Horstman® HDC-5CP & CS Clutch Manual

Foreword

The HDC-5CP triple disc dry model is designed for use on the Yamaha KT-100S kart engine in senior open pipe class where rules permit. HDC-5CS is for recreational karting. This manual will help you obtain the correct setup.
Note: Clutch may be special ordered with any of the spring sizes installed at the factory at no extra charge.

Warning!!!

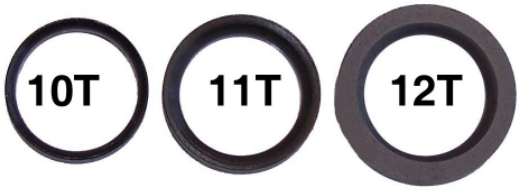
When the engine starts the clutch and chain may spin at high speeds if brake is not applied. Do not operate vehicle without proper guards in place. Do not attempt to touch, adjust, repair, or lubricate clutch or chain with engine running. The cerametallic friction discs are engineered with very aggressive lock up. This may cause clutch chatter at low speeds when exiting the grid to go onto racetrack however performance will not be compromised.

Installation

◄ **Figure 1**

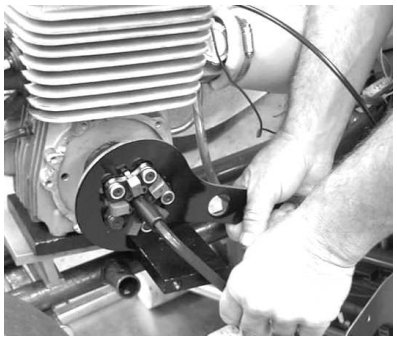
1. Install spacer with chamfer facing engine (See Figure 1**)**
Warning! Be sure to use the correct diameter spacer that is made for each sprocket size. See Figure 2 This is mandatory for correct chain wrap over the sprocket as well as prevention of bearing damage.
2. Apply thin coat of grease to the bearing in the sprocket
3. Slide drum onto crankshaft…sprocket faces engine
4. Insert woodruff key into crankshaft
5. Slide the drive hub unit onto tapered area of crankshaft. Make sure the keyway in the drive hub is aligned with the woodruff key in the crank. Rotate the drum to allow the outer lugs of the friction disc to align with the slots in the drum.
6. Install starter nut (item 16) Torque to 350 inch lbs
The optional spanner wrench p/n 336062 is helpful in holding clutch during installation, removal, and disassembly. See Figure 3
7. Check end play (Figure 4) if correct go to step 8
8. Install chain and clutch support system as required by rules.

Figure 2▼



End Play (lateral movement of drum)

Proper end play allows the clutch to spin freely. Zero end play will not allow the engine to start.
Check end play with feeler gauge. Measure between crankshaft step and spacer. (Fig.4) Minimum end play is .005" and maximum is .025". If end play is below .005" you must remove the clutch and grind or sand material from the flat side of the spacer. If end play is greater than maximum contact your dealer for purchase of a wider spacer.
Note: Picture is 2 disc model. Measurement is the same for 1 disc, 2 disc, and 3 disc models.



← **Figure 3**

Figure 4 →

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 design, and surface finish are engineered into the product therefore you only need to be concerned with adjusting the spring tension.

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. Data acquisition with memory is needed to log accurate data. Do not set the stall speed of the HDC-5CP clutch above 9800 RPM. If the stall speed is set above the prescribed limit then excessive wear and possible warping from heat may occur. Non racing use of clutch should keep stall speed below 8300 rpm.

Steps

1. 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. Data acquisition systems enable recording stall speed as you make practice laps. 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 while the friction discs seat in.
2. Return to your pit and look at the tachometer data. Log the stall speed off tightest corner …also log Max RPM, MPH, lap times, and engine temp.
3. 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. **Warning! When adjusting the clutch wear protective gloves as clutch will be hot!**

Stall Speed Chart*

Class	Clutch Model	Spring	Stall Speed Range	Initial Setting
KT-100 Yamaha Senior Open Pipe	HDC-5CP	3130Y	9600-9800	.650”
Recreational Setup	HDC-5CS	3282Y 5142Y	8000-8200 7000-7400	.650” .630”

* Chart is a guideline only …exact setting must be accomplished by track tests

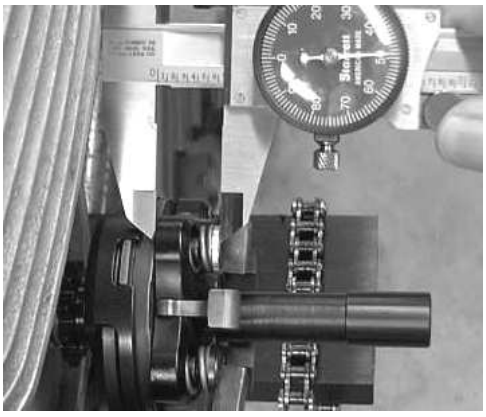


Figure 5

← Measure from edge of lever support (item 9) to top of spring retainer (item 13)

How to raise Stall Speed

Increase spring tension by inserting 1/8” allen wrench into adjusting screw (item 14) and turn clockwise. Adjust all five screws equally. 1/4 turn will raise stall speed approximately 100 rpm

How to lower Stall Speed

Decrease spring tension by inserting 1/8” allen wrench into adjusting screw(item 14) and turn counterclockwise. Adjust all five screws equally. 1/4 turn will lower stall speed approximately 100 rpm.

Spring Adjustment Limits

The clutch can only be adjusted within a finite range. **See Figure 6**
Do not adjust below the minimum height .600” because the springs will coil bind. Coil bind is when the spring is fully compressed and becomes a solid object. Coil binding of the springs will prevent the pressure plate (item 7) from moving the full distance to allow total lock up and the clutch will get hot and be ruined.
Do not adjust above the maximum height of .680” because the adjusting screws will not stay in place. Put a drop of blue locktite on the screws (item 14).

Figure 6

For stall speeds below 9600 rpm install optional springs. **Contact your dealer or factory for advise.**

Air Gap

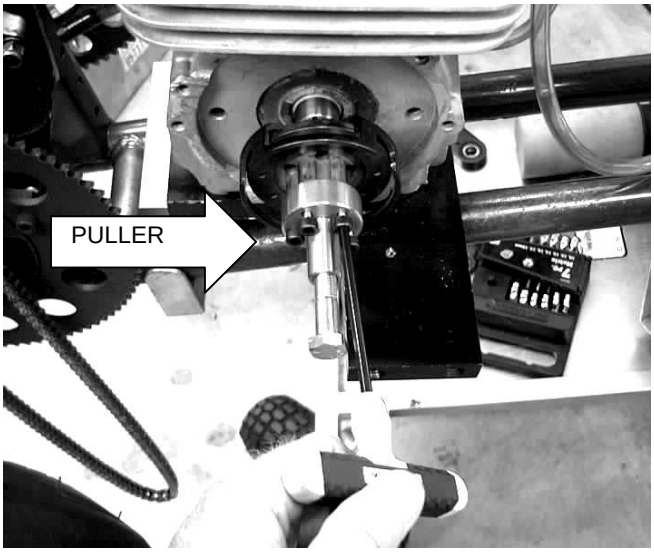
Air gap is the space between the disc (item 6) and the pressure plate (item 8) Correct air gap will allow a neutral mode for starting the engine as well as correct lever pressure. The air gap is preset at the factory at .030” +/- .006” .When regrinding or sanding components it is important to stay within factory tolerance for best performance. Optional thick floaters are available to reduce excessive air gap. Also thinner floaters are available to increase air gap. Max air gap is .045” .

Cleaning

Use disc brake spray cleaner for best results. **Do not** use solvents, gasoline, water, or household cleaners as rust or contamination can occur. Wear safety glasses and protective gloves when cleaning and performing maintenance. A light spray of WD-40 after cleaning will help prevent corrosion. Never spray Teflon based lubricants onto clutch as discs may be ruined and over-slipping will occur.

Removal … Allow clutch to cool before touching Wear eye protection and gloves for safety.

1.Remove starter nut (item 16)
(an impact wrench can be used to save time)
2.Remove the 5 top assembly cap screws (item 15)
3. Remove top assembly from clutch and remove discs and floaters
4.Thread 5 bolts in optional puller into clutch hub and tighten center bolt until clutch pops off taper. **See Arrow**



Maintenance

Drum/ sprocket

Check drum for wear in slots (**See Figure** 7) replace when wear exceeds .075" deep. Inspect sprocket and replace when teeth are worn to a point or broken as chain will keep coming off. Normal sprocket life is 2-3 race events on a 10T and 3-5 race events on an 11T under ideal conditions.

USE OF QUALITY RACING CHAIN LUBE WILL INCREASE SPROCKET LIFE. Worn chain, improper lube on chain, track surface (dirt vs asphalt) , over tight chain, misalignment, causes the sprocket to wear faster. ***Apply grease to bearing before each race day.*** Also purchase spare spacers (item 1) as they will wear or crack from constant pounding when cornering. **Be sure to use the correct diameter spacer!** ALWAYS INSTALL A NEW CHAIN WHEN INSTALLING A NEW SPROCKET.

Friction Disc (item 6) is subjected to high surface heat 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 medium grit emery paper onto a flat surface then place the disc onto the emery paper. 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 .123" overall thickness. Also sand the floaters to remove glaze. When installing new friction discs use genuine Horstman discs for best performance. Floaters can be resurfaced numerous times and should be replaced when warped or beveled.
Pressure Plate (item 8) Sand friction surface with 80 grit emery paper after every race event. Sanding will remove the glaze and high spots for maximum contact patch will friction disc.
Lever Support (item 9) The lever support is made from alloy aluminum and has a hard coating for corrosion protection and wear resistance. Check frequently for excessive wear in the slots where the levers pivot. Replace when deeply worn.
Levers (item 11) 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 10) Subject to high forces from levers. Replace after 10-20 races
Tip … apply a light coat of anti-seize lube to the dowel pins and the levers will move freely and last longer
Springs (item 12) Springs are subjected to heat and stress and must be inspected every five races. When free length is below .475" replace the springs.
Assembly :

Insert a dowel pin (item 10) into each lever (item 11) and install into lever support.
Insert pressure plate(item 8) onto lever support
Install 5 springs,5 retainers, and 5 screws(item 14) but do not adjust yet. (This is now referred to as the top assembly.
Install friction discs and floaters onto drive hub(item 5)
Slide top assembly onto drive hub
Insert five screws (item 15) and tighten to **95** inch pounds, replace screws after each rebuild because screws stretch when tightened.

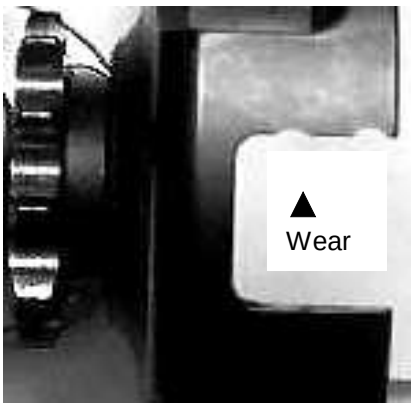
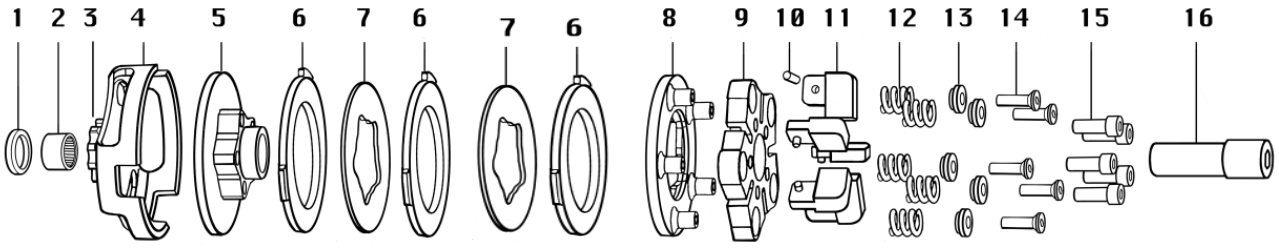


Figure 7

Now adjust the spring height per Stall Speed Chart



Patent D,487,760S

Item No	Part Number	Description	Units Required
1	322300 323800 325900	Spacer .145" x .670" ∅ for 10T #219 drum only Spacer .145" x .740" ∅ for 11T #219 drum only Spacer .145" x .830" ∅ for 12T #219 drum only	1 1 1
2	330132 300300 300400	Bushing for 10T #219 Bushing for 11T #219 Bearing for 12T-15T #219	1
3	330133 330138 330139	Sprocket, bolt on 10T #219 Sprocket, bolt on 11T #219 Sprocket, bolt on 12T #219	1
4	336067S 336068 336069 336070	Drum only, steel less sprocket HDC-5CP and CS Drum kit , steel w/bolt-on sprocket 10T #219 HDC-5CP &CS Drum kit, steel w/bolt-on sprocket 11T #219 HDC-5CP &CS Drum kit, steel w/bolt-on sprocket 12T #219 HDC-5CP & CS	1
5	336026	Drive hub HDC-5CP & CS	1
6	336023	Friction disc	3
7	336027 336027A 336027B 336028 336029	Floater, .095" thick standard size Floater, .090" thick optional Floater, .085" thick optional Floater, .100" thick optional Floater, .105" thick optional	2
8	336021	Pressure plate	1
9	336022	Lever support	1
10	330027	Dowel pin	5
11	330037A 330088	Lever 10 grams for pipe class HDC-5CP Lever 10.7 grams for can class or recreation HDC-5CS	5
12	3130Y 3282Y 5142Y	Spring (Matched set of 5) .091" Standard on HDC-5CP Spring (Matched set of 5) .085" Standard on HDC-5CS Spring (Matched set of 5) .075" optional	1
13	334700	Retainer	5
14	334800	Screw, spring adjusting 10-32 flat head	5
15	336038	Screw, 10-32x3/4 socket head	5
16	703600	Starter nut	1
	309300	Woodruff key 3mm	1
	336061	Puller	Optional
	336062	Spanner wrench	Optional