

TWO DISC CLUTCH for KART RACING ENGINES



Adjustment - Set the engagement speed to the engine's peak torque RPM. The engagement speed is set by spring stiffness (Silver, Black, Gold) and the position (1 thru 5) of the lower spring leg. The optional Vortex Spring Wrench, Part Number 4018 simplifies spring removal and replacement. See Spring Chart for Estimated Engagement RPM.

If you plot the engine's torque vs. rpm curve and the clutch's torque vs. rpm curve on the same graph, the two lines will cross. At that point the clutch and engine are in equilibrium. The equilibrium point defines the engagement rpm. At lower rpm the clutch slips because the engine produces more torque than the clutch can accommodate. At higher rpm the clutch is locked up because it can handle much more torque than the engine can produce. If you modify the engine by changing cam, jets, bore, stroke, valve position, fuel type et cetera, the shape of the engine's torque vs. rpm curve will change. If you modify the clutch by changing spring position, the shape of the clutch's torque vs. rpm curve will change. When either curve changes shape, the equilibrium point moves. The table is merely an estimate of where that point occurs for various combinations of engines and springs. See Spring Chart for Estimated Engagement RPM.

Maintenance - Clutches like tires get dirty quickly. It is important to clean clutch discs every race weekend if not every heat if you want maximum acceleration.

Upon disassembly use an appropriate marker to identify the top sides of the drive plates and clutch discs if they will be reused. It is very important to replace each disc and drive plate in its original orientation. Heat and pressure force the drive plates into a permanently cupped shape and the soft discs will quickly wear into a conforming shape. These five pieces become a matched set. An upside down clutch disc or drive plate can cause poor contact between members and require another break-in process. Even if only one of these five parts is damaged, replace all five parts for maximum performance.

The Vortex clutch is not sensitive to air gap. Clutch disc thickness and taper do not affect performance. The criteria for replacing a disc are heat and chemistry i.e. replace the discs when they become glazed.

SMC highly recommends cleaning clutch (friction) discs mechanically NOT chemically. Brake cleaner and other chemicals are inadequate for removing dirt and other fine particles packed into the tiny voids. Do not use sandpaper on the 12 tab disc. A stainless steel utility brush (aka platers' brush) with a wire diameter of .006 is ideal for removing the hard-to-get-at dirt. The friction material is very porous and unfortunately works well as a dirt collector. Once the voids are filled and packed, the dirt starts to act as a lubricant (think tiny ball bearings) and causes the clutch to slip for a greater distance.

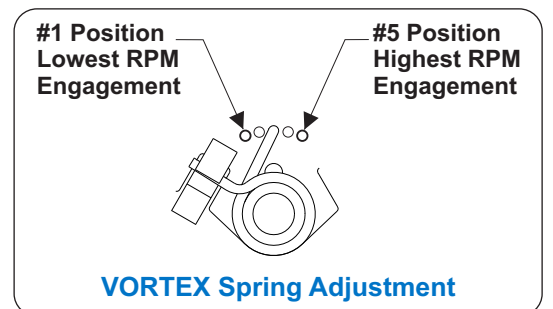
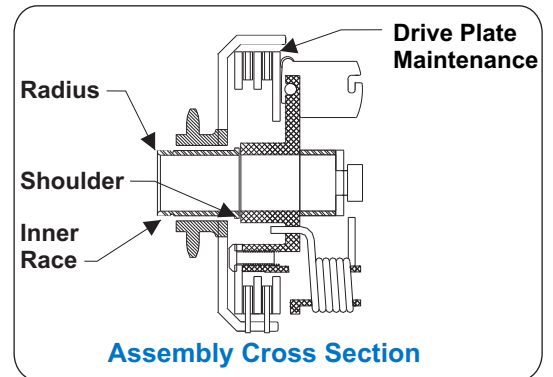
Drive plates that are tan, yellow, light blue or dark blue in very small areas and distorted less than 0.020 inch from flat may be reused. Heat and pressure cause friction material to separate from the clutch disc and bond to the drive plates. This friction material should be removed from the drive plates with sandpaper.

Use a Torx® T25 wrench with 60 inch-pounds (5 foot-pounds) of torque to tighten the six button head cap screws.

SMC Roller Levers cause disc clutches to engage more effectively. Rollers located at the contact point between the lever and the pressure plate eliminate sliding friction. The lower friction reduces engine bogging. There is now more energy available for acceleration.

Protect the clutch from moisture. Corrosion will diminish performance.

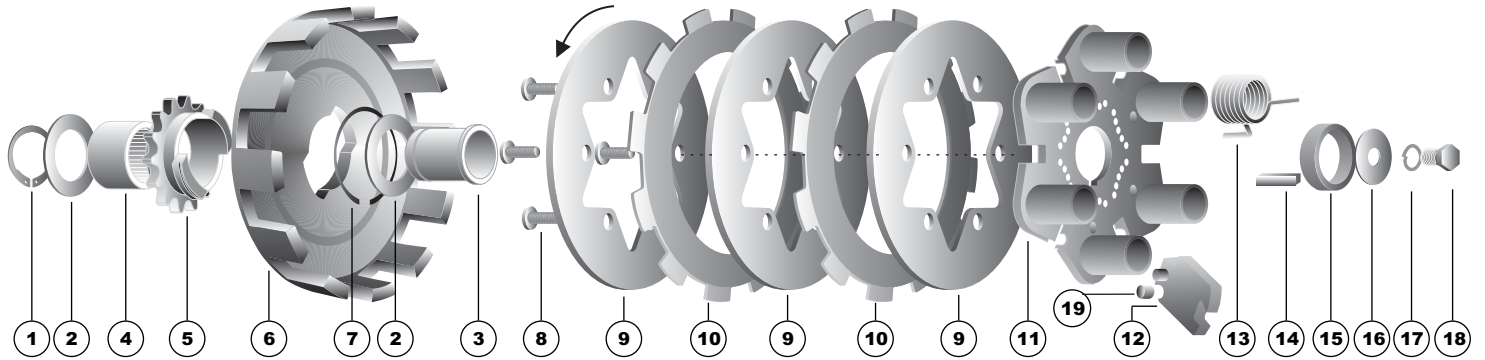
DO NOT USE BULLY SPROCKETS ON SMC CLUTCHES - Bully sprocket do not meet SMC requirements for accuracy or quality.



TWO DISC CLUTCH for KART RACING ENGINES



PATENTS
6,279,711
6,536,574



Vortex Parts

Ref. No.	Part No.	Price Each	Description (Number Required)
	4102	330.00	VORTEX Roller Lever, Two Disc Clutch
1	4087	0.55	Retaining Ring, Inner Race (0.042 thick)
2	4010	1.25	Inside Washer - for all clutches (0.080 thick) Outside Washer - for all sprockets with Needle Roller Bearings
	4023	1.25	Outside Washer (1) (#35-13T & #219-15T)
	4049	1.25	Outside Washer (1) (#35-12T & #219-14T)
3	4088	9.00	Inner Race 1.15" length, 0.09" Shoulder
4	4012	7.50	Needle Roller Bearing
5			Sprocket (see sprocket chart)
6	4812	24.95	Drum, 12-Slots
7	4037	1.50	Retaining Ring, High RPM
8	4006	0.25	Button Head Cap Screw (6)
9	4003	16.00	Drive Plate (3)
10	4250	24.50	Clutch Disc, Twelve Tabs (2)
11	4242	135.00	Drive Hub, Two Disc
12	4280	20.00	SMC Roller Lever, New, Vortex (6)

Vortex Parts

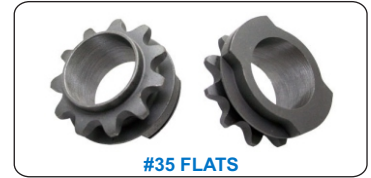
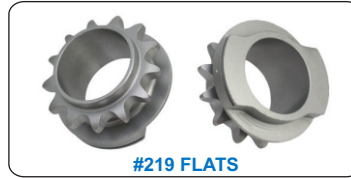
Ref. No.	Part No.	Price Each	Description (Number Required)
13	4059	3.00	VORTEX Spring - Black (6) (Standard)
	4004	3.00	VORTEX Spring - Silver (6) (Optional)
	4068	3.00	VORTEX Spring - Gold (6) (Optional)
14	4036	0.50	Key (0.875" length)
15	4032	4.00	Spacer (0.250 length)
16	4227	2.00	Crankshaft Washer
17	4025	0.06	Grade 8 Lock Washer
18	4217	0.35	Hex Head Cap Screw
19	4279	3.00	Roller, New, Vortex (For Lever #4280) (6)
	4018	15.00	VORTEX Spring Wrench
	4234	95.00	Rebuild Kit, Two Disc Clutches (three drive plates, two clutch disc, six cap screws)
	4082	17.00	Inner Race Kit, Two Disc Clutches (inner race, two washers, retaining ring, spacer)
	4038	5.00	Bushing, Short (#35-11, #219-13, #219-14)
	4039	7.00	Bushing, Long (#35-11, #219-13, #219-14)
	4045	5.75	Hardware Pack, Two Disc Clutches
	4055	9.00	T-Handle, T25 Torx (Tool for #4006)

Spring Chart - Estimated Engagement RPM

Engine	Silver 1	Silver 2	Silver 3	Silver 4	Silver 5	Black 1	Black 2	Black 3	Black 4	Black 5	Gold 1	Gold 2	Gold 3	Gold 4	Gold 5
Honda/clone, Stock	3000	3160	3320	3480	3640	3600	3825	4050	4275	4500	4200	4425	4650	4875	5100
Honda/clone, Restricted	3100	3260	3420	3580	3740	3700	3925	4150	4375	4600					
Honda/clone, Modified	3200	3360	3520	3680	3840	3800	4025	4250	4475	4700	4400	4625	4850	5075	5300
B & S Animal, Stock	3200	3360	3520	3680	3840	3800	4025	4250	4475	4700	4400	4625	4850	5075	5300
B & S Animal, Restricted	3300	3460	3620	3780	3940	3900	4125	4350	4575	4800					
B & S Animal, Modified	3400	3560	3720	3880	4040	4000	4225	4450	4675	4900	4600	4825	5050	5275	5500
B & S flat head	3400	3560	3720	3880	4040	3600	3825	4050	4275	4500	4600	4825	5050	5275	5500
B & S flat head, Restricted	3500	3660	3820	3980	4140	3700	3925	4150	4375	4600					

FLATS - SPROCKET CHARTS

		Part No.	Price Each	Description
#35 CHAIN	PTO Assembly	4611	23.00	11T Sprocket
		4612	23.00	12T Sprocket & Bushing
		4613	23.00	13T Sprocket & Bushing
		4614	23.00	14T Sprocket & Needle Roller Bearing
		4615	23.00	15T Sprocket & Needle Roller Bearing
		4616	23.00	16T Sprocket & Needle Roller Bearing
		4617	23.00	17T Sprocket & Needle Roller Bearing
		4618	23.00	18T Sprocket & Needle Roller Bearing
		4619	23.00	19T Sprocket & Needle Roller Bearing
		4620	26.45	20T Sprocket & Needle Roller Bearing
		4621	26.45	21T Sprocket & Needle Roller Bearing
4622	26.45	22T Sprocket & Needle Roller Bearing		
4623	26.45	23T Sprocket & Needle Roller Bearing		



		Part No.	Price Each	Description
#219 CHAIN	PTO Assembly	4713	22.00	13T Sprocket
		4714	23.00	14T Sprocket
		4715	23.00	15T Sprocket & Bushing
		4716	23.00	16T Sprocket & Needle Roller Bearing
		4717	23.00	17T Sprocket & Needle Roller Bearing
		4718	23.00	18T Sprocket & Needle Roller Bearing
		4719	23.00	19T Sprocket & Needle Roller Bearing
		4720	23.00	20T Sprocket & Needle Roller Bearing
		4721	23.00	21T Sprocket & Needle Roller Bearing
		4722	23.00	22T Sprocket & Needle Roller Bearing
		4723	23.00	23T Sprocket & Needle Roller Bearing
		4724	26.45	24T Sprocket & Needle Roller Bearing
		4725	26.45	25T Sprocket & Needle Roller Bearing
		4726	26.45	26T Sprocket & Needle Roller Bearing
		4727	26.45	27T Sprocket & Needle Roller Bearing
4728	26.45	28T Sprocket & Needle Roller Bearing		
4729	26.45	29T Sprocket & Needle Roller Bearing		



PULLEY CHART

		Part No.	Price Each	Description
#428 CHAIN	PTO Assembly	4631	45.00	11T Sprocket & Needle Roller Bearing
		4632	45.00	12T Sprocket & Needle Roller Bearing
		4633	45.00	13T Sprocket & Needle Roller Bearing
		4634	45.00	14T Sprocket & Needle Roller Bearing
		4635	48.00	15T Sprocket & Needle Roller Bearing
		4636	48.00	16T Sprocket & Needle Roller Bearing
		4637	48.00	17T Sprocket & Needle Roller Bearing
		4638	48.00	18T Sprocket & Needle Roller Bearing

		Part No.	Price Each	Description
8mm PULLEY	PTO Assembly	4523	75.00	23t-8mm20m HTD Pulley
		4524	75.00	24t-8mm20m HTD Pulley
		4525	75.00	25t-8mm20m HTD Pulley
		4526	75.00	26t-8mm20m HTD Pulley
		4527	75.00	27t-8mm20m HTD Pulley
		4528	75.00	28t-8mm20m HTD Pulley
		4529	75.00	29t-8mm20m HTD Pulley
		4530	75.00	30t-8mm20m HTD Pulley
4532	75.00	32t-8mm20m HTD Pulley		



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