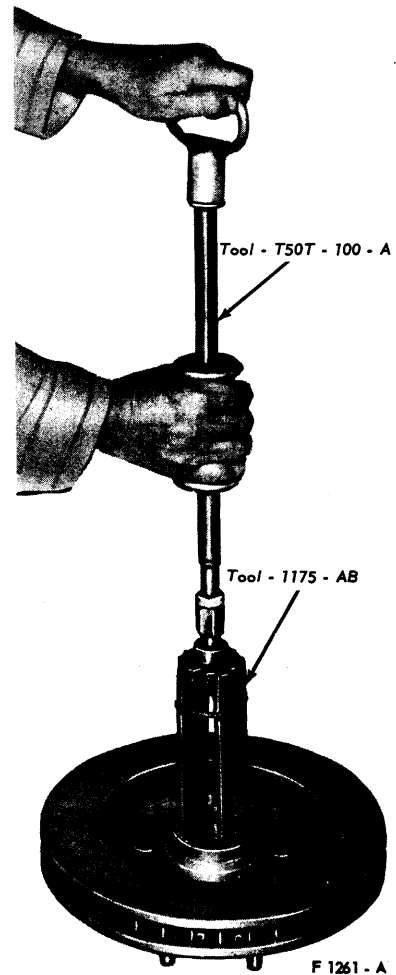
8. Clean the lubricant off the inner and outer bearing cups with solvent and inspect the cups for scratches, pits, excessive wear, and other damage. If the cups are worn or damaged, remove them with the tools shown in Fig. 11.

9. Soak a new grease retainer in light engine oil at least 30 minutes before installation. Thoroughly clean the inner and outer bearing cones and rollers with solvent, and dry them thoroughly. **Do not spin the bearings dry with compressed air.**

Inspect the cones and rollers for

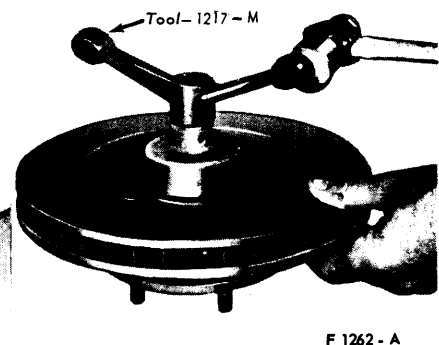


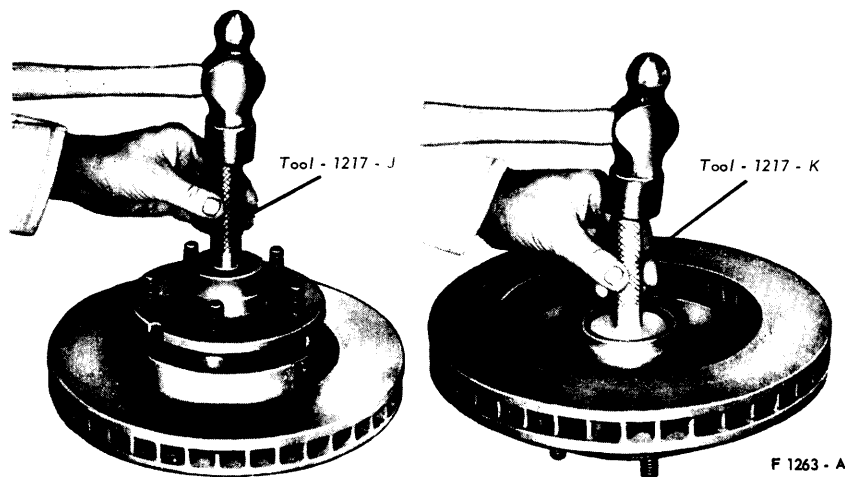
**FIG. 11—Front Wheel Bearing Cup Removal**



**FIG. 10—Removing Grease Retainer**

wear or damage, and replace them if necessary. The cone and roller assemblies and the bearing cups should be replaced as a set if damage to either is encountered.





**FIG. 12—Front Wheel Bearing Cup Installation**

10. Thoroughly clean the spindle and the inside of the hub with solvent to remove all old lubricant.

Cover the spindle with a clean cloth, and brush all loose dust and dirt from the splash shield. To prevent getting dirt on the spindle, carefully remove the cloth from the spindle.

11. If the inner and/or outer bearing cup(s) were removed, install the replacement cup(s) in the hub with the tools shown in Fig. 12. Be sure to seat the cups properly in the hub.

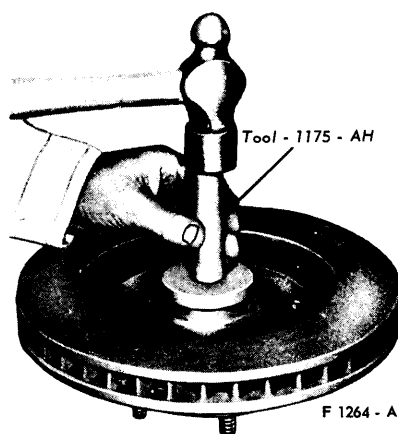
12. Pack the inside of the hub with the specified wheel bearing grease. Add lubricant to the hub only until the grease is flush with the inside diameter of both bearing cups. All old grease should be completely cleaned from the bearings before repacking with new grease.

13. Pack the bearing cone and roller assemblies with wheel bearing grease. A bearing packer is desirable for this operation. If a packer is not available, work as much lubricant as possible between the rollers and cages. Lubricate the cone surfaces with grease.

14. Place the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer with the tool shown in Fig. 13. Be sure the retainer is properly seated.

15. Install the hub and rotor assembly on the wheel spindle. Keep the hub centered on the spindle to prevent damage to the grease retainer or the spindle threads.

16. Install the outer bearing cone and roller assembly and the flat



**FIG. 13—Grease Retainer Installation**

washer on the spindle, then install the adjusting nut.

17. Adjust the wheel bearings and install a new cotter pin. Bend the ends of the cotter pin around the castellations of the nut lock to prevent interference with the radio static collector in the grease cap. Install the grease cap.

18. Install the caliper to the spindle and tighten the retaining bolts to specifications. Check for the correct flexible hose routing (Part 2-2).

19. Install the wheel and tire on the hub.

20. Install the wheel cover.

## CLEANING AND INSPECTION

### FRONT BRAKES

1. Remove the wheel and tire assembly, caliper splash shield, and the shoe and lining assemblies.

2. Make three thickness measure-

ments with a micrometer across the middle section of the shoe and lining. Take one reading at each side and one in the center. If the assembly has worn to a thickness of 0.195 inch (shoe and lining together) or 0.030 inch (lining material only) at any one of the three measuring locations, replace all (4) shoe and lining assemblies on both front wheels.

3. With the shoe and lining assemblies installed, insert a feeler gauge between the lining and rotor. If the clearance is not within 0.002-0.010 inch, check for shoe and lining assemblies not being properly seated on the caliper bridges, for a piston pushed back in the cylinder bore, for a seized piston, or for malfunction of a piston seal.

Ordinarily, the clearance should be 0.002-0.010 inch. However, if the vehicle was stopped by a brake application just prior to checking the clearance, the brakes may drag slightly.

4. To check rotor runout, first eliminate the wheel bearing end play by tightening the adjusting nut. After tightening the nut check to see that the rotor can still be rotated.

5. Clamp a dial indicator to the caliper housing so that the stylus contacts the rotor at a point approximately 1 inch from the outer edge. Rotate the rotor and take an indicator reading. If the reading exceeds 0.002 inch total indicator runout, replace the rotor. Do not attempt to refinish a rotor that indicates runout in excess of specification.

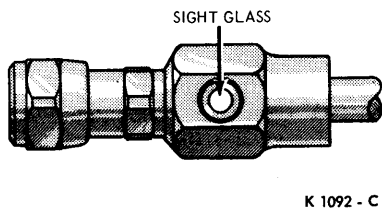
When the runout check is finished be sure to adjust the bearings as outlined in Group 3, in order to prevent bearing failure.

6. Check the rotor for scoring. Minor scores can be removed with a fine emery cloth. If the rotor is excessively scored replace it.

7. Visually check the caliper. If it is cracked or if excess leakage is evident, it should be replaced. Slight leakage or seized pistons indicate removal and disassembly.

8. If upon disassembly the caliper is found to be distorted or damaged, or if the cylinder bores are scored or excessively worn, replace the assembly.

The two halves of the caliper assembly should never be separated. Damage or failure of one requires replacement of both as a unit.



**FIG. 14—Sight Glass Installation**

### CHECK BRAKE LINES AND LINING

1. Raise all four wheels. Remove one of the rear brake drums, and inspect the drum and linings. **Do not let oil or grease touch the drum or the linings.** If the linings are worn to within  $\frac{1}{2}$  inch of the rivet heads, replace or reline both sets (primary and secondary). **Under no circumstances replace one lining only, or one wheel set. Both rear wheel sets should be replaced whenever a respective lining or shoe is worn or damaged.** If the drum braking surface is excessively scored, refinish it.

2. With the parking brakes in the fully released position, check the brake cables. The cable adjustment should be just tight enough to remove the slack. **Excessive tightening may pull the brake shoes off their anchors.**

3. Check all brake lines for leakage or physical damage and replace or repair as required.

4. Lower the car.

### CHECK AIR CONDITIONING SYSTEM

A quick test of the refrigerant supply can be made by observing the flow of refrigerant through the sight glass (Fig. 14).

To check the refrigerant supply, place a large fan in front of the radiator to aid in cooling the engine. Set the servo control for maximum cooling and the blower on high. Operate the engine at 1300 rpm. and observe the sight glass while the compressor is operating. There should be no bubbles in the sight glass after the start of the compressor. Bubbles will appear when the compressor starts but should clear after a few moments.

### CHECK FRONT WHEEL ALIGNMENT AND LINKAGE AND ADJUST AS REQUIRED

Do not attempt to check and

adjust front wheel alignment without first making a preliminary inspection of the front-end parts.

Check all the factors of front wheel alignment except the turning angle before making any adjustments. The turning angle should be checked only after caster, camber and toe-in have been adjusted to specifications.

The front wheel alignment specifications given in Part 3-5 are correct only when the car is at "Curb Height". Before checking or adjusting the alignment factors, the suspension alignment spacers must be installed to obtain the Curb Height.

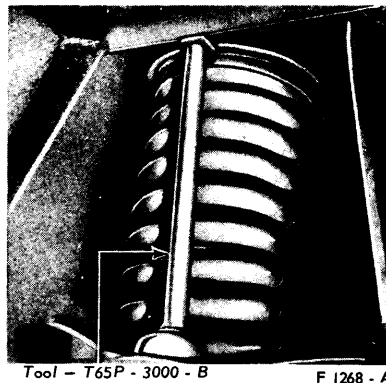
### EQUIPMENT INSTALLATION

Equipment used for front wheel alignment inspection must be accurate. If portable equipment is being used, perform all inspection operations on a level floor.

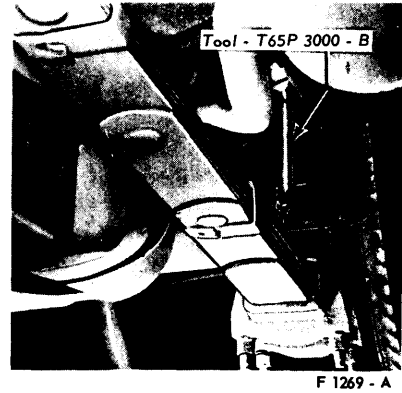
Alignment height spacers (Figs. 15 and 16) are used to check caster, camber and toe-in. If the car is operated under abnormal load conditions, the spacers should be omitted when checking toe-in.

1. Drive the car in a straight line far enough to establish the straight-ahead position of the front wheels, and then mark the steering wheel hub and the steering column collar (Fig. 17). **Do not adjust the steering wheel spoke position at this time.** If the front wheels are turned at any time during the inspection, align the marks to bring the wheels back to the straight-ahead position.

2. With the car in position for the front end alignment inspection and adjustment, install the suspension



**FIG. 15—Alignment Spacer Installation—Front**



**FIG. 16—Alignment Spacer Installation—Rear**

alignment spacers as follows to establish the curb height.

Lift the front of the car and position the suspension alignment spacers between the suspension upper arm and the edge of the frame spring pocket as shown in Fig. 15. The lower end of the alignment spacers should be placed over the head of the ball joint retaining nut. Position the alignment spacers for the rear of the car between the rear axle and the frame side rail as shown in Fig. 16. Lower the rear of the car so that the weight of the body will hold the alignment spacers in place.

3. Install the wheel alignment equipment on the car. Whichever type of equipment is used, follow the installation and inspection instructions provided by the equipment manufacturer.

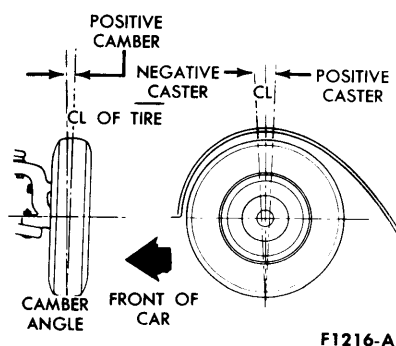
### CASTER

Check the caster angle at each front wheel. Caster is the forward or rearward tilt at the top of the wheel spindle (Fig. 18). If the spindle tilts



**FIG. 17—Typical Straight-Ahead Position Marks**





**FIG. 18—Caster and Camber Angles**

to the rear, caster is positive. If the spindle tilts to the front, caster is negative. The correct caster angle, or tilt, is specified in Part 3-5.

The maximum difference between both front wheel caster angles should not exceed  $\frac{1}{2}^\circ$ . However, a difference of not more than  $\frac{1}{4}^\circ$  is preferred.

#### CAMBER

Check the camber angle at each front wheel. The camber angle is the amount the front wheels are tilted at the top (Fig. 18). If a wheel tilts outward, camber is positive. If a wheel tilts inward, camber is negative. The correct camber angle, or outward tilt, is specified in Part 3-5. The maximum difference between both front wheel camber angles should not exceed  $\frac{1}{2}^\circ$ . However, a difference of not more than  $\frac{1}{4}^\circ$  is preferred.

#### TOE-IN

Alignment height spacers are used on all cars to check and adjust toe-in, except on those operated under abnormal conditions. Toe-in should only be checked and adjusted after the caster and camber has been adjusted to specifications.

Check the toe-in with the front wheels in the straight-ahead position. Measure the distance between the extreme front and also between the extreme rear of both front wheels. The difference between these two distances is the toe-in.

Correct toe-in, or inward pointing of both front wheels at the front is specified in Part 3-5.

#### FRONT WHEEL TURNING ANGLE

When the inside wheel is turned  $20^\circ$ , the turning angle of the outside

wheel should be as specified in Part 3-5. The turning angle cannot be adjusted directly, because it is a result of the combination of caster, camber, and toe-in adjustments and should, therefore, be measured only after these adjustments have been made. If the turning angle does not measure specifications, check the spindle or other suspension parts for a bent condition.

#### WHEEL ALIGNMENT ADJUSTMENTS

After front wheel alignment factors have been checked, make the necessary adjustments. Do not attempt to adjust front wheel alignment by bending the suspension or steering parts.

#### CAMBER

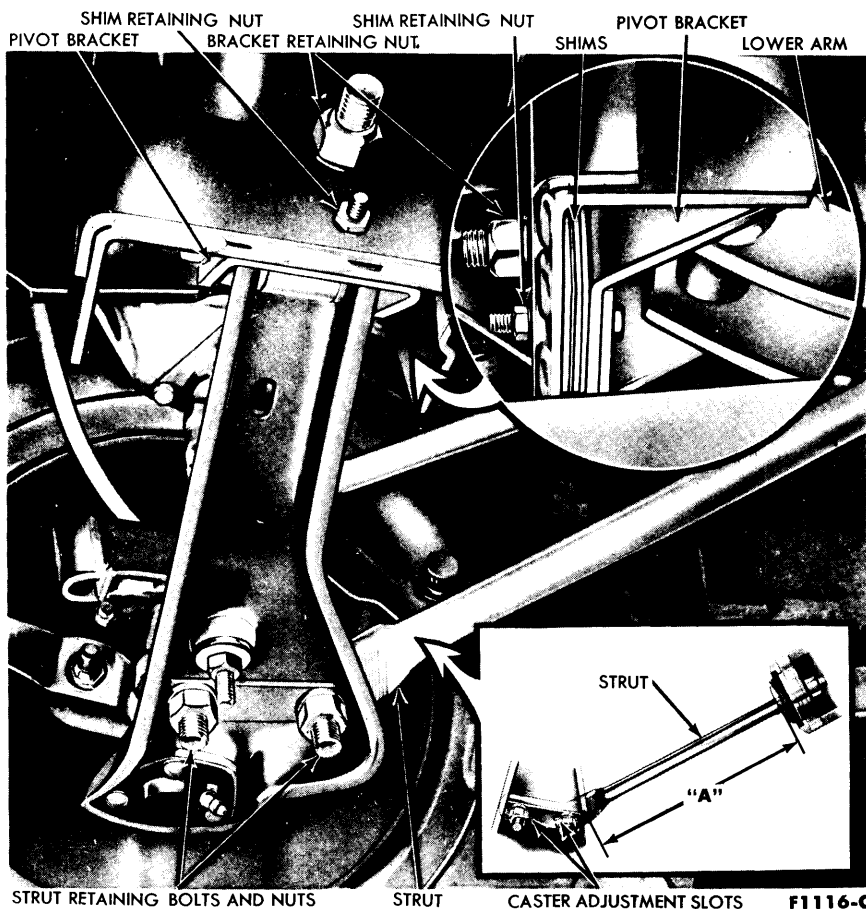
Adjust the camber by removing or installing shims between the pivot bracket of the front suspension lower arm and the mounting bracket on the underbody in the engine compartment (Fig. 19).

The removal of shims between the mounting and pivot brackets will

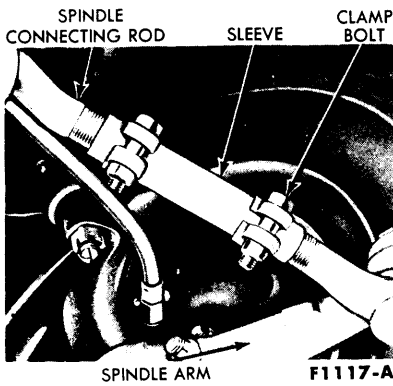
move the lower ball joints inward. The installation of shims between the mounting and pivot brackets will move the lower ball joint outward. Camber adjusting shims are available in several standard shim thicknesses. A  $\frac{1}{16}$  inch change of shim thickness will change the camber angle  $\frac{1}{8}^\circ$ . The total shim stack thickness should not exceed  $\frac{1}{16}$  inch.

#### CASTER

The caster adjustment is made by repositioning the strut on the lower arm as shown in Fig. 19. Adjust the caster by loosening the rearward washers, nuts and bolts. Lift the strut so that the strut serrations will be free from the serrations on the lower arm. Lengthen the distance between the strut forward mount and the side of the lower arm (Fig. 19, dimension "A") to increase the caster angle. Tighten the rearward nuts that retain the strut to the lower arm. Check the caster, camber,



**FIG. 19—Caster and Camber Adjustments**



**FIG. 20—Spindle Connecting Rod Sleeve**

and toe-in alignment for the correct settings listed in the specifications. Remove the suspension alignment spacers.

**TOE-IN AND STEERING WHEEL ALIGNMENT ADJUSTMENTS**

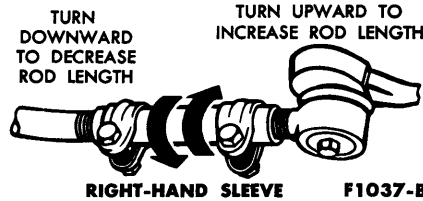
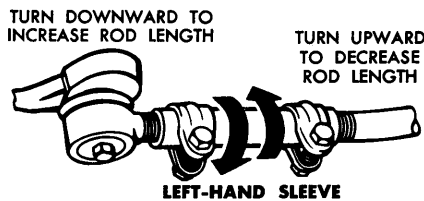
Check the steering wheel spoke position when the front wheels are in the straight-ahead position. If the spokes are not in their normal position, they can be properly adjusted while toe-in is being adjusted. The toe-in specification is specified in Part 3-5.

1. Loosen the two clamp bolts on each spindle connecting rod sleeve (Fig. 20).

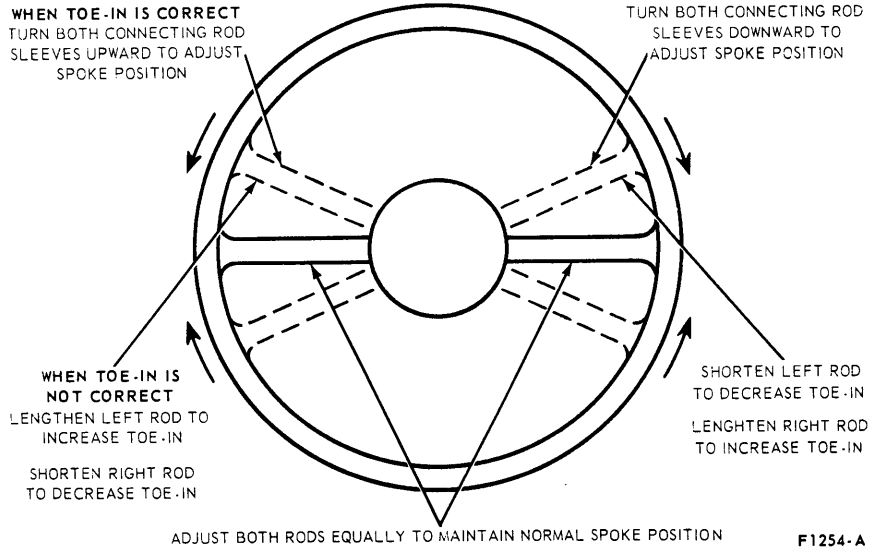
2. Adjust toe-in. If the steering wheel spokes are in their normal position, lengthen or shorten both rods equally to obtain correct toe-in (Fig. 21). If the steering wheel spokes are not in their normal position, make the necessary rod adjustments to obtain correct toe-in and steering wheel spoke alignment (Fig. 22).

3. Recheck toe-in and steering wheel spoke alignment. If toe-in is correct and the steering wheel spokes are still not in their normal position, turn both connecting rod sleeves upward or downward the same number of turns to move the steering wheel spokes (Fig. 22).

4. When toe-in and steering wheel



**FIG. 21—Spindle Connecting Rod Adjustments**



**FIG. 22—Toe-In and Steering Wheel Spoke Adjustments**

spoke alignment are both correct, torque the clamp bolts on both connecting rod sleeves to specifications.

**FRONT END GENERAL INSPECTION**

Do not check and adjust front wheel alignment without first making the following inspection for front-end maladjustment, damage, or wear.

1. Check for specified air pressures in all four tires.

2. Raise the front of the car off the floor. Shake each front wheel grasping the upper and lower surfaces of the tire. Check the front suspension ball joints and mountings for looseness, wear, and damage. Check the brake caliper attaching bolts. Torque all loose nuts and bolts to specifications. Replace all worn parts as outlined in Part 3-2.

3. Check the steering gear mountings and all steering linkage connections for looseness. Torque all mountings to specifications. If any of the linkage is worn or bent, replace the parts as outlined in Part 3-3.

4. Check the front wheel bearings. If any in-and-out free play is noticed, adjust the bearings to specification. Replace worn or damaged bearings

as outlined in Part 3-4.

5. Spin each front wheel with a wheel spinner, and check and balance each wheel as required.

6. Check the action of the shock absorbers. If the shock absorbers are not in good condition, the car may not settle in a normal, level position, and front wheel alignment may be affected.

**WHEEL INSPECTION**

Wheel hub nuts should be inspected and tightened to specification at predelivery. Loose wheel hub nuts may cause shimmy and vibration. Elongated stud holes in the wheels may also result from loose hub nuts.

Keep the wheels and hubs clean. Stones wedged between the wheel and rotor or rear drum and lumps of mud or grease can unbalance a wheel and tire.

Check for damage that would affect the runout of the wheels. Wobble or shimmy caused by a damaged wheel will eventually damage the wheel bearings. Inspect the wheel rims for dents that could permit air to leak from the tires.

**CHECK TIRE PRESSURES**

Check all tires for specified pressures.

**CHECK BATTERY FLUID LEVEL**

The battery is mounted under the hood at the right front side of the engine compartment.

Keep the fluid in each battery cell up to the level of the ring in the bottom of the filler well. Generally, tap water may be added unless it has a high mineral content or has been stored in a metal container.

## 4 BODY

### BODY LUBRICATION

Apply Rotunda Silicone Lubricant R113-A (Ford Specification M99C40-A or B) to the following points as required:

Door Hinges and Hinge Checks; Hood Hinge Pivots; Luggage Compartment Hinge Pivots; Hood Latch; Hood Auxiliary Latch; Fuel Filler Door Hinges.

Operate the components after lubricating, to be sure the lubricant has "worked-in".

Apply Rotunda Lock Lubricant R117-A (Ford Specification M2C20) sparingly to the following lock cylinders:

Door Locks; Luggage Compartment Lock.

Insert the key and operate the lock several times to work the lubricant into the lock.

### CHECK CONVERTIBLE TOP OPERATION

#### MECHANICAL CHECKS

Improper top operation can be caused by bent or misaligned linkage, binding linkage pins, and/or broken pivot bushings. Should the electrical and hydraulic systems be functionally correct and unsatisfac-

tory operation of the top persists, check and adjust or replace the mechanical components as required.

#### HYDRAULIC CHECKS

Faulty hydraulic system operation can be caused by lack of fluid, leaks, air in the system, obstruction or kinks in the hoses, or faulty operation of a cylinder or the pump.

#### FLUID LEVEL CHECK

1. Erect the top.
2. Remove the spare tire for access to the hydraulic pump and reservoir.
3. Place absorbent cloths below the filler plug.
4. Remove the filler plug, and check the fluid level. It should be level with the bottom edge of the hole.
5. If the level is low, check the system for leaks, adding Automatic Transmission Fluid as necessary. Check system for leaks.
6. Install the spare tire.

#### LIFT CYLINDER OPERATION CHECK

Operate the top control switch and observe the operation of the lift cylinders for the following:

If the movement of the piston rods is sluggish or uneven, check

the hoses from the pump to the cylinder for kinks.

If one piston rod moves more slowly than the other, the cylinder with the slower rod is defective and should be replaced.

If both rods move slowly, or do not move at all, disassemble and repair the pump.

#### CLEAN BODY DRAIN HOLES

Inspect the rubber drain valves in the door sills and body rocker panels to make sure they are open and operating. Periodically check any removable rubber plugs for moisture or dust accumulation and for security of installation.

#### REPLACE WINDSHIELD WIPER BLADES

Wiper blade replacement intervals will vary with the amount of use, type of weather, chemical reaction from road tars or salts and the age of the blades. Be sure that the windshield glass surface is not contaminated with oil, tree sap or other foreign substance which cannot be easily rubbed off.

Generally, if the wiper pattern across the glass is still uneven and streaked after these tests, replace the blades.