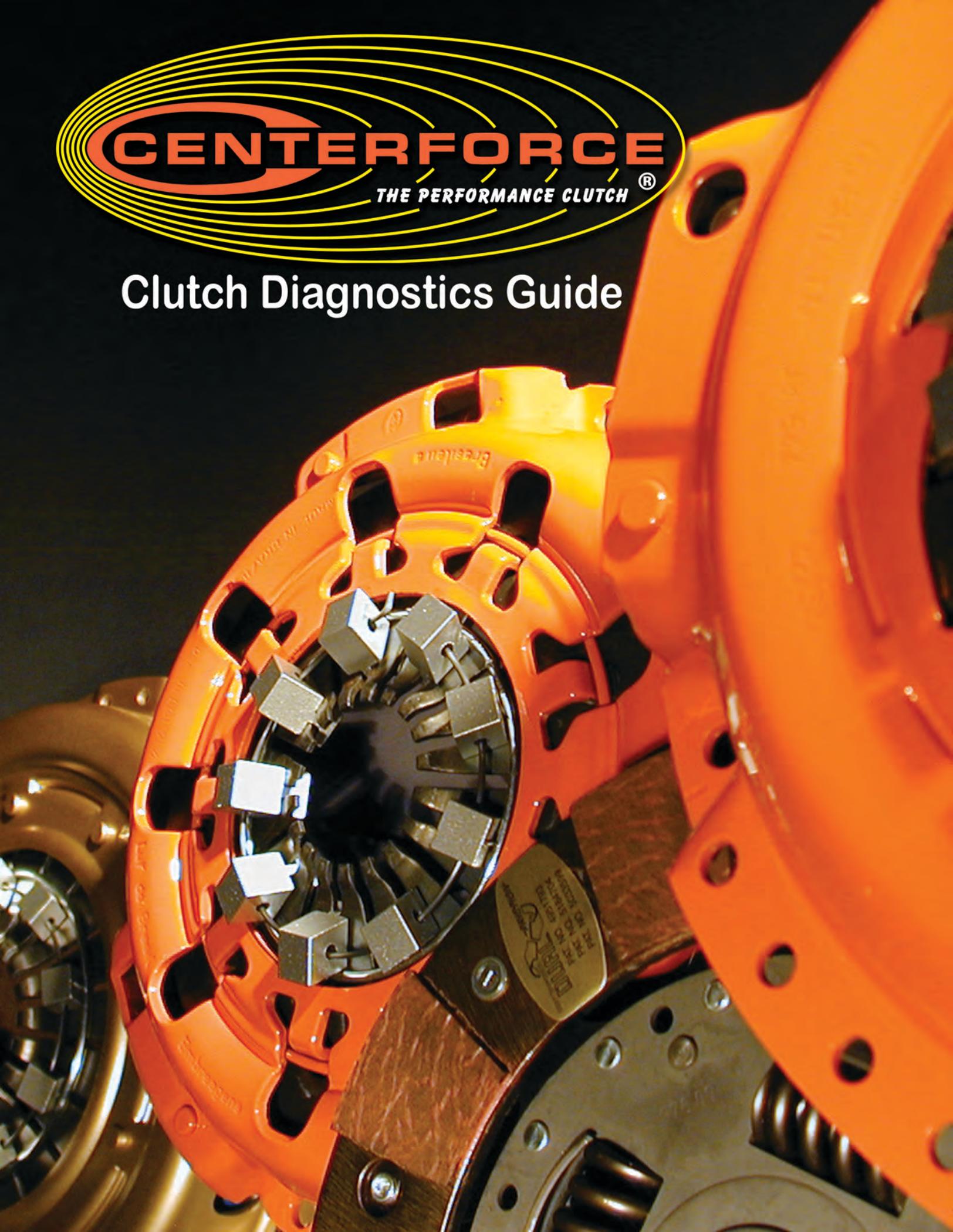




Clutch Diagnostics Guide



INTRODUCTION: Clutch Diagnostics & Installation Guide

Centerforce®, the leader in street performance clutches and flywheels, brings you this helpful clutch diagnostics and installation guide. This compilation of clutch assembly diagnostics helps the reader to determine the cause of improper operation or failure of a clutch assembly. This guide also provides helpful hints and installation tips essential for proper clutch assembly operation and performance.

This guide informs the customer/installer of potential causes to common clutch assembly problems or failures. We stress that it is imperative to ask the initial question—Why is the clutch assembly being replaced? All too often clutch assemblies are replaced without first determining the cause of the clutch assembly failure. Centerforce is determined to provide the customer with the highest quality clutch and flywheel components, including the best technical assistance. This guide will help you figure out what is wrong and direct you how to properly begin correcting a problem.

Please read this guide carefully! This guide will provide awareness of common examples and is for reference only. This guide will not solve every clutch related problem, but will give insight towards remedying common problems. There are many instances where compounded issues may cause a clutch assembly failure or poor performance. Direct any questions or concerns to a technical representative at Centerforce by calling **(928)771-8422.**

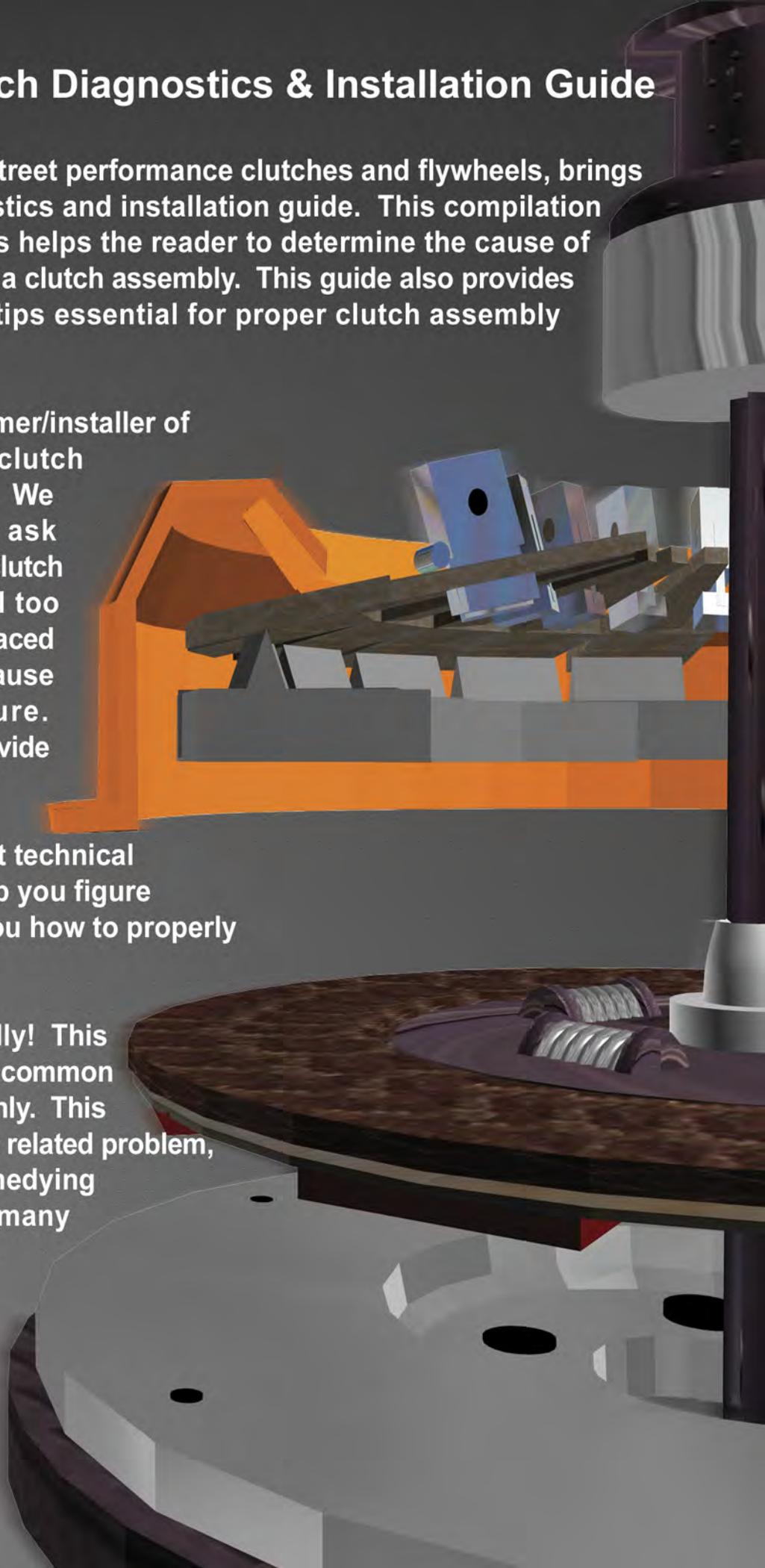


Table of Contents

| | |
|--|--------------|
| How to Use this Diagnostics Guide | 2 |
| Pressure Plate Diagnostics | 3-5 |
| Clutch Disc Diagnostics | 6-10 |
| Throw Out Bearing Diagnostics | 11 |
| Things to Notice about Centerforce Products | 12 |
| Installation Tips | 13-14 |
| Frequently Asked Questions | 15-21 |
| Glossary of Terms | 22-23 |

How to Use this Diagnostics Guide

This clutch diagnostics guide will help determine the cause of several known clutch failures. Please read all the diagnostics before concluding the cause of a clutch failure. Often, compounding problems will cause a clutch to fail. Keep the following questions in mind:

1. What is the reason for the replacement of the clutch assembly?
2. What types of symptoms were occurring in the vehicle?
3. What changes were made to the vehicle prior to or with the installation of the failed clutch component or assembly?
4. Was the clutch assembly installation performed properly and in accordance with the vehicle's factory service manual?
5. Has the clutch component or assembly failed in the same manner before?

Please direct questions about this guide or determining the cause of a clutch failure to a Centerforce technical representative at www.centerforce.com or 928/771-8422.

Pressure Plate Overheated— Severe Hot Spots

Symptoms:

- Clutch slips—does not hold vehicle power
- Clutch judders (chatters)
- Clutch wore out prematurely

Possible Causes:

- Improper break-in procedure
- Clutch excessively preloaded—improper adjustment
- Excessive slipping from driving style



Solutions:

- ✓ Replace clutch assembly¹
- ✓ Inspect & resurface flywheel—replace if necessary¹
- ✓ Adjust clutch pedal freeplay
- ✓ Follow proper break-in procedure
- ✓ Evaluate driving style

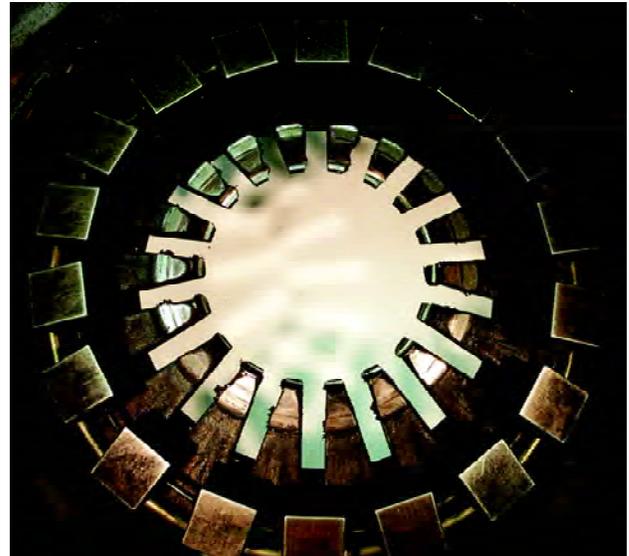
Worn Diaphragm Spring Fingers on Pressure Plate

Symptoms:

- Difficult clutch engagement or disengagement—difficult shifting
- Difficulty adjusting clutch pedal freeplay
- Clutch slips—does not hold vehicle power
- Clutch wore out prematurely

Possible Causes:

- Improperly installed throw out bearing
- Clutch excessively preloaded—improper adjustment



Solutions:

- ✓ Replace throw out bearing with correct part & install properly
- ✓ Inspect transmission guide tube & bearing collar for wear--repair or replace if necessary
- ✓ Adjust clutch pedal freeplay
- ✓ Replace clutch assembly¹
- ✓ Inspect & resurface flywheel—replace if necessary¹

1. Due to the nature of this failure, Centerforce shall not be held accountable for the repair or replacement of any parts associated with the failure. All parts manufactured by Centerforce may be returned, with proper authorization, to Centerforce for examination.

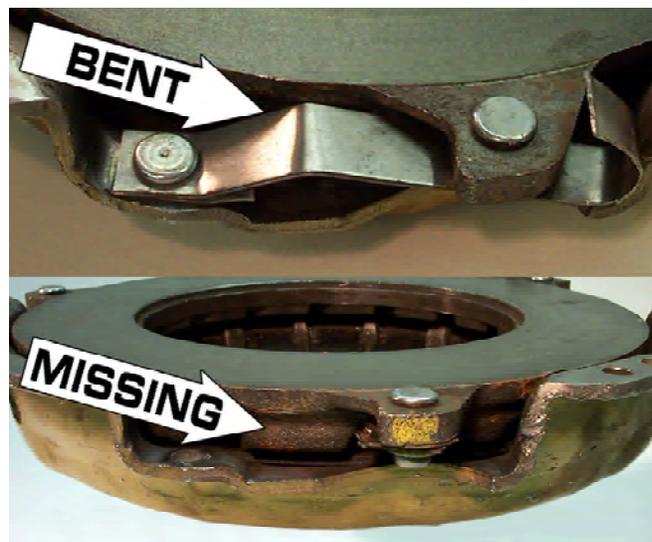
Pressure Plate Drive Strap(s) Bent / Broken / Missing

Symptoms:

- ❑ Difficult clutch engagement or disengagement—difficult shifting
- ❑ Noise from clutch

Possible Causes:

- Abusive downshifting
- Using clutch as a brake to slow vehicle
- Missed shifts



Solutions:

- ✓ Replace clutch assembly¹
- ✓ Inspect & resurface flywheel—replace if necessary¹
- ✓ Evaluate driving style—avoid abusive downshifting

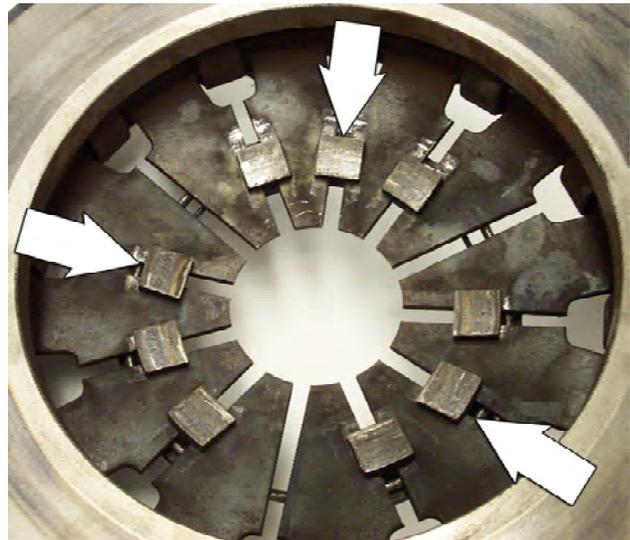
Diaphragm Spring Fingers Over-traveled—Hitting Clutch Disc

Symptoms:

- ❑ Clutch slips—does not hold vehicle power
- ❑ Difficult clutch engagement or disengagement—difficult shifting
- ❑ Clutch wore out prematurely
- ❑ Noise from clutch

Possible Causes:

- Clutch excessively preloaded—improper adjustment
- Improper pressure plate and clutch disc combination
- Improper flywheel step / cup dimension



Solutions:

- ✓ Replace clutch assembly¹
- ✓ Inspect & resurface flywheel—replace if necessary¹
- ✓ Adjust clutch pedal freeplay

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Pressure Plate Improperly Balanced

Symptoms:

- Vibration from engine / transmission / shifter
- Centerforce weight system shifted off center

Possible Causes:

- Improper flywheel counterbalance
- Improper hardware
- Clutch improperly balanced
- Flywheel improperly balanced



Solutions:

- ✓ Verify flywheel counterbalance, if equipped
- ✓ Use proper hardware—shouldered bolts or locating dowel pins to retain pressure plate to flywheel
- ✓ Replace clutch assembly¹
- ✓ Inspect, resurface & balance flywheel—replace if necessary¹

Pressure Plate Bent

Symptoms:

- Pressure plate won't bolt evenly to flywheel
- Difficult clutch engagement or disengagement—difficult shifting
- Clutch judders (chatters)

Possible Causes:

- Pressure plate dropped
- Improper flywheel step / cup dimension
- Improper hardware used to fasten pressure plate to flywheel
- Debris between pressure plate and flywheel



Solutions:

- ✓ Replace clutch assembly¹
- ✓ Inspect & resurface flywheel—replace if necessary¹
- ✓ Use proper hardware—torque bolts to factory specification
- ✓ Clean surfaces prior to installation

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Clutch Disc Hub Springs Loose / Missing

Symptoms:

- ❑ Noise from clutch
- ❑ Difficult clutch engagement or disengagement—difficult shifting

Possible Causes:

- Clutch disc installed improperly
- Transmission misalignment
- Abusive upshifting / downshifting
- Worn or missing pilot bearing / bushing



Solutions:

- ✓ Replace clutch disc—install properly
- ✓ Inspect & resurface flywheel—replace if necessary
- ✓ Inspect pilot bearing / bushing—replace if necessary
- ✓ Evaluate driving style—avoid abusive shifting

Clutch Disc Hub Splines Worn Excessively / Hub Spring Pack Cracked

Symptoms:

- ❑ Noise from clutch
- ❑ Difficult clutch engagement or disengagement—difficult shifting
- ❑ Rapid pilot bearing / bushing wear

Possible Causes:

- Transmission / Bellhousing misalignment
- Transmission hung on clutch disc by input shaft during installation
- Worn or missing pilot bearing / bushing



Solutions:

- ✓ Check transmission & bellhousing alignment
- ✓ Inspect input shaft for wear
- ✓ Replace clutch disc¹
- ✓ Replace pilot bearing / bushing
- ✓ Support transmission when installing

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Clutch Disc Oil Contaminated

Symptoms:

- Clutch judders (chatters)
- Clutch slips—does not hold vehicle power
- Clutch wore out prematurely

Possible Causes:

- Oil leak from engine or transmission



Solutions:

- ✓ Repair oil leak
- ✓ Thoroughly clean bellhousing & release components
- ✓ Replace clutch assembly¹
- ✓ Inspect & resurface flywheel—replace if necessary¹

Clutch Disc Overheated / Abused

Symptoms:

- Clutch won't release
- Clutch judders (chatters)
- Clutch slips
- Clutch vibrates
- Clutch wore out prematurely

Possible Causes:

- Excessive engine power
- Improper break-in procedure
- Clutch excessively preloaded—improper adjustment



Solutions:

- | | |
|--|---|
| <ul style="list-style-type: none"> ✓ Adjust clutch pedal freeplay ✓ Replace clutch with upgraded clutch assembly¹ | <ul style="list-style-type: none"> ✓ Inspect & resurface flywheel—replace if necessary¹ ✓ Follow proper break-in procedure ✓ Evaluate driving style |
|--|---|

1. Due to the nature of this failure, Centerforce shall not be held accountable for the repair or replacement of any parts associated with the failure. All parts manufactured by Centerforce may be returned, with proper authorization, to Centerforce for examination.

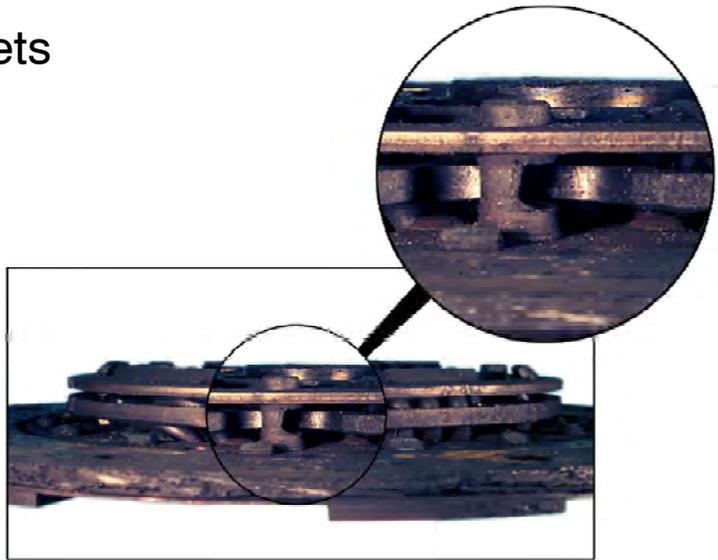
Clutch Disc Drive Stop Rivets Abused / Worn / Broken

Symptoms:

- Clutch wore out prematurely
- Noise from clutch

Possible Causes:

- Abusive downshifting / upshifting
- Side-step launch of vehicle



Solutions:

- ✓ Replace clutch assembly¹
- ✓ Inspect & resurface flywheel—replace if necessary¹
- ✓ Evaluate driving style—avoid using clutch to slow vehicle and abusive launching

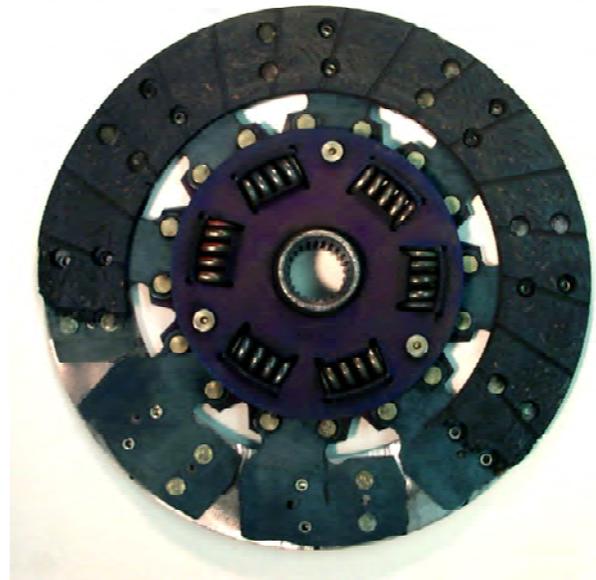
Clutch Disc Friction Material Cracked / Broken / Missing

Symptoms:

- Clutch slips—does not hold vehicle power
- Difficult clutch engagement or disengagement—difficult shifting
- Noise from clutch

Possible Causes:

- Abusive downshifting / upshifting
- Side-step launch of vehicle
- Improper break-in procedure
- Missed shifts



Solutions:

- ✓ Replace clutch with upgraded clutch assembly
- ✓ Inspect & resurface flywheel—replace if necessary¹
- ✓ Follow proper break-in procedure
- ✓ Evaluate driving style—avoid abusive shifting & launching

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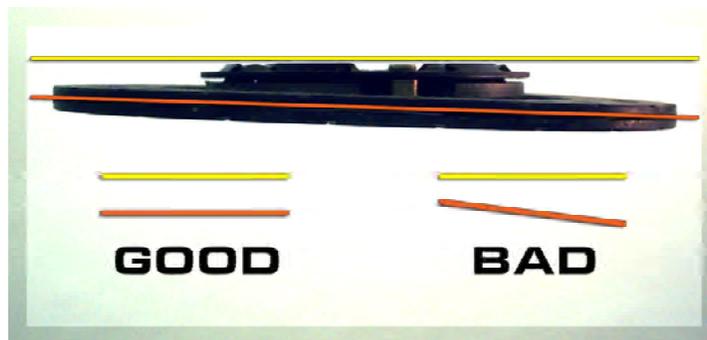
Clutch Disc Bent

Symptoms:

- ❑ Difficult clutch engagement or disengagement—difficult shifting
- ❑ Noise from clutch

Possible Causes:

- Clutch disc installed incorrectly
- Transmission hung on clutch disc by input shaft during installation
- Part damaged during shipping



Solutions:

- ✓ Replace clutch disc¹
- ✓ Inspect pressure plate—replace if wear is found¹
- ✓ Evaluate transmission installation—support transmission during installation

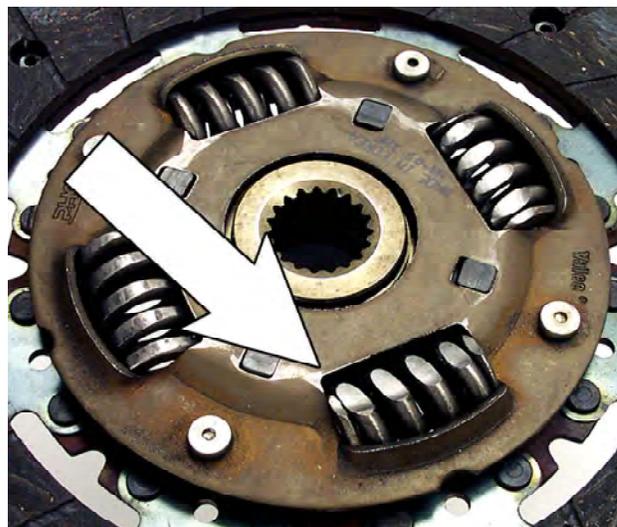
Clutch Disc Hitting Flywheel or Flywheel Bolts

Symptoms:

- ❑ Difficult clutch engagement or disengagement—difficult shifting
- ❑ Noise from clutch
- ❑ Hub spring(s) loose in clutch disc
- ❑ Difficulty adjusting clutch pedal freeplay

Possible Causes:

- Clutch disc installed backwards
- Flywheel bolts improper—head of bolt too large
- Flywheel worn—improper resurfacing or too thin



Solutions:

- ✓ Replace clutch disc¹
- ✓ Inspect pressure plate—replace if wear is found¹
- ✓ Inspect flywheel crankshaft bolts—replace if wear is found or head is too large
- ✓ Inspect flywheel—replace if improperly dimensioned¹

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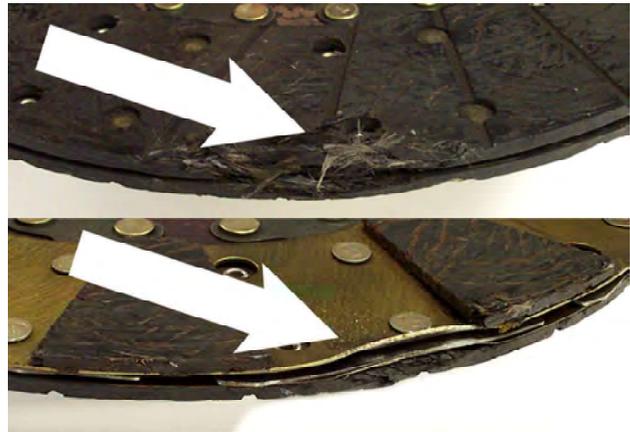
Clutch Disc Friction Material Chipped / Bent

Symptoms:

- ❑ Difficult clutch engagement or disengagement—difficult shifting
- ❑ Clutch slips—does not hold vehicle power
- ❑ Noise from clutch

Possible Causes:

- Clutch disc dropped during installation or removal
- Clutch disc not installed using alignment tool



Solutions:

- ✓ Replace clutch disc¹
- ✓ Use care when installing or removing clutch disc

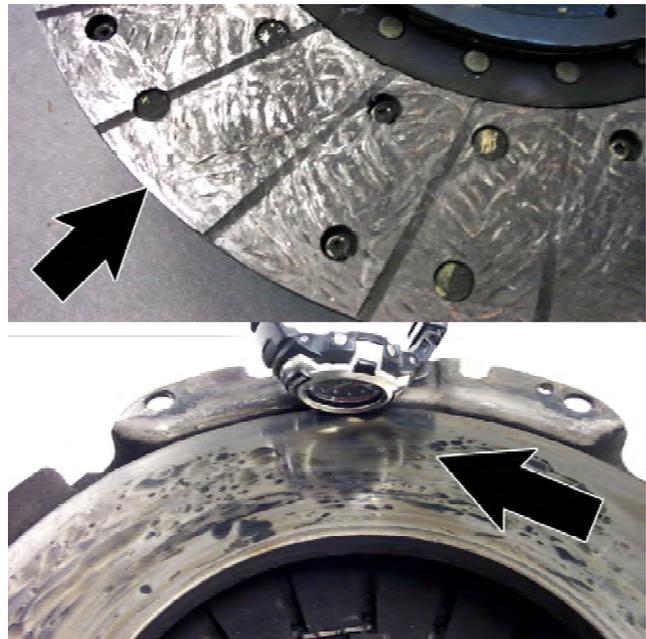
Clutch Assembly Glazed

Symptoms:

- ❑ Clutch slips—does not hold vehicle power
- ❑ Clutch wore out prematurely

Possible Causes:

- Improper break-in procedure
- Clutch excessively preloaded—improper adjustment
- Excessive slipping from driving style
- Oil leak from engine or transmission



Solutions:

- ✓ Repair oil leak—if necessary
- ✓ Thoroughly clean bellhousing & release components
- ✓ Replace clutch assembly¹
- ✓ Inspect & resurface flywheel—replace if necessary¹
- ✓ Adjust clutch pedal freeplay
- ✓ Follow proper break-in procedure
- ✓ Evaluate driving style

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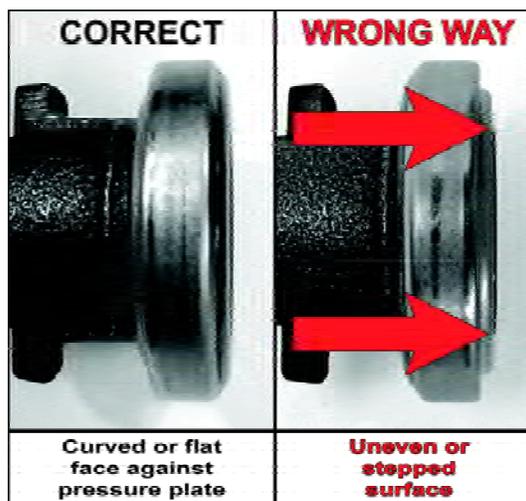
Throw Out Bearing Installed Backwards

Symptoms:

- Noise from throw out bearing
- Hard and/or pulsating clutch pedal
- Difficult clutch engagement or disengagement—difficult shifting

Possible Causes:

- Bearing installed incorrectly



Solutions:

- ✓ Replace throw out bearing—install correctly¹
- ✓ Inspect pressure plate—replace if wear is found¹
- ✓ Inspect transmission guide tube & bearing collar for wear—repair or replace if necessary

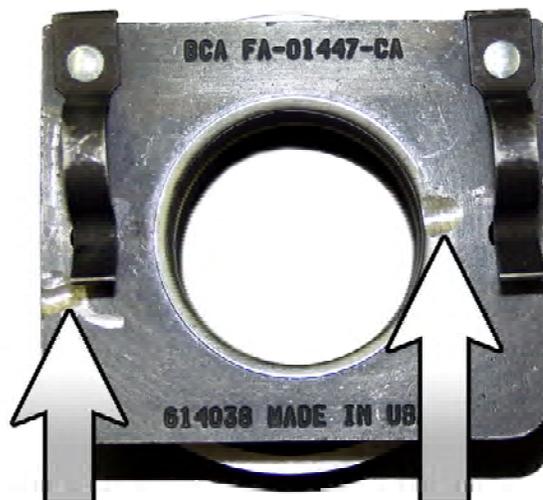
Throw Out Bearing and/or Clutch Fork Improperly Installed

Symptoms:

- Hard and/or pulsating clutch pedal
- Noise from throw out bearing
- Difficult clutch engagement or disengagement—difficult shifting

Possible Causes:

- Fork and/or bearing installed incorrectly
- Clutch excessively preloaded—improper adjustment
- Clutch release linkage worn or damaged



Fork not located on collar properly

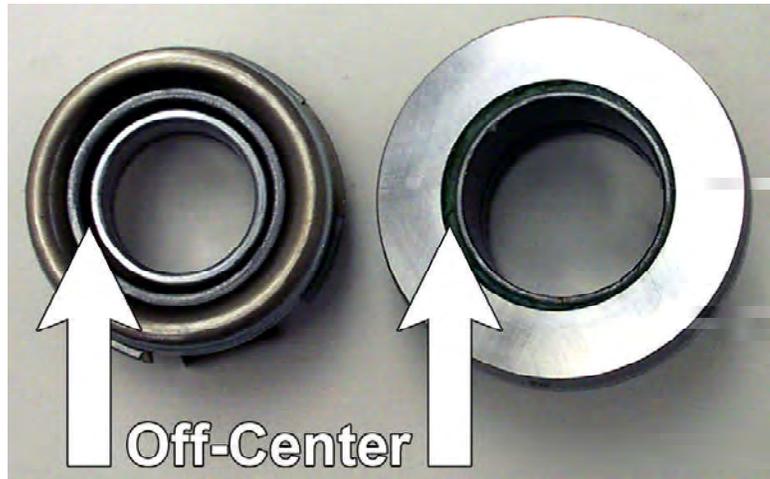
Solutions:

- ✓ Inspect throw out bearing for wear—replace if wear is found
- ✓ Inspect transmission input shaft collar for wear—replace if wear is found
- ✓ Inspect pressure plate diaphragm fingers—replace if wear is found
- ✓ Install clutch fork / throw out bearing correctly
- ✓ Adjust clutch pedal freeplay
- ✓ Inspect clutch release linkage—replace if wear is found

1. Due to the nature of this failure, Centerforce shall not be held accountable for the repair or replacement of any parts associated with the failure. All parts manufactured by Centerforce may be returned, with proper authorization, to Centerforce for examination.

Things to Notice About Centerforce Products

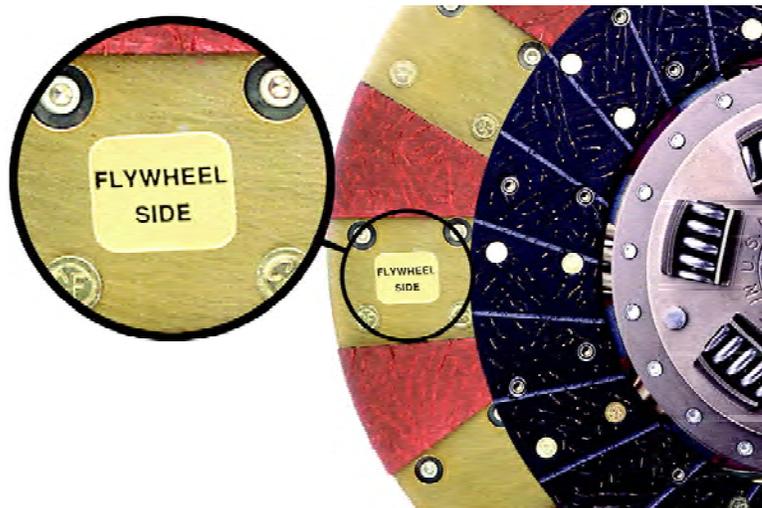
Self-Aligning Throw Out Bearings may not look like the collar and face are aligned. This is not a defect. The face will align with the clutch assembly once the pedal has been cycled several times.



Centrifugal Weight System is designed to provide the clutch with increased holding capacity as RPM increase. Do not remove the system from the clutch assembly.



Dual Friction clutch assembly is designed to provide a positive engagement with daily drivability. Install the Dual Friction disc with side indicating "Flywheel Side" against the flywheel (typically the segmented or puck style facing as shown.)



****Please contact a Centerforce technical representative if you have any questions about this page at 928/771-8422.***

Installation Tips

- ✓ *It is a good idea to obtain the vehicle's factory supplied service manual to provide awareness of special procedures or tools required (i.e. bolt torque specs, pedal freeplay adjustment) for the removal and installation of the clutch & flywheel assembly.*
- ✓ *Before attempting installation, check to ensure all necessary replacement parts are in hand such as a throw out bearing, pilot (clutch alignment) tool, replacement bolts, etc. Always replace the throw out bearing and pilot bearing / bushing and properly lubricate the mating surfaces.*
- ✓ *Always replace both the pressure plate and clutch disc with new components. Never combine a worn pressure plate with a new clutch disc or vice versa.*
- ✓ *Compare clutch components removed from vehicle with new Centerforce components, especially the mounting hole locations. In some cases, your new Centerforce assembly may not look exactly like the removed clutch assembly or the assembly depicted on the packaging. If you have any questions, please call a Centerforce technical representative at 928/771-8422.*
- ✓ *Always check the new clutch disc for proper fitment on the transmission input shaft prior to installation. Ensure the input shaft splines are free of wear and twisting.*
- ✓ *Replace any worn components such as input shaft collars, clutch forks, slave / master cylinders, etc.*
- ✓ *Always properly resurface or replace the flywheel. Resurfacing of a flywheel with any other device than a dedicated flywheel resurfacing machine is not recommended.*
- ✓ *Always clean the surfaces of the pressure plate and flywheel with brake parts cleaner or acetone before installing.*
- ✓ *Install the clutch disc with the side indicating "Flywheel Side" against the flywheel. If your clutch disc does not have a decal indicating which side of the clutch disc is the flywheel side, please contact a Centerforce technical representative at 928/771-8422.*

Installation Tips

- ✓ *Always use a pilot tool to align the clutch disc to the pressure plate and flywheel. Failure to use a pilot tool to align the clutch disc could result in damage to the disc during installation of the transmission.*
- ✓ *Always torque all hardware to factory specifications. Replace hardware if it is worn or if the factory service manual recommends replacement.*
- ✓ *Always utilize the proper hardware (shouldered bolts, dowel pins, etc) to affix the pressure plate to the flywheel and the flywheel to the crankshaft. Failure to do so could result in a vibration, improper clutch operation or clutch failure.*
- ✓ *Do not allow any petroleum based products to contaminate the clutch disc friction material. If contaminated, the disc may cause clutch judder, slippage, premature wear, or improper clutch operation.*
- ✓ *Do not mix Centerforce products with other non-Centerforce products because it will void the warranty. Using a non-Centerforce product with a Centerforce product may cause improper clutch operation, premature wear or clutch failure. Please contact a Centerforce technical representative if you have any questions or concerns at 928/771-8422.*
- ✓ *Do not attempt to balance any Centerforce pressure plate component that has the centrifugal weight system. Balancing of the pressure plate is not required. Please contact a Centerforce technical representative if you have any questions or concerns at 928/771-8422.*
- ✓ *Do not remove the centrifugal weight system, if equipped, from your Centerforce pressure plate. The weight system is designed to provide increased holding capacity with increasing RPM.*
- ✓ *Follow the required break in procedure for your new Centerforce clutch assembly. It is necessary to ensure proper seat-in of the friction material, full performance and proper heat cycling. Failure to do so may result in premature wear, decreased holding capacity, improper clutch operation and will void the warranty.*

Frequently Asked Questions

Which Centerforce clutch system is best for my vehicle?

It is important to match the proper Centerforce clutch system with the vehicle and its intended use.

To answer the question properly, several things must be taken into consideration:

1. What is the vehicle's make, model, year and engine size?
2. What is the vehicle used for?
 - a. Daily driving
 - b. Weekend driving
 - c. Off road
 - d. Competition use
 - e. A combination of the above
3. What types of changes have been made to the vehicle?
 - a. Is the engine stock or has it been modified?
 - i. If the engine has been modified, to what extent?
 1. High flow air filter
 2. Remapped engine control unit (ECU)
 3. Exhaust modifications
 4. Superchargers
 5. Nitrous
 - ii. Have any driveline changes been made?
 1. Different tire sizes
 2. Different gear ratios
 - iii. Has any extra equipment (weight) been added to the vehicle?
 1. Camper
 2. Winch
 3. Tube bumper
 4. Roll cage

Please contact a Centerforce technical representative if you have any questions or concerns regarding a suitable Centerforce clutch system for your vehicle at 928/771-8422.

What is necessary to properly install my new Centerforce clutch?

All patented Centerforce clutches are designed to be a direct bolt-in high performance clutch system requiring no special modifications for installation.

How long can I expect my new Centerforce clutch to last?

All patented Centerforce products are designed with longevity in mind. However, clutch life will greatly depend on the vehicle, the type of driving and vehicle's modifications. For example, a vehicle driven in heavy stop-and-go traffic will have a shorter service life than the same vehicle that is driven on the open highway. Trucks with oversized tires will typically obtain less service life than if equipped with stock sized tires.

**Note: appropriate final drive gear ratio changes are necessary and will greatly aid driveline longevity (including the clutch) on vehicles carrying heavy loads or using oversized diameter tires.*

Frequently Asked Questions

Will a Centerforce clutch increase my pedal effort causing damage to my cable, hydraulics or mechanical linkage?

All patented Centerforce clutch assemblies will not cause damage to any of the vehicle's engine or clutch release components. Centerforce clutch assemblies exhibit a stock pedal feel and any increases would be unrecognizable.

What type of flywheel is best recommended for my application?

The patented Centerforce clutch system does not require using a special type of flywheel. The Centerforce friction materials are designed for use with the stock flywheel, aftermarket steel billet (or nodular) flywheels, or aluminum flywheels with steel insert heat shields. However, Centerforce does not recommend the use of aluminum flywheels for street use. If you are replacing your stock OEM flywheel, be sure the new flywheel meets the same specifications such as ring gear tooth count, flywheel thickness, ring gear offset, etc. All Centerforce flywheels are designed to meet standard OEM specifications and are SFI approved.

Does Centerforce require the flywheel to be resurfaced before installing a new clutch?

Yes. Flywheels are subject to heat, scoring and warping during use just like brake rotors and drums. Therefore, the flywheel should always be properly resurfaced or replaced to assure good clutch performance. Resurfacing must be performed on a qualified flywheel grinding machine. Centerforce does not recommend resurfacing flywheels on a lathe or a blanchard grinder. Also, be aware that using a hand-held electric or pneumatic grinder/sander or scuffing the surface with sandpaper does not constitute a properly resurfaced flywheel. Refer to your factory service manual for specifics on your vehicle regarding flywheel resurfacing and specifications (flat, step, etc.) Some vehicles require new replacement flywheels instead of resurfacing. Please consult the factory service manual or call a Centerforce technical representative.

Is it necessary to use the alignment dowel pins on my flywheel?

Yes. Flywheels originally equipped with alignment dowel pins must have the dowel pins in place and intact. The alignment dowel pins properly locate the pressure plate to the flywheel for balance purposes and provide shear strength between the pressure plate and flywheel. The alignment dowel pins should always be replaced if they are worn, damaged, broken, or missing from the flywheel.

What type of pressure plate bolts should be used with my Centerforce clutch?

Centerforce clutches are designed for use with stock OEM style bolts or aftermarket bolts designed specifically for pressure plate retention. Clutch hardware must endure high loads! Be sure replacement bolts are of high quality and match OEM bolt configuration (i.e. if stock bolts are shouldered, replacement bolts should be shouldered as well.)

What are the clutch bolt torque specifications?

Bolt torque specifications should be obtained from the factory service manual or from the bolt manufacturer. Proper torque is crucial to your safety—take time to obtain the correct pressure plate assembly and flywheel bolt torque specifications. Always use a calibrated torque wrench

Frequently Asked Questions

when tightening bolts to their proper torque specifications.

Are there any special modifications necessary to install a Centerforce clutch?

All patented Centerforce clutch assemblies are designed to be a direct bolt in replacement for the stock clutch assembly. If any of the surrounding clutch components including the bellhousing, flywheel or linkage have been replaced with aftermarket replacements, be sure the parts match the stock (OEM) specifications. Please contact a Centerforce technical representative if you have any questions or concerns at 928/771-8422.

Are Centerforce clutches pre-balanced?

Yes. All Centerforce clutch assemblies and flywheels are balanced to original factory equipment specifications unless otherwise specified.

Does Centerforce recommend changing the pilot bushing when installing a new clutch?

Yes. If your vehicle is equipped with a pilot bushing or bearing, it is always recommended to replace it when replacing the clutch assembly, where applicable. It is recommended to upgrade from a pilot bushing to a roller, needle or ball bearing, type pilot bearing.

Do Centerforce clutches require a break-in period?

Yes. It is recommended to properly seat in the new pressure plate and disc assembly to assure maximum clutch performance. Centerforce recommends 450-500 miles of stop-and-go driving before applying full engine power. If your driving consists mainly of highway type driving, extend the break-in period at least 250 miles. If the break-in period is not properly followed, clutch service life and performance may be severely reduced.

Can I use a Centerforce disc with my brand X pressure plate or Centerforce pressure plate with my brand X disc?

No. It is not recommended to use Centerforce components with other manufacturers' pressure plates or discs. Centerforce parts are designed to work as matched sets and to give superior clutch performance as well as reliable operation. Centerforce shall not guarantee any other manufacturers' components or damage occurring if mixing clutch discs and/or pressure plates with Centerforce products.

Are Centerforce clutches repairable or rebuildable?

In order to maintain proper clutch service, it is not recommended to rebuild patented Centerforce clutches. However, repair may be possible in some cases by Centerforce, following an inspection of the assembly conducted by Centerforce.

Can a new Dual Friction disc be purchased separately?

No. Dual Friction discs are custom built and designed for use with specific pressure plate assemblies. The pressure plate assembly and clutch disc should always be replaced as a

Frequently Asked Questions

matched set. If the disc has worn out, so has the pressure plate. Please contact a Centerforce technical representative if you have any questions or concerns at 928/771-8422.

Does the Centerforce clutch system weigh less than the stock OEM clutch I am replacing?

Typically, the weight of the patented Centerforce clutch assembly will be very similar to the weight of a stock OEM clutch assembly. If rotating mass (weight) is a concern, Centerforce manufactures a lightweight clutch assembly designed specifically for competition use. The Centerforce Light Metal Clutch, or LMC*, clutch assemblies save a considerable amount of weight.

**Note: LMC clutches are designed and intended for competition use only and cannot be used in street applications.*

How important is proper bellhousing alignment?

Bellhousing alignment is crucial for proper clutch function and reliability of the related components. Due to manufacturing tolerances of engine blocks and bell housings, it is possible for the transmission centerline and crankshaft centerline to be misaligned. The result of this misalignment may result in hard shifting; pilot bearing/bushing wear; transmission main shaft bearing wear; and/or failure of the clutch disc hub. Please refer to the vehicle's factory service manual or contact a Centerforce technical representative if you have any questions or concerns at 928/771-8422.

My engine is used mainly at low RPM. Will the Centerforce centrifugal weight system be beneficial for my application?

Yes. While it is true that the centrifugal weight systems efficiency is a direct function of engine RPM, the patented Centerforce weight system is effective and will provide additional clutch performance at all engine RPM levels.

My new throw out bearing appears to be off center on the bearing retainer and wobbles. Is it defective?

No. Although this may look abnormal, this bearing movement is one of the bearing's design features. Centerforce strives to supply only the highest quality bearings available. For most applications, Centerforce prefers the use of a self-aligning or self-centering type throw out bearing. This bearing may appear to be off center or improperly manufactured. However, the bearing will align and center itself properly during normal usage.

My application is not list in the Centerforce catalog. What should I do?

The Centerforce catalog is one of the most extensive and complete aftermarket performance clutch publications available. Centerforce is continually making changes and adding new applications. If a particular application is not found in the Centerforce catalog, please contact Centerforce for new releases or additions at 928/771-8422.

Frequently Asked Questions

Should I remove the Centerforce weights from the clutch fingers?

No. The patented Centerforce clutch system should not be altered or tampered with. The Centerforce clutch is designed to be a direct bolt in performance replacement clutch system and should not be modified in any way. The Centerforce centrifugal weight system is one of the design features incorporated into your new clutch. The centrifugal weights are designed to add centrifugal assist to the diaphragm clutch spring thus increasing the holding capacity as engine RPM is increased. The centrifugal weights should remain as installed by Centerforce to assure proper clutch performance.

Will the Centerforce weight system interfere with my throw out bearing?

No. The patented Centerforce centrifugal weight system is free-floating and will automatically center itself during normal operation. The centrifugal weight system will not interfere with the throw out bearing.

My new Centerforce clutch assembly did not come with the weights on the clutch fingers. Was it built improperly?

No. We utilize the patented Centerforce weight system on all applications that are possible. However, in space limited applications such as most front wheel drive vehicles, it may not be feasible to utilize the Centerforce weight system due to clearance restrictions in the bellhousing. Centerforce has modified the clutch assembly on these applications to increase the overall holding capacity without having the centrifugal weight system.

What parts in the clutch release system/linkage should I inspect before installing a new clutch?

All related clutch parts should be checked for wear or possible problems. The clutch linkage starting from the clutch pedal bushings to the bell crank (Z-bar) to the clutch fork and pivot ball or point should be inspected for wear or damage. Any questionable parts should be repaired or replaced. If your vehicle uses a hydraulic release system, check for any hydraulic leaks as well as wear on the push and pull rods operating the hydraulics and all hoses. Hydraulic systems, especially systems with high mileage, may have internal leakage beyond the master and/or slave piston seals. Keep in mind these leakages are difficult to diagnose because there may be no external leakage. If your vehicle is cable equipped, the cable should be checked for damage, stretch, excessive resistance or binding. If any of the previous is found, replace the clutch cable. Refer to the vehicle's service manual for factory specifications, regardless of the vehicle's linkage type. Always inspect the throw out bearing collar for signs of wear or galling.

In the catalog, why isn't a Dual Friction disc available separately?

For all Dual Friction applications, the pressure plate and clutch disc are sold as a matched set. Therefore, all applications are listed together under one part number.

Frequently Asked Questions

What could be the causes for clutch judder (chatter or shudder)?

Judder can be the result of any number of problems. Possible causes may be as follows:

1. Improper break-in procedure
2. Flywheel was not properly resurfaced before the new clutch was installed
3. Flywheel is not parallel, or the friction surface is out of parallel with the crank flange surface
4. Flywheel was not resurfaced properly or has an improper surface finish
5. Flywheel has severe hard spots or hot spots
6. Flywheel has an improper step or cup dimension
7. Damaged or excessively worn CV joints
8. Bad u-joints in driveshaft or u-joints misaligned
9. Excessive backlash in differential
10. Excessive driveline angle
11. Bad leaf springs, bushings or mounts
12. Improper gear ratio versus tire diameter
13. Defective pressure plate and/or disc
14. Disc has inadequate or no marcel—not enough cushion between friction facings
15. Oil or grease contamination on clutch facings
16. Worn or damaged clutch linkage
17. Bent cover assembly and/or disc
18. Improperly tuned engine
19. Worn or damaged engine mounts or transmission mounts

What could be the cause for improper clutch release?

Improper clutch engagement or disengagement (release) can be the result of any number of problems. Possible causes may be as follows:

1. Release linkage not properly adjusted or reset
2. Flywheel not surfaced before a new clutch installed
3. Flywheel surfaced improperly—incorrect flywheel step or cup dimension
4. Flywheel machined too thin or not manufactured to stock (OEM) specifications.
5. Release linkage worn or damaged
6. Hydraulics defective, leaking or air is trapped in hydraulic system
7. Release linkage cable stretched or damaged
8. Improper clutch fork geometry due to flywheel being too thin or bellhousing deeper than stock
9. Improperly adjusted pivot ball
10. Clutch disc installed improperly (backwards)
11. Clutch disc hitting flywheel bolts
12. Clutch disc binding on transmission input shaft
13. Input shaft bent causing clutch disc runout
14. Pressure plate assembly and/or clutch disc bent or damaged
15. Clutch disc is too thick or has excessive marcel
16. Pressure plate has defective or damaged drive straps
17. Damaged, worn or improperly installed pivot bearing/bushing
18. Damaged or worn throw out bearing collar

Frequently Asked Questions

What are the possible causes for clutch slippage?

Clutch slippage may be the result of any number of problems. Possible causes may be as follows:

1. Improper clutch adjustment
2. Improper release linkage adjustment—reset factory release linkage, where applicable
3. Incorrect throw out bearing—too long or too short
4. Clutch assembly contaminated with grease or oil
5. Clutch assembly not fully seated in—improper break in procedure
6. Flywheel not properly resurfaced and clutch disc is glazed
7. Clutch assembly not designed for the vehicle
8. Clutch assembly not designed for the specific type of use (racing, competition, etc.)
9. Clutch assembly not adequate for the vehicle's power
10. Incorrect gear ratio to tire diameter
11. Clutch disc has broken or missing friction material
12. Clutch assembly has failed or is defective
13. Flywheel improperly resurfaced
14. Damaged or worn throw out bearing collar
15. Damaged or bent clutch assembly

What are the causes of poor shifting quality or notchy shifting?

Poor shifting may be the result of any number of problems. Possible causes are as follows:

1. Improper clutch release caused by faulty linkage and/or improper release linkage adjustment
2. Improperly installed shifter
3. Improperly adjusted shifter or shift linkage
4. Damaged transmission parts—bent shift fork
5. Worn transmission synchronizer rings
6. Improper transmission lubricant—check factory service manual for proper fluid type and viscosity
7. Pilot bearing/bushing binding on transmission input shaft
8. Clutch disc hub spring pack hitting flywheel or flywheel bolts
9. Damaged or defective pressure plate drive straps
10. Bellhousing misalignment

Please direct any questions or concerns to a Centerforce technical representative by calling (928) 771-8422 or visit www.centerforce.com.

Glossary of Terms

- Alignment tool:** a tool, mimicking the transmission input shaft, used to center the clutch disc to the flywheel and pressure plate during installation.
- Bellhousing:** a housing or adaptor connecting the transmission to the engine where the clutch assembly and clutch release system is located.
- Clamp load:** a measurable amount of pressure exerted by the pressure plate used to determine the holding capacity of the clutch assembly.
- Clutch assembly:** a combination of pressure plate and clutch disc meant to link the engine's output to the drivetrain.
- Clutch disc facing:** see friction material.
- Clutch disc:** a plate consisting of friction facings and a hub that is pressed between the pressure plate and flywheel, providing a link between the clutch assembly and drivetrain. Clutch discs may be sprung or unsprung (solid), depending on the application.
- Clutch fork:** an arm, typically located in the bellhousing and component of the release linkage, which moves the throw out bearing.
- Clutch judder:** a condition of the clutch when rapid alternating slippage and grip occur during engagement, possibly causing the vehicle to shake or judder.
- Clutch release system:** a system composed of mechanical, cable or hydraulic linkage meant for engagement and disengagement of the clutch assembly.
- Clutch release:** the movement of the clutch pressure plate fingers or levers by the throw out bearing resulting in the clutch disc freeing from between the pressure plate and flywheel allowing the transmission to be shifted. See also disengagement.
- Coefficient of friction:** the ratio of the force that maintains contact between an object and a surface and the frictional force that resists the motion of the object.
- Diaphragm spring:** a Belleville spring used in the pressure plate to produce clamp load.
- Disengagement:** the process of the clutch assembly unlinking the engine's output from the drivetrain.
- Drive stop:** a rivet retaining the outer plates of the clutch disc hub spring pack preventing the hub springs from over traveling (coil bind).
- Drive strap:** a thin metal strap (usually more than one) used for attaching the internal pieces of the pressure plate, for assisting disengagement of the clutch assembly, and providing torsional strength within the pressure plate.
- Dual-mass flywheel:** a flywheel consisting of two masses that are dampened internally by springs.
- Engagement:** the process of the clutch assembly linking the engine's output to the drivetrain.
- Excessive preload:** preload which can cause the clutch assembly to slip due to improper clutch release system adjustment, driving style or improper clutch component(s).
- Flywheel:** a wheel with engineered inertia for regulating the engine's speed or RPM.
- Friction material:** a composition of materials located on the outer perimeter of a clutch disc that provides friction between the pressure plate and flywheel.
- Glazed disc or pressure plate:** a condition of the pressure plate or clutch disc surface that drastically decreases the efficiency of the friction material and reduces the holding capacity of the clutch assembly. The friction surfaces appear polished or shiny.
- Holding capacity:** the amount of torque in foot-pounds exerted from an engine that a clutch assembly can effectively transmit to the driveline.

Glossary of Terms, continued

- Hub splines:** the center of the clutch disc where the input shaft mates with, transmitting the engine's power to the transmission.
- Hub spring pack:** a mechanism on the clutch disc for dampening the transmission and clutch during engagement and disengagement.
- Input shaft:** a shaft extending from the front of the transmission connecting the clutch assembly to the transmission, meant for transmitting the engine's power to the transmission.
- Internal hydraulic throw out bearing (concentric slave cylinder):** a throw out bearing attached to a hydraulic release linkage that is mounted concentrically on the transmission input shaft collar. This type does not use a clutch fork.
- Marcel:** an amount of cushion wave spring between the clutch disc facings.
- OEM:** an acronym for Original Equipment Manufacturer.
- Pilot bearing/bushing:** a bearing (or bushing) located in the center of the crankshaft or flywheel that locates the transmission input shaft. Not all vehicles have a pilot bearing/bushing.
- Pivot ball (point):** a ball or point usually attached (threaded or pressed) to the transmission or bellhousing where a clutch fork pivots.
- Preload:** a condition that exists where the throw out bearing is slightly tensioned by the clutch release system upon the pressure plate, typically present in hydraulic clutch release systems.
- Pressure plate (cover):** a mechanism consisting of mainly a friction ring and spring(s) providing clamping force for the clutch assembly.
- Release linkage (release system):** a system on the vehicle comprised of a mechanical, hydraulic or cable mechanism for the engagement and disengagement of a clutch assembly. The system typically includes a throw out bearing, linkage and a pedal assembly.
- Safety bellhousing:** a bellhousing designed for sanctioned racing and often SFI approved. This type reduces further damage to the vehicle and passengers if the clutch and flywheel assembly fail when in operation.
- Safety block plate:** a plate located between the bellhousing and engine block that prevents damage to the engine from a failure of the clutch and flywheel assembly when in operation.
- Self-aligning throw out bearing:** a throw out bearing that automatically centers the cylindrical bearing on the pressure plate.
- SFI:** an acronym for SFI Foundation Inc.
- Shouldered bolt:** a bolt with an unthreaded portion underneath the head used for locating or indicating adjoining components, such as a pressure plate and flywheel.
- Single-mass flywheel:** a flywheel consisting of one mass, or a single piece.
- Slippage:** a condition existing when the clutch will not effectively transfer the vehicle's power possibly due to excessive engine power, insufficient clutch holding capacity or an improperly adjusted release linkage.
- Throw out bearing (clutch release bearing):** a cylindrical thrust bearing, typically with a bearing retainer collar, used for engaging and disengaging.
- Transmission:** a mechanism between the bellhousing and driveline(s) (driveshaft(s)) consisting of shafts and gears designed for selecting the vehicles speed relative to the engine RPM.



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Limited Warranty

CENTERFORCE® CLUTCH products are warranted free from defects in material and workmanship for a period of (90) days from the date of purchase. CENTERFORCE CLUTCHES does not warrant nor make any representations concerning its product when not installed and used strictly in accordance with manufacturer's instruction and maintenance practices of the automotive industry.

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