

FORD

Service Manual



Tractors

FW-20, FW-30, FW-40, FW-60

Reprinted

40003040

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Steiger Clutch, Operation and Maintenance

General:

The major cause of clutch failures could be summarized with two words: "EXCESSIVE HEAT." Excessive heat is not the amount of heat a clutch can normally absorb and dissipate, but the amount of heat a clutch is "FORCED" to absorb and attempt to dissipate.

Most clutches are designed to absorb and throw off more heat than encountered in normal clutch operation without damage or breakdown of the friction surfaces. Clutch installations are engineered to last many thousands of hours under normal operating temperatures and if properly used and maintained they will give satisfactory service.

However, if a clutch is "slipped" excessively or asked to do the job of a fluid coupling, high heat quickly develops to destroy the clutch. Temperatures generated between the flywheel, driven discs and pressure plates can be high enough to cause the metal to flow and the friction facing material to char and burn.

Heat or wear is practically non-existent when a clutch is Fully Engaged but during the moment of engagement, when the clutch is picking up the load, it generates considerable heat. An improperly adjusted or slipping clutch will rapidly generate sufficient heat to destroy itself.

Proper training of drivers, as well as mechanics, is essential for long and satisfactory clutch life. The tractor operator should be taught how to operate the tractor properly, not left to experiment for himself. Starting in the right gear, clutch malfunctions and "when to write up a clutch for readjustment" are the more critical points to cover in operator training programs.

The maintenance personnel should not be left out of the picture. Mechanics attending operator training programs have a chance to see what operator errors can do to clutch life and be in a better position to spot and analyze failures during their clutch maintenance and rebuild programs.

Clutches are designed and recommended for specific vehicle applications and loads. These limitations should not be exceeded. Excessive or extreme overloading is not only injurious to the clutch, but to the entire vehicle power train as well if the total gear reduction in the power train is not sufficient to handle excessive overloads.

"Riding" the clutch pedal is very destructive to the clutch, since a partial clutch engagement permits slippage and excessive heat.

"Riding" the clutch pedal will also put a constant thrust load on the release bearing, which can thin out the lubricant. Release bearing failures can be attributed to this type of operation.

Holding the vehicle on an incline with a slipping clutch is asking the clutch to do the job normally expected of a fluid coupling. A slipping clutch accumulates heat faster than it can be dissipated, resulting in early failures.

Description:

Operators and mechanics should be aware of the fact that the Steiger Angle-Spring Clutches have provisions for an internal clutch adjustment. This permits the clutch "itself" to be readjusted while it is in the tractor. Operators and mechanics should be advised that, unlike competitive clutches, **YOU DO NOT ADJUST THE EXTERNAL LINKAGE ON A STEIGER ANGLE-SPRING CLUTCH TO COMPENSATE FOR WEAR. LINKAGE SHOULD ONLY BE RESET TO PROVIDE FOR PROPER FREE-PEDAL AFTER THE INTERNAL CLUTCH ADJUSTMENT HAS BEEN MADE.**

On all models Series I and II tractors, including the Series III Wildcat, the clutch is activated by means of direct mechanical linkage.

On all model Series III tractors equipped with a 1010 transmission, with the exception of the Series III Wildcat, the clutch is activated hydraulically by means of a clutch master cylinder and slave cylinder arrangement.

Steiger Angle-Spring Clutches utilize twin 6-button "cermetallic facing" driven discs and are of the adjustable, pull-type design for heavy duty service, utilizing centrally located pressure springs entirely isolated from the heat of the pressure plate.

Operation and Maintenance

In the 14 inch (35.56 cm) two-plate models, the intermediate plate separating the driven discs is mounted inside a "cup-type" flywheel and carried on drive pins mounted in the flywheel itself. The 14 inch (35.56 cm) clutch will have a 1.75 inch (4.445 cm) -10 spline transmission input drive gear.

The 15.50 inch (39.37 cm) two-plate clutch requires a "flat-type" flywheel. The intermediate plate separating the driven disc is mounted and carried on drive pins inside the clutch cover assembly. The 15.50 inch (39.37 cm) clutch will require a 2.00 inch (5.08 cm) -10 spline transmission input drive gear.

In all models, the pressure plate is driven by four drive lugs, which mate with four drive slots in the clutch cover itself. The pressure plate also carries four return springs to retract the pressure plate when the clutch is disengaged.

The clutch release bearing rotates continuously since the inner race of the bearing is pressed on the release sleeve. However, the clutch release bearing only carries a thrust load when the clutch is released.

The clutches are ventilated to circulate cooling air through the clutch whenever the engine is running.

The clutch design is such that maintenance is readily accomplished without special tools other than a hand arbor press, which should be available for easier clutch disassembly and assembly.

Internal clutch adjustment is simple and quickly maintained by turning the threaded adjusting ring, which is accessible through the inspection plates located on the clutch housing.

A clutch brake is installed to the heavy-duty pull-type clutch as an aid to gear shifting when the vehicle is stationary. The clutch brake is located between the release bearing housing and transmission bearing cap. The steel washer has a tang on the I.D. to engage the transmission main drive gear. When the clutch pedal is fully depressed, the disc is squeezed between the release bearing housing assembly and transmission bearing cap to stop the rotation of the main drive gear and clutch discs.

Constant clutch capacity is maintained regardless of facing wear. There is no direct contact between pressure springs and pressure plate; therefore, springs will not take a set and lose pressure due to heat. The threaded internal adjusting ring permits a quick internal adjustment to restore the springs to their original height and pressure.

Clutch balance is maintained even though parts are interchanged or replaced in the field. All major parts are balanced individually at the factory.

NOTE: *Later production clutch assemblies have "knife-edge" design release levers in the adjusting ring. This design can be readily evidenced by the absence of the release lever pins and clips used on the former design.*

The newer design "knife-edge" lever and ring will be directly interchangeable with the earlier design as a complete ring assembly.

Refer to Parts Identification Section for specific identification of designs.

14.00" CLUTCH PARTS IDENTIFICATION

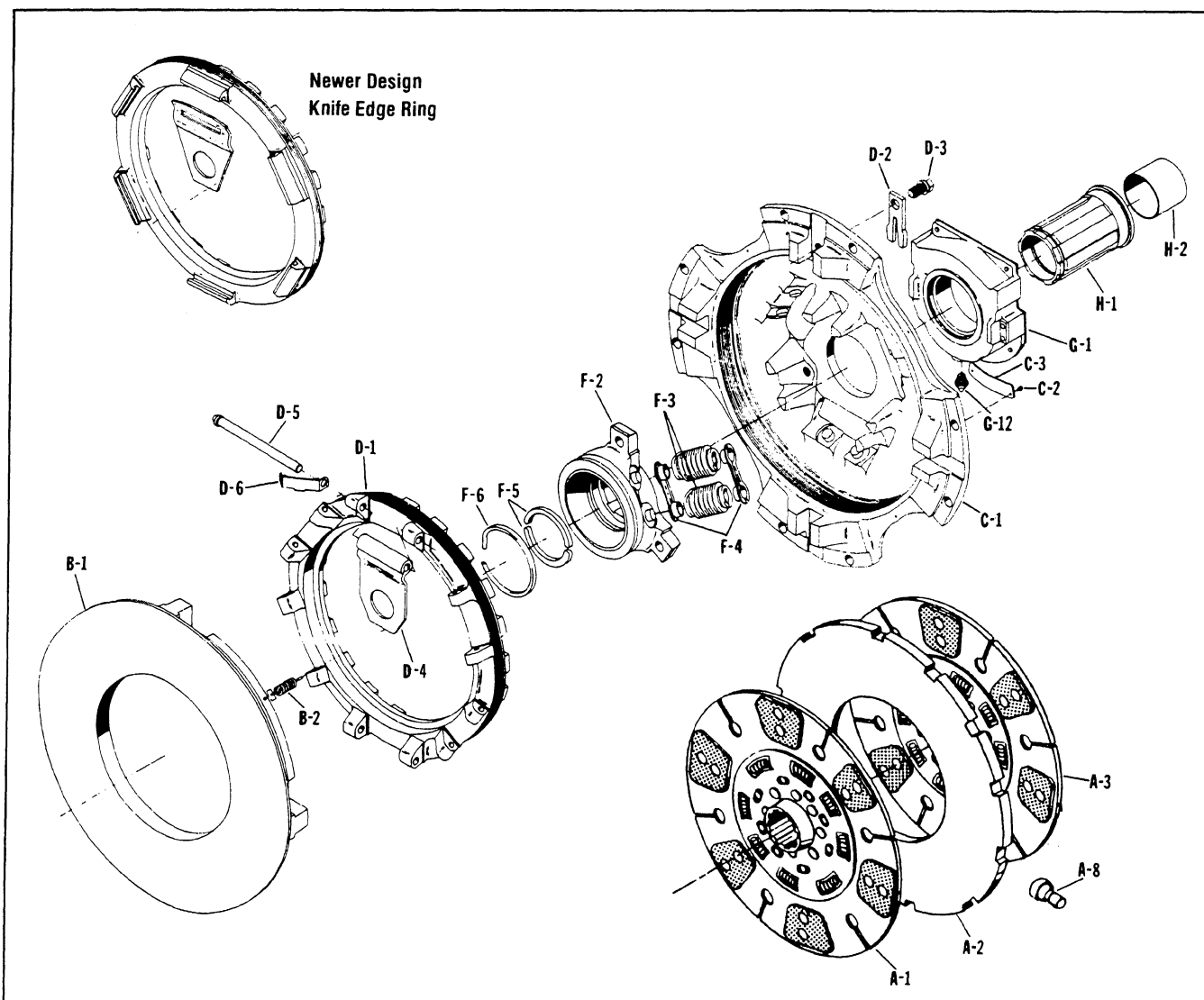


Figure 1:

A-1	DISC, driven front	D-4	LEVER
A-2	PLATE, intermediate	D-5	PIN, pivot
A-3	DISC, driven rear	D-6	CLIP, spring
A-8	DRIVE PIN	F-2	RETAINER, release sleeve
B-1	PLATE, pressure	F-3	SPRING, pressure
B-2	SPRING, return	F-4	PIVOT, spring
C-1	RING, flywheel	F-5	RING, release sleeve
C-2	PIN, name plate	F-6	RING, snap
C-3	PLATE, name	G-1	BEARING & COVER, Sub-Assembly
D-1	RING, adjusting	G-12	NIPPLE, Zerk
D-2	LOCK, adjusting ring	H-1	RELEASE SLEEVE, Sub-Assembly
D-3	BOLT & lock washer assembly	H-2	BUSHING, Release Sleeve

15.50" CLUTCH PARTS IDENTIFICATION

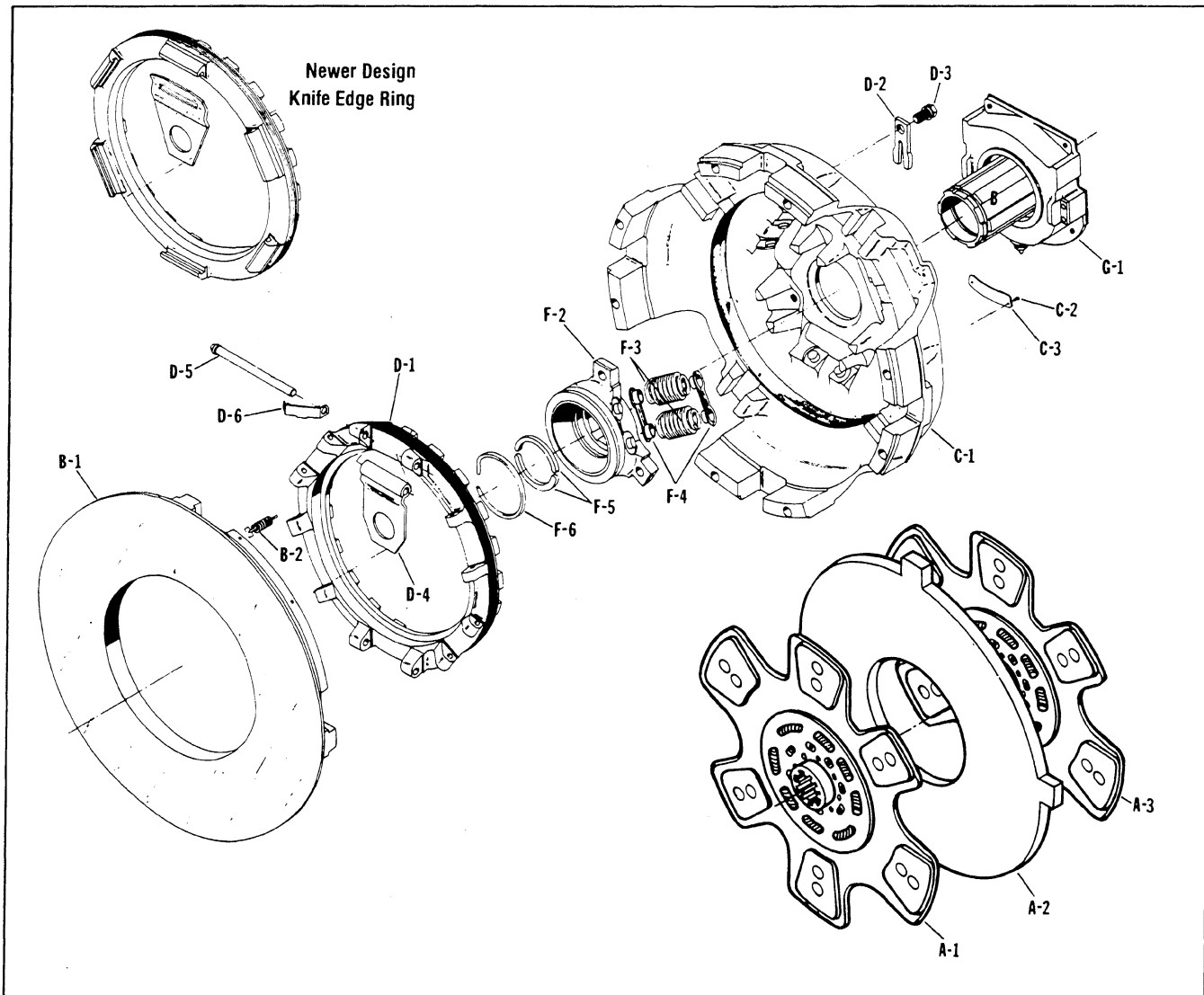


Figure 2:

A-1	DISC, driven front	D-4	LEVER
A-2	PLATE, intermediate	D-5	PIN, pivot
A-3	DISC, driven rear	D-6	CLIP, spring
B-1	PLATE, pressure	F-2	RETAINER, release sleeve
B-2	SPRING, return	F-3	SPRING, pressure
C-1	RING, flywheel	F-4	PIVOT, spring
C-2	PIN, name plate	F-5	RING, release sleeve
C-3	PLATE, name	F-6	RING, snap
D-1	RING, adjusting	G-1	RELEASE BEARING & SLEEVE ASSEMBLY
D-2	LOCK, adjusting ring		
D-3	BOLT & lock washer assembly		

Clutch Adjustment

Do not attempt to adjust the clutch with external linkage. After adjusting the clutch, then adjust external linkage (if required) to get 1/8 inch (3.175 mm) clearance between the tips of the release yoke fingers and the thrust pads of the release bearing assembly.

Procedure

1. Remove the switch key and set the parking brake.
2. Remove the access cover from the flywheel housing (see Fig. 1).
3. Rotate engine until the ring lock strap is visible in the center of the inspection opening (see Fig. 1).

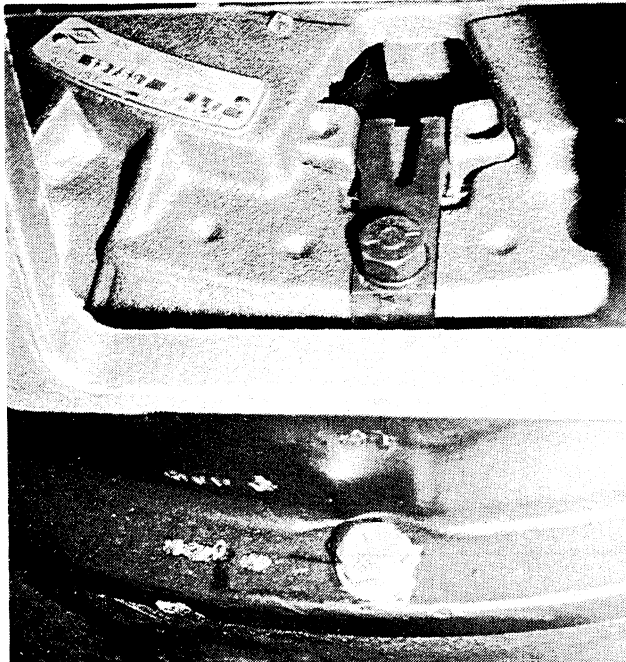


Figure 1:
A—Ring Lock Strap

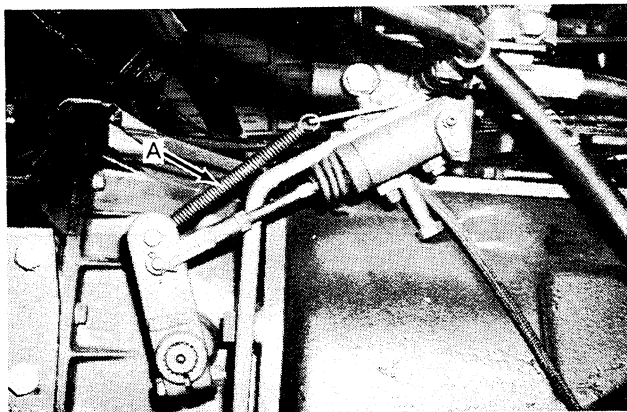


Figure 2:
A—Spring

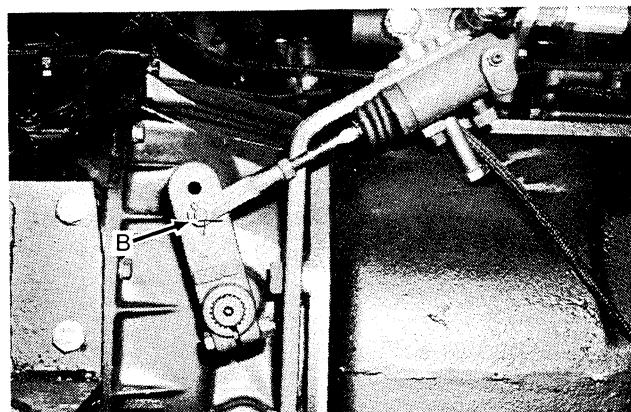


Figure 3:
B—Clevis Pin

4. Disconnect the clutch outer arm spring (A-Fig. 2).
5. Remove the pin from the slave cylinder rod clevis (B-Fig. 3).

Clutch Adjustment

5. On the hydraulic actuated clutch, rotate clutch outer release arm forward (CCW) (on the mechanical clutch "pull up" on the lever) by hand until a slight resistance is felt to remove any slack in the release bearing carrier (A-Fig. 4). At this point, the distance between the rear face of the release bearing assembly and the front face of the transmission brake disc (with brake disc rearward against front transmission bearing cap) must be $\frac{1}{2}$ inch (.50 inch) (12.7 mm) (Fig. 5). If the distance is not correct, proceed to the next step.

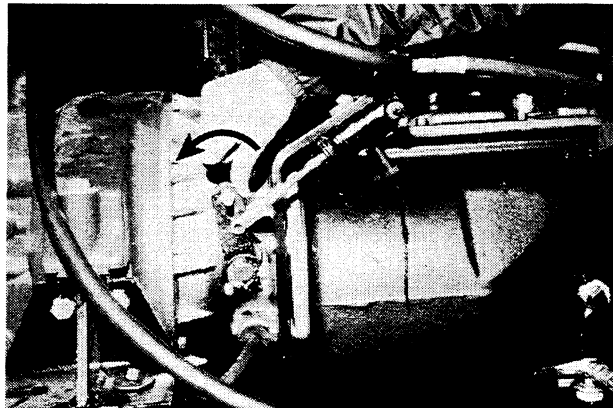


Figure 4:

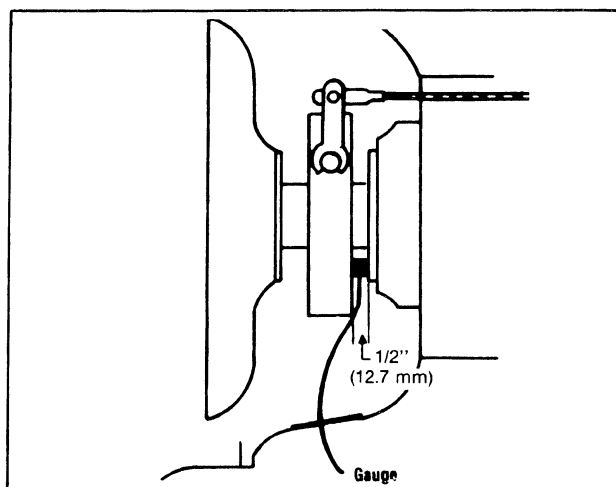


Figure 5:

6. Temporarily reinstall pin into the rod clevis (this is necessary to "release" the clutch before the adjusting ring can be turned). Remove the ring lock strap from the clutch assembly (see Fig. 6).

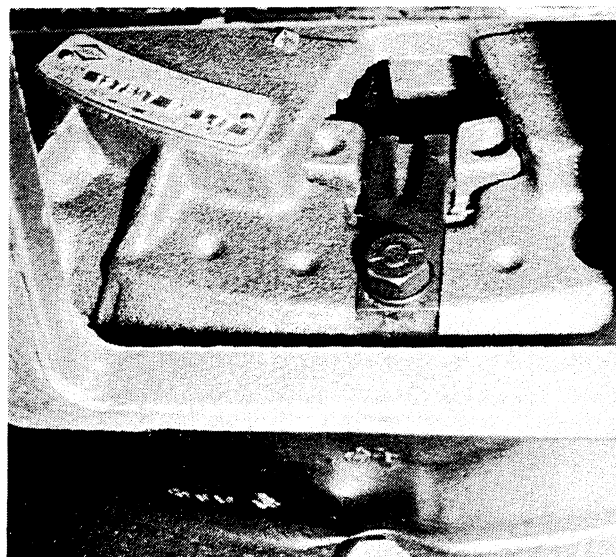


Figure 6:

Clutch Adjustment

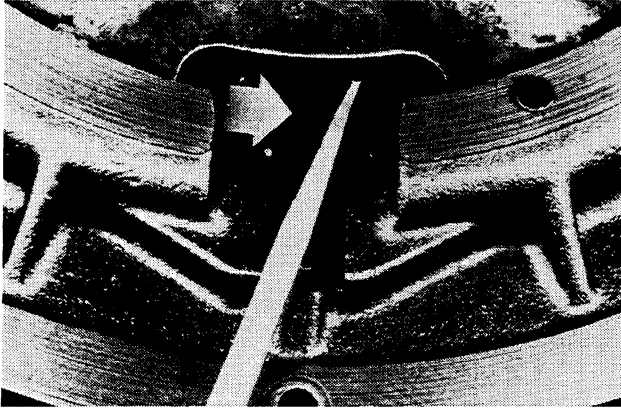


Figure 7:

7. With an assistant holding the clutch in the "released" position (or securely blocking the clutch), turn the adjusting ring "in" or "out" to obtain the desired .50 inch (12.7 mm) clearance. (Fig. 7)

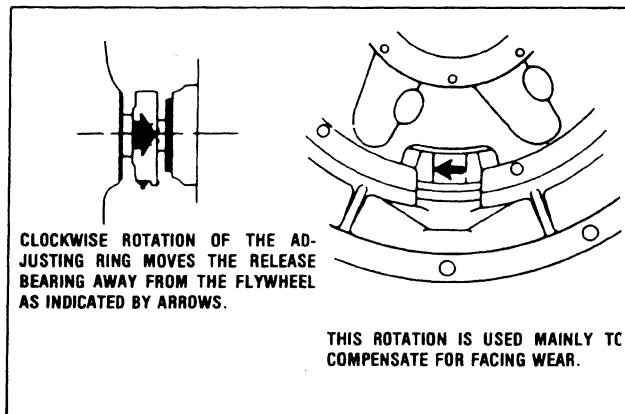


Figure 8:

NOTE: Turning the adjusting ring "CW" (in) moves the release bearing assembly toward the transmission (Fig. 8). Turning the ring "CCW" (out) moves the bearing away from the transmission (Fig. 9). Moving the ring three (3) notches will change the dimension approximately 1/16 inch. **THE CLUTCH MUST BE "RELEASED" TO TURN THE ADJUSTING RING.** The clutch ring lock strap must be installed before engine operation.

8. After making the ring adjustment, engage the clutch and remove clutch rod clevis pin. "Repeat step 5" to recheck clearance. Remember, clearance is measured with the clutch engaged and all slack removed from the release bearing carrier.

9. If clearance is correct, "reinstall" the ring lock strap. Install inspection cover.

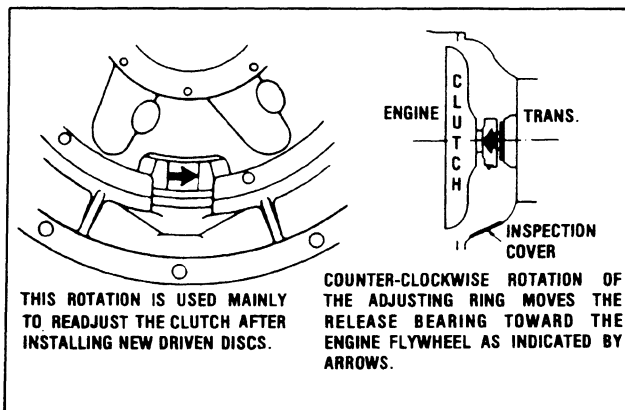


Figure 9:

Clutch Adjustment

"Mechanical Clutch" External Linkage Adjustment:

10. Check pedal free travel as follows before installing rod clevis pin. Rotate clutch outer arm until the clutch release yoke fingers contact the release bearing thrust pads (a slight resistance should be felt). Hold and mark the end of the clutch "cross shaft" in this position, while observing the mark on the end of the cross shaft rotate the shaft back (away from the release bearing) $\frac{1}{8}$ inch (3.175 mm) from the marked position. Screw clutch rod clevis "in" or "out" so that the pin will go through clevis and clutch release arm freely in this position. (see Fig. 10).

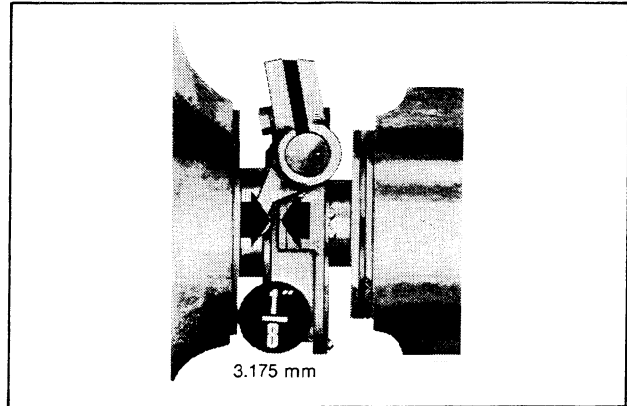


Figure 10:

NOTE: When $\frac{1}{8}$ inch (.125") (3.175 mm) clearance is correct, there will be approximately 1-1/2 inch (3.81 cm) "total" pedal free travel through the linkage (Fig. 11).

11. Reinstall the clevis pin, split key and clutch external return spring.

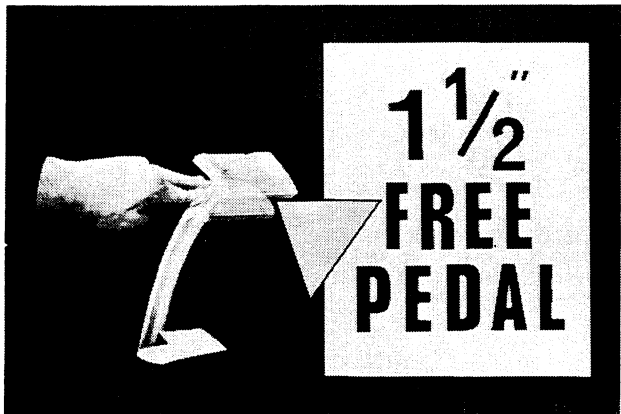


Figure 11:

Hydraulic Clutch "External" Linkage Adjustment:

IMPORTANT:

Before making external clutch "linkage" adjustment, check and make clutch adjustment as described in "clutch" adjustment (steps 1 through 9), then proceed as follows:

1. Check clutch master cylinder actuator rod length to obtain .125 inch (.317 cm) movement of the rod before the master cylinder piston is actuated with the pedal in the full up position. This clearance is necessary to ensure full retraction of both the master cylinder and slave cylinder pistons. If adjustment should be necessary, loosen the jamb nut on the actuating rod and screw the rod "in" or "out" to obtain the recommended .125 inch (.317 cm) lash and retighten the jamb nut. (see Fig. 12).

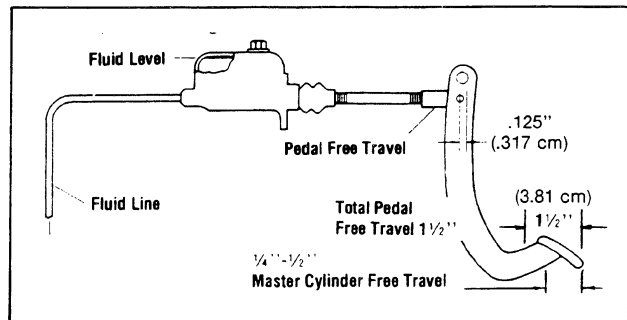


Figure 12:

Clutch Adjustment

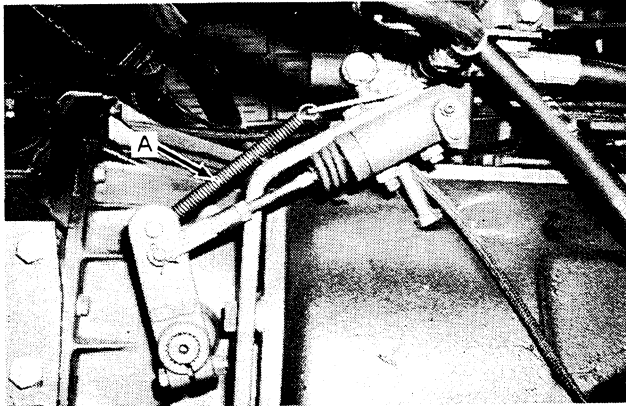


Figure 13:

2. On the left side of the transmission, remove the external clutch arm return spring (A—Fig. 13).

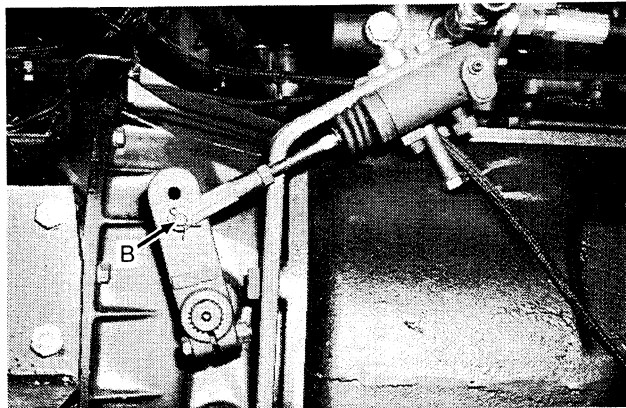


Figure 14:

3. Remove the pin from the slave cylinder actuator rod clevis (B—Fig. 14).

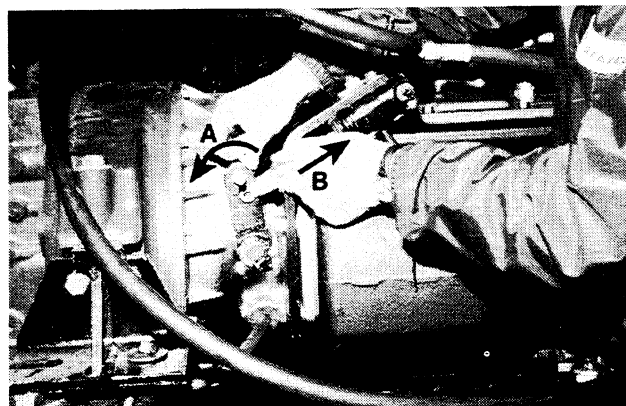


Figure 15:

A—Rotate Clutch arm "CCW"
B—Bottom Slave Cylinder Rod.

4. Rotate the clutch cross shaft "counter-clockwise" until a slight resistance is felt. At the same time, push in on the slave cylinder actuator rod to "bottom" the slave cylinder piston. (Open the bleeder valve momentarily, if necessary. The slave cylinder piston must be fully retracted) (see Fig. 15).

Clutch Adjustment

With the clutch cross shaft arm rotated forward (CCW) and the slave cylinder actuator rod fully "retracted," the slave cylinder actuator rod should be .125 inch (.317 cm) "short" from the center of the clutch cross shaft arm pin hole to the center of the slave cylinder clevis pin hole. If this dimension is not correct, screw the actuator rod clevis in or out to obtain this dimension (Fig. 16). When the dimension is correct, reinstall the actuator rod clevis pin. This adjustment will provide .125 inch (.317 cm) clearance between the tips of the release yoke and the thrust pads on the release bearing (Fig. 17).

NOTE: An alternative method for making slave cylinder adjustment is to rotate the clutch cross shaft outer arm "CCW" until resistance is felt, and with the slave cylinder actuating rod and piston fully retracted, screw the actuator rod clevis "in" or "out" until the pin holes are aligned. From this position, "shorten" the actuator rod by screwing the clevis "in" 5½ turns. Lock the jamb nut and install the clevis pin and external return spring.

IMPORTANT:

Reinstall clutch external return spring.

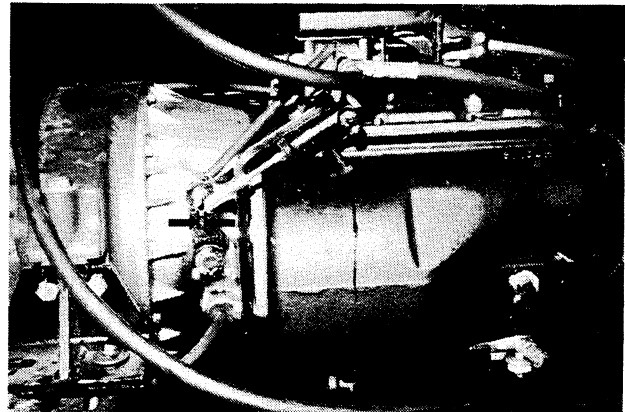


Figure 16:

A—Dimension to be .125"

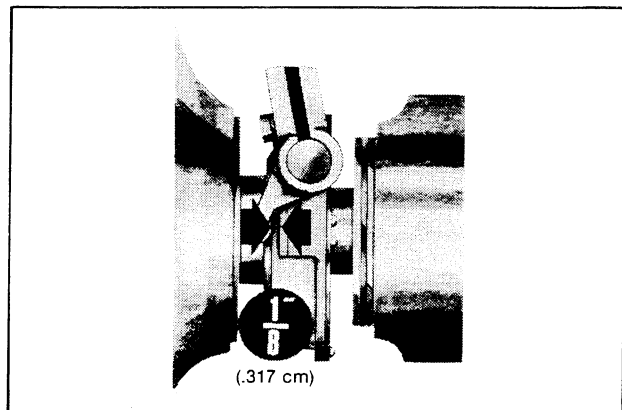
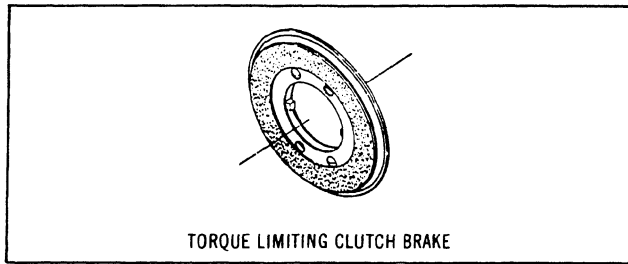


Figure 17:

Clutch Brake Installation

Torque-Limiting Clutch Brake



The torque limiting feature is provided by internal Bellevilles, which are driven by a hub. The Bellevilles react against the clutch brake covers with facing material positioned between each Belleville and cover. The hub and Belleville combination slips with respect to the covers after approximately a 25 to 30 ft. lb. load has been exceeded.

Longer tang life is provided by the brake's ability to limit torsionally induced damage. Also, 5° of free play is provided between the hub and Bellevilles so that the inertia of the Bellevilles can not load the hub directly. Inertia present in the covers is allowed to load the hub only up to the 25 to 30 ft. lb. load mentioned above. And, the tangs themselves are thicker to absorb what remaining torsionals do find their way to the hub.

There is no extra work on the driver's part to activate the brake. He just depresses the clutch pedal to the floorboard, beyond the normal clutch disengage position, causing the clutch release bearing to come in contact with the clutch brake. Because the brake is splined to the transmission main drive gear, the transmission is slowed down or stopped. The driver can then shift from first to reverse or from reverse to first without clashing or putting undue strain on the gears.

When using this Clutch Brake with Spicer Transmission equipped with spring-loaded backing plate, it must be mounted with small diameter facing toward transmission (see Figure 1).

When used with Spicer Transmission equipped with standard bearing cap, it should be mounted with large facing diameter toward transmission (see Figure 2).

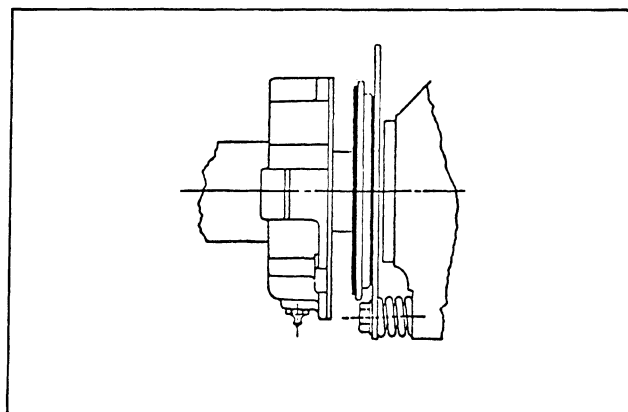
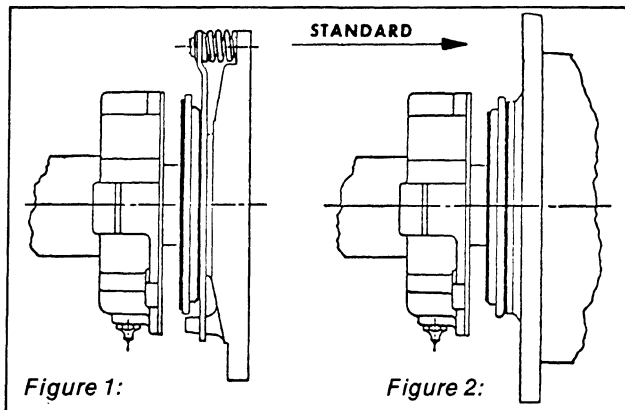


Figure 3:

When used with Fuller Transmissions, it must be mounted with small facing diameter toward transmission (see Figure 3).

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Anti-Rattle Springs

Installation (14" Clutch Only)

Select the proper anti-rattle springs to be installed.

1. Install the front driven disc in the flywheel.
2. Install the intermediate plate and check for proper clearance between the plate and drive pins (.006" min. at all locations).
3. Install the appropriate anti-rattle springs between the O.D. of the intermediate plate and I.D. of the flywheel. Push the springs forward until they have bottomed in the flywheel and when properly installed, they will set in approximately 3/16" from the clutch mounting flange of the flywheel.
4. Install the rear driven disc and complete the installation in the normal manner.

NOTE: The springs *MUST* be installed with the solid edge toward the engine for proper operation.

