



## TKM BT82 HORSTMAN CLUTCH SERVICE & FITTING GUIDE

### HORSTMAN CLUTCH

This older model optional clutch can only be fitted to the old type small crankshaft bearing crankcase. The only available chain sprocket drums that can be used are the standard fitment 10 Tooth & the optional 11Tooth.

#### Please Note:

If you are having an older type crankcase engine (before No 3499) converted to use with a Horstman clutch, only Tal-Ko are permitted to carry out the special machining operation needed to increase clearance on the outer face of the drive side crankcase of the engine. This work offers no performance advantage. Speak to Tal-Ko for details of this free service.

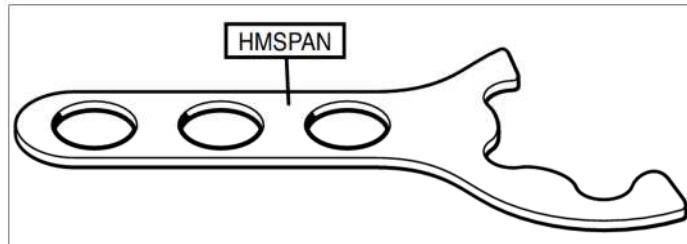
The Horstman clutch is designed to permit easy starting with a battery operated hand-held remote starter. The starter should have a 17mm A/F ½" square drive bi-hexagonal socket attached. When the engine starts, the clutch will be in neutral until the engine reaches approximately 6000rpm. At about 6000rpm the clutch will start to engage and the kart will start to move. Since the Horstman clutch 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 Horstman clutch in order to obtain maximum performance and reduce risk of clutch breakage or clutch slip.

### HORSTMAN CLUTCH REMOVAL

Remove the crank starter nut.

Note: The Special Horstman clutch holding spanner is designed to prevent the crankshaft from turning when this nut is being undone or done up.



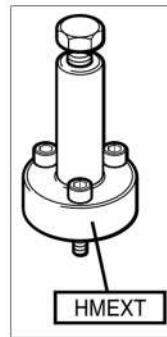
*Horstman Clutch Holding Spanner*

**⚠ 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.

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

Remove the large Horstman clutch hub nut on the crankshaft with the holding spanner pictured above and an extended long socket. You can use an impact gun if required. Then remove the large coned safety washer.

Remove the clutch from crankshaft by only using the special designed Horstman clutch extractor tool pictured below.



*Horstman Clutch Extractor*

Finally remove the Woodruff key from the crankshaft.

## **INSTALLATION**

Insert Woodruff Key into crankshaft.

Slide Horstman 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 40ft/lbs or 54Nm using holding spanner and long 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.

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 sprocket drum to spin free after the crank starter nut is tight. The end float clearance of 0.25mm - 0.38mm for the sprocket drum 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 Horstman clutch area.

Slide the sprocket drum onto the roller bearing ensuring the drive lugs on the friction disc locate in the slots on the sprocket drum. At this stage the sprocket drum 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 or crank and tighten to 15ft/lbs or 20Nm. The use of the Horstman clutch holding spanner tool is to prevent the crankshaft from turning while tightening the starter nut.

**⚠ 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.

Once the crank starter nut has been tightened, check that the sprocket drum 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 Horstman clutch in order to obtain maximum performance and reduce risk of clutch breakage or clutch slip.

### ***Roller Bearing***

The Horstman 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 at all times 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.

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

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

### ***Sprocket & Drum Assembly***

Lubricating the chain before each track session will increase the life of the Horstman sprocket drum. 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 Horstman clutch sprocket drum is made as one complete part, so it is not possible to replace just the sprocket without the drum as well.

### ***Horstman Clutch Friction Disc***

The friction disc has a steel core with ceramic friction material bonded to the surface. It should be inspected after two hours of use. Replace if friction material is cracked or worn below 2.90mm thick or the drive lugs are excessively worn.

### **Horstman Clutch Spring Green Nuts**

These green spring retainer nuts are made from aluminium and must be removed to strip clutch assembly

### **Horstman Clutch Springs**

The 3 springs are made from stainless steel. They will last many hours and only need to be replaced when broken, damaged or collapsed below 12mm free length. Only change in sets 3.

### **Horstman Clutch Pressure Plate**

The pressure plate is precision ground on the surface that engages the friction disc. This surface should be checked periodically for distortion and wear. Replace when badly distorted or worn.

### **Horstman Clutch Drive Hub**

Remove the levers from the drive hub, check for wear in the slotted area. Badly worn slots will cause poor performance.

### **Horstman Clutch Levers**

The pivot hole in the lever is subject to stress due to frictional loading from centrifugal force. This causes the pivot hole to eventually elongate. Inspect the levers for pivot hole wear whenever you rebuild the clutch.

### **Dowel Pins Horstman Clutch**

The dowel pins absorb high stress from the levers. Replace as part of a major clutch service.

### **CLUTCH ASSEMBLY**

Clean parts with disc brake cleaner. Disc brake cleaner comes in an aerosol can and is available at most automotive parts stores.

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

Apply small amount anti-seize copper slip grease to the dowel pins. Slide dowel pins into the levers.

Insert the levers and dowel pins into the drive hub assembly. Insert pressure plate onto the drive hub. Use a small quantity of copper slip grease on the triangular corners to ease movement. Place each spring over a corresponding pressure plate stud.

Apply small amount of **Blue Loctite 243** to threads of spring retainer studs. Next screw the green retaining nuts onto each stud until just tight. Torque to 2.5ft/lb or 3.5Nm. Check that the distance from the top of the retaining nut to the drive hub face is 6.25mm +- 0.25mm as per TKM regulations.

 **Warning:** Do not over tighten these nuts as this may damage and distort them.

Next lay the friction disc onto the flat side of the pressure plate. Place the fixed plate over the drive hub and align the 3 holes in the fixed plate with the drive hub holes.

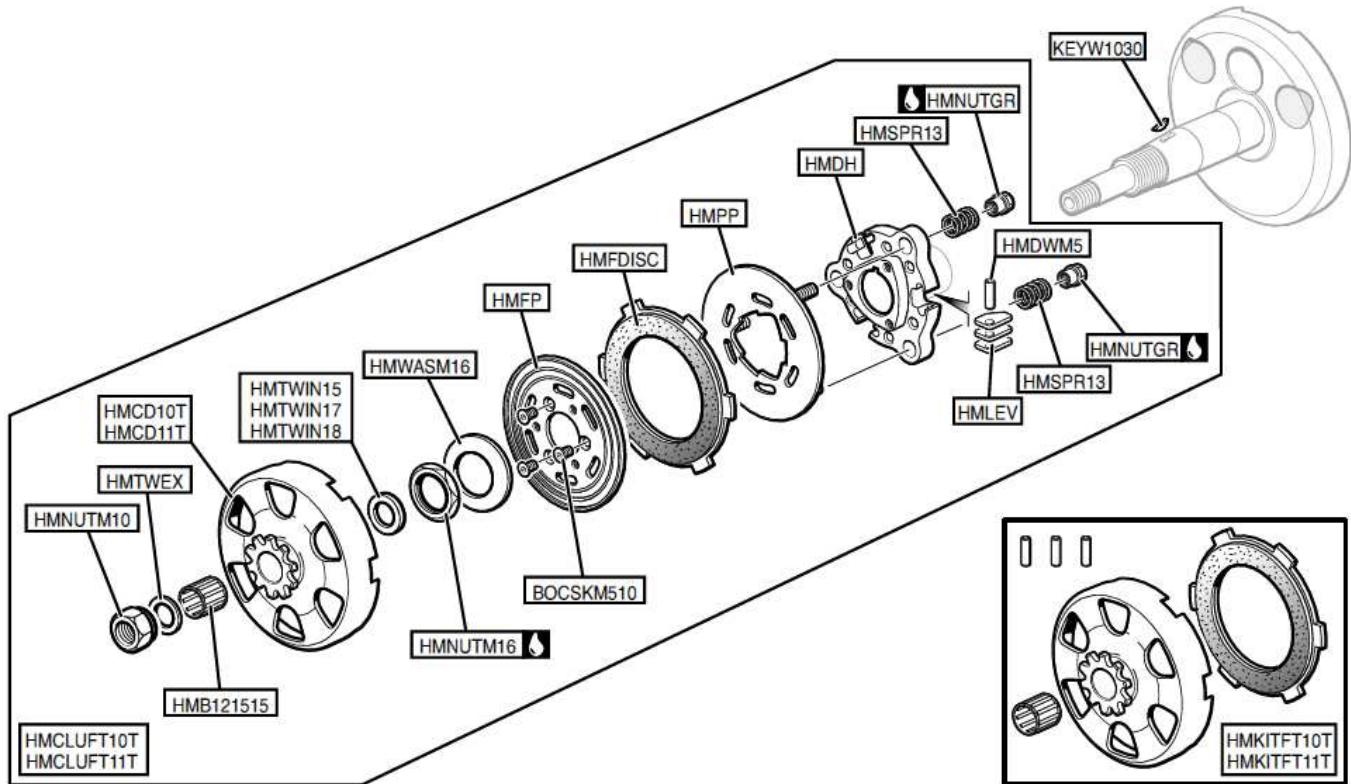
Apply small amount of anti-seize copper slip grease to screws and insert into the bolt holes in the hub. Tighten screws to 2.5ft/lb or 3.5Nm.

**Note these screws should not be over-tightened or they will be difficult to remove.**

Your Horstman clutch is ready for installation on crankshaft. Refer back to clutch installation.

### **Please Note:**

If you are having an older type engine (before No BT3499) converted to use with a Horstman clutch, only Tal-Ko are permitted to carry out the special machining operation needed to increase clearance on the outer face of the drive side crankcase of the engine. This work offers no performance advantage. Speak to Tal-Ko for details of this free service.



HORSTMAN CLUTCH ASSEMBLY

**Horstman Clutch torque wrench settings**

Part	Nut / Bolt	Foot-Pound	Newton-Metre
Horstman Clutch Starter Nut	M10 x 17mm A/F	15.0	20.0
Horstman Clutch Hub Nut	M16 x 24mm A/F	40.0	54.0
Horstman Clutch Spring Green Nuts	M6 x 10mm A/F	2.5	3.5
Horstman Fixed Plate Bolts	M5 CSK	2.5	3.5