

INFERNO

FLAME

INSTALLATION and MAINTENANCE Instructions

PATENTED RACING CLUTCH ** PAT. NUMBERS 6,857,515 AND 7,717,250 **

These instructions cover the Flame kart racing clutch. The difference between kart clutches and snowmobile clutches is the type of drum. The kart racing drums have holes for air flow and heat dissipation. The snowmobile racing clutch uses a solid drum that prevents excessive chain lubrication from entering the clutch. All parts are interchangeable between these designs.

This clutch is a two (2) piece mechanism. There is a potential that if the clutch is not assembled or installed properly that serious injury can occur. It is **VERY** important that you follow all the directions for proper clutch installation. Visit www.infernoclutch.com or visit us on facebook at www.facebook.com/infernoclutch for more information.

*****For best results, perform the following weekly maintenance*****

- 1. Drum & Sprocket:** The Flame clutch is engineered to minimize clutch chatter when cleaned with solvent based cleaners. Even though the clutch design minimizes chatter, the preferred method of cleaning is to spray some WD-40 on a rag and wipe the inside of the drum. Wipe out as much dirt and debris as possible. The area where the drum and the shoes make contact is the heart of the clutch. A nice, clean, smooth surface provides the best consistency from race to race. An alternate method of cleaning is to clean the drum with acetone, starting fluid, or carburetor cleaner. These cleaning fluids will remove all of the oil and can cause the clutch to become aggressive during engagement. A small amount of oil residue will give a more consistent coefficient of friction and longer clutch life. If the drum is galled and not smooth then you can sand the inside of the drum with fine sandpaper. Clean the drum I.D. with WD-40 after sanding.
- 2. Shoes:** The preferred method to clean the shoes is to spray some WD-40 on a rag and clean the outside of the shoe. An alternate method is to clean the mechanism with acetone, starting fluid, or carburetor cleaner. These cleaning fluids will remove all of the oil and will cause the clutch to become more aggressive during engagement. A small amount of oil residue will give a more consistent coefficient of friction and longer clutch life so WD-40 is recommended for cleaning. The Flame shoe has cleaning grooves so scrape any debris out of each groove when performing the weekly maintenance.
- 3. Bushing:** Spray some WD-40 on a rag and clean the outside of the bushing. Apply one small drop of oil to the outside of the bushing. We recommend light-weight oil. Do NOT use grease, never-seize, or lubricants containing Teflon. Do NOT excessively lubricate the bushing. Excessive lubricant will end up inside the drum. Only a small drop is needed. Centrifugal force and heat will cause some oil to come out of the pores of the bushing and it automatically lubricates the bushing during operation. Do NOT clean the bushing with acetone, starting fluid, or carburetor cleaner. The bushing is oil impregnated at the factory and these cleaning fluids will dissolve all of the oil out of the pores of the bushing. Do NOT put the bushing on a rag, paper, cardboard, or other porous surface because the oil will wick out of the bushing. The bushing must be wrapped in plastic or placed in a plastic bag for storage.

Following these instructions will give you the best performance. The clutch should be cleaned prior to the first use as some parts have been dipped in oil to prevent rusting.

CLUTCH ASSEMBLY:

Insert Weights:

- These are optional and can be purchased separately. The snap rings that retain the weight are easily overstressed and damaged. **NEVER RE-USE THE SNAP RINGS.** Once removed, discard, and replace with new.

Shoe Installation:

- Shoes are to be placed on the driving lugs of the hub.
- Shoes should fit loosely on these lugs, and be able to slide freely on them.

Spring Installation:

- Use External Snap Ring Pliers to spread the springs apart for easy installation. **DO NOT** stretch the springs any further than necessary for installation.
- If mismatching springs, make sure similar springs are opposite one another in the assembly. Keep balance in mind (see tuning section).

Sprocket Installation:

- Insert the sprocket into the drum.
- Using external snap ring pliers, place the bowed snap ring into the groove on the sprocket. Because the snap ring is bowed there are two sides. Make sure the side marked "A" in the following picture is away from the drum. Side "B" is toward the drum. The bowed snap ring keeps the sprocket tight in the drum.



Bushing:

- Oil the bushing with one small drop of lightweight oil. Wipe off excess oil before installing into the sprocket. The bushing is installed from the inside of the drum. The ears of the bushing will be inside the drum when properly installed (See illustration on page 4).

Clutch Installation: Inboard mounting (sprocket closest to the engine) is recommended unless using a small sprocket that requires outboard mounting.

**** FOR BRIGGS & STRATTON L0206 ENGINE USERS PLEASE SEE THE SECTION SPECIFIC FOR THAT ENGINE ****

FOR ENGINES OTHER THAN BRIGGS & STRATTON L0206

- Slide the $\frac{3}{4}$ " I.D., 1-1/8" O.D. washer (part # 8444-22-009) onto the crankshaft until it hits the shoulder. This washer is used because some engines have a small shoulder or large radius on the shoulder that is not large enough in diameter to retain the sprocket.
- Slide the bushing/sprocket drum assembly/washer onto the engine shaft.
- Slide on the hub/shoe/spring assembly on the engine shaft. The key in the hub will need to be lined up with the keyway on the crankshaft to get the clutch to slide on completely. Make sure the shoes and springs are inside the drum and the cover is toward the outside of the clutch. You should be able to read the warning information on the face of the cover when it is assembled properly. The shoes should be fully enclosed under the drum when installed properly. Please contact your clutch dealer if you are not sure if it is assembled correctly. Improper assembly can cause serious injury or death.
- The crankshaft should be approximately 1/32" longer than the clutch assembly. (**IF USING A BRIGGS & STRATTON L0206 please see the appropriate section.***) This spacing will make sure the clutch has some free end play to move. You must not clamp tight against the clutch with the bolt and retaining washer or the bronze bushing will fail (Note: If you are using the Bully conversion kit, you can clamp tight against the clutch because the bronze bushing is not used with the conversion kit). After the bolt and retaining washer is tight you should be able to move the clutch hub back and forth 1/32" (about the thickness of a business card). If the gap is too large, then remove the clutch and place appropriate spacers (part # 8444-22-009 can be purchased as needed) on the engine shaft, and re-install the clutch following the same instructions. If the clutch is longer than the shaft then remove the bolt and retaining washer and place the necessary amount of 5/16" washers on the bolt so the retaining washer will clamp the 5/16" washers against the face of the shaft instead of the hub. These washers need to fit inside the I.D. of the hub and are meant to create a gap between the clutch retaining washer and the hub.
- Recheck your measurement for end play. (**IF USING A BRIGGS & STRATTON L0206 please see the appropriate section.***) You do not want to have the clutch clamped tight, nor do you want too much room for it to move. This step is critical, and needs to be confirmed.

CLUTCH INSTALLATION ON BRIGGS & STRATTON L0206

BRIGGS & STRATTON requires the clutch to be held tight on their crankshaft. The following instructions will help you achieve that without damaging your clutch. (**DO NOT CLAMP the Hilliard Inferno clutch tight to the shaft without following these instructions. Damage to the bushing will occur if you do not follow one of these 2 methods.)

Option 1: L0206 Clutch Mounting Kit.

- Acquire a Hilliard Clutch mounting kit, part number 8444-9u-030 from your dealer. (Not included with this clutch.) The kit includes a bolt, lockwasher, a large washer, and a chamfered spacer that are required for mounting to the L0206.
- Install the chamfered spacer on the engine first, making sure that the chamfer is over the radius on the crankshaft. (Chamfer on the engine side.)
- Slide the bushing/sprocket drum assembly/washer onto the engine shaft.
- Slide on the hub/shoe/spring assembly on the engine shaft. The key in the hub will need to be lined up with the keyway on the crankshaft to get the clutch to slide on completely. Make sure the shoes and springs are inside the drum and the cover is toward the outside of the clutch. You should be able to read the warning information on the face of the cover when it is assembled properly. The shoes should be fully enclosed under the drum when installed properly. Please contact your clutch dealer if you are not sure if it is assembled correctly. Improper assembly can cause serious injury or death.
- Check to insure that the clutch overhangs the engine crankshaft, by .020" - .030". (If the clutch overhang is outside that range you need to remove the clutch and add or remove the appropriate number of spacers (2 are provided with the clutch) to achieve the correct spacing.) Apply the washers to the inside of the crankshaft. Reinstall the clutch per the instructions, and recheck your spacing before moving on to the next step.
- Place the small lockwasher from the mounting kit, on the bolt.
- Place the large washer on the bolt. DO NOT SUBSTITUTE THIS WASHER. The washer is designed to provide the correct clamping force, and flex to insure that there is no damage to the clutch bushing. (The order should be bolt head, lockwasher, then large washer.)
- Install the bolt to the end of the crankshaft. (Torque the bolt to the recommended specification.) During the tightening of the bolt, the large washer will flex allowing the clutch to be tight enough without damaging the clutch bushing.

Option 2: L0206 Running a Bully Conversion Kit

- Acquire a Hilliard Bully Conversion Kit, part number 8444-9u-024 from your dealer. (Not included with this clutch.) The conversion kit allows you to use the "Bully" style sprockets, needle bearings, and inner race that is used in place of the bronze bushing that is included with this clutch.
- Install 2 small washers first.
- Install the bearing race to the crankshaft.
- Slide the bushing/sprocket/drum assembly onto the engine shaft. Making sure that the needle bearing is over the race.
- Install the Large washer.
- Slide on the hub/shoe/spring assembly on the engine shaft. The key in the hub will need to be lined up with the keyway on the crankshaft to get the clutch to slide on completely. Make sure the shoes and springs are inside the drum and the cover is toward the outside of the clutch. You should be able to read the warning information on the face of the cover when it is assembled properly. The shoes should be fully enclosed under the drum when installed properly. Please contact your clutch dealer if you are not sure if it is assembled correctly. Improper assembly can cause serious injury or death.
- Check to insure that the clutch overhangs the engine crankshaft, by .020" - .030". (If the clutch overhang is outside that range you need to remove the clutch and add or remove the appropriate number of spacers (2 are provided with the clutch, and 6 are included in the bully conversion kit.) to achieve the correct spacing.) Apply the washers to the inside of the crankshaft. Reinstall the clutch per the instructions, and recheck your spacing before moving on to the next step.
- Install a bolt and retaining washer (Larger than 1 1/16" in diameter). Torque the bolt to the recommended specifications.

****IMPROPER INSTALLATION/ASSEMBLY CAN RESULT IN SERIOUS INJURY****

For any additional support visit www.infernoclutch.com or contact your dealer.

INFERNO FLAME TUNING:

Balancing is the most important feature to keep in mind. If you change the weight of one shoe, then the shoe that is opposite it (180 degrees apart) **MUST** also be the same weight. Opposing shoes must run the same orientation as well. If you have a leading shoe then the shoe that is opposite it (180 degrees apart) **MUST** be in a leading shoe orientation as well.

Heavier Springs = higher engagement speed Weaker Springs = lower engagement speed

****Springs Available from Heaviest to Lightest****

****Speeds are listed as the point at which the shoes touch the drum, NOT LOCK UP RPM****

- Black – 8443-35-006-A – 3800 RPM
- White – 8443-35-005-A – 2800 RPM
- Yellow – 8443-35-004-A – 2300 RPM
- Orange – 8443-35-003-A – 1900 RPM
- Red – 8443-35-002-A – 1400 RPM
- Green – 8443-35-009-A – 1200 RPM

Note: Speeds shown are a FLAME shoe with no added weight.

- Springs can be alternated. For example, reading around the clutch, white black white black, or any combination of colors. Keep balance in mind. As long as the springs that are opposite one another are of the same color, balance is retained.
- Visit www.infernoclutch.com and download the complete engagement speed chart.

Insert Weights for tuning torque, engagement, and configuration.

- These are optional, and not required for the clutch operation.
- The more weight that is added to the shoe, the lower the engagement.
- The more weight that is added to the shoe, the higher the torque capacity.
- The placement of the weights allows engagement properties to change. Moving the weights from one end to the other will affect the configuration, making it more leading or more trailing, or making it more center balanced.
- **NEVER REUSE THE SNAP RINGS.** Once removed, discard, and replace with new.

Shoe Orientation is also tunable and changes the engagement characteristics of the clutch.

- Shoes with a mass in front of the driving lug (the 4 lugs on the hub that drives the shoes), with respect to the direction of rotation are called leading shoes. Leading shoe will have the tip of each shoe pointing towards the direction of rotation.
- Leading shoes self energize and carry more torque with very little slip. Leading shoes often stay engaged with the engine back very close to the engagement speed before releasing. (More on and off, with little slip.)
- Shoes with a mass behind the driving lug (the 4 lugs on the hub that drives the shoes), with respect to the direction of rotation are called trailing shoes.
- Trailing shoes will allow more slip and have less aggressive engagement.
- Leading and trailing shoes can be mixed. You can run 2 leading shoes, with 2 trailing shoes as long as they are opposite each other. This is called the "X" pattern.
- The Flame clutch shoe is engineered to make best shoe contact in leading orientation. If you run the shoe in a trailing orientation, you will not see full contact on the shoe until the shoe wears to the drum. This will take a lot of racing time to fully bed. Never machine the outer radius of the shoe. It has a specially designed offset in the surface to ensure the best contact.

Recommended Initial Setup:

As you can see the FLAME clutch has a wide range of tuning ability. A suggested starting point is to put the shoes in a leading orientation and install (2) white springs with (2) black springs. This setup will be a good starting point for the majority of racers. Each spring color needs to be installed opposite of each other to maintain balance. This setup will start to engage around 3400 rpm. After you test your setup you then can adjust the clutch to your specific needs. Add or remove weight or change the springs. Adding weight to each shoe will adjust your engaging speed down approximately 100-200 rpm per weight. A full engagement speed chart and a diagram showing leading versus trailing orientation is available to download from our website. www.INFERNOCLUTCH.com