AUTO ELECTRIC CORNER —
Denso Tool, Dual Alternators and Fan Relay



BY MOHAMMAD SAMII

Denso Starter Drive Tool…!

One of the great opportunities of the ERA Show was seeing exhibitors' parts, tools and equipment, giving attendees the chance to see the latest, but also enabling us to take advantage of special pricing that is usually offered during each show.

That is how I came across this clever little tool and bought it during last April's ERA Show (*see Figures 1 and 2*). It is made and sold by CAE Pullers and is a real time-saver for replacing the snap-ring, collar, and pinion used on Denso reduction gear starters. The tool presses and holds the pinion gear down, thus freeing both hands for snap-ring removal using whatever suitable tool that you may have. It is also fully adjustable to accommodate all of the different sizes of Denso drive assemblies.

The manufacturers' website (www.caepullers.com) lists the details of this and a full line of sophisticated pullers that the company has made for the electrical rebuilding industry.

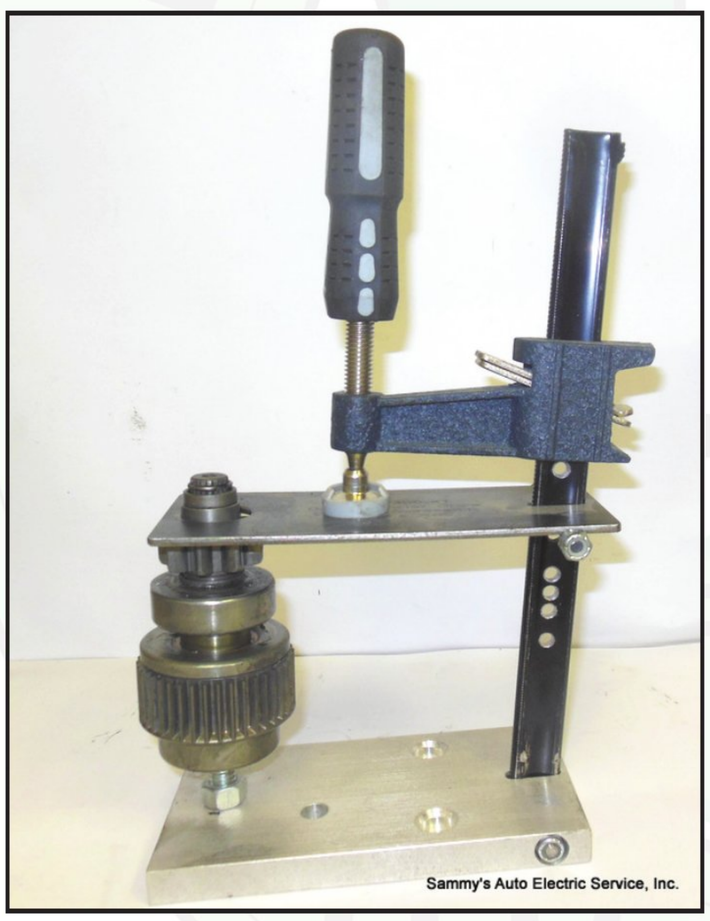


Figure 1 – CAE Pullers #7400 Drive Compression Fixture Kit

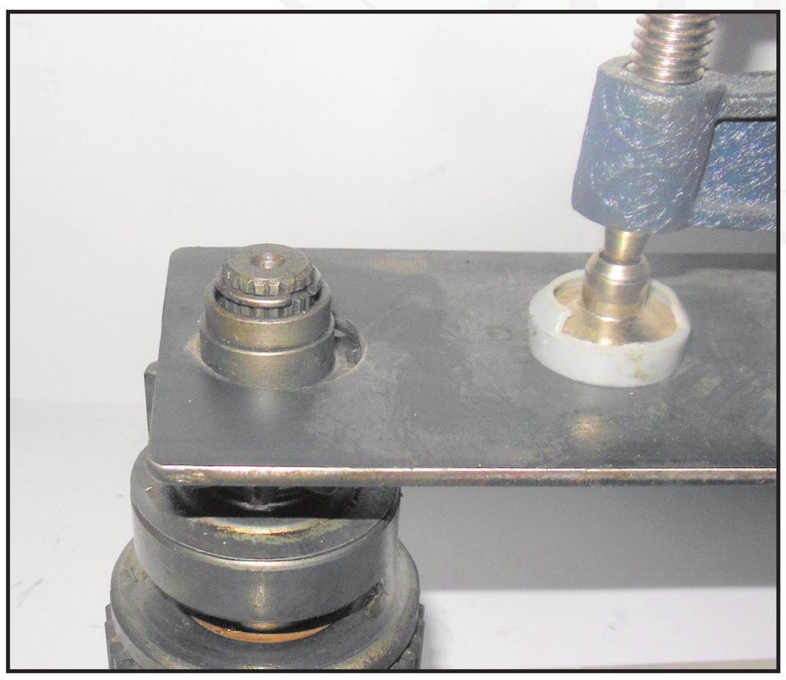


Figure 2 – Holding down the pinion gear for snap-ring removal

The designer/manufacturer, Fred Colson who owned Colson Auto Electric in Clearwater, Florida (thus the name, CAE) is no stranger to electrical rebuilders. In addition to being a first class working machinist for the last 20-25 years or so, he has concentrated on making specialty tools for electrical rebuilders. His products have been long known and used by many rebuilding shops. He also told me that now that he is working in a machine shop, he is more apt to getting tool ideas from rebuilders and see to it that viable concepts are put into making actual prototypes, working samples, and finished tools for us to use.

The point is that we must support such small businesses who devote their time and effort to make parts or tools to help us make the rebuilding process faster, safer and easier. This should be a priority for rebuilders. Such companies need our full financial support to keep going.

Dual Alternators…!

In responding to a thread of discussion on the ERA Forums regarding modification for dual alternators, I would like to share some of my experience and thoughts with readers.

With the exception of the some factory dual alternator system equipped vehicles, designed and built by automakers such as Ford and GM or their authorized subsidiaries, modifying a single alternator system to accept dual alternators is a rather tricky business to say the least.

There are a few aftermarket companies who specialize in providing modification kits for this purpose. Some of them are well engineered and manufactured, but others are mediocre at best. It seems that some makers of these kits are not aware of the importance of belt and pulley surface contact area. A belt that barely touches an alternator pulley with very low surface contact area cannot provide very much additional output, not to mention that the heat generated by slippage rapidly increases belt wear and overheats alternator bearings.

A good example of this can be seen in this picture (*see Figure 3*) that was provided by our esteemed colleague Nathan Unger of A.S.I. Rebuilders of Abbotsford, British Colombia in Canada. I believe that the minimal contact area between belt and pulley on this vehicle could never provide enough grip to generate any significant amount of amperage.

Another important issue is how the load is being divided and shared between the two alternators. Load-sharing is an important issue if the two alternators are not identical which obviously means they do not share the same voltage setting (Vset) by their respective voltage regulators.

Just to clarify this point, let's assume the Vset of first alternator is 14.0V, and the second one is 14.3V, and both share the same sense voltage and load. As the system voltage gets closer to 14.0V, the first alternator will stop charging or charge at a much lower rate while the second one is looking

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Figure 3 – Minimal contact between the belt and alternator pulley (Picture by Nathan Unger)

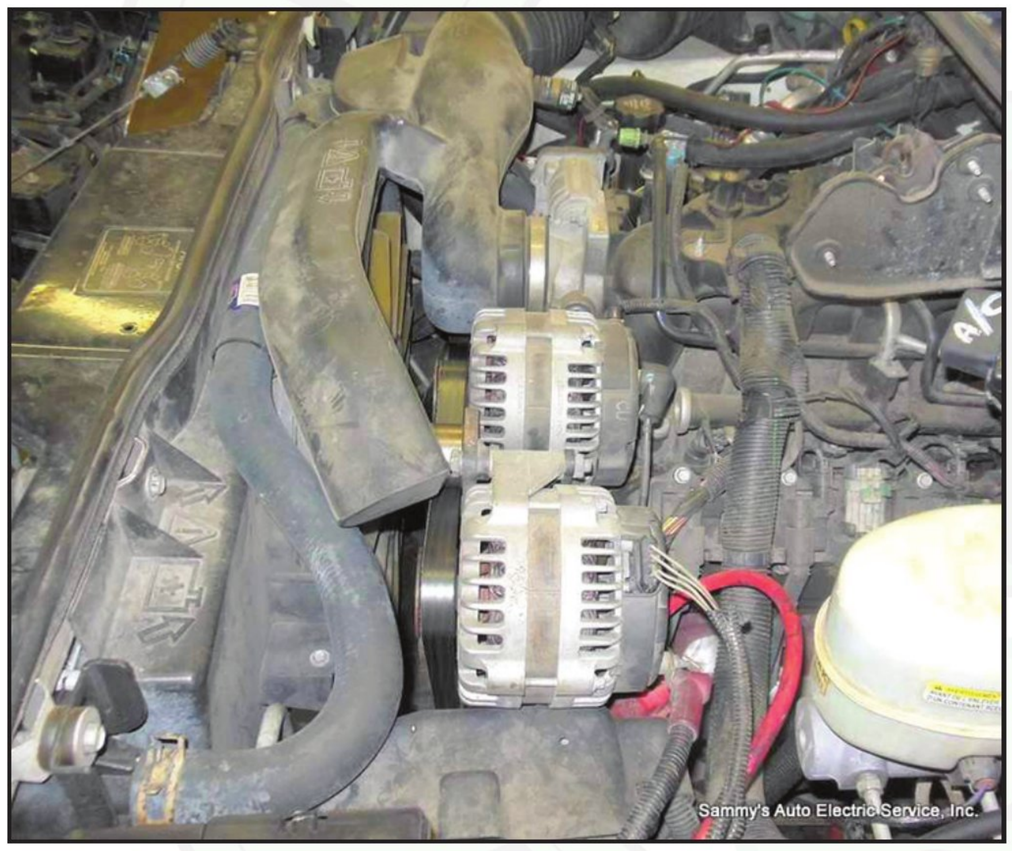


Figure 4 – A rather well made dual alternator kit on a Hummer limousine

for 14.3V and ends up carrying the majority of the load. This usually causes the premature failure of the one with a higher setting.

This problem is not as prominent if the alternators are of the same brand and family. But even having identical alternators sharing the same "sense voltage" is not a bullet-proof answer. You can still have uneven charge rates for different battery sets, often located at opposite ends of the limousine.

One of the ways that we have experimented with and found to be more viable, is to divide the load into 2 separate systems: Main and Auxiliary. The main load being the engine compartment batteries and the auxiliary being the bank of batteries used to operate the coach accessories that are common in limousine applications for passenger comfort and entertainment.

Once the systems are isolated from one another, each alternator can be assigned to carry the load of its respective battery bank, without interfering with each other or handling more load than they are assigned. Depending on the calculated electrical load, the alternators must be sized and chosen for each function. The next photo (*see Figure 4*) shows a pair of 160-amp 8292 alternators mounted securely by a well-designed dual alternator mounting kit on a Hummer stretch limousine.

For redundancy or back-up, a continuous-duty power relay can be installed to bridge the two independent systems together in the case if an alternator failure. This way the one working alternator can be used with some load moderation to make it through a trip until the system can be repaired.

One point that is important to remember is that the majority of the limos that we work on are ten years old or more and have been used, abused, rigged, and modified by various operators over that time. We are tasked to get them going by whatever means necessary and do the work within the anemic financial confines of the current owners, which somehow limits our options.

Above is of course my opinion based on our experience repairing such vehicles. I am sure there are newer system configurations and designs that are highly workable, especially with the availability of the many 250-plus amp alternators that abound these days. We can perhaps discuss this at a future ERA training event.

Toyota Power Relay

The ISO-type Bosch 4 or 5-pin relay has been around for a long time and most of us are well familiar with them. But there are certain vehicles and applications that use other types of relays for operating various systems. One of those that is used extensively in the Toyota/Lexus line of cars as an ignition relay, blower relay, cooling fan relay, fuel pump relay…etc. is shown here (*see Figures 5 and 6*).



Figure 5 – A commonly used Toyota/Lexus relay

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While they are well designed and robust, they can fail in various modes and render the related circuit inoperative. We had a recent case with a 2001 Lexus ES-300 with a radiator cooling fan that stayed on all the time, running the battery down due to relay contact points stuck in the closed position. The system was traced and the defective relay identified and replaced to restore the cooling fan to normal operation. (*see Figure 7*).

Until I see you again, keep up the good work.
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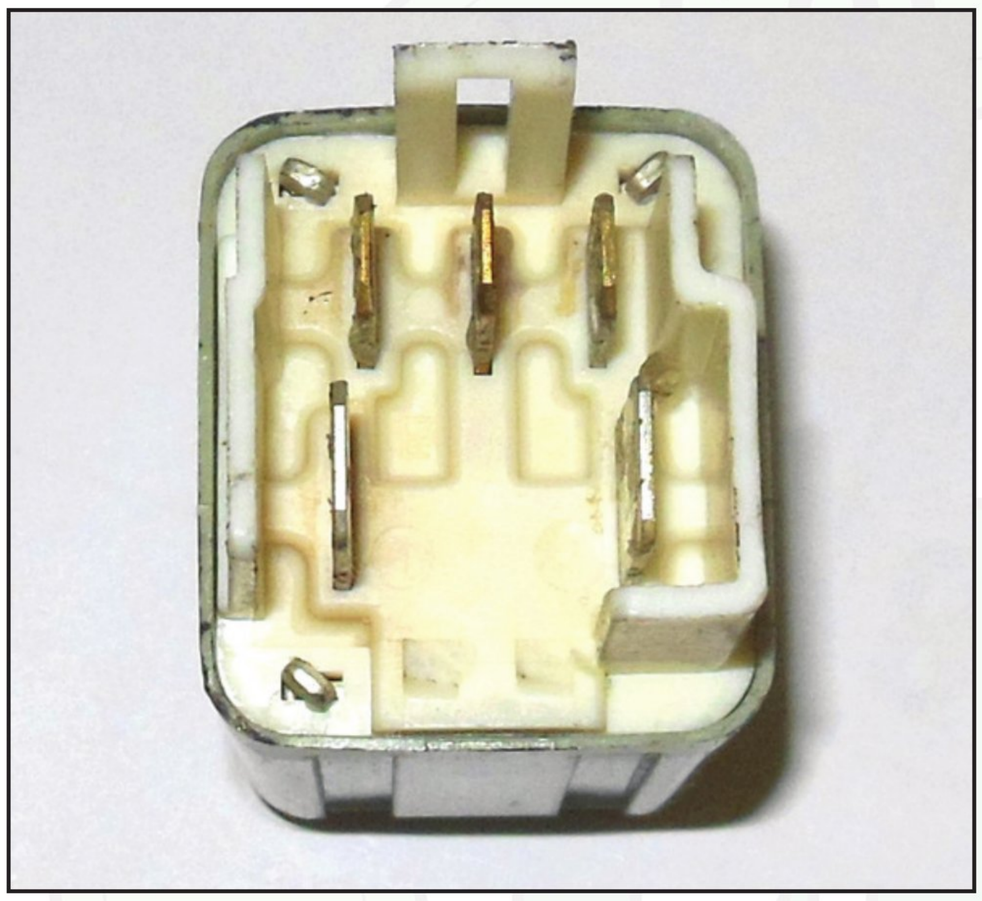


Figure 6 – The pin side of this popular Toyota/ Lexus relay

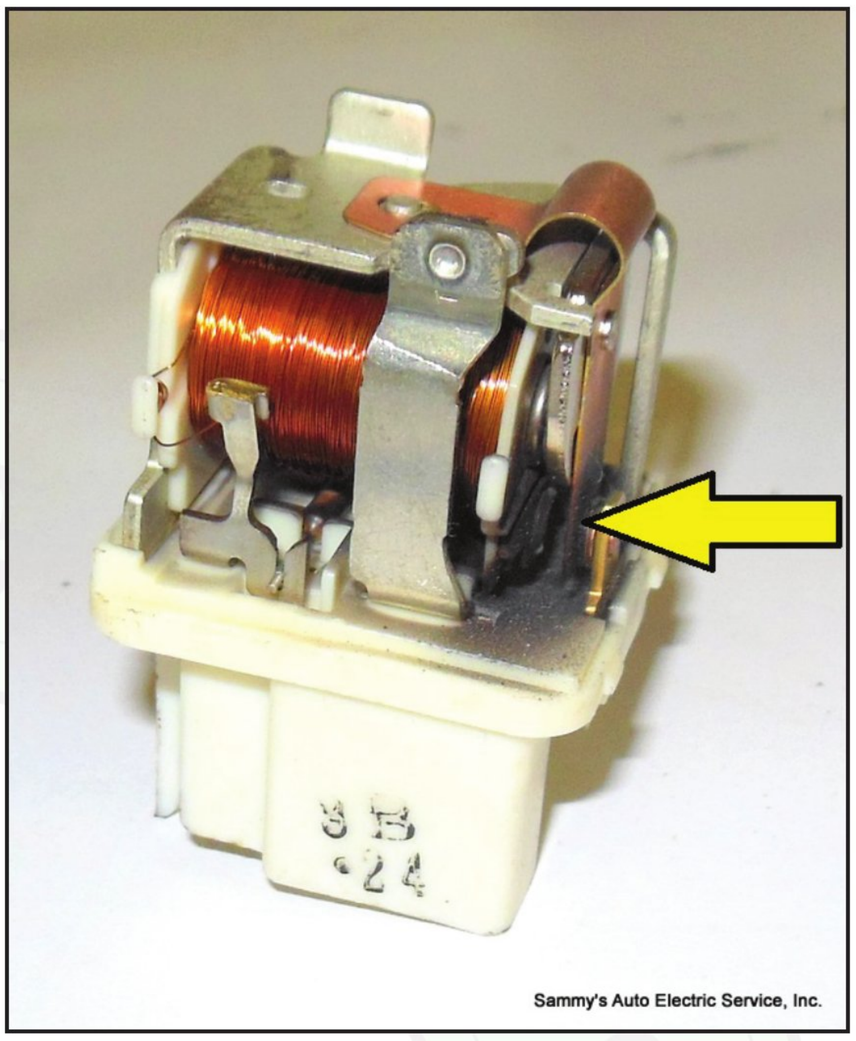


Figure 7 – Fused contacts of this relay caused cooling fan run on

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