

CLUTCH

CONTENTS

	Page		Page
CLUTCH HOUSING ALIGNMENT	6	SERVICE DIAGNOSIS	1
CLUTCH PEDAL FREE PLAY	1	SERVICE PROCEDURES	1
CLUTCH RELEASE BEARING	5	SPECIFICATIONS	8
CLUTCH RELEASE FORK	5	STEAM CLEANING PRECAUTIONS	7
CLUTCH—SERVICING	2	TIGHTENING REFERENCES	8
PILOT BUSHING—CRANKSHAFT TO TRANSMISSION DRIVE PINION	5	TORQUE SHAFT AND BEARINGS	6

GENERAL INFORMATION

The Semi-Centrifugal, single, dry disc clutch (Fig. 1), combines the feature of low pedal effort with that of a clutch capable of transmitting the full torque of the engine.

Six centrifugal rollers are assembled between the pressure plate and cover. These rollers are provided to increase the normal load on the disc assembly at higher engine speeds. As the engine speed increases, the centrifugal force of the rollers causes them to act as wedges between the cover and pressure plate and exert greater force against the disc.

No adjustment for wear is provided in the clutch itself. The clutch pedal linkage, however, is provided with an adjustable rod to maintain specified pedal

free play.

The three pressure plate release levers are preset during manufacture and no attempt should be made to adjust them in service.

Clutch Pedal and Bracket

The clutch pedal is connected to the torque shaft through a vertically positioned rod (Fig. 2). A non-adjustable over-center spring is provided between the pedal and the pedal bracket to allow easy clutch pedal operation.

The upper end of the clutch pedal pivots in the pedal bracket on two needle bearings. These bearings do not require periodic lubrication.

SERVICE DIAGNOSIS

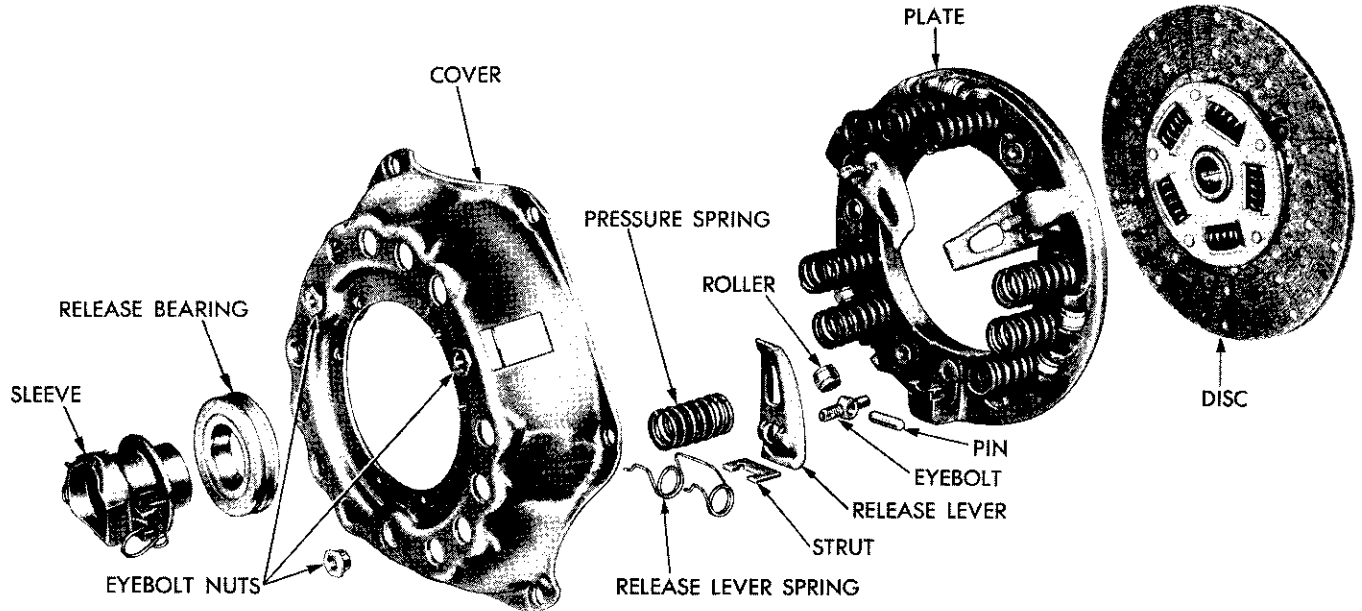
Condition	Possible Cause	Correction
CLUTCH CHATTER	(a) Worn or damaged disc assembly.	(a) Replace disc assembly.
	(b) Grease or oil on disc facings.	(b) Replace disc assembly and correct cause of contamination.
	(c) Improperly adjusted cover assembly.	(c) Replace cover assembly.
CLUTCH SLIPPING	(a) Burned, worn, or oil soaked facings.	(a) Replace disc assembly and correct cause of contamination.
	(b) Insufficient pedal free play.	(b) Adjust release fork rod.
	(c) Weak or broken pressure springs.	(c) Replace cover assembly.
DIFFICULT GEAR SHIFTING	(a) Excessive pedal free play.	(a) Adjust release fork rod.
	(b) Worn or damaged disc assembly.	(b) Replace disc assembly.
	(c) Improperly adjusted cover assembly.	(c) Replace cover assembly.
	(d) Clutch disc splines sticking.	(d) Remove disc assembly and free up splines or replace disc.
CLUTCH NOISY	(a) Dry clutch linkage.	(a) Lubricate where necessary.
	(b) Worn release bearing.	(b) Replace release bearing.
	(c) Worn disc assembly.	(c) Replace disc assembly.
	(d) Worn release levers.	(d) Replace clutch assembly.
	(e) Worn or dry pilot bushing.	(e) Lubricate or replace bushing.
	(f) Dry contact-pressure plate lugs in cover.	(f) Lubricate very lightly.

SERVICE PROCEDURES

CLUTCH PEDAL FREE PLAY

The only adjustment required for the clutch is the

clutch pedal linkage adjustment to provide the prescribed clutch pedal free play. The adjustment is



NY70A

Fig. 1—Clutch Disassembled (Semi Centrifugal)

necessary to restore pedal free play reduced by normal clutch wear.

Adjusting Clutch Pedal Free Play

(1) Inspect condition of clutch pedal rubber stop (Fig. 2). If stop is damaged, install a new one.

(2) Adjust fork rod by turning self-locking adjusting nut (Fig. 3) to provide $5/32$ inch free movement at end of fork. This movement will provide prescribed one-inch free play at pedal.

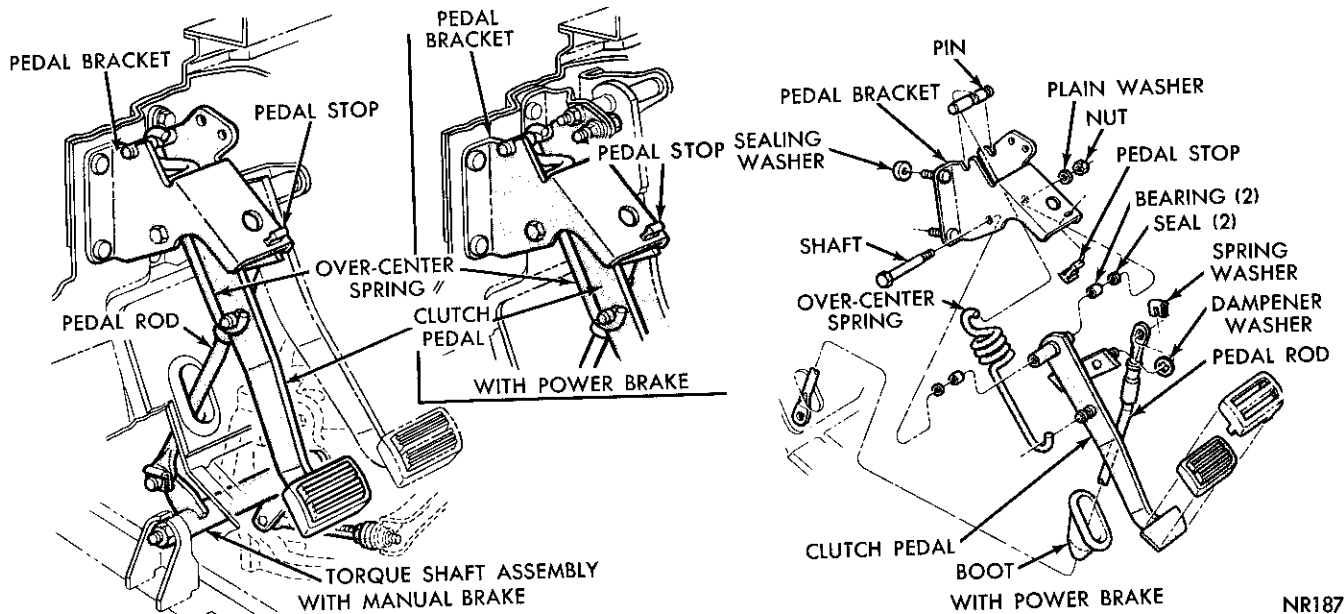
CLUTCH—SERVICING

Improper operation or excessive wear may impair

the clutch function to a point where it may be necessary to remove and replace the disc and/or clutch assembly. Should this become necessary, proceed as follows:

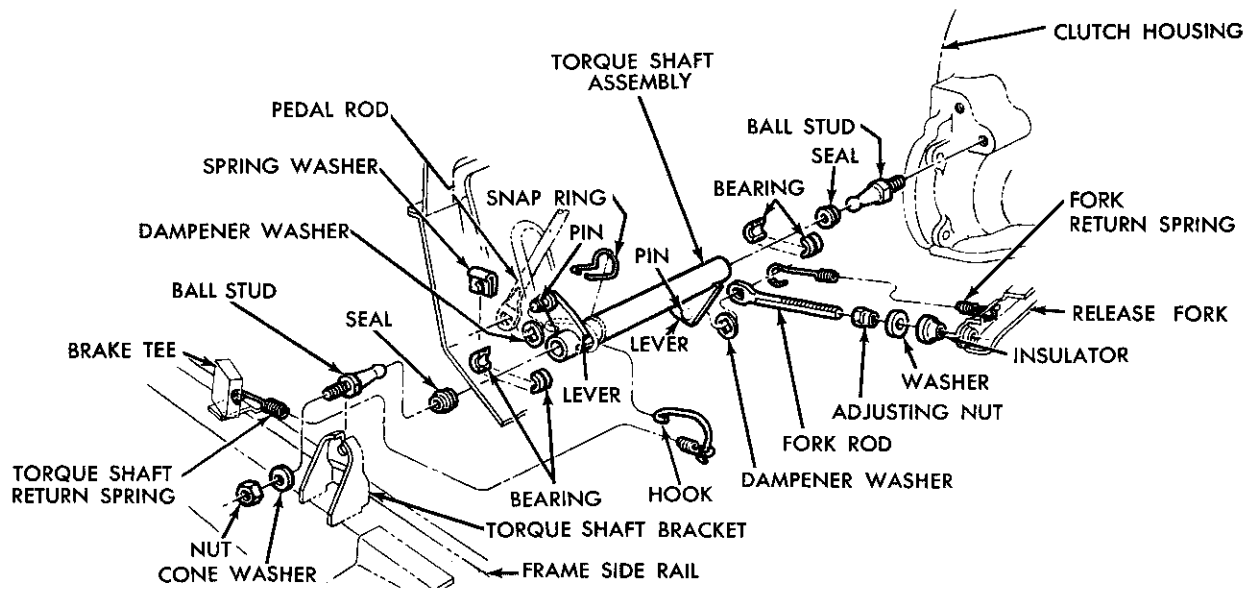
Removal

- (1) Remove transmission. See "Manual Transmission," Group 21, for detailed procedure.
- (2) Remove clutch housing pan.
- (3) Disconnect return spring from clutch release fork and torque shaft lever pin.
- (4) Remove fork rod assembly from pin and release fork (Fig. 3).



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Fig. 2—Clutch Pedal and Linkage



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Fig. 3—Torque Shaft and Linkage

(5) Remove clutch release bearing and sleeve assembly from clutch release fork (Fig. 4) then remove release fork and boot from clutch housing.

(6) Mark clutch cover and flywheel (Fig. 5) to maintain their same relative positions when reinstalling clutch assembly.

(7) Loosen and back off clutch cover attaching bolts, one or two turns at a time, in succession, to avoid bending cover flange.

(8) Remove clutch assembly and disc from clutch housing.

CAUTION: Handle clutch and disc carefully to avoid contaminating the friction surfaces.

Cleaning and Inspection

(1) Use compressed air to clean dust out of clutch housing. Inspect for oil leakage through engine rear main bearing oil seal and transmission drive pinion seal. If leakage is noted, it should be corrected at this time.

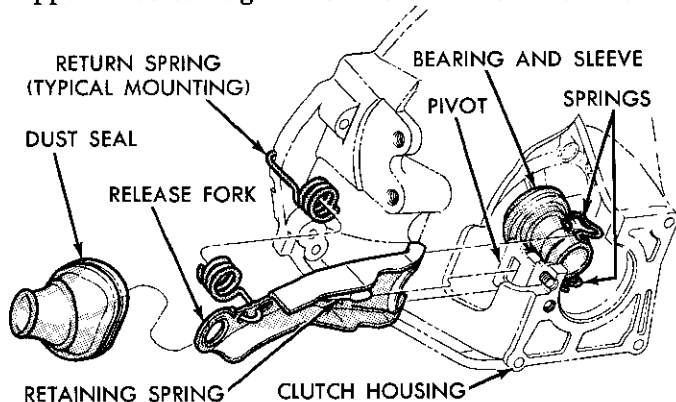
(2) Friction face of flywheel should have a uniform appearance throughout entire clutch contact area. If

there is evidence of heavy contact on one portion of wear circle and a very light contact 180° from that portion, flywheel may be improperly mounted or sprung. In either case, a dial indicator mounted on clutch housing with plunger in contact with wear circle, should show **no more than .003 inch** runout throughout complete rotation of flywheel.

(3) Friction face of flywheel should also be free from discoloration, burned areas, small cracks, grooves or ridges.

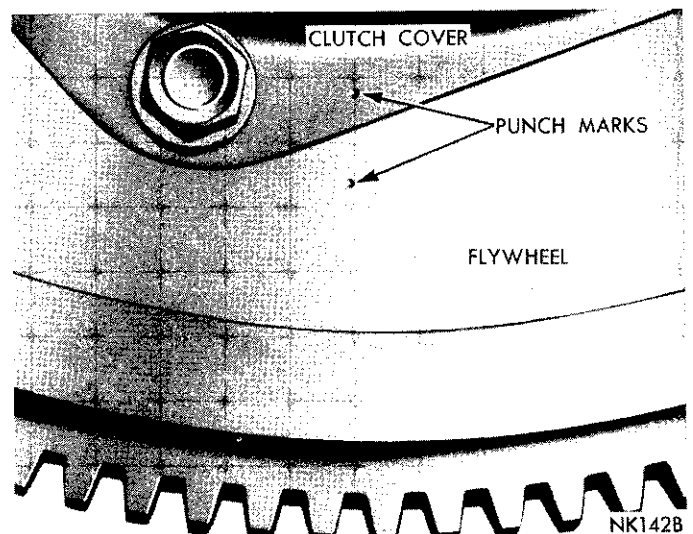
(4) The drive pinion pilot bushing pressed in rear end of crankshaft should be smooth and show no excessive wear. A new transmission main drive pinion can be used to gauge size of bushing.

If necessary to replace bushing, proceed as detailed under "Crankshaft to Transmission Drive Pinion Pilot Bushing."



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Fig. 4—Clutch Release Fork, Bearing and Sleeve



NK142B

Fig. 5—Marking Clutch and Flywheel

(5) End of transmission main drive pinion should be smooth and bright, without grooves and ridges.

(6) The disc assembly should be handled without touching facings. Replace disc if facings show evidence of grease or oil soakage, or wear to within less than .015 inch of rivet heads. The hub splines and splines on transmission main drive pinion should be a snug fit without signs of excessive wear. Metallic portions of disc assembly should be dry and clean and show no evidence of having been hot. Each of the arched springs between facings should be unbroken and all rivets should be tight.

(7) Wipe friction surface of pressure plate with kerosene, mineral spirits or other suitable solvent.

(8) Using a straight edge, check pressure plate for flatness. The pressure plate friction area should be flat within .015 inch and free from discoloration, burned areas, cracks, grooves or ridges.

(9) Inner ends of release levers should have a uniform wear pattern.

(10) Using a surface plate, test cover for flatness. All sections around attaching bolt holes should be in contact with surface plate within .015 inch.

(11) The cover should be a snug fit on pressure plate lugs.

If clutch assembly does not meet these requirements, it should be replaced.

(12) Examine condition of clutch release bearing.

CAUTION: The clutch release bearing is a prelubricated, sealed thrust bearing and should not be immersed in solvent.

The bearing should turn freely when held in the hands under light thrust load, with no evidence of roughness.

(13) If bearing is noisy, rough or dry, install a new one on sleeve as detailed under "Clutch Release Bearing."

Installation

The grease recommended for use during reassembly procedures is **Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.**

(1) Lubricate transmission drive pinion pilot bushing in end of crankshaft with about one-half teaspoon of grease. Place lubricant in radius back of bushing.

(2) Clean the surfaces of flywheel and pressure plate thoroughly with fine sandpaper or crocus cloth, and make certain that all oil or grease has been removed.

(3) Hold clutch disc, pressure plate and cover in mounting position, with springs on disc damper facing away from flywheel. **Do not touch disc facing, as contamination may result in clutch chatter.** Insert a Clutch Disc Aligning Arbor through hub of disc and into bushing (Fig. 6). If an Arbor is not available,

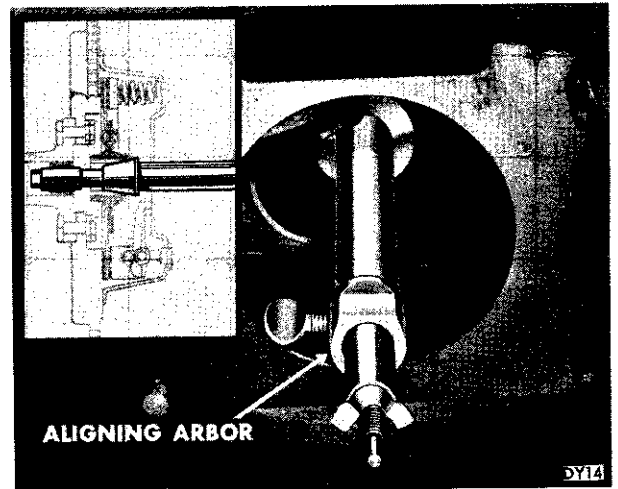


Fig. 6—Clutch Disc Aligning Arbor

use a spare transmission drive pinion.

(4) Install clutch cover attaching bolts (after aligning balance punch marks) but do not draw down (Fig. 5). The special 12 point bolts used on 11 inch clutches for 383 cu. in. and larger engines, require no lock washers. The use of lock washers would create interference problems.

(5) **To avoid distortion of the clutch cover, bolts should be tightened a few turns at a time (alternately) until they are all snug.** Tighten bolts to 30 foot-pounds. Remove Arbor (or drive pinion if used).

(6) Fill cavity of bearing sleeve with Lubricant. Also, apply a film to release fork pads of sleeve (Fig. 7).

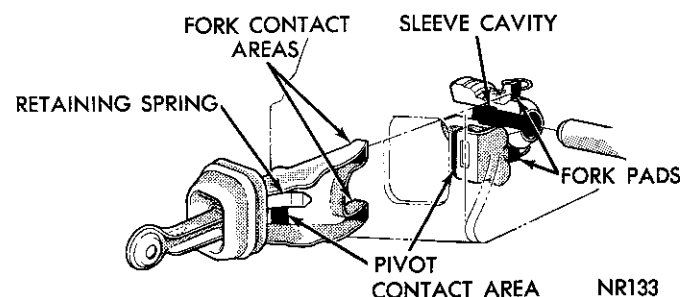
(7) Lubricate fork fingers and retaining spring at pivot contact area (Fig. 7), with a film of grease.

(8) Engage fork fingers under clutch sleeve retaining springs while engaging fork spring into fork pivot (Fig. 4).

(9) Be sure groove in dust seal is engaged on seal opening flange in clutch housing.

(10) Assemble clutch release rod in end of release fork (Fig. 3). Install torque shaft return spring in end of release fork. Assembly front end of rod on torque shaft lever pin and secure with front end of return spring (Fig. 3).

CAUTION: Do not lubricate splines or pilot end of



transmission drive pinion, when installing transmission. These areas must be kept dry.

(11) Install transmission as detailed in "Transmission Installation," Group 21.

(12) Adjust clutch linkage as detailed under "Adjusting Clutch Pedal Free Play."

PILOT BUSHING—CRANKSHAFT TO TRANSMISSION DRIVE PINION

Tools called out are part of Bushing Service Tool Kit C-3887-A.

Removal

(1) Thread bushing puller SP-3631 into bushing firmly and squarely, about 3 or 4 turns.

(2) Place receiving cup SP-3633 over threaded shaft of puller and install nut SP-1191 down against cup.

(3) Hold puller and turn nut to draw bushing out of crankshaft.

Installation

(1) Soak new bushing in oil before installing.

(2) Place handle SP-3549 on head SP-3551 and use this tool to drive new bushing into crankshaft flush to end.

(3) Place one-half teaspoon of grease in crankshaft cavity behind bushing.

CLUTCH RELEASE FORK

Removal

(1) Unhook return spring from torque shaft lever pin and release fork (Fig. 3).

(2) Remove fork rod assembly from torque shaft and release fork.

(3) Pry dust seal out of clutch housing and remove from clutch fork (Fig. 4).

(4) Grasp outer end of clutch fork and pull fork out and free of retaining springs and off knife edge pivot (Fig. 3). The clutch fork has a riveted flat retaining spring that is engaged in a hole in the pivot. The clutch release fork pivot is an "L" shaped bracket bolted inside the clutch housing.

(5) Remove clutch housing pan.

Installation

(1) The grease recommended for use during reassembly procedures is Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.

(2) Before installing release fork, lubricate both sides of fork contact areas, pivot contact area, edge of pivot, also the clutch sleeve fork pads (Fig. 7).

(3) Install clutch release fork in housing, being careful to engage flat retaining spring in hole in pivot and under retaining springs of bearing sleeve.

(4) Install dust seal over release fork and engage groove of seal in clutch housing. Install housing pan.

(5) Insert threaded end of fork rod assembly in hole of release fork (Fig. 3). Install eye end of fork rod on torque shaft lever pin.

(6) Hook torque shaft return spring in release fork and on torque shaft lever pin (Fig. 3).

(7) Adjust clutch linkage as described under "Adjusting Clutch Pedal Free Play".

CLUTCH RELEASE BEARING (Removed From Clutch)

Removal

(1) Examine condition of bearing. If bearing is noisy, rough or dry when rotated by hand under light thrust load, remove bearing from sleeve.

(2) Support bearing in a vise or press and carefully press out sleeve.

(3) Clean sleeve in solvent and remove all old lubricant.

Assembly

CAUTION: Exercise care when installing a new clutch release bearing to avoid damaging bearing race. Never drive bearing on sleeve with a hammer. Use either of following two methods.

Vise Method

(1) Position new bearing on sleeve and place old bearing against face of new bearing.

(2) Support parts in a vise and carefully press new bearing on sleeve (Fig. 8). **Make certain bearing is seated on shoulder of bearing sleeve. Rotate bearings as they are pressed together.**

Press Method

(1) Support sleeve on press bed.

(2) Position new bearing on sleeve and place old bearing on new one.

(3) Bring press ram into contact with old bearing and apply sufficient pressure to seat new bearing on shoulder of sleeve. Rotate bearings as they are pressed together.

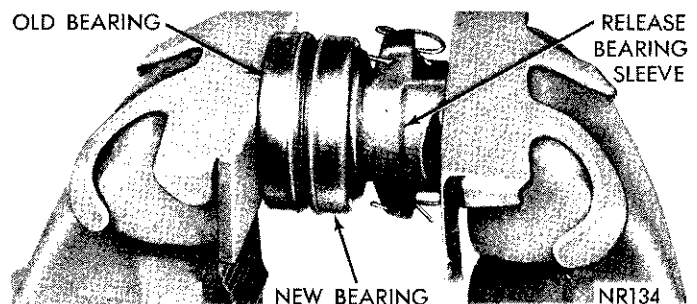


Fig. 8—Replacing Clutch Release Bearing

Lubrication

Before installing bearing and sleeve assembly, lubricate parts as follows:

(1) Fill cavity of bearing sleeve with the previously recommended Automotive Multi-Purpose Grease, NLGI grade 2 EP (Fig. 7).

(2) Also, apply a film of lubricant to release fork pads of sleeve.

(3) A film of lubricant should be applied to the pivot contact area of fork retaining spring and contact areas of fork fingers.

Installation

(1) Install bearing and sleeve assembly in clutch housing, engaging fork under the sleeve springs (Fig. 4). **Be sure springs have lateral freedom.**

CAUTION: Do not lubricate splines or pilot end of transmission drive pinion, when installing transmission. These areas must be kept dry.

(2) Install transmission as detailed in "Transmission Installation," Group 21.

(3) Adjust clutch linkage as detailed in "Adjusting Clutch Pedal Free Play."

TORQUE SHAFT AND BEARINGS**Removal**

(1) Remove spring washer securing pedal rod to torque shaft lever pin and remove rod from pin (Fig. 3).

(2) Unhook torque shaft return spring from torque shaft lever pin and release fork. Remove fork rod assembly. Remove outer torque shaft return spring from hook on torque shaft lever and brake tee (Fig. 3).

(3) Remove nut and cone washer from outer ball stud.

(4) Unscrew ball stud from clutch housing (Fig. 3).

(5) Lift frame end of torque shaft from torque shaft bracket and remove torque shaft assembly from vehicle.

(6) Disassemble torque shaft assembly by removing snap ring, ball studs, seals and bearings.

Cleaning and Inspection

(1) Clean all parts in kerosene, mineral spirits or other suitable solvent. Remove all grease from inside torque shaft.

(2) The two ball studs should be bright and free from scratches, ridges, or other surface imperfections.

(3) The inner surfaces of bearings should also be smooth and free from surface scratches or embedded foreign material. The wear pattern should be uniform over entire surface.

(4) Replace worn or cracked rubber seals.

Installation

(1) Install new seals on ball studs (Fig. 3).

(2) Coat counterbored ends of torque shaft, torque shaft bearings and ball studs with Multi-Mileage Lubricant, Part Number 2525035, or Automotive Multi-Purpose Grease, NLGI grade 2 EP.

(3) Install bearings on ball studs and push studs and bearings into torque shaft. Install snap ring on frame end of shaft.

(4) Place torque shaft in approximate position and thread inner ball stud into clutch housing. Tighten stud to 40 foot-pounds (Fig. 3).

(5) Position frame end of torque shaft in slotted frame bracket. Install cone washer and nut on stud and tighten to 40 foot-pounds.

(6) Install pedal rod on torque shaft lever pin and secure with spring washer.

(7) Insert threaded end of fork rod assembly in end of release fork (Fig. 3). Install eye end of rod assembly on torque shaft lever pin.

(8) Hook one end of torque shaft return spring in release fork (Fig. 3) and opposite end over torque shaft lever pin to secure fork rod on pin. Install outer torque shaft return spring between hook on torque shaft lever and brake tee.

(9) Adjust clutch linkage.

CLUTCH HOUSING ALIGNMENT

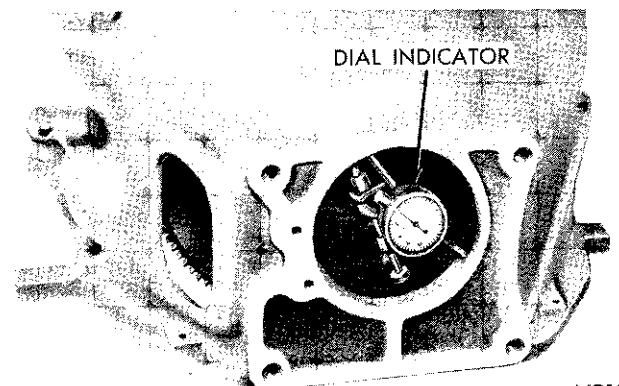
When performing adjustments or repairs that involve removing the clutch housing, it will be necessary to check transmission mounting bore runout and squareness to the crankshaft when reassembling.

Bore Runout

(1) Replace one flywheel to crankshaft bolt with a bolt about 3 inches long. Mount Dial Indicator C-3339 on this bolt with a "C" clamp (Fig. 9).

(2) With C-771 Turning Tool turn flywheel while noting dial indicator needle deflection. Bore out-of-round must not exceed .008 inch maximum total indicator reading, or .004 inch, one-half total indicator reading.

(3) Excess bore runout can be corrected by install-



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Fig. 9—Measuring Clutch Housing Bore Runout

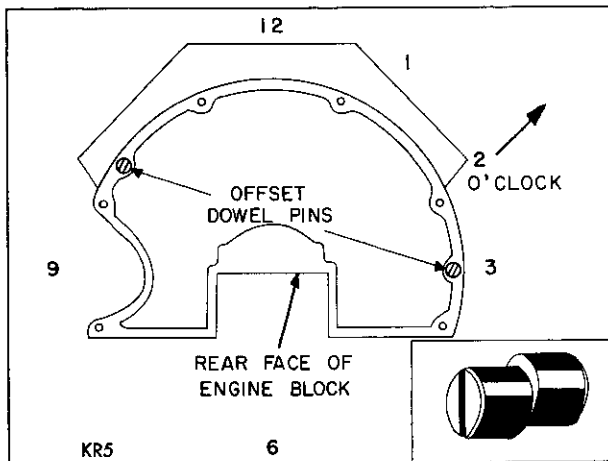


Fig. 10—Offset Dowel Diagram

ing correct size offset dowels (Fig. 10). These dowels are available in three offset sizes and they **must be** installed in pairs of the same size: .007 inch, Part Number 1736347; .014 inch, Part Number 1736348 and .021 inch, Part Number 1736353.

(4) To illustrate recommended correction procedure, assume total indicator reading is .020 inch, in a direction which approximates 2 o'clock on engine block (Fig. 10).

(5) In this case, housing is off crankshaft centerline .010 inch (one-half total indicator reading) which is .006 inch greater than allowable limit of .004 inch (one-half total indicator reading).

(6) In the case under consideration, installation of two .007 inch dowels will bring runout within the allowable limits of .004 inch or .010 inch minus .007 inch (dowels) which equals .003 inch runout.

(7) The amount of eccentricity of the dowel will produce a total indicator reading change of double the dowel eccentricity, therefore, select a pair of dowels with the nearest to one-half of total indicator runout of bore. For runout (total indicator reading) of .009" through .020", use a .007" dowel (No. 1736347); .022" through .034", use .014 dowel (No. 1736348) and .036" through .050", use .021" dowel (No. 1736353).

(8) To install dowels, remove clutch housing and old dowels from rear face of engine block.

(9) Install both dowels with slots parallel and aligned in direction to correct bore runout. (Slot indicates direction of maximum dowel eccentricity.) Both dowels must be inserted into engine block, up to off-set shoulder.

(10) Install clutch housing to engine block bolts. Tighten 7/16 inch bolts to 50 foot-pounds and 3/8

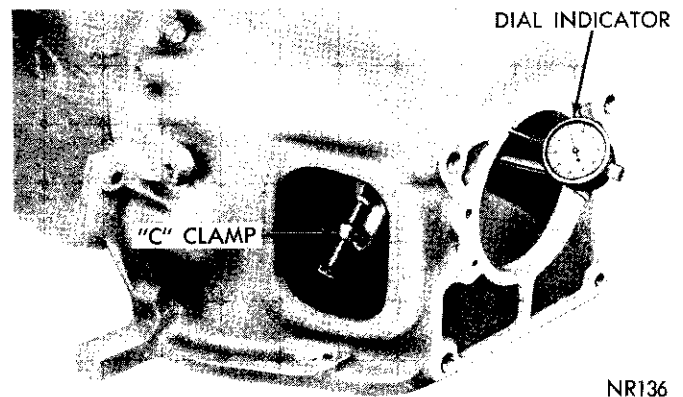


Fig. 11—Measuring Clutch Housing Face Squareness

inch bolts to 30 foot-pounds.

(11) Remount dial indicator and remeasure bore runout. Small corrections can be made by removing clutch housing (if necessary) and turning dowels with a screwdriver to shift housing and bring bore within limits.

Face Squareness

(1) Relocate dial indicator (Fig. 11) and rotate fly-wheel, using Tool C-771. If total indicator reading is greater than .006 inch, note amount of total indicator reading and location of lowest indicator reading (i.e., point where indicator arm or follower is extended farthest).

(2) To correct squareness, place proper thickness shim stock between clutch housing and engine block or between transmission and clutch housing. After remeasuring face squareness, tighten 7/16 inch housing bolts to 50 foot-pounds and 3/8 inch bolts to 30 foot-pounds.

(3) Install clutch release bearing, fork, linkage and transmission. Adjust clutch linkage.

STEAM CLEANING PRECAUTIONS

Since the clutch housing has provisions for ventilation, condensation from steam vapors tend to accumulate on the internal clutch mechanism when the vehicle is steam cleaned. The facings of the disc will absorb moisture, and the force exerted by the pressure plate will bond the facings to flywheel and/or, pressure plate, if the car is allowed to stand for some time before use. If this condition occurs, it will necessitate replacement of disc assembly, flywheel and/or clutch assembly. **Immediately after cleaning operation, start engine and "slip clutch" in order to dry off disc assembly, pressure plate and flywheel.**

SPECIFICATIONS

COVER AND PRESSURE PLATE ASSY. IDENTIFICATION CHART

Size	Part Number*	Springs No. & Color	Mounting Bolt Circle Dia.	Centrifugal Assist Rollers
11"	3410157	6 White—6 Tan	11-5/8"	6

CLUTCH DISC ASSY. IDENTIFICATION CHART

Size	Part Number*	Facing Dia. Outside x Inside	Springs No. & Color	Spline Inside Dia.
11"	3410160	11" x 6-1/2"	5 Tan—5 Green	15/16"

*Part Numbers subject to change during model year.

TIGHTENING REFERENCE

	Pounds			Pounds	
	Foot	Inch		Foot	Inch
Clutch Cover to Flywheel Bolts ...	30		Clutch Housing Pan Bolts		200
Clutch Fork Pivot Bolts		200	Flywheel Bolts	55	
Clutch Housing to Engine			Torque Shaft Ball Stud	40	
Bolts 3/8"	30		Torque Shaft Ball Stud Nut	40	
Clutch Housing to Engine			Transmission to Clutch Housing		
Bolts 7/16"	50		Bolts	50	