X5D1 and X5D2 Manual

Foreword
The X5D1 one disc clutch is engineered for restricted Jr Raptor Purple plate class, the X5D2 two disc is for Raptor or Animal Jr & Sr classes

Warning!!! When the engine starts the clutch and chain may spin at high speeds if brake is not applied. *Do not* **operate vehicle without proper guards in place.** *Do not* **attempt to adjust, repair, or lubricate clutch or chain with engine running**. The friction disc has a very aggressive lock up for winning performance. Therefore when leaving the grid to enter track it is possible to have clutch chatter. Chatter does not affect performance on the track. Keep air gap under .035" to reduce chatter.

Installation
It is better to mount the clutch with the sprocket facing the engine because stall speed adjustment can be accomplished without removing the clutch. Mounting the clutch with the sprocket facing away from the engine requires the optional spacer kit p/n 477736 for proper clearance between the levers and the side of the engine.

Steps for inboard installation **Animal requires spacer 490001 installed first to prevent damage to hub**

1. slide spacer #0 andclutch onto crankshaft … if clutch does not slide freely then sand nicks from the crank
2. align keyway in clutch with crank keyway .. insert key (item 20) … do not force key … file any burrs from clutch or crank keyway …Also you may need to sand or file the side of the key a small amount
3. slide spacer (item 19) onto crankshaft
4. install lock washer (item 22 and flat washer (item 21) onto bolt (item 23)
5. thread bolt into crank and tighten firmly (150 inch pounds)

Stall Speed
Stall speed is the RPM that the clutch locks up solid. For top performance it is important to adjust the stall speed to match the peak torque of the engine. This allows the engine to operate within its power band for quicker acceleration. Factors that affect stall speed such as metallurgy, friction material, lever dynamic, and surface finish are engineered into the product therefore you only need to be concerned with the number of washers on the levers and adjusting the spring tension. The ideal stall speed adjustment will result in the fastest lap time.

Stall Speed Adjustment
Adjusting the stall speed of the clutch may be intimidating if you are a newcomer to the sport however it is relatively easy to learn. A tachometer with memory is needed to obtain accurate data. Setting the clutch stall speed to the engine's peak torque should produce the fastest lap times. If the stall speed is set more than 100 rpm above peak torque lap time may be slower. Of course if the stall speed is below peak torque lap time may also be slower.

Steps
1. Install the recommended color-coded springs from the ***Stall Speed Chart and adjust the height (fig 2)***
2. Go onto the track and observe tachometer reading while kart is accelerating. The stall speed is the rpm reading when the clutch engages solid and the kart begins accelerating rapidly. Warning! If the stall speed is above the range on the chart below you must exit the track in a safe manner and return to your pit to adjust the stall speed lower to prevent overheating the clutch. If the stall speed is within the prescribed range on the chart you may drive enough laps to get the engine up to proper temperature and get comfortable with the track configuration. Run about five to ten laps to establish your performance base line.
3. Return to your pit and look at the tachometer data. Note the Max RPM, MPH, lap times, and stall speed.
4. Adjust stall speed if necessary and make another test session. Keep making clutch adjustments until you determine the best stall speed for the fastest lap. Now you can look at gear ratio changes as well as chassis adjustments to test for even faster lap times.

Stall Speed Chart

The chart is a guideline only as various weight/spring combinations can produce comparable results. Adding washers and/or installing weak springs will lower the stall speed. Removing washers and/or installing strong springs will raise stall speed.

Class	Weight	Spring color	Stall Speed Range	Initial spring height setting
Briggs Jr Sportsman .425" purple restrictor	4 washers	black	2900-3100	.210"
Briggs Jr Sportsman Raptor or Animal Blue restrictor or Honda GX-160 (2 disc)	3 washers	black	3200-3400	.200"
Briggs Jr (2 disc) Raptor /Animal gold restrictor	2 washers	Yellow	3600-3800	.210"
Briggs Jr Lite & Hvy Raptor (2 disc) Unrestricted and Jr Animal	1 washer	Yellow	3800-4000	.190"
Briggs Senior (2 disc) Honda GX Sr Animal	1 washer	Yellow	3800-4000	.190"

How to raise Stall Speed

There are four ways to raise the stall speed

1. Spring adjustment (clockwise)
2. Less washers on levers
3. install stronger springs
4. use shorter bolts

To raise stall speed by increasing the spring tension you must dial the five adjusting screws equally clockwise. ¼ turn will raise the stall speed about 100 rpm. If you can't get the correct stall speed within the spring adjustment limits (Fig 2) then remove a washer from the levers and reset the springs.

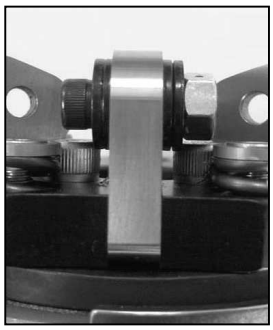


Figure 1

How to lower Stall Speed

There are three ways to lower the stall speed

1. Spring adjustment (counterclockwise)
2. Install weaker springs
3. Add washers to levers for more mass

To lower stall speed by decreasing the spring tension you must dial the five adjusting screws (item 17) equally counterclockwise. ¼ turn will lower the stall speed about 100 rpm. If you can't get the correct stall speed within the spring adjustment limits (**Fig 2**) then install weaker springs or add washers. Figure 1 shows lever with 4 washers installed as an example of where to put the weight. When installing 3 or more washers use the 10-32 x ¾ bolt size.

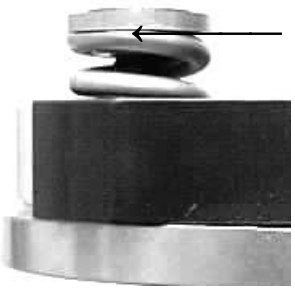
Spring Adjustment Limits

Warning!!!! The springs in this clutch have a finite range of travel therefore adjustment limits must be followed. (**Fig 2**)

Do not adjust above the maximum height .225" because the springs(item 15) will not have enough tension to keep the adjusting screws in place.

Do not adjust below the minimum height .170" because the springs will coil bind. Coil bind is when the spring is fully compressed and acts like a solid object with zero travel. Coil binding of the springs will prevent the pressure plate (item 10) from moving the prescribed distance to allow complete lock up and excess heat will quickly ruin the clutch.

Measure from top of spring to lever support



top of spring

lever support

Maximum .225"
Minimum .170"

Figure 2

Air Gap

Air gap is the space between the disc (item 9) and the pressure plate (item 10). Correct air gap will allow a neutral mode for starting the engine. The air gap is preset at the factory at .025" +/- .006" . Excessive air gap hurts performance and contributes to chatter. When air gap exceeds .035" replace the standard floater with an optional thicker floater.

Cleaning

Remove clutch from engine when cleaning. Use disc brake spray cleaner for best results. **Do not** use solvents, gasoline, water, or household cleaners as contamination of the friction disc can occur. Wear safety glasses and protective gloves when cleaning and performing maintenance.

Disassembly

1. Remove snap ring (item 1)
2. Remove outer thrust washer (item 2)
3. Slide drum (item 5) off drive hub
4. Remove thrust washer (item 6)
5. Remove thrust bearing (item 7)
6. Remove spring adjustment screws (item 17) and springs
7. Remove the five ¼-28 cap screws (item 18)
8. Remove lever support (item 11)
9. Take off pressure plate (item 10)
10. Remove friction disc(s) (item 9) and floater (s) 9A
11. Remove levers (item 13 and dowel pins (item 12)

Maintenance

For peak performance it is important to clean and apply multipurpose grease to the sprocket bearing and thrust bearing after each race event. Also inspect the following:

Drum and sprocket (item 4&5)

Check the four screws that attach the sprocket to the drum and if loose apply loctite and tighten to 85 in lbs. Check drum for wear in slots or any cracks where bolted to sprocket and replace. Replace sprocket when teeth are worn to a point as chain will keep coming off. Replace any bearing that will not spin freely. Replace any washer that is not smooth. When installing a new sprocket it is necessary to use a new chain. A worn or stretched chain will not seat correctly.

Drive Hub (item 8)

Check for wear or score marks where friction disc makes contact**.** Remove score marks or glaze with 100 grit sandpaper. Replace hub if keyway is cracked.

Friction Disc (item 9) ***Most important !!!!***

A friction disc is subjected to high surface heat from friction during engagement cycles and will wear and glaze. Deglazing the disc will improve performance and can be accomplished easily. Just lay a clean sheet of 100 grit sandpaper onto a flat surface then place the disc onto the sandpaper. Now make a figure 8 motion while sanding the disc. Most glazing can be removed in about 60 seconds . Sand both sides of the disc. A disc will have useful life until worn to .138" overall thickness. If you have the 2 disc model sand the floater and pressure plate to remove glaze. Thicker floaters are available to reduce air gap.

Lever Support (item 12)

The lever support is made from alloy aluminum and has a hard coating for corrosion protection and wear resistance. Check after every ten race events for excessive wear in the slots where the levers rub. Replace when deeply worn.

Levers (item 13)

The levers are made from hardened alloy steel and will last a long time. After every ten race events check for wear at the pivot hole and replace when oval shaped.

Dowel pins (item 12)

Subject to high forces from levers. Replace after a season of racing. Tip . apply a light coat of anti-seize lube to the dowel pins every five races and the levers will move freely and last longer.

Springs (item 15)

Springs are subjected to heat and stress and must be inspected every five races. When free length is below .475" replace the springs. Warning: use genuine Horstman springs …. Aftermarket springs are not cryogenically treated nor in most cases shot peened or made from the best alloy therefore they will make your clutch inconsistent.

Item No	Part Number	Description	Units Required
0	490001	Spacer , use with 11T #35 clutch and or Animal Crank	1
1	463000	Snap ring, 12T-23T clutch	1
2	490003	Washer, 1 1/8" diameter fits 12T & 13T #35 & 15T #219 clutch	1
	490004	Washer, 1 ¼" diameter fits 14T-23T #35 & 17T-23T #219 clutch	1
3	463600	Bearing, bronze fits 11T #35 clutch	1
	463400	Bearing, bronze fits 12T & 13T #35 & 15T #219 clutch	1
	463500	Bearing, roller fits 14T-23T #35 & 17T-23T #219 clutch	1
	300300	Bearing, bronze fits 9T #35 Arena Sprocket	1
	300400	Bearing, roller fits 10T #35 Arena Sprocket	1
4	See chart	Sprocket Kit, includes bearing and hardware	1
4A	477701	Screw, 10-32 button head	4
5	See Chart	Drum Kit, includes sprocket, bearing and hardware	1
5A	477702	Drum only, one disc style	
	477880	Drum only, two disc style	
6	490035	Thrust washer, 9T, 10T, & 11T #35 Clutch only	1
	480078	Thrust washer, 12T-23T Clutch	1
7	490036	Thrust bearing, 9T, 10T, & 11T #35 Clutch only	1
	480079	Thrust bearing, 12T-23T Clutch	1
8	477725	Drive hub, fits 9T, 10T, &11T #35 one disc clutch only	1
	477726	Drive hub, fits 12T-23T one disc clutch only	1
	477882	Drive hub, fits 9T, 10T, & 11T #35 two disc clutch only	1
	477883	Drive hub, fits 12T-23T two disc clutch only	1
9	477729	Friction disc	1 or 2
9A	477885	Floater, standard size .085" thick fits two disc clutch only	1
	477886	Floater, .075" optional size	
	477887	Floater, .095" optional size	
10	477727	Pressure plate	1
11	477898	Lever support D series	1
12	477897	Dowel pin	5
13	477896	Lever. Jumbo .275" wide	5
14	477732D	Weight kit, 5 bolts, 20 washers, 5 lock nuts	1
15	3130Y	Spring, yellow high tension (Set of 5 blueprinted)	1
	4650Y	Spring, black medium tension (Set of 5 blueprinted)	1
	5142Y	Spring, blue ,low tension (For stall speed below 2800) Set of 5	optional
16	477733	Retainer, color gold	5
17	334800	Screw, 10-32 x ¾ flat head	5
18	477734	Screw, ¼-28 x ¾ socket head	5
19	477738	Spacer, fits all X5 clutch models 11T-23T	1
20	465100	Key	1
21	465200	Washer, flat	1
22	465500	Washer, lock	1
23	465300	Bolt	1
	477735	Spanner wrench	optional
	477889	Outboard Spacer kit	optional

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