

An Overview of Delco 22SI Alternators

IN THIS ISSUE WE WOULD LIKE to update you on Delco's 22SI series of alternators. These are brush-type, heavy-duty alternators made by Delco Remy America (DRA) (*Figure 1*).

According to the literature from DRA, 22SI units are available in three different amperage ratings for 12-volt applications (100, 130 and 145 amps), and two different amperage ratings for 24-volt applications (50 and 70 amps). To this date we have not been able to acquire a 24-volt version to research, so we will cover only the 12-volt versions in this issue, as listed in *Table 1*.

Table 1.

OE #	WAI #	Volt	Amp.	B+Terminal
19020300	1-2044-00DR	12	100	5/16 x 18
19020302	1-2064-00DR	12	130	5/16 x 18
19020303	1-2065-00DR	12	145	5/16 x 18
19020308	1-2154-00DR	12	100	1/4 x 28

The 22SI looks similar to the 21SI but has several differences. The DE and SRE frames are beefier than the 21SI and the thru bolts are a 1/4 x 20 Grade 8 bolt. Also the boss for attaching the ground wire has been moved slightly, and in its place a small hole exists for the brush lock pin (*Figure 2*). As you can also see in *Figure 2*, DRA has cast their name and the model number into the SRE frame.

The stators for the 12-volt 22SI series are the same as the stators for 12-volt 21SI alternators with equivalent amperage ratings. The rotors, on the other hand, have a few differences (*Figure 3, page 2*). For example, the slip ring for the 22SI is 25.9mm OD (WAI #28-1858) while a 21SI slip ring has a 30mm OD (WAI #28-1852). Also, because the SRE end of the 22SI's rotor shaft is



Figure 1. Delco 22SI Series alternators are brush-type heavy-duty units.

longer than the shaft for 21SI, it requires a longer SRE bearing (WAI #8-109). This improvement was also made on some later 21SI units, as well. The amperage draw on the 130- and 145-amp 22SI units is approximately 9 amps. On 100-amp units, the amperage draw is approximately 6.5 amps.

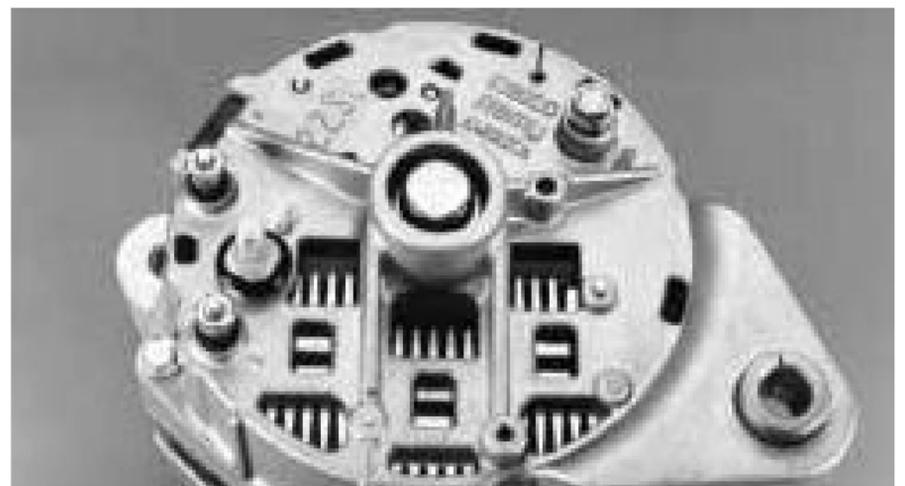


Figure 2. In the SRE frame for the 22SI, the boss for attaching the ground wire has been moved and a small hole exists for the brush lock pin.

We would like to alert you to one quirk in these alternators. If you encounter a 22SI with what appears to be a shorted rotor, try cutting one of the slip ring leads and retest. It may only be a shorted slip ring, not a shorted rotor.



Figure 3. Stators for the 12-volt 22SI are basically the same as those for the 21SI. Rotors have a smaller slip ring and a longer shaft.

The voltage regulator and rectifier for the 12-volt 22SI are the same as those used in 21SI units with comparable amperage ratings (*Figure 4*). When you look at the electrical components, notice the small sponge pad on the rectifier side of the diode trio. This is to dampen the vibration and prevent fracture to the diode trio's connector straps.

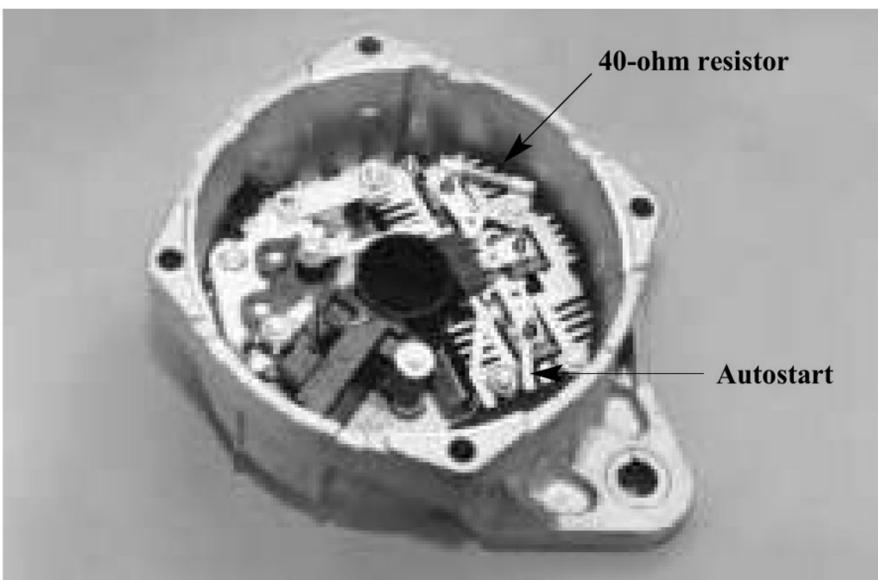


Figure 4. The regulator and rectifier in the 12-volt 22SI are the same as those used in the 21SI.

In *Figure 4*, you will also note a feature unique to the 22SI: the autostart-and-trio assembly. The autostart is a circuit attached to a standard diode trio that allows the 22SI to turn on at a much lower RPM than the 21SI, without an electrical draw on the battery. The circuit has four connections to the alternator. These connections go to ground, the stator, B+ and the output leg of the diode trio (regulator) (*Figure 5*).

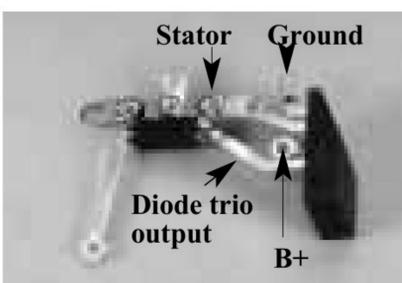


Figure 5. The autostart circuit on 22SI units has four connections to the alternator.

Although you test this diode trio the same as any other diode trio, there is a specific procedure for testing the autostart circuit. According to the Delco service manual, the procedure for testing the autostart is as follows:

Use ohmmeter to check autostart and trio assembly. Place negative lead of ohmmeter on regulator strap and positive lead to the auto start and trio assembly B+ terminal. The meter should indicate open circuit. Reverse the ohmmeter leads and the reading should indicate continuity. If either reading is incorrect, replace the entire autostart-and-trio assembly.

This procedure tests only the power transistor, not the entire autostart system. We have also found that some ohm meters are not capable of making this test. In order to do a complete test of the autostart system you need expensive sophisticated equipment.

The autostart system is designed to be turned on only during startup. However, in early 22SI units, ripple voltage from a battery charger could turn on – and keep on – the autostart, which would destroy it. The first fix for this problem was to install a 40-ohm resistor on the inside of the alternator from a stator terminal to ground, using the stator terminal farthest from the autostart assembly (*Figure 4*). The later version of the autostart-and-trio assembly has this resistor built into it.

In March, 1998, Navistar issued another fix for this problem in their "Authorized Field Change G-97906." This document announced a program to

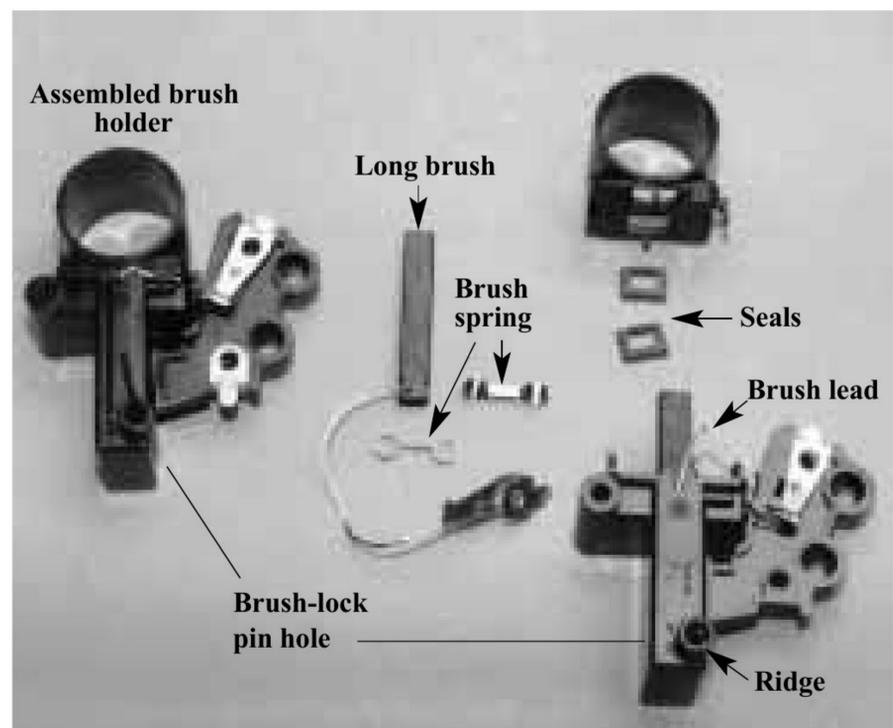


Figure 6. The 22SI has a new-style brush holder with very long brushes and a unique brush spring. The brushes and brush spring are tricky to install.

install a resistor cable on the outside of alternators already in service. The cable was to be installed from the R-terminal to ground on all Delco 22SI alternators built before July 1, 1997, or with a date code earlier than 97G01.

The 22SI series has a new-style brush holder with much longer brushes and unique brush springs that give equal brush tension over the entire life of the brush. There is a small seal that fits into the brush holder at the tip of the brushes (*Figure 6*).

Installation of the brushes and brush springs on these alternators is a little tricky. First, it is extremely important to install the brush springs so the ends of the springs unwrap in the correct direction (*Figure 7*). Failure to do so will cause the springs to break.

It is also very important to position the brush leads correctly, or the brushes will stick. When the

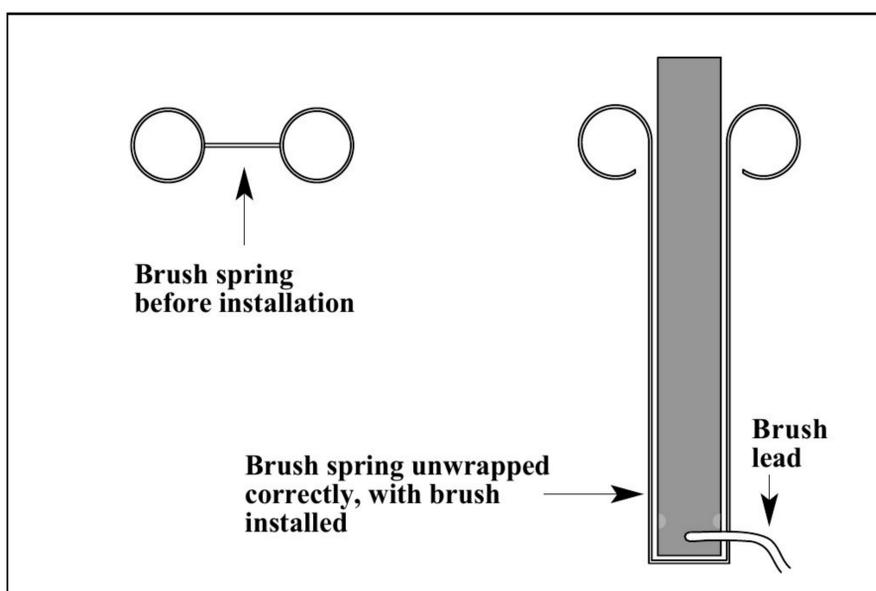


Figure 7. Front view. Look carefully at the brush spring before you begin installation to make sure it unwraps in the proper direction. Otherwise you will break it.

brushes are correctly installed, the brush-lead side of the brushes will be facing each other. The brush leads must then go all the way to the bottom of the brush-holder cavity, under the brush springs and back up, exiting on the side of the brush holder (*Figure 8*).

Note that the hole for the brush pin is at the opposite end compared to most other brush holders. Use caution when installing this pin so you don't bend the brush springs. On the latest design of this brush holder, the pin will not extend all the way through. Also note that there is a ridge around the brush-pin hole that will accept a rubber seal for agricultural applications (*Figure 6*).

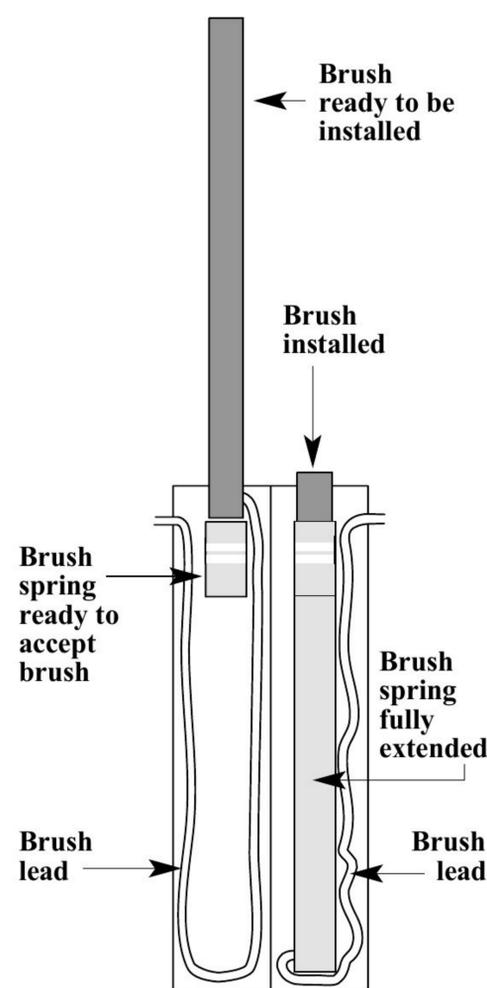


Figure 8. Side view. The brush on the left is ready to be installed into the brush spring. The brush on the right is properly installed. Note that the brush-lead sides of the brushes face each other, and the leads must be taken all the way to the bottom of the brush holder and back up again to the exit slot in order for the brush and brush spring to be installed correctly.

Major Components, 22SI, 12-volt

WAI #	Description	WAI #	Description	WAI #	Description
6-305-4	DE Bearing	28-140	Rotor 130-145A	39-1210	Brush holder
8-109	SRE Bearing	28-1858	Slip Ring	39-1703	Brush spring
21-165	DE Frame	31-116	Rectifier	39-1501	Brush pin
22-152	SRE Frame	31-119	Rectifier	41-1703	Seals
27-125	Stator 115-130A	33-108	Auto-start-trio assy.	46-1461	Cover, slip ring
27-126-9	Stator 90-100A	35-126	Voltage Regulator	46-1174	Terminal B +
27-129	Stator 145-160A	38-121	Brushes	46-1175	Terminal B +
28-139	Rotor 100A	39-110	Brush holder assy.	46-1183	Terminal R - I
				46-1184	Terminal R - I

