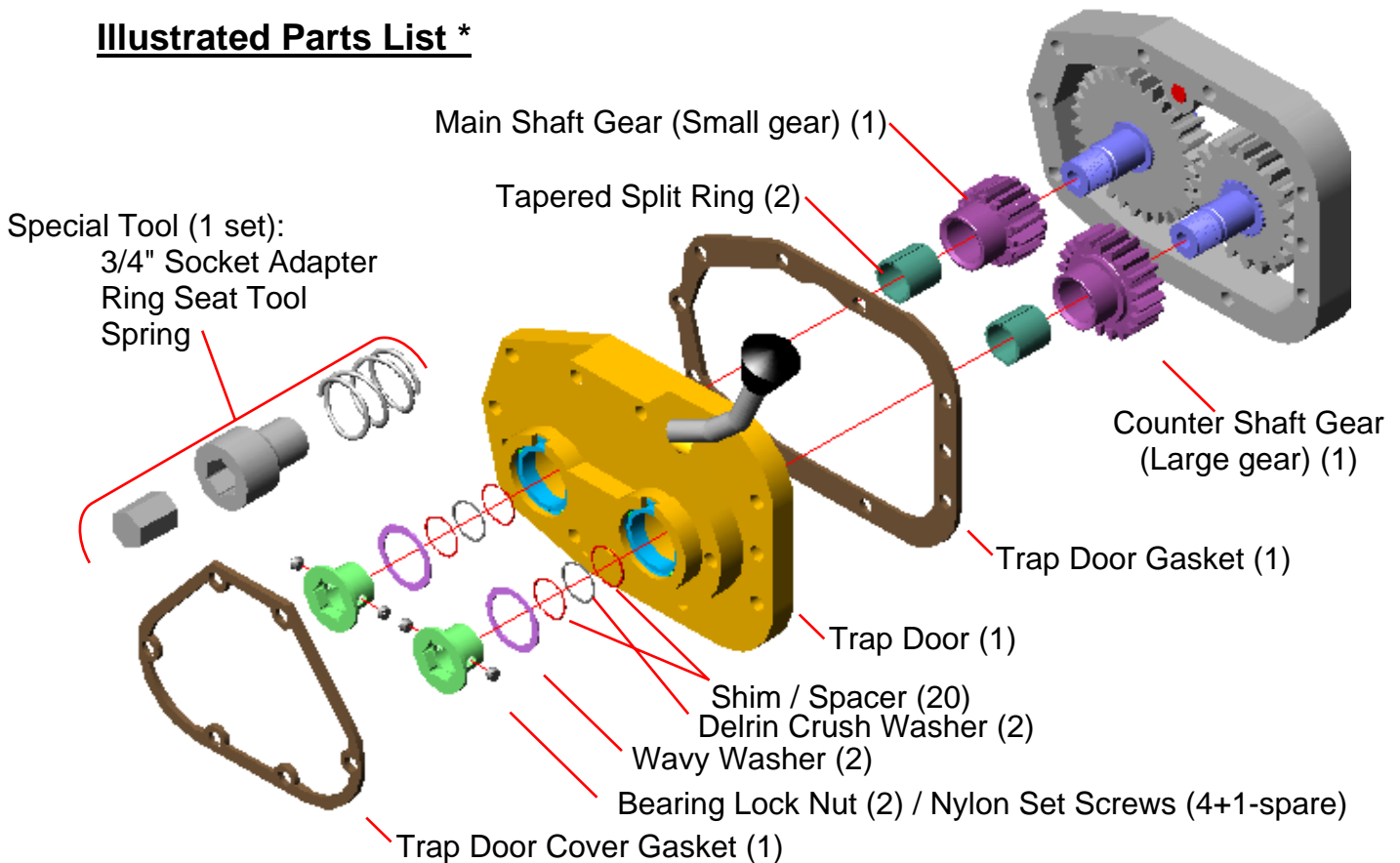


REVERSE GEAR

Installation Instructions FOR HARLEY-DAVIDSON® 5 Speed Transmissions

'84 – '99 EVO / 5 Speed & '99 – '06 Twin Cam

Illustrated Parts List *



* Not Illustrated: Champion Super-Lock Compound
: O-Ring for Clutch Cable (If needed)
: Cleaning Pad

Revision 7

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1 Parts Listing

Please check your reverse gear packaging to ensure you have received the following parts

Qty	Part No.	Part Description
1	RG-001-100	Housing, aluminum, assembly, RG3
1	RG-000-002	Gear, large, counter shaft
1	RG-000-003	Gear, small, main shaft
2	RG-000-008	Ring, split
2	RG-000-009	Nut, lock, bearing
1	RG-000-029	Ring, "O", cable, clutch, No. 011
1	SE-K00-001	Gasket, transmission case
1	SE-K00-002	Gasket, clutch cover
1	RG-000-015	Tool, ring, lock
1	RG-000-016	Tool, driver, hex
1	RG-000-023	Spring, for tool
1	RG-101-020	Compound, thread, assembly, RG3/RG
1	None	Instructions
1	None	Warranty Card
Hardware Kit, consisting of:		
24	RG-000-030	Washer, shim, flat
2	RG-000-021	Washer, wavy
2	RG-000-032	Washer, crush, nylon
5	RG-000-033	Screw, set, nylon
1	RG-000-031	Gauge, feeler, 3/16" x 2" x 0.010"
1	RG-000-041	Pad, cleaning

2 Preparation

NOTE: Please read Special Notes (Section 8) for special restrictions for certain models

Remove Original Parts From Vehicle.

- 2.1 Obtain a small tube of Loctite® #262 (red) for use later.
- 2.2 Drain the transmission oil.
- 2.3 Remove the clutch adjustment cover (left side).
- 2.4 Remove rear exhaust header pipe (cross over exhaust pipe).
- 2.5 Remove the muffler support bracket.
- 2.6 Remove the clutch release cover (right side).
- 2.7 Remove clutch push rod and oil slinger. To be disassembled and modified later.
- 2.8 Remove the two nuts from the main (rear) and counter (front) transmission shafts.
- 2.9 Remove the transmission bearing housing (puller available from Champion Sidecars). To be replaced with new reverse gear transmission bearing housing (Trap Door).
- 2.10 Cover the exposed gears in the transmission with a cloth in preparation to cut the shifter fork shaft.

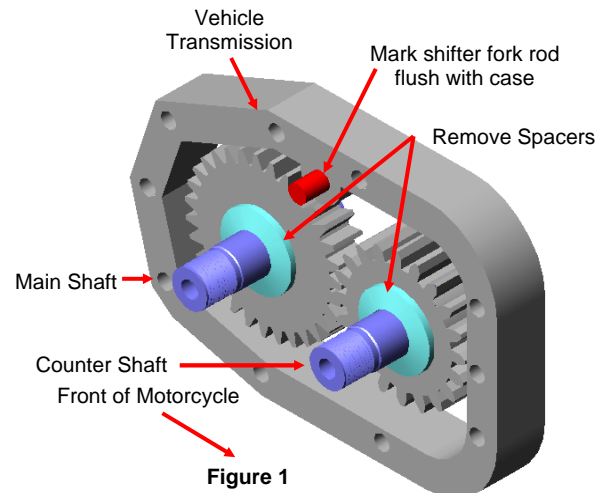


Figure 1

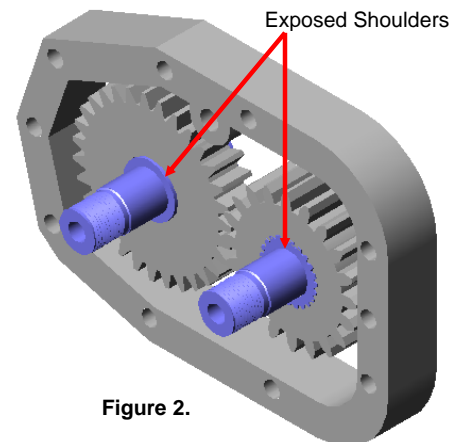


Figure 2.

3 Install New Main and Countershaft Gears

NOTE: Gears and Tapered Split Rings are factory matched sets. Do not mix!.

- 3.1 Locate the shifter fork rod, mark fork rod flush at transmission case and pull out 1/4". Figure 1

Reverse Gear Installation Instructions

For EVO / 5 Speed and Twin Cam Harley-Davidson® Motorcycle



CAUTION: Do not pull the shifter fork rod out of the transmission more than 1/4". If you pull the shifter fork rod out too far, it will be difficult to realign it with the internal shifter fork.

3.2 Cut the shaft at the mark and push it back in. The shaft end **MUST NOT** stick out of the transmission case. If the shaft is in deeper, fill the hole with silicone to prevent the shaft from moving in and out.

NOTE: Shifter fork is made of non-tempered metal and may be cut with a hacksaw or Dremel® cutting tool.

3.3 **Important:** Remove stock spacers from main and counter shafts. Spray with silicon remover (Brake-Clean) then, using supplied cleaning pad, clean shafts, new counter and main shaft gears and tapered lock rings (inside and outside) Figure 1

3.4 With motorcycle in neutral, pull both the shafts out and simultaneously push the OEM outermost gears in until seated completely to expose the shoulders of both shafts. The countershaft shoulder should be flush with the gear face. For the main shaft the gear would "hang over" the shoulder a small bit. Figure 2

3.5 Apply supplied Champion Super-Lock retaining compound to the inside and outside surfaces of the large gear tapered split ring, to the inside of the new countershaft gear (large gear) and to the transmission countershaft (the forward most shaft).

3.6 Install new countershaft gear to the transmission countershaft. Insert tapered split ring (tapered end first) into the countershaft gear. Install ring seat tool and spring to counter shaft and new countershaft gear. Torque ring seat tool to **40 ft-lb's**. Figures 3 and 4

NOTE: It is important that the outside face of the tapered lock ring must be at least 1/2" recessed below the outside face of the new gear. If not, override the 40 ft-lb. torque to push the tapered lock ring further in until the 1/2" depth is achieved.

3.7 Remove and clean tool, clean counter shaft and inside of new countershaft gear with a brake parts cleaner to remove all excess Champion Super-Lock retaining compound between the countershaft and the gear

3.8 Repeat steps 3.5 – 3.7 for the installation of the new main shaft (small) gear to the transmission main shaft. Figure 5

4 Install Transmission Bearing Housing (Trap Door)

4.1 Install Trap Door and gasket to transmission using the original bearing housing bolts. Lightly tapping the Trap Door with a rubber or plastic hammer while tightening the bolts will help with the seating of the case against the transmission. Figure 6

NOTE: a. Ensure that the OEM dowel pins are in place in the transmission casing
b. Do not install nylon set screws into bearing lock nut yet. This will be done at a later stage.
b. The Bearing lock nut and two wavy washers are used only as a tool in this step and will be permanently installed in the next section.

4.2 Place two wavy washers on to a bearing lock nut and install to the countershaft. Using 3/4" socket adapter, torque to **40 ft.lb.** Wavy washers will compress! This will ensure that housing bearing is seated against the shoulder of the new gear.

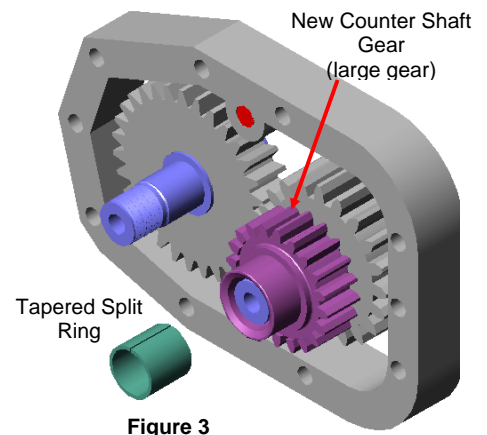


Figure 3

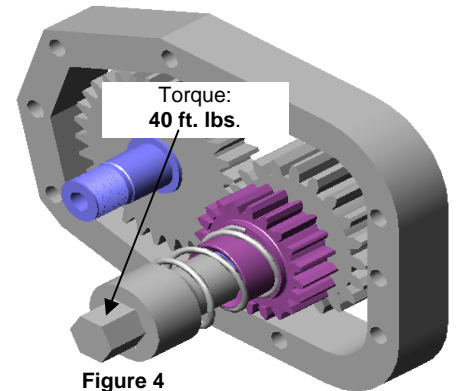
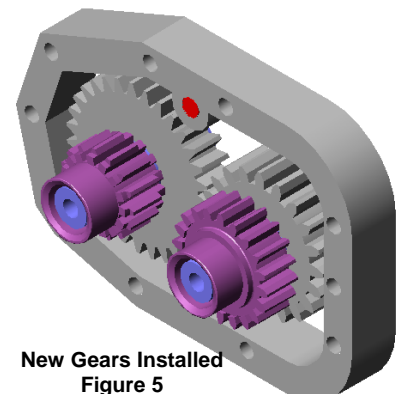


Figure 4



New Gears Installed
Figure 5

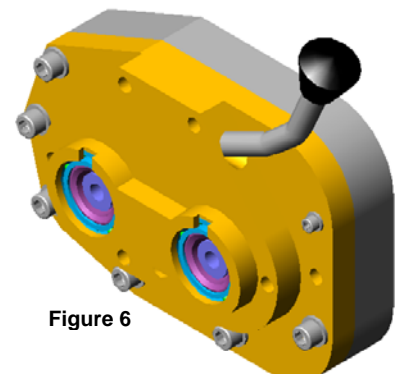


Figure 6

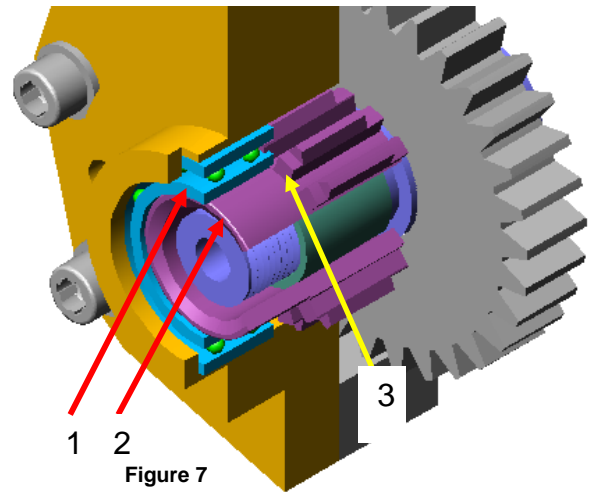
Reverse Gear Installation Instructions

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4.3 Remove bearing lock nut and measure distance between bearing face and gear end surface. Measurement should not exceed 0.099". Figure 7 – Arrows 1 and 2.

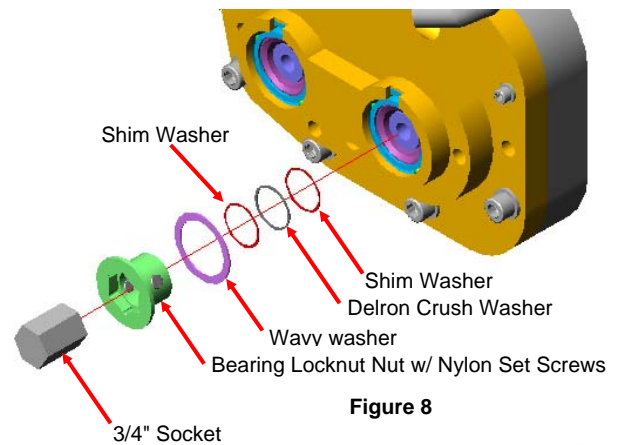
NOTE: If the wavy washer does not compress and/or the measurement is more than 0.099", the bearings are not seated against the shoulder of the new gear. See Figure 7 - Arrow 3. In the **unlikely** event that this occurs, the only way to correct it is to obtain (make) another washer(s) with the same dimensions as the wavy washer and use it together with the two wavy washers and push the bearing in until the 0.099" measurement is achieved.



4.4 Repeat steps 4.2 and 4.3 for the Main Shaft.

5 Install Shim Washers

5.1 Install one shim washer, one Delrin crush washer and one shim washer to countershaft. (**NOTE: Do not install nylon set screws into bearing lock nut at this time**) With one wavy washer on the bearing lock nut, install nut onto countershaft. Using 3/4" Socket Adapter, torque to **10 ft. lbs.** Figure 8.



5.2 Check clearance between bearing lock nut and outer bearing at openings above shafts. Check between waves of wavy washer with feeler gauge provided (.010") Clearance should measure between .010" minimum and .015" maximum (0.26 mm – 0.38 mm). Figure 9.

5.3 If clearance is less than the 0.010" tolerance specified:

- Remove bearing lock nut
- Install one more shim to the counter shaft
- Reinstall bearing lock nut, torque to 10 ft. lbs and check clearance
- Shim thickness is 0.010"

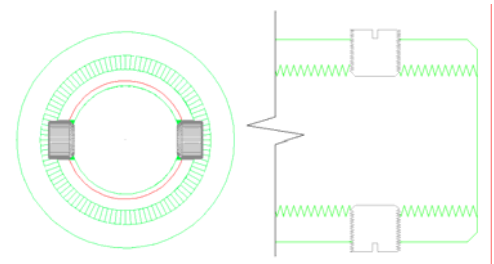
5.4 Repeat step 5.3 adding only one shim at a time, until proper clearance is achieved.

NOTE: Step 5.3 is very important, as this will insure that the tapered split ring stays locked and the bearing will be locked onto the gear after final assembly.



Figure 9

5.5 When proper clearance has been obtained, remove and clean bearing lock nut and shaft threads with a brake cleaner. **Install two nylon set screws into bearing lock nut until flush with inside of threads.** Figure 10. Nylon set screw must extend out of lock nut, to ensure proper locking. Apply Loctite® # 262 (red) lock compound to threads and torque to 60 ft. lbs. Wavy washer will now be compressed. No measurement shall be necessary.



Install Nylon Set Screws, Ends Flush With Inside of Lock Nut Thread

Figure 10

5.6 Repeat steps 5.1 – 5.5 for main shaft.

6 Modify Clutch Push Rod

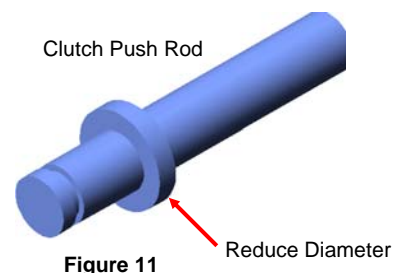
- 6.1 Disassemble the clutch push rod / oil slinger assembly and remove the C-clip. Oil slinger is permanently removed.
- 6.2 Remove throw out bearing.
- 6.3 On lathe or bench grinder, reduce collar diameter of clutch push rod to 5/8". Figure 11.

NOTE: If preferred, clutch push rod, HD Part No. 37089-84, may be installed as is, without modification.

- 6.4 Ensure clutch push rod slides easily through hex hole of bearing lock screw.

CAUTION: If clutch push rod does not slide easily through hex hole of bearing lock nut, clutch may not operate. Machine it smaller until it fits.

- 6.5 Install clutch push rod to transmission after re-installing throw out bearing with C-clip.
- 6.6 Loosen clutch push rod adjustment nut on left side of engine. Clutch to be adjusted later.



7 Modify Clutch Cover

The OEM clutch cover must be modified to allow clearance for the new Trap Door.

- 7.1 Disassemble the clutch cover.
- 7.2 Mill or grind the area indicated in Figure 12. Depth should be to approximately half the depth of the clutch cable hole (inset-Figure 12)
- 7.3 Reassemble and install clutch cover to transmission using new gasket and original bolts. Ensure proper fit of cover to transmission.
- 7.4 Adjust clutch (See also OEM manual).
 - Shorten the outer cable in front of the engine to ensure maximum free play.
 - Loosen push rod adjustment lock nut (left side-primary side) and screw in push rod adjustment screw until clutch plates open approx. 1/16" – 1/8".
 - Pull clutch lever (to ensure zero positioning of ball and ram) and release.
 - Back out push rod adjustment screw and screw in until tension is created. Now loosen 1/2-3/4 turn and tighten jam nut.
 - Adjust outer cable to ensure desired clutch play.

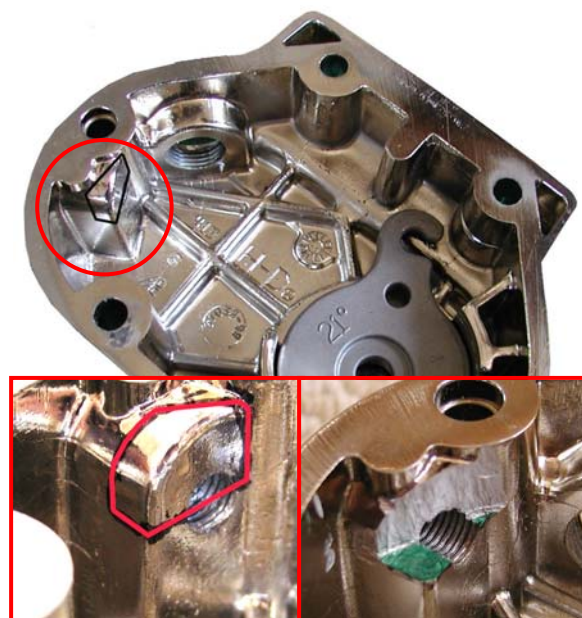


Figure 12

WARNING:

- Do not refill transmission with gear oil yet.
- Allow 12 hours for Champion Super-Lock compound to set
- **Refill the transmission with gear oil.**



8 Special Notes

- It may be necessary to shorten the clutch release cover-to-transmission bolts up to 1/4".
- On some Softail® models, shift handle may be obstructed. In this case, oil cooling pipes on the right side must be replaced and re-routed with braided lines. (Braided 3-hose kit, HD #63860-00)
- On some Harley-Davidson Springer®, Indian® & other custom models, cross-over pipe may obstruct Reverse handle.
- In some cases, replacement of cross-over pipe may be necessary.

9 Instructions for Use

WARNING! USE ONLY IN NEUTRAL

Clutch must be engaged and the transmission in neutral when shifting in and out of reverse.

To engage reverse:

- Start Motorcycle.
- Place bike in neutral. **(See Note A below)**
- Engage clutch.
- Shift reverse handle in and upward to select reverse.
- Feather clutch and throttle to reverse motorcycle. **(See Note B below)**

To disengage:

- Engage clutch
- Shift handle in and down to deselect reverse

NOTE:

- A. It is good practice to first engage first gear to stop the gearbox from spinning (This will prevent the “grinding” noise when reverse gear is engaged) and then place the bike in neutral and immediately engage reverse.**
- B. Do not let the bike “free wheel” backwards while in reverse gear and the clutch disengaged (i.e when rolling down a slope when in reverse) – The reverse gear will automatically try to disengage and will result in a “grinding” sound. To prevent this – Always engage the clutch immediately after the reverse action is completed.**

WARNING! Reverse gear is intended for light duty use only. Do not drive for long periods in reverse.

WARNING! Any attempt to modify this product without written permission from the manufacturer will void the warranty and may cause damage to vehicle and injury to persons.
Do not attempt to engage reverse while motorcycle is up on lift stand.

10 Warranty

One year on reverse gear parts only.
15% restocking fee on all returned orders.
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