9 10 11

INEX 3 DISC CLUTCH

To follow are some guidelines and instructions to ensure that you are able to get the maximum life and performance out of your clutch.

WHEN INSTALLING

With the design of this clutch the length of the crankshaft affects the internal side clearance of the clutch. This internal side clearance is measured by inserting a feeler gauge behind the sprocket with the clutch installed on the crankshaft. The clearance should be in the range of .010" to .025". Adjustments are made by removal or addition of the included thrust washers. On the last page of this set-up sheet is an exploded view of the clutch where item 2 represents the thrust washers and their intended location.

APPLICATIONS

The standard weight and spring set-up was developed for a stock engine mounted on a race ready Bandolero car. Spring and weight combinations may be interchanged to suit different conditions. If the decision is made to alter the spring/weight combination be aware that the heavier the weights and the stiffer the spring, the more positive the engagement becomes. Stiffer springs are springs with shorter installed heights, and or a larger wire diameter. Fig.3 is a chart with weight and spring combinations that may be used as a guideline for changes. The clutch is installed on the crankshaft with the sprocket end of the clutch "inboard" next to the motor. The first item to be placed on the crankshaft is the stepped steel spacer washer. Then secure the clutch on the crankshaft. The steel retaining washer is held in place by a 3/8"x 24nf socket head cap screw.

STALL SPEED

Stall speed is the R.P.M. reading shown on the tachometer as the vehicle is accelerating from a slow speed until the time that the clutch becomes a locked couple with the crankshaft.

As the springs are adjusted clockwise, spring tension is increased and the stall speed increases while turning the springs counter clockwise reduces tension and results in a decreased stall speed.

Many theories exist regarding the ideal stall speed for a given engine. However the fastest acceleration will occur when the clutch engages at the torque peak of the motor. It also should be pointed out that the addition of the clutch to an engine may change the RPM your engine produces its torque peak. (Usually it moves up 100 to 200 RPM) Also, a given clutch set up will be most efficient with a given amount of torque and engagement RPM. Figure 3 provides some information for anyone looking to experiment with their settings.

When setting stall speed by changing spring height, we suggest making your adjustments in 1/4 turn increments at a time. When testing for your stall speed, use extreme caution as to not over heat the clutch. Next to contamination of the friction discs, heat is the clutch's biggest enemy. Be sure to let the clutch cool down completely between stall speed tests.

CLUTCH DISC BREAK IN

The clutch discs require a period of run-in in order to achieve maximum clutch performance. During this time the outer surface of the linings becomes hot and the microscopic pores of the lining material will burnish themselves to a stable condition. The friction material used in the manufacture of the INEX clutch discs will cause the discs to have more bite as the clutch builds some heat. Also if the discs do not become contaminated the "bite" from the disc will actually continue to increase throughout its life.

The break in process should be done when the clutch is new and also after each time the clutch is rebuilt. It is normally done with the clutch installed on the vehicle. The goal of the process is to gradually build temp in the clutch at short intervals with cooling down periods between the intervals, similar to the break in process of a rebuilt motor. With the rear axle locked in place (brakes on) the engine is run while slowly opening the throttle until the clutch just begins to engage. It is important to monitor the temp of the friction discs during the break in process. An infrared temp gun with a laser pointer works very well. The best practice is to position the temp gun on the outside diameter of the clutch so that the laser can be positioned to illuminate the friction material of the discs. When the disc temp climbs up to about 250 degrees, let the engine idle, and allow the discs to cool down approximately 50 degrees. Then re-engage the clutch by slowly increasing the engine speed, this time bring the disc temp up to about 300 degrees. Next slow the engine speed to an idle and again allow the discs to cool down 50 degrees. Continue this process with slightly more throttle each time until you bring the disc temp up to approximately 400 degrees. This entire process should take about 4 to 5 minutes. If this process is interrupted, or performed to quickly it is possible for the clutch to develop a "chatter". Chatter is caused by an extreme abrupt engagement of the clutch. One way to eliminate chatter is to slightly burnish the clutch discs and reduce the difference in the co-efficient of friction between the static and dynamic states. This can be accomplished by wetting the friction surfaces of the discs with a low temperature spray lubricant which will evaporate at normal operating temperatures. This procedure of applying spray lubricant should only be performed when a severe chatter is present and only after the clutch has **completely** cooled to ambient temperature. A modest amount of WD-40 can be sprayed on the friction surfaces of the discs. After spray lubricating, the above break-in process is repeated using lower loads and longer cool down periods. During this 2nd break-in process a vapor of WD-40 may be seen exiting from the clutch. When break-in is finished and the clutch is at operating temp, the vapor will no longer be present.

SPRING HEIGHT

As mentioned earlier, spring height will affect the engagement RPM of the clutch. We suggest making equal adjustments to all 6 springs of 1/4 turn increments at a time, but to really dial it in closely, a 1/6 turn may result in a noticeable engagement rpm range. The spring diameter, preload, weight package, engine's power and several other variables all will affect how much of an RPM change is found with a 1/4 turn change, but an *average* change will be approximately 100 RPM. Turn the spring adjustment clockwise for more slip and counter-clockwise for less slip. The range of adjustment should be between .140" and .330". This is the distance between the bottom of the spring retaining washer and the top of the activator plate. See Figure 2.

Caution...WD-40's flammability increases when applied to warm or hot objects. It is very important to use extreme caution and **apply the WD to a COOL clutch only!!**

Figure 1: air gap

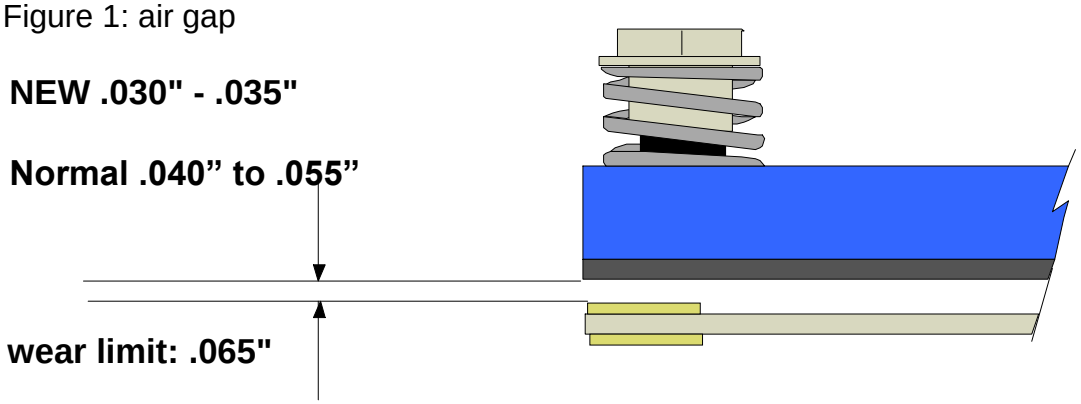
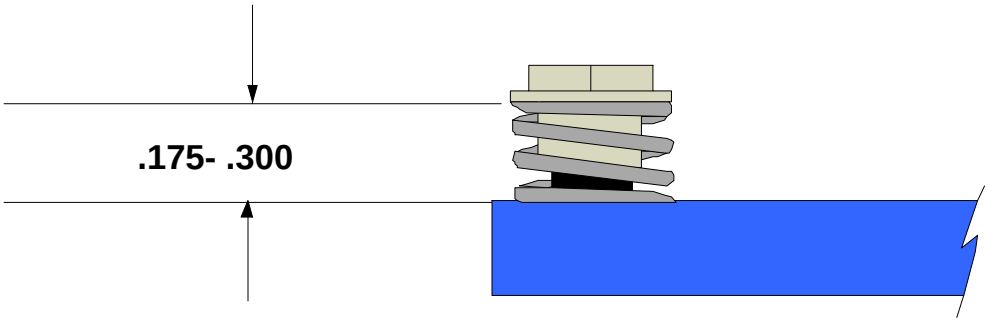


Figure 2: spring height



AIRGAP

The air gap is the clearance between the friction discs. It is measured with a common feeler gauge and is stated in thousandths of an inch. When new, the “TURBO” clutch is pre set between .030” and .035”. During break-in it is expected to see the air gap grow by approximately .010”. For most applications the clutch will perform at its peak with an air gap between .040” and .055”. When this dimension becomes greater than .065” a change to a thicker floater disc will restore the air gap back to the original dimension.

THEORY OF OPERATION AND TUNING OF THE INEX CLUTCH

For theory sake lets suppose that the outer clutch basket is constrained and not allowed to rotate such as would occur if the brake were held on tight. When the throttle is opened, the engine will come up to a certain R.P.M., the clutch will engage and a point of equilibrium will be found. At this point of equilibrium, or stall speed, the entire amount of torque being produced by the engine is being transferred into the clutch. What R.P.M. this occurs at is controlled by 4 variables: the weight of the levers, applied tension of the springs, the coefficient of friction between the friction discs, and the amount of torque the engine is producing. A change in each of these variables has its own unique effect on the engagement quality of the clutch. As a guideline, lighter levers and less spring tension perform best on motors with lower peak torque values and on tracks where the clutch is continually cycled through its slip range. Heavy levers and high spring tensions will perform best on motors with high torque values and on tracks that require a good launch on the start. If levers are too light for the torque available, the clutches point of equilibrium will be inconsistent and the transfer of power will be inefficient.

If the clutch has too much weight on the levers, or the coefficient of friction of the discs is too great for the torque of the engine, chatter will be produced by the clutch. Chatter is an attempt by the clutch to create a complete lock-up. If the engine does not have enough torque to maintain its RPM, the clutch slows... releases...the engine speeds back up... and the resultant chatter is from this process repeating itself very rapidly. Chatter, if left unchecked will destroy a clutch in just a matter of minutes.

FIGURE 3 chart provides recommended starting points for spring height and lever weights on a motor with average torque. What the chart does not allow for is the coefficient of friction available from the friction discs. The amount of friction produced by the discs may vary. The biggest culprit to friction reduction is from contamination of the discs. The most common forms of contamination are chain oil, moisture and dirt. In most instances the clutch discs will run hot enough to burn off most of these contaminates, however, if the discs become contaminated the clutch may lose its positive feel while also losing some of its ability to transfer power. In the real world, friction discs will not always be able to work in an uncontaminated environment. To cure a soft engagement and restore the clutches ability to transfer power you may want to add weight to the levers. Follow this by readjusting your springs clockwise until you reach the ideal engagement rpm.

The other side of the above condition is too much disc friction. This can occur from a very rapid break-in, very low humidity conditions, rust, or when certain cleaners have contaminated the friction discs. This condition will result in clutch chatter and if left unchecked may cause mechanical damage to the clutch.

FIGURE 3

	BLACK SPRINGS				***RED SPRINGS***			
Spring height (See fig. 2) **STALL SPEED RPM**	**.175 RPM**	**.225 RPM**	**.275 RPM**	**.300 RPM**	**.175 RPM**	**.225 RPM**	**.275 RPM**	**.300 RPM**
Lever w/bolt in both positions	**4200**	**3500**	**2700**	**2400**	**4550**	**3800**	**3100**	**2700**
Levers w/ steel weights	**3500**	**2400**	**1500**	**1100**	**4000**	**3900**	**3200**	**2900**

MAINTENANCE

The clutch should be protected from moisture and dirt as much as possible. Of course it is important that a small amount of lubrication be provided to the chain. However, too much lubrication can cause the lubricant to migrate to the friction discs and render them useless. So, oil the chain sparingly.

The clutch should be cleaned after each race night. To clean your clutch we recommend removing the sprocket/basket assembly from the clutch. If the clutch was run in a clean environment it may only be necessary to blow the clutch out with clean dry compressed air. If there are more contaminates present than compressed air can remove, soak the internal assembly of the clutch in a bath of **acetone** (or non-flammable brake cleaner) for about 10 minutes. After soaking, spray the clutch out with air and reinstall on the motor.

Periodically the air gap and disc thickness should be checked. Disassembly of the clutch is not recommended except to change the air gap or for rebuilding. When the clutch is re-assembled all of the components should go back together in the same position as they were removed. Example… All friction surfaces should be in contact with the same mating surface.

Note...Acetone is extremely flammable. If you are not familiar with its proper use non-flammable brake cleaner may be used, following the precautions on its label.

The thrust bearing located in between the sprocket and the clutch hub should be run dry. Of course, lubricating it would extend its life, but any lubrication on this bearing will most likely contaminate the friction discs. Since the price of replacing the thrust bearing is very low compared to the price of friction discs, we recommend that this bearing be run dry. Thrust washers are not required on either side of the thrust bearing but may be installed as an adjustment to achieve the correct side clearance. The friction discs should be replaced when their thickness becomes less than .100" or when the square outer drive prongs become deformed. A chatter condition in the clutch will cause almost immediate damage to the friction disc drive prongs and the basket

The pressure plate and the clutch hub should periodically be checked for warpage and straightness. If in doubt, they should be re-ground or replaced. The floater discs should be replaced when they become warped or distorted, or when it is necessary to make an air gap adjustment.

Levers require visual inspection each time the clutch is disassembled. Look for flat spots developing on the nose of the lever. By the nose, we are referring to where the lever contacts the pressure plate. If any noticeable wear is seen, the lever should be replaced. Also make sure that the lever is able to rotate freely on the dowel pin.

REBUILDING

When the thickness of the individual friction discs becomes thinner than .100", Or if the clutch has been drastically overheated, it becomes necessary to re-build the clutch. In most cases it is possible for the end user to perform this action themselves in the field. In order to get the most life after the rebuild to follow are a few suggestions on how to deal with the friction surfaces.

1st Whenever the friction discs are replaced it is important that all of the friction surfaces which contact the friction disc material be either re-ground, or replaced. These surfaces rely on the cross hatch pattern ground on their surfaces to properly break-in a new set of friction discs. As an analogy the steel friction surfaces are very similar to a cylinder wall and the friction discs are similar to a piston and rings. If the proper surface finish is not present, the contact between the surfaces will never become as intended and performance will suffer. (In many cases there will be evidence of a cross hatch pattern remaining on the pressure plate and backing plate, if so many times these parts may be re-used)

2nd If the steel friction surfaces are re-ground. The process must not only result in a proper cross hatch, but also the finished surface must be is completely flat.

3rd NEVER, EVER, use sand paper to rough-up or deglaze the surfaces. This method simply cannot keep the surfaces flat enough nor can it provide the proper cross hatching. It will however provide some "teeth" for the friction material to bite into, and may initially seem to make a feeble clutch perform better. But after the initial roughness is worn off the clutch will perform worse than it did before the treatment. (The initial roughness from course sanding usually takes 1 to 3 starts to be worn away)

Parts available from

US Legend Cars International
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Harrisburg, NC 28075

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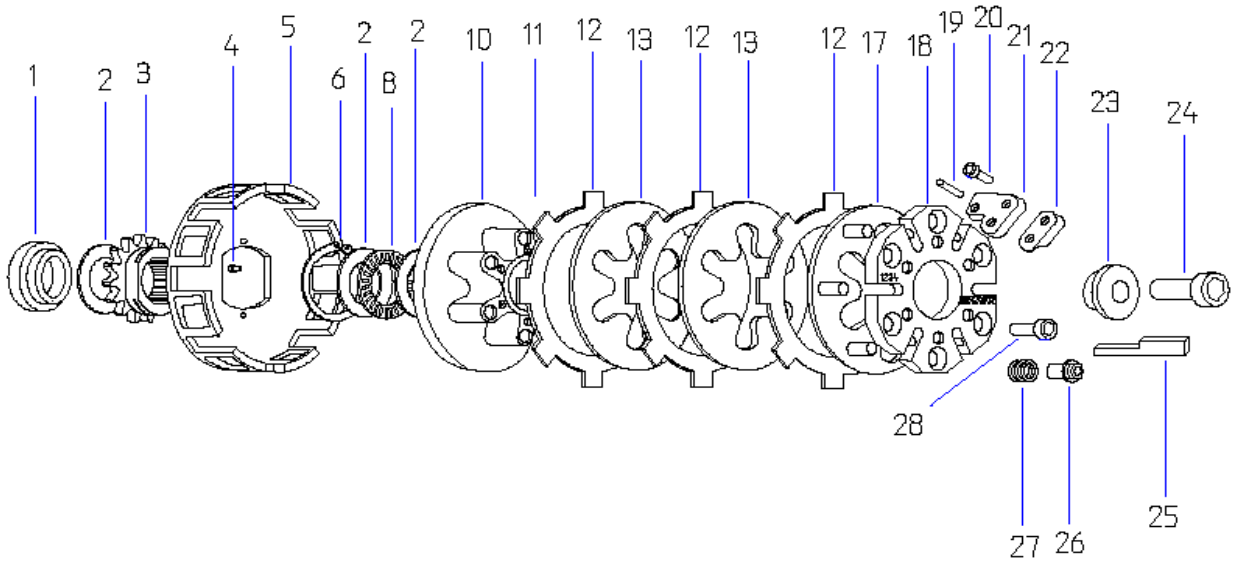
3 *Disc Clutch*



ITEM	PART #	DESCRIPTION	#
1	098-123	Crank spacer	1
2	098-602	Inner Thrust washer	2
2a	098-603	Sprocket thrust washer, outer	1
3	098-514	14 tooth #35 sprocket	1
	098-515	15 tooth #35 sprocket	
	098-516	16 tooth #35 sprocket	
	098-517	17 tooth #35 sprocket	
	098-518	18 tooth #35 sprocket	
	098-519	19 tooth #35 sprocket	
	098-520	20 tooth #35 sprocket	
	098-521	21 tooth #35 sprocket	
	098-522	22 tooth #35 sprocket	
	098-045	Sprocket replacement bearing	1
4	zn-93738	Retaining ring screw	1
5	098-305I	INEX 3 disc steel drum	1
6	098-028	Sprocket retaining ring	1
8	098-601	Thrust bearing	1
10	098-641I	INEX 3 disc 1” drive hub	1
12	098-248S	Slotted friction disc	3
13	098-111	Std. .100” floater disc	2
	098-122	optional .110” floater disc	
	098-121	optional .120” floater disc	
17	098-250T	6 spring pressure plate	1
18	098-260TI	INEX activator plate	1
19	098-001	Dowel pin	6
20	098-005	Weight lever bolt	12
21	098-115	Weight lever	6
22	098-117	INEX steel weight	6
23	098-608	INEX retaining washer	1
24	098-604	Retaining bolt	1
25	098-612	Stepped key	1
26	098-120	Spring retainer- 10/32	6
27	098-086	.085” black spring (standard light rate)	6
	098-090	.090” red spring (medium rate)	
28	098-606	Plate bolt w/ Torx head	6

Phone-704-455-3896 Fax-704-455-3820 www.uslegendcars.com