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Technical Update 32

Ford 4G Alternators: An Overview

In 1995, Ford introduced a new series of alternators known as the 4G. The first applications were on the 1995 Lincoln Continental with a 4.6L V8 engine. Then in 1996, 4G-series alternators began appearing on a number of other models. To date, these alternators are all 130-amp.

Unusual Mounts

The original units in this series, which were used on Lincoln Continental, have a saddle mount (*Figure 1*). At first, these saddle-mount units had round mounting holes (Ford #F5OU-10300-FA). Then Ford changed to the slotted mounting holes shown in *Figure 1*, but kept the same basic part number, changing only the last letter (Ford #F5OU-10300-FB). The WAI number for these saddle-mount units is 1-1904-11FD.

Inside the 4G

When you remove the cover of a 4G alternator, you will see that it has a small slip ring (like many other later-style alternators), six stator terminals on the outside edge of the positive rectifier, eight diode terminals, and three rivets (*Figure 4*).

You will also find that the SRE frame on these units is very hard to remove. In fact, one of the more difficult things about working on 4G units is getting them apart. One reason for this is that the SRE frame has only three thru-bolts, so you don't have anything directly across from the thru-bolts to get leverage on. Also, the SRE bearing has plastic tolerance rings. And finally, because the stator stays in the DE frame, you must unsolder the stator leads to separate the unit.

Figure 1. Saddle-mount units with slotted mounting holes were the second version of the 4G to be introduced.

Figure 2. A version with long-arm mounts was introduced in 1996 on 3L V6 Taurus and Sable.

Figure 3. A side-mount version was used on several 1996 models.

In 1996 Ford introduced a unit with unique long-arm mounts (*Figure 2*) that is used on 1996 3.0L V6 Ford Taurus and Mercury Sable (WAI #1-1993-11FD).

Also in 1996, Ford began using two side-mount versions of the 4G, one on Windstar with 3.8L engine (WAI #1-2012-21FD) and the other on Explorer with 5.0L V8 engine and F Series pickup with 4.6L V8 (WAI #1-2024-21FD) (*Figure 3*). See the chart on page 2 for complete details on all these units.

SRE Frame Assembly

When you look at the inside of the SRE frame on a 4G unit, you see the four negative diodes, four positive diodes and the bottom side of the three rivets (*Figure 5*).

To separate the positive rectifier from the SRE frame, unsolder the four negative diodes and drill just the heads of the three rivets. The three negative

	WAI Ref. No.	OE No.	Application	Regulator
See Figure 1	1-1904-11FD	F5OU-10300-FA F5OU-10300-FB	1995-96 Continental V8 4.6L	35-208
	1-1988-11FD	F6LU-10300-CA	1996 Mark VIII V8 4.6L	35-210
		F6ZU-10300-BB F6ZU-10300-BC	1996 Crown Victoria V8 4.6L & 1996 Mustang V8 4.6L	
See Figure 2	1-1993-11FD	F6DU-10300-BB	1996 Taurus & Sable V6 3.0L	35-208
See Figure 3	1-2012-21FD	F68U-10300-AD	1996 Windstar V6 3.8L	35-208
	1-2024-21FD	F77U-10300-AB F77U-10300-AC	1996 Explorer V8 5.0L & F Series Pickup V8 4.6L	35-210

diodes with white potting material are 50-amp and the one with black potting material is 25-amp (*Figure 6*).

These units also use three positive 50-amp diodes and one positive 25-amp diode. Both of the 25-amp diodes in this unit have a small "dimple" on the bottom (*Figures 5 & 7*).

The positive rectifier has a copper heat sink molded into the plastic. For cooling, sections of this heat sink are cut and bent over rather than removed. The bent material acts like fins for better transfer of heat away from the rectifier (*Figure 7*).

Ford made a change in the rectifier on later versions of this unit. The early-style rectifier had a metal tab for battery connection to the voltage regulator. However, since there was no connection on the voltage regulator for this tab, it really served no purpose, so Ford eliminated the tab in later versions. At the other end of the rectifier a tab is still used as a connection point between the stator and voltage regulator (*Figures 8 & 12*).

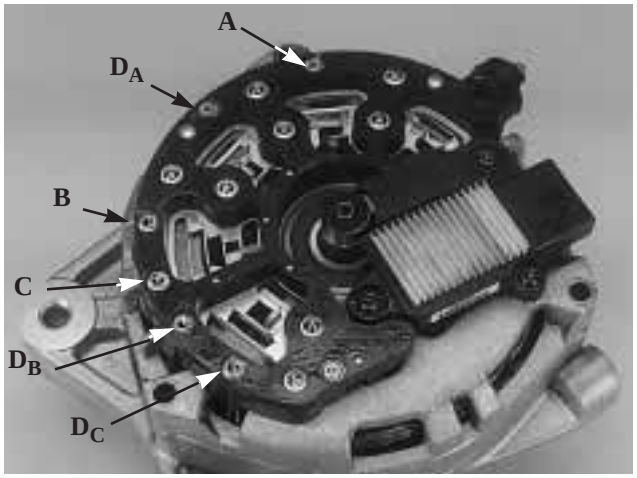

Figure 4. The 4G has a small slip ring, six stator terminals and eight diode terminals. Letters mark stator connections.

Testing Rectifiers

4G rectifers used different amp-rated diodes. When you use a diode tester to do a forward voltage-drop test, the reading will be slightly higher on lower amp-rated diodes. Different testers will give slightly different readings. The readings below were from the tester we used.

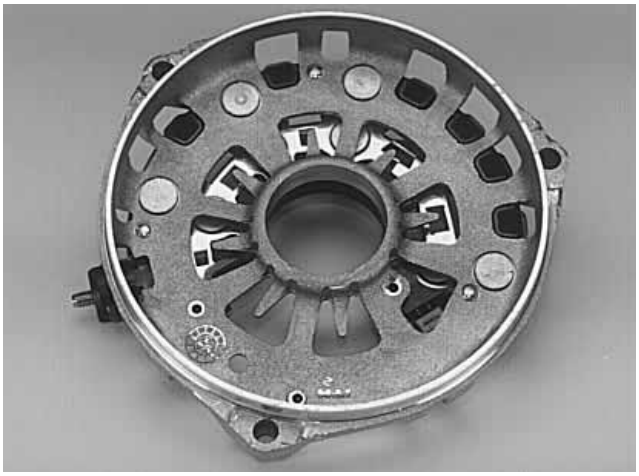

Figure 5. Inside the 4G SRE frame you see four negative and four positive diodes and the bottom side of three rivets.

Refer to *Figure 4* for correct stator connections.

To check the three positive output diodes, connect one test lead to the battery terminal. Then touch the other test lead in turn to the stator connections designated A, B and C in *Figure 4*. The readings should all be the same. With the tester we used, we got readings of .706 forward voltage drop.

To check the positive diode at the "Y" connection (*designated "D"; see Figure 4*), connect one test lead to the battery terminal and touch the other test lead to a stator connection designated Da, Db ***or*** Dc. You only need to test one of these connections, since they all connect to the same diode. Our reading for this test was .718.

Figure 6. The three 50-amp negative diodes have white potting material. The 25-amp negative diode has black potting material.

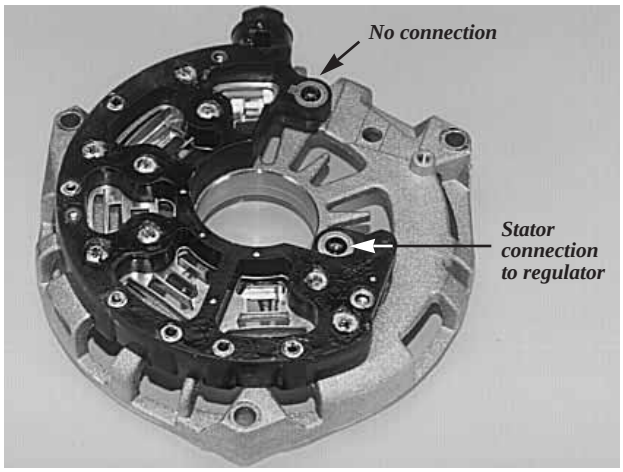

Figure 8. The tab shown at top was eliminated in later versions. The tab shown at the bottom is still used to contact the voltage regulator.

To test the three negative output diodes, connect one test lead to ground and with the other test lead touch stator connections A, B and C. Again, these should all be the same reading. Our readings were .713.

Finally, to test the negative diode at the "Y" connection (*designated "D"*), connect one test lead to ground and with the other test lead touch stator connection Da, Db ***or*** Dc. Again, you only need to test one connection, since all these connections are on the same diode. Our reading for this test was .723.

Figure 7. Sections of the copper heat sink are cut and bent over for better transfer of heat away from the rectifier.

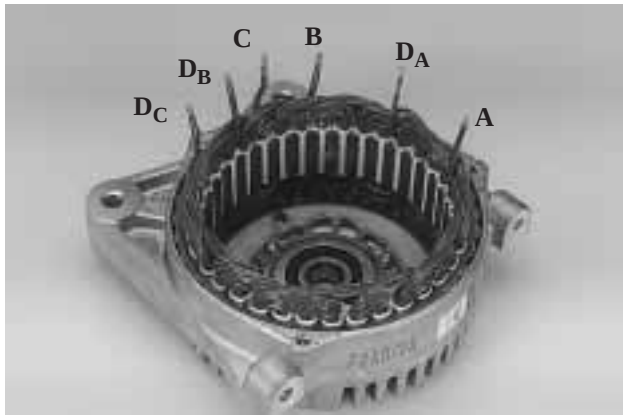

Figure 9. The stator on the 4G has two wires at each connection, which indicates a parallel winding.

Stator

The stator on 4G units fits a little tighter into the DE frame than the stator on 3G units. We needed to heat the frame in order to remove the stator. However, reinstalling the stator is not too hard, since the laminations are chamfered on the leading edge to help it slide back into the frame.

Ford 4G units use a parallel "Y" wound stator, and the "Y" connection is made in the rectifier. You will find a detailed discussion of stator windings in *Technical Update 17* (Feb. 1994). As a refresher, here is how you can confirm the type of winding used in the 4G.

The stator has two wires at each connection (*Figure 9*), which indicates a parallel winding. To determine if it is a parallel Delta or a parallel "Y," you can run a test on the rectifer to find out if a D connection -- a common connection point -- exists (*Figure 10*). If a D connection does exist, the winding is a "Y."

To determine if a D connection is present, use an ohm meter or a continuity tester. If you find continuity between the Da, Db and Dc con-

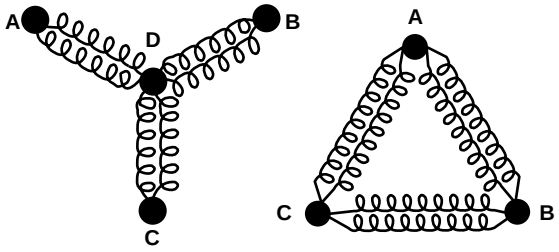

Figure 10. To determine if a parallel winding is a "Y" or a Delta, you need to test for a "D" connection, as in the winding on the left. On the 4G the "D" connection is in the rectifier.

nections (*Figure 4*), this indicates the existence of a D connection for a "Y" wound stator.

You may note that both the 3G and 4G use the same stator (WAI #27-212 130-amp). However, the D connections are different on the rectifier (*Figure 11*).

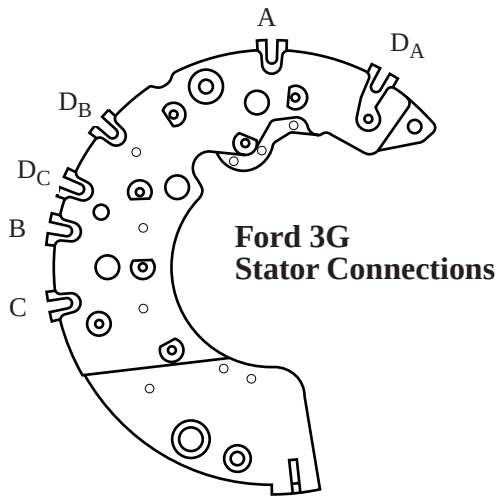

Figure 11. The Ford 3G uses the same stator as the 4G, but the D connections on the rectifier are different.

Testing Stators

When you are testing stators that have more than one wire at each rectifier connection, as these for the 4G do, make sure that the wires at each connection point are connected together. If they are not, you will get a faulty reading.

To test the stator for the 4G you will want to do an amp-draw test on each set of windings separately. Again, refer to *Figure 9*. Connect one test lead to connection A and the other lead to connection Da and record the reading. Move the test lead from Da and touch connections B and C to make sure that windings A, B and C are not shorted together.

Follow the same procedure for B and Db, then C and Dc. The readings for A-Da, B-Db and C-Dc should all be equal. You should get no reading when you connect A-B, A-C or B-C.

Finally, to find out if the coils are grounded, use a high-voltage leakage tester and test each coil (A, B, C) to ground.

See *Technical Update 17* for complete details on these kinds of tests.

Rotor

The rotor for these units has dual internal fans. It uses a 6203 SRE bearing with plastic tolerance rings and a 6303 DE bearing.

Regulators

These units use two different regulators. The black one (F5OU-10C359-AA, GR-815, WAI #35-208) has a 7-second load-response time (LRC) delay. The gray one (F6DU-10C359-AA, GR-817, WAI #35-210) has no LRC delay. They both have a 14.6 voltage set point and do not have soft start. (Soft start means the regulator does not allow full field current until it sees stator voltage.) Both of these regulators have cooling fins.

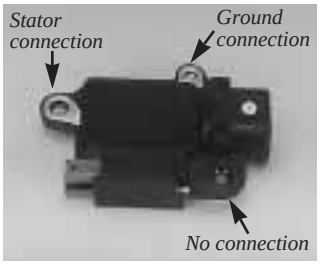

Figure 12. The 4G uses two different regulators, one with a load-response time delay and one without it.

The plug on these regulators is the same as the plug on 3G regulators. Brushes can be easily desoldered and replaced once you clean off the epoxy (*Figure 12*).