Positive Traction Differentials

CLUTCH PACK TYPE

Eaton Design
General Motors (Exc. Corvette)
Dana Design
Corvette
General Motors Design
Ford Motor Co.
General Motors (Exc. Corvette)

DESCRIPTION

Positive traction type differential that directs major driving force to wheel with greatest amount of traction. This is accomplished by a spring loaded multiple disc clutch pack behind each side gear. Each clutch pack uses friction surfaced clutch discs splined to the side gear and steel clutch plates held by the differential case. The only major difference in the designs is the type of preload spring used.

The Eaton design uses 4 coil springs held by a spring retainer plate located between the side gears. The Dana design incorporates a Belleville type spring behind each side gear. The G.M. design employs a single "S" shaped spring located between the side gears to provide outward pressure on the gear and clutch pack assembly.

In operation, the preload spring pressure is accompanied by the side gear thrust load to compress the clutch packs providing resistance to normal differential action. Preload spring pressure is calibrated to allow some slippage of the clutch packs under variable torque conditions (turning corners, etc.). All designs use a 2 pinion, single piece case assembly.

IDENTIFICATION

Differential can be identified as a postive traction unit by raising the vehicle and turning one of the rear wheels. With the transmission in neutral, if both rear wheels rotate in the same direction, the vehicle is equipped with a positive traction differential. Identification of the axle ratio, ring gear diameter and differential type is contained in the axle code. *See Fig. 1 for axle code locations.*

Axle Ratio Identification

Ratio	Code	Ring Gear Dia.
Eaton Design		
General Motors		
2.41:1	TT,UY,VT,WT,YT	8-3/4"
2.56:1	TU,YU	8-3/4"
2.73:1	TW,WW,YW	8-3/4"
2.93:1	TX,VY,VX,WX,YX	8-3/4"
3.08:1	TY,WY,YY	8-3/4"
3.23:1	TZ,VZ,WZ,YZ	8-3/4"
3.42:1	VP,VR	8-3/4"
Dana Design		
Corvette		
2.87:1	①	①
G.M. Design		
Ford Motor Co.		
2.73:1	WFZ-D	8-1/2"
3.08:1	WFZ-B	8-1/2"
3.42:1	WFZ-F,WFZ-G	8-1/2"
General Motors		
2.41:1	LZ	8-1/2"
2.56:1	LY	8-1/2"
2.73:1	LX	8-1/2"
3.08:1	LV	8-1/2"
3.23:1	LU	8-1/2"

① — Information not available from manufacturer.

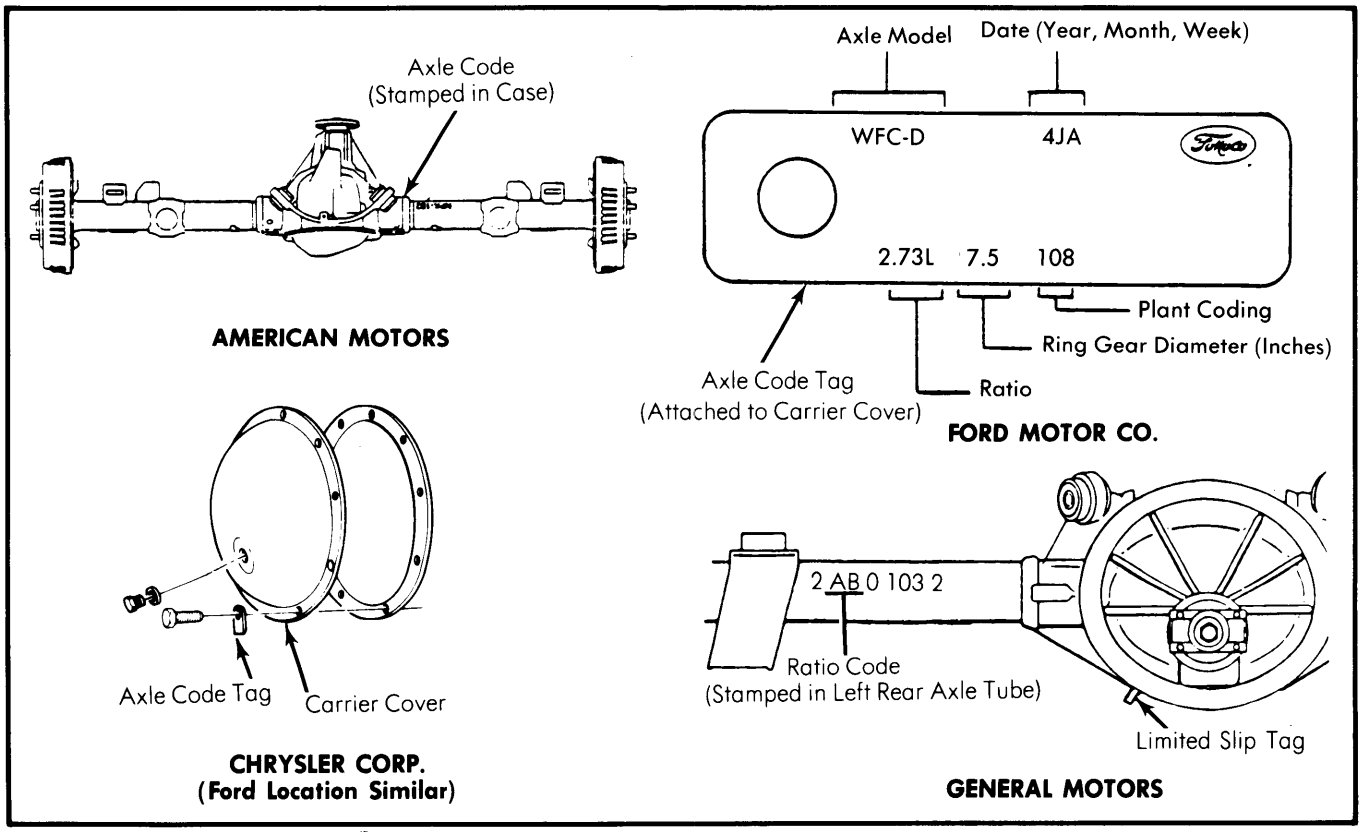

Fig. 1 Axle Code Locations

CLUTCH PACK TYPE (Cont.)

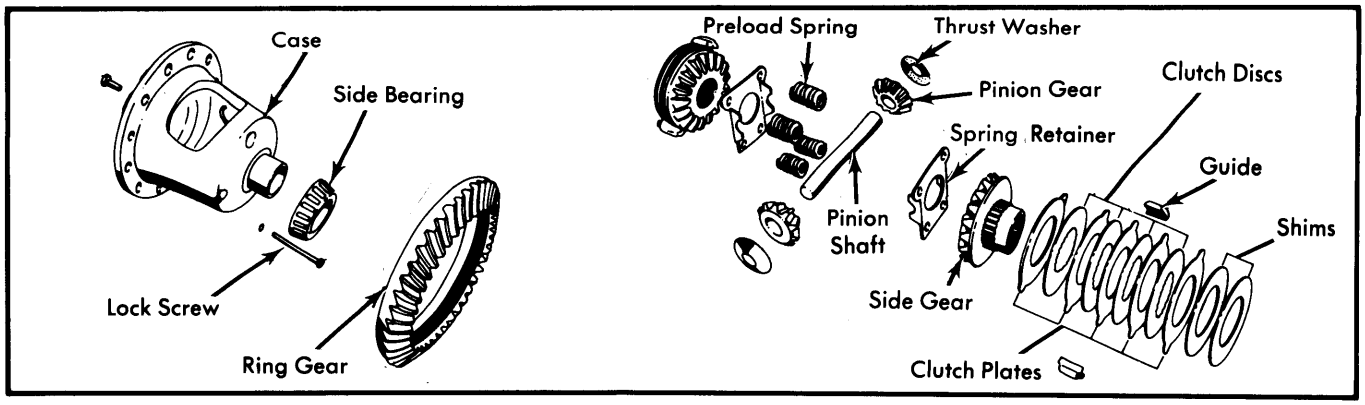

Fig. 2 Exploded View of Eaton Design Differential

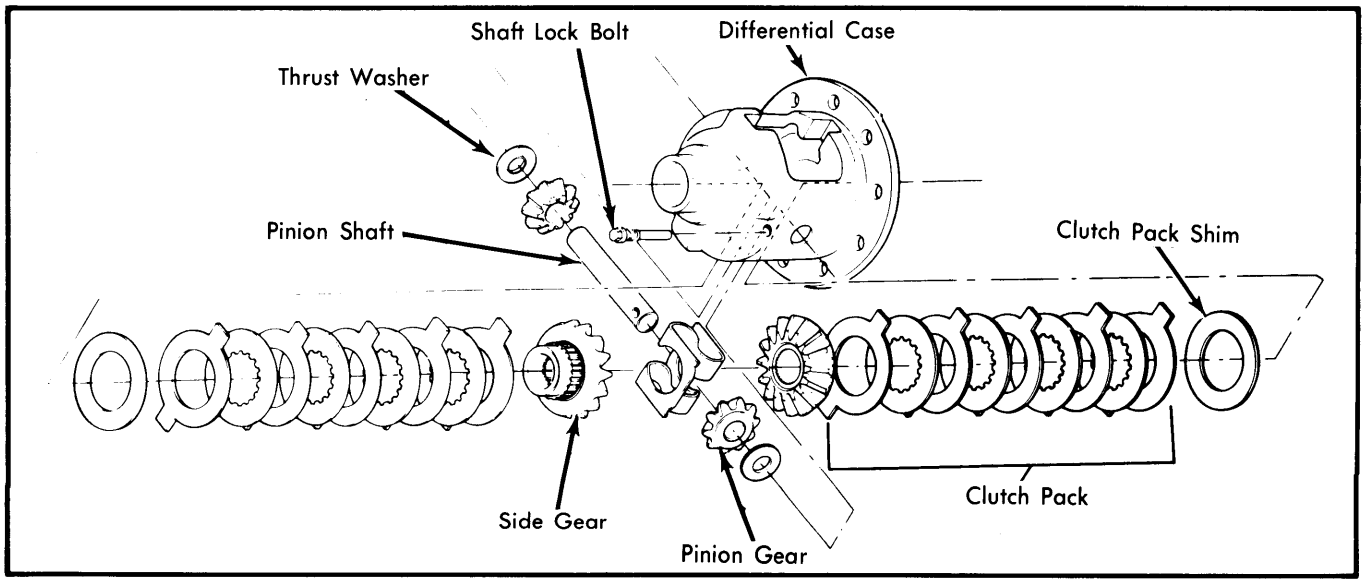

Fig. 3 Exploded View of General Motors Design Differential

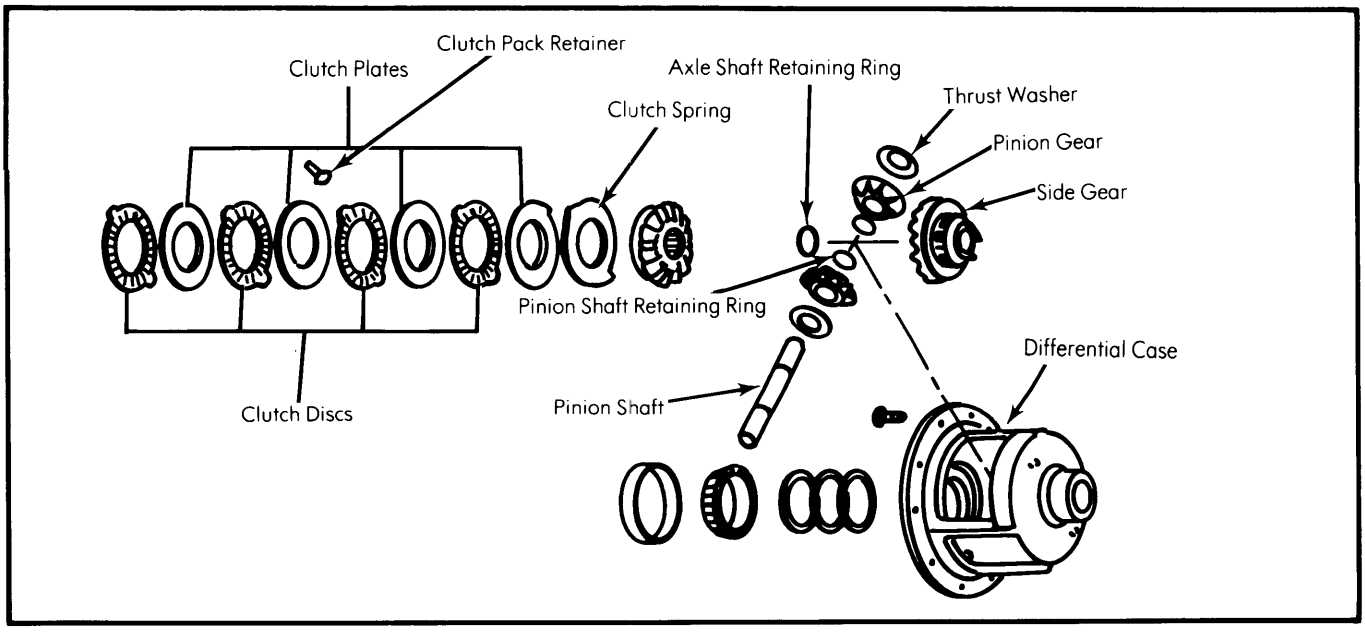

Fig. 4 Exploded View of Dana Design Differential

CLUTCH PACK TYPE (Cont.)

LUBRICATION

Dana Design (Corvette) — Fill to level of filler plug hole with GM Gear Lubricant (1052271) or equivalent with 4 ounces of GM Limited Slip Additive (1052358) or equivalent added. Change lubricant after first 7,500 miles and check level every 12 months or 7,500 miles afterward.

Eaton Design (General Motors) — Approximately 4.25 pints of GM Gear Lubricant (1052271) or equivalent with 4 ounces of GM Limited Slip Additive (1052358) or equivalent added. Change lubricant after first 7,500 miles and check level every 12 months or 7,500 miles afterward.

G.M. Design (Ford Motor Co.) — Approximately 3.75 pints of Ford Hypoid Gear Lubricant (EOAZ-19580-D) or equivalent. Change lubricant after first 7,500 miles and check level every 12 months or 7,500 miles afterward.

G.M. Design (General Motors) — Approximately 4.25 pints of GM Gear Lubricant (1052271) or equivalent with 4 ounces of GM Limited Slip Additive (1052358) or equivalent added. Change lubricant after first 7,500 miles and check level every 12 months or 7,500 miles afterward.

TESTING

Positive traction differentials can be tested externally by raising 1 rear wheel, with transmission in neutral, and attempting to rotate wheel by hand. If wheel can be turned, differential should be repaired or replaced. Differential can also be tested by attaching a torque wrench to an axle shaft/side gear assembly (in vehicle/on bench). Turning torque wrench, while holding opposite axle shaft (or driveshaft)/opposite side gear stationary, should require up to 120 ft. lbs. for breakaway and 30-40 ft. lbs. to maintain rotation. *See Fig. 5 and Fig. 6.*

REMOVAL & INSTALLATION

See appropriate Rear Axle article for individual manufacturer's removal and installation procedures.

OVERHAUL

DISASSEMBLY

1) On all designs, with ring gear removed, remove pinion shaft lock bolt or snap rings. Using a punch, drive pinion shaft out of case.

2) On Eaton and G.M. designs, remove preload spring assembly. When removing spring assembly on Eaton design, insert 2 bolts through spring plates and tighten enough to enable removal of spring assembly. *See Fig. 7.* Rotate 1 side gear to roll pinion gears to an opening where they can be removed. Remove side gear and clutch pack assemblies, noting which end of case each assembly is installed in.

3) On Dana design differentials, install clutch pack compressor/side gear rotator tool (GM J-23781) and compress clutch pack. *See Fig. 8.* Push pinion thrust washers out from behind pinion gears with .020" shim stock or similar tool. Using rotating tool, turn side and pinion gears until pinion gears can be removed. Remove side gear and clutch pack assembly, noting which end of case each assembly is located in.

NOTE — *Keep clutch discs and plates in original sequence when reusing.*

Inspection — Inspect all parts for excessive wear, cracks or scoring. If replacement of any clutch components or gears is necessary, replace these parts only in complete sets. Clean all parts for reassembly.

REASSEMBLY

Eaton & G.M. Design — 1) Check for required side gear shim thickness by measuring either pinion gear backlash or clearance with clutch gauge (Ford T80P-4946-A).

2) To check backlash, lubricate all parts and install clutch pack with shims onto side gear in original sequence. Install 1 side gear assembly, pinion shaft and pinion gears with thrust washers into case. Compress clutch pack by inserting a screwdriver and prying between pinion shaft and side gear. Measure backlash at pinion gear with a dial indicator. If backlash is not within .001 -.006", change side gear shim thickness and recheck backlash measurement. *See Fig. 9.* Repeat procedure for other side gear assembly.

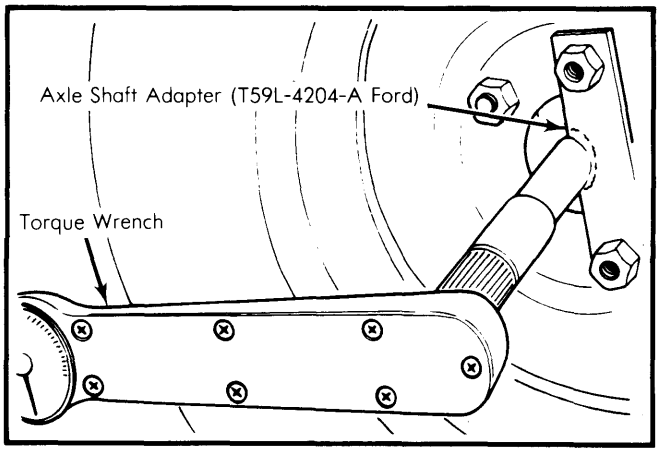

Fig. 5 Testing Differential In Vehicle

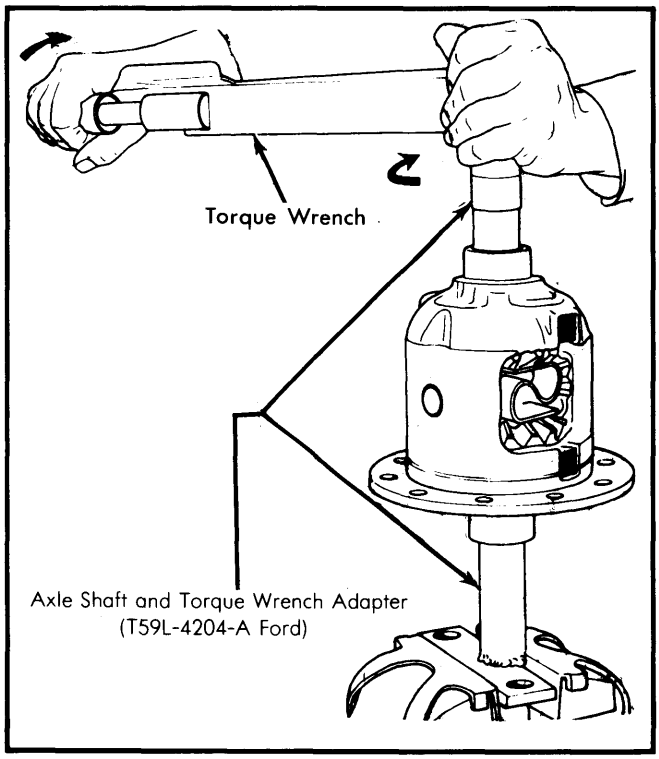

Fig. 6 Testing Differential on Bench

CLUTCH PACK TYPE (Cont.)

3) To measure required shim thickness using gauge, lubricate all parts before installing clutch pack and side gear, without shims, onto gauge tool. Measure clearance with a feeler gauge. *See Fig. 10.* Repeat procedure for other side gear assembly. Clearance measured on each clutch pack will be shim size required for each assembly.

All Designs — Oil all parts with approved lubricant and install internal parts in reverse order of removal. Bench test differential before installing in carrier.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N·m)
Pinion Shaft Lock Bolt	20 (27)

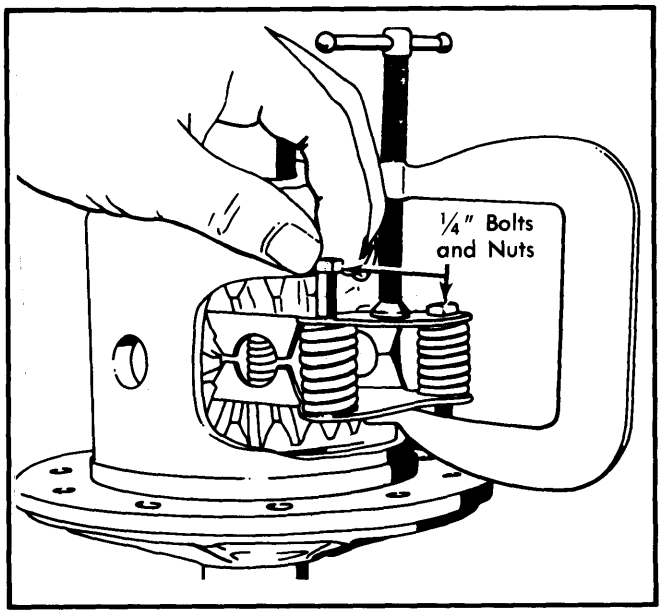

Fig. 7 Removing Preload Spring Pack

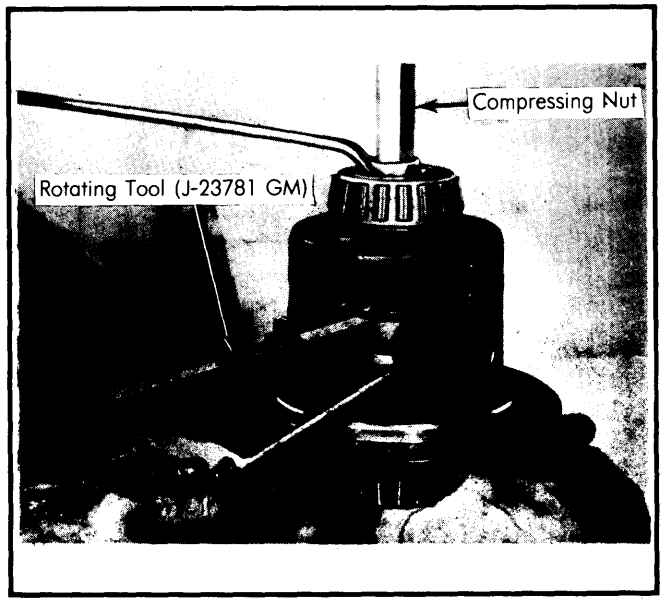

Fig. 8 Dana Side Gear Rotating Tool

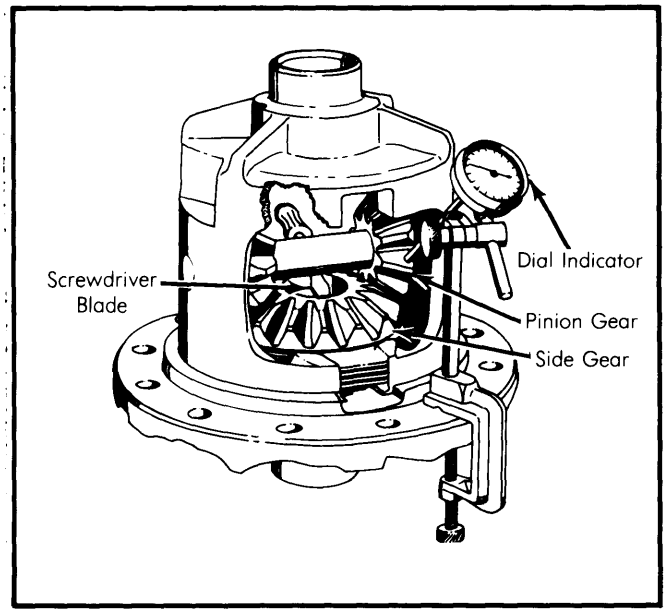

Fig. 9 Pinion Backlash Measurement

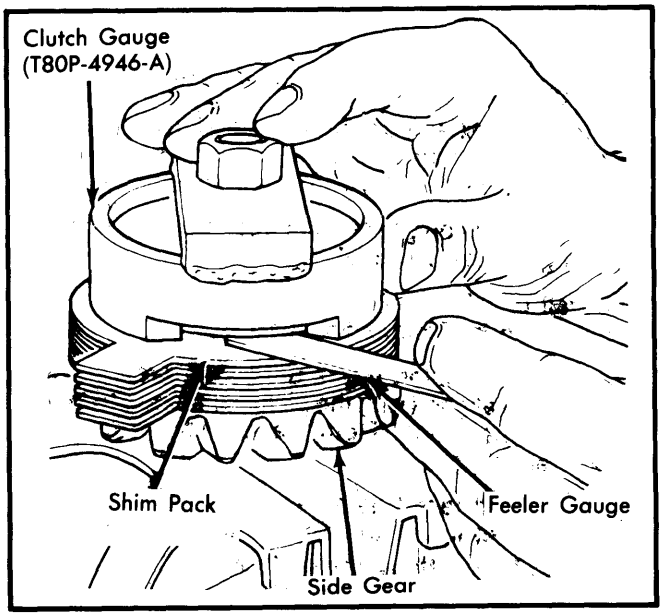

Fig. 10 Clutch Pack Shim Measurement