

## All About Starters for Saturn

### A Brief History

When Saturns were introduced by GM in 1991, they were equipped with Delco permanent-magnet gear-reduction (PMGR) starters. Through 1992, the Saturns with manual transmissions used a 0.8 KW PG100 (Delco #21020892, WAI #2-1482-DR) (Figure 1); those with automatic transmissions used a 1.4 KW PG150 (Delco #21021366, WAI #2-1478-DR) (Figure 2).

In 1993, GM started using only the PG150

starter for all transmissions. Then in 1994, they switched again, this time to a PG150S (Delco #21020761, WAI #2-1467-DR) (Figure 3). They used this starter through first production 1995, when they switched yet again, and began using Valeo starters, made in France, on these vehicles.

The first Valeo starter was used in second production 1995 through 1996. This starter was Valeo #D6RA65, Saturn #21023232 (Figure 4). Then in 1997 Saturn changed to Valeo #D6RA165, Saturn #21023719. The only difference we can find



Figure 1. This .8 KW PG100 was used on Saturns with manual transmission, through 1992.



Figure 2. This 1.4 KW PG150 was used on Saturns with automatic transmission, through 1992, and all transmissions in 1993.

### Saturn Starter Changes 1991-1998

Year	Trans.	Series	Unit #	WAI#	Replaced by	WAI#
1991-92	Manual	Delco PG100	21020892	2-1482-DR	21023719	2-1713-VA
1991-92	Automatic	Delco PG150	21021366	2-1478-DR	21023232	2-1713-VA
1993	All	Delco PG150	21021366	2-1478-DR	21023232	2-1713-VA
1994	All	Delco PG150S	21020761	2-1467-DR	21023232	2-1713-VA
1995	1st. Prod	Delco PG150S	21020761	2-1467-DR	21023232	2-1713-VA
1995	2nd. Prod	Valeo D6RA65	21023232	2-1713-VA	21023719	2-1713-VA
1996	All	Valeo D6RA65	21023232	2-1713-VA	21023719	2-1713-VA
1997	1st. Prod	Valeo D6RA165	21023719	2-1713-VA	21023994	2-1713-VA
1997	2nd. Prod	Valeo D6RA85	21023994	2-1713-VA		
1998		Valeo D6RA185	21024210	2-1713-VA		





**Figure 3.** This PG150S with bolt-on solenoid was used in 1994 Saturns, through first production 1995.



**Figure 4.** Valeo starters were used on Saturns beginning with second production 1995, through 1998.

between the D6RA65 and the D6RA165 is in the length of the battery terminal on the solenoid: the terminal on the D6RA165 is 6mm shorter than the terminal on the D6RA65. These starters both use all the same components, are completely interchangeable and can replace all the earlier Delco starters.

Then during 1997 Saturn changed these Valeo starters twice — first to a D6RA85, then to a D6RA185. The D6RA185 was also used in 1998 models.

These two late-model starters can replace all the Delco starters and both of the earlier Valeo starters. However, they use a different armature, planetary gear, stationary gear and planetary-gear cover than the two earlier Valeo units. These four components are not individually interchangeable



**Figure 5.** These components for late-model Saturn can be interchanged if they are kept together as a group. On the left are stationary gear, planetary gear and armature for starters D6RA65 and D6RA165. On the right are the same components for D6RA85 and D6RA185.

with the components of the earlier versions. However, if these four components are kept together, they can be interchanged as a group.

Here are the components that must be kept together when you are rebuilding these units (*Figure 5*):

Valeo starters D6RA65 and 165 use a	
White stationary gear	59 teeth
Planetary gears	22 teeth
Armature	13 teeth
Starters D6RA85 and 185 use a	
Black stationary gear	37 teeth
Planetary gears	15 teeth
Armature	8 teeth

See the table on page 1 for a summary of all the changes made to Saturn starters.

## Rebuilding Valeo for 1995 Saturn

When disassembling this starter, first remove the three D.E.-housing screws and the one solenoid-attaching screw. Then you can remove the DE housing. This will reveal two more solenoid attaching screws that must be removed in order to remove the solenoid (*Figure 6*).



**Figure 6.** Remove three D.E.- housing screws and one solenoid-attaching screw to remove the D.E. housing on this Valeo starter. This will reveal two more screws that must be removed in order to remove the solenoid.

You will notice that there are two rivets that attach the center plate to the motor assembly. These must be removed to further disassemble the starter. The shift-lever pivot pin is a slip fit and will fall out very easily, so be careful not to lose it (*Figure 7*).

After removing the starter drive stop collar and wire ring, you can disassemble the drive and planetary gear assembly.



*Figure 7. The shift-lever pivot pin is a slip fit and will fall out easily, so be careful not to lose it.*

To disassemble the motor assembly, remove the two small nuts and washers that attach the C.E. cover. With the cover removed you will expose the brush holder assembly (*Figure 8*).



*Figure 8. When you remove the C.E. cap, you will see this brush-holder assembly. Don't try to remove it until you release the lock tab holding the spring in place. (See Caution)*

This brush-holder assembly is unique in that it has only one brush spring pushing on both the positive and negative brushes. With closer inspection you will notice a small insulating pad on top of each brush (*Figure 9*).

**Caution:** Don't try to remove the brush-holder assembly at this time, even though it seems like it will come right off, or you will break it. You must first remove the spring, as follows:

The center of the brush spring locks under a tab on the motor case. But before you release this tab, keep in mind that the spring comes out with so much force it can travel at least 20 feet before the



*Figure 9. This unique brush holder has only one brush spring that must be removed with caution. It also features two small insulating pads.*

first bounce. So, before releasing the tab, run a piece of string or wire through the coils of the spring. If you don't secure the spring in this way, you may cause eye damage and will most definitely need to buy a new spring.



*Figure 10. Once the brush holder is removed, you will see a small cap that must be pried off to get to the retaining clip for the armature.*

Once the brush holder is removed, it will expose a small cap that can be pried off to get to the retaining clip for the armature (*Figure 10*). Also remove the shims for adjusting the end-play of the armature. Once the armature is removed you should remove the spacer from the commutator end of the armature so it does not get lost.

You will notice some very small parts in this series of starters. In fact the size of the entire motor case is not much larger than a 10MT solenoid case.

