



**Performance  
Machine · Inc**  
DISC BRAKES AND WHEELS FOR MOTORCYCLES

**Installation Instructions  
PM Phatail Kit**  
For 1991 and newer Softails®

**ATTENTION**

Statements in these instructions that are preceded by the following words are of special significance:

**Warning**

This means there is the possibility of injury to yourself or others.

**Caution**

This means there is the possibility of damage to the motorcycle.

**Note**

*Information of particular importance has been placed in italics.*

**Important Notice**

☞ Before installing this kit, read through these instructions completely; this will familiarize you with the way in which the parts fit together and the tools needed to complete the job.

☞ The PM Phatail Kit involves significant alterations of your motorcycle and may void your factory warranty. PM STRONGLY recommends this conversion be done by an experienced motorcycle mechanic.

☞ Before performing any installation steps, disconnect the motorcycle's battery to eliminate any possibility of damage to the electrical system or injury to yourself due to a short circuit.

**Warranty**

Performance Machine Inc. warrants to the original purchaser that the parts of this Phatail Kit to be free of manufacturing defects in materials and workmanship for a period of one (1) year from the date of purchase. In the event warranty service is required, you must call Performance Machine immediately with a description of the problem.

If it is deemed necessary for Performance Machine to make an evaluation to determine whether the part is defective, a return authorization number will be given by Performance Machine. The parts must be packaged properly so as to not cause further damage and returned prepaid to Performance Machine with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem. If after the evaluation by Performance Machine the part was found to be defective it will be repaired or replaced at no cost to you. If we replace it, we may replace it with a reconditioned one of the same design.

Performance Machine shall not be held liable for any consequential or incidental damages resulting from the failure of a Performance Machine part.

Performance Machine shall have no obligation if a part becomes defective as a result of improper installation or abuse.



**Disclaimer**

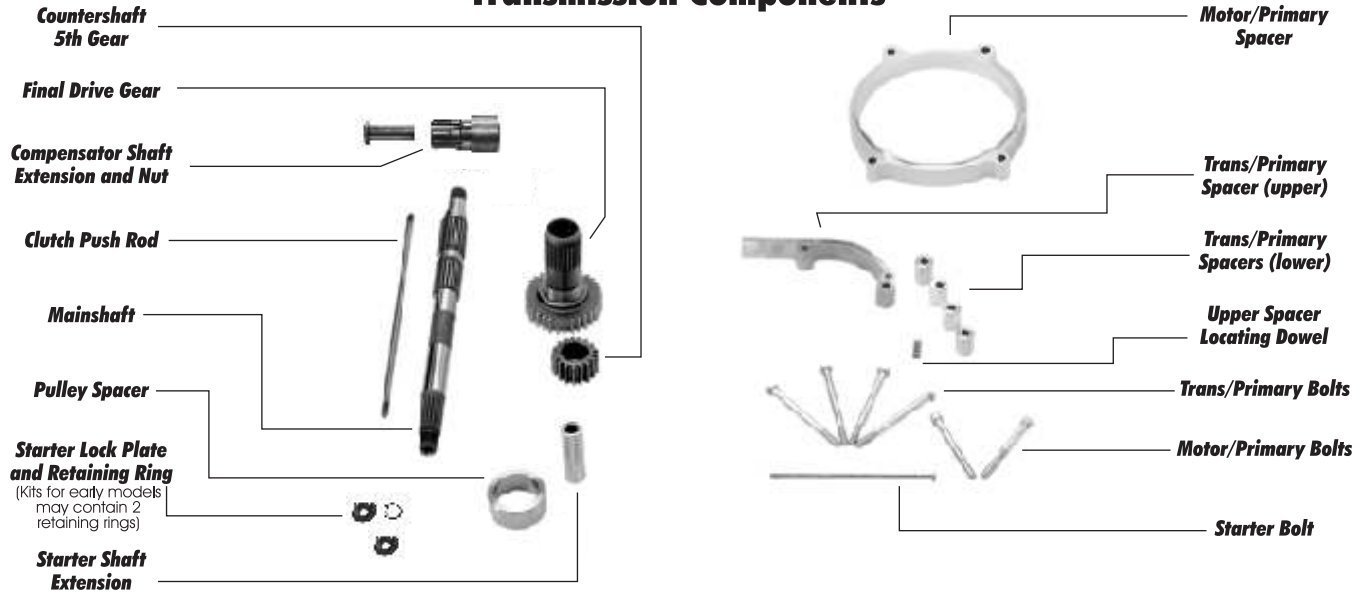
These Performance Machine parts are designed for high performance motorcycle applications and are intended for the very experienced rider only. The installation of these Performance Machine parts may adversely effect or void your factory warranty.

6892 Marlin Circle, La Palma, CA 90623 - USA 714-523-3000 fax 714-523-3007 tech@performancemachine.com

## PM Phatail Parts List

Before starting to install the Phatail kit on your motorcycle, check the packing list to make sure the kit received is the correct one for your model motorcycle and that all components are present.

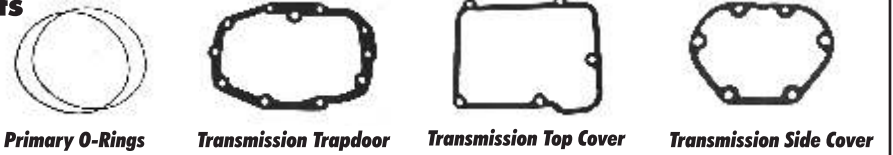
### Transmission Components



### Floorboard Spacer



### Gaskets



### Swingarm & Fender Components



### Additional items necessary for installation (not included)

*Engine Oil  
Transmission Oil*

*Primary Oil  
Primary Gasket*

*1991-99 Softails will require a  
2000 and newer rear brake system*

*Corbin Seat:  
Standard (part# pm-phatail-g)  
Ducee (part# pm-phat-ducee)*



Photo 1



Photo 2

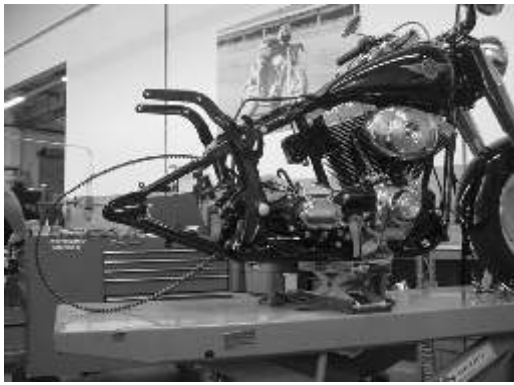


Photo 3



Photo 4

## Recommended Tools

This is a complex installation and will require several specialized tools to complete correctly.



- 1) Sawzall (can substitute hack saw)
- 2) Inner bearing race remover/installer
- 3) Transmission pulley tool
- 4) Mainshaft locknut wrench
- 5) Main drive gear remover/installer

## Stock Component Removal

To install the PM Phatail Kit it will be necessary to raise the motorcycle off the ground on a suitable lift.

### Warning

*Be sure to center the motorcycle on the lift so that it does not fall over when you raise it up or when you are working on it*

Installation of the PM Phatail Kit begins with the disassembly and removal of the rear end of the bike. Start with the simplest and most obvious components. For detailed information on removal of these parts, consult your factory manual.

### Disconnect the battery, Drain oil from Motor, Trans & Primary

Remove:

- 1) Seat
- 2) Battery
- 3) Pipes & Mounting Brackets
- 4) Fender Struts, Fender & Lights
- 5) Rear Wheel & Brake
- 6) Electronics from under seat and rear of oil tank
- 7) Oil tank (careful not to damage clips)

———— Note ————

*1991 through 1999 Softails will NOT remove oil tank until later steps.*

## Remove Stock Swingarm

The stock swingarm will be removed and discarded to make way for your new Phatail swingarm!

- 1) Remove rear shock absorbers.
- 2) Remove pivot shaft and spacers.
- 3) Remove swingarm from frame. **See photo 4.**

———— Note ————

*Save all stock hardware & spacers, as some will be re-used.*

## Oil Tank Modifications (1991-1999 only)

In order to gain needed clearance for the wider swingarm, the 1991-1999 Softail oil tank will need to be modified. The process is relatively simple and all necessary components are supplied with the PM Phatail Kit.

- 1) Remove the rear oiltank bracket.
- 2) Using supplied 5/16" socket head cap screws, bolt new oil tank bracket to frame.
- 3) Mark lower holes on oil tank. **See Photo 7.**
- 4) Remove oil tank and drill 5/16" holes where marked.
- 5) Cut original mounting tabs off of oil tank.

———— Note ————

*Oil Tank modifications only apply to 1991 through 1999 models and are NOT necessary for 2000 and newer bikes.*



Photo 5



Photo 6



Photo 7

## Stock Component Removal (continued)

The next stage involves the removal of the inner and outer primary. Please consult your factory manual for more detailed information.

- 1) Begin by removing the outer primary cover.
- 2) Remove center nut from chain tensioner
- 3) Remove retaining ring and release plate from clutch
- 4) Remove clutch hub mainshaft nut (**NOTE: Left Hand Threads!**)
- 5) Remove Compensating sprocket nut, spacer, sprocket cover and sliding cam.
- 6) Remove clutch assembly, primary chain tensioner, and sprocket as a single assembly.
- 7) Remove starter jackshaft (inspect primary case/jackshaft oil seal, replace if necessary).
- 8) Remove starter motor from primary case.



Photo 8





Photo 9

## Recommended Tools

- 9) Remove inner primary (save original hardware and lock tabs)
- 10) Remove bolts and lockplate from front drive pulley.



- 11) Secure pulley using Transmission Pulley Tool and remove pulley nut with Mainshaft Locknut Tool. (NOTE: Left Hand Threads!)



- 12) Remove mainshaft bearing inner race using Bearing Race Remover/Installer Tool. See factory manual for detailed instructions.



Photo 10

- 13) Remove Tranny Top Cover
- 14) Remove Shift Drum. See Photo 10.
- 15) Remove Clutch Side Cover
- 16) Remove Shift Forks
- 17) Remove clutch pushrod assembly (from right side of trans)
- 18) Lock trans in between gears and loosen mainshaft locknut.
- 19) Remove trapdoor (trapdoor, mainshaft and countershaft will slide out as an assembly). See Photo 11.
- 20) Remove gears from mainshaft (note order and inspect gears for any damage)
- 21) Remove Mainshaft from trapdoor.
- 22) Remove 5th gear from countershaft.
- 23) Remove Final Drive gear from transmission case.

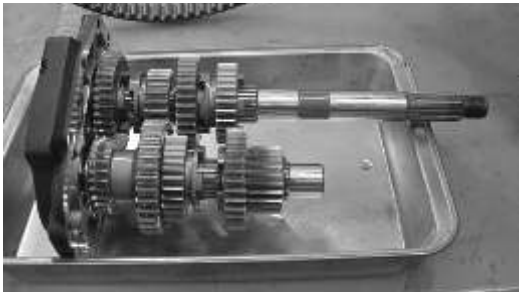


Photo 11



— Note —

*PM Strongly recommends utilizing the factory manual as a guide for disassembly as well as assembly of all primary and transmission components.*

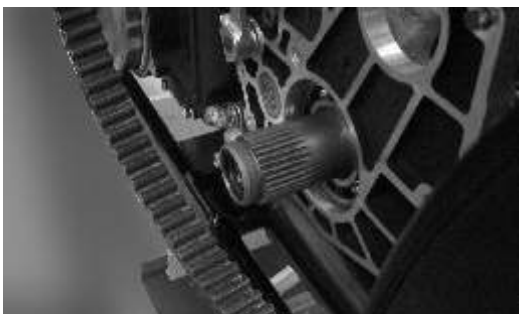


Photo 12

## Transmission Re-Assembly



- 1) Install supplied Final Drive Gear into transmission case using Main Drive Gear Tool. See Photo 12.
- 2) Install Supplied countershaft 5th gear.
- 3) Install stock gears onto supplied mainshaft (refer to factory manual for detailed installation instructions).
- 4) Install completed mainshaft assembly into trapdoor and torque mainshaft nut to factory specs. See Photo 13.



Photo 13



## Transmission Re-Assembly (continued)

- 5) Install trapdoor/gear assembly into transmission case using supplied gasket. **See Photo 14.**
  - 6) Install shift forks and shift drum.
  - 7) Install clutch pushrod assembly into mainshaft
  - 8) Install transmission side cover using supplied gasket.
  - 9) Install Transmission top cover using supplied gasket.
- At this point, all internal transmission changes are completed.*
- 10) Install supplied spacer onto main drive gear (stock spacer is also utilized). **See Photo 15.**



- 11) Secure pulley using Transmission Pulley Tool and install pulley nut with Mainshaft Locknut Tool. (NOTE: Left Hand Threads!)
- 12) Install Belt (1991-99 models use supplied 1.125" wide belt)
- 13) Install lockplate over pulley nut.
- 14) Refill transmission with fresh oil.



- 15) Install inner bearing race as specified in factory manual using Bearing Race Remover/Installer Tool. **See Photo 16.**

### Warning

*Inner bearing race length and location is critical to proper function and must be installed to manufacturers specifications. Consult factory manual for correct installation.*

The stock primary will now bolt to the motor and trans through a series of 1" spacers. Each of these 6 spacers is supplied with the PM Phatail kit.

## Re-Install Primary

- 1) Install Motor/Primary spacer (coat all seal lips with oil) using supplied o-ring gaskets (one between motor and spacer and the other between spacer and inner primary). **See Photo 17.**
- 2) Install locating dowel in Trans/Primary upper spacer.
- 3) Place spacer onto transmission **See Photo 18.**
- 4) Locate stock trans/engine bolts and select two bolts. **These will now be used as motor/primary bolts.**
- 5) Confirm that drive belt is placed over transmission pulley.



Photo 14

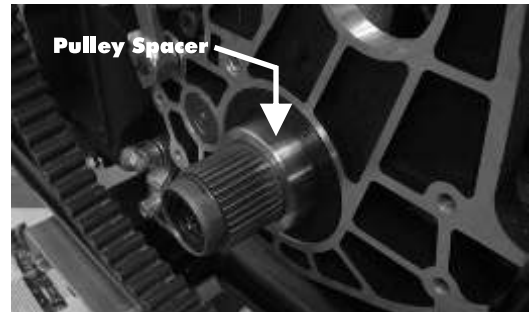


Photo 15

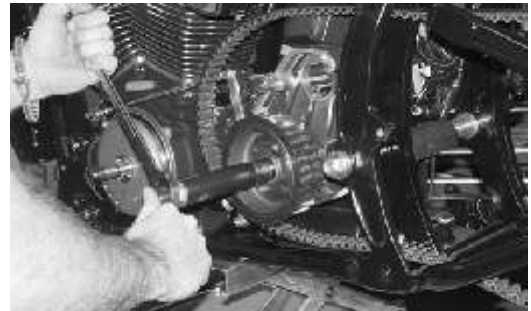


Photo 16



Photo 17

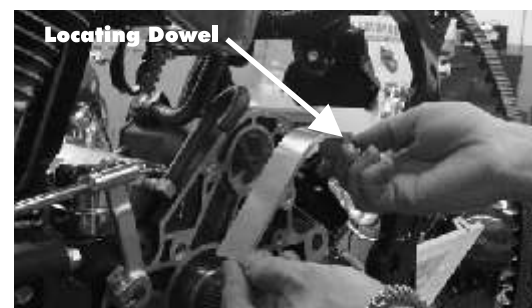


Photo 18

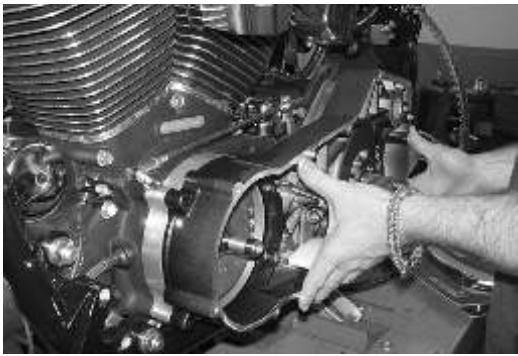
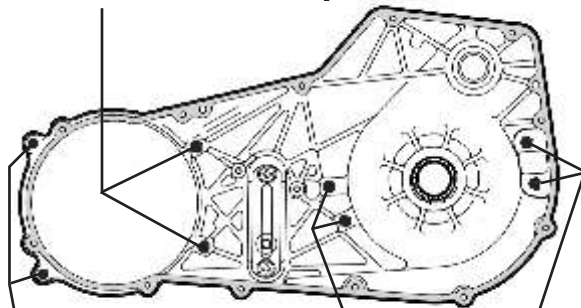


Photo 19

**Stock Trans/Primary Bolts  
Now used for Motor/Primary**

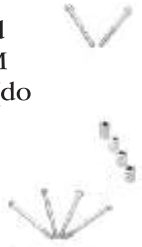


**Supplied Allen  
Head Bolts**

**Supplied Hex  
Head Bolts**

## Re-Install Primary (continued)

6) Place inner primary over spacers and install supplied socket head cap screws on outside of primary. Use OEM trans/primary bolts and lock tabs on inside of primary (do not tighten bolts at this point). See photo 19



7) Install 4 lower Trans/Primary spacers as shown in photo 20 using supplied bolts and stock lock tabs.

8) Torque all inner primary case bolts down to factory specs and bend up the lock tabs.

***The Inner Primary is now successfully installed!***

9) Install supplied circlip inside starter shaft extension



10) Install supplied starter shaft extension (Counter bore towards jack shaft) onto starter.

11) Install starter motor using 5/16" x 2 3/4" bolts.

12) Install jackshaft assembly using supplied lock plate and bolt. See factory manual for detailed breakdown of jackshaft assembly. Torque jackshaft bolt to 7-9 ft-lbs and bend up locktab.

———— Note ————

*Phatail Kits for 1991 thru 1999 will include two lock plates. Early models will use larger I.D., Later models will use smaller I.D.*



Photo 20

13) Slide motor shaft extension onto engine output shaft. Using stock compensator assembly, install primary chain/compensator/clutch assembly to motor and trans. Use supplied extended compensator nut to retain compensator assembly. Reference harley manual for additional instructions and torque specs. Use threadlock and torque motor sprocket nut to 160 ft-lbs.



14) Install supplied clutch pushrod inside mainshaft and install release plate, retainer ring, adjuster screw and jam nut. Adjust clutch to factory specifications.

14) Adjust primary chain to factory specifications.

16) Using a new gasket (not supplied), install outer primary. See photo 21. Refill primary with fresh oil.

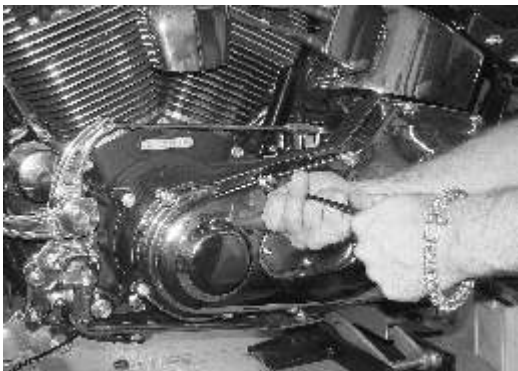


Photo 21



## Remove Fender Struts

To accommodate the Phatail Kit, the OEM fender struts will have to be cut off of the frame. Cover all exposed motor parts to prevent contamination from metal chips. Remove the strut flush with the horizontal connector plate and grind smooth. PM recommends painting the exposed metal to prevent corrosion.

——— Note ———

*Fit Supplied Billet Fender Struts to frame to check fitment.  
Remove additional material if necessary*



**Photo 22**



**Photo 23**

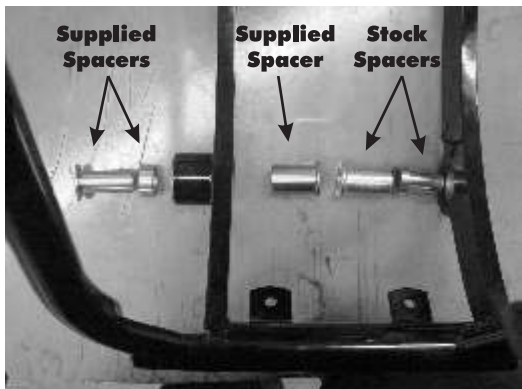
## Final Re-Assembly

Re-install oil tank, oil lines and related parts. Fill oil tank and motor with factory prescribed amount of oil. (99 and earlier shown)



**Photo 24**





(As viewed from rear of swingarm)

Photo 25



Photo 26

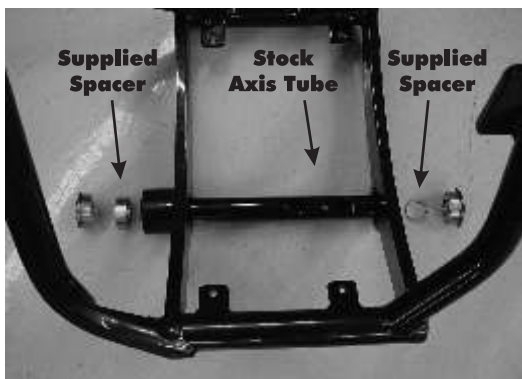
### Install Phatail Swingarm (2000 and newer)

The PM Phatail Kit for 2000 and newer Softails includes 3 swingarm spacers that are used in addition to the OEM spacers.

- 1) Remove bearings from stock swingarm and install in Phatail unit.
- 2) Insert left side long spacer from outside of frame.
- 3) Slide left side small spacer over long spacer from inside frame.
- 4) Insert third left side spacer in swingarm bearing tube from inside swingarm.
- 5) Slide swingarm into frame.
- 6) Push left side outboard spacer through frame and into swingarm.
- 7) Slide stock right side spacer from inside swingarm through bearing and into frame.
- 8) Locate 2nd stock spacer between trans case and inside of swingarm.
- 9) Install swingarm pivot bolt and tighten to factory specs.

———— Note ————

*Consult factory manual for detailed instructions explaining swingarm installation.*



(As viewed from rear of swingarm)

Photo 27



Photo 28

### Install Phatail Swingarm (1991-99 Models)

The PM Phatail Kit for 1991-1999 Softails includes 2 swingarm spacers that are used in addition to the OEM Axis Tube.

- 1) Remove bearings and axis tube from stock swingarm and install in Phatail swingarm from the outside on both bearings. (Axis tube MUST be in place before bearings are installed).
- 2) Locate swingarm into frame
- 3) Using stock pivot bolt and lockwasher, capture large spacer between chassis and swingarm on left side. **See Photo 27.**
- 4) Place thin spacer between axis tube and bearing on right side.
- 5) Install stock pivot bolt and lockwasher on right side.
- 6) Tighten swingarm pivot bolts to factory specs.

———— Note ————

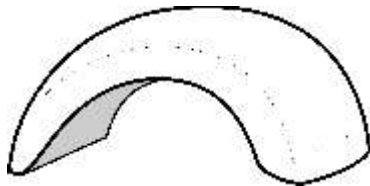
*Although lowering the suspension is not necessary, the PM Phatail Fender contour is best suited to a 1" lowered rear end.*

## Install Rear Fender & Struts

Install supplied strut studs into frame (apply drop of Threadlock). Note step stud is NOT used for Duece frames. Install Supplied fender struts with acorn nuts. Install fender bolts (3/8" 16 x 3/4" button head with washer) from inside fender. Will not be accessible once wheel is mounted.

———— Note ————

*Stock rear lights and license plate will not bolt directly to Phatail fender. Will require custom fabrication or use of PM Phatail fender with integrated light and license plate frame.*



Drill holes in fender for ignition module (fit seat for proper clearance, before mounting ignition module)

PM recommends any changes or modification to rear fender be done at this point, as fender can not be removed without removing rear wheel as well. Always test fit fender before painting.

Install supplied splashguard into swingarm.

### Warning

*Confirm all electrical, as well as electrical breakers do not make contact with metal or moving parts.*

———— Note ————

*This is a good time to test fit your exhaust system, as some full length systems sill interfere with the wider Phatail Swingarm.*

## Integrated License Plate Frame

### PM Phatail Wiring Changes:

The light housing/license plate frame included with the PM Phatail was designed to use with the light on top or bottom. The Phatail application utilizes the light in the bottom position and therefore requires the purple and brown wires to be swapped for correct turn signal function.

**Swap BROWN and PURPLE before plugging into harness**



Supplied harness

Wires from Phatail Taillight



Photo 29



Phatail Fender Struts



Phatail Fender without License Plate



Phatail Fender with integrated license plate taillight and blinkers.



**Photo 31**

## **Install Floorboards**

Included with the PM Phatail Kit is a floorboard spacer plate and hardware. With the primary moved over 1" the foot control will have to be moved to regain clearance and properly align shift linkage. Spacer will work with stock floorboards as well as aftermarket forward controls.

Mount floorboard assembly to frame, capturing supplied spacer between floorboard bracket and mounting plate on frame. Use supplied allen head screws and a drop of Threadlock, tighten to factory specs. Install Shift linkage and adjust if necessary. See **photo 31**.



**Photo 32**

## **Install Rear Brake & Wheel**

Attach brake line to brake caliper (stock line can be used in most cases). Some PM brake systems require the caliper be bled off of the bike (do this now). for additional information covering PM brakes, see separate instruction sheet included with PM caliper.



**Photo 33**

Raise rear of bike high enough to allow rear wheel to slide under. Locate wheel and slide drive belt over pulley.

Lower bike until swingarm axle holes line up with wheel. See **photo 32**.

Before locating caliper bracket, wheel spacers (Supplied with PM Wheels) must be installed.

On right side, insert wheel spacer against wheel bearing and slide caliper bracket between spacer and swingarm. See **photo 33**.



**Photo 34**

———— Note ————

*For PM Driveside brake systems, please reference the Driveside Installaion Sheet supplied with the brake system.*

———— Note ————

*All 1991-99 Softails will require a 2000 or newer rear brake system.*



## Install Rear Brake & Wheel (continued)

Install supplied axle (coat axle with thin layer of grease) and insert into swingarm from left side of bike. Do not force axle, slight movement of wheel and spacers will aid in axle insertion. Install supplied star washer and nut. Using allen head wrench, align wheel and adjust belt tension to factory specifications and torque axle to 60-65 ft-lbs.

Install supplied axle caps on both sides of swingarm.

Re-install exhaust system.

Stand back and gloat over a successful conversion as well as having one of the wildest HD framed custom bikes in your neck of the woods!

### Warning

*Exceeding 65ft. Lbs will damage wheel bearings.*

After installing the PM Phatail Kit we strongly encourage you to do a systems check of your bike.

1. While bike is still on a stand, slowly rotate wheels watching for any potential interference (disc to caliper, caliper to wheel, wheel to fender).
2. After properly bleeding brakes, lever or pedal feel should be firm and consistent.
3. Test at slow speeds, checking brakes in short intervals. Visually inspect disc, caliper and wheel before and after road testing. For the first 100 miles break in disc and pads by using light to medium braking. Avoid unnecessary hard braking. Braking power will progressively increase with less effort as brake pads and disc break in.



Photo 35



Photo 36



<http://www.performancemachine.com>



**Performance  
Machine · Inc**  
DISC BRAKES AND WHEELS FOR MOTORCYCLES