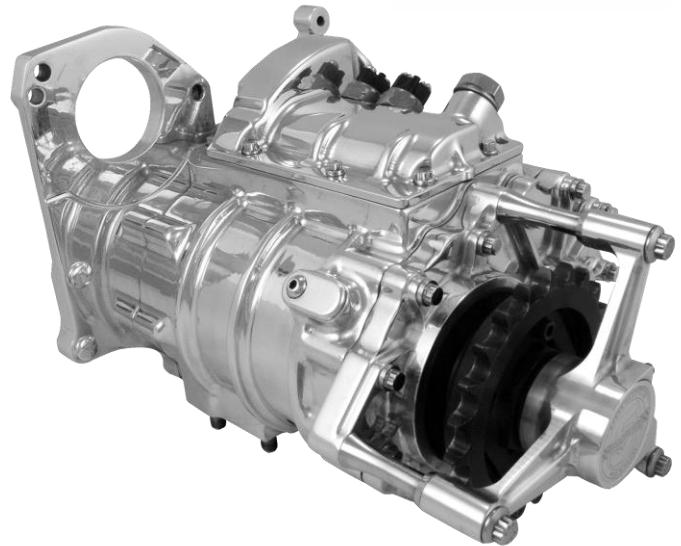
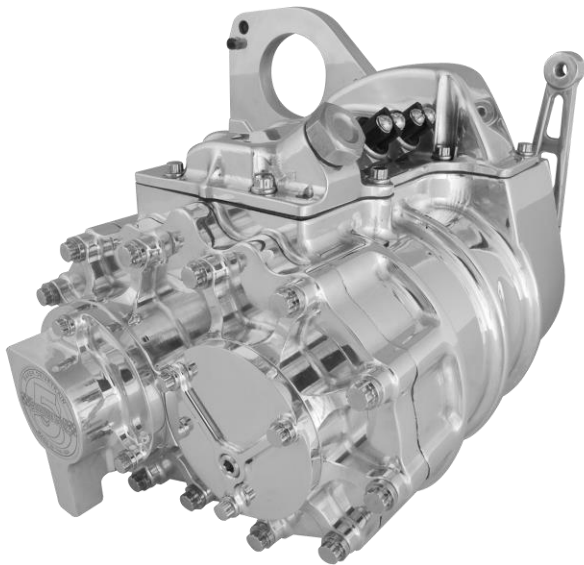


# TORQUEBOX TRANSMISSION



**LEFT SIDE DRIVE  
(LSD) SERIES**

**RIGHT SIDE DRIVE  
(RSD) SERIES**



# TORQUEBOX TRANSMISSION

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# ABOUT YOUR NEW TORQUEBOX

## INTRODUCTION

It's torque, not horsepower, that destroys clutches, transmissions, and drive belts. The torque capacity of a transmission is proportional to the gear width and the center distance between the two shafts. Pre-2007 stock Harley and aftermarket transmissions have a center distance of 2.5". By increasing the center distance 20% to 3.0", the TorqueBox conservatively increases the torque capacity to 250 ft-lbs. The TorqueBox is available as a 5 or 6-speed, left or right-side drive. The unique design of the TorqueBox allows the 6<sup>th</sup> gear pair to be removed or installed to create a 5-speed or 6-speed transmission. This work must be performed by BAKER Drivetrain. All frame, starter, and clutch interfaces are identical to stock 1990-1999 models.

## FITMENT

### TorqueBox LSD and RSD 5 & 6 Speed Transmissions

- 1990 – 1999 Left Side Drive (LSD) Softtail Based Models
- 1990 – 2006 Right Side Drive (RSD) Softtail Based Models

## BREAK-IN

The TorqueBox requires no break-in schedule. However, we do recommend that you take it easy for the first 20 miles to confirm that there are no issues related to basic function of the transmission and the reassembly of the motorcycle. You will notice that the transmission will shift smoother and operate quieter after about 2500 miles. Like any machine, scheduled oil changes are key to years of trouble free service. Log your transmission oil changes at the recommended intervals on page 12.

## FLUIDS

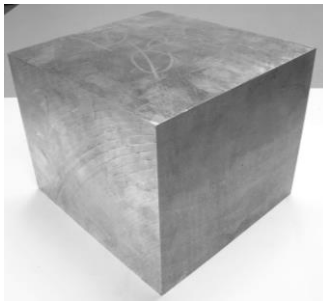
The TorqueBox requires 22-24 fl-oz (DRY) or 18-22 fl-oz (WET) of transmission fluid, see page 9. We recommend Spectro 6-Speed transmission oil that has long chain polymers that stand up to the harsh environment that this high-performance transmission can deliver. Think of it this way – the transmission is a meat grinder and the oil is the meat. The meat gets ground and re-ground and after a number of miles it turns to mush. Synthetic oils are superior to petroleum-based oils in that the polymers are longer and more robust. This means that synthetics take longer to be ground into mush and therefore provide better protection for a longer period of time. Please follow the recommended oil change intervals on page 12 and document your transmission service history. The exception to the stated intervals is winter storage. If the bike is stored in an environment that has significant temperature fluctuations, there will be water condensation inside the transmission. The oil should be changed immediately when it comes out of storage and is put back into service.

# TORQUEBOX FEATURES

## FEATURES

The TorqueBox is the most innovative, well executed, robust transmission we have ever designed and manufactured. Significant TorqueBox features:

1. **Materials.** The case starts life as a 6061-T6 billet chunk of aluminum that weighs in at 95 lbs. This creates the framework for the TorqueBox's ability to handle 250ft.-lbs. of torque. It gets whittled down to a 17 lb. case that is both structurally and aesthetically pleasing with design cues from an 8V-71 blower. The guts needed to match this, so both mainshaft and countershaft are cut out of the best steel made, 9310 and the gears, cut out of 8620.



SOLID CHUNK OF  
6061-T6 BILLET ALUMINUM  
BEAUTIFULLY CARVED  
INTO A WORK OF ART



2. **Shift Drum.** All TorqueBox transmissions are fitted with N1 shift drums. For 5 speeds this makes the shift pattern N-1-2-3-4-5 and for 6 speeds it makes the shift pattern N-1-2-3-4-5-6. Along with N1 these racing transmissions are fitted with ignition kill shift drums. This makes for clutch-less, wide open throttle shifts down the 1/4 mile! The ignition kill system will need to be wired into your current ignition system; see page 10.

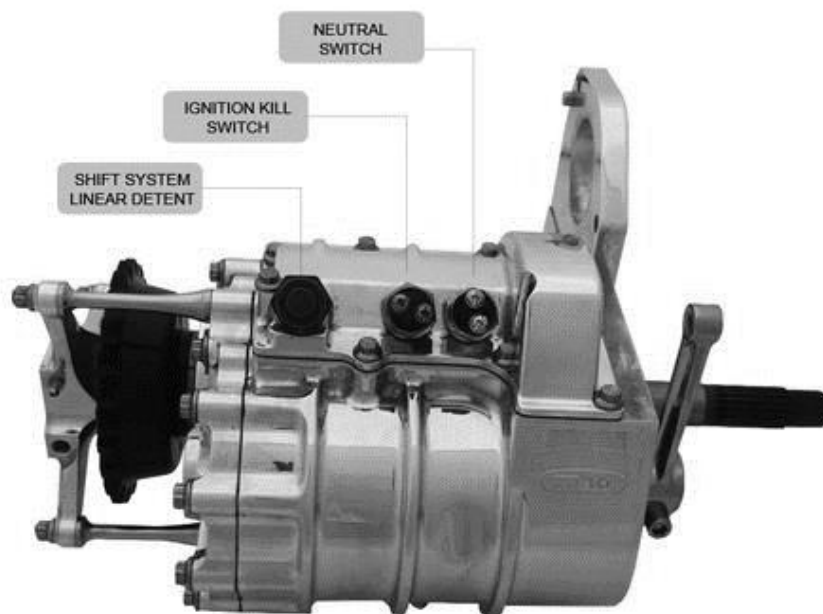


FIGURE 1 | TORQUEBOX TOP COVER  
SWITCH LAYOUT; RSD SHOWN

# FEATURES AND GEAR RATIOS

## FEATURES CONTINUED

3. **Shift System.** We utilize a two-rail fork system. This makes it possible to increase the width of the fork to provide more support and smoother shifts. 1 common shift fork is used 3 times to achieve commonality.
4. **Frictionless Detent System.** The shift system has a frictionless detent. A 3/8" primary ball bearing is cradled by, and rolls on, 50 secondary micro ball bearings. In turn, the cradle is part of a plunger that actuates during shifting and is guided by a tertiary linear micro ball bearing system.
5. **Heavy-Duty Shifter Pawl.** We didn't stop at the forks and fork rods – a heavy-duty shifter pawl was needed. The shifter pawl design makes shifts short and crisp. This system delivers a lever ratio that is 35% less than stock. The heavy-duty shifter pawl rides on two radial ball bearings for smooth, repeating shifts.
6. **Clutch Actuator.** Right and left side drive units are both equipped with a 1.5" bore hydraulic slave cylinder. This provides easy holding (depending on clutch) at the drag tree before you go into clutchless ignition kill shifts. You will need a 11/16" bore master cylinder, brake, and banjo bolt. The banjo bolt going into the actuator is a 3/8-24 thread. A mechanical ball-ramp style actuator can be special ordered for LSD versions only.

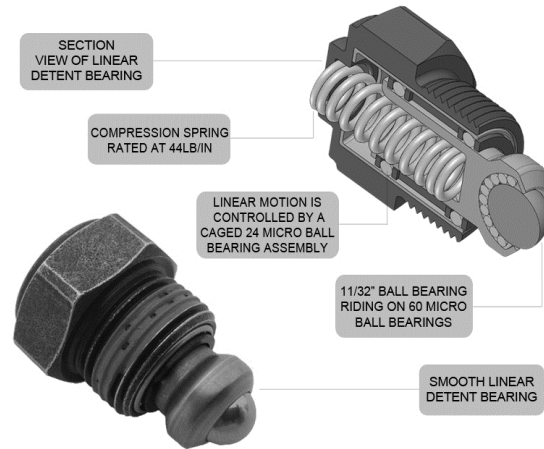


FIGURE 2 | SHIFT DRUM LINEAR DETENT SYSTEM

## GEAR RATIOS

### TorqueBox R-Ratio 6-Speeds

- 1<sup>st</sup> – 2.75
- 2<sup>nd</sup> – 2.05
- 3<sup>rd</sup> – 1.55
- 4<sup>th</sup> – 1.18
- 5<sup>th</sup> – 1.00
- 6<sup>th</sup> – 0.86

### TorqueBox R-Ratio 5-Speeds

- 1<sup>st</sup> – 2.75
- 2<sup>nd</sup> – 2.05
- 3<sup>rd</sup> – 1.55
- 4<sup>th</sup> – 1.18
- 5<sup>th</sup> – 1.00

### TorqueBox Z-Ratio 6-Speeds

- 1<sup>st</sup> – 2.61
- 2<sup>nd</sup> – 1.89
- 3<sup>rd</sup> – 1.50
- 4<sup>th</sup> – 1.12
- 5<sup>th</sup> – 1.00
- 6<sup>th</sup> – 0.95

### TorqueBox Z-Ratio 5-Speeds

- 1<sup>st</sup> – 2.61
- 2<sup>nd</sup> – 1.89
- 3<sup>rd</sup> – 1.50
- 4<sup>th</sup> – 1.12
- 5<sup>th</sup> – 1.00

## WHAT DO I NEED?

### REQUIRED PARTS, TOOLS, & REFERENCE MATERIALS

To properly install the TorqueBox, the following is required:

- 11/16" bore master cylinder, brake line, banjo fittings and bolts, 3/8-24 banjo bolt for the clutch actuator
- Factory Service Manual for your year and model motorcycle
- Common hand tools (allen wrenches, sockets, retaining ring pliers, etc.)
- Healthy breaker bar, 1/2" drive
- Torque wrenches, 3/8" & 1/2" drive
- 1-3/16" socket, 6 pt, 1/2" drive (clutch)
- 1-1/2" socket, 6 pt. 1/2" drive (comp sprocket)
- Red and blue threadlocker
- A new primary cover gasket
- Pulley locking tool
  - BAKER TOOLC-56
  - H-D equivalent 41184
- Pulley nut socket
  - BAKER TOOLD-56
  - H-D equivalent 94660-37B
- Primary drive locking tool
  - HD-41214
- Primary fluid – 26 – 32 oz.
  - BAKER recommends Spectro Heavy Duty Primary Chain Case Oil; R.HDPCO
- Transmission Fluid – 32 oz.
  - BAKER recommends Spectro Heavy Duty Platinum 6 Speed Transmission Oil; BD-75140-32
- Brake Fluid – Clutch Actuator
  - BAKER highly recommends using DOT 4

### HIGHLY RECOMMENDED ADDITIONAL PARTS

BAKER highly recommends our Cadillac of clutches, the King Kong Clutch for putting that horsepower and torque to the ground. Available in bearing support (designed to fit the BAKER FFP only) and non-support options.

We also recommend our BAKER FFP; Function Formed Primary. Sculpted out of 6061-T6 to enhance the natural mechanical beauty of the elements inside.



FIGURE 3 | KING KONG CLUTCH, SUPPORT VERSION SHOWN



FIGURE 4 | FUNCTION FORMED PRIMARY

# LSD 5-SPEED GEARSET LAYOUT VIEW

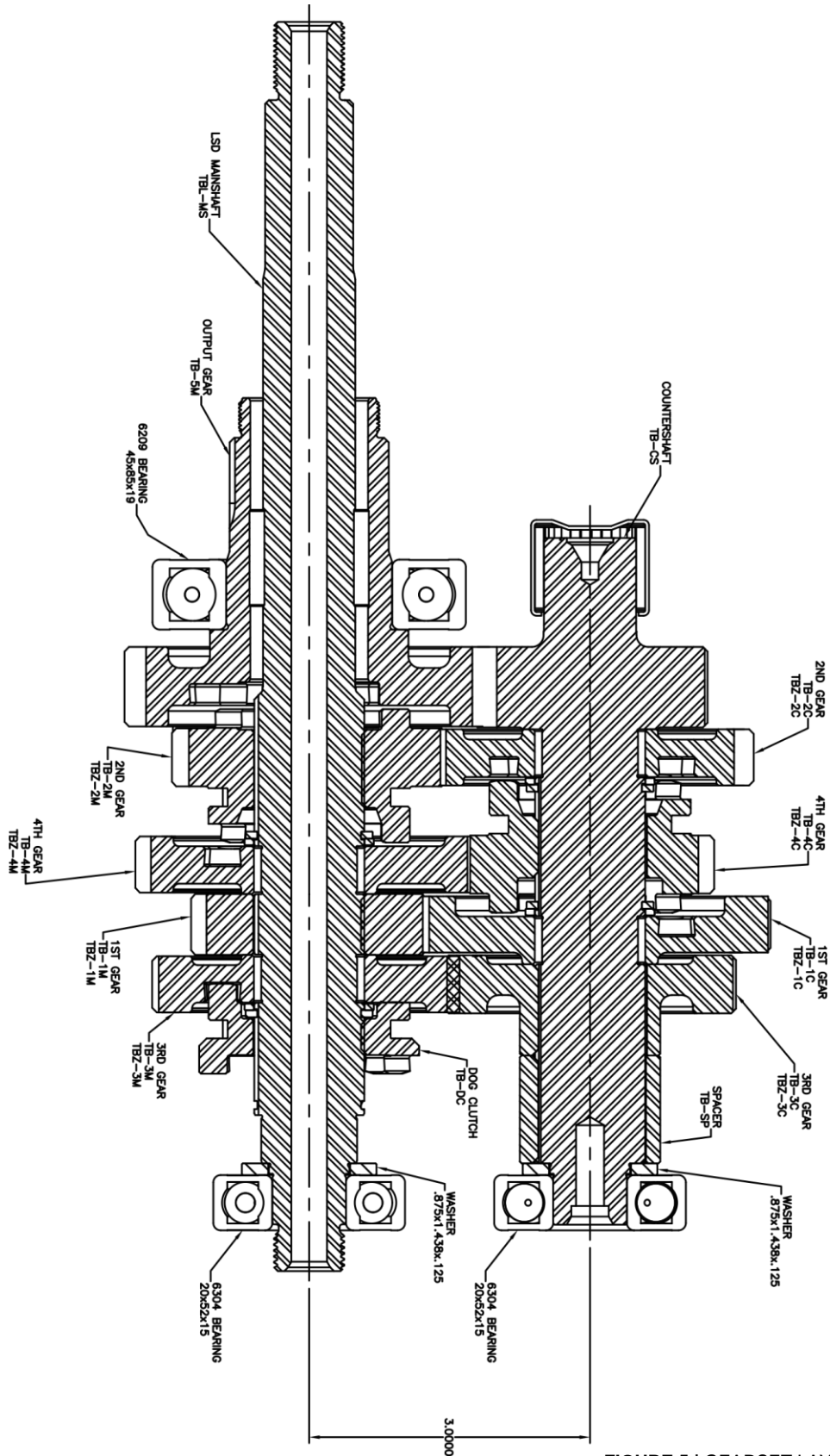


FIGURE 5 | GEARSET LAYOUT, TORQUEBOX 5-SPEED LEFT SIDE DRIVE (LSD)

# RSD 5-SPEED GEARSET LAYOUT VIEW

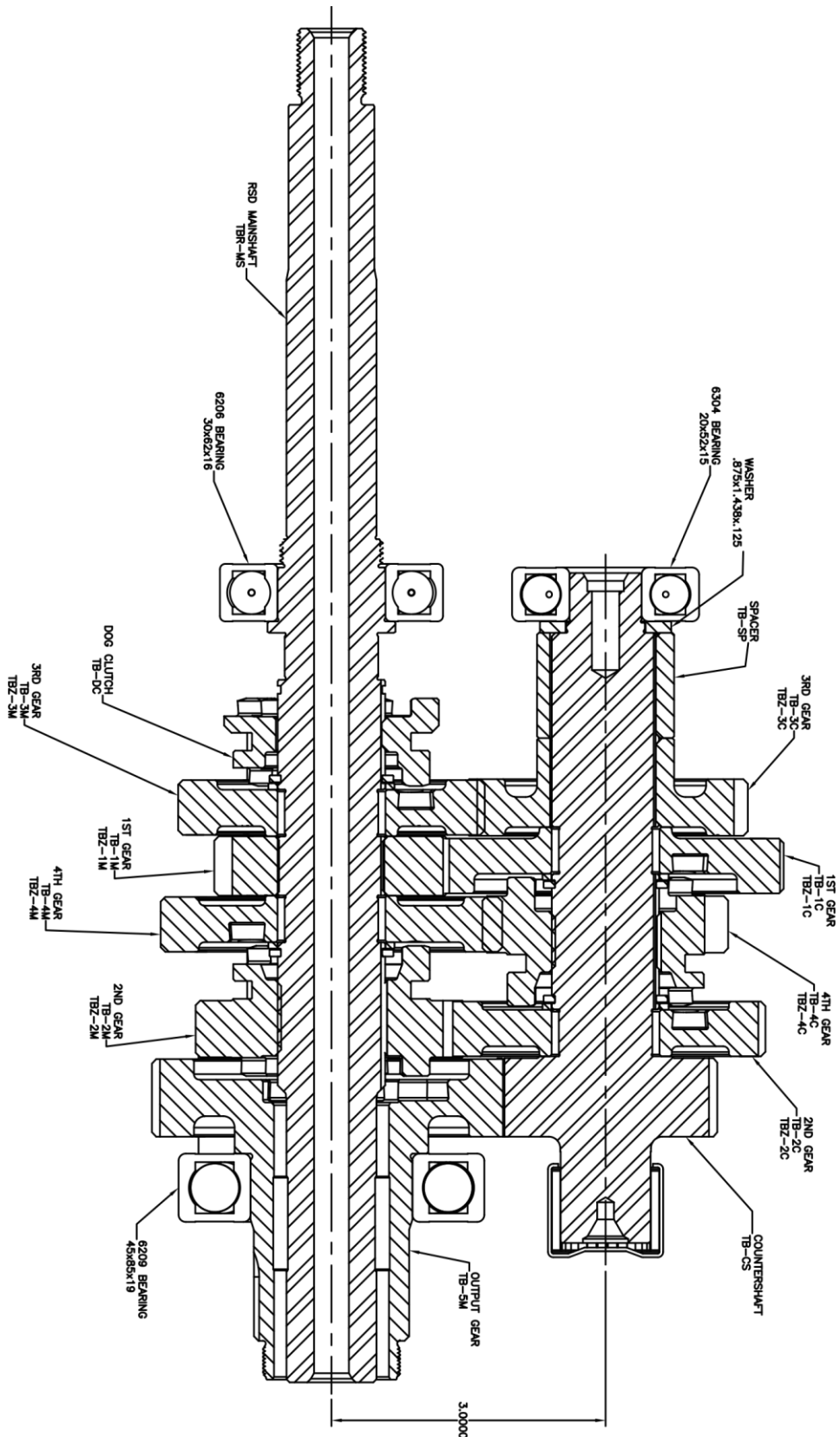


FIGURE 6 | GEARSET LAYOUT, TORQUEBOX 5-SPEED RIGHT SIDE DRIVE (RSD)



# LSD 6-SPEED GEARSET LAYOUT VIEW

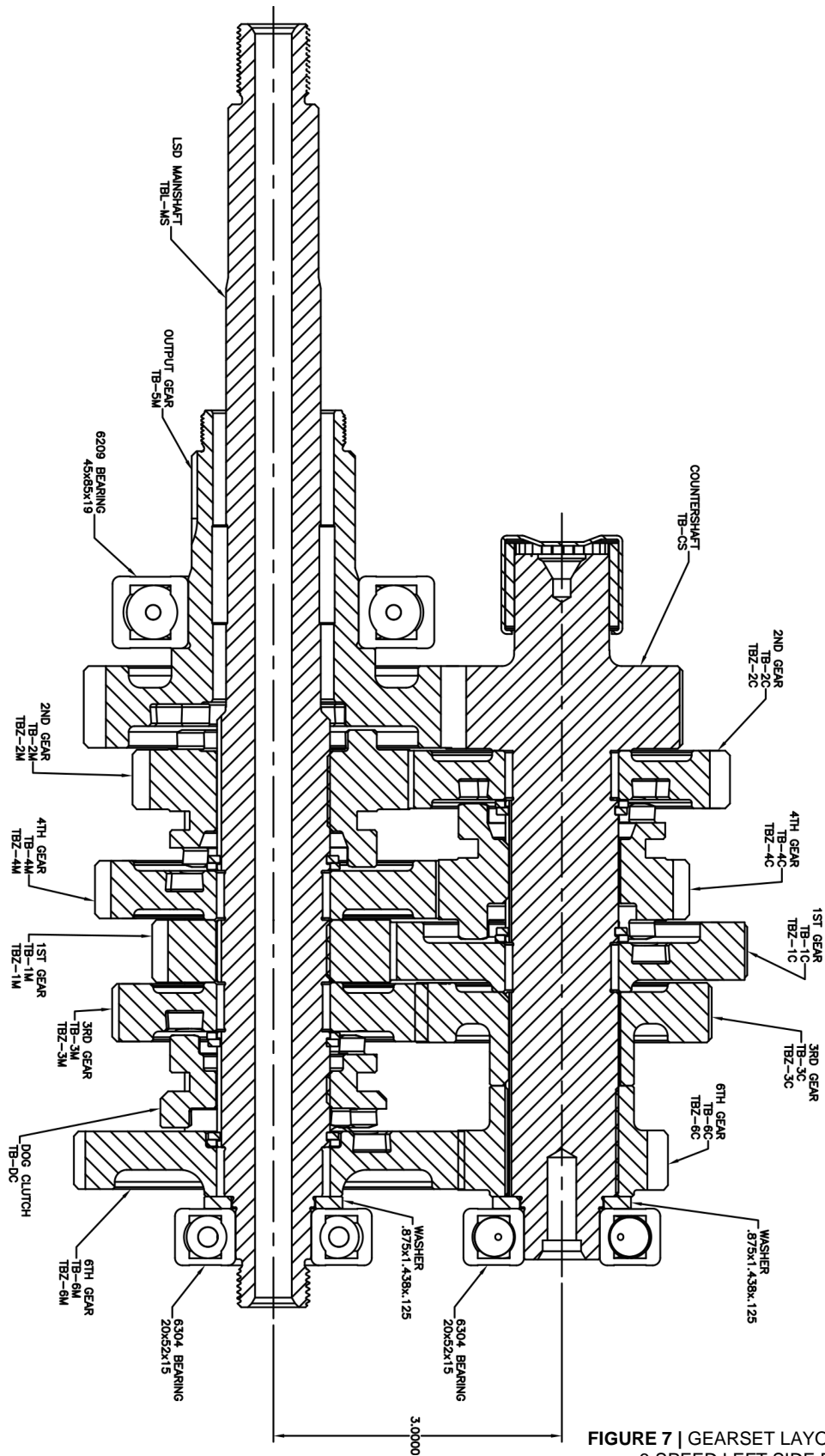
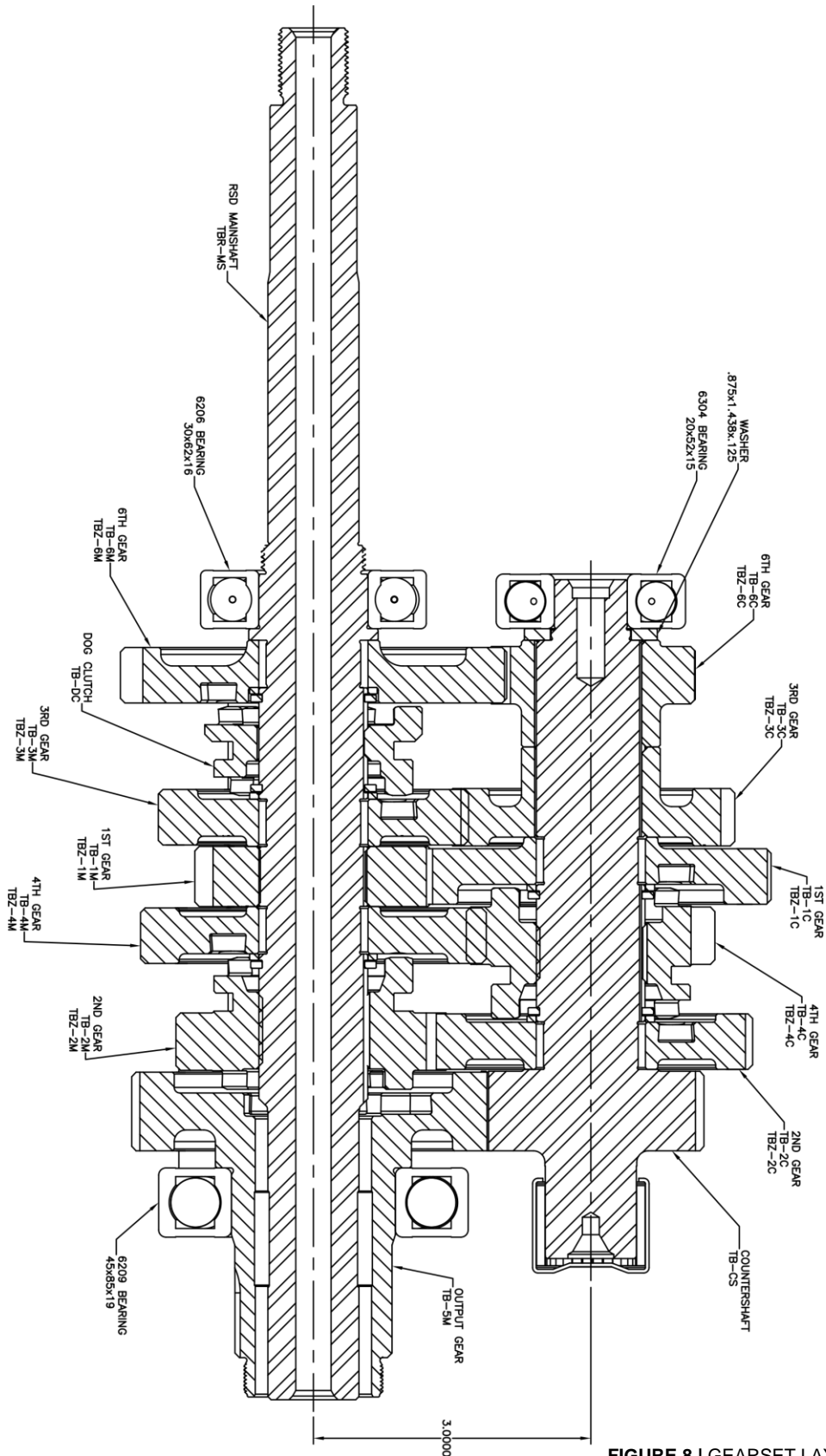


FIGURE 7 | GEARSET LAYOUT, TORQUEBOX 6-SPEED LEFT SIDE DRIVE (LSD)

# RSD 6-SPEED GEARSET LAYOUT VIEW



**FIGURE 8 | GEARSET LAYOUT, TORQUEBOX 6-SPEED RIGHT SIDE DRIVE (RSD)**

# BEFORE INSTALLING YOUR TORQUEBOX

## BEFORE YOU DO A DAMN THING

Know the following – the transmission is a component in the powertrain of your motorcycle. As such, it's function is highly dependent on other components in the powertrain to perform as designed. If the clutch, clutch actuator, primary, or shift linkage is worn, tired, or compromised in any way, the transmission will not perform as designed. The process of installing the TorqueBox is the perfect time to assess and freshen up these components to ensure the transmission gives you years of trouble-free service.

## STOCK TRANSMISSION REMOVAL | TORQUEBOX INSTALLATION

Refer to your Factory Service Manual for detailed instructions on how to remove your stock transmission. Ensure that you have the correct Factory Service Manual for your year and model of motorcycle.

Install the TorqueBox transmission by following the Factory Service Manual.

### TECH TIP:

*Make sure you align the transmission to the inner primary before tightening down the transmission studs on the bottom of the case. If any shims need to be installed for proper alignment of the transmission case; do so before installing stud nuts and or tightening the transmission into the frame.*

*Failure to properly align your transmission can result in bearing and component failures. The transmission mainshaft should spin freely once everything is torqued down and inner primary is installed.*

## TRANSMISSION FLUID FILL | CHECK PROCEDURE

Once the TorqueBox is installed, fill with transmission fluid by removing the shift drum linear detent. Add 22 – 24 fl-oz (DRY) or 18 – 22 fl-oz (WET) of transmission fluid. Re-install the shift drum linear detent using blue threadlocker. Torque to 220 in-lbs. The TorqueBox transmission is unique in which you must measure out the amount of fluid you're putting in the transmission, similar to filling fork legs.

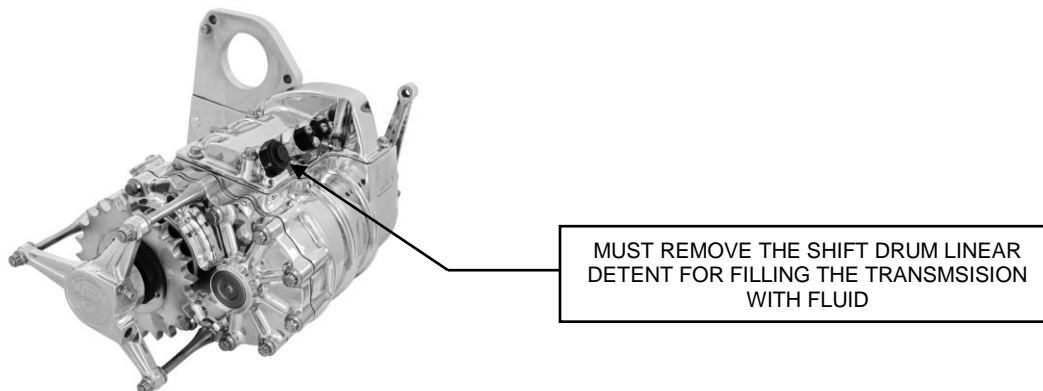
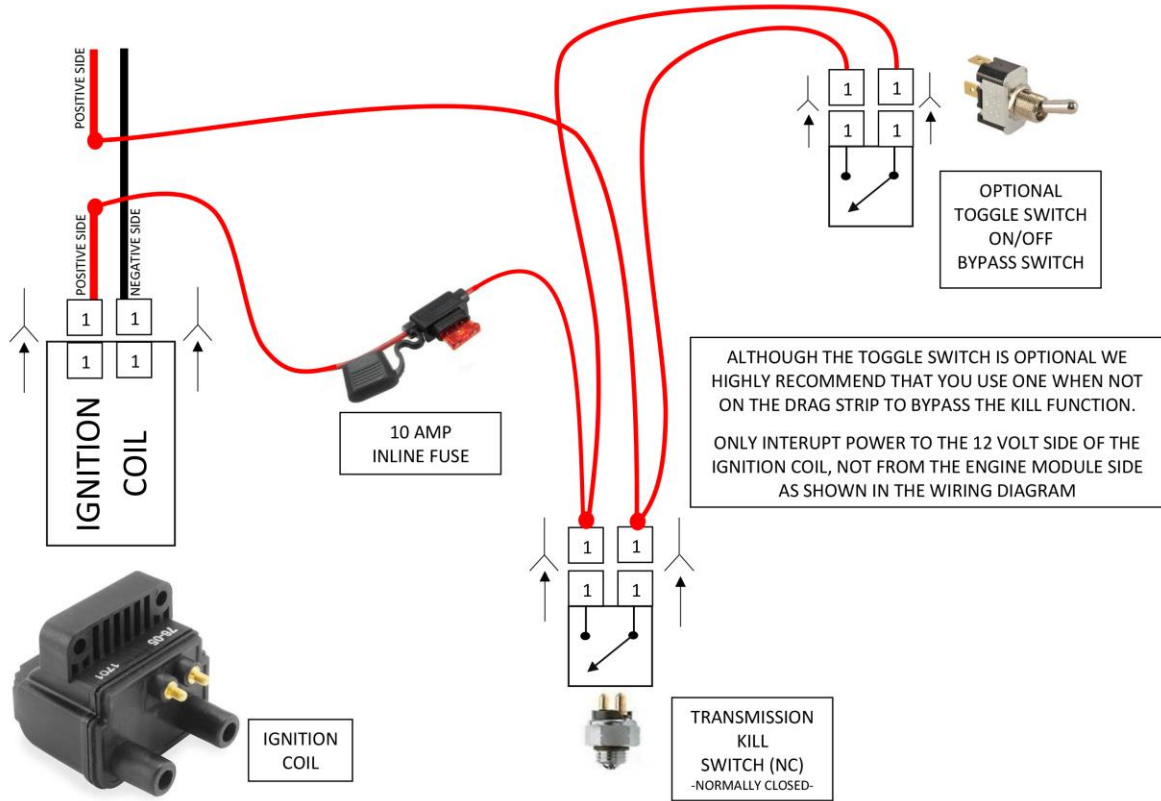


FIGURE 9 | FLUID FILL LOCATION

# IGNITION KILL WIRING

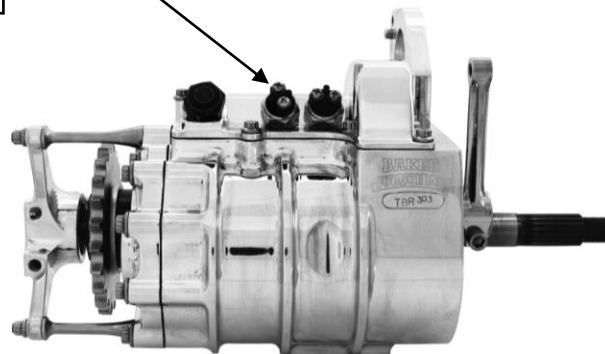
## IGNITION KILL WIRING

Wire the TorqueBox ignition kill switch by using the diagram below. Refer to figure 11 for the correct switch to be wired.



**FIGURE 10 | WIRING DIAGRAM**

THE KILL SWITCH IS LOCATED IN THE CENTER, BETWEEN THE NEUTRAL LIGHT SWITCH AND SHIFT DRUM LINEAR DETENT



**FIGURE 11 | KILL SWITCH LOCATION**

# TERMS & CONDITIONS

## ORDERS

Orders can be pre-paid using VISA, MasterCard, American Express, and Discover or via wire transfer (\$30 wire transfer fee applies). All orders not pre-paid will be sent C.O.D. certified check or money order only unless pre-approved for company check acceptance. Any orders from outside the USA must be pre-paid in US funds via wire transfer (\$30 transfer fee applies). Prices shown are F.O.B. Haslett, MI. BAKER™ ships via UPS Ground or USPS Parcel Post for all orders. UPS air shipment or USPS Priority/ Express services are available upon request. Customer is responsible for all shipping charges unless otherwise arranged at the time of sale.

## CUSTOMER SUPPORT

For any installation or service questions, please contact our BAKER technical department: 1-517-339-3835.

## LIMITED WARRANTY

BAKER™ transmission assemblies, transmission kits, primaries, and oil pans are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of 5 years from the date of purchase or up to 50,000 miles. BAKER™ clutches, kicker cover kits, belt drives, F6F kit, reverse systems, covers and accessories are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of 2 years from the date of purchase or up to 24,000 miles. Electrical components are guaranteed for 90 days, chrome finish is guaranteed for 6 months.

If the product is found by BAKER™ to be defective, such products will, at the option of BAKER™, be replaced or repaired at cost to BAKER™.

In the event warranty service is required, the original purchaser must call or write BAKER™ immediately with the problem. If it is deemed necessary for BAKER™ to make an evaluation to determine whether the transmission assembly or transmission kit is defective, the entire transmission assembly, whether originally purchased as an assembly or kit, must be properly packaged and returned prepaid to BAKER™ with a copy of the original invoice of purchase. If after an evaluation has been made by BAKER™ and a defect in materials and/or workmanship is found, BAKER™ will, at BAKER™ option, repair or replace the defective part of the assembly.

BAKER Warranty card must be returned within 45 days of purchase to be valid.

## RETURNS AND EXCHANGES

Any merchandise returned for any reason (exchange, credit or modification) must be accompanied by a Returned Goods Authorization (RGA) number or it will be refused. Call BAKER™ to obtain this number prior to returning goods for any reason. There is a 15% restocking fee for all returned items. BAKER™ is not liable for any shipping changes or damages incurred during shipping. Shipments of returned goods must be insured by the customer.

## ADDITIONAL WARRANTY PROVISIONS

NOTE: This limited warranty does not cover labor or other costs or expenses incidental to the repair and or replacement of BAKER™ products. This warranty does not apply if one or more of the following situations is judged by BAKER™ to be relevant: improper installation, accident, modification (including but not limited to use of unauthorized parts), racing, high performance application, mishandling, misapplication, neglect (including but not limited to improper maintenance), or improper repair.

BAKER™ shall not be liable for any consequential or incidental damages arising out of or in connection with a BAKER™ transmission assembly, transmission kit, swingarm, fender, component or part. Consequential damages shall include without limitation, loss of use, income or profit, or losses sustained as the result of injury (including death) to any person or loss of or damage to property.

BAKER™ transmissions, transmission kits, and accessories are designed exclusively for use in American V-Twin motorcycles. BAKER™ shall have no warranty or liability obligation if a BAKER™ part is used in any other application.

If it is determined that a BAKER™ transmission assembly has been disassembled during the warranty period for any reason, this limited warranty will no longer apply unless you were instructed to do so by a BAKER Drivetrain technician for diagnostic purposes.

## DISCLAIMER

The words Harley and H-D are registered trademarks and are for reference only. Use of H-D model designations and part numbers are for reference only. BAKER Drivetrain has no association with, and makes no claim against, these words, trademarks, or companies.

It is the sole responsibility of the user to determine the suitability of this product for his or her use, and the user shall assume all legal, personal injury risk and liability and all other as well as all other obligations, duties and risks associated therewith.

# TRANSMISSION OIL CHANGE LOG

<b>DATE</b>	<b>ODOMETER</b>	<b>OIL USED</b>	<b>SERVICED BY</b>
	500		
	2,500		
	7,500		
	12,500		
	17,500		
	22,500		
	27,500		
	32,500		
	37,500		
	42,500		
	47,500		
	52,500		
	57,500		
	62,500		
	67,500		
	72,500		
	77,500		
	82,500		
	87,500		
	92,500		