SECTION 02: CLUTCH

CONTENTS

LIST OF ILLUSTRATIONS

1. CLUTCH

1. Description

Vehicles equipped with a manual transmission are provided with the "Spicer" Angle-Spring clutch. The clutch assembly consists of a 15.1/2" dry disc two-plate model. It is a pull-type design with riveted organic wear surface facing on driven discs. It is manually adjustable to compensate wear, hydraulically operated and pneumatically assisted. A torque limiting clutch brake as well as a positive separator pin system are also provided. One type of clutch is installed regardless of transmission (6 or 7 speeds).

Refer to the Spicer, Service manual annexed to the end of this section for the following subjects:

• Transmission Removal

Note: *For more details, refer to Section 07 "TRANSMISSION".*

Note: *Disconnect the clutch operating cylinder external linkage and remove cylinder assembly (without disconnecting hydraulic hose), to permit the release yoke to turn up and pull free of the release bearing thrust pads, then disconnect the transmission shift linkage.*

• Clutch Removal
• Engine and Transmission Alignment (Inspection)
• Clutch Installation
• Transmission Installation

Note: *For more details, refer to Section 07 "TRANSMISSION".*

Note: *Position the torque limiting clutch brake on the main drive gear of the transmission, then shift transmission into gear so that the input shaft can be rotated during assembly to align with clutch-driven disc hub splines.*

Note: *Rotate clutch release bearing housing so that flat section is on top.*

Note: *Rotate clutch release yoke so that release yoke fingers clear the pads on the release bearing housing. Use a suitable transmission jack to support and maintain the engine-to-transmission alignment while installing the transmission. Use care to avoid having the weight of the transmission bearing on the clutch or forcing the transmission into the clutch or flywheel housing. Such abuse can cause bent or "sprung" driven discs and prevent the clutch from releasing. Rotate clutch release yoke into proper position as transmission is moved into place.*

Note: *Start all transmission bell housing cap screws and tighten progressively around the housing to 45 lbf ft (61 N m).*

Note: *Connect the transmission shift linkage. Install the clutch operating cylinder and its linkage, then proceed with the clutch adjustment in accordance with paragraph "2.* CLUTCH ADJUSTMENT".

2. CLUTCH ADJUSTMENT

Note: *if for any reason, air is present inside clutch hydraulic line, bleed clutch in accordance with paragraph "*3.1. BLEEDING*"*

2.1 Clutch Pedal Adjustment

Adjust clutch pedal as follows:

1. Free play adjustment is made by loosening nut (1, Fig. 1) and moving bolt in slot. The pedal moves down allowing a 1/4" (6 mm) of **free play** before the master cylinder (5, Fig. 1) starts to move.

2. Keep this adjustment by tightening nut (1, Fig. 1).

3. Push the clutch pedal until the master cylinder piston touches the cylinder bottom.

4. Loosen the adjustment bolt (2, Fig. 1) until it touches the pedal wall support (3, Fig. 1).

5. Loosen the adjustment bolt (2, Fig. 1) for another 1-1/2 turn. Lock in position by tightening nut (4, Fig. 1).

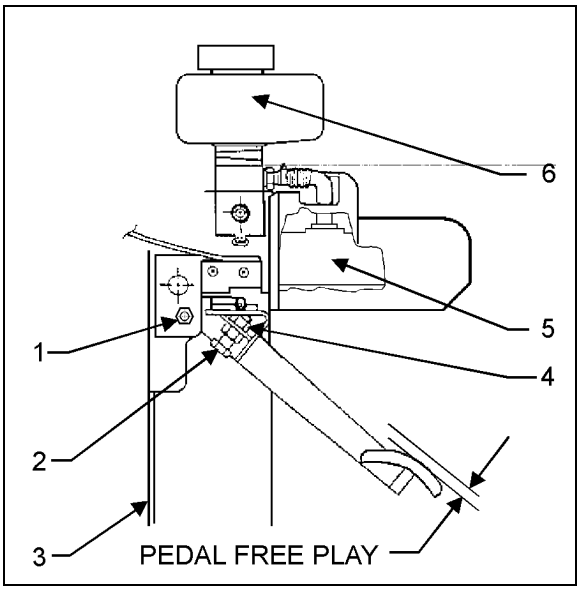


FIGURE 1: FREE PLAY ADJUSTMENT OEH3B716

Note: *Clean reservoir internal pieces with jet air to eliminate dirt.*

2.2 Internal Clutch Adjustment

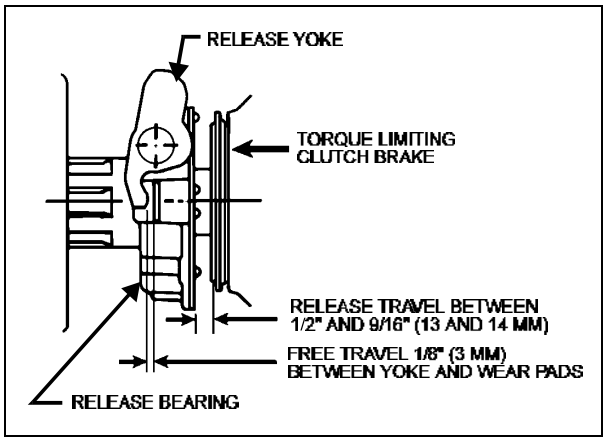
1. Remove inspection cover at bottom of clutch housing (Fig. 4).

2. Measure the **release travel** (clearance between release bearing housing and clutch brake). Refer to figure 2. The clearance should be between 1/2" and 9/16" (13 and 14 mm).

3. If clearance is incorrect, release the clutch by depressing the clutch pedal to end of pedal travel. Insert a 3/4" socket (12 points) or a 3/4" box-end wrench through inspection hole (Fig. 4). Depress square-head bolt to adjust clutch (Fig. 3). The "Kwik-Adjust" will re-engage at a quarter of a turn. The flat surface on the bolt head will align with the flat edge of the bracket.

Note: *If clearance between release bearing housing and clutch brake is less than 1/2" (13 mm), rotate the adjusting ring counterclockwise to move the release bearing towards the engine. If clearance is greater than 9/16" (14 mm), rotate the adjusting ring clockwise to move the release bearing towards the transmission.*

4. Ensure *"Kwik-Adjust"* is engaged in the locked position. Release the clutch pedal to engage clutch.



MA3E0223

FIGURE 2: RELEASE TRAVEL AND FREE PLAY TRAVEL ADJUSTMENT

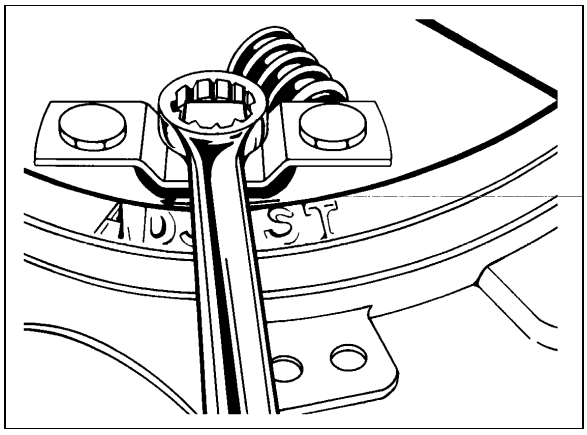


FIGURE 3: SQUARE HEAD BOLT MA3E0224

2.3 Free Travel Setting

1. Check **free travel** as shown in figure 2. The clearance should be 1/8" (3 mm).

2. If clearance is incorrect, adjust bolt until it touches the shaft lever and locks in position with nut (Fig. 4).

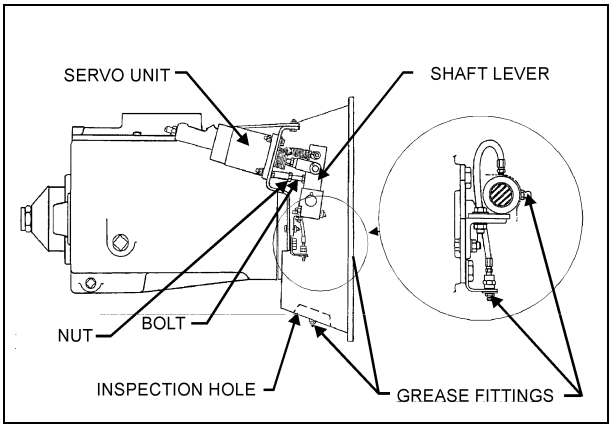


FIGURE 4: CLUTCH INSTALLATION 02001

Note: *The return springs do not require any tension adjustment.*

2.4 Air Pressure Regulator

The air pressure regulator is located in engine R.H. side door (Fig. 5). To adjust, remove dust cap from regulator. Attach a pressure gauge to port. Loosen adjusting screw lock nut. Turn screw to **adjust pressure to 40 psi (275 kPa)**. Tighten lock nut, then reinstall dust cap. Refer to Section 12, BRAKE AND AIR SYSTEM under paragraph "8. PRESSURE REGULATING VALVES".

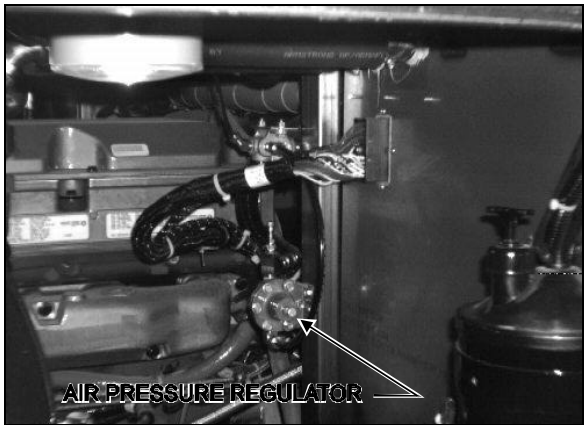


FIGURE 5: AIR PRESSURE REGULATOR 02003

3. RENEW CLUTCH HYDRAULIC LINE

3.1 Bleeding

The clutch hydraulic system must be bled whenever air enters it. Unlike hydraulic fluid, air is compressible. This means that instead of transmitting pedal pressure through the hydraulic line, the master cylinder will compress air in the line. This results is a spongy feel in the pedal, incomplete clutch disengagement and hard shifting.

Note: *Two people are required to bleed air from the hydraulic lines. One to operate the clutch pedal and the other to open and close the bleed valve.*

Warning: *Wear safety glasses during the following operation.*

1. Locate the bleed valve mounted at the end of servo unit. Remove dust cap (Fig. 4 and 6).

2. Attach a plastic tube to the bleeding valve (Fig. 6). Dip the other end of the tube in a jar containing several inches of clean brake fluid.

Note: *Do not allow the end of the tube out of the brake fluid during bleeding. This could allow air into the hydraulic system, requiring that the bleeding procedure be done over.*

3. Press the clutch pedal as far as it will go 2 or 3 times, then hold it down.

4. With the clutch pedal down, open the bleeding valve until the pedal goes to the floor, then close the bleeding valve. Do not let the pedal up until the bleeding valve is closed.

5. Let the pedal back up slowly.

6. Repeat steps 4-6 until the fluid entering the jar is free of air bubbles.

Note: *If after pumping the clutch pedal the system does not bleed, open the bleeding valve and blow air under pressure inside the master cylinder reservoir until system has been completely bleeded. Then perform the filling procedure.*

3.2 Filling

1. Remove the master cylinder reservoir cap.

2. Slightly loosen teflon flexible hydraulic hose connector from adaptor mounted on extremity of servo unit (Fig. 6).

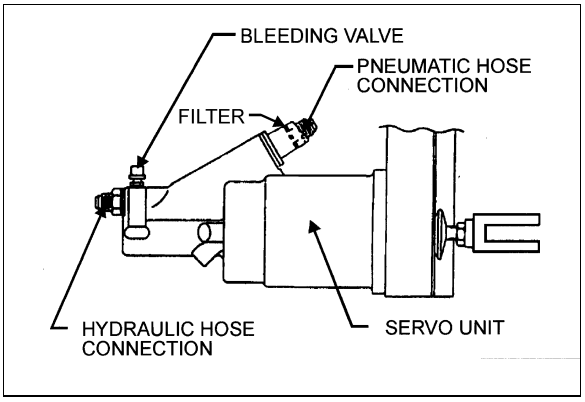


FIGURE 6: SERVO UNIT 02002

3. Remove the plastic tube on the bleeding valve. Make sure the bleeding valve is open. Force fluid (meeting DOT 3 specifications) through the bleeding valve opening. Tighten teflon flexible hose connector when fluid is free of air bubbles. Continue to force brake fluid until it enters master cylinder reservoir and flows free of air bubbles.

Note: *A 40 psi (275 kPa) pressure allows filling hydraulic line in reasonable time.*

4. Tighten bleeding valve and reinstall dust cap.

5. Fill master cylinder reservoir.

6. Install the master cylinder reservoir cap

Note: *To make the filling procedure easier to perform, the reservoir support may be unbolted and reservoir moved closer to you.*

Caution*: Never re-use brake fluid which has been bled from the system. Discard old brake fluid and use a fresh supply.*

4. LUBRICATION

The clutch components should be lubricated every 6,250 miles (10 000 km) or twice a year, whichever comes first (refer to previous Fig. 4 to identify the clutch component grease fittings). The clutch release bearing (one grease fitting) and the clutch control cross shaft (three grease fittings, two on the operating cylinder side and one on the other side) should be lubricated with a good quality lithium-based soap or equivalent E.P. grease meeting N.L.G.I. grades 1 or 2.

5. PNEUMATIC AIR LINE FILTER

The pneumatic air line filter should be cleaned every 6,250 miles (10 000 km) or twice a year, whichever comes first (Fig. 6). The filter is mounted inside servo unit pneumatic branch.

To clean the filter :

1. Remove pressure in the pneumatic air line. Refer to paragraph "2.4 AIR PRESSURE REGULATOR" in this section.
2. Remove the pneumatic hose connection from servo unit pneumatic branch.
3. Unscrew the filter.
4. Clean the filter.

6.TROUBLESHOOTING

Poor Clutch Release or Poor Engagement	
Probable cause	**Corrective action**
Clutch adjustment incorrect.	Recheck adjustment as per instructions.
Air in clutch hydraulic line.	Bleed clutch hydraulic line as per instructions.
Flywheel pilot bearing too tight in flywheel or on end of drive gear.	Free pilot bearing with a light push. If bearing is rough, replace it.
Damage clutch release bearing.	Replace bearing. Lubricate with recommended lube.
Clutch release shaft projecting through release yoke.	Relocate release shaft so that it does not Check bell housing bushing and release yoke for wear.
Release yoke contacting cover assembly at full release position.	Replace release yoke with proper yoke.
Release yoke not aligned properly with release bearing.	Check flywheel. Probably has been resurfaced more than the 0.060" (1,52 mm) recommended.
Intermediate plate sticking on drive lugs	Check that drive pins are 90° square to flywheel surface and that there is a minimum .006" (0,152 mm) clearance between drivepins and intermediate plate slots.
Pressure plate not retracting.	a. Check pressure plate drive lugs for (0,152 mm) clearance. b. Check pressure plate return springs for proper tension. c. Check amount of release travel. d. Lever nose out of groove.
Driven disc distorted.	Should be straight within 0.015" (0,381 mm). Replace if distortion cannot be corrected.

Poor Clutch Release or Poor Engagement (contd.)	
Probable cause	**Corrective action**
Worn splines on drive gear of transmission.	Check drive gear and driven disc hubs for excessive wear.
Disc facings gummed with oil or grease.	Replace facings or entire disc. Cleaning not recommended. Check for leak causing
Broken intermediate plate.	Replace entire intermediate plate/driven disc assembly. Damage such as this is almost caused by abusive use of clutch.
Clutch Slipping	
Probable Cause	**Corrective action**
Pedal has no free play	Re-adjust as per instructions.
Release mechanism binding.	Check release mechanism and linkage. Lube if necessary.
Worn clutch facings.	Replace facings or complete disc, if necessary.
Grease or oil on facings.	Replace facings.
Weak pressure springs.	Replace springs
Overloaded clutch	Check to assure that proper clutch has been specified.
Noisy Clutch	
Probable Cause	**Corrective action**
Clutch release bearing dry or damaged.	Lubricate bearings or replace.
Flywheel pilot bearing dry or damaged.	Lubricate bearings or replace.
Clutch release bearing housing striking flywheel ring.	Adjust clutch. Also check wear on cross shafts, bell housing bushings and release yoke fingers. Replace if necessary.
Improper clearance between drive slots and drive. lugs on pressure plates.	Clearance should be at least 0.006" (0,152 mm).

7. SPECIFICATIONS

Clutch Adjustment

Pedal free play	1/4 ±1/8" (6±3 mm)
Internal clutch adjustment	between 1/2-9/16" (13-14 mm)
Free travel setting	1/8" (3 mm)
Clutch brake setting (between stopper and adjusting bolt)	between 1/4-3/8" (6-9 mm)

Clutch Assembly

Make	DANA Corp. (Spicer)
Supplier number	108391-78
Prevost number	520147
Model	Easy Pedal
Type	Dry, two-plate, pull-type, manually adjustable (Kwik- Adjust)
Size	15 1/2" (394 mm)
Plate Load Capacity	4000 lbs (17 792 N)
Maximum Torque Capacity	1450 lbf•ft (1966 N•m)
Disc Facing Thickness	0.487/0.452
Hub Spline Size (No. splines)	2" (10)
Disc Assembly Max. Runout (T.I.R.)	0.015" (0,381 mm)
Disc Assembly Max. Out-of-Flat	0.020" (0,508 mm)
Release Sleeve Bushing Dia. (new)	2.010/2.008" (51,054/51,003 mm)
Intermediate Plates, driving lugs to slot clearance (new min.)	0.006" (0,152 mm)
Intermediate Plates, driving lugs to slot clearance (max. worn)	0.015 to .021" (0,381 to 0,508 mm)
Pressure Plates, driving lugs to slot clearance (new)	0.003 to .010" (0,076 to 0,254 mm)
Pressure Plates, driving lugs to slot clearance (max. worn)	0.016/.021" (0,406/0,533 mm)
Intermediate Plates & Pressure Plates: Out-of-Flat	0.000 to .004 Concave (0,000 to 0,102 mm)
Scoring - Max. depth that can be re-used	0.015" (0,381 mm)
Release Sleeve Retainer, driving lugs to slot clearance (max. worn)	0.020" (0,508 mm)
Maximum Engine RPM	2600

Master Cylinder

Make	Kongsberg Automotive
Supplier Number	624409-P01
Prevost Number	520139

Operating Cylinder (slave cylinder)

Make	Kongsberg Automotive
Supplier Number	624410-P01
Prevost Number	520138

The Spicer System

SERVICE MANUAL

EASY-PEDAL™ CAST PULL-TYPE CLUTCHES

SPICER®

DANA

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PURPOSE AND FUNCTION OF A CLUTCH

The purpose of a clutch is to transfer the power from the engine to the transmission which may be either stationary (getting started) or rotating at a different speed (upshifting or downshifting). The clutch has performed its function when both engine and transmission are rotating at the same speed.

To perform this function, clutches are provided with discs which are designed to slip for a short period of time. As spring pressure is applied, they stop slipping and rotate at the same speed as the engine.

SPICER" EASY-PEDAL™ CLUTCHES

The "Spicer System" means matching the right clutch with the "right" drivetrain components. Start with a Spicer Easy-Pedal Clutch and select the options which will keep your equipment running smoothly-day in, day out.

Spicer's 14" and 15 1/2" Easy-Pedal Clutches are available for use on Class 8 trucks with engines up to 600 hp (refer to Maximum Torque Capacity chart on the next page) for specific models/applications.

The Easy-Pedal Clutches are the most advanced clutches in the industry.

Both clutches (14' and 15 1/2") offer these advantages:

- Lower pedal effort/bearing load
- Smooth engagement
- Maximum ventilation for cooler operation
- Simplified adjustment
- Direct interchangeability

BENEFITS OF THE SPICER EASY-PEDAL" KWIK-ADJUST"

Spicer's Kwik-Adjust is a manual adjusting, easy lock component included on Spicer's 14" and 15 1/2" 2-plate pull-type clutches. It allows quick adjustment, is easy to reach and has no bolts to remove.

GENERAL DESCRIPTION

As seen in the exploded view, (Fig. 1) the major components of the Spicer Easy-Pedal Clutch are the cover assembly and two driven discs separated by an intermediate plate. They are pull-type clutches of the dry disc design, adjustable, and have centrally located springs isolated from the heat of the pressure plate. Dampened driven discs (with springs) and ceramic facings (shown here) are considered standard and are recommended for most applications. Driven discs with solid centers (rigid) are available **but not recommended.**

In the 14" 2-plate models, the intermediate plate separating the driven discs is driven inside a "pot-type" flywheel and mounted on six drive pins in the flywheel itself.

In the 15 1/2" 2-plate models, the intermediate plate separating the driven discs is driven by four lugs within the clutch cover assembly. The cover assembly is mounted on a flat type flywheel.

In all models, attached to the cover assembly are four return springs to retract the pressure plate when the clutch is disengaged.

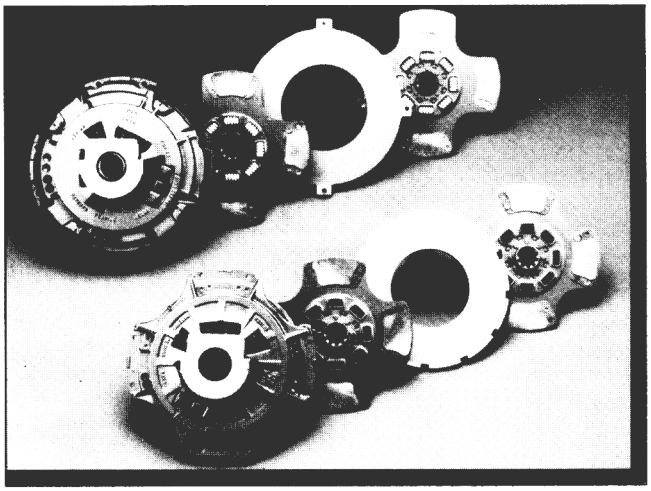


FIGURE 1

This Service Manual is provided to help you obtain best value and longest life from Spicer Easy-Pedal Clutches; both 14" and 15 1/2" models.

WHY SPICER"14° AND 15 1/2" EASY-PEDAL" CLUTCHES ARE THE INDUSTRY STANDARD:

The Easy-Pedal design decreases pedal effort as much as 50% by use of assist springs and increases facing life up to 25% more than other pull-type clutches. With regular maintenance you can always be sure of constant pressure plate load, regardless of age or wear, because of the precise angle of Spicer's rugged angular-spring design.

Spicer clutches will last hundreds of thousands of miles if properly installed, used and maintained. They are designed and built to withstand rugged use.

EXCESS FRICTION HEAT, A CLUTCH'S WORST ENEMY

Almost every early failure of a clutch can be traced to excess friction heat - all of which can be prevented by proper operation and maintenance. Here's how:

Do not "ride or s/ip" the chdch. Once a clutch is fully engaged, there is no heat generated and little or no wear. However, during the brief period when the clutch is picking up the load, considerable heat is generated. By riding or slipping the clutch, the period of partial engagement is lengthened - causing unnecessary heat and wear.

Always start in the proper gear Obviously, an empty vehicle can be started in a higher gear than a fully loaded one. But starting in a gear too high for the load can cause clutch slippage, too much heat and unnecessary wear. Drivers should be trained to use a gear low enough to prevent excess wear on the clutch. *A gear that will start the vehicle moving with the engine at idle speed is usua//y correct.* If the engine must be rewed up to prevent stalling, the gear selection is too high.

Do not shift unti/ vehic/e has reached proper speed. Upshifting before the vehicle has reached the right speed is almost as bad as starting off in too high a gear. When the difference between the vehicle speed and the engine speed is too great, the clutch is forced to slip. The result is extra heat and wear.

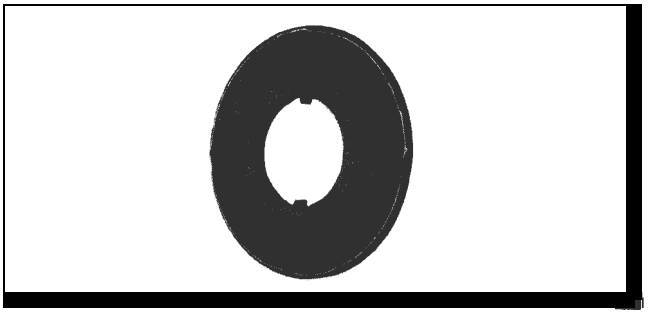
Match the ch.dch to the vehic/e and the job. Improper specification may result in a clutch too light-duty for the job it must perform, resulting in early burn-out. It may be a perfectly good clutch when used in the application for which it was designed, but totally inadequate for heavy-duty use. Mismatching the clutch to the vehicle is not only bad for the clutch, it can cause early wear on the whole drivetrain.

Never hold a vehicle on a hill with the clutch. To hold on a hill with the clutch requires that the clutch be purposely slipped. By doing this, enough heat can be generated to burn up the clutch.

Never coast with the clutch disengaged. This can cause clutch failure by the very high RPM encountered when coasting in gear with the clutch released. In this situation, the rear wheels are driving the disc through the multiplication of the rear axle and transmission ratios. This can result in over 10,000 RPM, beyond the burst strength of the facing material. Something as simple as coasting down an unloading ramp can burst a driven disc.

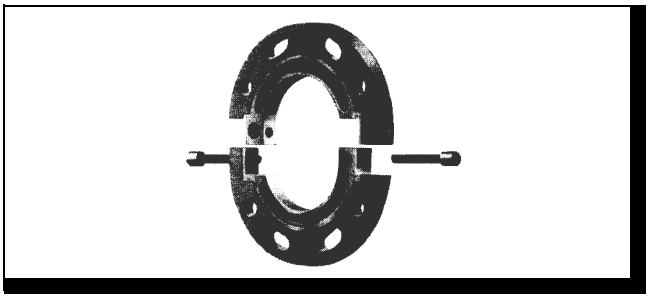
Never engage the c/utch whi/e coasting. This should not even have to be said, since responsible drivers should never coast with clutch disengaged. Re-engaging a clutch after coasting causes tremendous shock to the clutch and the whole drivetrain. It can result in internal engine damage and/or clutch and flywheel failure.

Always report unusual clutch operation promptly Proper maintenance, performed on time, will greatly extend the life of the clutch. The driver should report any change in free pedal (free travel), slippage or any strange "feel" to the clutch operation.



TORQUE-LIMITING CLUTCH BRAKE:

The Spicer Torque-Limiting clutch brake not only helps lengthen the life of your transmission, it has a long life of its own. And, drivers will shift easily into first or reverse, without transmission-damaging gear clash. A must for all heavy-duty unsynchronized transmissions with pull-type clutches, the Spicer Torque-Limiting clutch brake has a self-contained torque limiting feature which eliminates the need for special transmission bearing caps.



KWIK-KONNECT ™TWO-PIECE CLUTCH BRAKE

The Spicer Kwik-Konnect Two-Piece Clutch Brake has been designer to provide effortless engagement when shifting into reverse, low and/or first gears while the truck is at a standstill. Kwik-Konnect installs easily and provides cooler operation than competitive clutch brakes.

The proper match of a clutch to a vehicle should be made by using the formula below, which takes into consideration the vehicle's gross weight, the engine, transmission, rear axle and tires. All of these combined are called the Gradeability Factor. For adequate clutch life the vehicle must have a Gradeability Factor of at least 15%. Less than this puts undue stress on the clutch. Here's how to figure it.

$$\text{Gradeability (\%)} = \frac{867 \times T \times R}{r \times GCW} - Rrg$$

T - Gross engine torque in lbs. ft.

R - Axle ratio x transmission ratio (first gear)

Rrg - Rolling resistance in equivalent grade percent

(See Chart Below)

r - Rolling radius of tires

GCW - Gross combination weight in pounds

ROLLING RESISTANCE

	Road Surface	Equivalent Grade%
CONCRETE	Excellent	1
	Good	1.5
	Poor	2
ASPHALT	Good	1.25
	Fair	1.75
	Poor	2.25
MACADAM	Good	1.5
	Fair	2.25
	Poor	3.75
COBBLES	Ordinary	5.5
	Poor	8.5
SNOW 2 inches	2 inches	2.5
	4 inches	3.75
DIRT Smooth	Smooth	2.5
	Sandy	3.75
MUD	.....	3.75 to 15

SPICER® 14" EASY-PEDAL" FLAT FLYWHEEL CAST-IRON CLWCH FOR STANDARD 15 1/2" FLYWHEELS.

Spicer offers a 14" Cast-Iron Flat Flywheel Clutch (Fig. 2) that will fit the same flywheel as existing 15 1/2" clutches. Only the Spicer 14" Easy-Pedal Flat Flywheel Clutch offers the following benefits:

- Maximum engine torque rating of 1400 lbs. ft.
- Improved ventilation and heat dissipation over pot-type clutches
- Standardizes flywheels of fleets
- Greater heat sink—thicker pressure plate and intermediate plate are able to absorb more heat
- Best possible engagement characteristics through the use of the ceramic Super Buttons
- Lug Drive
- Spicer Angle-Spring design/reliability
- Positive Separator

CLUrCH CAPACITY

Using the same gross engine torque as used in the previous formula, you can select a clutch using the Clutch Capacity Selection Chart. For safety, please note these speed limitations:

14" clutch - Maximum engine speed 3300 RPM
15 1/2" - Maximum engine speed 2600 RPM

CLUTCH CAPACITY SELECTION CHART FOR 2-PLATE CLWCHES

Size	Clutch Plate Load-Lbs.	Cover Assy. Spring Color Code	Facing	Recommended* Max. Engine Torque - Lbs. Ft.
14"	2800	Red	Organic	820
14"	2800	Red	Ceramic (3 buttons)	1000
14"	3200	Plain	Oroanic	1000
14"	2800	Red	Super-Duty Ceramic (4 buttons)	1250
14"	3200	Plain	Super-Duty Ceramic (4 buttons)	1400
14"	3600	Yellow	Organic	1150
15 1/2"	2800	Red	Organic	940
15 1/2"	2800	Red	Ceramic	1200
15 1/2"	3200	Plain	Organic	1070
15 1/2"	3200	Plain	Ceramic	1400
15 1/2"	3600	Yellow	Organic	1250
15 1/2"	3600	Yellow	Ceramic	1650
15 1/2"	4000	White	Organic	1400
15 1/2"	4000	White	Organic-10 spring	1450

* Refer to page 6 for driven disc-damper torque capacity.

POSITIVE PIN SEPARATOR

Spicer's positive separator (Fig. 4) improves 15 1/2" and 14" Flat Flywheel clutch life and performance by providing cooler operation, smoother engagement and equal plate separation-all resulting in longer clutch life.

The separator pin allows the intermediate plate to move back when the clutch is released, giving equal gap on both sides of the intermediate plate.

KWIK-ADJUST COMPONENT

Spicer's 14" & 15 1/2" Easy-Pedal Clutches include a manual-adjusting, easy-lock component. The Kwik-Adjust component (Fig. 3) offers the following benefits:

- Allows quick adjustment
- Easy to reach
- No bolts to remove.

Several performance advantages are designed into Spicer Easy-Pedal Clutches. Pedal effort is reduced by as much as 50%. The clutch plate load is constant and uniform throughout the wear-life of the facing material. An efficient cover ventilation design cools the clutch quickly. Because the pressure springs are isolated from

the pressure plate (which is the source of friction heat), they retain their load which provides constant performance over the life of the clutch.

HEAVY-DUTY CLUTCHES

Spicer Easy-Pedal Clutches are available in 14“, 14“ Super-Duty and 15 1/2” 2-plate models. The 14” Super-Duty version gives you extra capacity for heavy-duty conditions, on and off-highway, and for pick-up and delivery applications. The Super-Duty has a thicker intermediate plate to absorb and dissipate up to 30% more heat. Driven discs are faced with four ceramic buttons per side to provide 33% more friction area.

COAXIAL SPRINGS

Spicer’s coaxial spring (spring within a spring) design (Fig. 5) increases the life of the clutch and whole drivetrain by dampening the torsional vibrations which are inherent in all drivelines.

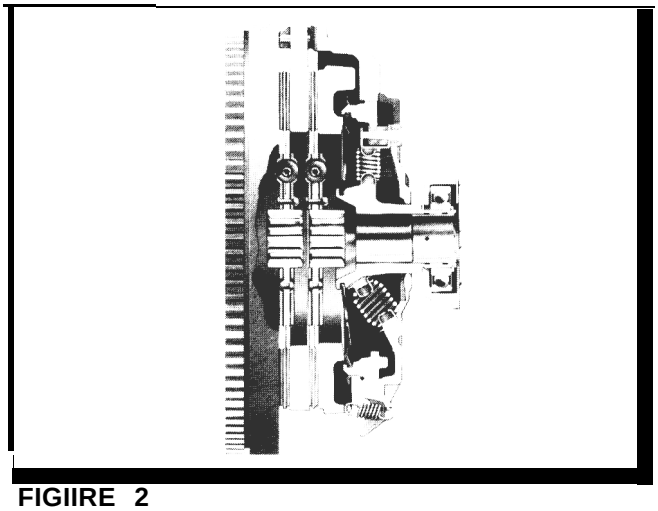
DRIVEN DISC OPTIONS

Spicer offers several choices in 14“ and 15 1/2” driven disc designs. The proper selection depends on the operating conditions the vehicle will encounter. The options are; organic material, rigid (Fig. 6), organic material, dampened (Fig. 7), 4-button ceramic, rigid (Fig. 8), 4-button ceramic, dampened (Fig. 9)

3-button ceramic *facings* (Fig, 10) To obtain extended 14" clutch life in vehicles operating under normal, over-the-road conditions, 3-button ceramic clutch facings are recommended.

4-button *ceramic* facings—For vehicles such as rear dumps, cement mixers, landfill trucks, etc., operating on/off-highway, in mud, sand or uneven ground, and higher horsepower line haul applications Spicer recommends the super-duty, 4-button ceramic facing clutch for long life and high torque capacity.

Super damper (Fig. 11) Available 15 1/2” only with 4 ceramic buttons and 10 coaxial springs with built-in free travel to reduce gear rattle at idle. Also available in organic facings with 10 coaxial springs.



FIGIIRE 2
14" EASY-PEDAL™ FLAT FLYWHEEL

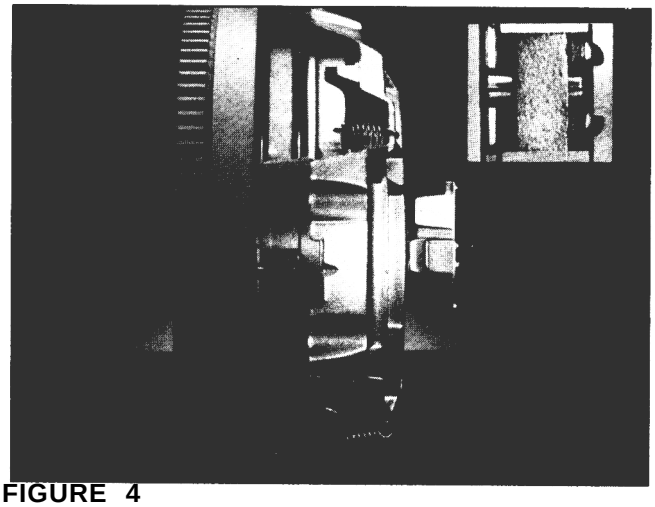


FIGURE 4
POSITIVE PIN SEPARATOR

FIGURE 3
KWIK-ADJUST™ COMPONENT

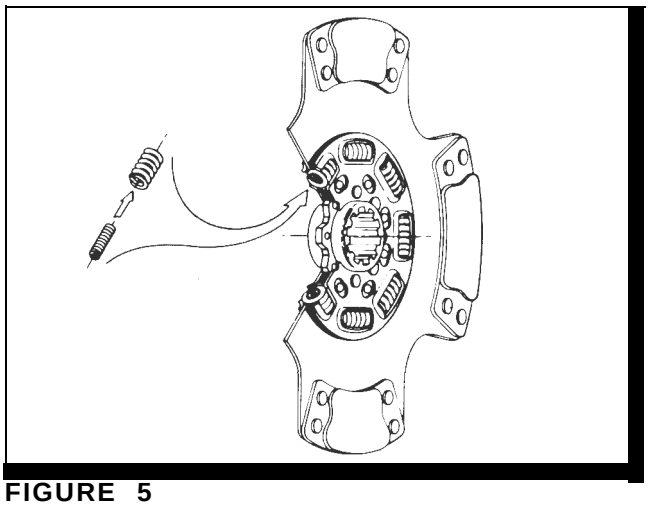


FIGURE 5
COAXIAL SPRING DESIGN

Free travel: This allows the disc hub to move 1.5 degrees in either direction before it engages the dampening springs, thereby reducing gear rattle when the truck is at idle.

/Vote: The hub in the super damper may be turned by hand depending upon the amount of friction lag (it is not loose).

SPICER% LATEST TECHNOLOGY IN DRIVEN DISC DESIGN:

- Patented Coaxial
- Super Button™
- Free Travel
- For use with all diesel engines
- Greatly reduces vibration
- Extends driveline life
- Reduces spline wear
- Available with ceramic or organic facings

In the past, no one worried about torsional vibration. Transmissions with ten or more speeds were split in a narrow range between 1800 and 2100 rpm. Today's fuel-efficient engines, have high torque, lower-governed rpm, and with fewer speeds in the transmission, the result is much greater torsional vibration. This presents a need for ***finely tuned dampened discs.***

Excessive torsional vibration can significantly shorten the life for your transmission, prop shaft, and axle, and add to driver discomfort. ***For maximum service /life, rigid discs are not recommended.*** That's why Spicer engineered the Coaxial-Spring (spring-within-a-spring) Driven Disc to dampen critical vibrations in high-torque-rise engines.

AVAILABLE IN THREE MODELS:

- Our 8 (green) coaxial springs are adequate for engines up to 1400 Ibs. ft. of torque.
- Our 8 (white) coaxial free travel springs are adequate for engines up to 1250 lbs. ft. of torque.
- Our 10 (black) coaxial springs are adequate for engines up to 2000 Ibs. ft. of torque (only offered in a 15 1/2" disc).

CERAMIC OR ORGANIC FACINGS:

Organic (non-asbestos) facings are offered for lower horsepower or on-highway applications.

Spicer recommends ceramic facings (with the Super Button design) for more rugged use, longer life (on or off the highway) "providing a figher coefficient of fricton for more effective engagement and longer facing life.

Spicer clutches should be replaced when internal adjustment cannot correct for a loss of free pedal or cannot compensate for a slipping clutch.

If clutch replacement is necessary, the transmission must be removed.

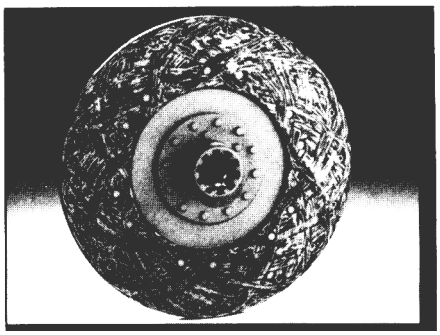


FIGURE 6
RIGID ORGANIC 14" & 15 1/2"

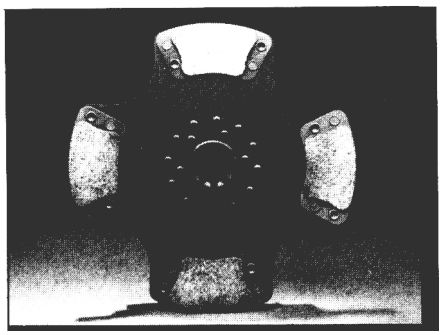


FIGURE 8
RIGID 4-BUTTON CERAMIC 14" & 15 1/2"

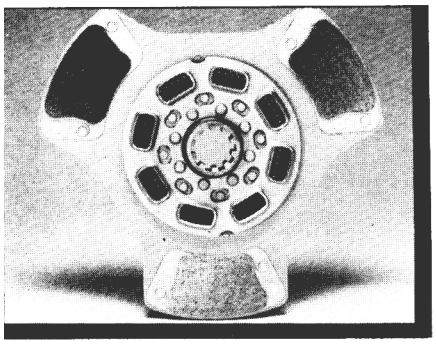


FIGURE 10
DAMPENED 3-BUTTON CERAMIC 14" ONLY

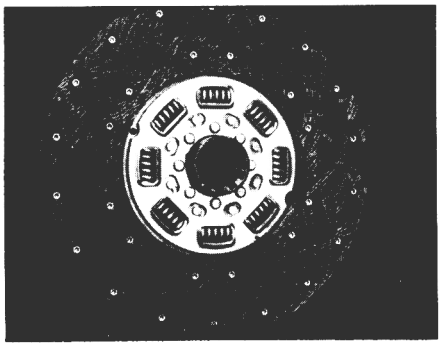


FIGURE 1
DARIPENED ORGANIC 14"& 15 1/2"

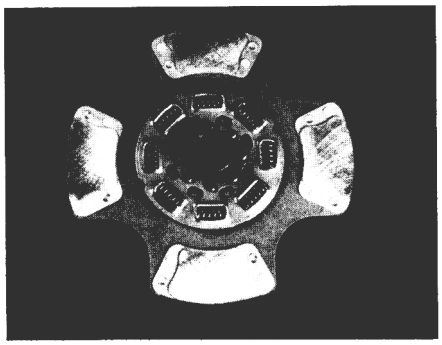


FIGURE 9
DAMPENED 4-BUTTON CERAMIC 14"& 15 1/2"

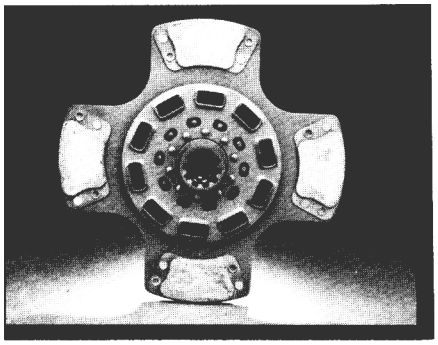
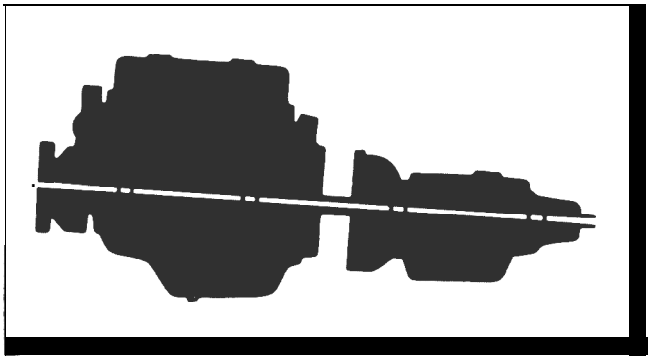


FIGURE 11
SUPER DAMPER 4-BUIION CERAMIC 15 1/2" ONLY (10 SPRING OAMPER)

Note: Throughout the following sections, reference will be made to specialized tools recommended to assist in performing clutch removal, replacement and adjustment. Please refer to Spicer CSK-I tool kit as shown on page 22.

TRANSMISSION REMOVAL **STEP 1**

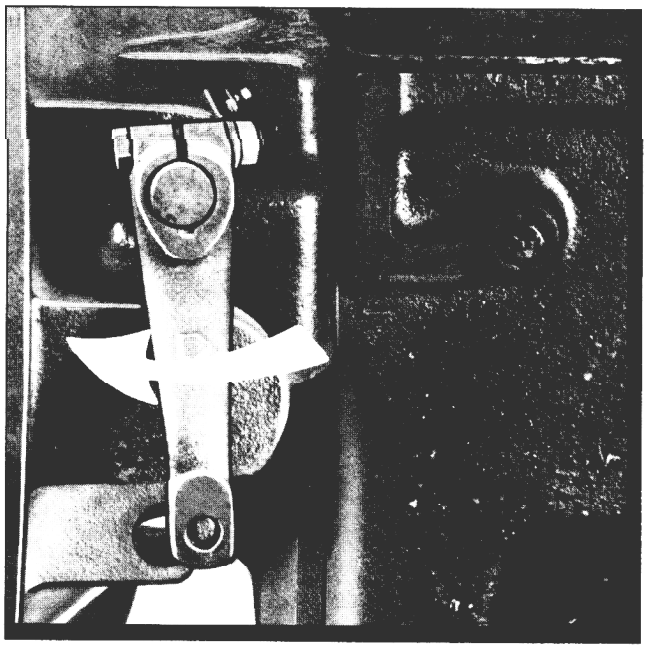


When removing the transmission, use a sling or jack to maintain alignment.

Don't let the rear of the transmission drop and don't let the transmission hang unsupported in the splined hubs of the driven discs because it distorts them and could cause poor clutch operation or clutch release problems.

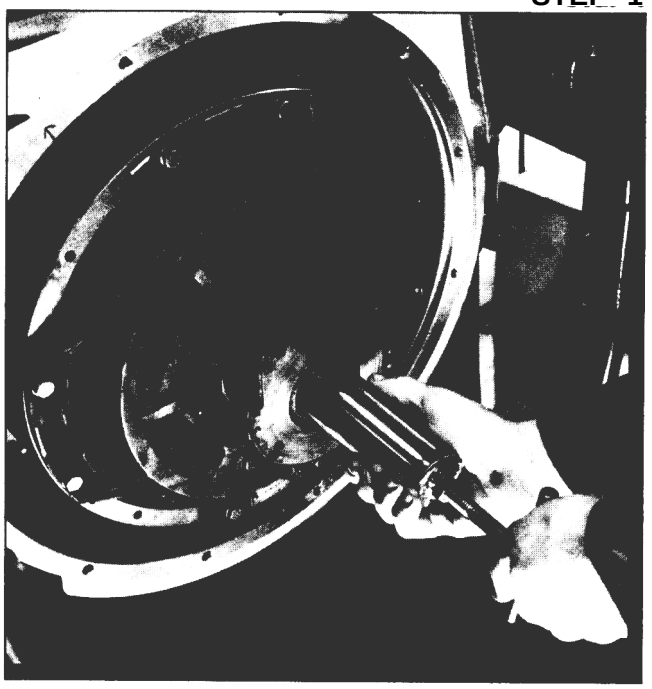
Taking these precautions will prevent bending and distortion of the clutch discs and ensures trouble-free performance.

STEP 2



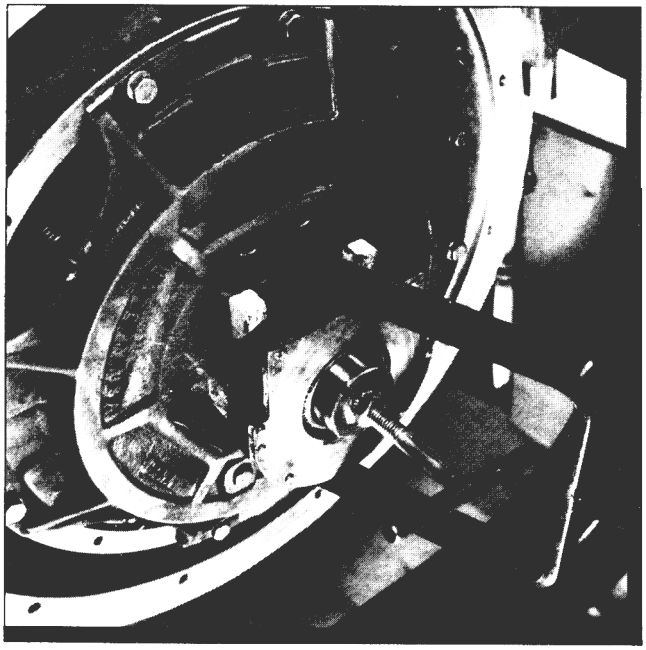
Before pulling the transmission free, disconnect the external clutch linkage and rotate the release yoke so it will clear the release bearing when it is removed. Carefully pull the transmission back to remove the splined shaft from the driven discs and the clutch.

CLUTCH REMOVAL **STEP 1**



Install a spline aligning tool through the release bearing and the driven discs, into the pilot bearing. You can use an old transmission input shaft for this purpose.

STEP 2



Pull bearing back using release tool shown and insert two, 5/8 inch spacers between the clutch cover and the release bearing. The spacers relieve the internal spring load of the clutch cover and allow for reinstallation.

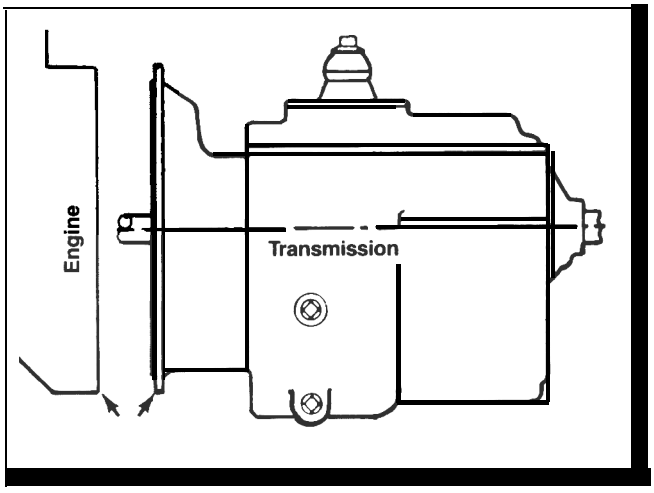
STEP 3

Completely remove the top two bolts and install two 3/8 - 16UNCx21/2" long guide studs. Take out the remaining mounting bolts and carefully remove the clutch.

You may want to use a hoist to do this because a 14" clutch weighs approximately 75 pounds and a 15 1/2" clutch installation weighs approximately 150 pounds.

INSPECTION

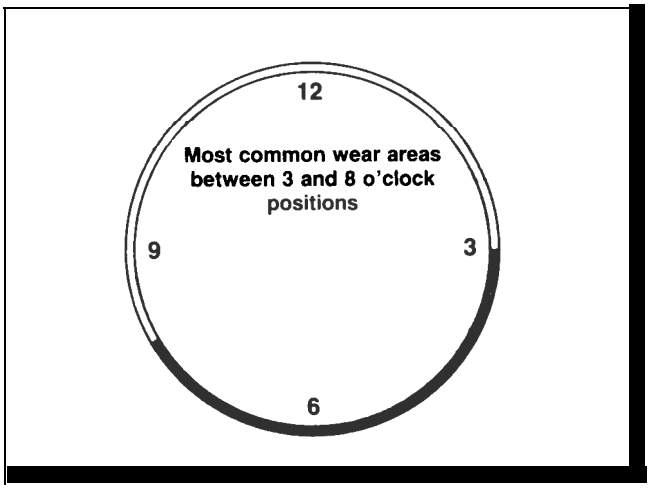
STEP 1



Inspect the mating surfaces of the transmission clutch housing and the engine flywheel housing.

Any appreciable wear on either housing will cause misalignment.

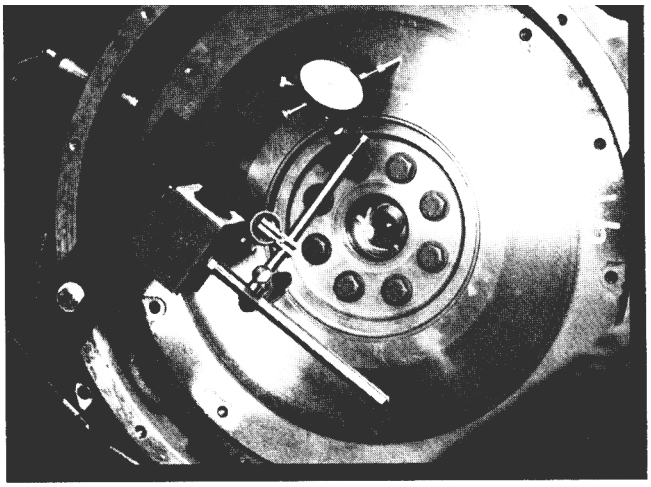
STEP 2



Most wear will be found on the lower half of these surfaces with the most common wear areas between the 3 and 8 o'clock positions.

Replace the clutch housing if it is worn.

STEP 3



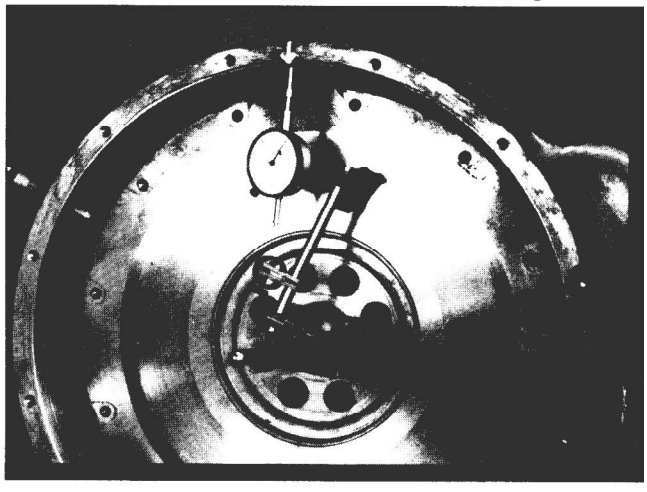
Begin by wiping all surfaces before gauging. Secure the dial indicator to the engine flywheel housing with the gauge finger on the face of the flywheel near the outer edge.

Rotate flywheel.

Maximum permissible runout is .0005" per inch of flywheel diameter.

The total indicated difference between the high and low points must be .007" or less for 14", .008" or less for 15 1/2".

STEP 4

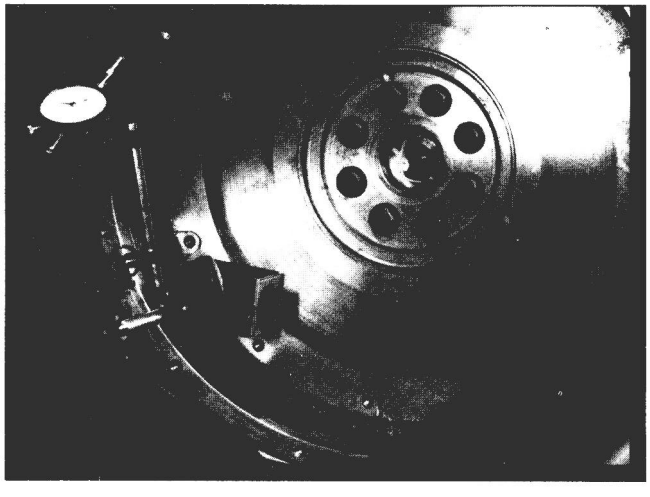


Next, secure a dial indicator to the crankshaft, with the gauge finger against housing pilot rotate the crankshaft.

Use a marker or piece of soapstone to mark the high and low points.

Total difference between high and low points should not exceed .008".

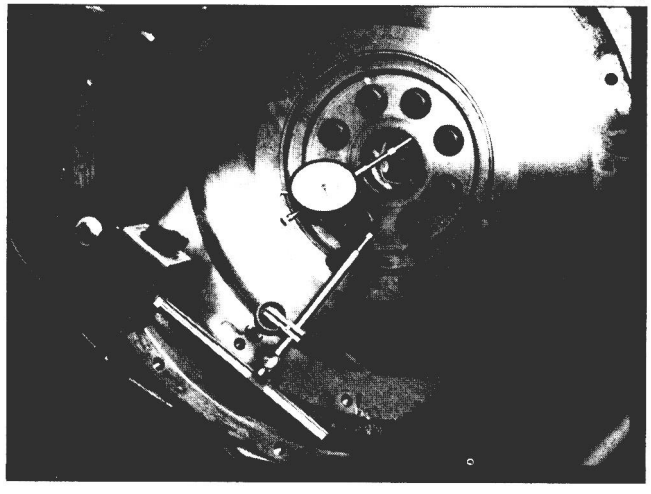
STEP 5



Move the gauge finger to contact the face of the engine flywheel housing. Again, rotate the crankshaft and then mark high and low points using a soapstone.

The total difference between the high and low points should not exceed .008".

STEP 6

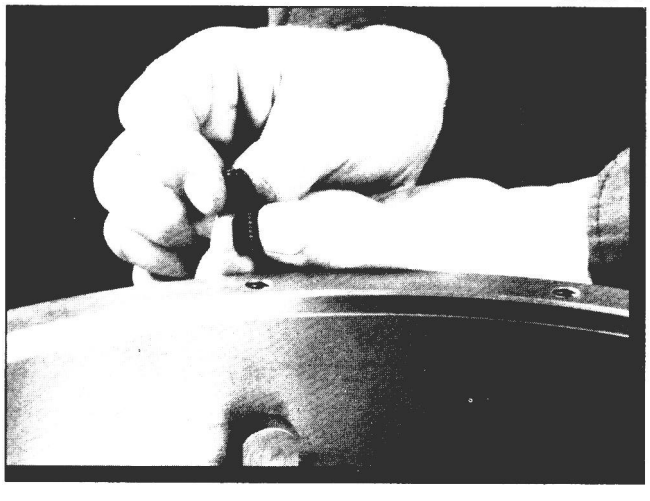


Move the gauge finger to contact the pilot bearing bore surface. Again, rotate the flywheel. The maximum total allowable runout is .005".

If any of these limits are exceeded, the problem must be corrected or misalignment will cause premature wear to the drivetrain components.

THIS STEP APPLIES FOR 14" POT STYLE FLYWHEELS ONLY.

STEP 7



Mark the flywheel to crankshaft positon with a piece of soapstone or chalk and remove the crankshaft bolts. Remove the flywheel and set it on a flat work surface.

Remove two set screws from each of the six drive pins.

Caution: Since the drive pins are made of hardened steel and could chip, wear safety glasses when removing the old drive pins.

Drive out the old drive pins with a brass hammer.

INSTALLATION OF A SPICER 14" CLUTCH

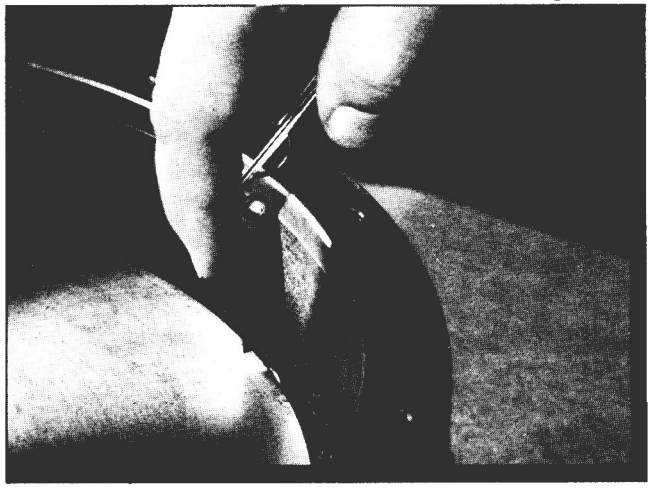
STEP 1

Install six new drive pins in the previously unused holes in the flywheel. Space them out equally. Make sure that the shanks of the pins area press fit in the flywheel rim.

We recommend using a drive pin aligning tool like the one found in the Spicer CSK-1 Tool Kit. Make ***sure that the heads are square with the friction surface, misaligned drive pins may cause a clutch release problem.***

Put two small spacers on the friction surface of the flywheel and carefully set the intermediate plate over the drive pins. The spacers will prevent getting your fingers pinched by the intermediate plate and give you a finger hold when removing it.

STEP 2

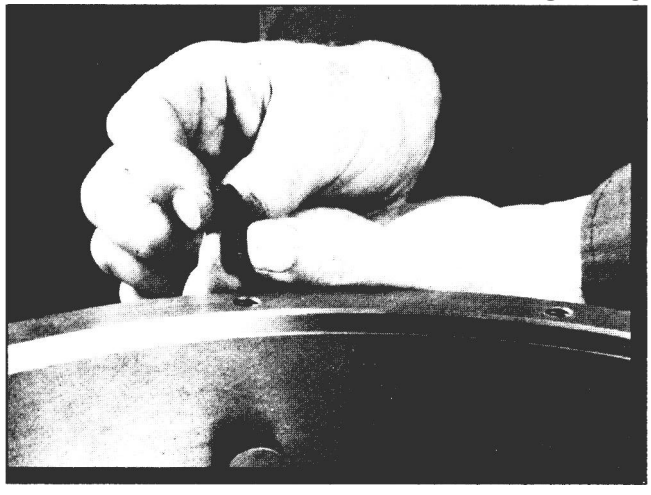


Turn the intermediate plate in one direction as far as it will go.

Use a .006" feeler gauge and check the clearance between the drive pin and the drive slot. Check the same side of each pin. The minimum clearance between the drive pins and the drive slots is .006". If the proper clearance is not obtained, realign the drive pins and recheck the squareness. Then recheck the clearances. This check is necessary to ensure that the clutch will release properly when installed.

Do not file the drive pin slots on the intermediate plate to obtain correct clearances. Doing so will cause an unequal load on the pins. This is a frequent cause of poor release or the clutch not releasing at all. It can also result in broken drive pins.

STEP 3



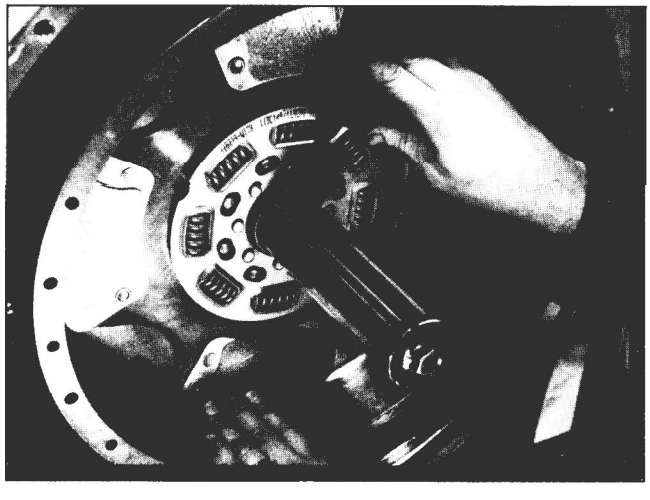
If the alignment and clearance is correct, lock each of the six pins in place with two, new, 3/8" by 3/8" set screws.

Reinstall the flywheel to the engine crankshaft, making sure the chalk marks are lined up. Refer to the engine manual for torque specs on the flywheel mounting bolts.

Remove the pilot bearing and replace with a new bearing.

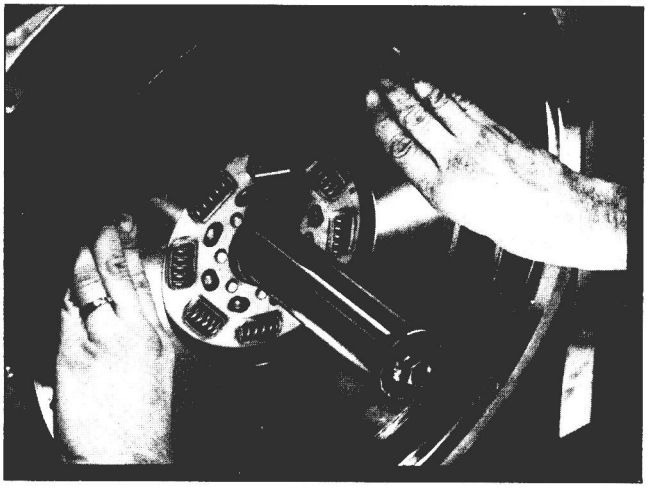
Caution: Tap on the outer race of the pilot bearing *only,* making sure it is seated properly in the bearing bore. This bearing must have a press fit within the pilot bearing bore.

STEP 4



Place the front driven disc against the flywheel with the side stamped "flywheel" facing the engine.

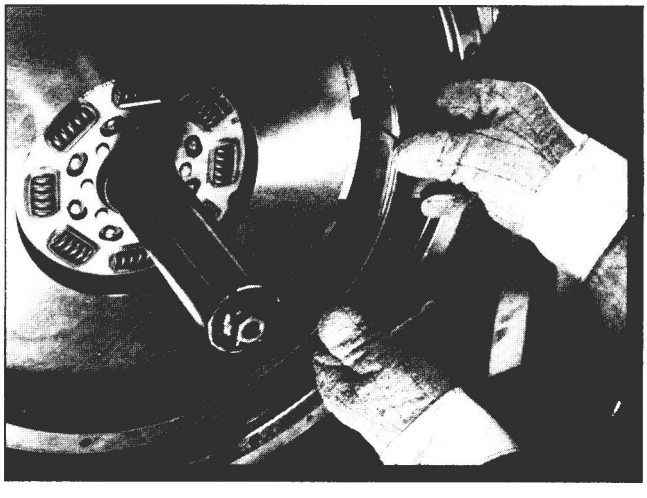
STEP 5



Next, install the intermediate plate by positioning the drive slots on the drive pins and remove the aligning tool.

Caution: Super-Duty Clutches have thicker intermediate plates and thinner super buttons than standard clutches. ***Do not intermix these conponents!***

STEP 6



If you are installing a Super-Duty Clutch, be sure to install three, anti-rattle springs. Space them equally between the drive pins with the rounded sections toward the flywheel face. For safety reasons, you should wear heavy gloves when installing anti-rattle springs.

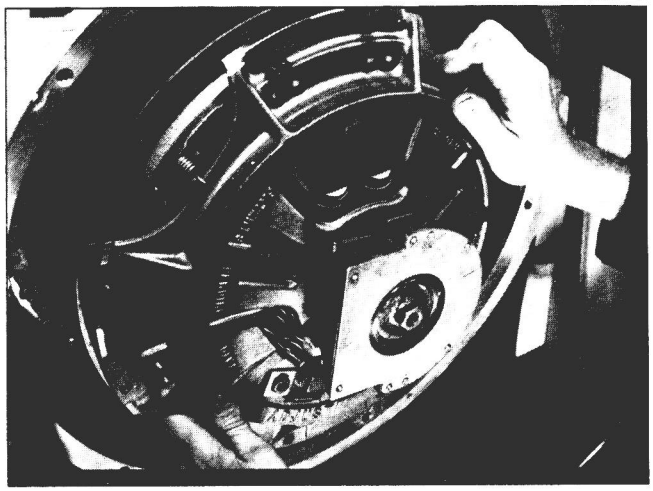
Insert the aligning tool through the hub of the rear disc with the side stamped "pressure plate" facing the transmission and install it after the intermediate plate. ***Remember: It's imperative that the side stamped "pressure plate" faces the transmission and the side stamped "f/ywhee/" faces the engine.***

STEP 7

Re-insert the aligning tool through the hub of the front driven disc and into the pilot bearing.

The relative position of the buttons on the front and rear discs is not important.

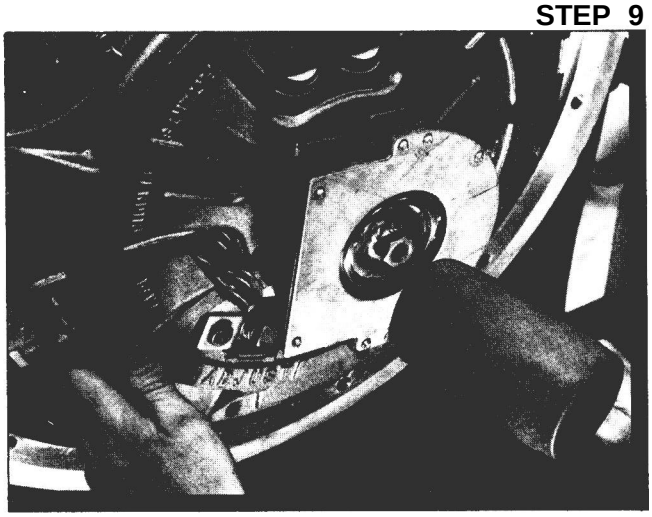
STEP 8



Position the clutch cover over the guide studs installed at the top of the flywheel. ***Make sure that the Kwik-Adjust mechanism will be aligned with the opening in the bell housing of the transmission.***

Start six, 3/8" by 1 1/4", grade 5 or better mounting bolts with lockwashers and tighten them finger-tight.

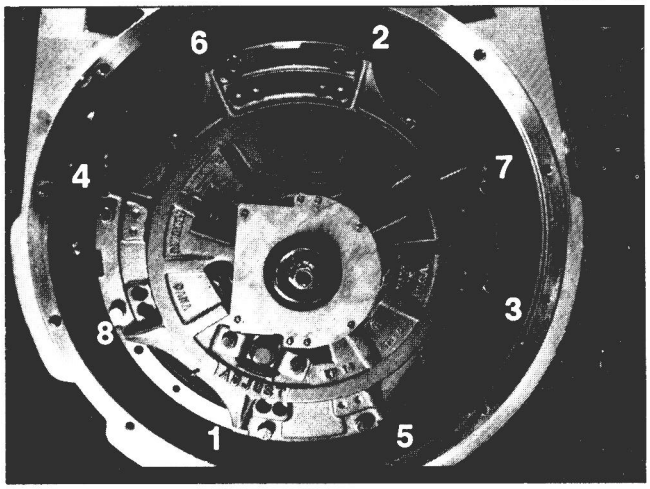
STEP 9



Lightly tap the aligning tool to make sure it is centered and seated into the pilot bearing.

Remove the guide studs and replace them with bolts and lockwashers.

STEP 10



Tighten the bolts in the criss-cross sequence shown to pull the clutch into its proper position in the flywheel pilot. You must start with the lower left-hand bolt.

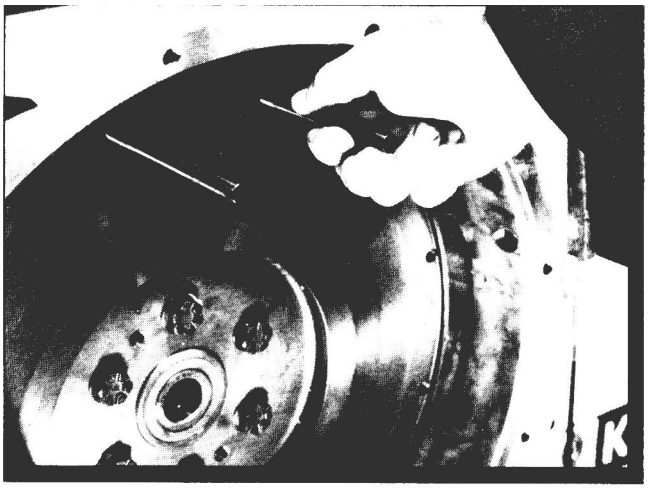
Failure to tighten the bolts in this manner can cause permanent damage to the clutch cover or create an out-of-balance condition.

To achieve final torque, progressively tighten all bolts to 35-40 lbs. ft.

As the bolts are tightened, the wooden spacers should fall out. If they do not fall free, be sure to remove them.

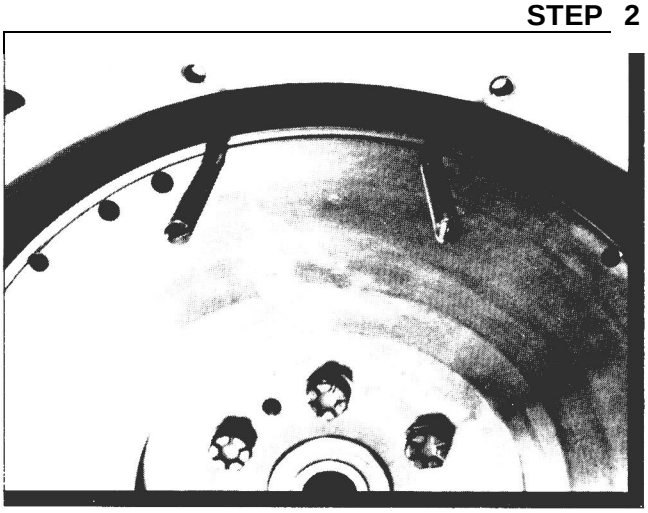
You may have to *light/y* tap the aligning tool with a mallet to remove it.

STEP 1



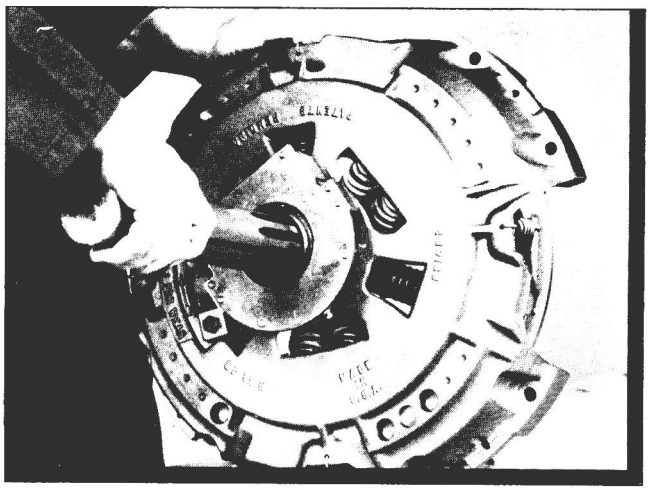
Insert two 7/16“ - 14 UNC (5” long) guide studs into the two upper mounting holes of the flywheel.

STEP 2



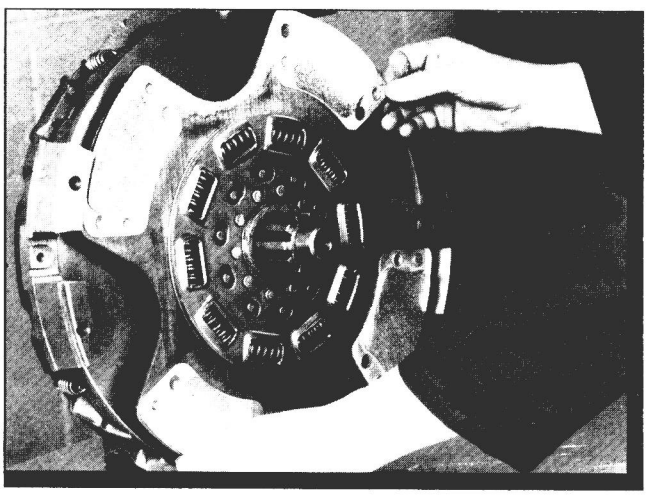
Rotate the flywheel to level the two guide studs.

STEP 3



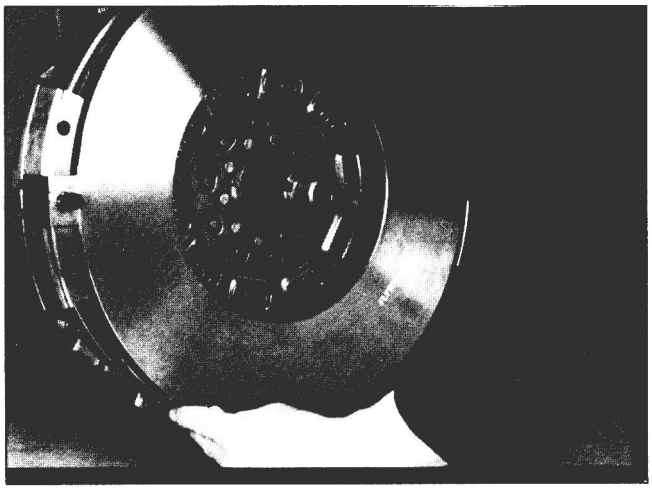
Insert the aligning tool through the release bearing sleeve in the new clutch.

STEP 4



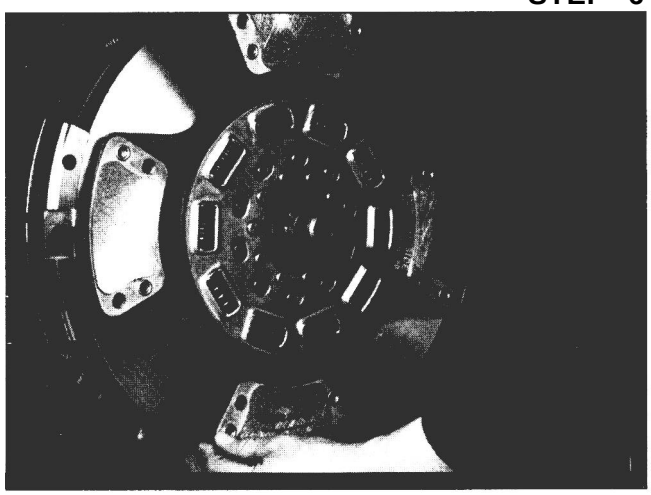
Put the rear driven disc on the aligning tool with the side stamped “pressure plate” facing the pressure plate.

STEP 5



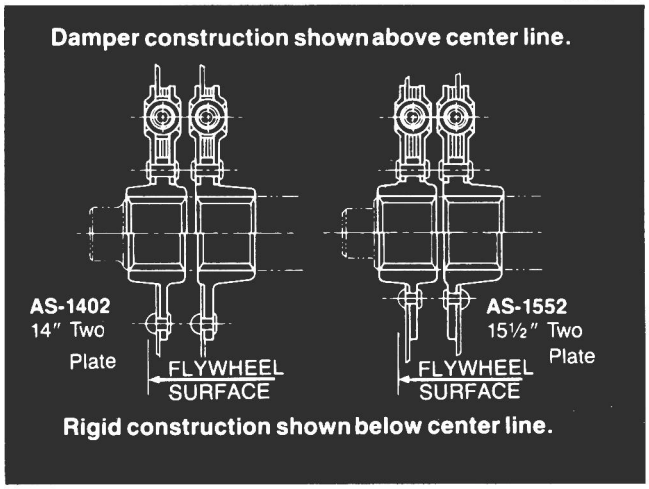
Place the intermediate plate in the clutch cover and align the driving lugs of the plate with the slots provided. ***The four positive separator pins in the intermediate p/ate must be f/ush with the cast lug, on the pressure plate side.***

STEP 6



Install the front disc on the aligning tool with the side stamped “flywheel” facing the engine.

STEP 7



Remember: It’s imperative that the side stamped “flywheel” faces the engine and the side stamped “pressure plate” faces the transmission.

The relative position of the buttons on the front and rear driven discs is not important.

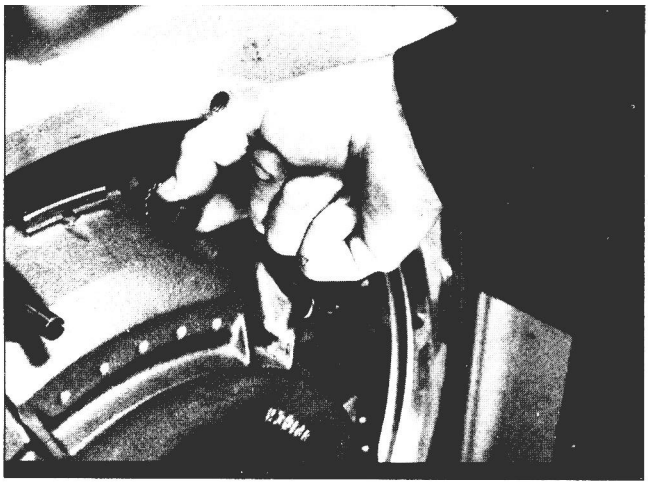
Make sure that the Kwik- Adjust mechanism will be aligned with the opening in the bell housing of the transmission.

STEP 8

Position the clutch over the guide studs and slide it forward until contact is made with the flywheel surface.

A 15 1/2” clutch installation weighs about 150 pounds and a hoist may be required to lift it into place.

STEP 10



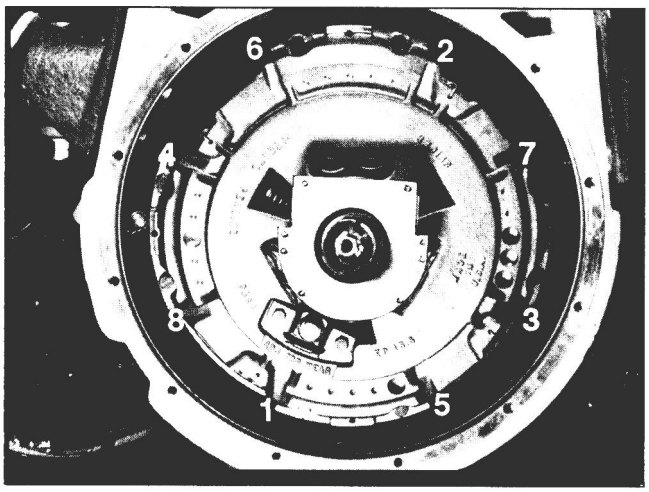
Start six, 7/16“by2 1/4”, grade 5 or better mounting bolts with lockwashers and tighten them finger-tight.

STEP 10

Lightly tap the aligning tool to make sure it is centered and seated in the pilot bearing.

Remove the guide studs and replace them with bolts and lockwashers.

STEP 11



Tighten the bolts in the criss-cross sequence shown to pull the clutch into its proper position in the flywheel pilot. You must start with the lower left-hand bolt.

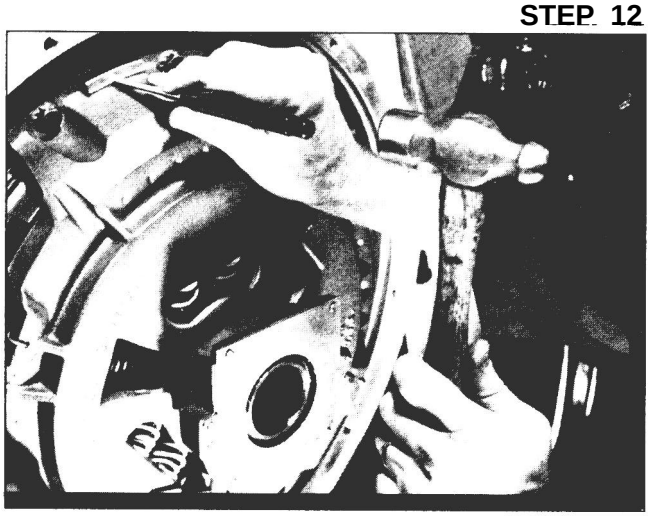
Failure to tighten the bolts in this manner can cause permanent damage to the clutch cover or create an out-of-balante condition.

To achieve the final torque, progressively tighten all bolts to 45 to 50 lbs. ft.

As the bolts are tightened, the wooden spacers should fall out. If they do not fall free, remove them.

You may have to ***lightly*** tap on the aligning tool with a mallet to remove it.

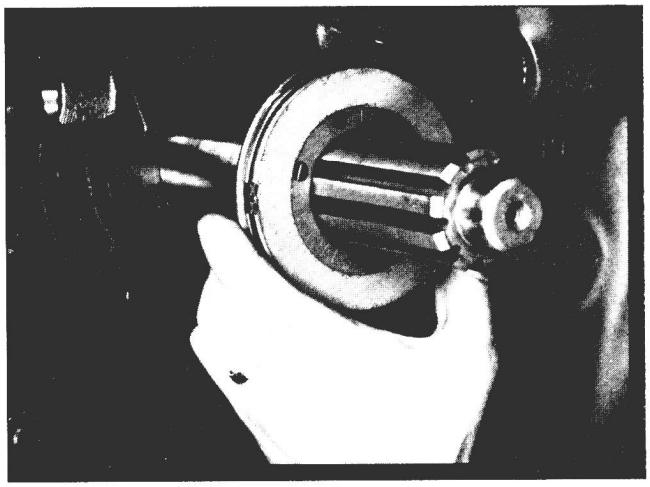
STEP 12



Using a 1/4” diameter flat nose drift, ***lightly*** tap each of the four positive separator pins toward the flywheel. After tapping, the pins should be flush against the flywheel.

RE-INSTALLING TRANSMISSION

STEP 1



To reinstall the transmission, shift it into gear.

Inspect the transmission input shaft for wear. If worn, replace. Using a clean, dry cloth wipe the shaft clean.

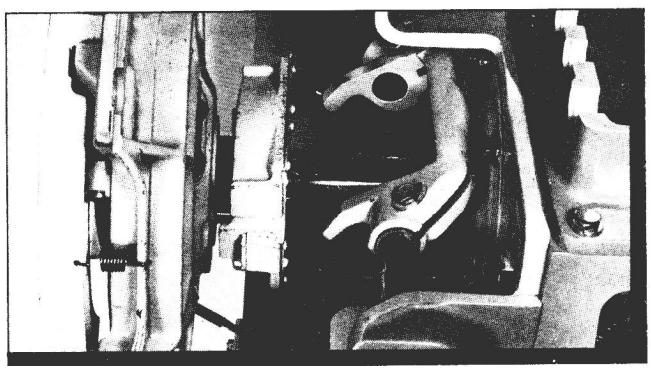
Check for wear on transmission bearing caps. See O.E. Service Manual if replacement is needed.

If a clutch brake is used, be sure to install it on the input shaff of the transmission at this time.

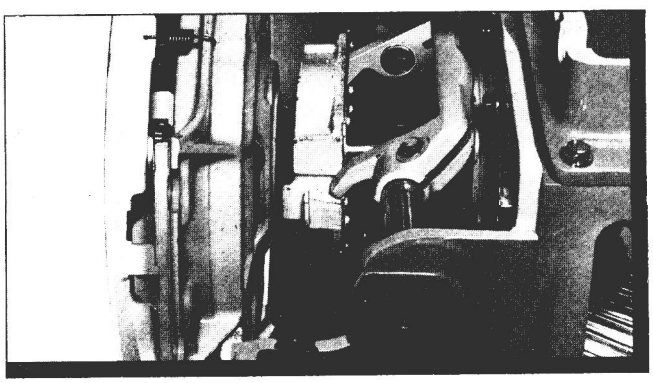
Check for wear on the fingers of the clutch release yoke. Also, check the cross shaft and the cross shaft bushings. Replace them if necessary.

Check to be sure that neither cross shaft protrudes through the release fork since this could cause side loading of the release bearing.

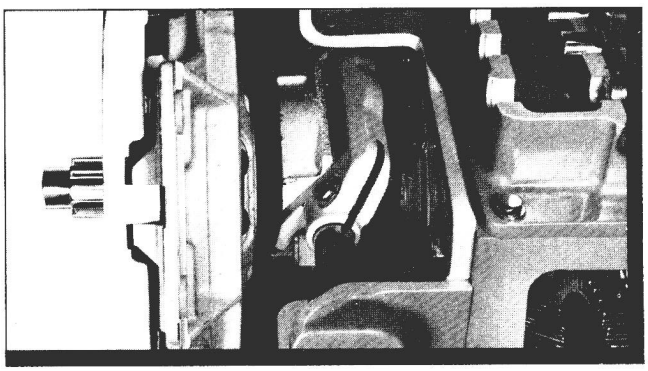
STEP 2



STEP 3



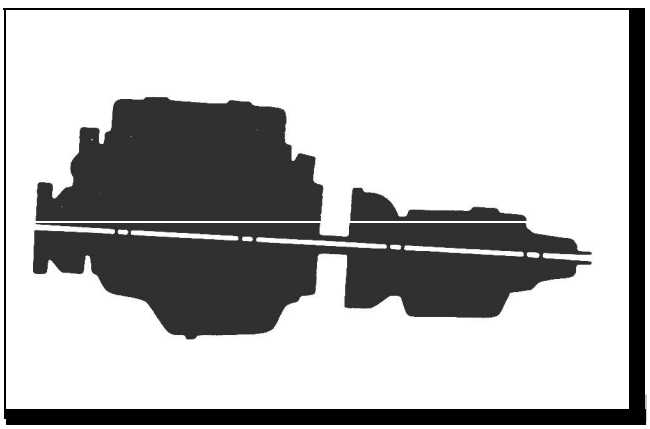
STEP 4



Rotate the release yoke so that it clears and is rotated over the wear pads of the release bearing as the transmission is moved forward. (See progessive steps2-4). Be careful: The release yoke fingers must not be elevated to the straight out position, as they could damage the clutch cover when moving the transmission forward.

Make sure that the transmission aligned with the engine when it is raised into position.

STEP 5



Don't let the rear of the transmission drop and don't let the transmission hang unsupported in the splined hubs of the driven discs because it distorts them and could cause poor clutch operation or clutch release problems.

Taking these precautions will prevent bending and distortion of the fine/y tuned clutch discs and ensures troub/e-free performance.

Move the transmission forward but ***never*** force the transmission into the clutch or flywheel housing. If it doesn't enter freely, investigate the cause and make adjustments until it does.

Mate the transmission with the engine housing and install the mounting bolts. Torque the bolts to the proper manufacturer's specifications. Attach the clutch release linkage.

Installation of the transmission is complete and adjustments can now be made to the clutch and, if necessary, the linkage.

UNDERSTANDING SPICER CLUTCH ADJUSTMENT

To assure optimum performance of Spicer Clutches:

a. l/2'' to 9/16'' release travel is required
b. 1/8" free travel (clearance between release bearing and release yoke)
c. Clutch to brake squeeze must occur 1/2" to 1" from the end of pedal stroke

TERMINOLOGY

1. RELEASE TRAVEL: 1/2" TO 9/16"

Proper release travel assures that the release bearing is capable of releasing far enough, to allow the two driven discs to spin freely, avoiding clutch drag.

2. CLUTCH FREE PEDAL:

Pedal free play is an indication of clutch adjustment interval. When free pedal is no longer present, begin adjustment procedures as outlined below.

3. CLUTCH FREE TRAVEL: 1/8"

Free travel is the clearance between the release yoke and clutch release bearing wear pads. This dimension regulates how much free pedal is obtained in the cab.

4. CLUTCH BRAKE SQUEEZE: 1/2" TO 1" FROM THE END OF THE PEDAL STROKE.

Proper clutch brake squeeze assures that the input shaft will stop rotating when the vehicle is stationary. Clutch brake is only used when shifting into 1st or reverse. Keep clutch brake squeeze close to end of pedal stroke to assure that it will **not be used as *an upshifting brake,*** causing brake life reduction.

EXPLANATION OF ADJUSTMENT

1. INTERNAL CLUTCH ADJUSTMENT: (NORMAL SERVICE ADJUSTMENTS).

Clutch component wear is adjusted internally in the clutch through clockwise rotation of the adjusting ring. This adjustment moves the release bearing toward the transmission and re-establishes the 1/2" release travel and 1/8" free travel.

2. LINKAGE ADJUSTMENT

Linkage adjustment should only be performed in the following cases:

A. Initial dealer preparation to set total pedal stroke and yoke throw.
B. To compensate for linkage wear, clutch brake wear, transmission bearing cap wear or replacement of relative clutch or linkage components.

SPICER CLUTCH AND LINKAGE NORMAL SERVICE ADJUSTMENTS

STEP 1: INTERNAL CLUTCH ADJUSTMENT

1. Remove inspection cover at bottom of clutch housing.
2. Measure clearance between release bearing housing and clutch brake. See Fig. 1. If clearance is less than 1/2" or greater than 9/16", adjust clutch as outlined in following steps:

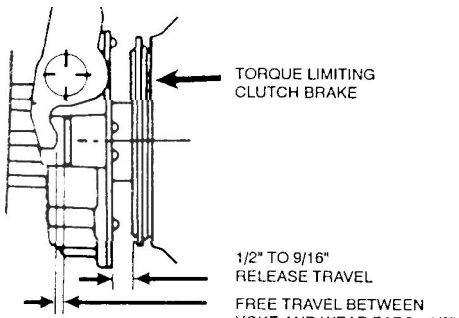
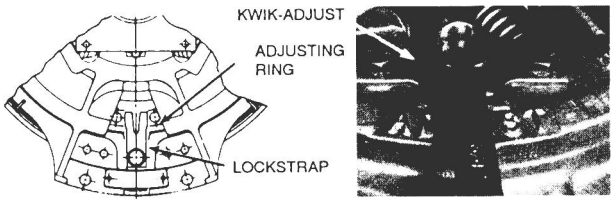


FIGURE 1

A. ***In order to turn the adjusting ring, release the clutch by depressing the clutch pedal to end of pedal travel.***
B. Adjust the clutch ***internally to get 7/2" to 9/16" release.*** This is done by turning the adjusting ring as shown in Fig. 2 (measurement taken with pedal in the "Up" position).
   - Angle Spring Clutches: Remove lockstrap and adjust with Spicer adjusting tool. (Spicer Tool Kit CSK-1)
   - Easy Pedal Clutches with Kwik-Adjust: Insert a 3/4" socket (12 point) or a 3/4" boxed end wrench through inspection hole and ***depress square headed bolt to adjust clutch.*** The Kwik-Adjust will re-engage at a quarter of a turn. The flat on the bolt head will align with the flat edge of the bracket.



Angle-Spring **Easy-Pedal**

FIGURE 2

1. If clearance between release bearing housing and clutch brake is ***less than 1/2",*** rotate the adjusting ring ***counterclockwise*** which moves the release bearing toward the engine.
2. If clearance between release bearing housing and clutch brake is ***greater than 9/16",*** rotate the adjusting ring ***clockwise*** which moves the release bearing toward the transmission.

C. Re-install lock strap or assure Kwik-Adjust is engaged in the locked position and release the clutch pedal to engage clutch.

STEP 2: FREE TRAVEL SETTING

CAUTION: STEP #1 *MUST* BE COMPLETED BEFORE PROCEEDING WITH FREE TRAVEL SETTING.

1. Check clutch free travel (or clearance between the release yoke and release bearing as shown in Figure 1). Set ***free travel*** at'1/8° dimension by adjusting the ***external linkage.*** This dimension correlates to a *free pedal* of approximately 1 1/2" - 2" in the cab.

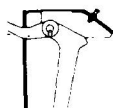
IMPORTANT CONSULT OEM LINKAGE ADJUSTMENT PROCEDURES FOR REQUIRED *FREE PEDAL* DIMENSION AND DESCRIPTION OF LINKAGE ADJUSTMENT.

STEP 3: CLUTCH BRAKE SETTING

1. Depress clutch pedal. With correct release travel and free travel settings, clutch brake "squeeze" should occur approximately 1" from the end of pedal stroke.
Depress the clutch pedal. The pedal should be 1/2" to 1" from the end of stroke at the beginning of the clutch brake squeeze. See Fig. 4.

A. To check this insert a .010" feeler gauge or business card between the release bearing and clutch brake (refer to Fig. 2). Depress the clutch pedal and squeeze the card. Let the pedal up slowly. Stop when the card can be pulled out. The pedal should be 1/2" to 1" from the end of pedal stroke.

2. Re-install inspection cover.



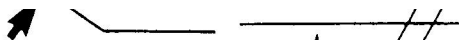
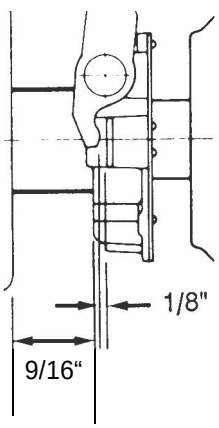


FIGURE 3

OTHER:

ADJUSTMENT FOR SYNCHRONIZED TRANSMISSIONS, NO CLUTCH BRAKE:

With the pedal depressed, turn the adjusting ring to obtain approximately 9/16" between clutch cover and release bearing housing. Check measurement with pedal up. Refer to step 2 above for free travel setting.



HYDRAULIC LINKAGE:

Refer to manufacturer's Specifications for proper adjustment of system.

Clutches should be lubricated after adjustment and at regular maintenance intervals. Lubricate the release bearing (Fig. 1) with a recommended lubricant as shown. Clutches with permanently sealed release bearings require no lubrication.

Note: It is important that a high temperature lubricant be used as listed below. **Do *not*** use chassis lubricant.

RECOMMENDED LUBRICATION

Grease shall be composed of refined mineral oil and soap suitable for high temperature anti-friction bearings. The product shall be noncorrosive, have good pumpability, and shall not bleed or separate in this application. The use of solid fillers such as graphite, carbon black, asbestos, mica, talc, etc., are not acceptable. The following are the minimum physical requirements of greases recommended for this application.*

Dropping, point °F	- 350 min.
Penetration, ASTM worked @ 77W	- 265-295
Base oil viscosity, SUS @ 100°F	- 500 min.
Soap	-Lithium

*For approval of products other than those shown on this specification, a 5 lb. sample of the candidate greases in its *origins/container on/y* along with complete physical specifications from the manufacturers, should be forwarded to the Dana Corporation, Spicer Clutch Division.

Item to be Serviced	Recommended Lubrication[1]	Recommended Change Intervals[2] Regular Service	Severe Service Off-Highway[3]
Spicer Clutch Release Bearing on All Models with Greasable Bearings	Use a good quality lithium soap base or equivalent E.P. grease having an operating temperature range of +325°F to 10°F. In addition, the grease should meet the N.L.G.I. grades 1 or 2 specifications.	**Every 10,000 Ml (16,000 KM) or 1 Month**	**Every 250 HRS or 1 Month**

[1] Do not mix different basis of lubricant without completely purging the system.

[2] For specific applications contact your Spicer representative.

[3] Any vehicle that operates off paved roads more than 10% of the time.

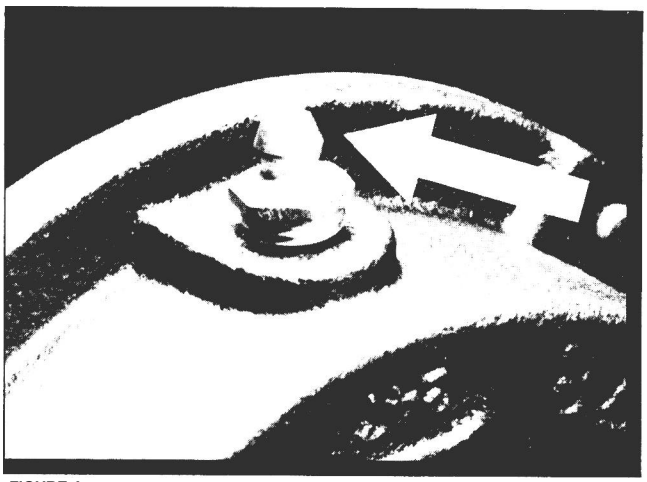


FIGURE 1

APPROVED SOURCES:

Supplier	Product
American Oil Co.	Amoco Lithium-M.P Grease
City Service Co.	Citgo Premium Lithium Grease #2
Fiske Refining Co.	Lubriplate 630-2
Keystone Lubricating Co.	#81 Light
Mobil	Mobilgrease MP
Shell Oil Co.	Retinax A
Atlantic Richfield Co.	Arco M .P.
Texaco	Multifak #2
Humble Oil Co.	Lidok 2
Shell Oil Co.	Alvania #2
* Chevron Oil Co.	S.R.I. #2
* Texaco	Premium RB
* Exxon	Unirex N3

* Approved for vendor prepack, other greases listed are for service only.

LUBRICATION INSTRUCTIONS - WARNING

GREASABLE TYPE

1. The release bearing housing **has not been pre-packed with grease!** It must be lubricated when the clutch is installed in the vehicle or premature failure will occur.
2. Only ***high temperature greases*** should be used. Chassis lube or all purpose lubricants are not recommended.
3. Add lubricant at each chassis lubrication period or more often if service is extreme.

SEALED TYPE

Some models are supplied with a sealed release bearing. These are not equipped with a lube fitting and require no additional grease for the life of the clutch.

DIMENSIONAL CHECKLIST

SUBJECT	EP-1402 14" 2-disc	EP-1552 15 1/2" 2-disc
Minimum Bell Housing Size for Mounting (S.A.E.)	No. 2	No. 2
Pilot Diameter	14.750/14.747	17.156/17.153
Bolt Circle	15.500	16.625
Flywheel Pot Depth	2-15/16	Flat
Clutch Bell to C/L of Release Yoke	3-3/4 (105-C-137 Yoke) 4-3/1 6(105-C-64 Yoke)	3-3/4 (105-C-137 Yoke) 4-3/16 (105-C 64 Yoke)
NEW DISCS ONLY Disc & Ceramic Facing Thickness (Standard) Disc & Ceramic Facing Thickness (Super Duty) Disc & Organic Facing Thickness	 .455/.445 .365/.355 .460/.440	 .455/.445 - .460/.440
NEW l/P ONLY Intermediate Plate Thickness (Standard) Intermediate Plate Thickness (Super Duty) Intermediate Plate Thickness (14" FFW)	 .6300/.6250 .8100/.8050 .8100/.8050	 .7620/.7570 — —
Hub Spline Size (No. splines)	1-3/4-10 2-10	1-3/4-10 2-10
Disc. Assembly Max. Out-of-Flat (feeler gage)	.050	.050
Release Sleeve Bushing Dia. (new)	1.754/1.750 2.010/2.008	1.754/1.750 2.010/2.008
Intermediate Plates, driving lugs to slot clearance (new min.)	.006	.006
Intermediate Plates, driving lugs to slot clearance (max. worn)	.020	.020
Pressure Plates, driving lugs to slot clearance (new min.)	.003	.003
Pressure Plates, driving lugs to slot clearance (max. worn)	.020	.020
Intermediate Plates & Pressure Plates: Out-of-Flat	.000 to .004 Concave	.000 to .004 Concave
Pin Separator Gap (New)	—	.037/.023
Clutch Brake-Torque Limiting torque to rotate	35/12 lb.ft.	35/12 lb.ft.
Maximum Engine RPM	3300	2600

(All dimensions are shown in inches)

POOR CLUTCH RELEASE OR POOR ENGAGEMENT

Probable cause	Correction
1. Clutch adjustment not correct.	1. Recheck adjustment per instructions,
2. Flywheel pilot bearing too tight in flywheel or on end of drive gear.	2. Free pilot bearing with a light push. If bearing is rough, replace it.
3. Siezed pilot bearing.	3. Replace bearing.
4. Non-Functioning clutch brake.	4. Review adjustment procedures. Assure torque to rotate is 12-35 Ib.ft.
5, Damaged clutch release bearing.	5. Replace bearing. If bearing is grease type is installed, lubricate with recommended lube.
6. Clutch release yoke cross shaft projecting through release yoke,	6. Relocate release shaft so that it does not protrude. Check bell housing bushings and release yoke for wear. Lubricate bushing.
7. Release yoke contacting cover assembly at full release position.	7. Replace release yoke with proper yoke and/or adjust linkage for proper travel. Inspect transmission bearing cap for excessive wear.
8. Release yoke not aligned properly with release bearing.	8. Check flywheel. Probably has been resurfaced more than the .060" recommended.
9. Intermediate plate sticking on drive pins (EP-1402 only)	9. Check that drive pins are 90° square to flywheel surface and that there is minimum .006" clearance between drive pins and intermediate plate slots.
10. Intermediate plate binding. (15 1/2" OR 14" FFW)	10, Check that there is minimum .006" clearance between drive lugs and intermediate plate slots.
11, Pressure plate not retracting.	11, Check pressure plate drive lugs for .003" clearance. a. Check pressure plate return springs. b. Check amount of release travel, c. Internal lever nose out of groove.
12. Worn splines on drive gear of transmission.	12, Check drive gear and driven disc hubs for excess wear. Replace if necessary.
13. Disc facings gummed with oil or grease.	13, Replace disc. Cleaning not recommended. Check for leak causing contamination.
14. Broken intermediate plate.	14. Replace entire intermediate plate/driven disc assembly. Damage such as this is almost always caused by abusive use of clutch.
15. Hub and input shaft interference.	15. Check for rust, corrosion, burrs, etc.
16. Improper setting of pin separator (15 1/2" or 14" FFW clutches)	16. Lightly tap each of the four separator pins in the intermediate plate so they contact the flywheel. See page 15, step 12.
17. Bent driven disc.	17. Replace driven disc.

CLUTCH SLIPPING

Probable cause	Correction
1. No free pedal	1. Re-adjust per instructions.
2. Release mechanism binding	2. Check release mechanism and linkage. Lube if necessary.
3. Worn clutch facings	3. Replace complete disc and check opposing surfaces.
4. Grease or oil on facings	4. Replace driven discs.
5. Overloaded clutch	5. Check to assure that proper clutch has been specified for application.

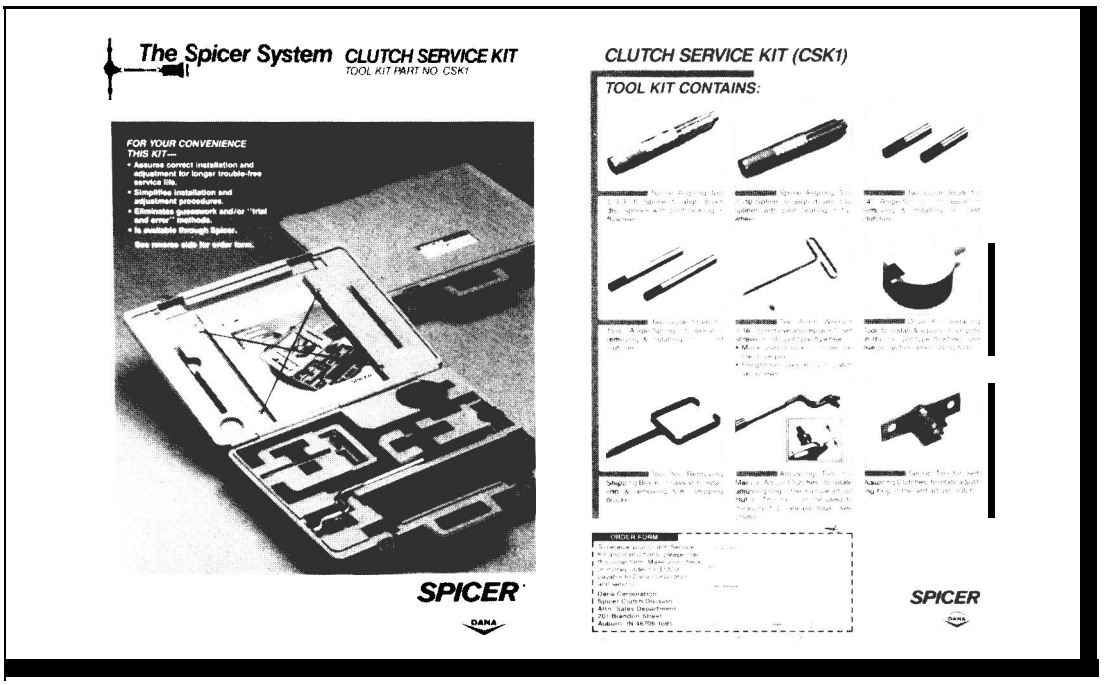
NOISY CLUTCH

Probable cause	Correction
1. Clutch release bearing dry or damaged.	1. Lubricate bearing or replace.
2. Flywheel pilot bearing dry or damaged.	2. Replace bearing.
3. Clutch release yoke striking flywheel ring.	3. Adjust clutch. Also check wear on cross shafts, bell housing bushings and release yoke fingers. Replace if necessary.
4. Improper clearance between drive slots and drive lugs on pressure plates or intermediate plates.	4. Clearance should be no more than .020" on either component.
5. Gear rattle - free travel.	5. Specify correct disc.
6. Clutch disc damper interfering with flywheel mounting bolts.	6. Replace worn driven discs. Ensure correct height on flywheel bolt head. Ensure discs are installed in correct positions.

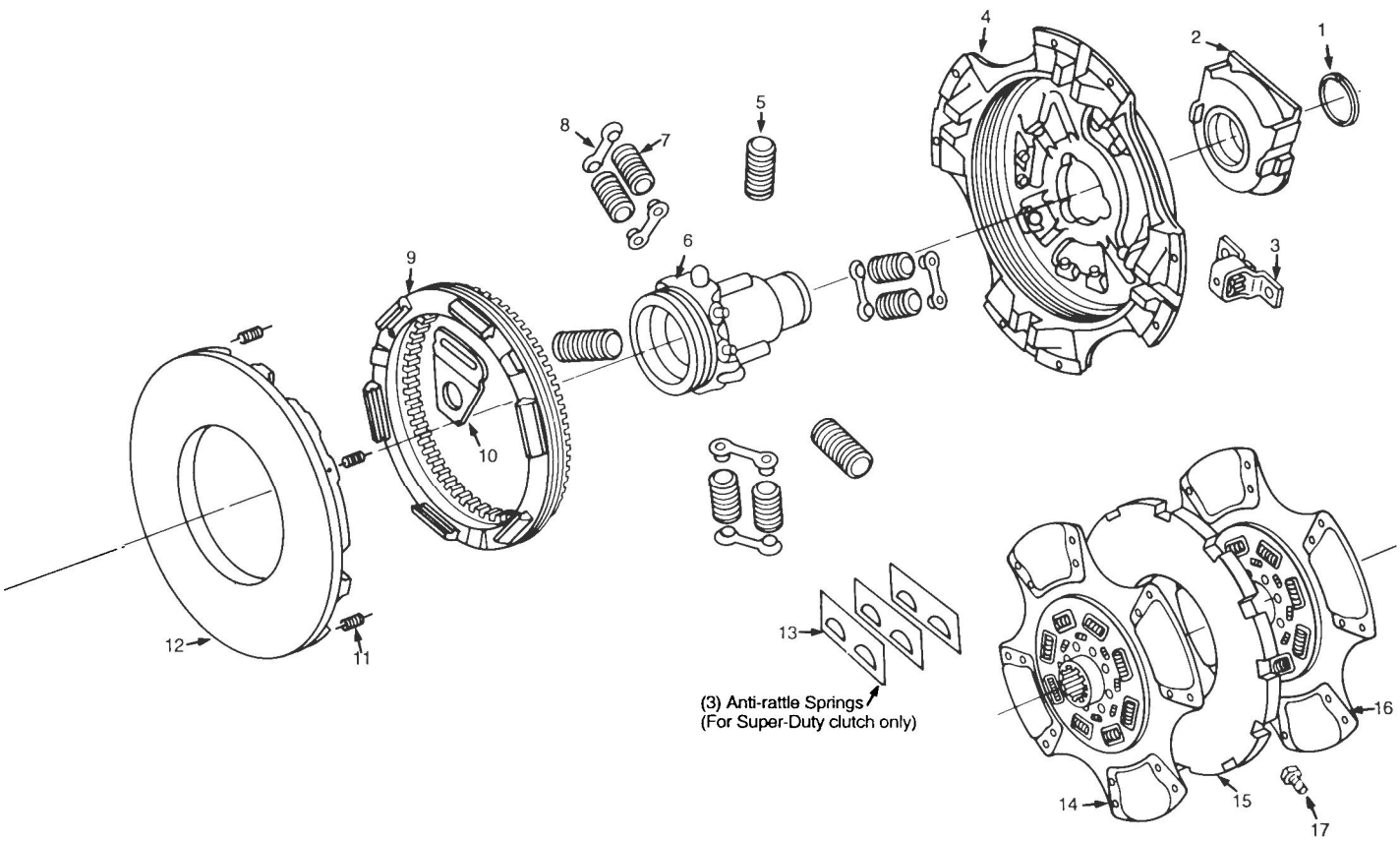
Helpful Hints to Operate Vehicles With Ceramic Clutch facings

1. Driver must start vehicle in first gear.
2. Ceramic facings slip-period is shorter than organic facings.
3. While operating a ceramic clutch the driver has to engage the clutch before giving the engine any fuel (engine at idle)
4. If driver tries to slip ceramic clutch facings by raising R.P.M.'s with accelerator and riding or feathering clutch pedal, the vehicle will experience erratic engagement.

SPICER CSK-1 TOOL KIT

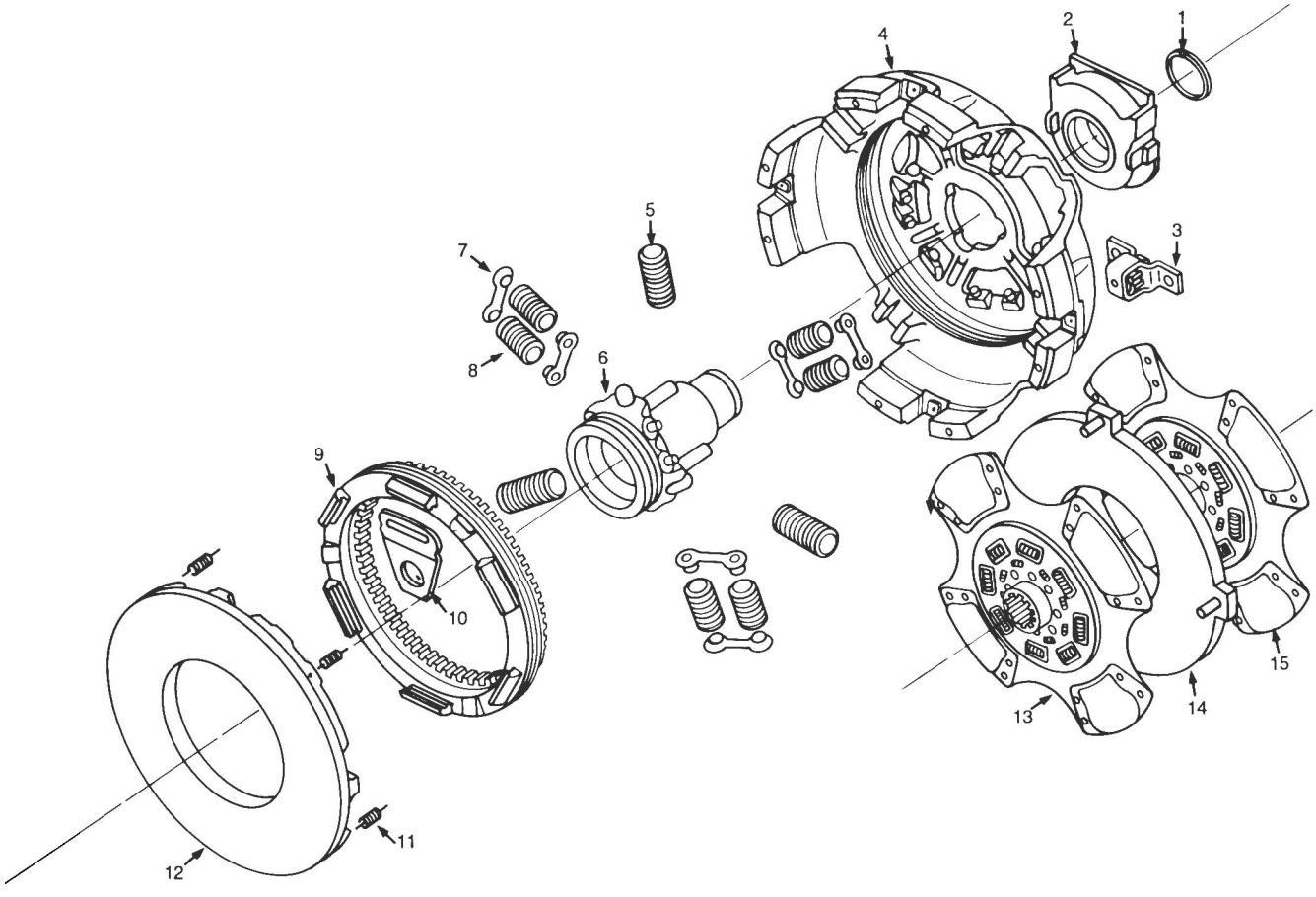


Call-out No.	No. Req'd	Part Name
1	(1)	Snap Ring
2	(1)	Release Bearing Assembly
3	(1)	Kwik-Adjust
4	(1)	Flywheel Ring
5	(3)	Assist Springs
6	(1)	Release Sleeve and Bushing Assembly
7	(6)	Pressure Springs
8	(6)	Spring Pivot
9	(1)	Adjusting Ring
10	(6)	Lever
11	(4)	Return Spring
12	(1)	Pressure, Plate
13	(3)	Anti-Rattle Springs (Super Duty Only)
14	(1)	Front Disc Assembly
15	(1)	Intermediate Plate
16	(1)	Rear Disc Assembly
17	[6)	Drive Pin



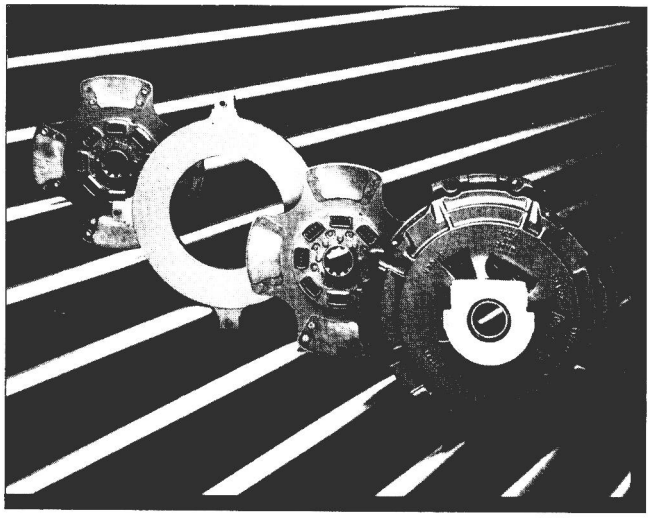
PARTS LIST
15 1/2" EASY-PEDAL™ CLUTCHES

Call-out No.	No. Req'd	Part Name
1	(1)	Snap Ring
2	(1)	Release Bearina Assemblv
3	(1)	Kwik-Adjust
4	(1)	Flywheel Ring
5	(3)	Assist Springs
6	(1)	Release Sleeve and Bushing Assembly
7	(6)	Spring Pivat
8	(6)	Pressure Springs
9	(1)	Adjusting Ring
10	(6)	Lever
11	(4)	Return Spring
12	(1)	Pressure Plate
13	(1)	Front Driven Disc Assembly
14	(1)	Intermediate Plate With Positive Pin Separator
15	(1)	Rear Driven Disc Assembly



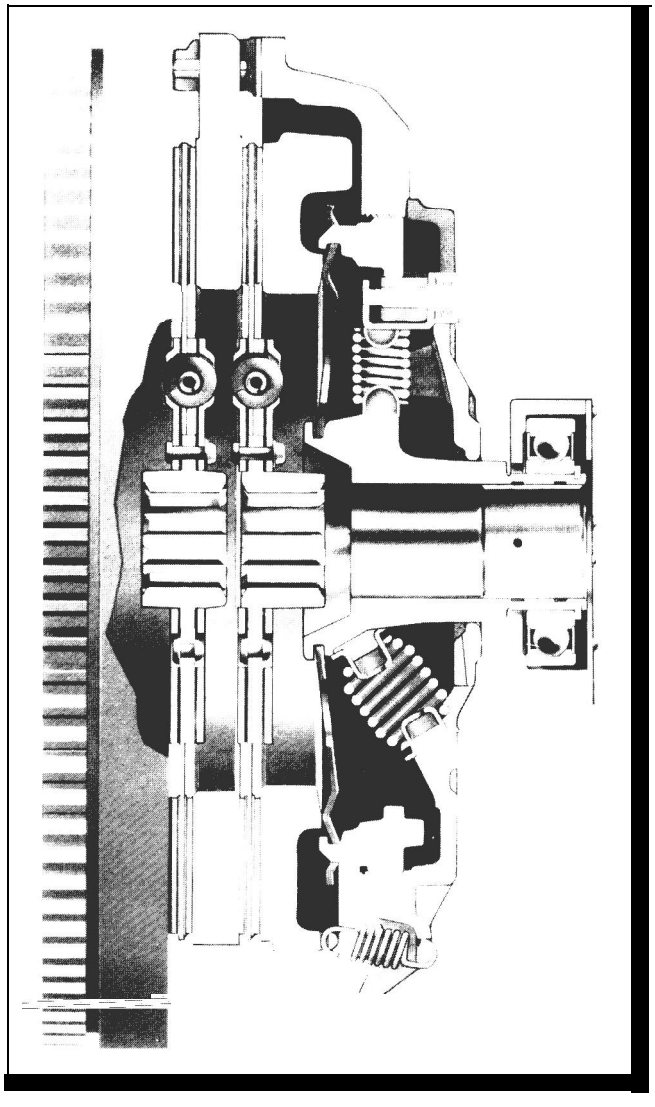
Spicer offers a 14' cast iron Flat Flywheel Clutch that will fit the same flywheel as existing 15 1/2" clutches. Only the Spicer 14" Flat Flywheel Clutch offers the following benefits:

- Mfimum engine torque rating of 1400 lb. ft.
- Improved ventilation and heat dissipation over pot type clutches.
- Standardizes flywheels of fleets (whether 14" or 151 /2").
- Greater heat sink—thicker pressure plate and intermediate plate are able to absorb more heat.
- Best possible engagement characteristics through the use of the ceramic Super Buttons.
- Lug Drive.
- Spice@ Angle-Spring design/reliability.
- Positive Separator



Note: This clutch comes with 14" dampened ceramic super-duty discs which cannot be mixed or matched with other discs.

For installing procedures: refer to page 13 under the caption; Installation of a 15 1/2" clutch.



Spice® 14" Flat Flywheel Clutch easily mounts to 15 1/2" flywheel, without alterations.

NOTES

SpiceP Angle Spring Patents

U.S. Patent 4,760,906 & 4,936,432 (Easy-Pedal Angle-Spring Concept)
U.S. Patent 4,549,643 (Wear Compensator)
U.S. Patent 4,034,836 & 4,157,749 (Knife-Edge Levers)
U.S. Patent 4,254,855 (Co-axial Damper)
U.S. Patent 4,762,215 (Torque-Limiting Clutch Brake)
U.S. Patent 4,565,274 (Ceramic Super Button)

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1-800-666-8688

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