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Inter Office

Ford Parts and Service Division

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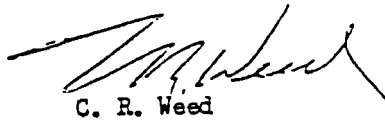
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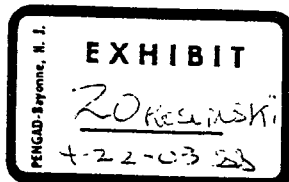
As discussed during our recent phone conversation, we have reviewed the contents of our current service manuals for mention of cautions regarding brake repair. We are not currently providing a procedure for removal of dust from the brake drums or brake lining area.

I have noted on the attached copies of our shop manual, the locations that should include a caution regarding asbestos particles.

If you will provide some suggested copy for a caution, we will insert it in the next printing. We will also incorporate this caution in all future texts, such as training manuals and video tapes, that pertain to the areas where asbestos dust may be considered harmful.


C. R. Weed

Attachments



007894

REMOVAL AND INSTALLATION

BRAKE DRUM REMOVAL AND INSTALLATION THROUGH 1000 SERIES

Use the following service procedures for both hydraulic and air brakes. Since the E-100 through E-350, F-100-E-350 rear drums, Bronco or the P-350-400 (front and rear) and the 4-wheel drive front brake drum procedures apply to hydraulic brakes only, they are covered in Part 12-02.

FRONT BRAKE DRUM

1. Raise the vehicle until the tire clears the floor and remove the wheel and tire from the hub. Loosen the brake shoe adjusting screw until the shoes no longer touch the brake drum. Remove the grease cap and the gasket (if equipped) from the hub.
2. On vehicles with 4,000 through 7,000 lb. and 16,000-20,000 lb. front axles, remove the cotter pin, adjusting nut, and flat washer from the spindle. On vehicles with 9,000, 11,000 or 15,000 lb. axles, remove the lock nut, dimpled washer, locking ring, and adjusting nut and pin assembly.
3. Remove the outer bearing cone and roller assembly. Pull the hub and drum assembly off the wheel spindle.
4. Remove the front wheel-to-hub retaining nuts (or rim and tire attaching nuts). Remove the wheel (or rim and tire) from the hub and drum.
5. Remove the brake drum retainers and attaching bolts, screws, or bolts and nuts.
6. Remove the brake drum from the hub.
7. Check the drum for damage or wear, and repair or replace if necessary. If a new drum will be installed, be sure to remove the protective coating with degreaser.

- Install new grease retainer seals whenever a wheel and hub is removed.
8. Place the brake drum to the hub and install the retainers and retaining bolts, screws, or bolts and nuts.
 9. Install the hub and drum on the wheel spindle. Keep the hub centered on the spindle to prevent damage to the grease retainer or the spindle threads.
 10. On vehicles with 4,000 through 7,000 lb. and 16,000 lb. front axles, install the outer bearing cone and roller and the flat washer on the spindle. Install the adjusting nut. On vehicles with 9,000, 11,000 or 15,000 lb. front axles, install the outer bearing cone and roller assembly, and the bearing adjusting nut and pin assembly.
 11. Install the wheel and tire on the hub. Then install the clamps (if applicable) and the wheel stud nuts.
 12. While rotating the wheel, torque the adjusting nut to specification. Adjust wheel bearings as described in Group 11.
 13. Install the dimpled washer with the dimple indexed in one of the holes in the adjusting nut. Install the lock nut and torque to specification. Bend the dimpled washer over a flat of the lock nut.
 14. Install the gasket (if equipped) and the grease cap, and torque the wheel stud nuts to specification. Install the hub cap (if equipped), and adjust the brakes as described in this Part.

REAR BRAKE DRUM E250-E350, F250-F350, P350-P400

1. Raise the vehicle and install safety stands.
2. Remove the wheel and tire as an assembly. Loosen the brake shoe adjusting screw until the shoes no longer touch the brake drum.
3. Remove the rear axle shaft retaining nuts, adapters, axle shaft, and grease seal.
4. Remove the wheel bearing locknut, lock washer, and adjusting nut. On E-250 and E-350 vehicles, remove the locking wedge and adjusting nut.
5. Remove the hub and drum from the axle.
6. Remove the brake drum-to-hub retaining screws, bolts, or bolts and nuts. Remove the brake drum from the hub.
7. Check the drum for damage or wear, and repair or replace if necessary. Do not machine brake drums to a braking surface diameter greater than the maximum diameter shown on the drum. If a new drum will be installed, remove the protective coating with degreaser.
8. Install new grease retainer seals whenever a wheel and hub is removed.
9. Position the brake drum to the hub and install the attaching screws, bolts, or bolts and nuts.
10. Position the hub and drum, as an assembly, on the axle and start the adjusting nut.
11. Adjust the wheel bearing nut, and install the wheel bearing lock washer and lock nut.
12. Install a new rear axle oil seal, axle shaft and gasket, stud adapters, and attaching nuts.
13. Install the wheel and tire as an assembly.
14. Adjust the brake shoes. Remove the safety stands and lower the vehicle.

OVERHAUL

BRAKE DRUM REFINISHING E100-E350, F100-F350, P350-P400, U100

Minor scores on a brake drum can be removed with fine emery cloth, provided the emery is thoroughly cleaned off the drum after the operation.

A badly scored, rough, or out-of-round drum should be ground or turned on a drum lathe. Do not remove any more material from the drum than is necessary to provide a smooth surface for the brake shoe contact. Brake drum maximum braking surface diameter is

shown on each brake drum (Fig. 19). Brake drums which exceed the maximum braking surface diameter shown on the brake drum, either through wear or refinishing, must be replaced. The maximum braking surface diameter specification, which is shown on each brake drum (Fig. 18), allows for a 0.060 inch machining cut over the original nominal drum diameter plus 0.030 inch additional wear before reaching the drum-discard diameter.

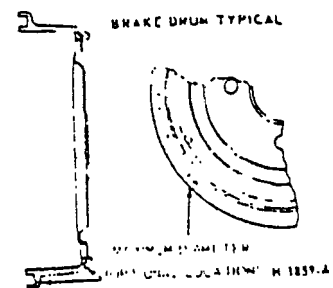


FIG. 18 Brake Drum Maximum Inside Braking Surface Diameter Marking Location

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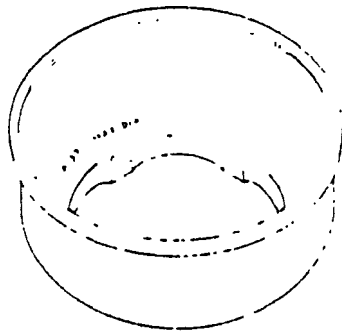


FIG. 19 Brake Drum Maximum Braking Surface Diameter Marking Location—Typical Medium—Heavy Truck Shown

On all vehicles 500 and up Series heavy trucks, the maximum braking surface diameter specification, which is shown on each brake drum, allows for 0.000 inch machining cut over the original nominal drum diameter, plus 0.010-inch additional wear before the drum must be replaced. After refinishing the brake surface runout must not exceed 0.010-inch total indicator reading, measured from the bearing cup.

On 500 and up Series heavy trucks, if the drum diameter is less than 0.030-inch oversize after refinishing, install standard linings on the brake assemblies. If the diameter is over 0.030 inch, install oversize or shimmed linings.

BRAKE SHOE AND BAND RELINING

1. Remove the rivets holding the old lining and remove the lining.
2. Clean the shoe or band thoroughly with cleaning fluid, especially the rim surface. Wipe the shoe or band dry and remove all burrs or rough spots from the shoe. Do not use shoes with elongated rivet holes.
3. On service brake, check the inside diameter of the brake drum.
4. Position a new lining on the shoe or band. Install new rivets, beginning with the rivet holes near the center of the shoe. On some vehicles, the primary lining is shorter than the secondary lining. If this condition exists, position the shorter (primary) lining in line with the heel end of the shoe. Do not let brake fluid, oil, or grease touch the brake lining. If a brake lining kit is used to replace the worn linings, follow the instructions in the kit and install all the parts provided.

5. Check the clearance between the lining and shoe rim. The lining must seat snugly against the rim with not more than 0.005-inch separation between any two rivets. If only the linings are replaced on disc service (split) anchor brakes with fixed anchor pins, the brake linings must be cam ground 0.010 inch at the ends after the linings are riveted to the brake shoe.

FRONT DISC BRAKES

1. Remove the shoe and linings as described in Part 12-24.
2. Measure the thickness of the brake lining. If the lining thickness at any point on the assembly is less than 0.210 inch above the backing plate or rivets, or if the lining shows evidence of brake fluid or oil contamination that is causing a brake pull, replace all four shoe and lining assemblies.
3. Check caliper to spindle attaching bolt torque (1-250-050 1-250 1-050 above 6000 GVW). Torque them to specification if required.
4. To check rotor runout, first eliminate the wheel bearing end play by tightening the adjusting nut. Then check to be sure the rotor can still be rotated.
5. Clamp a dial indicator to the spindle so the stylus contacts the rotor approximately 1 inch from the outer edge. Rotate the rotor and take an indicator reading. If the reading exceeds 0.010-inch total lateral runout within a six inch radius on the indicator, replace or resurface the disc brake rotor. The following requirements must be met when resurfacing disc brake rotors.

Use Rotunda Disc Brake Refinishing Lathe, Tool F-81-1466-B to refinish the disc brake rotors. Follow the step-by-step resurfacing instructions that come with the tool.

No more than 0.020 inch of material may be machined equally off each surface (A and B, Fig. 20). If rotor thickness falls below the

minimum shown on each rotor, it must be replaced.

The finished braking surfaces of the rotor must be flat and parallel within 0.011-inch, lateral runout must not exceed 0.003-inch total indicator reading, and the surface finish of the braking surfaces must be 16 to 80 micro inches.

When the runout check is finished, adjust the bearings as described in Part 12-10, to prevent bearing failure.

6. Check the rotor for scoring. Remove minor scores with a fine emery cloth. If the rotor is excessively scored, refinish it as outlined in Step 5 or replace the rotor if necessary.
7. Check the caliper. If it is cracked or shows any signs of leakage, replace it. If the caliper is leaking around the dust boot, remove and repair it.
8. Check brake hoses for signs of cracking, leaks or abrasion. Replace them if necessary.

BRAKE CYLINDER

1. Clean all brake cylinder parts in clean isopropyl alcohol. Inspect all parts for wear or damage. Check the cylinder bore for rust, scores or other damage. Be sure the bleeder screw passage is clean and open. Replace all parts that are worn or damaged.
2. If dirt is found in any part of the hydraulic system, flush the entire system with clean isopropyl alcohol.

MASTER CYLINDER

1. Clean all master cylinder parts in clean isopropyl alcohol, and inspect the parts for wear or damage. Replace them if required. When a master cylinder repair kit is used, follow the instructions in the kit and install all of the parts provided.
2. Make sure that all ports and vents in the master cylinder are open and free of foreign matter.
3. On a single brake system master cylinder, check the spring valve (riveted to the front end of the piston).

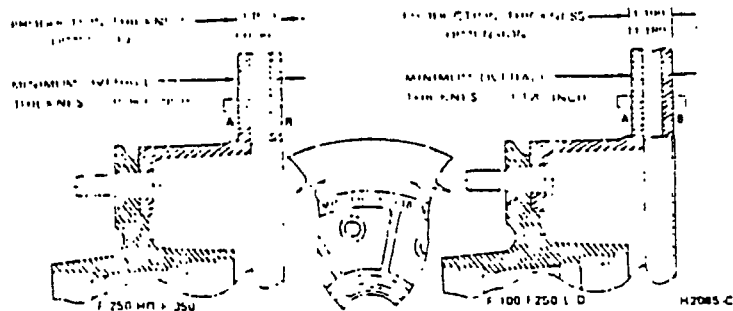


FIG. 20 Disc Brake Rotor Service Limits

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screw inside the hole to expand the brake shoes until they drag against the brake drum and lock the drum.

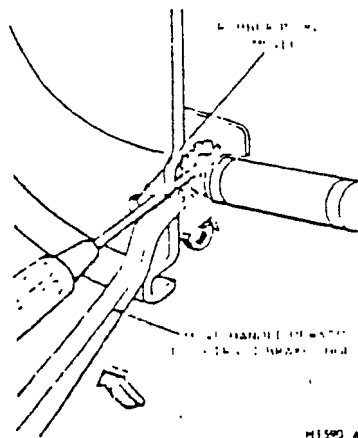


FIG. 11 Backing Off Brake Adjustment—F 100-250, E 100-150, with Rear Drum Brakes

Loosen the adjusting screw until a slight drag is noted (Fig. 11).
3. When the shoes are against the drum, loosen the adjusting screw an

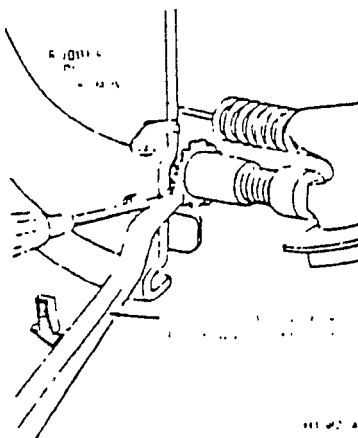


FIG. 12 Expanding Brake Shoes—F 250-350, E 250-350 Rear, and P-350-400

- additional 10 to 12 notches so that the drum rotates freely without drag. If the drum does not rotate freely, remove the wheel and drum, and blow out any dust and dirt from the linings. Using sand paper, remove any rust from the points where the shoes touch the backing plate. Apply a light coating of high temperature grease (C1A Z-19590-B). Do not get the lubricant on the linings.
4. Install the wheel and drum, and adjust the shoes. Install the adjusting hole cover on the brake backing plate.
5. Check and adjust the other three brake assemblies.
6. Apply the brakes. If the pedal travels more than halfway to the floor, there is too much clearance between the brake shoes and the drums. Repeat Steps 2 and 3 above.
7. When all brake shoes have been properly adjusted, lower the vehicle and road test to check brake operation. Perform the road test only when the brakes will apply and the vehicle can be safely stopped.

REMOVAL AND INSTALLATION

BRAKE DRUMS

Front Brake Drum—P-350-400 Series

Removal

1. Raise the vehicle until the tire clears the floor.
2. Remove the wheel cover or hub cap and wheel bearing dust cap. Remove the cotter pin, nut lock, nut, and washer.
3. Pull the brake drum approximately two inches forward, then push it back into position. Remove the wheel bearing and pull off the brake drum.

If the brake drum will not come off, insert a narrow screwdriver through the brake adjusting hole in the carrier plate, and disengage the adjusting lever from the adjusting screw. While holding the adjusting lever from the adjusting screw, loosen the adjusting screw with the brake adjusting tool (Fig. 11). Loosen the adjusting screw only if the drum cannot be removed. Do not burr, chip, or damage the notches in the adjusting screw or the self adjusting mechanism will not function properly. If the adjusting screw was loosened, check to be sure the adjusting lever is still properly seated in the shoe web.

Installation

1. If the hub and drum assembly will be replaced, remove the protective

coating from a new drum with carburetor degreaser. Install new bearings and a new grease retainer. Pack the wheel bearing, install the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer as described in Part 11-10. If the original drum will be installed, be sure the grease in the hub is clean and adequate.

2. Install the drum assembly, outer wheel bearing, washer, and adjusting nut as described in Part 11-10.
3. Adjust the wheel bearing, install the nut lock and cotter pin, and grease cap.
4. Install the wheel and hub cap. If the adjustment screw was loosened, adjust the brake as described in this Part.

REAR BRAKE DRUM—F-100, F-250 (UP TO 6900 G.V.W.), E-100-150 AND U-100

Removal

1. Raise the vehicle so the wheel is clear of the floor.
2. Remove the hub cap and wheel and tire assembly. Remove the three retaining nuts and remove the brake drum.

If the brake drum will not come off, insert a narrow screwdriver through the brake adjusting hole in the

backing plate, and disengage the adjusting lever from the adjusting screw. While holding the adjusting lever away from the adjusting screw, loosen the adjusting screw with the brake adjusting tool (Fig. 11). Loosen the adjusting screw only if the drum cannot be removed. Do not burr, chip, or damage the notches in the adjusting screw or the self adjusting mechanism will not function properly.

If the adjusting screw was loosened, check to be sure the adjusting lever is still properly seated in the shoe web.

Installation

1. Remove the protective coating from a new drum with carburetor degreaser.
2. Adjust the brakes as described in this Part.
3. Install the drum.
4. Install the brake drum retaining nuts and tighten securely. Install the wheel on the axle shaft flange studs against the drum, and torque the retaining nuts to specification.

REAR BRAKE DRUM—F-250 (ABOVE 6900 G.V.W.), 350, E-250-E-350, P-350, P-400

Removal

1. Raise the vehicle and install safety stands.

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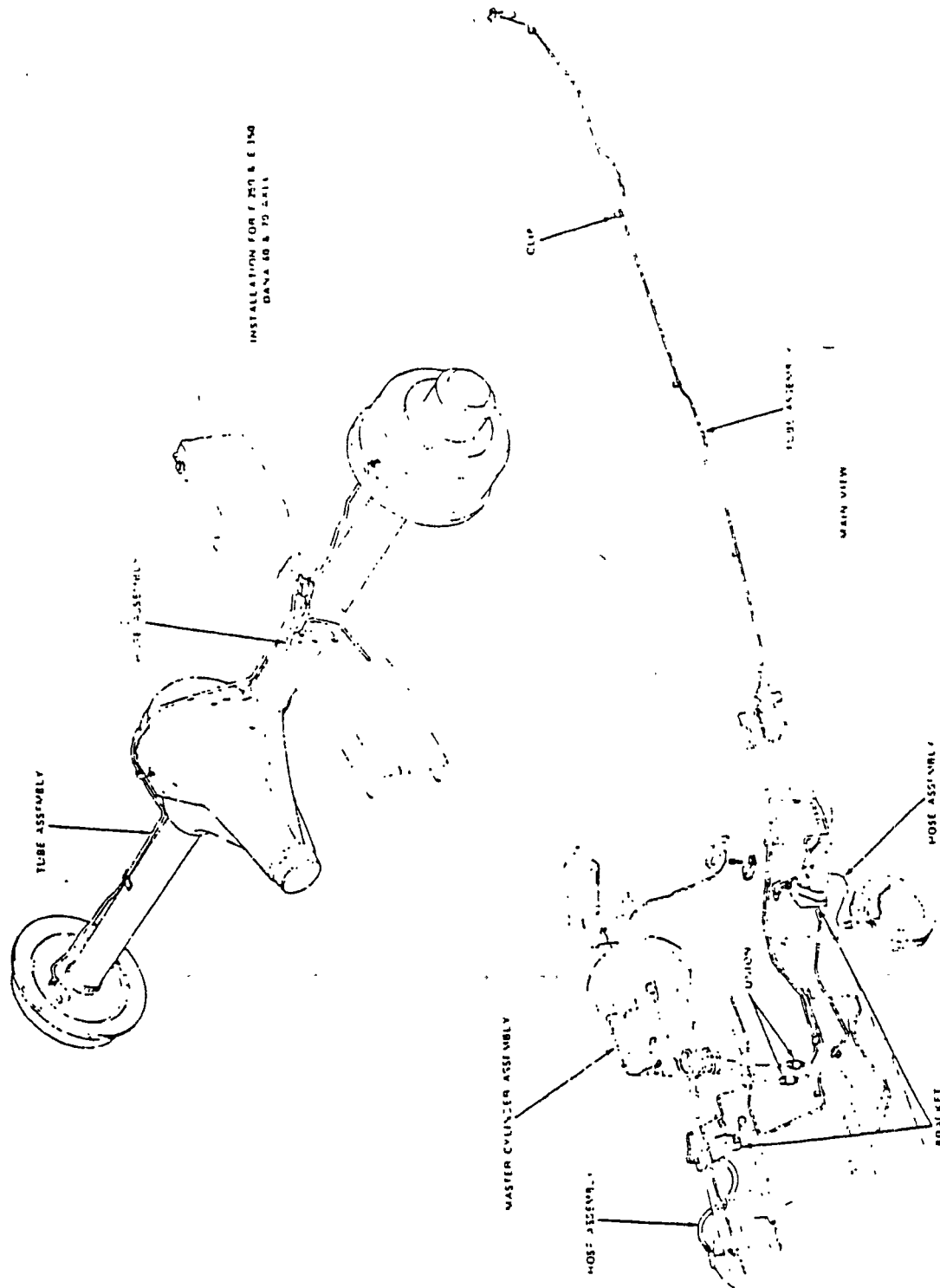


FIG. 10 E-100-E-350 Brake System

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REMOVAL AND INSTALLATION

BRAKE SHOES AND ADJUSTING SCREW

P-500 Series—Rear

Removal

1. Raise the vehicle until the tires clear the floor. Remove the wheel and tire assembly, and remove the drum or hub and drum assembly. Mark the hub and drum to aid assembly in the same position.
2. Clamp the brake cylinder boots against the ends of the cylinder and remove the brake shoe retracting springs using Tool 2035-N (Fig. 5).
3. Remove the brake shoe guide bolt, cotter pin, nut, washer, and bolt from both shoes, and remove the shoes from the backing plate.
4. Remove the clamp-type adjusting wheel lock from the anchor pin support, and unthread the adjusting screw and wheel assembly from the anchor pin support.

Installation

1. Lubricate all points where brake shoes contact other brake assembly parts with high temperature grease (C1AZ-19590-B).
2. Thread the adjusting screw and wheel assembly into the anchor pin support and install the clamp-type adjusting wheel lock. Thread the adjusting wheel into the support so the brake shoe rests against the adjusting wheel end.

3. Place the brake shoe against the backing plate, insert the ends in the brake cylinder links, and install the shoe guide bolt, washer, and nut (Fig. 4). Finger tighten the nut, then loosen it one full turn and install the cotter pin.
4. Install the retracting springs using Tool 2035-N (Fig. 5).
5. Remove the cylinder clamps, install the drum or the hub and drum assembly, and install the wheel assembly. Align the marks on the hub and drum for proper installation.
6. Adjust the brakes, and lower the vehicle.

600-900

SERIES—REAR—WAGNER

Removal

1. Raise the vehicle until the tires clear the floor. Remove the wheel, and tire assembly, and the drum or hub and drum assembly. It may be necessary to loosen the adjusting wheels slightly to free the grooved drums. Do not loosen the adjustment so much that adjusting wheel jams against the friction ring on the adjuster screw or damage to the ring may result.

Mark the hub and drum to aid assembly in the same position. Be sure there is no vacuum in the system before

disconnecting the hydraulic line. Expell vacuum in the system by pushing down on brake pedal with the engine off.

2. Unhook the automatic adjuster springs (Fig. 2). Remove each long adjuster link by pivoting back the adjusting wheel cranks until their slots align with the link hooks. Lift out the links and slide the hooks from the anchor pin cranks. Remove the short links by rotating the anchor cranks until the link hooks clear the eccentrics on the shoe webs. Then remove the smaller hooks from the cranks.
3. Spread the anchor crank O-washers and remove the cranks (it is usually unnecessary to remove the adjusting wheel cranks). If shoes will be relined, remove adjuster eccentrics from the shoe webs by unscrewing their self-tapping screws.
4. Remove the shoe retraction springs by sliding the looped ends off the pins. Remove the shoe hold-down lock wires, castellated nuts, and plain washers, and lift the shoes off the backing plate.
5. Unthread the adjusting screw and adjusting wheel from each of the anchor supports.

Installation

1. Insert the adjusting wheels in the anchor support slots and thread in the adjuster screws from the shoe side, with the friction ring end toward the shoe. For new linings, loosen adjusters, but do not loosen them far enough to jam the adjusting wheels.

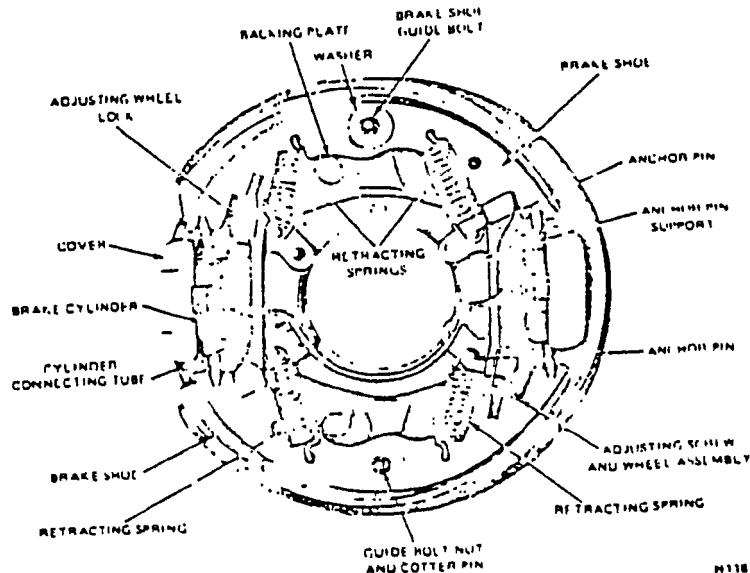


FIG. 4 Two Cylinder Brake—Rear—P-500

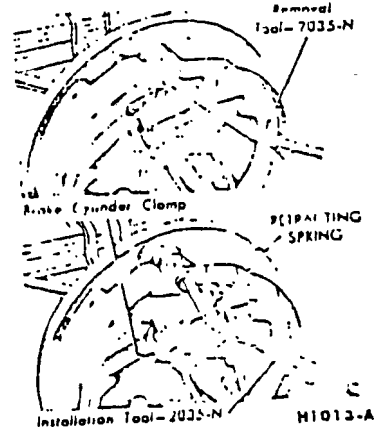


FIG. 5 Retracting Spring Replacement—Typical

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C-Series**Removal**

1. Remove the brake pedal retracting spring (Figs. 9 and 11).
2. Remove the brake master cylinder push rod eccentric bolt nut, bolt, and nylon bushings.
3. Remove the brake pedal bumper-to-bracket retaining nut. Remove the bolt and bumper.
4. On models with a single hydraulic brake system, remove the master cylinder push rod by pulling up the tab on the push rod boot, and pulling the push rod and boot from the cylinder.
5. Remove the nut from the bolt, slide the bolt to the right and remove the brake pedal assembly, sleeve, and bushing.
6. Remove the bushings from the pedal assembly.

Installation

1. Coat all bushings and the pedal shaft with a small amount of Lubriplate or

an equivalent lubricant. Position the nylon bushings in the brake pedal shaft bore.

2. Position the brake pedal assembly, sleeve, and bushing in the pedal support bracket, slide the bolt to the left and install the nut. Torque the nut to specification.
3. On models with a single hydraulic brake system, install the push rod and boot in the master cylinder.
4. On models with a single hydraulic brake system, install the pedal bumper bolt, bumper, and nut. Tighten the nut securely.
5. Install the nylon bushings in the push rod bore, and install the push rod eccentric bolt and nut.
6. Install the pedal retracting spring.
7. On models with a single hydraulic brake system, adjust the brake pedal free-travel to $\frac{1}{2}$ to $\frac{3}{4}$ inch. Torque the eccentric bolt nut to specification.

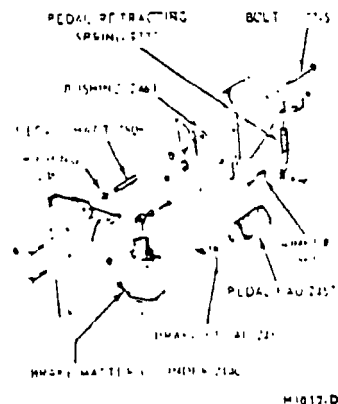


FIG. 11 Single Master Cylinder and Brake Pedal Installation—C-Series

OVERHAUL**BRAKE WHEEL CYLINDER****Disassembly**

1. With the wheel cylinder removed, remove the rubber boots from the ends of the brake cylinder. Remove the pistons, cups, and piston return spring from the cylinder (Fig. 12).

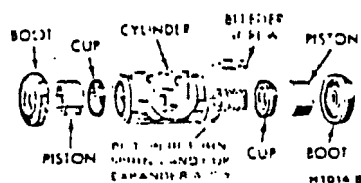


FIG. 12 Double Servo Brakes Cylinder

2. Remove the bleeder screw from the cylinder.

Assembly

1. Coat all brake cylinder parts with clean extra heavy duty brake fluid (6A7-19542-A).
2. Install the bleeder screw (Fig. 12) in the brake cylinder.
3. Place the piston return spring, cups, and pistons in the cylinder bore, and install a boot and link over each end of the cylinder. Clamp the brake cylinder pistons against the ends of the cylinder. When using a brake cylinder repair kit follow the instructions in the kit and install all of the parts provided.

MASTER CYLINDER**Single Brake System****Disassembly**

1. Remove the master cylinder. Clean the outside of the master cylinder, and remove the filler cap and gasket. Pour out any brake fluid left in the cylinder and reservoir.

On C-Series vehicles, (Fig. 13), remove the bolts that hold the

cylinder body on the reservoir and remove the gasket. Press down on the piston to compress the return spring, and remove the snap ring. Remove the piston, primary cup, piston filter, return spring, check valve, and check valve seat.

On vehicles with a frame-mounted vacuum brake booster, the check valve is installed in the booster instead of in the master cylinder.

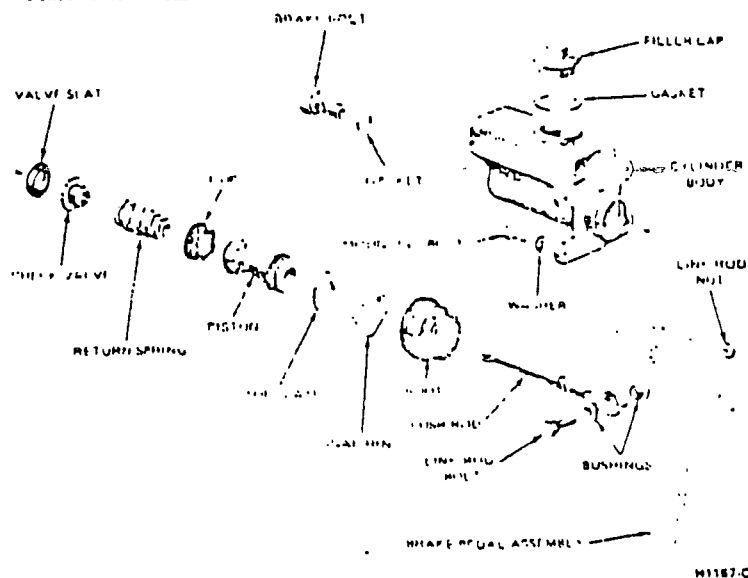


FIG. 13 C Series Brake Master Cylinder—Disassembled

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5. Adjust the brake pedal free travel to 3/16 to 3/8-inch. Torque the eccentric bolt nut to specification.
6. Install the stop light switch in the pedal bracket as far in as possible. Pull the pedal to its furthest return position to properly reset the stoplight switch.

P.500 Series

Removal

1. Open the front cover and disconnect the transmission gearshift rods from the shift levers. Position the rods so maximum working space is available at the pedal support bracket.
2. Remove the pedal pads from the clutch and brake pedal (Fig. 10).
3. Remove the screws that hold the floor covers at the steering column, and remove the covers. Unlatch the engine cover assembly and open.
4. Remove the floor plate, retaining screws. Remove the accelerator pedal from the accelerator linkage and remove the floor plate.
5. Disconnect the clutch and brake pedal retracting springs.
6. Loosen the pedal support bracket clamp bolt. Remove the cotter pins and clevis pins from the clutch and brake pedals.
7. Turn the front wheels all the way to the left. Through the left front fender apron, remove the locking pin from the clutch pedal and remove the pedal. Push the pedal shaft toward the centerline of the vehicle. From inside the cab, slide the pedal shaft

and clutch pedal lever to the right and out of the support bracket. Remove the brake pedal from the support bracket. Remove the bushings from the pedal and the pedal support bracket.

Incubation

1. Coat all bushings and the pedal shaft with a small amount of lubricant. LSA MUC-211 or equivalent. Install new bushings in the pedal support bracket and the brake pedal.
2. Position the brake pedal in the support bracket and slide the pedal shaft and clutch pedal lever through the bracket and pedal.
3. Through the left front fender apron, install the clutch pedal on the shaft and secure it with a new cotter pin.
4. Position the clutch rod on the clutch pedal lever, install the clevis pin and secure it with a new cotter pin.
5. Position the brake master cylinder push rod in the brake pedal. Install the clevis pin, and secure it with a new cotter pin.
6. Install the clutch and brake pedal retracting springs.
7. With the brake pedal against the stop, adjust the brake master cylinder push rod to give 0.07 to 0.24 inch free play measured at center line of pedal pad before push rod contacts piston. Remove the clevis pin from the push rod and turn the rod until the specified free travel is obtained. Tighten the jam nut and install clevis pin after adjustment.

B-Series

Removal

1. Remove the stop light switch from the pedal bracket (A or F).
2. Remove the retainer clip, master cylinder push rod and bushing.
3. Remove the clip from the pedal shaft. Slide the shaft to the left and remove the brake pedal.
4. Remove the bushings from the pedal

Installation

- 1 Coat all bushings and the pedal shaft with a small amount of Lubriplate or an equivalent lubricant.
- 2 Install the nylon bushings in the brake pedal shaft bore.
- 3 Position the brake pedal assembly in the pedal support bracket. Slide the pedal shaft through the pedal and secure with the retaining clip.
- 4 Position the nylon bushing in the bore of the push rod to assemble the brake pedal with the clevis pin.
- 5 Install the stoplight switch in the pedal bracket as far in as possible. Pull the pedal in its furthest return position to properly reset the stoplight switch.

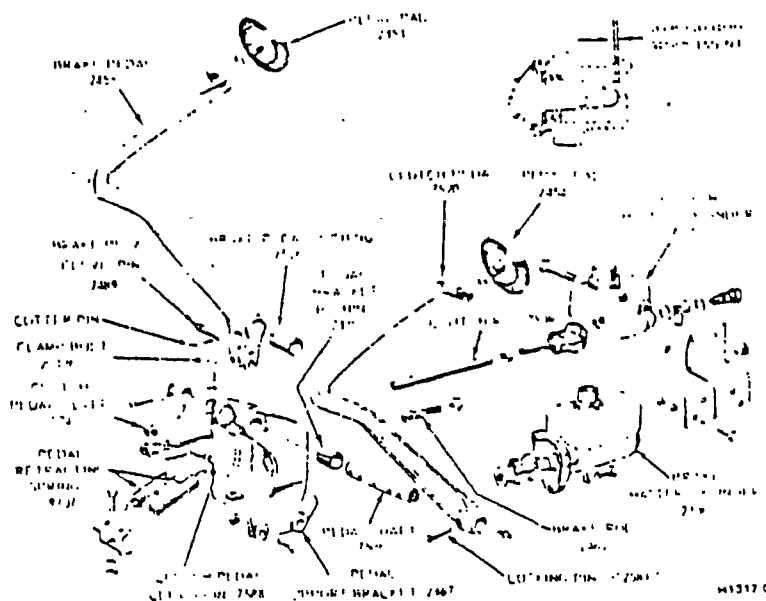


FIG. 10 Brake Pedal and Related Parts—P-500

PART 12-09 Drum Brakes — Dual Cylinders, Single Piston (Wagner)

Applies To 600 Thru 900 Series Trucks			
COMPONENT INDEX	Page	COMPONENT INDEX	Page
BRAKE BACKING PLATE		BRAKE SHOES	
Removal and Installation . . .	09 2	Adjustment . . .	09 1
BRAKE DRUMS		Removal and Installation . . .	09 1
Removal and Installation	09 1	BRAKE WHEEL CYLINDER	
BRAKE MASTER CYLINDER		Removal and Installation	09 2
Removal and Installation	09 3	Disassembly and Assembly	09 5
Disassembly and Assembly	09 5	SPECIFICATIONS	09 8
Inspection and Repair	09 5		

ADJUSTMENTS

BRAKE SHOE ADJUSTMENT

Adjust the brake shoes when the brake drums are at normal room temperature. If the shoes are adjusted when the drums are hot and expanded, they may drag as the drums cool and contract.

Brake adjustment re-establishes the brake lining-to-drum clearance and compensates for normal lining wear.

Follow the adjustment procedures below:

SELF ADJUSTING BRAKES—600-900 SERIES

Manually adjust two-cylinder front brakes using the hex-head, self-locking cam adjusters. Subsequent adjustment is automatic. For manual adjustment:

1. Raise the vehicle and check the front brakes for drag by rotating the wheels.
2. Adjust one shoe by rotating the wheel forward while turning the cam hex-

head forward. Expand the shoe until a light drag is felt on the drum. Do not apply excessive force on the hex-head cam, or the automatic adjuster parts may be damaged. Loosen the adjustment until the wheel turns freely. Adjust the other cam in the same manner.

3. Adjust the other front wheel brake using the procedure above.
4. Apply the brakes and recheck the adjustment.

REMOVAL AND INSTALLATION

BRAKE DRUMS THROUGH 900 SERIES

Removal and Installation

Service procedures for these models are described in Part 12-01.

BRAKE SHOES AND ADJUSTING MECHANISM

600-900 Series

Removal

1. Raise the vehicle until the tires clear the floor. Remove the wheel and tire assembly. Remove the drum or the hub and drum assembly. Mark the hub and drum to aid assembly in the same position.

Expell all vacuum in the system before disconnecting the hydraulic lines. Expell vacuum in the system by pushing down on brake pedal when engine is off.

2. Remove both brake shoe retracting springs (Fig. 1).
3. Remove the C-washers and flat washers from the hold-down studs. Lift the shoes off the backing plate.
4. To remove the adjuster assembly from the shoe, unhook the wedge spring from the wedge and the coil spring from the shoe web. Work the coil spring off the lever pivot pin and slide the spring hook from the plug lever pin. Pull the adjuster lever from the back of the shoe and remove the plug, wedge washer, wedge, and wedge guide.

Installation

1. To install the adjuster assembly, position the wedge guide with its pin in the hole provided in the brake shoe. Place the wedge guide on the side of the brake shoe farthest away from the carrier plate. Position the wedge on

the shoe web with its serrated edge resting against the serrations on the wedge guide.

2. Insert the drum contact plug so its head is through the hole in the brake shoe and lining and its shank rests over the wedge and wedge guide. The plug must be installed from the inside of the brake shoe.
3. From the opposite side of the shoe, install the shoe adjustment lever, guiding the pin into the mating hole of the contact plug. Install the washer over the wedge on the lever pivot pin.
4. Position the U-hook of the adjuster torsion spring on the plug lever pin. Attach one end of the wedge spring to the hook, and install the coiled portion of the torsion spring over the lever pivot pin. Install the outer end of the torsion spring over the edge of the shoe web.

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12-08-12

Drum Brakes—Dual Cylinders, Dual Pistons

12-08-12

- 16 Compress the spring and install the remaining snap ring and split washer on the piston stop rod.
- 17 Slide the piston stop rod into the secondary piston and engage the snap ring in its groove.
- 18 Slide the end cap and piston assembly into the master cylinder bore and screw the end cap into the master

- cylinder body. Torque the cap to 15 to 20 ft-lb.
- 19 Install washers on the reservoir retainers and place the retainers in the mounting holes of the reservoir.
- 20 Place the rubber washers and O-rings on the retainers.
- 21 Install the reservoir and retainer assembly on the master cylinder body.

- and torque the retainers to 15 to 20 ft-lb.
- 22 Replace the springs and check valves in the outlet ports of the cylinder.
- 23 Replace the primary and secondary port caps and torque to 15 to 20 ft-lb.
- 24 Install the mounting seal on the flange of the master cylinder. Install the filler cap and gasket.

SPECIFICATIONS

SPECIFIC TORQUE LIMITS

Location	Part	Torque (ft-lb)
Master cylinder cap	Cap	15 to 20
Reservoir retainers	Retainers	15 to 20
Port caps	Port caps	15 to 20
Mounting seal	Mounting seal	15 to 20
Filler cap	Filler cap	15 to 20
Gasket	Gasket	15 to 20
Spring	Spring	15 to 20
Check valve	Check valve	15 to 20
Primary piston	Primary piston	15 to 20
Secondary piston	Secondary piston	15 to 20
Piston stop rod	Piston stop rod	15 to 20
End cap	End cap	15 to 20
Split washer	Split washer	15 to 20
Washer	Washer	15 to 20
Rubber washer	Rubber washer	15 to 20
O-ring	O-ring	15 to 20
Mounting seal	Mounting seal	15 to 20
Filler cap	Filler cap	15 to 20
Gasket	Gasket	15 to 20

TORQUE LIMITS - HYDRAULIC TUBE NUTS (FT LBS)

TORQUE LIMITS - HYDRAULIC TUBE NUTS (FT LBS)		Thread Size	FT LBS
1/2-12	15	1/2-12	15
3/4-16	25	3/4-16	25
1-18	40	1-18	40
1 1/4-20	60	1 1/4-20	60
1 3/4-24	80	1 3/4-24	80
2-28	100	2-28	100
2 1/2-30	120	2 1/2-30	120
3-36	150	3-36	150
3 1/2-40	180	3 1/2-40	180
4-44	200	4-44	200
4 1/2-48	220	4 1/2-48	220
5-52	240	5-52	240
5 1/2-56	260	5 1/2-56	260
6-60	280	6-60	280
6 1/2-64	300	6 1/2-64	300
7-72	320	7-72	320
7 1/2-76	340	7 1/2-76	340
8-80	360	8-80	360
8 1/2-84	380	8 1/2-84	380
9-96	400	9-96	400
9 1/2-100	420	9 1/2-100	420
10-108	440	10-108	440
10 1/2-112	460	10 1/2-112	460
11-120	480	11-120	480
11 1/2-124	500	11 1/2-124	500
12-132	520	12-132	520
12 1/2-136	540	12 1/2-136	540
13-144	560	13-144	560
13 1/2-148	580	13 1/2-148	580
14-156	600	14-156	600
14 1/2-160	620	14 1/2-160	620
15-168	640	15-168	640
15 1/2-164	660	15 1/2-164	660
16-176	680	16-176	680
16 1/2-180	700	16 1/2-180	700
17-184	720	17-184	720
17 1/2-188	740	17 1/2-188	740
18-192	760	18-192	760
18 1/2-196	780	18 1/2-196	780
19-200	800	19-200	800
19 1/2-204	820	19 1/2-204	820
20-210	840	20-210	840
20 1/2-216	860	20 1/2-216	860
21-220	880	21-220	880
21 1/2-224	900	21 1/2-224	900
22-230	920	22-230	920
22 1/2-236	940	22 1/2-236	940
23-240	960	23-240	960
23 1/2-244	980	23 1/2-244	980
24-250	1000	24-250	1000
24 1/2-256	1020	24 1/2-256	1020
25-260	1040	25-260	1040
25 1/2-264	1060	25 1/2-264	1060
26-270	1080	26-270	1080
26 1/2-276	1100	26 1/2-276	1100
27-280	1120	27-280	1120
27 1/2-284	1140	27 1/2-284	1140
28-290	1160	28-290	1160
28 1/2-296	1180	28 1/2-296	1180
29-300	1200	29-300	1200
29 1/2-304	1220	29 1/2-304	1220
30-310	1240	30-310	1240
30 1/2-316	1260	30 1/2-316	1260
31-320	1280	31-320	1280
31 1/2-324	1300	31 1/2-324	1300
32-330	1320	32-330	1320
32 1/2-336	1340	32 1/2-336	1340
33-340	1360	33-340	1360
33 1/2-344	1380	33 1/2-344	1380
34-350	1400	34-350	1400
34 1/2-356	1420	34 1/2-356	1420
35-360	1440	35-360	1440
35 1/2-364	1460	35 1/2-364	1460
36-370	1480	36-370	1480
36 1/2-376	1500	36 1/2-376	1500
37-380	1520	37-380	1520
37 1/2-384	1540	37 1/2-384	1540
38-390	1560	38-390	1560
38 1/2-396	1580	38 1/2-396	1580
39-400	1600	39-400	1600
39 1/2-404	1620	39 1/2-404	1620
40-410	1640	40-410	1640
40 1/2-416	1660	40 1/2-416	1660
41-420	1680	41-420	1680
41 1/2-424	1700	41 1/2-424	1700
42-430	1720	42-430	1720
42 1/2-436	1740	42 1/2-436	1740
43-440	1760	43-440	1760
43 1/2-444	1780	43 1/2-444	1780
44-450	1800	44-450	1800
44 1/2-456	1820	44 1/2-456	1820
45-460	1840	45-460	1840
45 1/2-464	1860	45 1/2-464	1860
46-470	1880	46-470	1880
46 1/2-476	1900	46 1/2-476	1900
47-480	1920	47-480	1920
47 1/2-484	1940	47 1/2-484	1940
48-490	1960	48-490	1960
48 1/2-496	1980	48 1/2-496	1980
49-500	2000	49-500	2000
49 1/2-504	2020	49 1/2-504	2020
50-510	2040	50-510	2040
50 1/2-516	2060	50 1/2-516	2060
51-520	2080	51-520	2080
51 1/2-524	2100	51 1/2-524	2100
52-530	2120	52-530	2120
52 1/2-536	2140	52 1/2-536	2140
53-540	2160	53-540	2160
53 1/2-544	2180	53 1/2-544	2180
54-550	2200	54-550	2200
54 1/2-556	2220	54 1/2-556	2220
55-560	2240	55-560	2240
55 1/2-564	2260	55 1/2-564	2260
56-570	2280	56-570	2280
56 1/2-576	2300	56 1/2-576	2300
57-580	2320	57-580	2320
57 1/2-584	2340	57 1/2-584	2340
58-590	2360	58-590	2360
58 1/2-596	2380	58 1/2-596	2380
59-600	2400	59-600	2400
59 1/2-604	2420	59 1/2-604	2420
60-610	2440	60-610	2440
60 1/2-616	2460	60 1/2-616	2460
61-620	2480	61-620	2480
61 1/2-624	2500	61 1/2-624	2500
62-630	2520	62-630	2520
62 1/2-636	2540	62 1/2-636	2540
63-640	2560	63-640	2560
63 1/2-644	2580	63 1/2-644	2580
64-650	2600	64-650	2600
64 1/2-656	2620	64 1/2-656	2620
65-660	2640	65-660	2640
65 1/2-664	2660	65 1/2-664	2660
66-670	2680	66-670	2680
66 1/2-676	2700	66 1/2-676	2700
67-680	2720	67-680	2720
67 1/2-684	2740	67 1/2-684	2740
68-690	2760	68-690	2760
68 1/2-696	2780	68 1/2-696	2780
69-700	2800	69-700	2800
69 1/2-704	2820	69 1/2-704	2820
70-710	2840	70-710	2840
70 1/2-716	2860	70 1/2-716	2860
71-720	2880	71-720	2880
71 1/2-724	2900	71 1/2-724	2900
72-730	2920	72-730	2920
72 1/2-736	2940	72 1/2-736	2940
73-740	2960	73-740	2960
73 1/2-744	2980	73 1/2-744	2980
74-750	3000	74-750	3000
74 1/2-756	3020	74 1/2-756	3020
75-760	3040	75-760	3040
75 1/2-764	3060	75 1/2-764	3060
76-770	3080	76-770	3080
76 1/2-776	3100	76 1/2-776	3100
77-780	3120	77-780	3120
77 1/2-784	3140	77 1/2-784	3140
78-790	3160	78-790	3160
78 1/2-796	3180	78 1/2-796	3180
79-800	3200	79-800	3200
79 1/2-804	3220	79 1/2-804	3220
80-810	3240	80-810	3240
80 1/2-816	3260	80 1/2-816	3260
81-820	3280	81-820	3280
81 1/2-824	3300	81 1/2-824	3300
82-830	3320	82-830	3320
82 1/2-836	3340	82 1/2-836	3340
83-840	3360	83-840	3360
83 1/2-844	3380	83 1/2-844	3380
84-850	3400	84-850	3400
84 1/2-856	3420	84 1/2-856	3420
85-860	3440	85-860	3440
85 1/2-864	3460	85 1/2-864	3460
86-870	3480	86-870	3480
86 1/2-876	3500	86 1/2-876	3500
87-880	3520	87-880	3520
87 1/2-884	3540	87 1/2-884	3540
88-890	3560	88-890	3560
88 1/2-896	3580	88 1/2-896	3580
89-900	3600	89-900	3600
89 1/2-904	3620	89 1/2-904	3620
90-910	3640	90-910	3640
90 1/2-916	3660	90 1/2-916	3660
91-920	3680	91-920	3680
91 1/2-924	3700	91 1/2-924	3700
92-930	3720	92-930	3720
92 1/2-936	3740	92 1/2-936	3740
93-940	3760	93-940	3760
93 1/2-944	3780	93 1/2-944	3780
94-950	3800	94-950	3800
94 1/2-956	3820	94 1/2-956	3820
95-960	3840	95-960	3840
95 1/2-964	3860	95 1/2-964	3860
96-970	3880	96-970	3880
96 1/2-976	3900	96 1/2-976	3900
97-980	3920	97-980	3920
97 1/2-984	3940	97 1/2-984	3940
98-990	3960	98-990	3960
98 1/2-996	3980	98 1/2-996	3980
99-1000	4000	99-1000	4000
99 1/2-1004	4020	99 1/2-1004	4020
100-1010	4040	100-1010	4040
100 1/2-1016	4060	100 1/2-1016	4060
101-1020	4080	101-1020	4080
101 1/2-1024	4100	101 1/2-1024	4100
102-1030	4120	102-1030	4120
102 1/2-1036	4140	102 1/2-1036	4140
103-1040	4160	103-1040	4160
103 1/2-1044	4180	103 1/2-1044	4180
104-1050	4200	104-1050	4200
104 1/2-1056	4220	104 1/2-1056	4220
105-1060	4240	105-1060	4240
105 1/2-1064	4260	105 1/2-1064	4260
106-1070	4280	106-1070	4280
106 1/2-1076	4300	106 1/2-1076	4300
107-1080	4320	107-1080	4320
107 1/2-1084	4340	107 1/2-1084	4340
108-1090	4360	108-1090	4360
108 1/2-1096	4380	108 1/2-1096	4380
109-1100	4400	109-1100	4400
109 1/2-1104	4420	109 1/2-1104	4420
110-1110	4440	110-1110	4440
110 1/2-1116	4460	110 1/2-1116	4460
111-1120	4480	111-1120	4480
111 1/2-1124	4500	111 1/2-1124	4500
112-1130	4520	112-1130	4520
112 1/2-1136	4540	112 1/2-1136	4540
113-1140	4560	113-1140	4560
113 1/2-1144	4580	113 1/2-1144	4580
114-1150	4600	114-1150	4600
114 1/2-1156	4620	114 1/2-1156	4620
115-1160	4640	115-1160	4640
115 1/2-1164	4660	115 1/2-1164	4660
116-1170	4680	116-1170	4680
116 1/2-1176	4700	116 1/2-1176	4700
117-1180	4720	117-1180	4720
117 1/2-1184	4740	117 1/2-1184	4740
118-1190	4760	118-1190	4760
118 1/2-1196	4780	118 1/2-1196	4780
119-1200	4800	119-1200	4800
119 1/2-1204	4820	119 1/2-1204	4820
120-1210	4840	120-1210	4840
120 1/2-1216	4860	120 1/2-1216	4860
121-1220	4880	121-1220	4880
121 1/2-1224	4900	121 1/2-1224	4900
122-1230	4920	122-1230	4920
122 1/2-1236	4940	122 1/2-1236	4940
123-1240	4960	123-1240	4960
123 1/2-1244	4980	123 1/2-1244	4980
124-1250	5000	124-1250	5000
124 1/2-1256	5020	124 1/2-1256	5020
125-1260	5040	125-1260	5040
125 1/2-1264	5060	125 1/2-1264	5060
126-1270	5080	126-1270	5080
126 1/2-1276	5100	126 1/2-1276	5100
127-1280	5120	127-1280	5120
127 1/2-12			