

A blurred image of a large fleet of trucks, likely semi-trucks, moving through a tunnel or a narrow passage. The scene is illuminated with a strong red and orange glow, suggesting a tunnel or a specific lighting environment. The trucks are in motion, creating a sense of speed and activity.

Ultra Premium Long Haul Alternators



Long Haul Alternator Market

For Class 4 through 8

CLASS 4
<16000 lbs.



Conventional Van



Large Walk-in



City Delivery



Landscaping/Utility

CLASS 5
<19500 lbs.



Bucket



Large Walk-in



City Delivery

CLASS 6
<26000 lbs.



School Bus



Stake Body



Rack



Single Axle Van



Beverage

CLASS 7
<33000 lbs.



Medium Conventional



High Profile COE



City Transit Bus



Furniture

CLASS 8
>33000 lbs.



Heavy Conventional



COE Sleeper



Fuel



Dump



Cement



Superior Engineering

Bosch Ultra Premium Long Haul Alternators provide:

- Longer service life
- Longer battery life
- Improved fuel economy



Bosch LH 160...

For the most demanding applications.



The new Bosch LH 160 alternator is a direct drop-in replacement for Delco 21SI and 22SI and similar alternators.

LH 160



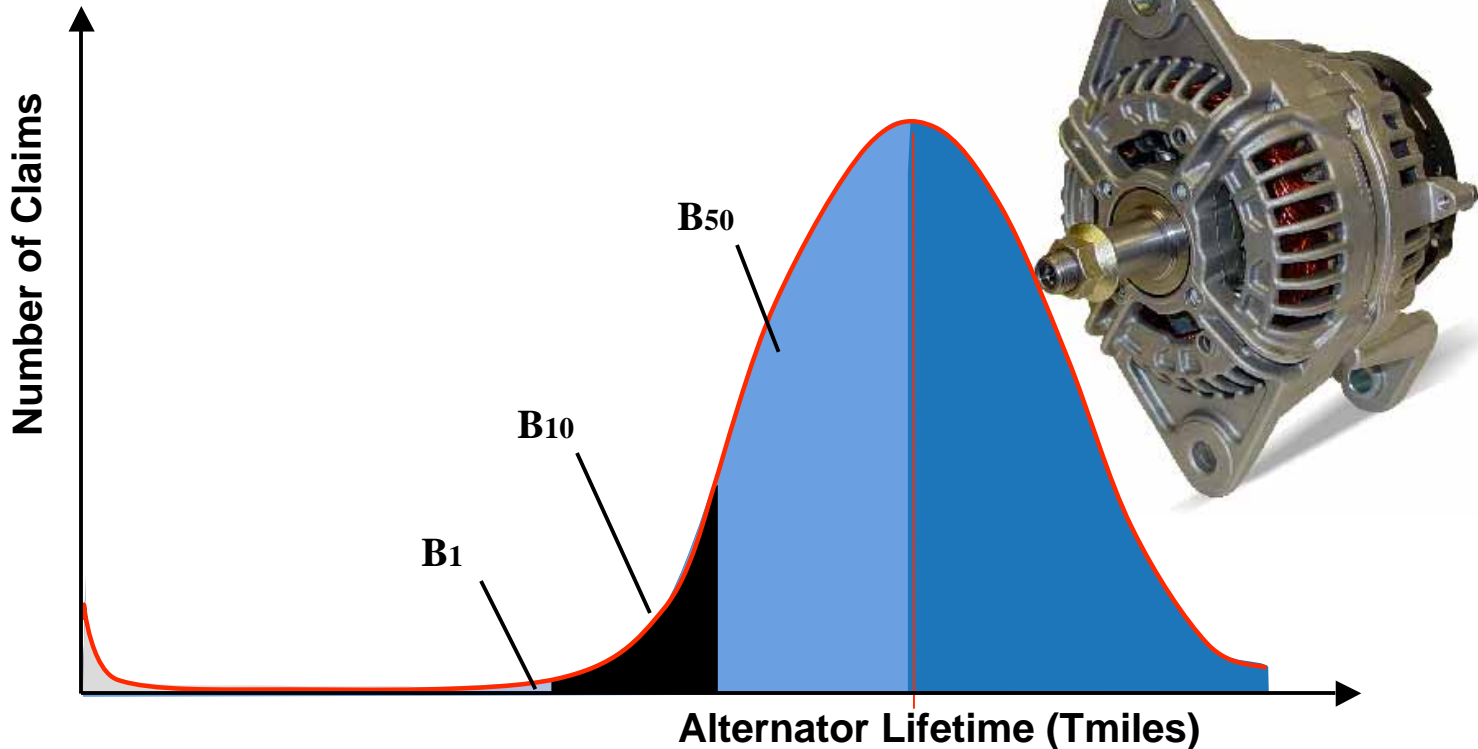
Delco 21SI / 22SI



Long Life

FIELD EXPERIENCE

- Since 2001 over 1,000,000 units have been sold. In 2004 alone 368k units were delivered to OEM customers
- The field quality of this alternator has been excellent. B10 life is >270,000 miles.





Comparison **Bosch** vs. Delco

- Output at speed/25C
- Output at speed/80C
- Output at Idle/25C
- Output at Idle/80C
- Efficiency
- Temperature Resistance
- Fans
- Slip ring diameter/brush wear
- Bearing lifetime
- Warranty



163A	155A
145A	126A
83 A	64A
72 A	55A
71%	60%
105/125C	93C
2 internal	1 external
15mm/60%	25mm/100%
>400k miles	300k miles
24months	18months



FEATURES

- High Efficiency
- Latest Bearing Technologies
- High Temperature Resistance
- World-class manufacturing
- Integrated Load Dump Protection
- Integrated fans
- High output at idle and speed
- Bosch quality



BENEFITS

- Fuel saving up to \$400/100,000 miles
- High reliability
- High reliability
- High reliability/Bosch quality
- Protection for the electrical system
- Increased safety, airflow, reduced noise
- less battery cycling, longer battery life
- 2 Years/250,000 miles warranty



The Bosch AL9960LH represents the next generation of commercial vehicle charging technology, delivering more power and greater efficiency than the Delco 21SI and 22SI units.

	Delco 21 - 22 SI	Bosch AL9960LH
<i>Cooling System</i>	External Fan	Dual internal cooling fans
<i>Output at Idle</i>	64 Amps	84 Amps
<i>At Speed Amps</i>	145 Amps	160 Amps
<i>Efficiency</i>	55%	71%
<i>Warranty</i>	18 mos./225,000 miles	24 mos./250,000 miles

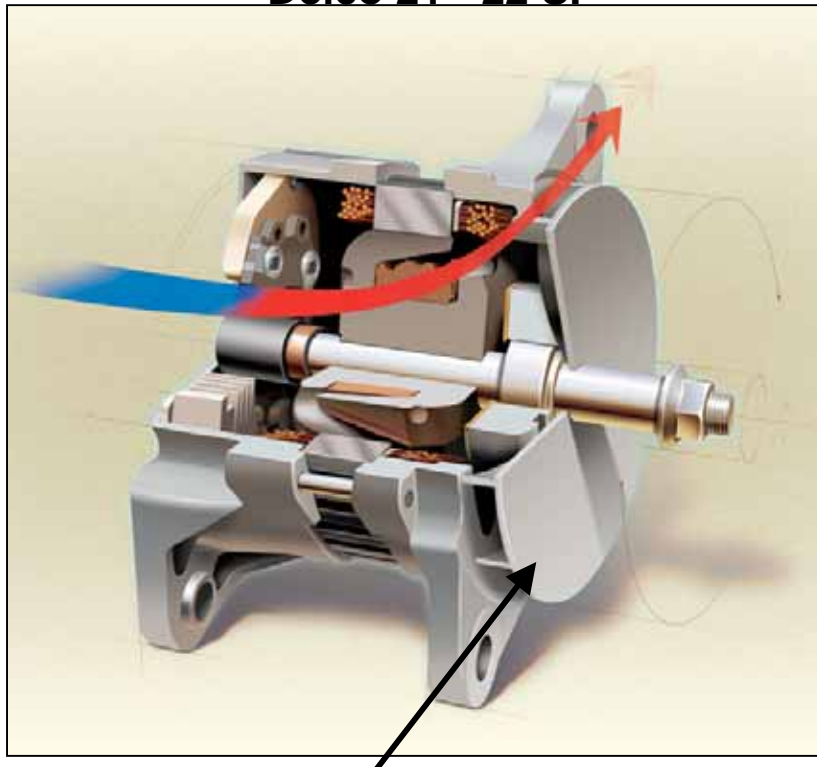


SUPERIOR COOLING

The Delco 21SI and 22SI units have a **single external cooling fan**, which pulls minimal cool air through the unit.

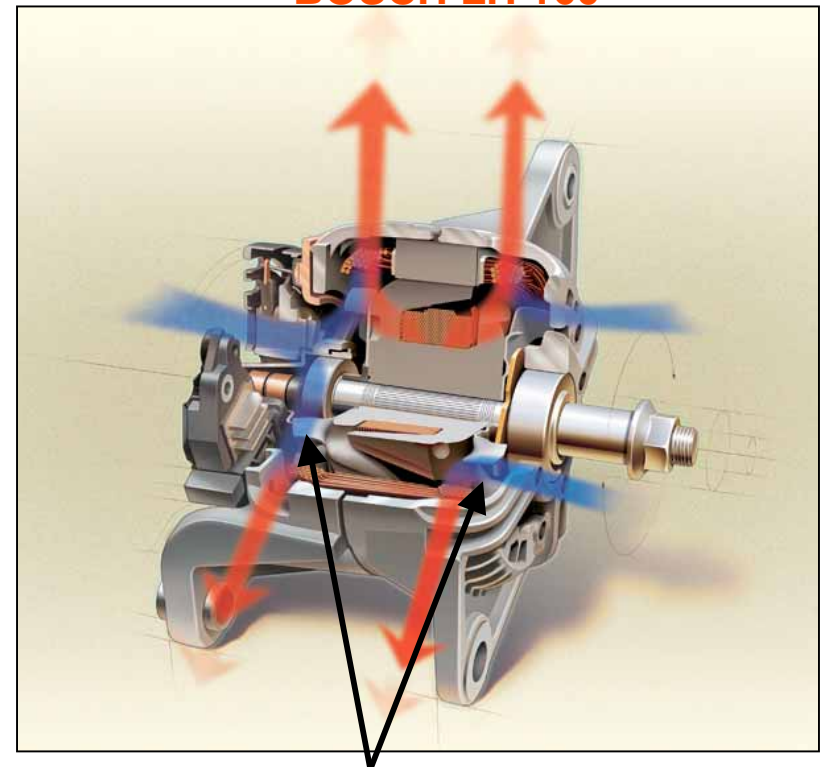
The Bosch AL9960LH has **dual internal cooling fans**. These fans maximize the amount of cooling air being pulled through the unit, driving damaging heat out of the housing.

Delco 21 - 22 SI



Single External Cooling Fan

BOSCH LH 160

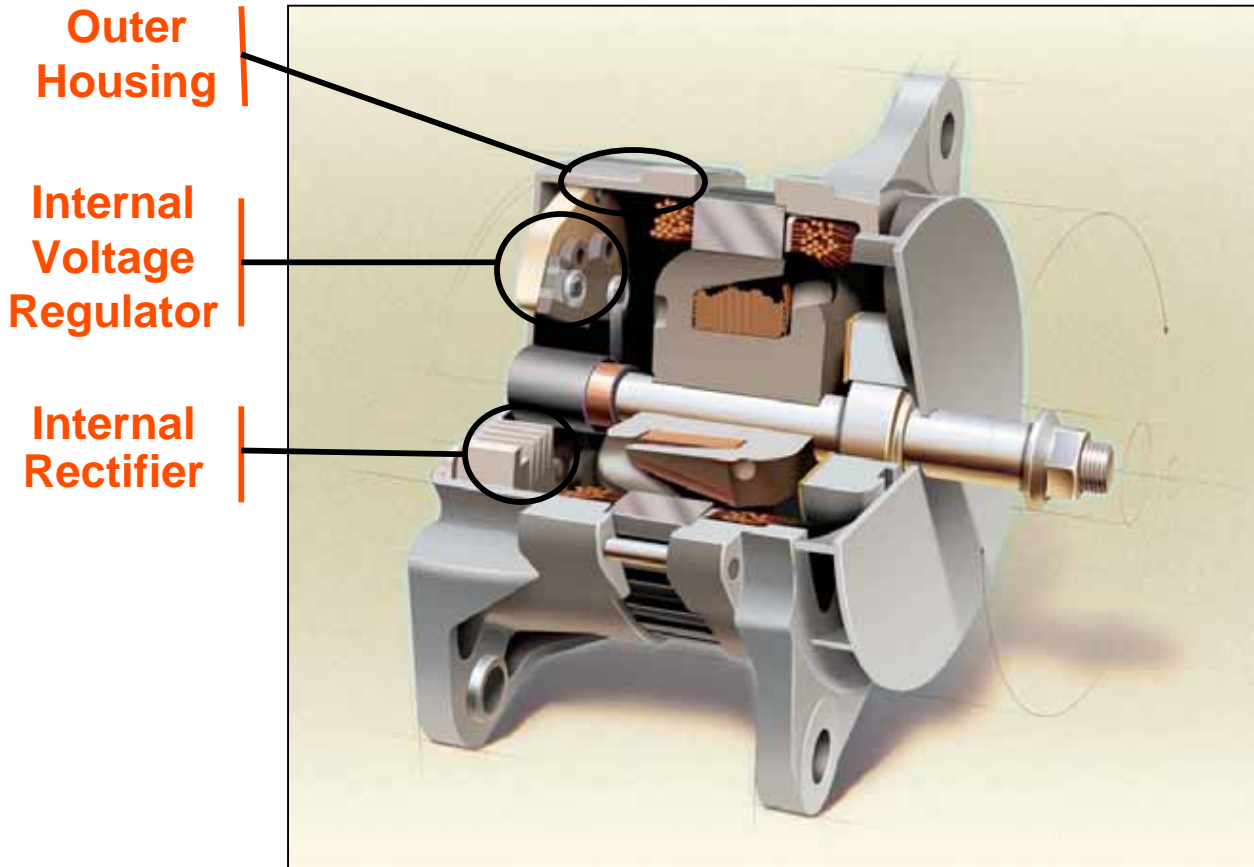


Dual Internal Cooling Fans



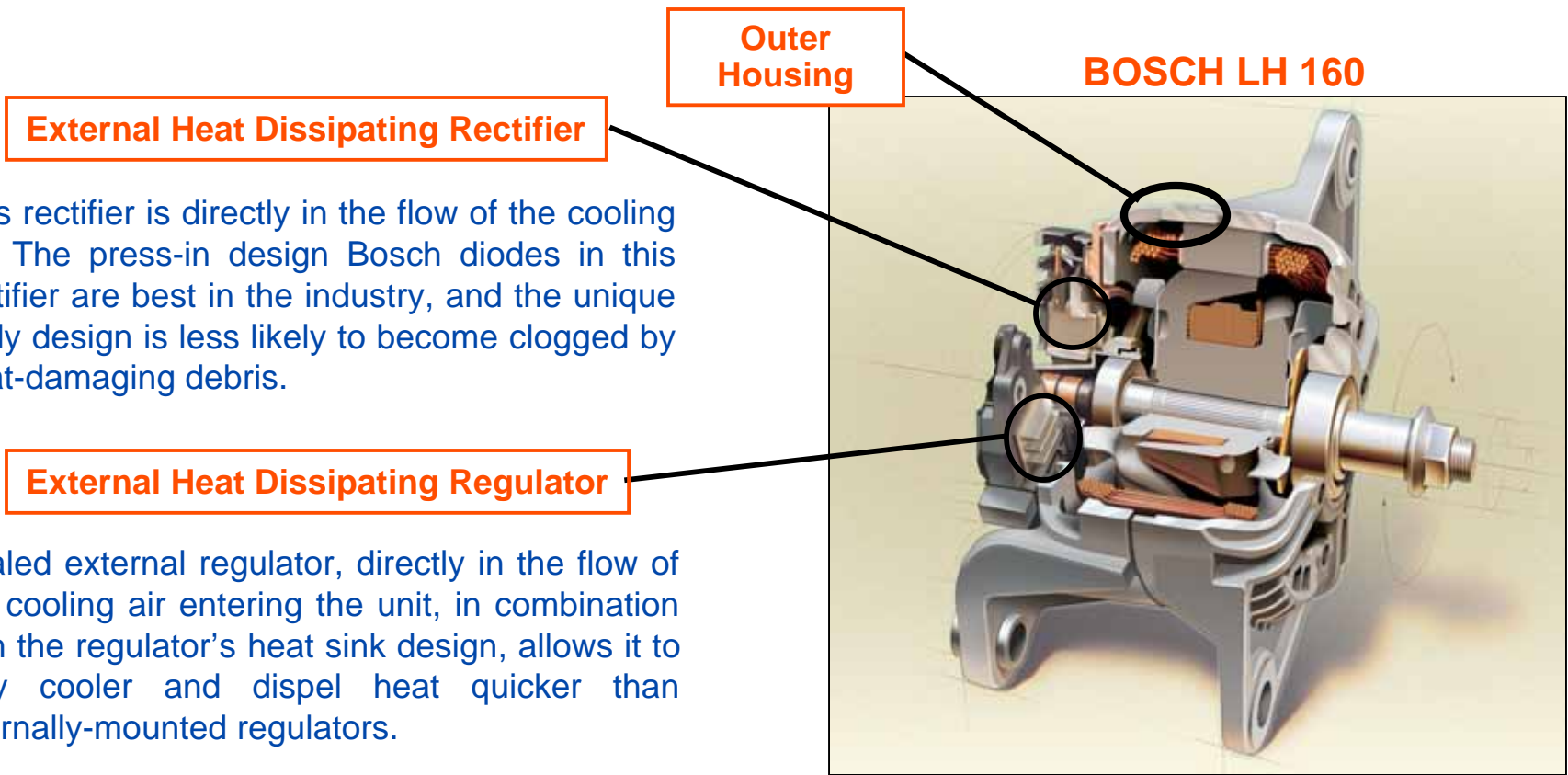
The Delco 21SI and 22SI units have an **internal Voltage Regulator & Rectifier** which results in *minimal cooling ability* and *low efficiency*.

Delco 21 - 22 SI





The Bosch AL9960LH has **external heat dissipating rectifiers and regulators**. The dual internal fans maximize the amount of cooling air being pulled through the unit, driving damaging heat out of these components and the housing.



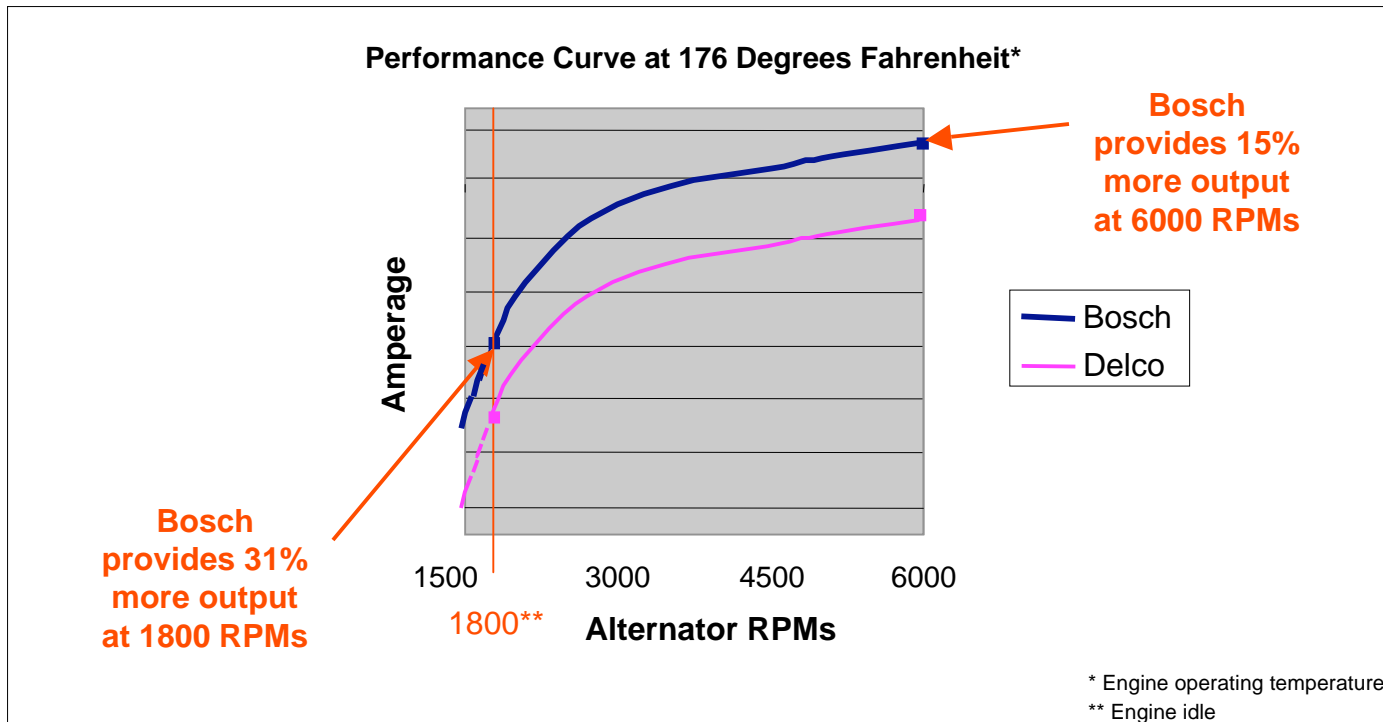
This rectifier is directly in the flow of the cooling air. The press-in design Bosch diodes in this rectifier are best in the industry, and the unique body design is less likely to become clogged by heat-damaging debris.

Sealed external regulator, directly in the flow of the cooling air entering the unit, in combination with the regulator's heat sink design, allows it to stay cooler and dispel heat quicker than internally-mounted regulators.



Due to higher cooling capacity, efficiency and superior engineering technology, the Bosch Long Haul Alternator has the ability to maintain its operating output at high under hood temperatures.

Bosch's high output at engine idle and engine operating temperatures reduces battery deep cycling, resulting in longer battery life.





HIGHER EFFICIENCY

The Bosch AL9960LH represents the next generation of commercial vehicle charging technology, delivering more power and greater efficiency than the Delco 21SI and 22SI units.

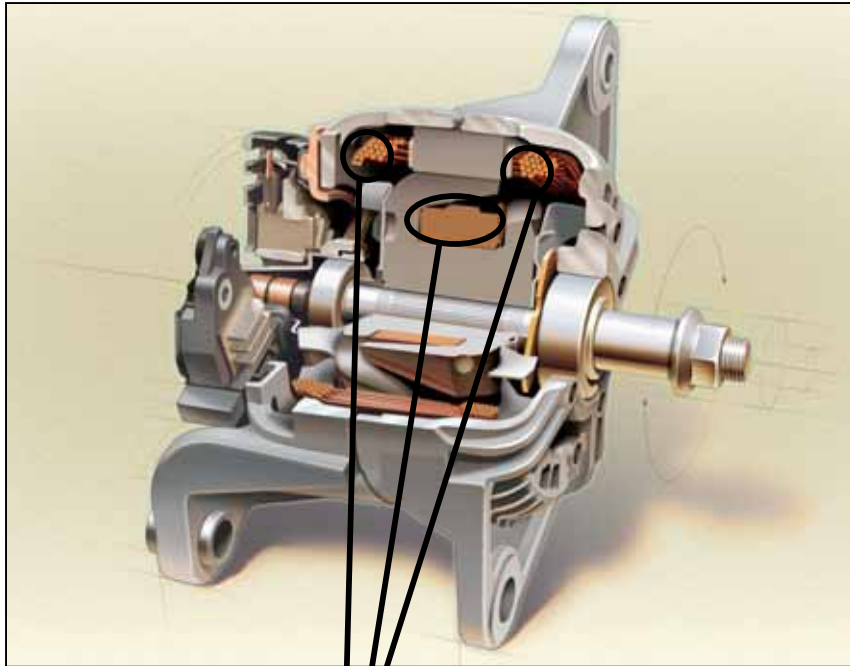
	Delco 21 - 22 SI	Bosch AL9960LH
<i>Cooling System</i>	External Fan	Dual internal cooling fans
<i>Output at Idle</i>	64 Amps	84 Amps
<i>At Speed Amps</i>	145 Amps	160 Amps
<i>Efficiency</i>	55%	71%

Arrows point from the 55% and 71% efficiency values down to the question below.

How did Bosch increase the efficiency of the Alternator?



Patented Process



Patented Bosch High-Efficiency Winding Process

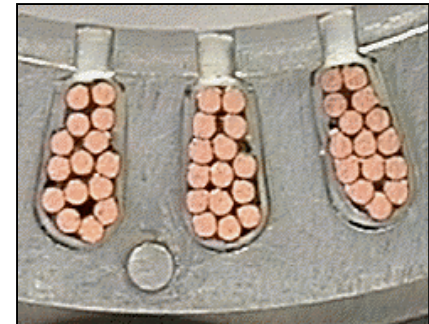
Higher eff through higher copper-fill factors

Standard Alternator



41% Stator fill factor

Patented Bosch Winding



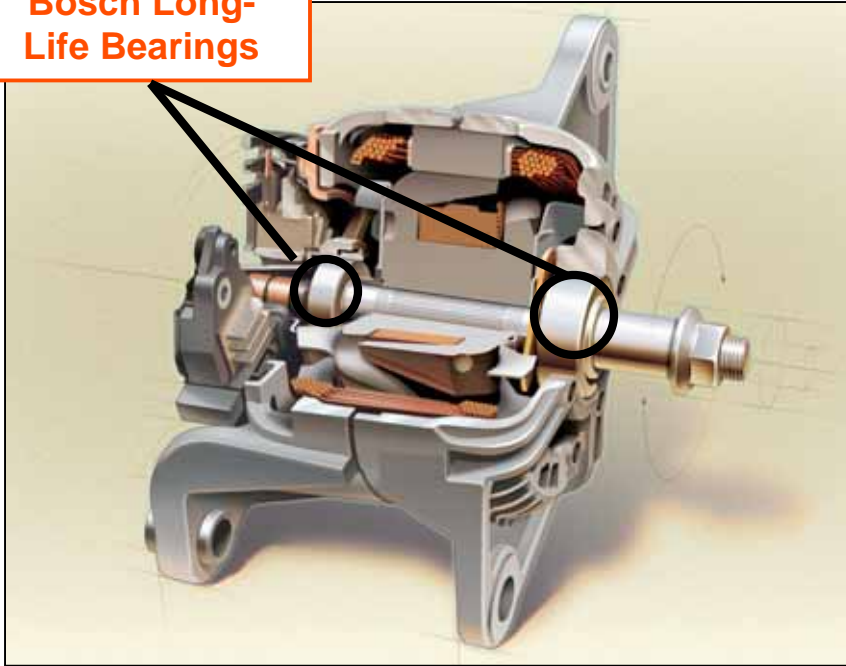
47% Stator fill factor

Uses 30% more copper per available space than conventional OE replacement units for increased efficiency and fuel savings.



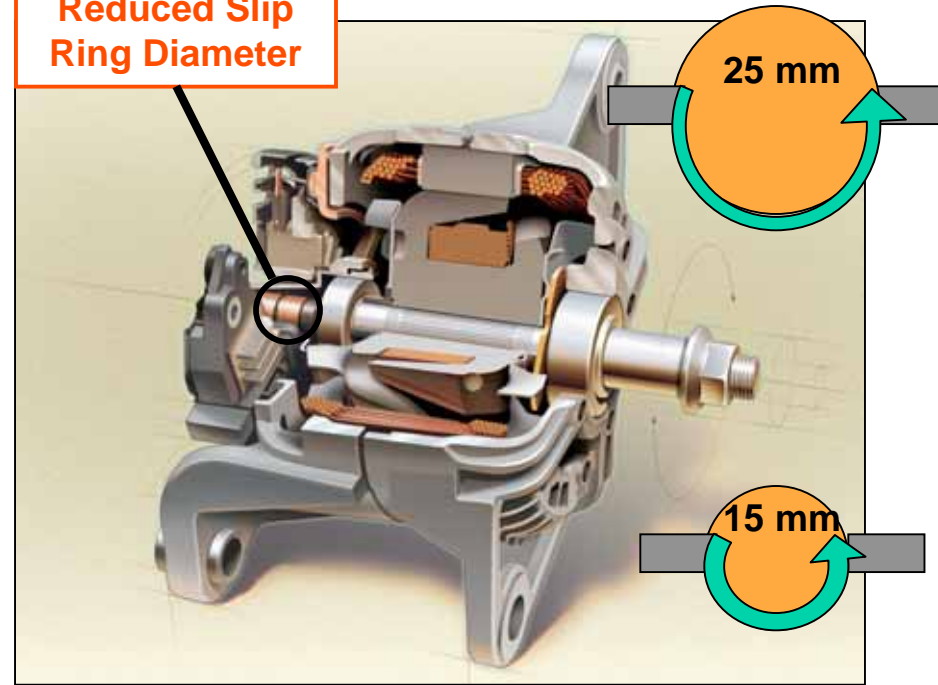
For the Long Haul

**Exclusive
Bosch Long-
Life Bearings**



**special heat-treated bearings
with a heat-resistant lubricant
to withstand heat and wear**

**Reduced Slip
Ring Diameter**



**Diminishes wear on the brushes
by 40% for longer service life
and greater reliability.**



Delco 21SI and 22SI

Bosch AL9960LH

Single External Cooling Fan

Dual Internal Cooling Fans

Closed Housing Design

Open Vent Housing Design

Internal Voltage Regulator

External Heat Dissipating Voltage Regulator

Internal Rectifier

External Heat Dissipating Rectifier

Standard Stator Windings

Patented Process High Efficiency Stator Windings

Conventional Voltage Regulator

Advanced Integrated Circuit Electronics

Standard Design Slip Ring

Reduced Diameter Slip Ring

Standard Output Loss at High Temperature

Reduced Output Loss at High Temperatures



How does the Bosch AL9960LH replace over 200 Delco 21SI / 22SI SKUs?

OE or Conventional Replacement

Bosch AL9960LH

3 different outputs (100-160 amps) —————>

160 amp output rating

1-wire units & 3-wire units —————>

1-wire regulator

One B+terminal per unit (1/4" or 5/16") —————>

Two B+ terminals per unit (1/4" & 5/16")

4 different types of R terminals —————>

Universal Pin/Threaded R terminal

Two sizes of I terminals —————>

Universal I terminal

The AL9960LH is also easy to install because there is *absolutely no cutting or crimping of wires required!*



BOSCH For the Long Haul

BOSCH
STARTING & CHARGING



The Bosch AL9960LH replaces over 220 OE and conventional part numbers.



BOSCH AL9960LH ALTERNATOR 21/22 SI REPLACEMENT GUIDE

OE Part No.	AMPS	OE Part No.	AMPS	OE Part No.	AMPS	OE Part No.	AMPS	OE Part No.	AMPS
1117880	100	1117953	100	10459107	100	19010105	100	19010187	130
1117882	130	1117954	100	10459109	100	19010114	100	19010188	130
1117885	100	1117955	100	10459111	130	19010115	130	19010189	145
1117886	100	1117956	100	10459115	100	19010116	130	19010190	100
1117887	100	1117957	130	10459117	130	19010118	100	19010191	130
1117889	100	1117958	130	10459118	145	19010120	130	19010192	145
1117890	100	1117959	130	10459133	145	19010124	130	19010194	100
1117891	130	1117960	100	10459134	100	19010125	145	19010196	130
1117892	100	1117961	130	10459135	130	19010126	160	19010207	130
1117893	130	1117962	130	10459147	100	19010127	145	19010209	100
1117894	100	1117963	130	10459154	100	19010129	130	19010210	130
1117903	100	1117964	145	10459155	130	19010134	130	19010212	130
1117904	130	1117965	130	10459156	145	19010136	100	19010213	100
1117905	100	1117966	130	10459157	100	19010137	130	19020300	100
1117906	130	10459013	100	10459158	100	19010138	145	19020302	130
1117907	100	10459017	100	10459159	130	19010141	100	19020303	145
1117908	130	10459026	100	10459160	145	19010145	130	19020304	130
1117909	130	10459027	100	10459174	100	19010146	100	19020305	100
1117910	130	10459028	130	10459175	130	19010147	130	19020306	145
1117911	130	10459035	100	10459176	145	19010150	130	19020354	130
1117914	130	10459036	100	10459177	100	19010153	130	19020360	130
1117916	145	10459037	130	10459178	130	19010154	100	19020362	130
1117918	130	10459038	130	10459179	145	19010155	130	19020363	130
1117921	145	10459039	100	10459185	100	19010156	145	19020365	145
1117920	160	10459040	130	10459187	145	19010157	100	19020377	100
1117923	130	10459041	130	10459188	100	19010158	100	19020379	100
1117925	100	10459042	100	10459189	130	19010159	100	19020380	130
1117927	100	10459043	100	10459190	145	19010160	100	19020381	130
1117928	130	10459044	100	10459204	100	19010161	130	110-450	160
1117929	130	10459045	100	10459205	145	19010162	130	110-555HD	140
1117930	100	10459046	100	10459209	100	19010163	130	110-573	150
1117931	100	10459047	130	10459210	130	19010164	100	110-579	110
1117932	130	10459048	130	10459211	145	19010165	130	110-900	135
1117933	145	10459049	130	10459211	145	19010166	130	110-901	145
1117937	100	10459050	145	10459212	130	19010168	145	110-902	160
1117941	130	10459051	145	10459302	100	19010170	130	2500LC	105
1117942	100	10459052	145	10459453	130	19010171	130	2670LC	130
1117943	130	10459053	145	10459482	145	19019172	130	2890LC	160
1117948	130	10459054	145	10459472	130	19019173	130	2895LC	145
1117949	130	10459055	145	10481236	130	19019174	145	2895LC	110
1117951	130	10459105	130	19010103	100	19010181	100		
1117952	145	10459106	145	19010104	130	19010186	100		

ONE UNIT can replace them all!