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November 5, 2008

Reply to:
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ASTM D02.B0.03 L-60-1 Surveillance Panel
Members and Guests:

Attached for your review and comment are the unconfirmed minutes of the August 13, 2008 L-60-1 Surveillance Panel meetings held at the PRI Headquarters in Warrendale, PA. Please direct any corrections or comments to my attention.

Sincerely,

Chris Schenkenberger
Chairman
L-60-1 Surveillance Panel

Attachments

With respect to sludge –
The following color code was used for sludge:

1. Red code is used if spread is 0.25 or greater

The surveillance panel agreed that a spread over 0.25 merits is a highly undesirable amount of variation. Two gear sets had a greater than 0.25 merit difference.

With respect to ACV –
The following color code was used for sludge:

1. Yellow code is used if spread of .5 or greater
2. Red code is used if spread is 1.0 or greater

All but one gear set was greater than 0.5 which was felt to be unacceptable by the panel members. The raters had a significant amount of discussion at the workshop on ideas to reduce this variability. Mr. Lind was able to get the raters to start looking at how they hold the gear with respect to the light and they decided to run a brief experiment. A couple raters placed the gear on a plastic case flat on a table and with the light 12 inches above. This seemed to be an improvement as the numbers became closer.

Mr. Lind believes that for the ratings to improve, continued standardization in the rating process needs to occur. Areas of improvement include the angle used to rate the gears, issues with the lighting and potentially incorporating a rating booth. The panel discussed ways to expand on the experiment that took place near the end of the July workshop. This was captured in the following motion.

Motion 1 ⇒ (Mr. Don Bartlett, Second ⇒ Mr. Bruce McGlone) – TMC to lead a rating exercise on exploring rating methods for improving carbon varnish through a round robin with the labs. Only the high volume raters are to be used in this experiment. The motion was unanimously approved 7-0-0.

Action Item # 1- Chairman to work with Lubrizol raters for documenting the actual method used for the experiment conducted at the July rating workshop.

Action Item # 2- Chairman to confirm process with GRTF Chairman and set up a future surveillance panel teleconference once a draft is written.

The meeting was adjourned at 4:52 pm (Brian Koehler/Galen Greene).

Respectfully submitted,

Chris Schenkenberger
L-60-1 Surveillance Panel Chairman

ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: August 13, 2008

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* Initial to indicate attendance at subject meeting

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Meeting Date: August 13, 2008

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ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: August 13, 2008

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ASTM L-60-1 Surveillance Panel Membership/Mailing List

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L-60-1 Surveillance Panel

August 13, 2008
4:00 p.m. – 5:00 p.m.
PRI Apollo Room – Warrendale, PA

Agenda

I. Call to order

II. Review Agenda

III. Update on possible alternator replacements

IV. Updating Figure A2.1 of the D5704

V. Review of L-60-1 Gear Ratings from July Rater Workshop

VI. New Business

VII. Adjournment

Attachment	2
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6.1.7 - Alternator for loading. No substitutions allowed.
specifies GM part #, 10SI, 12V 63A
model # is unit specific. not all 10SI
had the same windings

DELCO REMY models 10SI & 12SI alternators

Visual Identification and Differences

By Mark Hamilton

The "SI" in the model number stands for Systems Integrated, meaning that the voltage regulator is inside of the alternator.

these alternators have a built-in voltage regulator

10SI and 12SI are Delco Remy model number designations, but not part numbers. The model 10SI was built in several different output ratings, and assembled with any one of four available "clock" positions for different mounting bracket arrangements. There are many different part numbers among model 10SI alternators. And the same was true with the model 12SI. (several output ratings, and four possible "clock" positions of assembly, plus different types of pulleys came on the model 12SI, and so there are also many different part numbers)

Please don't expect the person at the parts counter to know what alternator you want simply by telling him "12SI" or "10SI" alternator. Within this feature, we have provided some information about these alternators, to assist with choice of the best alternator for particular applications. And we will provide a few AC Delco part numbers, popular rebuilder's part numbers, and information to tell parts counter people what car the alternator originally came on.

There are a few aspects worthy of knowing about, before choosing the alternator for your car. Please view our photos and read the brief technical information provided, before choosing the alternator for your car.

Attachment 3
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The photo above shows a typical, used, model 10SI, Delco Remy built alternator.

The model 10SI Delco built alternator is the first generation, SI series alternator. It was introduced on the 1969 Corvette, and by 1973 most GM built cars and light trucks used this model alternator. It was an option with at least some 70, 71, and 72 GM cars, although it rarely showed up in those years, except for on the Corvette where it was standard equipment.

Assembled with all original GM components, the model 10SI alternator had a maximum output rating of 63amps. Output rating is determined by the windings in the alternator, and not all model 10SI alternators had the same windings.

There were 10SI alternators with 37amp, 42amp, 55amp, 61amp, and 63amp ratings. The smaller amp output rated alternators were installed on cars with no air conditioning, and few electrical accessories. The 61amp output rated 10SI was very commonly installed on 8cylinder cars, with factory air conditioning option.

For luxury cars loaded with electrical accessories, there were larger and more powerful models of alternators than the 10SI. A few of the full size Buick, Pontiac, Cadillac, or Oldsmobile could be had with model 15SI, or possibly the model 27SI alternator. The 15SI and 27SI alternators looked the same, but were scaled up in size. They were physically larger and heavier, and output ratings were often 70amp, 85amp, and 100amp.

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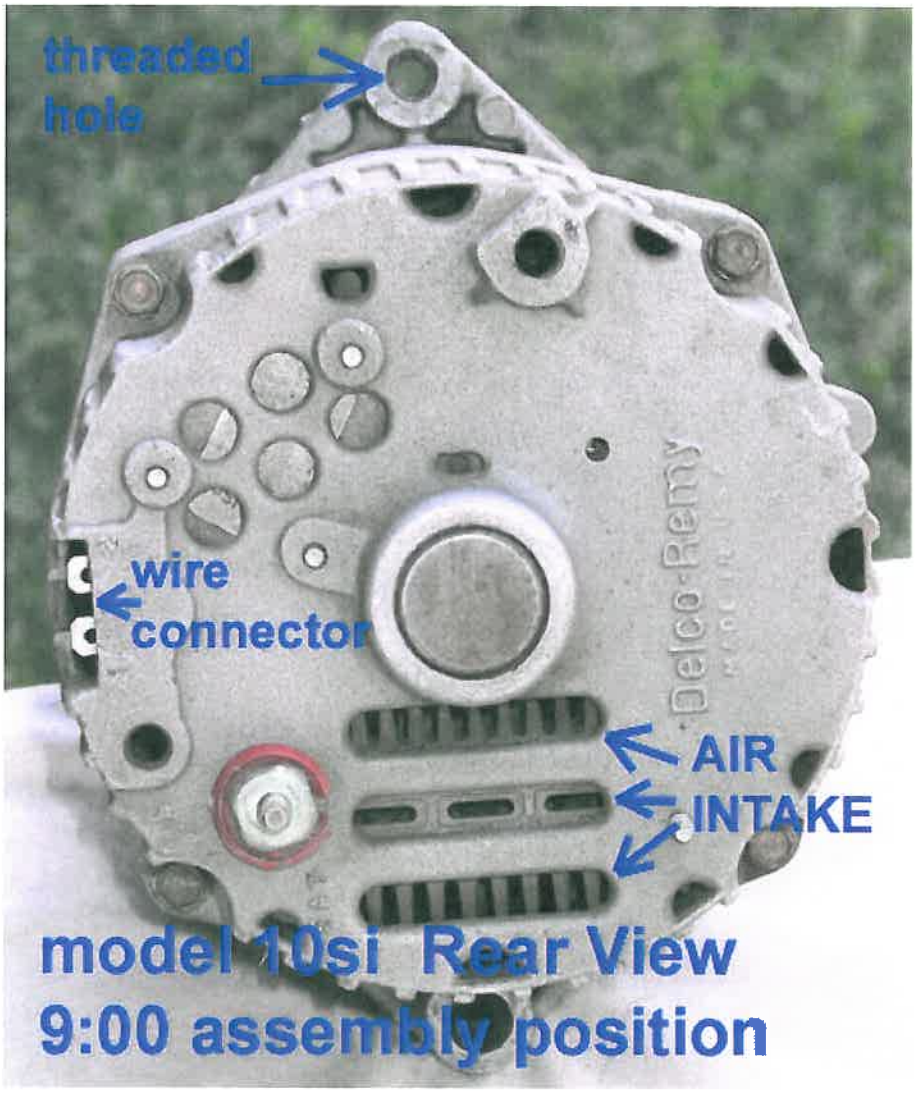
Reference 1-60-1

We do not recommend these physically larger diameter alternators for high performance applications. They are larger and heavier, which often makes mounting more difficult. ***Also, the physically larger alternators are easily damaged with high RPM.*** (Centrifugal force at the rotating parts will become much greater as the diameter becomes larger.)

Also, when building a practical car to drive and enjoy, replacement parts will be found more easily when using the 10SI or 12SI models, which were used on most cars and light trucks for many years. (The 12SI is a newer model alternator. The 12SI will be shown and discussed a little farther down, in this feature.)



If the person at the parts counter asks; "Would you like the alternator at 3:00?" *Then please don't reply with "No! I want it right now!"* (The author has experienced that conversation before, and everyone at the shop had a roaring good laugh.)

"CLOCK" POSITION ASSEMBLY

There are two halves of the alternator case, front half and rear half. The mounting bosses are at the front half of the case. And the electrical connections are at the rear half of the case. Four screws, spaced equally around the case diameter, hold the front and rear halves of the case together.

Conveniently, the rear half can assembled to the front half at any one of four directions. Industry refers to the assembly position as the "clock" position. **Clock position of the SI series of alternators is determined by viewing the alternator from the rear, with the threaded mounting hole straight up.** With this view, the receptacle for the two wire plug-in connector will point to any one of the four available "CLOCK" positions. Straight up is 12:00, to the right is 3:00, straight down is 6:00, and to the left as shown in the above photo is 9:00.

Having the different available clock assembly positions provides for proper exit of the wiring from the alternator, in any one of four directions, for use with different mounting setups. With the various clock positions available, the alternator could be mounted on the driver's side, or passenger side of the engine. And the alternator could be mounted upside down, or right side up. By choosing the proper clock position, the same model number of alternator could be used for many applications. (And it was. Buick, Cadillac, Chevy, Oldsmobile, Pontiac, Chevy and GMC trucks, and machinery of all sorts, used the SI series of alternator, with different mounting and clock positions.)

Although the SI series of alternators were replaced by the CS series of alternators, as original equipment on GM built vehicles, back in the 1980's; the SI series still remains the most popular alternator in the world of custom cars. And the SI series is by far the most popular alternator up-grade for the Muscle Car period.

And yes, the 10SI and 12SI alternators have been cloned! An exact replica of a 10SI or 12SI can be assembled without using a single GM part. Many "generic" alternators have been built, based upon the 10SI and 12SI format. (Therefore don't be surprised if one is spotted without the "Delco Remy" logo at the back of the case.) And suppliers to the alternator rebuilding industry can provide any part desired for these alternators, including screws, insulators, brushes, bearings, voltage regulators, stators, rotors, rectifiers, diode trios, and small parts too.

After all these years, the Delco SI format alternator remains very popular nationwide, and for good reasons it will be popular for years to come. It has proven to be a very reliable alternator. It provides reasonably good available output, and especially so at low RPM and idle speed, when compared to the older externally regulated models. The SI series of Delco alternators are also the most friendly of alternators to take apart for testing and replacement of parts. Mounting boss dimensions at the 10SI and 12SI are the same as with the previous externally regulated model 10DN Delco Remy alternator, and so except for wiring, the up-grade is a "bolt-on." Also the mounting is similar enough to FORD alternator dimensions that the 10SI or 12SI can be easily adapted onto many FORD engines. ***Yet if all that is not enough, the 10SI alternator is typically the least expensive alternator and voltage regulator in the nation.***

The photo above shows a Delco Remy built model 12SI alternator.

Notice that the cooling fan at the front of this alternator is visually different than with the model 10SI. (There's more to come about alternator cooling.) The cooling fan provides a quick visual identification as the model 12SI alternator. The fan is made of black thermoplastic, and has a laminated re-enforcing metal shield at the front. Most alternators that have an external fan at the front will have a "traditional" metal fan. These fans are strong and reliable, and they are efficient, no worries about that! And... These fans are not easily damaged by excessive RPM. With the typical stamped, steel fan, which is found on many alternators, centrifugal force at high RPM will bend the fan blades.

The model 12SI was introduced with 1983 models, and it continued into 1988 with some applications. (Although not all 1983 model cars were shipped with the model 12SI, some small 1983 cars were still equipped with the older 10SI.) By 1983, many cars needed more alternator output than the 10SI could deliver. Many cars were front-wheel-drive with transverse mounted engines, which required electric radiator fans. And by 1983, cars had at least primitive computers, often air conditioning, and other accessories too.

Engine compartments were often cluttered by 1983, which made it impractical to use the physically larger, existing SI alternators. The 12SI was built, with the same basic dimensions as its predecessor, the 10SI. The 12SI could be had with significantly greater output than a 10SI. **The 12SI also had a greater cooling capacity than the 10SI.**

NOT ALL MODEL 12SI ALTERNATORS WERE 94amp RATED

The 12SI was assembled with different clock positions, different pulleys were available, and with different versions of windings that gave them **different output ratings. 12SI alternators were built with 56amp, 66amp, 78amp, and 94amp maximum output ratings.** (The 78amp was popular as standard equipment on full size car models, and many were built. Quite few high performance and deluxe models of cars also came with the 94amp windings.)

The photo above shows a model 12SI Delco alternator, viewed from the rear. Notice the increased air intake area with this 12SI, as compared to the 10SI. When viewed from the rear, the greater air intake area is the most distinguishing visible feature of the 12SI. (The rear view of a 10SI was shown in a previous photo, above.)

ALTERNATOR COOLING IS VERY IMPORTANT!

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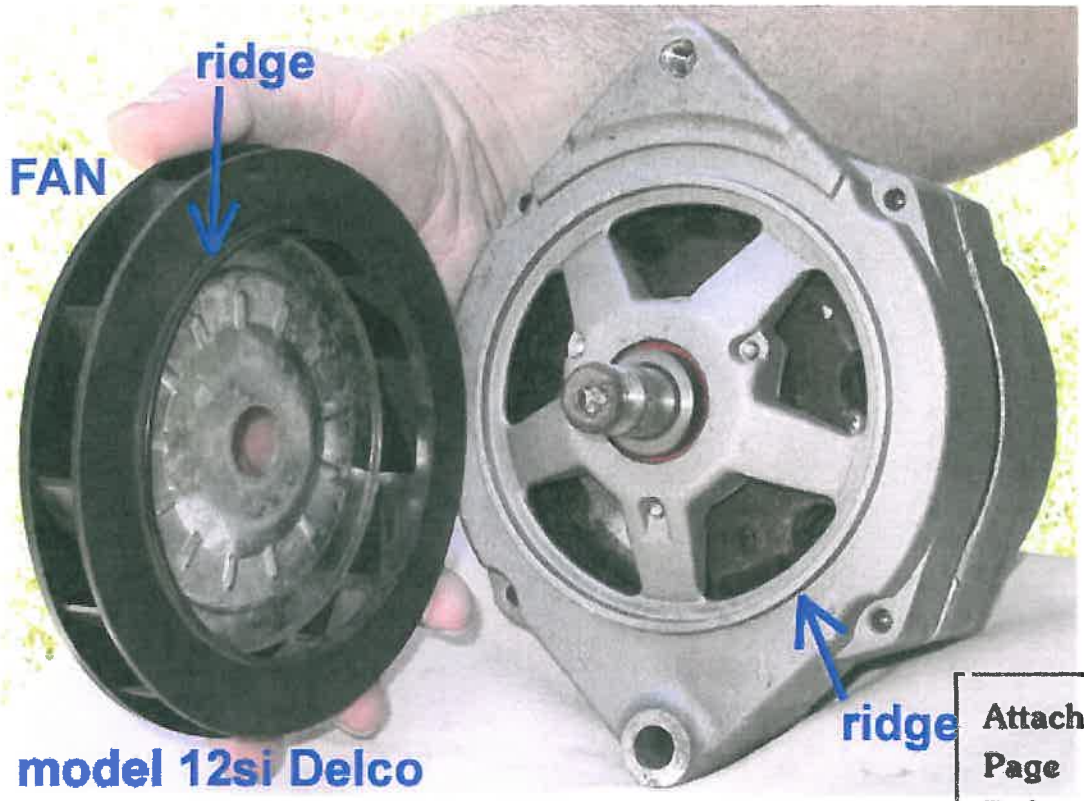
In the above photo, the pulley and cooling fan has been removed from the front of a model 10SI alternator. The factory built this model with a maximum of 63amp output rating. In the photo below, we will see the next generation alternator, a model 12SI, which is equipped with a high performance fan.



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And in the photo above, the pulley and cooling fan has been removed from a "stock," model 12SI, Delco Remy built alternator. Compared to the fan on the 10SI, the 12SI fan is certainly a high performance design.

Notice in the photo, the fan and the alternator end frame both have "ridges," where they will mate to each other. (The ridge at the fan fits just inside the ridge at the alternator case.) The effect is like a shroud, or like a seal, which will only let the fan draw air through the alternator. (This fan cannot suck "outside" air from near the front of the alternator–the fan can only draw air through the alternator.)

You can bet that the "factory guys" were thinking in parallel to the discussions below, about heat and cooling requirements with alternators, when they designed the model 12SI alternator. The 94amp model 12SI is about the same dimension size as the 63amp model 10SI. Yet ***the 94amp model 12SI is capable of producing a lot more heat than the 63amp model 10SI***.

ALTERNATOR COOLING

A point about the "AIR INTAKE," which is seen in photos of the alternators viewed from the rear, above. Clearly the author has written "**air intake**," and not air exit or air exhaust. The fan at the front of these alternators is an exhaust fan. The fan draws air in through the opening at the back of the alternator, where the air will pass through cooling fins at the rectifier heat sink. And the air will be drawn through the stationary "stator windings," where the air will also have a cooling effect. As usual with moving air through passages, the same fan efficiency will suck more air than the fan could blow through. That's why the fan at the front is an exhaust fan.

The significance of discussing the air intake is that ***obviously it's not a good idea to mount the alternator with the air intake directly against a header tube*** or exhaust manifold. Cool air drawn in at the back of the alternator will have a greater cooling effect than super-heated air!

Also, ***watch out for debris that can collect at the air intake***, which will restrict airflow. (There's a good photo of that problem in our feature on "ONE-WIRE compared to THREE-WIRE" alternators, with a 10SI alternator on a tractor.) The clogged air intake should also be of great interest to anyone who might consider picking up a used alternator at a salvage yard. Fiberglass hood insulators slowly deteriorate and fall apart. Long strands of the insulator often collect at the alternator air intake (like matted hair at a bathroom shower drain). Add a very small amount of oil film, which is often present under the hood, and ordinary road dust, and well, you get the picture; the air intake can be completely obstructed.

And another point about alternator cooling, the greater the AMP rating of the alternator the more heat it can generate. Machinery is never 100% efficient. But "energy is never lost or destroyed, it can only be converted." And typically with efficiency loss at machinery, heat is the undesirable by-product. In the alternator, current will flow through resistance at the diodes in the rectifier, and also through resistance at the stator wire winding. The math formula for calculating the amount of heat is $AMPS^2$ X OHMS = WATTS (of heat). It's interesting with this formula that AMPS is squared.

In the case of current flow through the stator winding, the outcome will be that when the AMP output of an alternator is increased by only a few percent, the heat output will double in amount. In example, **with a 40amp output;** 40^2 (AMPS) X .05 (OHM) = **80 WATTS of heat**. But **when output is increased to 60amps;** 60^2

(AMPS) X 0.05 (OHM) = **180 WATTS of heat**! (The 0.05 ohm resistance at the stator, which we used, is only an example quantity, but it, may be close to a real world number.) And so **with output increased from 40 amps to 60 amps, the amount of heat output at the same stator winding is more than double!**

ABOUT HEAT WITH ALTERNATORS

The significance of the previous heat calculations is that obviously ***when electrical power output is increased, the cooling capacity should also be increased***. Otherwise, the situation is like installing a high performance big block V-8 engine, where a stock six cylinder used to be, and leaving the six cylinder radiator in place.

Therefore, **100amp output or 120amp rated alternators, built upon a 63amp 10SI case design are not always a good idea**. If the application does not really need more than 63amps for very long periods of time, then the souped-up 10SI may live a long life. Also, sometimes the side effect of increasing the gross output rating is that we get increased output at idle and low RPM, which is good. If the application calls for considerable output at idle speed, but not especially a high gross output; then the souped-up 10SI may also live a long life.

Burned stator windings are common, in applications that continuously require a high amount of alternator output, and so are heat-damaged rectifiers. Some alternators are able to constantly put out a fairly high percentage of their gross output rating. Yet other designs fail when producing only about 50% of their gross output rating. For that reason, the author's preference is always a good margin with cooling capacity per electrical power output. **The models 10SI and 12SI alternators have proven to be very rugged with "stock" winding installed** (output not greater than factory ratings). And **for their cooling capacity, "stock' model 10SI and 12SI GM Delco built alternators are favorites.**

The SI series of alternators are also the primary reason that the author would not consider using an early FORD alternator on an early FORD built car! Anyone who wants to view an application that is stressful for alternators can look at photos of the FORD, which we used in "ONE-WIRE compared to THREE-WIRE Alternators," and also in "REMOTE VOLTAGE SENSING." That car has a solid state, 10minute time delay relay, which will run all four electric radiator fans for ten minutes every time the engine is switched OFF. And there is a powerful air conditioning system that must be supported. And there are two batteries to maintain. And there are Halogen headlights on relays. And a security system that causes a small drain when the car is parked. And there is a sound system with an amplifier. And there are still more accessories too.

At the time of this writing, the author has owned the car for about twenty years. The Ranchero has been and still is a primary usage car. The same "stock" model 12SI alternator has been on the car for all those years and miles of driving, and it has performed perfectly with no failures. (The alternator does get freshened up periodically, when the engine has to be replaced or removed for service. At that time the alternator at least gets new bearings, and about every other time it gets brushes and a new Delco voltage regulator and diode trio.)

A NOTE, Regarding "typical" rebuilt alternators

(from independent rebuilders, and local auto parts stores)

Originally, the car companies optimized alternator output requirements for particular applications, depending upon exactly how the new car would be equipped.

With alternators original to particular cars, there are many of the same models of alternators, but with different windings installed. So many cars came with the same model of alternator. But the same model car could have different alternator output ratings, depending upon what electrical accessories the car would have.

But in the world of independent rebuilders, it's not practical to accurately assign part numbers and provide inventory to precisely replace all alternators with the same, exact output, as a car originally had. Obviously, there's not a lot of difference in available output between a 61amp and 63amp model 10SI. However, there is significant difference between 56amp and 94amp model 12SI alternators. Expect that with alternators from an independent rebuilder, amperage output may be close, but often not exact. The independent rebuilders do what they can to provide serviceable, and economical, replacement alternators.

The author has worked for major alternator and starter rebuilding companies, in younger years. Primary duty at work was in the service bays, working on the electrical systems with cars; but not at the rebuilding department. However, with enough time spent around those facilities, general operation of the facility becomes very familiar.

With the typical rebuilding operation, work involves mass production methods. Different **models** of alternators and starters are worked on in "batches." A large truckload of model 12SI alternators may be "rebuilt" all at once. All the alternators in the batch are disassembled at once, and the cases (end frames) are put in a parts cleaning machine. Small parts and large parts are cleaned and tested. The surfaces where the brushes ride on the rotor are refinished. And so on.

Next comes the assembly phase. Cases are grabbed at random, and assembled with rectifiers, small parts, and the stator winding assembly. Bearings are installed in the front case halves, and then the rotors, complete with field windings are also installed. And by now the windings, which determine the output, are all scrambled with assembly in different cases. And when the large batch of alternators is finished, the output rating stamped on the case may not match the version of windings installed in the alternator.

In summary, we should not judge the actual output potential of an alternator by the output rating stamped into the case, when working with alternators that have been "rebuilt." The amount of output a rebuilt alternator can produce must be judged by testing the alternator.

NOTE about alternator pulleys

Pulleys can be interchanged between the old externally regulated (Delco Remy model 10DN), and the model 10SI, and the model 12SI, and with the newer model CS-130, and even with the old externally regulated FORD alternators.

The pulley is a slip fit on the shaft at the alternator, be sure not to loose any spacer rings behind the pulley or behind the fan.

The nut used to secure the pulley is best removed with an impact wrench. If an impact wrench is not within reach, then it's really best to take the alternator to a local tire shop or auto repair shop, and have the nut "broken loose." (Alternators have been damaged while attempting to remove the nut with only hand tools.) Wearing heavy leather gloves, hold the fan at the front of the alternator, and use the impact wrench to loosen the nut. (Typically a 15/16" socket will fit.)

Watch out for metric nuts and bolts!

Sometime in the 1970's, GM began using metric fasteners (nuts & bolts) at some parts of the cars. Expect that the later model 10SI alternators, and all of the model 12SI alternators will require metric fasteners at the threaded mounting boss, and also at the output stud (BAT) at the back of the alternator. Either pick up the hardware while at the auto parts store, or stop by a hardware store if the correct fasteners will be needed.

ALTERNATOR PURCHASING TIP

(The author prefers only genuine AC-Delco remanufactured alternators, which can be purchased at many independent auto parts stores in the nation. However, other options are also provided.)

Get out the phone book, and look in the yellow pages. There are many independent alternator and starter shops, in cities all over America, and many will sell alternators directly to the public. These people will know "10SI or 12SI," and they will also know "clock positions." When shopping for an ordinary rebuilt alternator, it's often best to go directly to the source.

These local rebuilding shops can also change the clock position, and test output of existing alternators. (And please be courteous and offer to pay them for their services! Their work is not a get rich quick business, they are spending big bucks to equip and operate the facility. The author can verify that!)

SOME PART NUMBERS AND APPLICATION DATA

Some popular application data will be given farther down, below the table. The application data will be useful when the parts counter person asks; "What year and model of car, with what engine, and with what accessories," and so on.

"By the numbers"

Model	Output Rating	Clock Position	AC Delco Part #	*Lester catalog Pt#
10SI	63amps	3:00	321-39	7127-3
10SI	63amps	9:00	321-41	7127-9
10SI	63amps	12:00	321-43	7127-12
10SI	63amps	6:00	321-135	7127-6
12SI	94amps	3:00	321-266	7294-3
12SI	94amps	9:00	321-269	7294-9
12SI	94amps	12:00	---------	7294-12
12SI	78amps	3:00	321-247 or 321-357	7278-3
12SI	78amps	9:00	321-244	7278-9
12SI	78amps	12:00	321-249 or 321-254	7278-12

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Reference L-60-1

*Lester is an automotive catalog service company. (They do not make alternators.) Nationwide, independent rebuilders and many auto parts stores have used the Lester catalog system for years. Parts catalogs by other companies, including AC-DELCO, will include the Lester part numbers in the "cross-reference" section of the catalog.

The 3:00 position is the most popular, because it fits passenger side-of-the-engine, stock mounting, with Chevy engines. (The typical long nose water pump arrangement, '69 and newer.) We know that the numbers above for the 3:00 position are correct, because we have used them to get the correct alternator, many times before. And... the part numbers we have given above for 3:00 positioning will have the typical V-belt pulley, which not all model 12SI's will have.

WHERE WE GOT THE DATA (in the table above, and in the application data below)

We looked it all up in AC-DELCO "Alternator & Starter" catalogs. If there are any mistakes, then AC-DELCO had the data incorrect in three different years and printings of their parts catalogs.

NOTE It's possible that some of the AC-Delco part numbers in the table above may not be perfectly suited for some applications. 12SI alternators were installed in applications that did not always use the typical V-belt pulley. And... The author has also encountered model 12SI alternators that did not have the threaded bolt-hole for mounting. (There was a drilled hole, without threads, at the mounting boss.)

APPLICATION DATA

These are only common examples, which the computer or catalog at the auto parts store should list. There will also be many other GM applications that use the same alternator.

10SI, 63 amp, at 3:00 (AC-DELCO # 321-39, Lester #7127-3)

Tell the auto parts counter person that "The alternator is for a 1978, Chevy Camaro, 8cylinder 350engine, with air conditioning."

10SI, 63 amp, at 9:00 (AC-DELCO # 321-41, Lester #7127-9)

Tell the auto parts counter person that "The alternator is for a 1979 Buick Regal, 8 cylinder 4.9L (301W) engine, with air conditioning."

10SI, 63 amp, at 12:00 (AC-DELCO # 321-43, Lester #7127-12)

Tell the auto parts counter person that "The alternator is for a 1977 Pontiac Grand Prix, 8cylinder 5.7L (350R) engine, with air conditioning **and with H.B.L."** (H.B.L. = Heated Back Light–meaning rear window defroster)

10SI, 61amp or 63 amp, at 6:00 (AC-DELCO # 321-135, Lester #7127-6)

No application was found. 6:00 position would put the two wire harness connector in direct interference with the "main mounting bolt," and so it's possible that no passenger cars used SI series with 6:00 positioning. (It's also why we did not list part numbers for the 94amp and 78amp model 12SI alternators, in the table above.)

12SI, 94 amp, at 3:00 (AC-DELCO # 321-266, Lester #7294-3)

Tell the auto parts counter person that "The alternator is for a 1984 High performance Chevy Camaro, with 5.0L (305G) engine, 94amp alternator

12SI, 94 amp, at 9:00 (AC-DELCO # 321-269, Lester #7294-9)

Tell the auto parts counter person that "The alternator is for a 1985 Buick Riviera, 5.0L (307Y engine), with Heavy Duty options and Air Conditioning."

12SI, 94 amp, at 12:00 (AC-DELCO #none found, Lester #7294-12)

No AC DELCO part number or application was found for this output model at 12:00 position.

12SI, 78 amp, at 3:00 (AC-DELCO #321-247, Lester #7278-3)

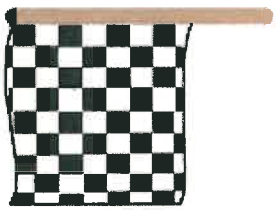
Tell the auto parts counter person that "The alternator is for a 1985 Pontiac Firebird, 5.0L (305H) engine, no air conditioning, H.B.L. only." (H.B.L. = Heated Back Light–meaning rear window defroster)

12SI, 78 amp, at 9:00 (AC-DELCO #321-244, Lester #7278-9)

Tell the auto parts counter person that "The alternator is for a 1985 Oldsmobile Cutlass Supreme, 5.0L (307Y) engine.

12SI, 78 amp, at 12:00 (AC-DELCO #321-249, Lester #7278-12)

No application was found for this output model at 12:00 position.



M.A.D.™

ENTERPRISES

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Schenkenberger, Chris

From: Mark Kasper [mark.kasper@swri.org]
Sent: Friday, February 15, 2008 12:35 PM
To: Schenkenberger, Chris
Cc: NON-LZ KOEHLER BRIAN
Subject: Replacement Alternator for L-60-1 Testing

Hello Chris,

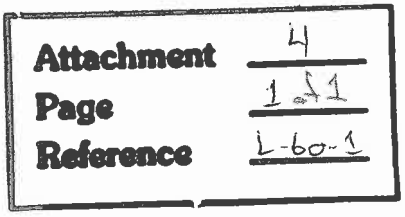
Brain has asked me to forward you the information we have gathered concerning a replacement alternator for the L-60-1 test. We contacted Remy World Wide and were told that Remy NEWGOLD part number 91751 is the exact NEW replacement alternator for Delco-Remy GM part number 1105360.

Remy World Wide would not sell SwRI these alternators and gave us several Remy distributors for Texas. All claimed they could not get this alternator.
We have contacted Remy several more times with no luck. Brian did contact a Remy engineer but we have not heard back from him.

It seem strange that the company shows this part number but cannot give us a supplier. We have been wondering if these are just being sold overseas.

Regard

Mark Kasper
Southwest Research Institute
6220 Culebra Rd. bldg. 209,
San Antonio, Tx, 78238
Office 210-522-2438
Cell 210-473-5779



ASTM Gear Calibration Workshop
Richmond, VA January 15, 16, 17 & 18, 2008

L-60 GEARS Sludge (Large Gear Only)

SET #	7	10	11	25	27	29	30	MAX	MIN	AVG	Std Dev	Max-Min	Max-Min
1C	9.48	9.75	9.65	9.75	9.73	9.73	9.73	9.75	9.48	9.69	0.098	0.27	0.1
2C	9.47	9.75	9.60	9.75	9.74	9.70	9.65	9.75	9.47	9.67	0.103	0.28	0.15
3C	9.47	9.75	9.60	9.75	9.74	9.63	9.65	9.75	9.47	9.66	0.103	0.28	0.15
4C	9.47	9.75	9.60	9.73	9.56	9.59	9.60	9.75	9.47	9.61	0.097	0.28	0.19
5	9.59	9.63	9.55	9.75	9.70	9.72	9.67	9.75	9.55	9.66	0.072	0.20	0.17
6	9.61	9.75	9.65	9.93	9.75	9.73	9.70	9.93	9.61	9.73	0.102	0.32	0.1
7	9.55	9.75	9.50	9.74	9.68	9.59	9.60	9.75	9.50	9.63	0.096	0.25	0.25
8	9.63	9.63	9.55	9.75	9.74	9.71	9.65	9.75	9.55	9.67	0.072	0.20	0.19
9	9.61	9.63	9.65	9.75	9.74	9.70	9.60	9.75	9.60	9.67	0.061	0.15	0.14
10	9.14	9.3	9.5	9.5	9.72	9.50	9.45	9.72	9.14	9.44	0.182	0.58	0.42
R1/5	9.48	9.63	9.65	9.75	9.72	9.60	9.65	9.75	9.48	9.64	0.088	0.27	0.12
R2/8	9.60	9.75	9.60	9.75	9.75	9.71	9.65	9.75	9.60	9.69	0.069	0.15	0.15

anything > .2 can cause sensitivity shift

- sludge looks good from

Attachment	5
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Reference	L-60-1

ASTM Gear Calibration Workshop

Cleveland, OH July 29, 30, 31 & Aug 1, 2008

L-60 GEARS Varnish (Large Gear Only)

SET #	4	6	7	10	11	16	22	25	27	29	30	33	MAX	MIN	AVG	Std Dev
1C			8.70	8.20	8.75			8.15	9.05	8.40	8.85		9.05	8.15	8.59	0.341
2C			8.00	8.60	8.30			8.00	8.90	7.85	8.82		8.90	7.85	8.35	0.425
3C			8.95	8.55	8.90			8.75	9.10	8.60	9.19		9.19	8.55	8.86	0.242
4C			6.08	7.61	6.47			6.93	6.15	6.92	7.60		7.61	6.08	6.82	0.629
5			8.80	9.30	9.05			9.15	8.85	9.00	9.21		9.30	8.80	9.05	0.184
6			8.71	9.00	8.40			8.93	8.65	8.55	8.74		9.00	8.40	8.71	0.208
7			7.35	7.70	7.30			8.28	7.65	7.85	7.58		8.28	7.30	7.67	0.330
8			4.53	5.38	3.60			4.00	4.12	3.96	4.71		5.38	3.60	4.33	0.593
9			7.90	8.65	8.30			8.58	8.15	8.00	8.38		8.65	7.90	8.28	0.282
10			7.60	8.50	7.75			8.58	7.95	8.00	7.85		8.58	7.60	8.03	0.371
RERATE																
R1/9			8.80	8.45	8.15			8.72	8.55	8.35	8.18	8.60	8.80	8.15	8.48	0.238
R2/10			8.85	8.40	7.75			8.68	8.20	8.45	8.10	8.50	8.85	7.75	8.37	0.346

yellow = caution

red = > 1 variability

Action Item: Task Force Lubrizol to meet w/Raters for defining a written method.

Motion: Rate TMC to lead rating exercise on exploring rating method improvements by using through 4 round robin exercise.

- only use high volume oils

Action Item: Chairman to hold conference call w/Raters, 4 gear sets

Attachment 5
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Reference L-60-1