



## TKM BT82 V CLUTCH SERVICE & FITTING GUIDE V2

### V CLUTCH

All new model Clutched & TAG engines are fitted with a V Clutch and the only available chain sprockets that can be used are the standard fitment 10 Tooth & the optional 11Tooth.

The V clutch is designed to permit easy starting with a battery operated hand-held remote starter or with the TAG (touch & go) on-board starter system. When the engine starts, the clutch will be in neutral until the engine reaches approximately 3400rpm. At about 3500rpm the V clutch will start to engage, and the kart will start to move. Since the V clutches engages at a low rpm, driving technique will be the same as a direct drive vehicle.

Due to the extreme demands of racing, it is important to properly maintain your V clutch in order to obtain maximum performance and reduce risk of clutch breakage or clutch slip.

### V CLUTCH REMOVAL

Remove the crank starter nut P/N: BTTNUTM10. On the older model clutch drum with through lightening holes, you can use the V clutch Spanner holding tool so this nut can be undone. On the newer model clutch drum with no through lightening holes you must use an impact gun to undo and do up this nut set on a low pressure.

- ▲ **Warning:** Do not hold the ignition rotor side crank nut or use a piston stop when attempting to undo the crank starter & clutch hub nuts as this will cause crankshaft to be misaligned & possible engine damage.
- ▲ **Warning:** Do not use anything wedged in starter ring gear teeth and crankcase when attempting to undo the crank starter & clutch hub nuts as this will cause stress and possible starter ring gear damage/failure.



*V Clutch Holding Spanner*

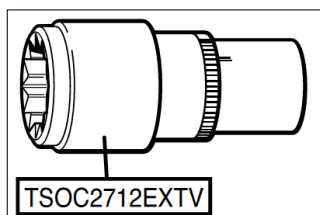


*Old Model Drum*

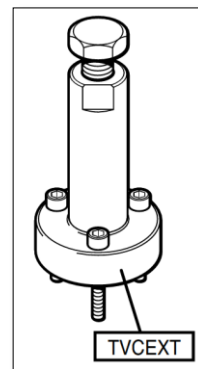
*New Model Drum*

Remove the external thrust washer, sprocket & drum assembly, roller bearing and internal thrust washer.

Remove the large V clutch hub nut on the crankshaft with the V clutch holding spanner pictured above & the special machined long socket pictured below. You can use an impact gun if required. Then remove the large, coned safety washer.



*Special Long Socket for Hub Nut*



*V Clutch Extractor*

Remove the V clutch from crankshaft by only using the special designed V clutch extractor tool pictured above.

Finally remove the Woodruff key from the crankshaft.

## **INSTALLATION**

Insert Woodruff Key into crankshaft.

Slide V clutch drive hub assembly onto taper of crankshaft. The tapers should be clean and dry. Be sure the keyway slot in the drive hub is aligned with the Woodruff key.

Install the coned safety washer with the dome facing outwards from the engine and tighten the large hub nut to 50ft/lbs or 68Nm using holding spanner and special socket. A small amount of Loctite 243 can be used on this nut.

▲ **Warning:** Do not over tighten this nut as this may cause cracking of the drive hub.

▲ **Warning:** Do not hold the ignition rotor side crank nut or use a piston stop when attempting to tighten the crank starter & clutch hub nuts as this will cause crankshaft to be misaligned & possible engine damage.

▲ **Warning:** Do not use anything wedged in starter ring gear teeth and crankcase when attempting to tighten the crank starter & clutch hub nuts as this will cause stress and possible starter ring gear damage/failure.

Install the internal thrust washer with inner radiused edge facing towards the engine. Due to manufacturing tolerances, three sizes of the internal thrust washer are available. It is important to install the washer that provides correct recommended clearance to allow the chain sprocket & drum assembly to spin free after the crank starter nut is tight. The end float clearance of 0.25mm - 0.38mm for the sprocket & drum assembly is recommended.

Apply a small amount of quality grease to the thrust washer and to the roller bearing and then slide the bearing onto the crankshaft.

▲ **Warning:** Any excess grease will likely cause power loosing clutch slip and overheating so be careful with the amount applied. This will also apply to chain lubrication if sprayed in the V clutch area.

Slide the sprocket & drum assembly onto the roller bearing and over clutch shoes. At this stage the chain sprocket & drum assembly should spin freely.

Install the external thrust washer with its inner radiused edge facing the starter nut and apply a little grease.

Place the starter nut on the end of crank and tighten to 15ft/lbs or 20Nm. The use of the V clutch spanner holding tool is to prevent the crankshaft from turning while tightening the starter nut or an impact gun set on a low pressure.

▲ **Warning:** Do not hold with the ignition rotor side crank nut or use a piston stop as this will cause crankshaft to be misaligned & possible engine damage.

▲ **Warning:** Do not use anything wedged in starter ring gear teeth and crankcase when attempting to tighten the crank starter & clutch hub nuts as this will cause stress and possible starter ring gear damage/failure.

Once the crank starter nut has been tightened, check that the sprocket & drum assembly spins freely and then measure and adjust if required its end float clearance with a feeler gauge. 0.25mm - 0.38mm is recommended. Different thickness internal thrust washers (1.5mm & 1.7mm & 1.8mm) are available to adjust this end float.

## **MAINTENANCE & REPAIR**

Due to the extreme demands of racing, it is important to properly maintain your V clutch in order to obtain maximum performance and reduce risk of clutch breakage or clutch slip.

### ***Roller Bearing***

The V Clutch is a dry clutch and therefore has no oil lubrication supply for the roller bearing. It is necessary to ensure that the roller bearing and thrust washers are always lubricated with quality grease otherwise as excessive crank wear could occur.

▲ **Warning:** Any excess grease will likely cause power loosing clutch slip and overheating so be careful with the amount applied. This will also apply to chain lubrication if sprayed in the clutch area especially with the older model clutch drum with the through lightening holes.

▲ **Warning:** Do not use Copper Grease for this lubrication.

We recommend that this roller bearing should be replaced whenever the chain sprocket is replaced.

### **Sprocket & Drum Assembly**

Lubricating the chain before each track session will increase the life of the V clutch chain sprocket. A worn or chipped chain should be replaced as it will quickly wear out the sprocket. The sprocket should be replaced when the teeth are worn or hooked. For maximum sprocket life use a long chain with the engine set forward and with 12mm of up and down total chain slack. This will maximise the number of teeth engaged. The V clutch sprocket is made separate to the clutch drum and can be replaced without a new drum being fitted.

The V clutch sprocket is fixed in position by 4 off M5 x 8 CSK bolts tightened to 8ft/lb or 11Nm. Use a small amount of Loctite 243 on these bolts.

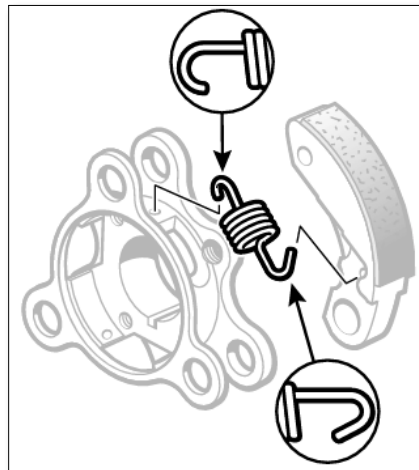
### **V Clutch Shoes**

The 3 V clutch shoes are made from Aluminium with clutch shoe material adhered to them. When this material wears down or the 10mm pivot pin mounting holes wear they should be replaced as a set of 3 shoes with 3 new clutch springs.

**▲ Warning:** Do not fit mismatched worn old shoes with new shoes as performance of clutch will be reduced causing overheating and power loss.

### **V Clutch Springs**

The 3 springs are made from steel. They will last many hours and only need to be replaced when broken, worn, damaged or when new shoes are being fitted. Only change springs in sets of 3 and note they have different shaped hooked ends so only fit correct way round. See picture below.



*Picture of V Clutch springs correct fitment*

### **V Clutch Drive Hub**

It is not necessary to remove the 68 tooth starter ring gear from the clutch hub if your engine is a TAG model to service the V clutch but this is done by undoing the 3 off M8 x 10 CSK retaining bolts while holding with the V clutch holding spanner. Starter ring gear should then just push off by hand.

### **V clutch shoe replacement**

Remove the 3 shoe retaining pin cir-clips and washers from the shoe mounting pins and then push these pins out from the front of clutch to the rear which will enable you to remove clutch shoes and springs. Check for wear both in the shoe mounting pin holes and on the mounting pins. Badly worn parts will cause poor performance and failure and will need replacing with new.

### **CLUTCH ASSEMBLY**

Clean parts with disc brake cleaner. Disc brake cleaner comes in an aerosol can and is available at most automotive parts stores. Avoid soaking V clutch shoe material with cleaner.

**▲ Warning:** Do not use petrol to clean the V clutch!

First place each V clutch spring in the clutch hub spring retaining hole. Then place other end of spring into the shoe spring retaining hole. This will require a pair of thin nose pliers and the spring and shoe positioned to give best access to positioning spring into this hole and then put shoe in correct location in hub. Remember the spring has different shaped ends so it is vital to fit springs the correct way round. See picture above or V Clutch parts drawing.

Repeat this on all 3 V clutch shoes and springs.

When all 3 shoes & springs are located in the hub then insert each shoe mounting pin by firmly pushing shoe in against spring tension so the shoe mounting pins slide through hub and each shoe. The clutch shoe alignment mandrel tool pictured below will make this job very easy.



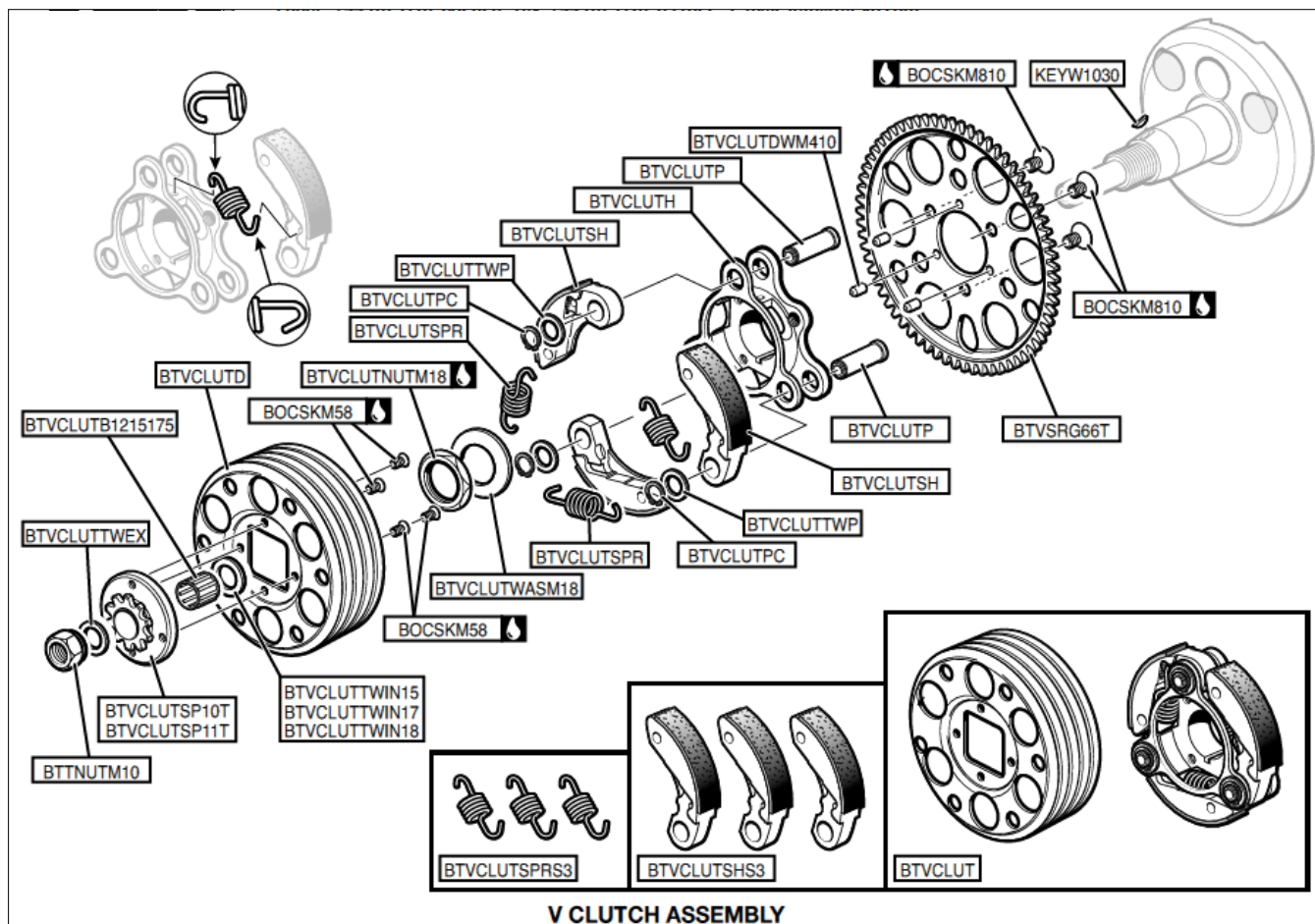
**Clutch Shoe Alignment Mandrel Tool**

When all 3 shoe mounting pins are fully in position then place each pin washer & retaining cir-clip on pin ends. Ensure each cir-clip is a snug fit in the cir-clip groove. If in doubt, always fit new cir-clips without over stretching them to fit. Refit starter ring gear (after close inspection for tooth damage or cracks) to V clutch if TAG model engine using Loctite 243 on the 3 off M8 x 10 CSK retaining bolts at 15ft/lbs or 20Nm.

**Warning:** Always carefully inspect the starter ring gear for both tooth damage and cracks, and if found immediately replace with a new starter ring gear and three new M8 x10 CSK fix bolts.

**Warning:** If these bolts become loose then the starter ring gear can crack and eventually fail, or a bolt may jam in crankcase.

Your V clutch is now ready for installation on crankshaft. Refer to clutch installation at start of this guide.



#### V Clutch torque wrench settings

| Part                              | Nut / Bolt     | Foot-Pound | Newton-Metre | Loctite |
|-----------------------------------|----------------|------------|--------------|---------|
| V Clutch Starter Nut              | M10 x 17mm A/F | 15.0       | 20.0         | NO      |
| V Clutch Hub Nut                  | M18 x 27mm A/F | 50.0       | 68.0         | YES     |
| V Clutch Chain Sprocket Fix Bolts | M5 CSK         | 8.0        | 11.0         | YES     |
| TAG Starter Ring Gear Fix Bolts   | M8 CSK         | 15.0       | 20.0         | YES     |