July 4, 2016

Jr. 1 Briggs Base Line Racing Set Up

Engine Set Up:

1. Carburetor – floats 22 mm, Pin 1, 1.5 turns on air screw, zero cold valve lash.

Gearing:

1. CCW – 16-55 (3.44 ratio) +/- 2% see chart below – dry conditions.
2. CC – 16-54 (3.38 ratio) +/- 2% see chart below – dry conditions.
3. General rule of thumb - the faster the driver the lower the gear ratio.
4. In wet conditions drop one tooth off the clutch or add 4-5 teeth on the rear gear.

Gear Ratios		Jr 1 Briggs		
# of Teeth				
Clutch	Axle	Ratio		
16	53	3.31	CC Range	
17	57	3.35	CC Range	
16	54	3.38	CC Range	CCW Range
17	58	3.41	CC Range	CCW Range
16	55	3.44	CC Range	CCW Range
17	59	3.47		CCW Range
16	56	3.50		CCW Range

Chain Tension:

1. Maximum absolute deflection at the mid point from the front and rear gears 30mm.

Tire Pressures:

1. 18-20 psi, on colder days use 20 psi

Base Dry Track Chassis set up:

1. **Rear end;** maximum permissible width, loose bumper.
2. **Front end;** std caster (mid point), 0 camber, 1 mm toe out, std Ackerman.
3. **Loose side pods** (but fastened securely).

Base Wet track set up (in order of importance)

1. Rain tires – 24 psi
2. Install carb rain can.
3. Narrow rear width 40 mm each side
4. Widen front track to maximum.
5. Toe out 4 mm
6. Maximum castor

Basic Chassis adjustments:

Problem	Where	Solution Minor	Solution Mid	Solution Major
Understeer	Corner Entry	Decrease front tire pressure		
Understeer	Entry to Apex	Increase front tire pressure	Widen front track width	
Understeer	Apex to Exit	Tighten upper front crash bar	Shorter rear hubs	Move Seat forward
		Decrease rear tire pressure	Remove Seat Struts	Use Softer Seat
Understeer	Entire Corner	Softer Axle	Increase front tire pressure	Increase castor
			Increase rear track width	
Oversteer	Corner Entry	Increase rear tire pressure	Reduce Ackermann	Raise rear ride height
			Raise front ride height	
			Reduce caster	
Oversteer	Entry to Apex	Increase rear track width		
Oversteer	Apex to Exit	Reduce rear track width	Longer Rear Hubs	Move Seat back
			Add rear seat strut	Use softer Seat
Oversteer	Entire Corner	Harder Axle	Narrow front track width	
Kart Bicycling		Increase rear track width	Lower rear ride height	Lower Seat
Kart unstable	Entire Corner	Loosen middle bearing	Remove middle bearing	
Rear bounce	Entire Corner	Increase rear track width		

Effective Kart Tuning

1. Always make one adjustment at a time and see if it makes the lap time faster or slower. Making multiple adjustments at a time may confuse the driver and tuner.
2. Remember that driver has the most impact on lap times.

BRIGGS & STRATTON
RACING ENGINES

206 RACING CLASS STRUCTURE AND SLIDE INFORMATION

Briggs & Stratton Racing Class Structure				
Class	**Age**	**Weight (Pounds)**	**Engine Package**	**Technical Configuration**
Cadet .310 Restrictor	Per sanctioning body/ club regulations		Junior 206 with carb lock	RLV pipe (#5507) Slide (#555728) 4,100 RPM Rev Limiter
Novice .342 Restrictor			206 with carb lock	RLV pipe (#5506 or 5507) 'Purple' slide (#555735)
Junior 1 LEGACY Club - .440			206 with carb lock	RLV pipe (#5506 or 5507) 'Red' Slide (#555733)
Junior 1 CLUB - .490			206 with carb lock	RLV pipe (#5506 or 5507) 'Green' Slide (#555740)
Junior 2 LEGACY .520			206 with carb lock	RLV pipe (#5506 or 5507) 'Blue' Slide (555734)
ASN Nat. Junior - .570			206 with carb lock	RLV pipe (#5506 or 5507) 'Yellow' Slide (#555741)
Briggs & Stratton 206 Senior			206	RLV pipe (#5506 or 5507) Stock Slide (#555590)
Masters			206	RLV pipe (#5506 or 5507) Stock Slide (#555590)

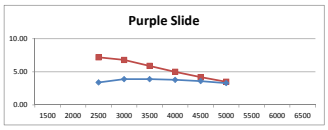
Class
.350 Cadet
.450 Novice
Junior 1
Briggs & Stratton 206 Junior

Slide Height Openings
.310 Opening
.342 Opening
.440 Opening
.520 Opening

Racer Measurement Tool
7.8 mm drill blank (.307)
'R' drill blank (.339)
7/16th drill blank (.437)
33/64th drill blank (.516)

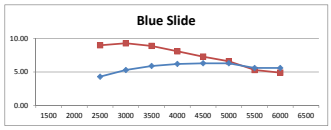
PURPLE SLIDE .342 Opening

Engine Speed (rpm)	Corr. Torque (ft-lbs)	Corr. HP (hp)
2500	7.25	3.45
3000	6.84	3.91
3500	5.99	3.99
4000	5.09	3.87
4500	4.20	3.60
5000	3.50	3.33
5500		
6000		



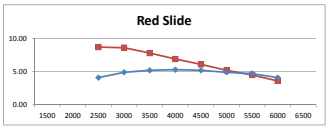
BLUE SLIDE .520 Opening

Engine Speed (rpm)	Corr. Torque (ft-lbs)	Corr. HP (hp)
2500	9.06	4.31
3000	9.39	5.36
3500	8.94	5.96
4000	8.19	6.24
4500	7.38	6.32
5000	6.62	6.31
5500	5.37	5.62
6000	4.96	5.67



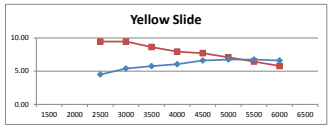
RED SLIDE .440 Opening

Engine Speed (rpm)	Corr. Torque (ft-lbs)	Corr. HP (hp)
2500	8.77	4.17
3000	8.62	4.93
3500	7.88	5.25
4000	6.98	5.32
4500	6.10	5.23
5000	5.22	4.97
5500	4.54	4.75
6000	3.63	4.14



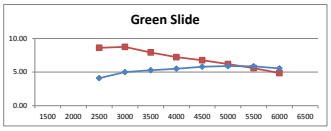
YELLOW SLIDE .570 Opening

Engine Speed (rpm)	Corr. Torque (ft-lbs)	Corr. HP (hp)
2500	9.45	4.50
3000	9.45	5.40
3500	8.63	5.75
4000	7.94	6.05
4500	7.70	6.60
5000	7.09	6.75
5500	6.45	6.75
6000	5.78	6.60



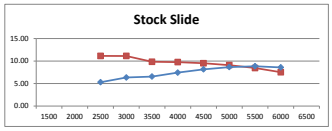
GREEN SLIDE .490 Opening

Engine Speed (rpm)	Corr. Torque (ft-lbs)	Corr. HP (hp)
2500	8.61	4.10
3000	8.75	5.00
3500	7.92	5.28
4000	7.22	5.50
4500	6.77	5.80
5000	6.20	5.90
5500	5.59	5.85
6000	4.86	5.55



STOCK, UNRESTRICED 206

Engine Speed (rpm)	Corr. Torque (ft-lbs)	Corr. HP (hp)
2500	11.13	5.30
3000	11.12	6.35
3500	9.83	6.55
4000	9.76	7.43
4500	9.51	8.15
5000	9.09	8.65
5500	8.45	8.85
6000	7.52	8.59



These net power curves are to be used as a guide for initial gearing and clutch recommendations. Net performance values have been obtained and corrected in accordance with SAE J1349 Engine Power Test Code - Net Power Rating. Net power values are taken with exhaust and air cleaner installed. These have been obtained from test results of a limited number of engines and have not been proven to be statistically significant. Given the wide array of factors which can affect engine performance such as, but not limited to, final engine trim (air cleaner, exhaust, sanctioning body rule variances), equipment set-up, application limitations, ambient operating conditions (temperature, humidity, altitude), etc. These curves are intended as a reference for gearing and clutch setup only.

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BRIGGSRACING.COM

Briggs & Stratton Racing Carburetor Tips and Reference Guide

Animal, 206, and M-series
PZ-22

World Formula
PZ-26

Version (REV. -)

BRIGGS&STRATTON RACING

PZ CARBURETOR PERFORMANCE TUNING AND MAINTENANCE

All information provided is intended for use as a guideline for basic operation, tuning, and maintenance of the PZ slide valve carburetor used on your Briggs & Stratton® race engine.

Contents:

SAFETY

As with any carburetor or fuel system, care must be taken to avoid fire from leaking or spilled fuel. Be sure all gaskets and seals are in good condition and properly assembled. Dispose of any drained or spilled fuel. Check condition of fuel lines and connections before every use. Fuel must be drained from the system if vehicle or engine is not stored or transported in a level position.

It is necessary to check the carburetor slide for free movement through the full range of travel any time the carburetor has been removed, installed, or adjusted and before starting the engine. Remove air filter and visually confirm the slide valve is fully closed as the throttle is released. Work the throttle control from closed to fully open and watch for any sticking or hang-up. Engines could start with an open throttle resulting in a runaway vehicle. Always install the correct return spring for the carburetor and use an additional return spring on the throttle pedal as needed.

Motorsports are dangerous and can lead to injury or death.

TUNING

Rich and Lean: An internal combustion engine needs a specific ratio or mixture of air and fuel for best performance. This mixture is delivered by the carburetor. In the following discussion numerous references will be made to the air and fuel mixture (air/fuel ratio) being rich or lean. Rich refers to a mixture with an excess of fuel. Lean refers to a mixture with an excess of air.

Float height

Parts involved:

- Float
- Inlet Needle

The float height controls the fuel level in the float bowl. This adjustment determines the point at which the inlet needle opens as the fuel level drops in the bowl. Float height is usually measured with the float bowl removed and is specified from the carburetor body to an edge or surface on the float. The float should be resting on the inlet needle but not depressing the spring under the needle stem when this measurement is taken. To adjust, carefully bend the tab where it makes contact with the inlet needle.

The float height should be adjusted before any other adjustments are made. A higher fuel level will cause a richer mixture and possibly excess overflow from the vents. A lower fuel level will a cause a leaner mixture and could lead to an engine miss or cut-out while cornering. Start at the specified height and change as needed for best performance on different type of tracks.

The float drop should also be checked. The proper adjustment will prevent the needle from pulling too far out of the inlet seat and becoming stuck in the open position.

Animal, 206, and M-series

World Formula

Idle and Low Speed

Parts involved:

- Idle Speed Screw
- Idle Mixture Screw
- Pilot Jet (Idle Jet, Slow Jet)

Carburetor tuning at idle and low speed is accomplished by adjusting the Idle Mixture Screw, the Pilot (or Idle) Jet, and Idle Speed Screw. These adjustments will control idle speed, idle quality, and initial responsiveness/ acceleration of the engine.

The screw in the center of the side of the carburetor body is the Idle Speed adjustment. This screw holds the throttle slide valve open slightly to obtain the desired engine rpm at closed throttle. Turning the idle speed screw clockwise will increase rpm. Turning counter-clockwise will decrease rpm.

The Pilot Jet is screwed into the carburetor body and is located inside the float bowl. (See photo, next page.) The Pilot Jet meters the amount of fuel entering the low speed circuit. A larger or smaller jet will change fuel flow accordingly. The size of the jet in millimeters is stamped on it.

The Idle Mixture Screw can be either an air or fuel adjustment so it should be determined what type of change you are making. A mixture screw on the air filter side of the PZ22 carburetor is an air-only adjustment so opening the screw (turning counterclockwise) will increase the air bleed and lean the mixture. The mixture screw on the engine side of the PZ26 carburetor is a fuel adjustment. Opening the screw will allow more fuel into the engine for a richer mixture.

For an initial setting, gently turn the mixture screw in until it lightly seats or stops. Back out the specified number of turns. The optimum setting of the mixture screw will usually result in the highest rpm with the throttle closed. As the amount of fuel is varied the engine rpm will also vary. With throttle closed and engine warm and running at or slightly above desired idle speed, slowly turn the Idle Mixture Screw in or out to obtain the highest rpm. Then set the idle speed screw to obtain the desired rpm.

If a smooth idle cannot be set with the idle mixture screw between ¼ to 2-¼ turns out, or if the engine does not respond to adjustment, a different size Pilot Jet may be needed. The pilot jet, also called idle or slow jet, controls the amount of fuel at idle and throttle positions up to ¼ open. If the mixture needle cannot be leaned out enough, a smaller Pilot Jet should be installed. A larger jet should be installed if the mixture is too lean. The proper Pilot Jet size will allow a satisfactory setting with the mixture screw.

Animal, 206, and M-series

World Formula

Midrange/Part Throttle

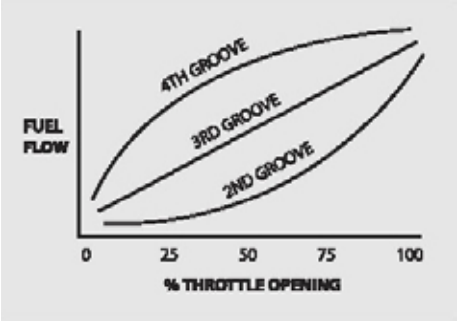
Part involved:

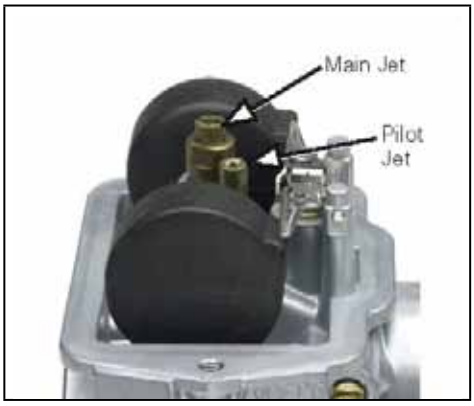
- Jet Needle
- Main Nozzle (Needle Jet)
- Throttle Slide Valve

The Jet Needle primarily controls fuel flow between 10% and 75% throttle opening. The Jet Needle is the long narrow needle in the center of the throttle slide valve. The needle can be seen when the throttle is opened. It is held in place in the center of the throttle slide by a V-shaped clip.

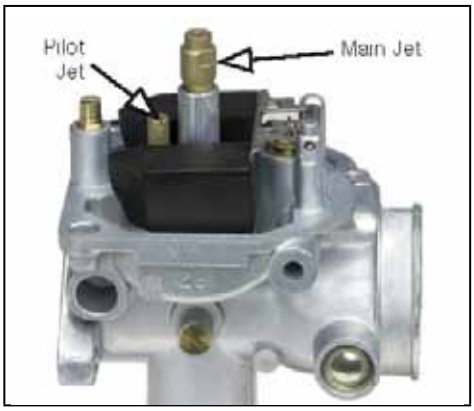
The Jet Needle has five notches and a C-clip which determines the position of the needle in the slide based on which notch the clip is placed in. By varying the height of the needle in relation to throttle opening, the amount of taper of the needle in the main nozzle will change the fuel mixture.

To richen the part throttle operation, move the clip to the next lower notch. This will hold the needle farther out of the main nozzle and allow more fuel into the air stream. To lean part throttle operation move the clip to the next higher position. The notch at the top of the needle would be considered the first position (leanest). Needle taper reference letters are stamped on the needle for identification.





Location of C-clip on jet needle determines mid-range fuel mixture.



Be sure the V-shaped jet needle retaining clip is in place and will hold the jet needle securely in the slide.

RAISING THE NEEDLE IN THE SLIDE = RICHER MIXTURE
LOWERING THE NEEDLE IN THE SLIDE = LEANER MIXTURE

High Speed/Full Throttle

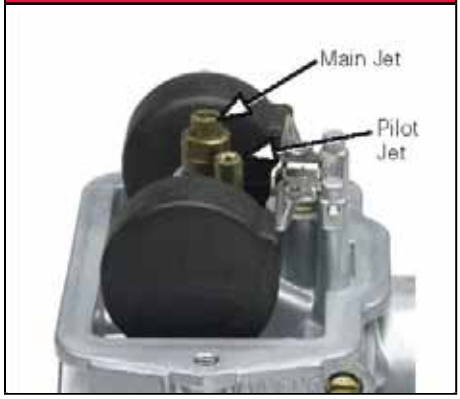
Parts Involved:

- Main Jet

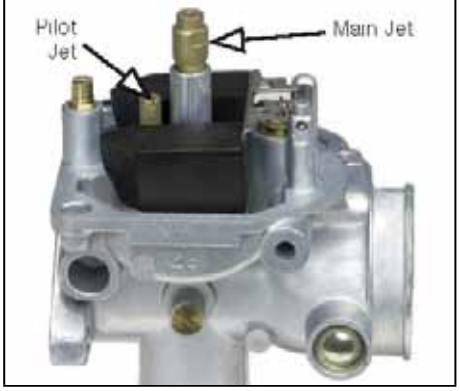
The Main Jet controls the fuel flow at throttle positions of one-half to full throttle. The Main Jet is located inside the float bowl and is screwed into the bottom of the Emulsion Tube in the center of the carburetor body. The jet size or diameter in millimeters is stamped on the jet. A larger diameter jet allows more fuel flow and a richer mixture.

Altitude and weather conditions can affect the engine operation enough to require changing the size of the Main Jet. High air temperature, humidity, or altitude could require a smaller Main Jet. Low temperature, humidity, or altitude would require a larger diameter Main Jet.

Animal, 206, and M-series



World Formula



RUNNING THE ENGINE WITH AN IMPROPER MAIN JET COULD RESULT IN A LOSS OF POWER, HIGH ENGINE TEMPERATURES, OR ENGINE DAMAGE.

TUNING TIPS

Gasoline is the typical fuel used for internal combustion engines. In some racing applications methanol alcohol is used for fuel. When using alcohol the engine must consume approximately twice as much fuel as with gasoline. For this reason some parts need to be replaced for proper tuning. The main nozzle, main and pilot jets, and the jet needle need to be replaced with the proper size.

If a carburetor has been working well and then develops a problem, the most likely cause is dirt or contamination in the carburetor. Dirt can plug jets or get stuck in the inlet needle and cause flooding. It will save time in the long run to be sure you are working with a clean carburetor.

If the engine performance seems to change or idle/low speed running seems erratic, check for loose carburetor and manifold mounting bolts or leaking gaskets or seals. This can cause a vacuum leak and lean condition.

Symptoms of a rich mixture are:

- Black smoke or popping in the exhaust
- A "flat" running engine or dull sound
- Runs worse as engine warms

Symptoms of a lean mixture are:

- High cylinder head or exhaust temperature
- Backfire/popping from the carburetor
- Runs better with partial choke
- Surging or cutting out
- Pinging or rattling sound from engine under load

The Pilot Jet, Idle Mixture Screw and Jet Needle will have the most effect on acceleration from closed throttle. A slightly rich idle mixture may help acceleration.

Moving the position of the Jet Needle clip is a good quick adjustment for a change in air temp. This will help with throttle response and corner exit.

The Main Jet will have the greatest effect at wide open throttle but will also affect mid-range operation. After a Main Jet change it may be necessary to move the Jet Needle position for best results.

The optimum float height setting may change from track to track. A rough track or an engine misfire in certain corners may require a float adjustment. If the carburetor can be rotated on the manifold, it may help to turn the carburetor a few degrees to compensate for a problem corner or for oval tracks.

SET-UP

The throttle/pedal ratio is an item that can be tailored to suit the driver's style and benefit overall engine performance. By changing the distance from the pedal pivot to the point the throttle cable or linkage attaches to the pedal, the carburetor action can be slowed down to help throttle control on a slick or rough track or smooth out a choppy driver.

IT IS IMPORTANT TO HAVE A FIXED STOP ON THE THROTTLE PEDAL.

This will reduce wear on the throttle cable and carburetor. Remove the air filter and visually confirm that the throttle slide reaches the wide open position just as the pedal hits the stop. The slide should also fully close with some slack in the cable with the pedal released. Idle speed cannot be set if the pedal is holding the slide partially open.

Seal the pedal end of the cable housing from dirt. Dirt will migrate up the throttle housing especially on a dirt track. Grit or debris on the slide could cause sticking. A rubber cap can be used on the end of the cable housing with a small hole through it for the cable to slide through. A dab of silicone could also be used at the end of the cable housing. The cable housing should also be sealed by the rubber boot on the top of carburetor cap.

For the cable hook-up, remove the cover, spring and slide assembly. USE CAUTION while unscrewing the cover as it will have spring tension behind it. Make a note of the orientation of the slide valve. The small groove on the side will align with a small guide pin in the bore. Thread the cable first thru the boot and cover, then thru the center of the spring and finally thru the top of the slide and hook the ball end under the bottom of the slide. (See photo.)

The hose attached to the bottom of the carburetor is for fuel overflow from the bowl. It should be routed down for proper draining.

Fuel pressure requirements are 1-3 psi.

MAINTENANCE

Draining carburetor

The carburetor should be "purged" of alcohol at the end of every day of running. Alcohol is very corrosive and will cause a lot of problems if left in the carb. The fuel line should be unhooked at the carburetor and the bowl drain screw opened to drain any fuel in the system. Another option is to run the engine on gasoline until it stalls. This will flush any alcohol out of the system. The carburetor should also be drained at least at the end of the season when running gasoline.

Filters

Always use an inline fuel filter to prevent contamination inside the carburetor. Air filters should fit the carburetor properly and be kept clean.

Bowl gasket

When reinstalling the float bowl you may find the gasket does not fit properly. If the gasket is too small it can be stretched to fit the groove. If it is wet it may swell slightly and can be set aside to dry and return to the proper size. If you are doing a lot of disassembly for tuning it may help to have extra gaskets.

Cleaning/Inspection

Once a year the carburetor should be disassembled for cleaning and inspection. Look for wear on the jet needle and inlet tip. Inspect and/or replace o-rings and seals. If cleaning is necessary a toothpick will work for clearing any holes such as jets. Remove the Inlet Needle and use a Q-tip to clean the inside of the inlet seat. Compressed air is also useful to remove contamination. The pilot jet has a very small metering orifice. If it cannot be blown out it will likely need to be replaced.

Always use a stop on the gas pedal. This reduces wear on the carburetor and the chance of a stuck throttle.

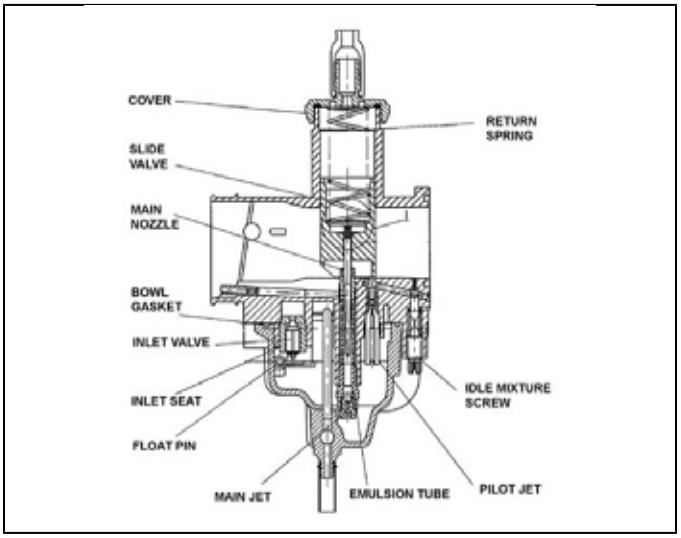
SPECIFICATIONS & EXPLODED VIEWS

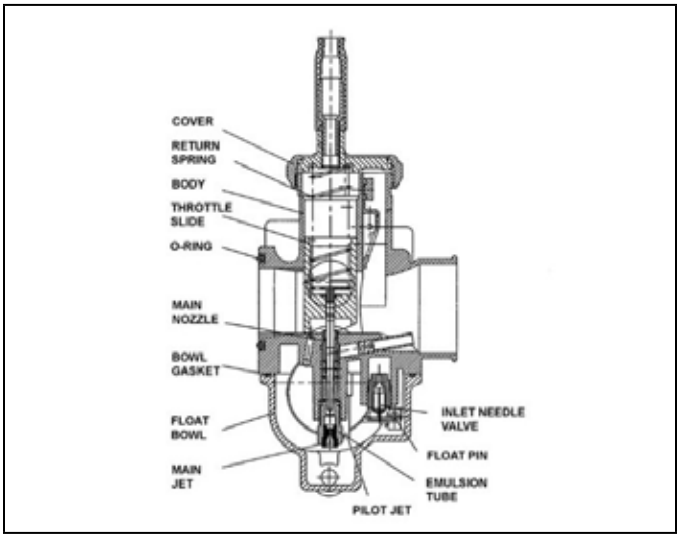
World Formula

Main Jet: 96
Pilot Jet: 38
Main Nozzle Diameter: 2.6
Jet Needle: CDB/3rd notch
Mixture Screw: 1 turn
Float Height: 14mm (.550in)

Animal, 206, and M-series

Main Jet: 95
Pilot Jet: 32
Main Nozzle Diameter: 2.6
Jet Needle: BGB/2nd notch
Mixture Screw: 1 ½ turn
Float Height: 22.0mm (.860in)





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BRIGGS&STRATTON
THE POWER WITHIN™

THE 16 COMMON MISTAKES, A PREVENTATIVE GUIDE

By David Klaus – Director, Briggs Racing

The 206 crate engine is built from a dedicated platform engineered and designed for racing. Even engineered for a brutal environment and built by hand to assure the highest level of craftsmanship, the experience you have still comes down to making the right choices. This simple guide is intended to help you navigate through the most common mistakes so that you can enjoy what racing is all about!

The common mistakes that a racer makes:

1. Not setting the float level upon first installing your engine resulting in poor engine performance.
    - After our labor of love leaves us your local parcel carrier will push, shove, and possibly even drop your engine changing the factory float setting in your carburetor.
    - Float height is critical to engine performance as it controls the amount of fuel in your carburetor bowl by controlling the opening and closing of the inlet needle (fuel supply from your fuel pump). Too much fuel can cause bogging or a sluggish throttle response. Whereas not enough fuel will elevate your engine operating temperatures and top end performance will suffer as the engine starves for fuel.
    - On our website, www.BriggsRacing.com, we have a video tutorial on how to set your float height.
    - Also under the documents tab of our 206 section is a carburetor tuning guide. **Print this out and put it in your toolbox**. The PZ carburetor is a very easy to tune but knowledge is power so please take the time to read and understand.

2. Using the wrong choice of oil which can leads to premature wear, internal rust, and even failure.
    - The choice of oil you use will play one of the largest roles in the performance and longevity of your engine. We recommend using only Briggs & Stratton 4T synthetic racing oil as it was specifically engineered for your race engine. 4T is readily available through any Amsoil or BriggsRacing dealer.
    - Do not:
        - Use 'karting' oils as many are simply a compressor lubricant and food coloring. They offer very limited protection, are prone to water contamination, and have a TBN of zero. This base oil is not used in any other form of racing and/or combustion engine because of these severe limitations.
        - Use car or 'race' oils designed for automotive use. This category of oil is engineered for pressure lube systems. When used in a splash lube system they tend to foam/froth greatly reducing their ability to protect. In addition, automotive oils are engineered for the lower operating temperatures of a liquid cooled verses air cooled environment.

3. Allowing your clutch to 'float' WILL lead to crankshaft damage.
    - Clutch manufacturers offer generic recommendations not necessarily knowing what engine or application their clutches will be used on.
    - Allowing the clutch to float on your 206 engine will overloads the keyway (too much torque spread over too small of surface area) and will result in keyway damage.
    - Our crankshaft is carbon steel and even so the design of most clutches offer an insufficient surface area to transfer load. *In order to prevent keyway damage the clutch hub HAS to be locked against the shoulder of the crankshaft.*
    - We have a video on www.BriggsRacing.com on how to properly installing your clutch.

4. Installing your exhaust system in a bind which can result in either the bracket or exhaust pipe failure.
    - When installing your exhaust always start with the cylinder head fasteners first. IF the brace does not fit flat against the cylinder head mounting boss use the washers provided to take up the space and or bend the brace carefully to fit flush. If any excess force is used installing the brace and/or exhaust fasteners this WILL over stress the exhaust system leading to breakage and/or the exhaust fasteners at the head to strip out. Bringing each fastener to final torque will naturally create a bind. *Take your time and do not use the force of an impact to make the exhaust 'fit'. Slowly work to final torque by alternating fastener torque in steps, increasing torque in stages.*

5. Overwrapping your exhaust system.
    - Sanctioning bodies mandate that your header system be wrapped with an approved exhaust material. When installing wrap it is important to make sure that you do not double wrap or excessively overlap of this material. This will insulate the exhaust trapping in excessive heat which can impact the strength and life of your exhaust. Do not start your header wrap until 3 inches above where the flange meets the cylinder head. Wrapping closer to the flange will trap heat elevating head temperatures that could lead to exhaust valve seat warping and/or head gasket failure.

6. Not checking valve lash after the initial break-in period.
    - After your engine goes through several heat cycles valve lash has a tendency to grow as component stresses from manufacturing are relieved. We recommend that lash is checked during the first 30-60 minutes of initial run time.
    - We have a video on www.BriggsRacing.com on how to set your valve lash.

7. Running at the rev limiter in slide restricted classes.
    - When air is restricted an engine's peak torque and horsepower occur earlier in the power band. The greater the restriction, the lower in the rpm range peak horsepower and torque will occur. Peak horsepower for the unrestricted 206 is around 5,600 rpm whereas the Green slide restrictor peak horsepower is at 4,800 rpm. Gearing past 5,300 rpm, given that the peak is 4,800 rpm with a Green slide, will result in slower lap times. *Gear for the power band, not the rev limiter*.

8. Using a ¼" aluminum offset motor mount plate and offsetting the motor mount plate too far.
    - Excessively offsetting an engine offers very little engine stability and amplifies vibration by acting as a 'springboard'. Engine stresses compound as the natural engine motion (which we have engineered for) falls on one plane, the flexing of the chassis on multiple planes, and your engine's crankshaft load changes as chain tension varies as your chassis flexes.
    - Install the engine with no more than a ¾ inch offset. When a 'typical' ½ inch plate is used and offset beyond ¾", strain gauge tests shows up to a **20% increase** in vibration measured at the valve cover. This is a TREMDOUS amount of additional vibration without taking into account any common additional sources of vibration (track surface, tire balance, bent axles, etc.). *Vibration accelerates fatigue causing component failure and fastener torque loss*.
    - *Just because an engine mount allows for a greater offset doesn't mean you should do it! The greater the offset the more harmonics and stress on your engine block and side cover.*
    - *Most ½ inch aluminum engine mounting plates are also machined for weight reduction allow even greater flex as the very rigidity needed is stripped away to save an ounce.*
    - Use a QUALITY mount. The BEST on the market is the Odenthal mount. It allows for greater offset without sacrificing rigidity. Another system would be the PMI engine mount with the ¾" engine plate verses the standard ½" plate. Typically we would not offer brand recommendations but the foundation that your engine sits on is critical to success.

9. Not oiling your Green air filter before using.
    - Your Green air filter is a premium filter that uses oil to effectively trap and prevent debris from entering your engine. It must be oiled before initial use (it shipped dry) and we recommend using Green air filters oil recharging system. For instructions on how to clean and oil your air filter please check out www.Greenfilterusa.com. Your oil filter is your only barrier to preventing debris from entering your engine. This is one of the BEST filters available but it needs to be properly oiled in order to offer you the best protection possible.

10. Not installing a fuel filter.
    - Your fuel source has dirt in it, your tank has dirt in it, and installing a fuel filter will prevent debris from entering your carburetor where it can clog a jet or prevent proper fuel delivery. All of which usually happens during a race as you agitate your fuel.

11. Not properly storing your engine.
    - Today's fuel has ethanol in it. Ethanol is corrosive and attracts water. Left in your carburetor over a period of time it will form zinc and aluminum oxide as it reacts with the materials around it. Aged fuel will also 'varnish' on carburetor parts over time. With some simple steps this mess can be prevent.
        - Fuel stabilizer – Check to make sure the addition of stabilizer (specific to ethanol fuel) does not impact the approach that your track or series uses to tech fuel.
        - After an event remove the fuel line feed <u>at</u> the pump, open up your bottom bowl drain, and let gravity remove all the fuel into an approved fuel gas. Retighten your drain screw and take some WD-40 and spray it into your fuel line. Use enough so that it drains into your carburetor and coats internal parts for protection. Reinstall and secure your fuel line to the pump.
        - If you are done for the season I would follow this same process AND leave Briggs 4T in your crankcase. Most 'karting' oils attract water and leaving them in your engine over a winter will cause rust and acid etching. Acid formation is a by-product of combustion that gets past the rings combining with water attracted by PAG based 'karting' oils. Briggs 4T has a high TBN (ability to neutralize engine combustion by-products) along with a premium rust inhibitor.
        - As we are talking about fuel please use all safety precautions and only perform 'pickling' your engine after it has cooled down and away from any ignition sources.

12. Not focusing on your chassis setup ***<u>first</u>***.
    - There is a natural assumption we as racers have that lap times are solely connected with the performance of the engine. If something changes or we aren't up to speed it <u>has</u> to be engine.
    - While engine issues can happen it is important to learn how to diagnose and isolate ALL variables that could lead to a performance change. Most of the time it will not be engine related. Learning the dynamics of chassis set-up, the impact of a changing track surface, kart condition (bearings, axle, alignment, etc.), and the 'feel' of what the kart is doing from your ears to your butt in the seat will allow you to piece together from the symptoms what the cause is.
    - The number one issue new racers make is misunderstanding cause and effect. That is perfectly natural and we all go through this learning curve.
        - A simple example: I can't get my engine to run over 5,800 rpm!
            - Was it earlier in the day?
            - Is it only in certain corners (left or right) or on parts of the track?
            - What changed?
                - You hit a curb?
                    - Your engine mount shifted causing misalignment and/or chain tension issues?
                    - Has it changed the toe-in of your kart in the process?
                    - Is your frame is cracked or bent?

        - Is your axle bent?
        - Has something else loosened up on your kart (from bearing carrier to a seat strut?
    - There is more rubber down on the track as conditions have changed?
        - This could be causing your chassis to bind
        - A bind can also cause too much chassis or engine mount flexing making your chain or clutch alignment to change.
- Attention to the changing variables is one of the keys to identifying and efficiently resolving problems. While the engine could be the factor work through a systematic process to isolate your root cause. Assumptions, as they say……lol

13. Improperly plumbing your valve cover catch can.
    - Another sanctioning body standard is that engine vents must be contained into a 'catch can' system to prevent oil from reaching the track surface. When installing your system it is important NOT to restrict the free flow of air to the valve cover vent or at your catch can to the atmosphere (open to the air).
    - The function of the valve cover vent is to allow the pressure created from the piston travel to exit and enter the engine as needed. It also helps promote oil distribution to the valve train area.
    - Make sure that your line is not pinched and/or restricted by even so much as a zip tie.
    - Your catch can HAS to have sufficient ventilation to the atmosphere.
    - A pinched line or a catch can that is improperly ventilated will create back pressure. Back pressure can impact engine performance (sluggish) and in extreme cases lead to gasket failure and/or excessive oil out of your fuel pump vent as the pressure has to go somewhere.
    - Use a quality vent line with a thicker side wall to prevent collapsing or pinching common when using cheap fuel line.

14. Oil pump routing and installation.
    - Pulsing from the crankcase requires some finesse but done properly will be problem free. Some of the key points:
        - The pulse line from the engine needs to be short and direct, allowing any oil mist that migrates towards the pump to harmlessly and naturally drain back into your crankcase. Do not have low spots where oil can pool in your line and prevent the pump from functioning properly.
    - The most common issue with pulsing from the crankcase is excessive oil exiting the pump vent (the small, circular brass piece).
        - Causes:
            1. Too much oil in the engine. We recommend 13 ounces of Briggs & Stratton 4T.
            2. Too much crankcase back pressure. If your valve cover breather is restricted the pressure HAS to go somewhere. *This pressure commonly forcing oil through your pump and out of the brass vent on your pump.*

a. Review your catch can system for restrictions. Drill another hole or two in the top of your catch can, check for a pinched line anywhere from the cover to the catch can. Even a zip tie used to hold your line in place can pinch.

- A strong suggestion to help reduce any mist from exiting your fuel pump vent: If you find yourself with an issue, clean the oil from your pump vent and using either **nail polish or silicone put a 'dab' on the screen itself. This 'dap' can completely cover the brass vent screen without negatively impacting the function or life of the pump**. This will naturally act as a restriction to the amount of air allowed to pass through. That will lower the velocity of the air passing through and its ability to carry oil mist with it.

15. General maintenance.
    - Although the 206 is engineered for racing and life some due diligence on your part to address issues before they become problems (and cost you money).
        - Some recommended checks:
            1. Exhaust system – Every time you come off of the track check your exhaust fasteners and safety wire. Left unchecked, a lose fastener will destroy a thread and a loose silencer will increase vibration and fatigue. Also check for any gasket leaks at the same time. A gasket leak can elevate head temperatures causing head gasket failure or head warping if not caught soon enough.
            2. Other preventative quick checks: Head bolts, oil drain plugs, and engine mounts
                a. Engine mounts tend to loosen up with chassis flex and kissing curbs leading to chain misalignment. This not only can lead to gear damage but also puts additional force on the crankshaft and side cover joint.
                b. Head Bolts – Regularly throughout the weekend check your head bolts for torque when the engine is COLD (220 lb.-in). Head bolts are exposed to severe heat which can be compounded by factors beyond the engine (chassis bind, chain misalignment, exhaust gasket leak, etc.). Left unchecked a loose head bolt can cause a head gasket leak. Any head gasket leak will cause a performance loss but severe enough and exhaust gases over time can destroy both the head and cylinder surface.
                c. Drain fill plugs – If not torqued properly, well, enough said. ☺

16. Not tapping into the awesome community of 206 racers to gain knowledge and ask questions.
    - Racing has a learning curve. We all start with ZERO knowledge and through reading, asking questions, and meeting friends at the track we reach learn. Don't get discouraged, this is a family and we share a common passion. While I might or might not end a weekend on the podium (usually not) it's the comradely, friendships, fun and adrenaline that you can't find anywhere else.
    - Join our Briggs & Stratton Racing Facebook page as well as other 206 enthusiast pages.
    - Stop by our website and ask a question on our forum (www.BriggsRacing.com).

INFERNO

BLAZE
BLIZZARD

INSTALLATION and MAINTENANCE Instructions

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

These instructions cover both the Blaze Kart racing clutch and the Blizzard Snowmobile racing clutch. The difference between the two models is the 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. The parts are interchangeable between the 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 for more information.

For best results, perform the following weekly maintenance

1. **Drum & Sprocket:** This area will get contaminated with oil, dirt, and other debris over time. 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. Do not clean the drum with acetone, starting fluid, or carburetor cleaner. These cleaning fluids will remove all of the oil and will 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:** Spray some WD-40 on a rag and clean the outside of the shoe. Do not clean the shoes with acetone, starting fluid, or carburetor cleaner. These cleaning fluids will remove all of the oil and will 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.
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 long life and the best performance out of the clutch.

CLUTCH ASSEMBLY:

Insert Weights:

- These are optional, and not required for the clutch operation. 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 (See Illustration on page 4).
- 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.

Side "A"

Side ""B"

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.

- Slide the ¾" 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 onto the engine shaft. You will have to line up the key in the bushing with the keyway on 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 (see illustration on page 4). 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. This 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. 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.

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

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

INFERNO 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 – 4200 RPM *Sold Separately**
- **White – 8443-35-005-A – 3300 RPM**
- **Yellow – 8443-35-004-A - 2850 RPM**
- **Orange – 8443-35-003-A – 2400 RPM**
- **Red – 8443-35-002-A – 2000 RPM *Sold Separately**
- **Green – 8443-35-009-A – 1250 RPM*Sold Separately**

Note: Speeds shown are a Blaze/Blizzard 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 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.**
- **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.**

Recommended Initial Setup:

As you can see the Blaze and Blizzard racing clutches have a wide range of tuning ability. A suggested starting point is to put your shoes in a leading orientation, add the heavy weight to the tip of each shoe, add the light weight to the middle position of each shoe, and then install (4) yellow springs. This setup will be a good starting point for the majority of racers. This will start to engage around 2700 rpm. After you test your setup you then can adjust the clutch to your specific needs. Add or remove weight, change the springs, change to a trailing orientation, or a combination of the adjustments.

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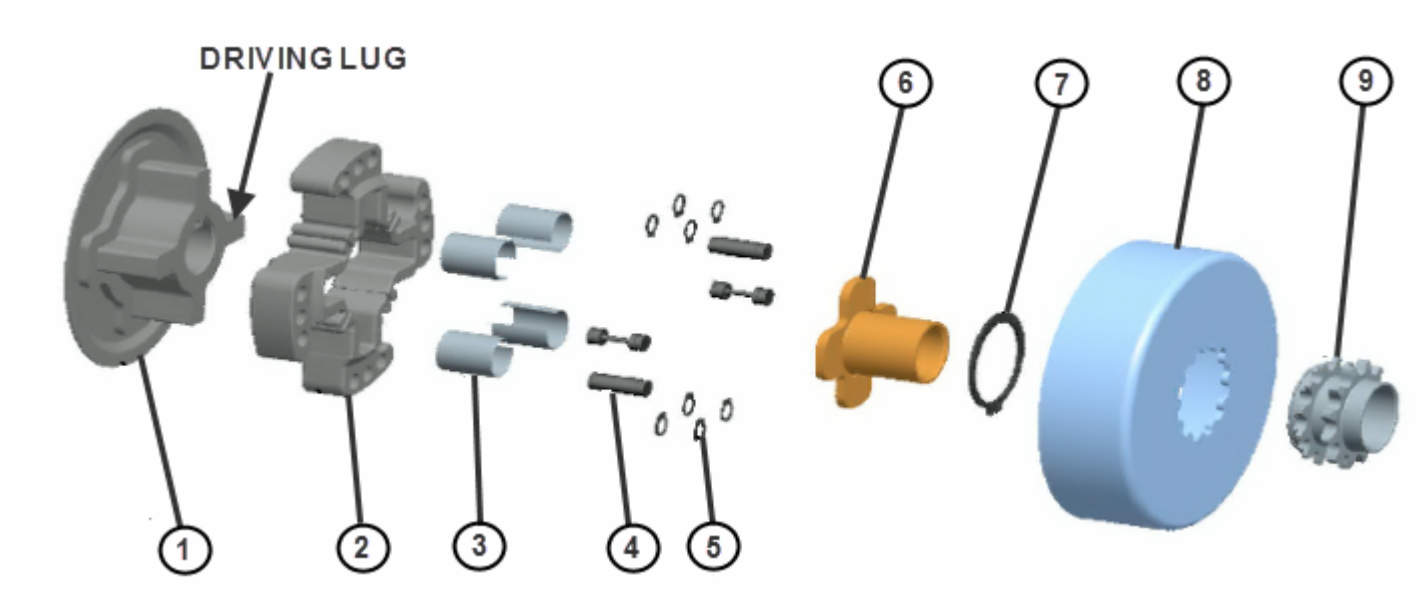
EXTREME DUTY

INFERNO

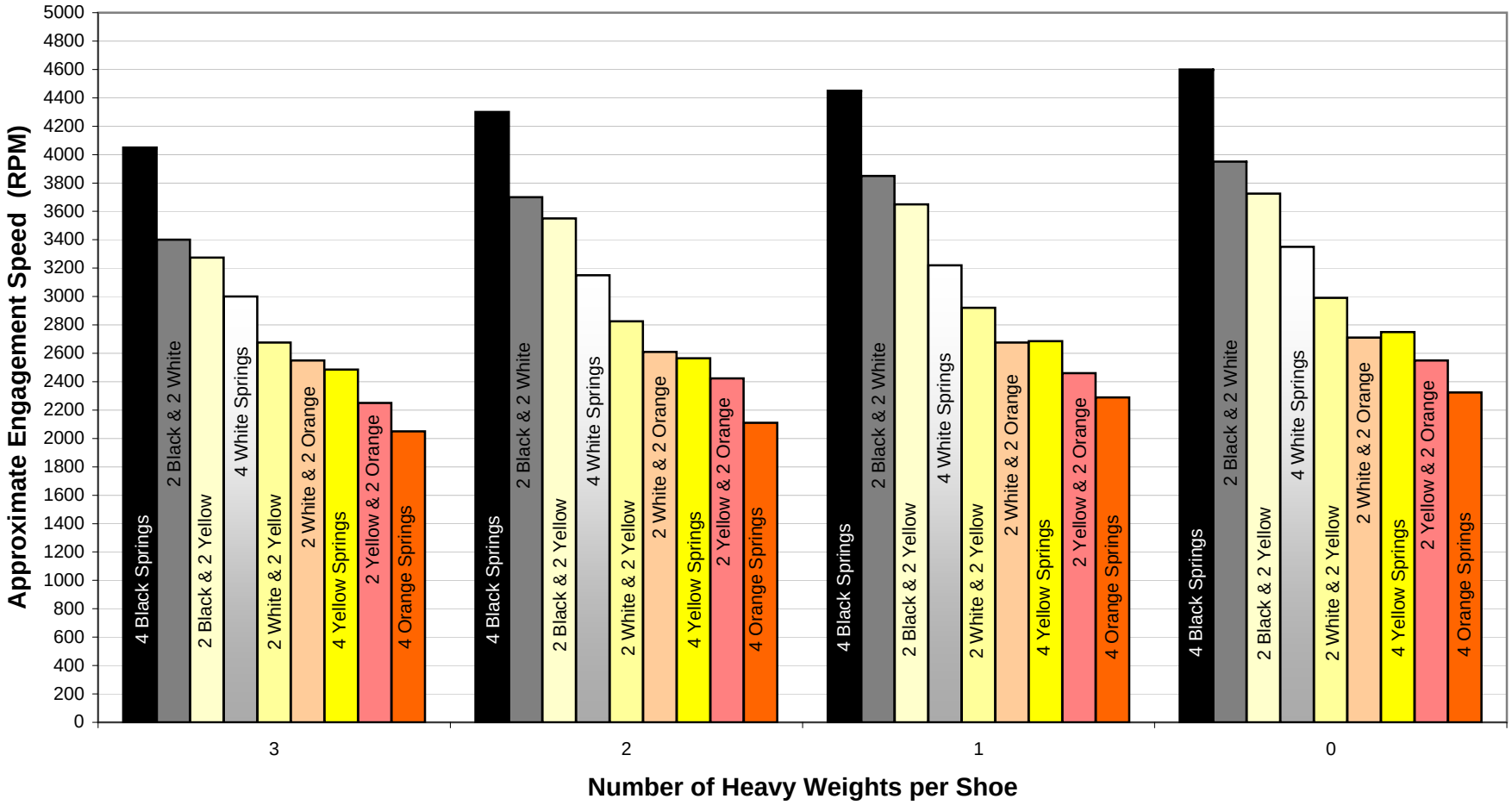
RACING CLUTCHES



BLAZE / BLIZZARD

Ref #	PART No.	DESCRIPTION
1	8444-23-089	3/4" HEAT TREATED HUB w/GUARD
2	8444-31-009	TUNABLE RACING SHOE
3	8443-35-002-A	RED SPRING (1950 RPM)
	8443-35-003-A	ORANGE SPRING (2300 RPM)
	8443-35-004-A	YELLOW SPRING (2800 RPM)
	8443-35-005-A	WHITE SPRING (3275 RPM)
	8443-35-006-A	BLACK SPRING (4325 RPM)
	8443-35-009-A	GREEN SPRING (1225 RPM)
4	8444-22-005	HEAVY WEIGHT
	8444-22-006	LIGHT WEIGHT
5	1279-01-033-T	WEIGHT SNAP RING
6	8444-15-002-B	BUSHING 3/4 (SHORT)
7	1279-01-136-T	BOWED SNAP RING
8	8444-13-100	STAMPED DRUM w/o HOLES (SHOWN)
	8444-13-099	STAMPED DRUM with HOLES
	8444-9U-024	BULLY CONVERSION KIT
9	8444-47-XXX	SPROCKET
	#35 CHAIN	11-23 TEETH AVAILABLE
	#219 CHAIN	16-22 TEETH AVAILABLE
10	8444-22-009	WASHER (NOT SHOWN)

HILLIARD INFERNO - BLAZE / BLIZZARD
Engagement Speeds Vs. Number of Heavy Weights per Shoe



* Engagement speed is defined as the speed at which the shoes first touch the drum. (NOT LOCK UP SPEED)

YouTube Inferno Videos

INFERNO RACING CLUTCHES

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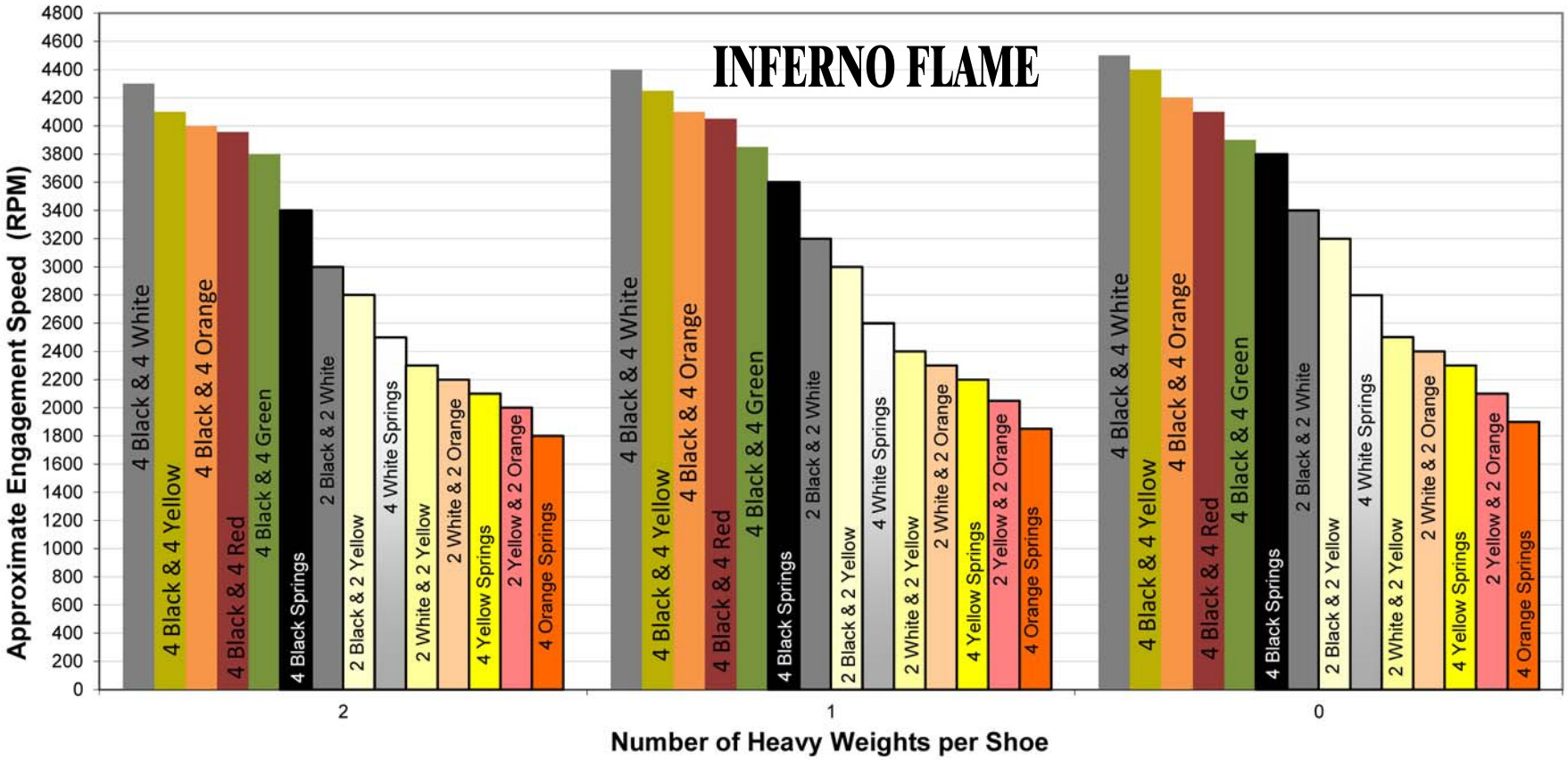
HILLIARD INFERNO - FLAME
Engagement Speeds Vs. Number of Heavy Weights per Shoe



* Engagement speed is defined as the speed at which the shoes first touch the drum. (NOT LOCK UP SPEED)

Engineered for Performance

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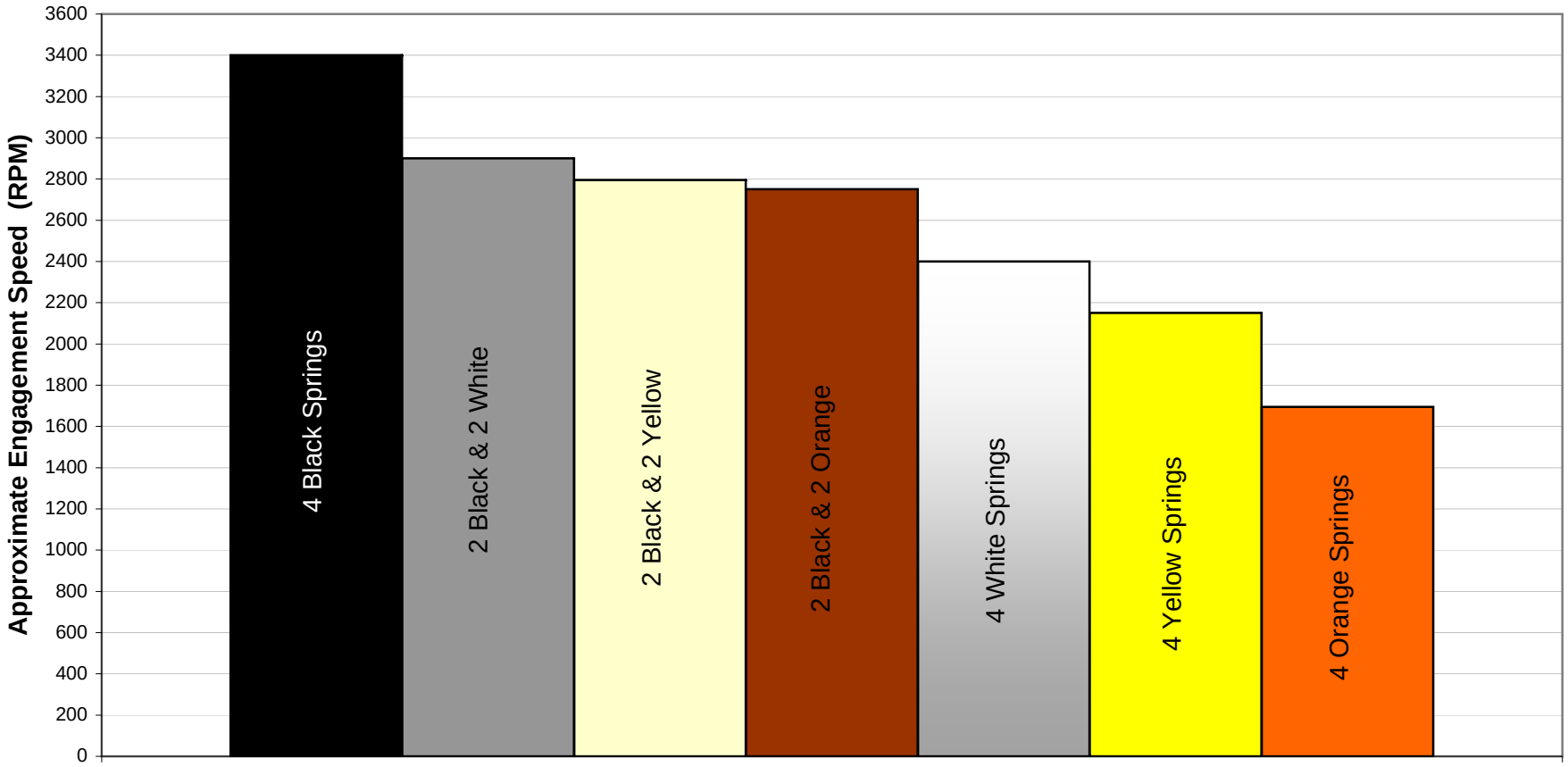
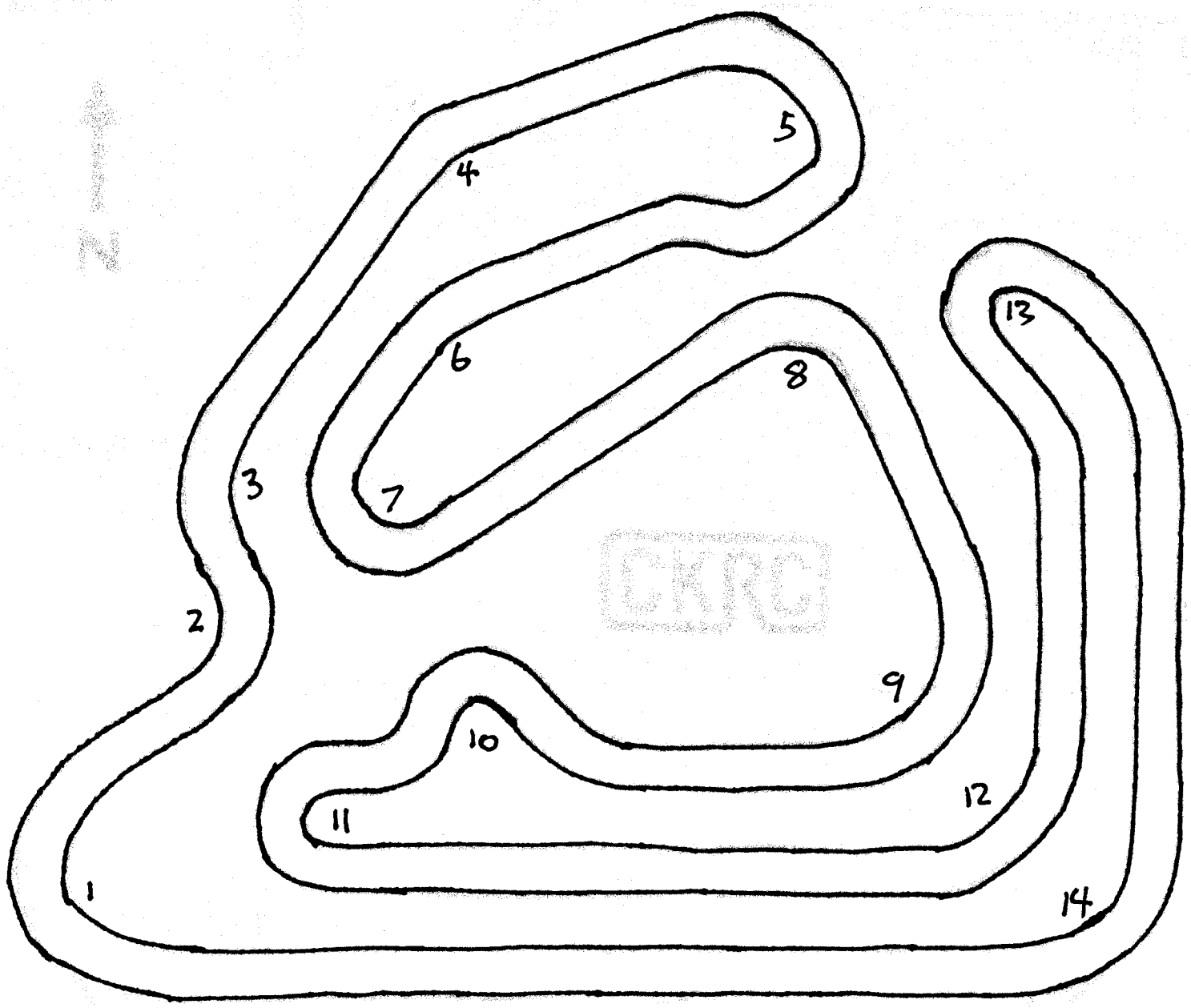
HILLIARD INFERNO - FURY / FLURRY
Engagement Speeds



* Engagement speed is defined as the speed at which the shoes first touch the drum. (NOT LOCK UP SPEED)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