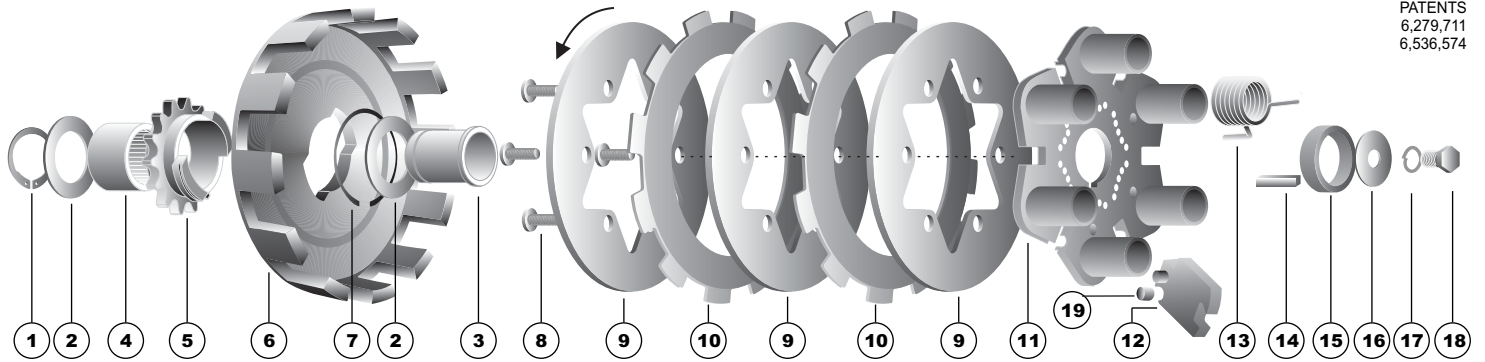


TWO DISC CLUTCH for KART RACING ENGINES



PATENTS
6,279,711
6,536,574



Vortex Parts

Ref. No.	Part No.	Price Each	Description (Number Required)
	4102	295.00	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	4080	9.00	Inner Race w/ Shoulder (1.187 length)
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	4031	98.00	Drive Hub
12	4280	20.00	SMC Roller Lever, New, Vortex (6)
13	4059	3.00	VORTEX Spring - Black (6) (High RPM) (Standard)
	4004	3.00	VORTEX Spring - Silver (6) (Low RPM) (Optional)
	4068	3.00	VORTEX Spring - Gold (6) (High RPM) (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)

Sprocket Chart

Part No.	Price Each	Description
#35* Chain		
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	25.00	20T Sprocket & Needle Roller Bearing
4621	25.00	21T Sprocket & Needle Roller Bearing
4622	25.00	22T Sprocket & Needle Roller Bearing
4623	25.00	23T Sprocket & Needle Roller Bearing
#219* Chain		
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	25.00	24T Sprocket & Needle Roller Bearing
4725	25.00	25T Sprocket & Needle Roller Bearing
4726	25.00	26T Sprocket & Needle Roller Bearing
4727	25.00	27T Sprocket & Needle Roller Bearing
4729	25.00	29T Sprocket & Needle Roller Bearing
4040	35.00	#35 - 11T Sprocket & Bushing Assembly
4041	35.00	#219-13T Sprocket & Bushing Assembly
4042	35.00	#219-14T Sprocket & Bushing Assembly

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					

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.

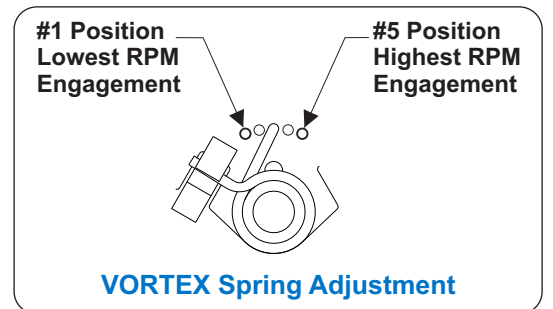
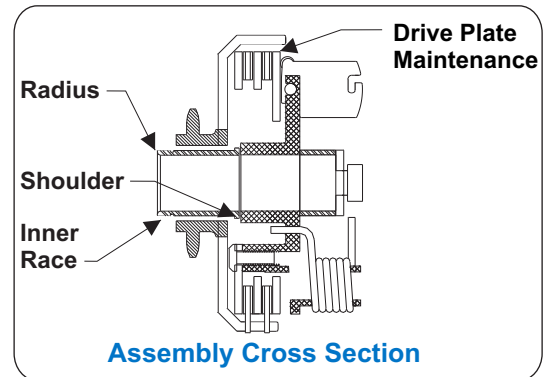
Drive plates that are tan, yellow, light blue or dark blue in very small areas and distorted less than 0.020 inch from flat may be reused. Heat and pressure cause friction material to separate from the clutch disc and bond to the drive plates. This friction material should be removed from the drive plates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



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