



Pull Type Carbon Clutch Operating Instructions.

General Notes.

All carbon clutches are capable of achieving a very long life. AP Racing carbon clutches are bedded during manufacture, this process continues for approximately the first 0.5 mm of wear, after which the wear rate should settle to a consistent and low level. The "Total Allowable Wear" figure quoted on the pressure plate fitment sheet gives total clutch life provided that the clutch remains in good condition and that the axial float of the hub is maintained, this is normally the case provided the wear is evenly distributed across all the carbon rubbing surfaces. To achieve the full life potential several interventions to compensate for wear are required with most carbon clutch designs. The "Wear In" of a clutch denotes the amount of incremental wear on the carbon faces that can occur before the clamp load and hence torque capacity of the clutch drops below its minimum specified value. Wear compensation then becomes necessary to restore the original characteristics.

Assembling and Installing a Carbon Clutch.

This type of clutch has the release-bearing fulcrum inside the clutch and requires the diaphragm spring fingers to be pulled (away from the flywheel) in order to release the clutch (fig 1).

Many pull type clutches are supplied with an installation plate fitted onto the spring (fig 2). This plate maintains the clutch in a partially released condition to assist the used whenever the clutch is installed or removed, failure to use the plate can result in the



(Fig 1).

bottom carbon plate being trapped under the clutch cover lugs, resulting in damage to the carbon plate and other clutch components. Before installing the clutch onto the flywheel ensure that the plates are correctly assembled into the clutch in their original positions. First install the diaphragm spring into the clutch cover / housing with the convex side towards the flywheel and fit the release fulcrum through the centre of the diaphragm so that the "Mushroom" head sits on the core formed by the tips of the diaphragm spring fingers. N.B. If an installation plate is fitted this will retain the diaphragm and release fulcrum and this step is omitted. Then install the main pressure plate into the clutch housing, (see pressure plate service sheet) with the raised fulcrum against the diaphragm spring and the identification mark adjacent to the similar mark on one of the clutch lugs. Next install the carbon plates in their original positions as follows:

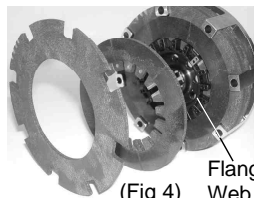
The carbon Intermediate plates are identified with notches on the outside edge (fig. 4). The plates are not all identical and must be installed in the correct sequence and the correct way up. Install number 1 Intermediate plate (1 notch) next to the Main Pressure Plate with the marking facing away from the Main Pressure Plate and the highest numbered plate (this depends whether it is a 2, 3, or 4 plate) last, against the flywheel. The intermediate plates also have a paint line marked on the external edge and this should be adjacent to the corresponding line marked on one of the lugs on the Clutch Cover (sometimes called the Basket). The Driven Plates are similarly numbered with dots or notches on the drive lug surfaces (fig. 3). These must be fitted in sequence in the same way as the Intermediates with the number 1 Driven Plate next to the number 1 Intermediate Plate with the marking towards the flywheel. Continue fitting the remaining carbon Intermediate and Driven Plates in sequence. The Hub must be fitted prior to fitting the

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(Fig 2).



(Fig 4) Flange / Web

last Driven plate and Intermediate with the flywheel bolt relief and the flange towards the flywheel (see fig 4). Ensure the marked Hub drive tooth is engaged with the outlined drive slot(s) in the carbon plates. Complete the assembly by fitting the last Intermediate and Driven Plates N.B. Carbon Clutches always have a Carbon Intermediate plate next to the flywheel.

Ensure that the bottom carbon intermediate plate is located correctly and install the clutch onto the flywheel. Tighten the retaining nuts down progressively in a diagonally opposite pattern to the recommended torque. When the clutch is tightened down the installation plate will become loose, remove the retaining circlip, and remove the installation plate from the release fulcrum.

NB The installation plate should be retained for future clutch removal.

Prior to fitting the slave cylinder, the piston in the slave cylinder should be pushed out to maximum travel towards the clutch.

Ensure that the release fulcrum in the clutch is fitted into slave cylinder piston. With the slave cylinder in place, the release fulcrum should be pulled into contact with the spring fingers, and the circlip refitted into the groove on the release fulcrum.

Basket Type Clutches

"Basket" type clutches have the clutch drive lugs built into the "flywheel" (basket) and the cover is bolted to the top of the lugs. On this type of clutch the assembly sequence is reversed, starting with the highest numbered intermediate plate at the flywheel (basket) end and fitting the main pressure plate last, just before the cover.

Clutch Removal.

Remove circlip from release fulcrum, remove slave cylinder, refit the clutch installation plate and circlip.

NB The installation plate is machined differently on either face, to accommodate "new / reshimmed", or "worn" clutches. Progressively release clutch cover retaining nuts and remove clutch from flywheel.

Hubs

Do not grease the splines in the hub; the grease can be dispersed by centrifugal force outwards towards the carbon friction faces causing contamination and clutch slip.

Wear Compensation

AP Racing Carbon-Carbon clutch covers are machined to suit the new carbon stack height and spring characteristics of that particular clutch. The clutch is then given its own unique serial number. (See Fig 5.)

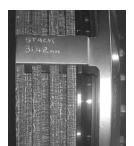


(Fig 5) Serial No.

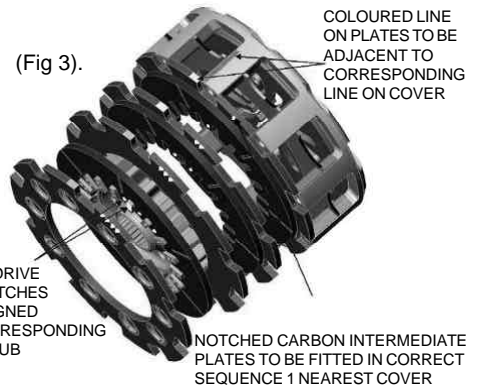
NB THE CARBON PLATES MUST NOT BE SWITCHED BETWEEN CLUTCHES AND THE MATING CARBON FACES MUST BE KEPT IN THEIR ORIGINAL RELATIONSHIP TO EACH OTHER. NEVER SWITCH COMPLETE CARBON STACKS FROM COVER TO COVER.

The serial number, and the original combined thickness of all the carbon plates when new, called the "Stack Height", are etched onto the cover. (See Fig 5 & 6)

Each carbon plate is identified with notches to identify the intermediate plate number (Fig 3) and dots or notches to identify the drive plate number (fig 3).



(Fig 6). Stack Height



(Fig 3).

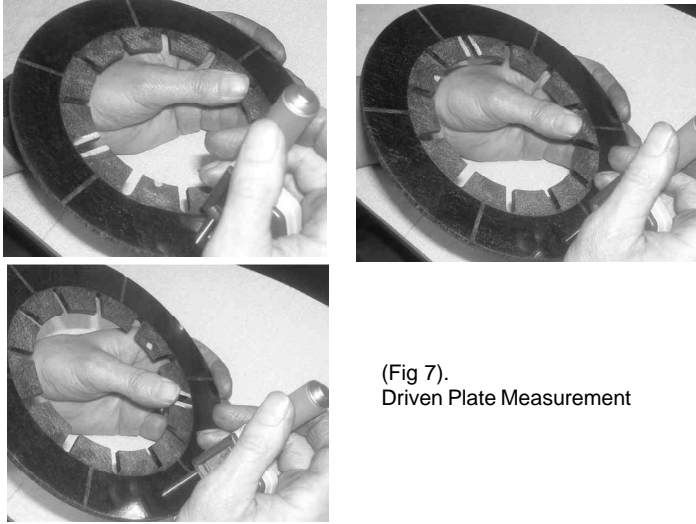
CARBON DRIVE PLATE NOTCHES TO BE ALIGNED WITH CORRESPONDING LINE ON HUB

NOTCHED CARBON INTERMEDIATE PLATES TO BE FITTED IN CORRECT SEQUENCE 1 NEAREST COVER

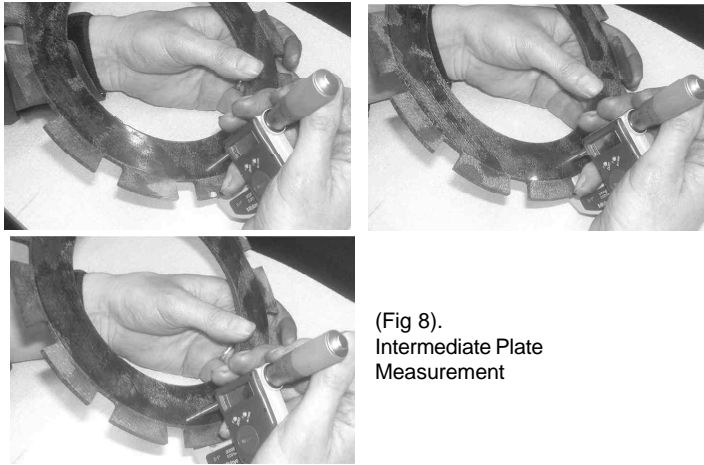
Carbon Measurements

For accuracy when measuring the carbon plates, each individual plate is measured in the centre of the worn surface in 3 positions (approx. every 120° - see fig 7.) and the mean thickness is then calculated (The measurements can be recorded on the carbon clutch measurement sheet provided). The mean thickness from all plates is added together to obtain the "Present Stack Height" and this is subtracted from the "New Stack Height" etched on the cover (fig 6.). The correct pressure plate should then be selected from the "Pressure plate fitment sheet" which will restore the "Wear In" to approximately its original value. Measurement of the carbon should only be made with a proper micrometer with flat anvils, not a sliding vernier or micrometer with a sharp point.

NB The maximum total wear allowed on the carbon stack is indicated on the pressure plate fitment sheet. Under no circumstances should this figure be exceeded. Wear over the total allowed could cause carbon plate failure and no hub axial float.



(Fig 7).
Driven Plate Measurement



(Fig 8).
Intermediate Plate Measurement

Carbon Drive Faces

The wear on drive faces (backlash) between the Intermediate Plates and Clutch Cover / Basket and between Driven Plates and Hub should also be



(Fig 9
Intermediate).



(Fig 10
Driven Plate).

monitored. This is done by placing the intermediate plate into the cover/basket and using feeler (slip) gauges to measure the gap between the drive faces of the carbon plates and cover lug as shown in fig.9.

The drive plate can also be measured in a similar manner by placing the drive plate on to the hub and using feeler (slip) gauges to measure the gap between carbon drive slot and hub tooth. (see fig. 10)

Tolerances as follows:

Clutches up to Ø115mm = 0.75mm

Clutches Above Ø115mm = 1.00mm

Release Loads / Diaphragm Spring

All clutches have a set maximum release travel (see attached clamp / release graph). **Exceeding this travel will damage the diaphragm spring**, and result in a decrease in clamp load and change the spring characteristics. Wear on the diaphragm spring fingers can indicate release bearing problems, misalignment, or just normal wear over an extended period. If excessive wear is present, or it is known the spring has been overstroked it is advisable to return the unit to AP Racing for fitment of new springs. Carbon clutches are very durable but not indestructible. Although the carbon material will not be significantly harmed by extreme heat generated by excessive slipping of the clutch, aluminium alloy can soften and distort. The diaphragm springs will also lose clamp load if subjected to prolonged or excessive heat. Excessive slipping is therefore best avoided.

Any clutches that have been subjected to excessive heat should be returned to AP Racing for inspection.

Maintenance & Servicing

All clutch components should be examined frequently for signs of damage or abnormal wear. Remove dust with a brush or vacuum cleaner, and any light deposits of oil or grease with a non-oil based solvent.

Heavier deposits of oil on the carbon plates are best cleaned in an ultrasonic wash. After cleaning the carbon plates with any fluid, it is recommended that any remaining traces of oil or solvent be removed by baking them for an hour at 300°C minimum in a suitable oven

WARNING

NEVER USE BRAKE CLEANER TO CLEAN CARBON. A FILM OF CLEANER WILL REMAIN ON THE CARBON CAUSING THE CLUTCH TO SLIP ON INITIAL USE EVEN IF THE CARBON IS BAKED.

User servicing is limited to replacing the main pressure plate and hubs when required. Other replacements require the use of specialised test equipment to set up the clutch and the unit should be returned to AP Racing for reconditioning.