

## Inspection Procedure: Tilton 7 ¼" & 5 ½" Metallic Clutches

### **Inspection of Assembled Unit**

- 1) Is there any physical damage to the cover caused by foreign objects in the housing area?
- 2) Are the pressure and floater plates properly installed with the balance marks aligned? If not, the clutch may have been run in either the present or the proper configuration. If the alignment marks are out of order, pay special attention to the direction of the warpage (dish shape) of the floater plates upon reassembly as noted in the section describing the installation of these plates.
- 3) Is the spring discoloured or flat? If so, then you should look for heat related damage. Are the pressure and floater plates blue? Again, you should pay specific attention to heat related damage.

### **Disassembly**

Remove the floater plates, friction plates and the pressure plate. Keep them organised in the same manner so they can be placed back in the clutch in the same order and facing in the same direction as they were when used in the clutch.

### **Component Inspection, Testing, and Cleaning**

Inspection of all components, used and new, is crucial to guarantee the performance of the product. Make sure that all of the following steps are followed.

### **Floater Plates and Pressure Plate**

- 1) Use a straight edge such as a parallel and lay it across the floater plate from outside edge of the wear surface to the opposite outside edge through the middle. Use a feeler gauge to measure the amount of warpage in the friction area. The maximum allowable warpage is .005". However, if the clutch is to complete a considerable number of miles before the next rebuild, you should consider a maximum warpage of .0035".
- 2) Install the plates in the cover, rotate them until they touch the thrust buttons on one side, and use a .006" feeler gauge between the thrust buttons and the plates. This is the minimum clearance for proper clutch release. The plates may close up this gap and pinch the legs of the cover if overheated.
- 3) The plates located the farthest from the flywheel usually experience the most warpage as a result of the heat. The warpage is in the form of a bowl shape. They all warp in the same direction. If you are reinstalling plates which are warped but under the .005" maximum, it is important to make sure that they are stacked in a manner which has all plates warped the same direction. This will be simple if the clutch has been used with the alignment marks in the proper orientation. But this is not always the case and sometimes they do not and the plates have opposite direction warpings when installed according to the alignment marks. Check this when you reinstall the plates. It may be necessary to scribe new alignment marks to correct this situation.

- 4) If a clutch experiences high temperatures there may be small areas where the friction material has welded itself to the pressure or floater plates. This can be removed using a bead blaster or by sanding in a circumferential direction with fine emery cloth. If there are large amounts of adhered friction material or if you have any doubts about the smoothness of the surface, replace the plate.
- 5) Pressure and floater plates should be replaced in sets and not individually.
- 6) Clean the plates by bead blasting. Do not use a wire wheel since these can embed oil and other contaminants in the surface which can harm clutch operation.

### **Cover**

- 1) Check for physical damage on the outside of the cover. If the damage is significant, the cover cannot be used again.
- 2) Check the fitment of the clutch cover (plates not installed) on the flywheel. The cover should slide freely over the step diameter without excessive force. It should also be free of excessive play and it should sit level. Clutch covers which have been exposed to very high temperatures can deform. If there are any signs that the friction discs have started to cut into the legs, the cover should be replaced. This is often the result of a pilot bearing failure.
- 3) A light tapping of the clutch cover on a hard surface will help locate loose thrust buttons with a rattling sound. Any cover that has loose thrust buttons should be replaced.
- 4) Clean the cover with a solvent which will not leave an oil residue.

### **Diaphragm Spring**

This is the most critical component in the clutch and close inspection of the spring can help to determine other problems.

- 1) Marks on the underside of the spring fingers where the spring has been pushed into the retainer plate are evidence that the spring has been overstroked. Overstroking the clutch even once damages the spring and reduces clamp load. Is there a pedal stop in the car and is it being adjusted properly?
- 2) A shiny area at the underside tips of the spring fingers indicates that the spring has been so far overstroked that it has been pushed into the hub of the friction disc. Check the friction plate for like evidence. On occasion you will find a different (other than Tilton) friction disc in the clutch with a longer hub. The hub may be too long and prevent clean disengagement by interfering with the spring.
- 3) If the spring has a significantly lower cone angle than a new spring it has a significantly lower clamp load. There are three possible causes for this. It can be the result of overstroking, heat damage from slipping (driver induced or clutch problem), or the spring could just be tired after a few seasons of use.
- 4) Heavy wear at the bearing contact area could be indicative of any of the following causes.
  1. The bearing is not rotating freely.
  2. The driver is riding the clutch pedal.
  3. Wrong type of bearing.
  4. Hydraulic release bearing is of the type which pulls the bearing clearly away from the spring, unlike the Tilton type which keeps the bearing rotating with the spring.

5. Insufficient bearing clearance upon installation. As the friction discs wear and the spring finger move towards the bearing they run out of room and place a load on the bearing. This can also result in a seized bearing.
6. A wear area outside the bearing contact diameter could be indicative of a release bearing which has been overstoked to the point where the bearing piston has contacted the spring.
7. Significant use over a number of events.

**The diaphragm spring is the most critical component in the clutch and is relatively inexpensive to replace. However its fitment requires a specialist fixture so it is not available as a spare for end user fitment. If your suspect that the diaphragm spring needs replacing then the clutch basket complete with its existing diaphragm spring still installed should be returned to Competition Supplies Ltd at the address at the bottom of this page.**

### **Friction Discs**

- 1) Organise the discs in a manner which will allow you to keep track of their location and orientation in the clutch. If they are to be reused, they should go back in their original positions. The direction of warp on the friction, pressure, and floater plates should match.
- 2) Visually check for cracks. These are most commonly found at the bottoms of the slots and extending from the hub near the rivet holes. Cracks are usually the result of Input shaft misalignment - The transmission locating hole on the back of the clutch housing should be concentric with the crankshaft within .01 0" total indicator readout. A sweep of the mounting face on the back of the clutch housing should have no more than .008" total indicator run-out.
- 3) Visually check for worn splines. Splines which are excessively worn are often the result of misalignment. In such cases they can be accompanied by cracks.
- 4) Visually check for extreme bowing of the plates. This is sometimes caused during installation when the input shaft splines are not aligned with the hub splines, yet the transmission is bolted on anyway.
- 5) Measure the thickness of the friction discs for wear. The friction plates are considered too thin when the total wear on all friction plates is .030"

#### **Sintered Metallic 5 ½" & 7 ¼":**

Nominally, the friction material is .104" thick.. The minimum thickness for the following clutch configurations are:

- 1 Plate: .074"
- 2 Plate .089"
- 3 Plate .094"

#### **Rally 7 ¼":**

Nominally, the friction material is .283" thick.. The minimum thickness for the following clutch configurations are:

- 1 Plate: .253"
- 2 Plate .268"

#### **Rally 5 ½":**

Nominally, the friction material is .236" thick.. The minimum thickness for the following clutch configurations are:

- 1 Plate: .206"
- 2 Plate .221"



- 6) Use a straight edge (parallel) and feeler gauges to check for flatness of the friction discs. Maximum allowed warpage is .008". More warpage requires more pedal travel for release.
- 7) Always replace friction discs in full sets. Mixing discs can cause disc failure since a new disc may take more of the load than an old or different disc.
- 8) Used discs should only be reinstalled when the old pressure and floater plates are used. New discs should be specified with new pressure and floater plates.
- 9) Used discs should be wiped clean only. Do not use solvents.

### **Reassembly**

- 1) Insert the main pressure plate and check for .006" minimum clearance next to the thrust buttons. If the plate is used, make sure its alignment mark mates with the mark on the cover.
- 2) Insert the first friction discs, when installing used friction discs (used pressure and floater plates only) place them in the same orientation and location as previously run in the car. The direction of warpage should be the same for all friction, pressure, and floater plates.
- 3) Insert intermediate pressure plates and additional friction discs paying attention to item 2 above.
- 4) With new pressure and floater plates you must mark the edge of the plates in line with the marks on the clutch leg. Use a spring loaded punch.
  - 1 dot for the pressure plate (1 ,2,3, and 4 plate clutches).
  - 2 dots for the first floater plate (2,3, and 4 plate clutches).
  - 3 dots for the second floater plate (3 and four plate clutches).
  - 4 dots for the third floater plate (4 plate clutches).
- 5) Use a paint pen to mark over the alignment marks on the cover and on the plates. This makes them easier to see.
- 6) If the clutch is not being immediately re-fitted then secure the assembly with two cable ties.

**For no charge at Competition Supplies we will undertake the above inspection, report to you and quote for any components required. To take advantage of this service please return your Tilton clutch to:**

**Competition Supplies Ltd  
Unit 40, Silverstone Circuit  
Towcester  
Northants  
NN12 8TN  
U.K.**

**Please include full contact details including name, return address, email address and telephone number.**



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