



Electrical Specification & Selection Guide Sae and Alenao

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2008



Electrical Specification and Selection Guide

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STARTING MOTORS

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STARTING MOTORS

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* TMC recommended maintenance practices and advisories are reprinted with the written permission of The Maintenance Council (TMC) of the American Trucking Association Inc. For a complete Manual please contact:

THE MAINTENANCE COUNCIL
 AMERICAN TRUCKING ASSOCIATION INC.
 950 NORTH GLEBE ROAD, SUITE 210
 ARLINGTON, VA. 22203-4181

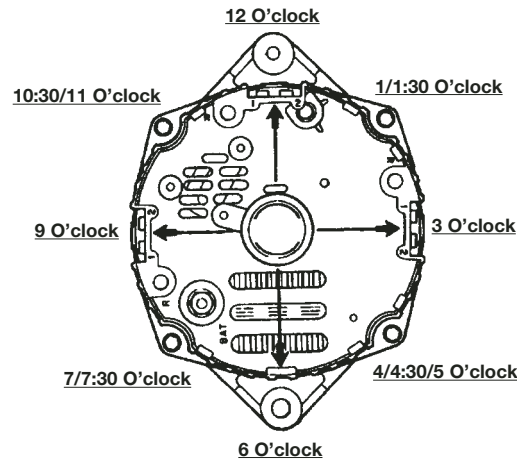
 Phone: (703)-838-1763

www.truckline.com/aboutata/councils/tmc

ALTERNATORS/GENERATORS

SI Series Generators/Generators with Built-in Regulator

The connector position is determined by viewing the alternator from the diode end with the threaded adjusting lug in the up or 12 o'clock position. Select the clock position to match the unit being replaced.



Remanufactured SI Series Alternators/Generators

NOTE: The following is a list of Delco Remy SI Series remanufactured Alternators/Generators, their amp rating, series type, and respective clock positions.

| Part Number | Amp. Rating | Series Type | Clock Position |
|-------------|-------------|-------------|----------------|
| 20039 | 63 | 10SI-100 | 3:00 |
| 20254 | 78 | 12SI-100 | 3:00 |
| 51106 | 72 | 10SI-116 | 3:00 |

When selecting the correct charging system for a specific application, electrical output performance and durability must be considered.

Electrical output must provide adequate current for all normal continuous loads. Twenty-five percent of intermittent loads such as brake lights, turn signals and radio transmitters should be added to continuous load; 50% for school buses, twenty percent of continuous load should be added for battery charging. See "Pulley Selection", to determine pulley ratio and size.

How to determine total vehicle electrical load:

1. With the engine "OFF" and the battery in good state-of-charge (approximately 70 to 100%) connect an accurate ammeter (50 Amperes range or less) in series with the grounded terminal of the battery and the ground cable.
2. Switch "ON and OFF" each individual electrical load separately. The sum of these values is the vehicle's total electrical requirements under the engine "OFF" conditions.
3. Generator output should be 50% more than vehicle load requirement.

Durability selection will be determined by: type of engine, gasoline or diesel; off highway, or marine use.

NOTE: If the vehicle is idling then the maximum output will be less than 1/2 rated output. If load exceeds this then it will drain from the battery.

Possible Parasitic Loads On Heavy-Duty Vehicles

Many tractor-trailer rigs are equipped with several creature-comfort items in the cab area for the benefit of their drivers. These items often require an electrical load beyond the original specifications of the vehicle. If the vehicle spends a large amount of time idling, then the batteries may become drained. The normal generator output at the idle is commonly only 40% of the rated output at 6500 rpm. Also, at night time, the drivers may operate several of their comfort items with the vehicle's engine off which also represents a battery drain. The table below lists several components and their associated ampere loads. It is not all-inclusive. The actual amp load of individual manufacturers' components will vary.

| Components | Average AMP Draw | Components | Average AMP Draw |
|---------------------------|---------------------|----------------------------|---------------------|
| Headlights Low Beam | 7.0 | AM/FM Radio | 1.0 |
| Headlights High Beam | 9.0 | C/B Radio | 4.0 |
| Fog Lights | 12.0 | Color TV | 8.0 |
| Brake Stop Lights | 5.0 | Tape Deck & Aux Speakers | 5.0 |
| Tail Lights | 1.2 | Radio/Telephone | 4.0 |
| Marker Lights | 4.0 | Radar Detection | 1.0 |
| Back-up Lights | 4.0 | Circulating Fan - Low | 2.0 |
| Turn Signals Lights | 4.2 | Circulating Fan - High | 3.5 |
| Hazard Signals Lights | 8.4 | Heater/Defrost Fan - Low | 5.0 |
| Front Clearance Lights | 1.2 | Heater/Defrost Fan - High | 14.0 |
| Identification Lights | 1.8 | Bunk Blower Fan | 8.0 |
| Trailer Load - Lights | 12.6 | Bunk Heater - Low | 16.0 |
| Cab Dome Light | 2.0 | Bunk Heater - High | 22.5 |
| Bunk Dome Lights (2) | 4.0 | Air Conditioner - Low | 9.0 |
| Parking Lights | 0.5 | Air Conditioner - High | 18.0 |
| Instrument Lights | 1.0 | Heated Mirrors | 9.0 |
| Instrument | 1.0 | Remote Control Mirrors | 2.0 |
| Ignition (transistor) | 4.2 | Cigarette Lighter | 6.5 |
| Electric Wipers | 6.1 | Fuel Heater - Cold Weather | 40.0 |
| Heated Wipers | 8.0 | Satellite Scanner/Locator | 12.0 |
| Field Current - Generator | 3.0 | Microwave Oven | 18.0 |
| Electric Fuel Pump | 2.6 | Refrigerator - First On | 30.0 |
| Electric Window | 7.0 | Refrigerator - Normal | 7.0 |

Series/Type vs Application Recommendation

| Application | Car & Light Truck | Medium Truck | Heavy Truck | Farm Equipment | Construction & Industrial | Mining & Dusty Environment | Lift Truck | Commercial Bus | School Bus & Emergency Vehicle | Mining & Explosive Environment |
|---|--|--|--|---|---|---|--|------------------------|--------------------------------|--------------------------------|
| Gas Engine Standard Models | CSI21 CSI21D CSI30 CS130D AD230 AD237 | 27SI/100 | 21SI 27SI/200 | 5SI 7SI 10SI/116* 11SI 15SI/116* | 5SI 7SI 10SI/102 11SI 15SI/116* | CSI21 CSI21D 5SI 7SI 11SI 27SI/202 | CSI30 CSI30D 5SI 10SI/116* 15SI/116* | CSI44 AD244 21SI | 21SI | — |
| Alternate Models: -for extra output | CSI44 AD244 15SI/100 27SI/100 | 15SI/100 | 21SI | 11SI 15SI/116* | 11SI 15SI/116* | 11SI 27SI/202 | 11SI 15SI/116* | CSI44 AD244 21SI | CSI44 AD244 21SI | — |
| -for higher durability | 10SI/100 (shock mt.) | 21SI 27SI/200 | 21SI | 20SI | 20SI | 20SI | 11SI 20SI | 21SI | 21SI | 27SI/202 |
| -for special purposes | CS144 AD244 LR630 | 20SI | 21SI | 10SI/136* | 10SI/136* 11SI | | 10SI/110 11SI | 21SI | 27SI/100 27SI/200 | 10SI/102 |
| Diesel Engine Standard Models | 10SI/100 27SI/100 | 15SI/116 21SI 22SI 26SI 23SI 30SI 27SI/200 | 21SI 22SI 26SI 30SI 33SI 34SI 35SI | 5SI 7SI 10SI/116* 11SI 23SI 26SI 30SI | 10SI/116* 20SI 22SI 23SI 24SI 33SI 34SI 35SI | 26SI | 10SI/116* 11SI 21SI 24SI 27SI/200 | 50DN | 21SI 22SI 24SI 30SI | 30SI |
| Alternate Models: -for extra output | 15SI/100 27SI/100 (high output) | 21SI 22SI | 21SI 22SI 30SI 33SI 34SI | 15SI/116* 21SI | 15SI/116* 21SI 22SI 24SI 33SI 34SI 35SI | 24SI 26SI 30SI 35SI | 15SI/116* 21SI 24SI | 50DN 31SI | 21SI 22SI 24SI 31SI | 30SI |
| -for higher durability | 10SI/116 20SI | 20SI 21SI 30SI | 22SI 30SI 33SI 34SI | 20SI 26SI 30SI 33SI 34SI 35SI | 22SI 24SI 30SI 33SI 34SI 35SI | 26SI 35SI | 20SI 24SI 26SI | 50DN | 21SI 24SI 30SI | 26SI 30SI |
| -for special purposes | 10SI/136 | 20SI | 22SI 26SI 27SI 33SI 34SI | 10SI/136* 26SI 34SI | 21SI 22SI 24SI 30SI 33SI 34SI 35SI | 24SI 26SI 34SI 35SI | 10SI/136* 21SI 24SI | 50DN | 21SI 27SI/200 31SI | 20SI 26SI |

* SERVICE ONLY

CHARGING SYSTEMS

Selecting a Charging System

Series/Type Description • Series - Electrical Performance

| SERIES | TYPE | VOLTS | GRD POL | AMPS @6000 RPM | AMPS APPROX. 1600 RPM |
|--------|------|-------|---------|----------------|-----------------------|
| 17SI | 100 | 12 | NEG | 108,124 | 50, 55 |
| | 100 | 12 | NEG | 63 | 23 |
| | | 12 | NEG | 18 | 7 |
| 10SI | 102 | 24 | NEG | 18 | 0 |
| | 116 | 12 | NEG | 61,72 | 0,23 |
| | 136 | 12 | NEG | 63,72 | 0,23 |
| 12SI | 100 | 24 | NEG | 40 | 0 |
| | | 12 | NEG | 66,78,94 | 30 |
| | | | | | |
| 15SI | 100 | 12 | NEG | 70,85 | 35,40 |
| | 116 | 12 | NEG | 105 | 28 |
| 20SI | 450 | 12 | NEG | 60 | 28 |
| | | 24 | NEG | 35,45 | 6,15 |
| 21SI | 100 | 12 | NEG | 100,130, | 60,44,40 |
| 22SI | | | | | 145 |
| 23SI | | 24 | NEG | 50 | 32 |

| SERIES | TYPE | VOLTS | GRD POL | AMPS @5000 RPM | AMPS APPROX. 1600 RPM |
|---------|------|-------|---------|----------------|-----------------------|
| 26SI | 400 | 12 | NEG | 75, 85 | 46, 48 |
| | | | POS | 75 | 46 |
| | 450 | 12 | NEG | 75 | 46 |
| | | 24 | NEG | 50,75 | 0,24 |
| 30SI | 450 | 12 | NEG | 90,105 | 44,53 |
| | | | POS | 90 | 44 |
| | | 24 | INS | 60 | 25 |
| | | 30/32 | INS | 60 | 0 |
| 30SI/TR | | 12/24 | NEG | 90 | 44 |
| | | | POS | 90,105 | 44,40 |
| 33SI | 450 | 24 | NEG | 100,82 | 0,20 |
| 34SI | 455 | 12 | NEG | 122,137 | 50,38 |
| 35SI | 455 | 12 | NEG | 122,140 | 50,40 |
| 36SI | 455 | 12 | NEG | 160 | 60 |
| 50DN | 500 | 12 | NEG | 320 | 240 |
| | 600 | 24 | NEG | 265,280 | 135,140 |

Note: Output rpm is generator speed, not vehicle's.

Type-Durability

| TYPE | SHAFT DIA | SPECIAL DESIGN FEATURES | WIRE SYSTEM | MOUNTING | R TERM |
|-------|-----------|---|----------------------------|----------|--------|
| 100 | 5/8 | Standard Light Duty | 3 | Spool | Kit |
| **102 | 5/8 | Totally Enclosed | 1 & 3 | Spool | Yes |
| **110 | 5/8 | Flame Resistant | 1 | Spool | No |
| 116 | 5/8 | Swivel Brush Holders | 1 & 3 | Spool | Yes |
| 136 | 7/8 | Swivel Brush Holders | 3 | Spool | Yes |
| 150 | 7/8 | Standard Medium Duty | 1 & Phase or Inverter Taps | *Lug | Yes |
| 200 | 7/8 | Standard Medium Duty | 1 | *Lug | Yes |
| 202 | 7/8 | Totally Enclosed | 1 | *Lug | Yes |
| 205 | 7/8 | Extended Shaft for Vacuum Pump | 1 | *Lug | Yes |
| 300 | 7/8 | 29SI Air Cooled | 1 | *Lug | Yes |
| 350 | 7/8 | 21SI Load Dump Protected | 1 & 3 | *Lug | Yes |
| 355 | 7/8 | 21SI 40-Volt Voltage Clamp | 1 & 3 | *Lug | Yes |
| 400 | 7/8 | Heavy-Duty — Brushless | 1 | *Lug | Yes |
| 450 | 7/8 | 400 Features Plus Load Dump Electronics | 1 | *Lug | Yes |
| 500 | — | 50DN/Belt Drive | — | Pad | — |
| 600 | — | 50DN/Gear Drive | — | Flange | — |

*SAE J180 Mounting

** Reference only — "No longer available for OEM usage."

Note: Currently no active generators are J1171 certified; however, many of the brushless designs are used on marine applications.

Generators with R-terminals

Some generators have an R-(relay) terminal. Voltage at the R-terminal is a pulsating D.C. and is usually one-half system voltage as read by a voltmeter. Pulse frequency varies with rpm and series of generator.

Devices for sensing engine (generator) rpm such as tachometer may be connected to the R-terminal.

The following are the maximum amperage loads that can be connected to the R-terminal:

SI & DN 4.0 Amps

50DN 50.0 Amps

Determining Generator Output Frequency vs. Engine rpm

1. Determine generator - engine pulley ratio:

$$\frac{\text{engine pulley dia}}{\text{generator pulley dia}} = \text{ratio}$$

"The ratio of the size between the two pulleys is also the ratio for the difference in their respective speeds."

Example: $\frac{9"}{3 \frac{5}{8}" (3.62)} = 2.51$ (generator rpm is 2 1/2 times faster than the engine)

2. Determine generator R terminal frequency vs engine rpm:

$$\frac{\text{engine rpm x ratio}}{\text{GF (generator factor)}} = \text{R terminal Hz}$$

GENERATOR FACTORS

12 Poles

15SI
17SI, 21SI
40SI, 50DN } GF = 10

14 Poles

10SI
12SI
20SI } GF = 8.57

16 Poles

26SI, 27SI
29SI, 30SI } GF = 7.5

Example for 26SI:

$$\frac{600 \text{ rpm} \times 2.5}{7.5} = 200 \text{ Hz}$$

Therefore, R Terminal frequency is 200 hz @ 600 engine rpm.

Generator factor (GF) is a function of the number rotor poles.

Generators with I-Terminal: Do not connect devices requiring more than 1.0 Amps to the I-Terminal.

5SI and 7SI Off-Highway Alternators

Suitable for gas and diesel engines.

**Conforms to SAE J1171
(external ignition protection).**

**High temperature capability
(up to 105°C).**

**Debris and contamination resistant
design (passes SAE J180 dust test).**

Performance in a Small Package

These compact alternators are designed for rugged industrial, agricultural, marine, and construction applications. The 5SI and 7SI have passed stringent environmental tests, and offer many optional features available for various applications, such as mounting style, pulleys, and terminal configurations. Suitable for gas and diesel applications, the 5SI and 7SI are ideal for compact engine compartments.

MxC Technology

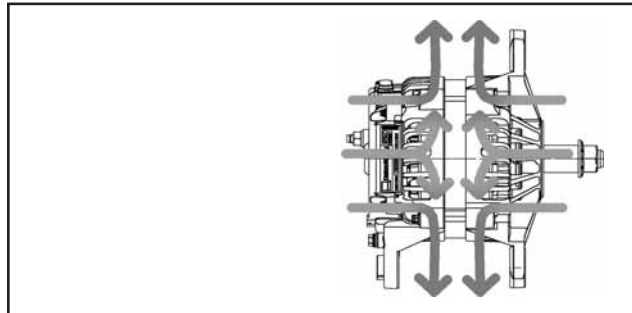
Increases in under-hood temperatures can cause premature wear of components within the alternator, potentially shortening service life and reducing amperage output. Maximum Cooling Technology (MxC) provides the answer to this dilemma. MxC's heat-reducing design begins with a fully vented case, allowing the maximum amount of exposure to environmental air. Dual internal cooling fans draw air in on both sides of the alternator, where traditional external fan units draw air across the alternator along one pathway. This convective cooling process helps the alternator run cooler, which improves operating efficiency and output capability. Together these features are designed to provide the maximum temperature reduction to keep your charging system at optimum output and efficiency. Maximum Cooling Technology... Cool, even under the most severe conditions.



5SI

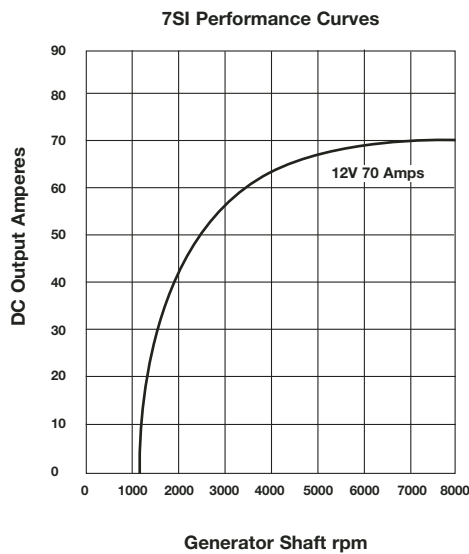
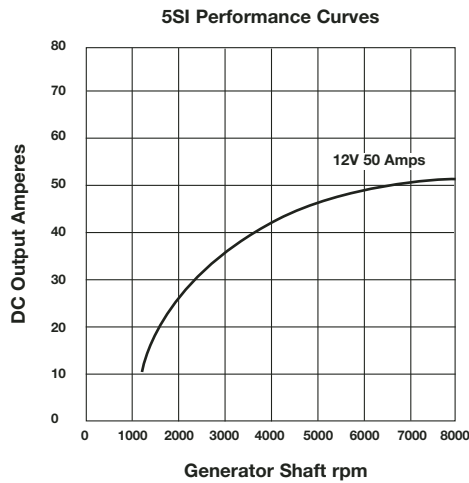


7SI



Draws air from drive end and terminal end over electronics and internal components and out frame air vents for cooler internal alternator temperature. These design enhancements also make MxC alternators exceptionally resistant to debris and contamination.

5SI and 7SI Off-Highway Alternators



Specifications

Performance Output: 5000 rpm

5SI: 50 Amps – 12 Volt

7SI: 70 Amps – 12 Volt

Construction:

Dual Internal Fan

Rotation:

Clockwise

Inlet Temperature Limits:

105°C

Polarity:

Negative Ground

Stator Diameter:

5SI: 105.0 mm

7SI: 115.0 mm

Length:

5SI: 158.2 mm / 6.23 in

7SI: 115.0 mm / 6.89 in

Weight:

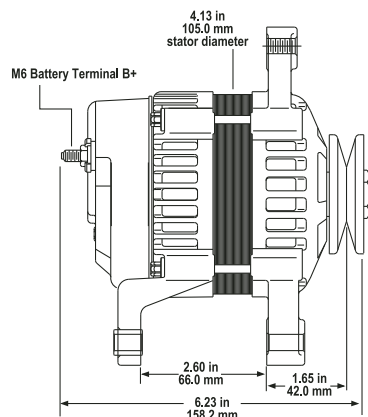
5SI: 3.3 kg / 7.27 lbs

7SI: 4.0 kg / 8.8 lbs

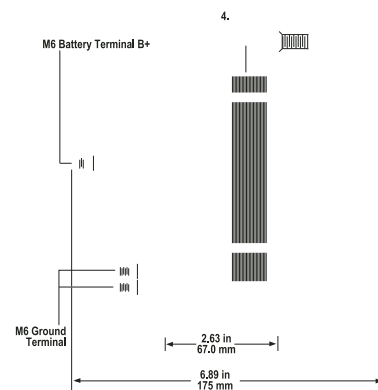
DE Bearing Size:

40 mm

Dimensions



5SI



7SI

10SI Alternator

Flow-thru drive-end frame prevents dust clogging

Optional chaff shield available

Special dust-sealed 17 mm bearing with grease reservoirs

No periodic lubrication or service

Swivel brush holders for longer brush life

Built in integrated-circuit regulator

Self turn-on and shut-down with engine operation on one wire systems

Special R-terminal provided for electric tachometers, tach hour meter, etc.

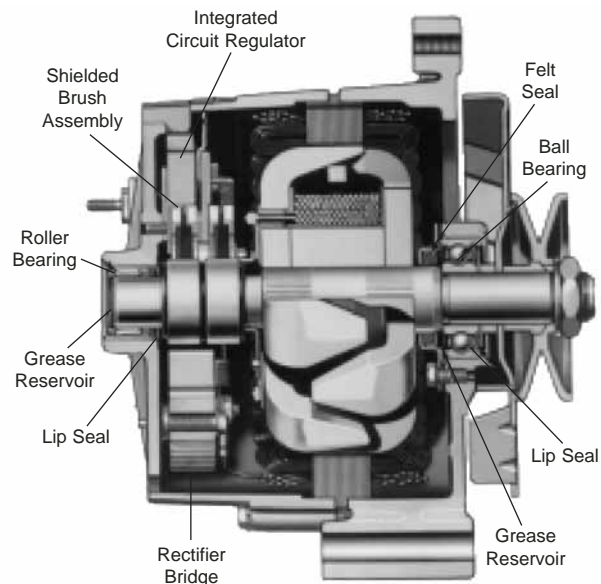


Recommended for Farm and Industrial Applications

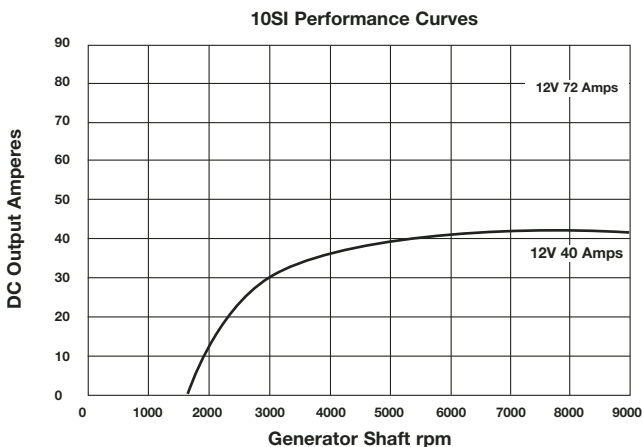
The 10SI Series/Type 116 is a complete power generating system designed for normal electrical and belt loads and tough environmental requirements of farm and industrial equipment.

A special R-terminal is provided for use with electric tachometers, tach hour meters and other devices. An optional chaff shield is available to protect the generator from loose debris. A special swivel brush holder provides longer brush life even in dusty environments.

The 17 mm drive-end ball bearing and the 17 mm roller bearing at the opposite end have grease reservoirs with dust-protecting lip seals.



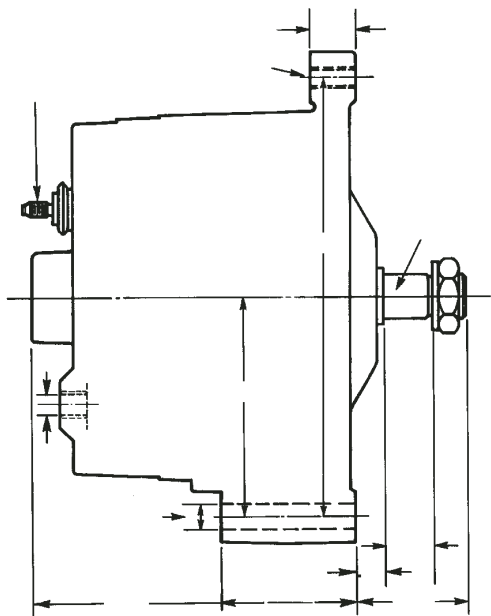
10SI Alternator



| 10SI SERIES D.C. AMPERES OUTPUT | | | |
|------------------------------------|---------|--------------|-------------------------------------|
| REMAN | VOLTAGE | RATED OUTPUT | GENERATOR OUTPUT AT APPROX 1600 RPM |
| 20039 | 12V | 63 Amps | 23 Amps |
| 51106 | 12V | 72 Amps | 0 Amps |
| 53150 | 24V | 40 Amps | 0 Amps |
| Weight: 10.5 lbs | | | |

3-wire system — w/o fan and pulley

Wiring Information



11SI Off-Highway Alternator

Debris-resistant design extends service life in harsh environments.

47mm Heavy Duty DE bearing built to handle higher belt loads.

Environmentally sealed voltage regulator with optional remote sense capability.

Pigtail adapter to retro-fit to standard connection terminals available.

Available in 12V and 24V configurations.

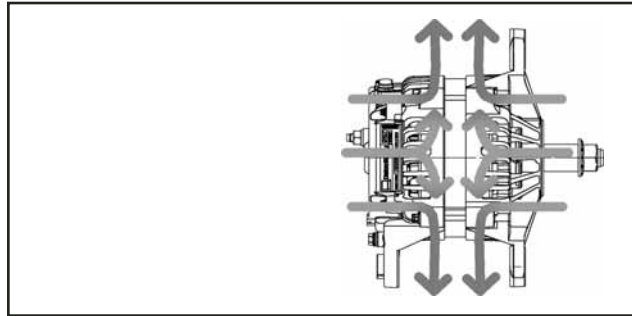


High Output in a Compact Frame

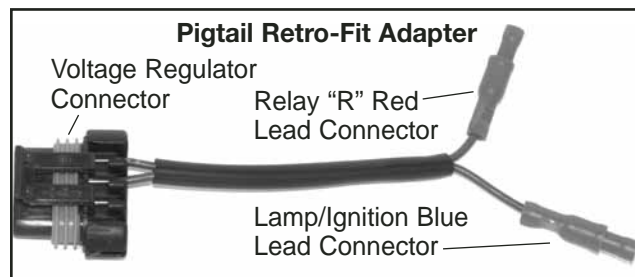
As the Off-Highway heavy duty industry moves toward higher-efficiency, smaller displacement diesel engines, the need has arisen for a small frame alternator to fit within these new space restraints. The addition of lights and electronics to these applications has also significantly increased the amperage demand requirements on the alternators and batteries of these vehicles and implements. Continuing in an effort to supply electrical system solutions, Delco Remy Heavy Duty Systems proudly introduces the 11SI alternator, featuring Maximum Cooling Technology (MxC). In a compact 121mm diameter design, the 11SI delivers powerful current to get the job done. When space is at a premium, a premium product is required.

MxC Technology

Increases in under-hood temperatures can cause premature wear of components within the alternator, potentially shortening service life and reducing amperage output. Maximum Cooling Technology (MxC) provides the answer to this dilemma. MxC's heat-reducing design begins with a fully vented case, allowing the maximum amount of exposure to environmental air. Dual internal cooling fans draw air in on both sides of the alternator, where traditional external fan units draw air across the alternator along one pathway. This convective cooling process helps the alternator run cooler, which improves operating efficiency and output capability. Together these features are designed to provide the maximum temperature reduction to keep your charging system at optimum output and efficiency. Maximum Cooling Technology... Cool, even under the most severe conditions.

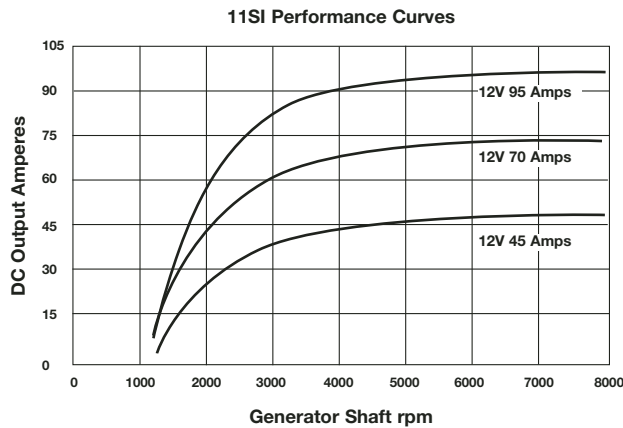


Draws air from drive end and terminal end over electronics and internal components and out frame air vents for cooler internal alternator temperature. These design enhancements also make MxC alternators exceptionally resistant to debris and contamination.

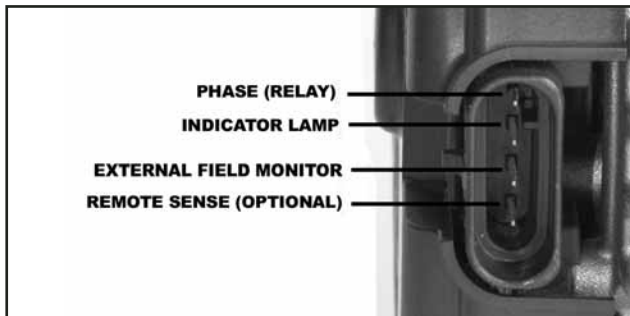
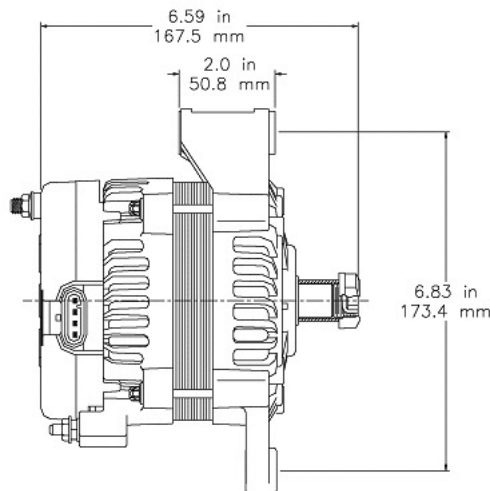


Delco Remy has designed a pigtail adapter to retro-fit the 11SI to standard connector terminals. Contained in every aftermarket package is the pigtail connector, accompanied by full instructions to ensure that replacing your older, existing alternator with the Delco Remy 11SI goes smoothly.

11SI Off-Highway Alternator



Dimensions



The Delco Remy 11SI features an environmentally sealed, plug-in connector for the Indicator Lamp, External Field Monitor, Phase (Relay), and optional Remote Sense terminals.

| 11SI | | | |
|-------------|----------|-------|------|
| ENGINE | PART # | VOLTS | AMPS |
| Non-Cummins | 19020207 | 12 | 70 |
| Cummins | 8600030 | 12 | 95 |
| Non-Cummins | 19020208 | 12 | 95 |
| Non-Cummins | 19020209 | 24 | 45 |

Specifications

Performance Output: 1800\600 rpm

44/95 Amps – 12 Volt

25/45 Amps – 24 Volt

Rotation:

Clockwise

Inlet Temperature Limits:

Low: -30°C / -22°F

High: 105°C / 221°F

Polarity:

Negative Ground

Stator Diameter:

121 mm

Length:

169 mm

Weight:

4.5 kg / 9.9 lbs

DE Bearing Size:

407 mm

Speed Capability:

Continuous: 18,000 rpm

Intermittent: 21,000 rpm

Efficiency: (% - Peak)

58% – 12 Volt

59% – 24 Volt

12SI Type 100 Alternator

Built-in solid-state integrated circuit regulator

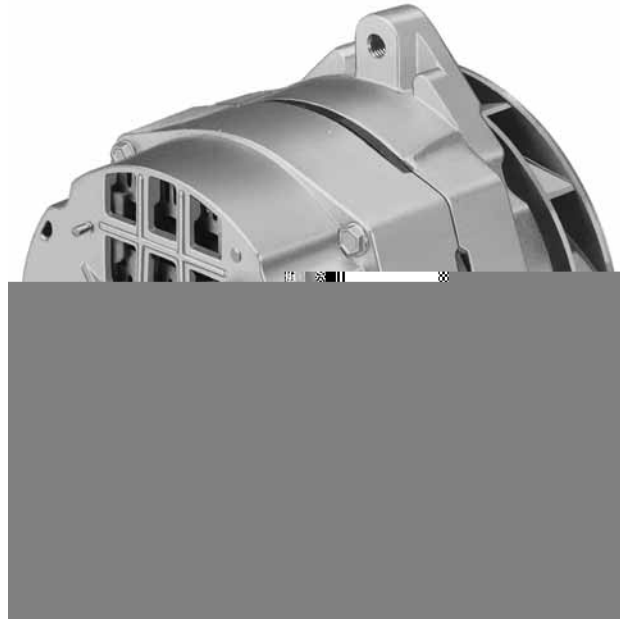
Simplified wiring

17 mm drive-end ball bearing and 17 mm opposite-end roller bearing with grease reservoirs

No periodic lubrication or service

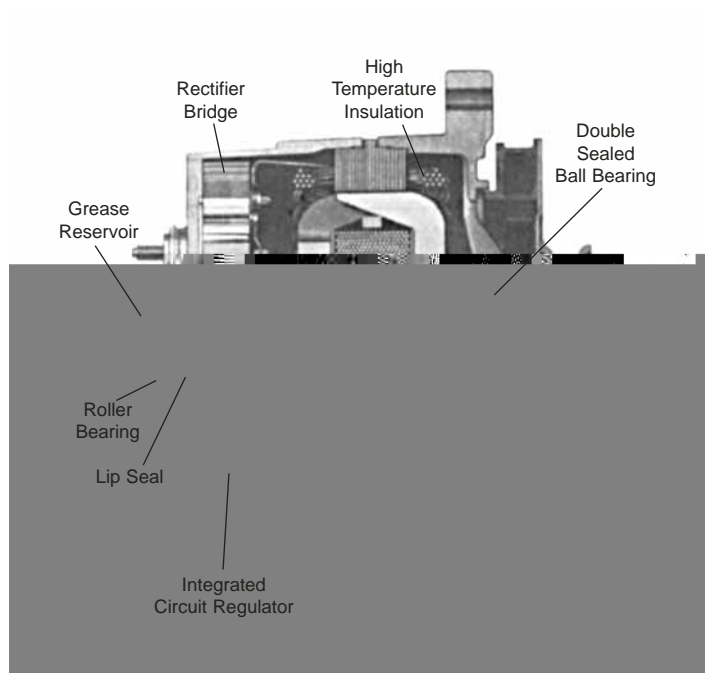
***Easy installation**

Optional R-terminals for electric tachometers, and hour meter available in kit form



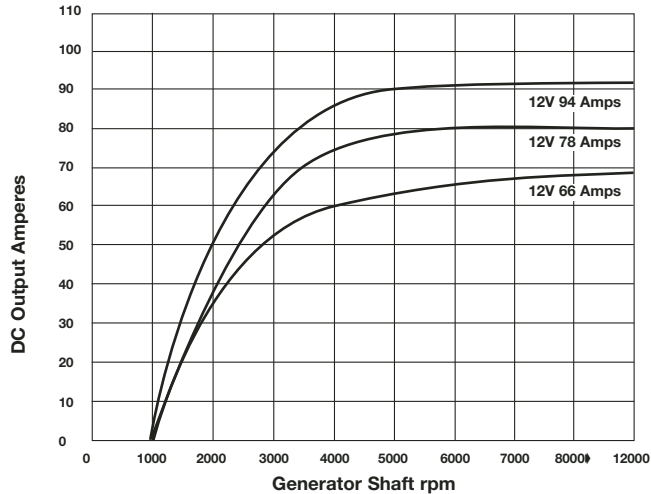
Recommended for Passenger Cars and Light Trucks with Gasoline or Small Diesel Engines

The 12SI Series/Type 100 is designed for normal belt and electrical loads for passenger car and light truck applications equipped with gasoline or small diesel engines. Recommended whenever higher output is required. Optional R-terminal is available for use on models with electric tachometers, tach hour meters and other devices.



12SI Type 100 Alternator

12SI Type 100 Performance Curves



10SI SERIES/TYPE 136
D.C. AMPERES OUTPUT

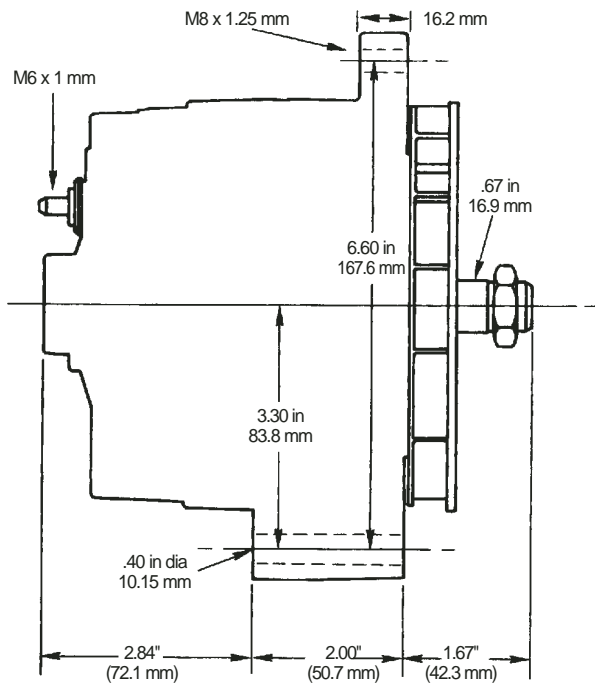
| NEW REMAN | VOLTAGE | RATED OUTPUT | GENERATOR OUTPUT AT APPROX 1600 RPM |
|------------------|---------|-----------------|--|
| 20254* | 12V | 66 Amps | 23 Amps |
| 20220** | 12V | 78 Amps | 23 Amps |
| Weight: 11.2 lbs | | | |

3-wire system — w/o fan and pulley

* Metric

** Metric w/R-terminal

Dimensions



See Generator Installation Hardware pages.

19SI Brush Alternator

High Output Performance

Load Dump Protection

Spool Mounting

Recommended for Medium-Duty Farm, Construction, and Industrial Applications

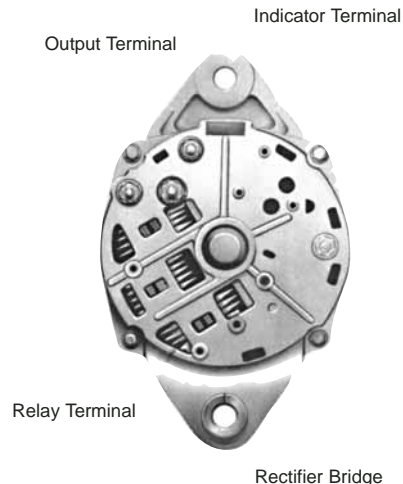
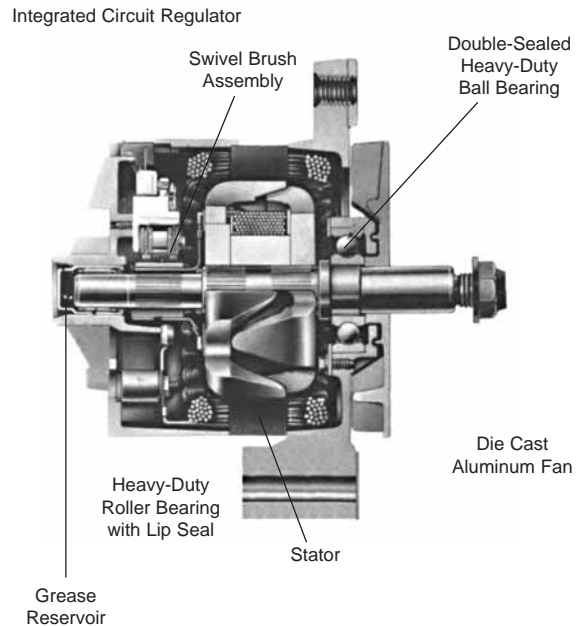
Performance and reliability is what you get with the 19SI brush alternator from Delco Remy. It's the smart choice for medium-duty farm, construction, and industrial applications.

The 19SI features a swivel brush holder design to minimize side wear, bounce, hang-up and brush erosion. The permanently sealed bearings and spool mounting are designed to handle standard belt loads and engine vibration.

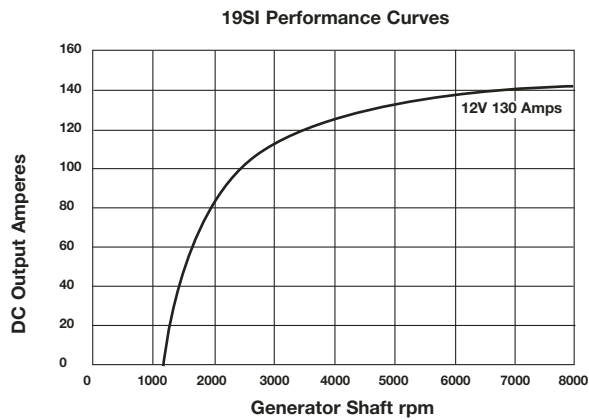
A specially designed bridge provides protection for other electronic devices on the vehicle by effectively clamping voltage surges to 40 Volts. The 19SI features indicator light I- and R-terminals conveniently located on the rectifier frame.

The 19SI offers high output in a small rugged package with integrated circuit regulator, low parasitic draw provides excellent radio frequency interference (RFI) suppression. Standard load dump protection guards against voltage spikes caused by loose connections or charging line interruptions.

NOTE: See generator instruction hardware pages.



19SI Brush Alternator



Specifications

Performance Output:

105 Amps – 12 Volt

130 Amps – 12 Volt

Maximum Speed:

10,000 rpm Continuous

12,000 rpm Intermittent

Rotation:

Clockwise or Counterclockwise

Temperature Limits:

-30° F or -34° C Ambient

+200° F or +93° C Ambient

Polarity:

Negative Ground

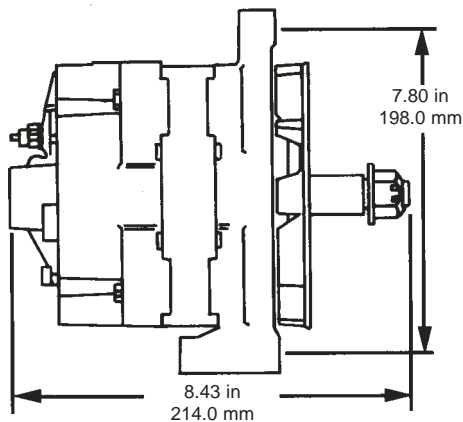
Mounting:

Spool

Weight:

15.4 lbs or 7.00 kg

Dimensions



20SI Brushless Alternator

One-wire charging system

Integrated-circuit regulator

Load dump protection

Recommended for Mid-Range Diesel, Farm, Industrial and Off-Road Applications, Heavy Belt Loads and Vibrations, Moderate Electrical Loads

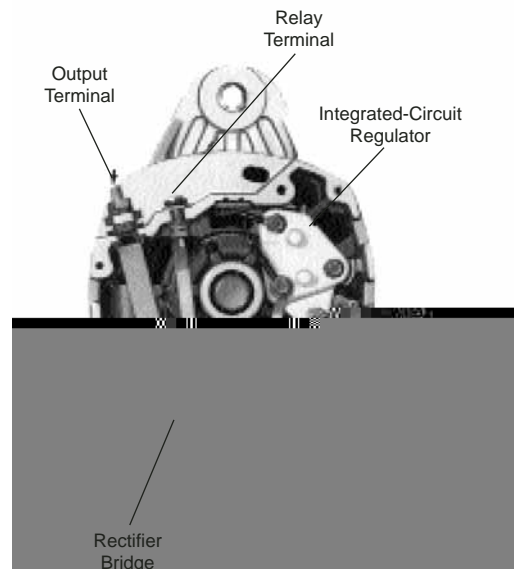
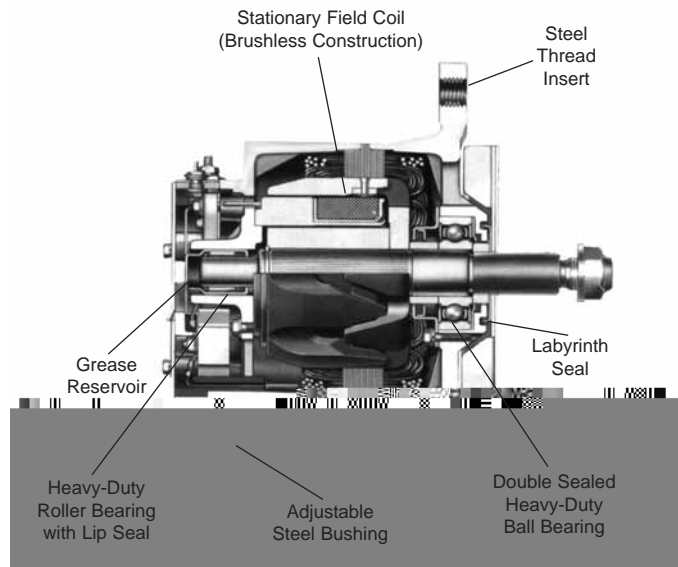
Delco Remy's 20SI, 60 Amp generator combines brushless construction and state-of-the-art electronics in a small high-efficiency package.

The 20SI's brushless construction substantially increases service life. The absence of moving electrical connections eliminates sparks from the brush/slip ring contact, providing safety for those applications that require stringent spark control.

A built-in, integrated-circuit regulator, designed for low parasitic draw, provides excellent radio frequency interference (RFI) suppression and low turn-on speed. Standard load dump protection guards the generator against voltage spikes caused by loose connections or interruptions in the charging line.

The 20SI's 25 mm drive-end ball bearing and rectifier-end roller bearing have ample supplies of high temperature grease that are sealed and designed to withstand the vibrations of diesel engines which allow for prolonged generator life.

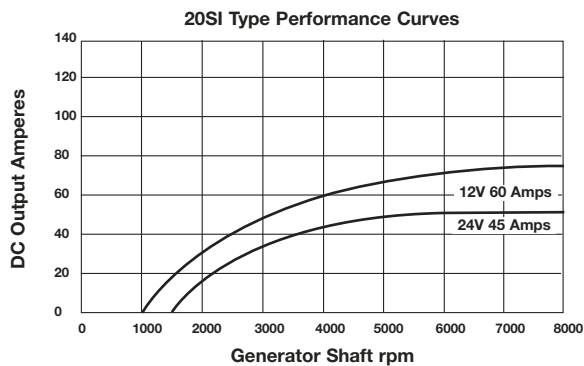
A one-wire charging system prevents wiring errors that can occur from multiple connections, making generator replacement simple. Standard SAE mounting makes the 20SI interchangeable with most competitive units and other Delco Remy generators.



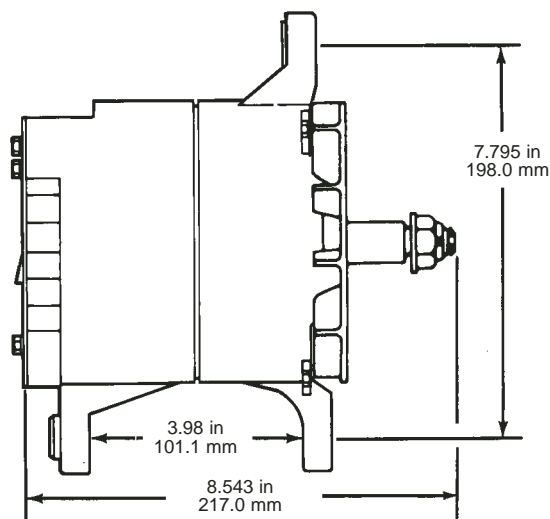
20SI Brushless Alternator

| 20SI HEAVY-DUTY BRUSHLESS GENERATOR D.C. AMPERES OUTPUT | | | | |
|--|----------|---------|--------------|-------------------------------------|
| NEW SERVICE | REMAN | VOLTAGE | RATED OUTPUT | GENERATOR OUTPUT AT APPROX 1600 RPM |
| 1117641 | 10459020 | 12V | 60 Amps | 30 Amps |
| 1117642 | 10459319 | 24V | 45 Amps | 0 Amps |
| Weight: 17.5 lbs | | | | |

*1 wire system — w/R-terminal and fan



Dimensions



Specifications

Maximum Speed:

8,000 rpm Continuous
10,000 rpm Intermittent

Ambient Temperature Limits:

-40°C to +95°C
(-40°F to +200°F)

Transient Voltage Limits:

100 V-300ms (12 Volt)
250 V-300ms (24 Volt)

Polarity:

Negative Ground

Rotation:

Clockwise or Counterclockwise

Weight:

17.5 lbs (8 kg)

Mounting:

SAE J180 Standard

Built-In Voltage Regulator:

Integrated-Circuit Regulator
Flat Temperature-Compensated
Low Parasitic Draw
Low Turn-On speed
Improved RFI Suppression
Load Dump Protection

Brushless Construction:

Stationary Field Coil
No Brushes or Slip Rings

One-Wire Charging System:

Prevents Wiring Errors and Damage

Medium-Output Models

60 Amps, 12 Volt
45 Amps, 24 Volt

21SI Brush Alternator

High output

Load dump protection

RFI suppression

Optional “R”-and/or “I” terminals

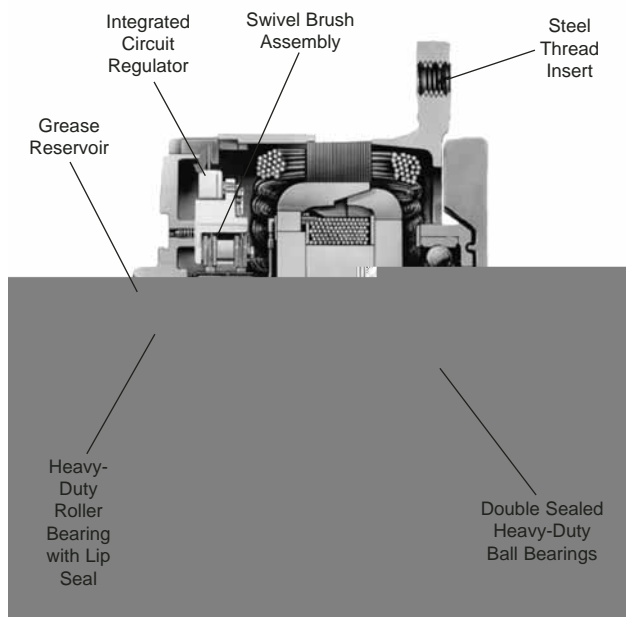
Recommended for Large and Mid-Range On-Highway Diesel and Gasoline Engines, Off-Road, Farm, Construction High Electrical Loads

Performance and reliability in a small rugged package, that's Delco Remy's 21SI brush generator.

The 21SI offers high output (to 145 Amps), a built-in integrated circuit regulator designed for low parasitic draw, and it provides excellent radio frequency interference (RFI) suppression. Standard load dump protection guards against voltage spikes caused by loose connections or interruptions in the charging line. An I indicator light and/or R-terminals are optional.

A specially designed bridge provides protection for other electronic devices on the vehicle by effectively clamping voltage surges up to 40 Volts. This feature is standard on the 130 and 145 Amp models.

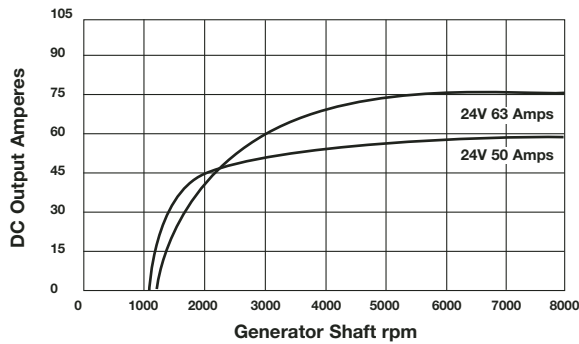
The 21SI has improved brush service life, thanks to a swivel brush holder design that minimizes brush side wear, bounce, hang-up, and erosion. The permanently sealed drive-end ball bearing is capable of handling heavy belt loads and diesel engine vibration. The needle bearing in the rectifier-end is sealed. Standard SAE mounting makes the 21SI interchangeable with most competitive units.



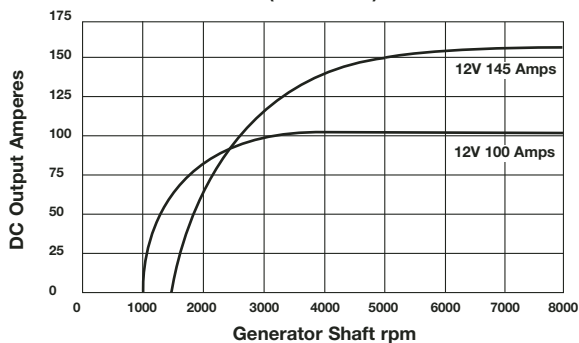
**See 21SI Series
Original to Service
Cross Reference Section
for OEM Part Numbers**

21SI Brush Alternator

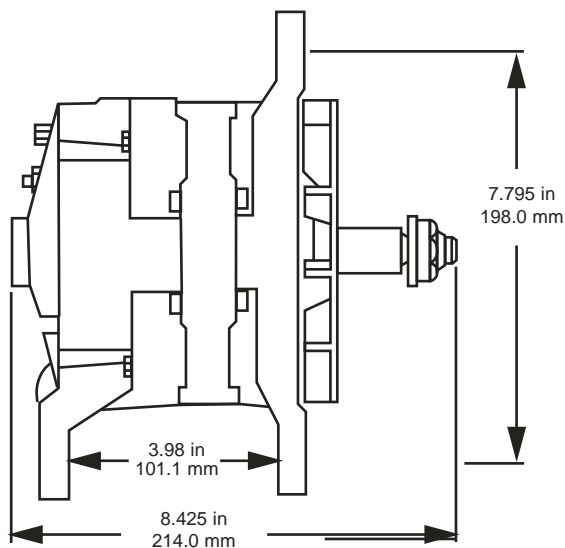
21SI 116 Performance Curves
(14V @ 25°C)



21SI Performance Curves
(28V @ 25°C)



Dimensions



Specifications

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Ambient Temperature Limits:

-34°C to +90°C
(-30°F to +200°F)

Polarity:

Negative Ground

Rotation:

Clockwise

Weight:

14.2 lbs (6.6 kg)

Mounting:

SAE J180 Standard

Built-In Voltage Regulator:

Solid-State Integrated Circuit
Flat or Temperature Compensated
Low Parasitic Draw
Improved RFI Suppression
Load Dump Protection

High-Output Models

65 to 145 Amps- 12 Volt
50 and 70 Amps- 24 Volt

Charging system Wiring

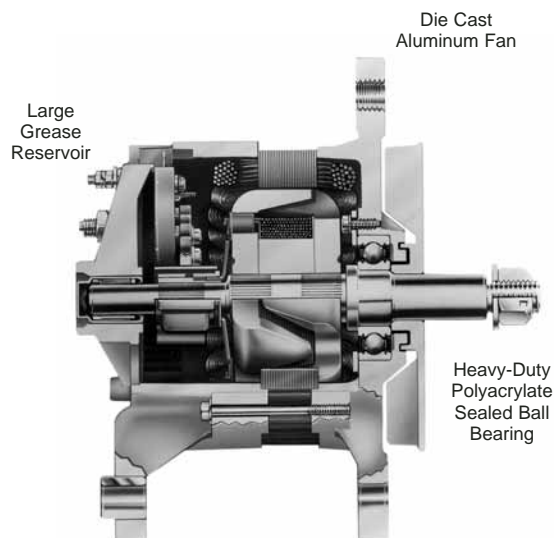
One, Two or Three Wire Capacity
Terminal Boots Prevent Damage
Optional I and/or R-terminals

Heavy-Duty Design

High-Output Rectifier Bridge
Long Single Seal Bearing
25 mm Drive-End Ball Bearing
Swivel Brush Holder Design

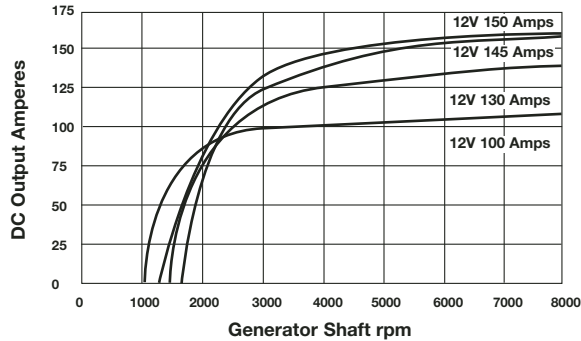
**SI Series
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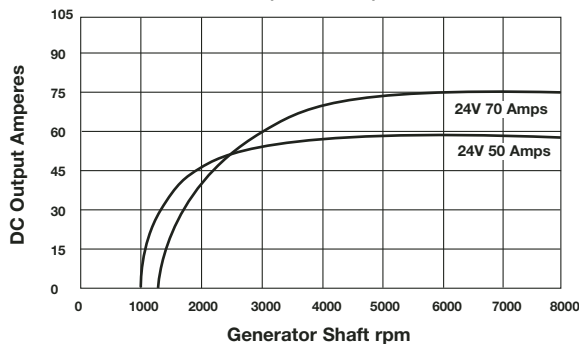


22SI & 22SI PAD Mount Brush Alternator

22SI PAD Mount Performance Curves
(14V @ 25° C)



22SI Performance Curves
(28V @ 25°C)



Specifications

Performance Output:

50 Amps - 24 Volts
70 Amps - 24 Volts
100 Amps - 12 Volts
130 Amps - 12 Volts
145 Amps - 12 Volts
150 Amps - 12 Volts

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Rotation:

Clockwise or Counterclockwise

Temperature Limits:

-30° F or -34° C Ambient
+200 F or +93° C Ambient

Polarity:

Negative Ground Standard

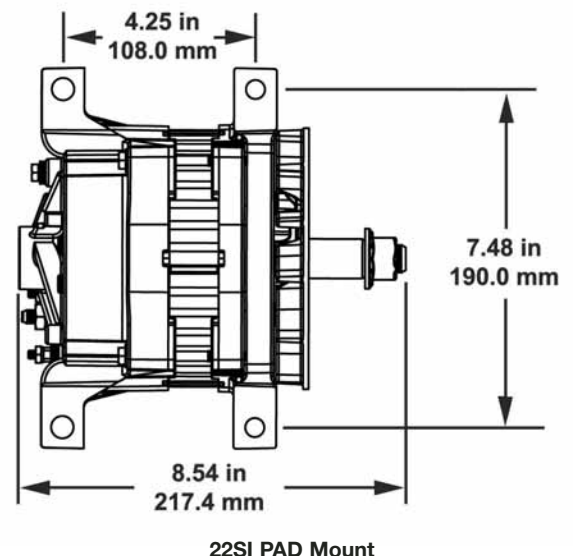
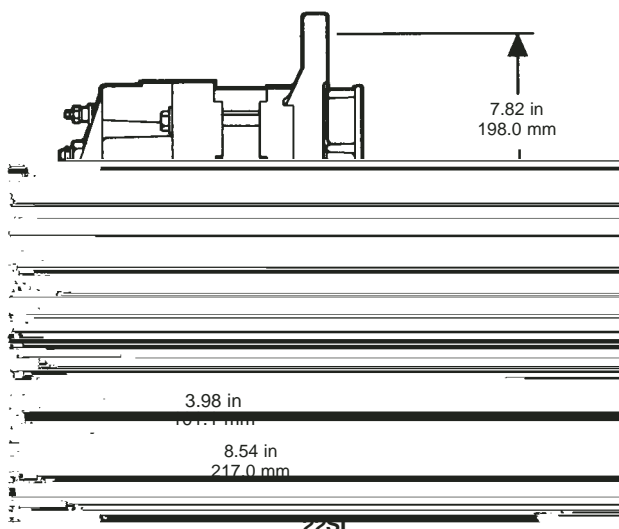
Mounting:

SAE J180 Standard
PAD Mount Mounting System

Weight:

SAE J180: 14.2 lbs or 6.46 kg
PAD Mount: 7.00 kg or 15.4 lbs

Dimensions



23SI Brushless Alternator

Brushless Reliability

Vibration Resistant

Load Dump Protection

Durable Frame

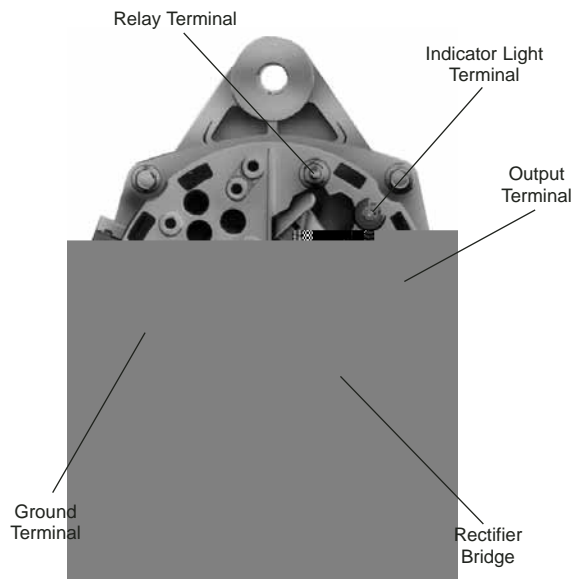
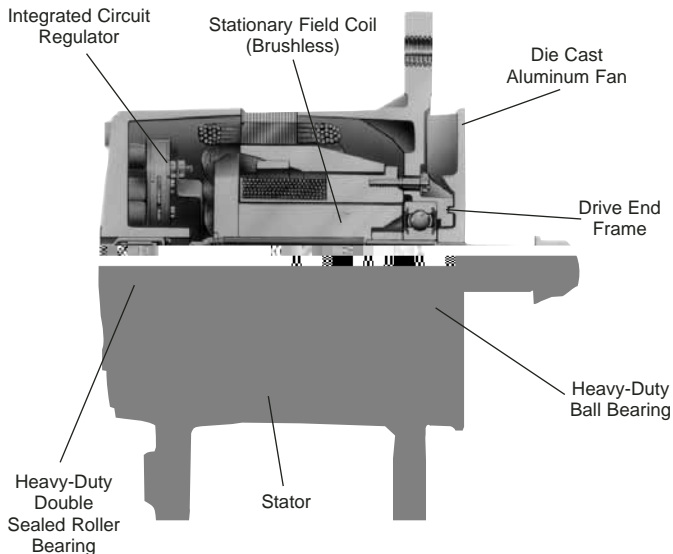


Experience more output and service life for today's mid-range diesels with high electrical load requirements. The brushless design eliminates moving electrical connections. The 23SI offers 70 and 50 Amp outputs in 24 Volt models and up to 130 Amp output in the 12 Volt models, all suitable for most off-highway and medium duty applications.

The vibration resistant end frames have sealed heavy-duty bearings for environmental protection and severe belt loads. These 144 mm frames are assembled with grade 5, 1/4"-20 bolts and the sturdy lugs mount according to SAE J180.

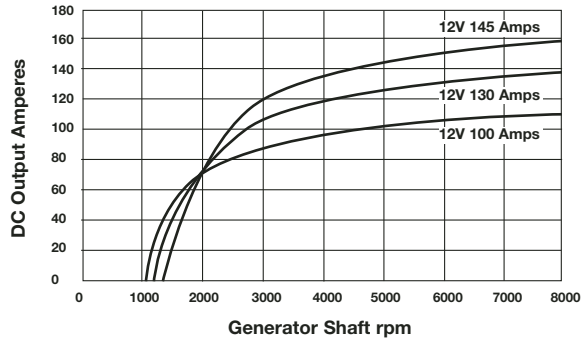
The Single Wire Charging Line prevents errors that could occur from multiple connections on the 23SI, yet is ideal for agricultural, industrial and medium duty vehicles.

The Integrated Circuit Voltage Regulator is designed for low parasitic draw and provides excellent radio frequency suppression. Standard load dump protection prevents voltage spikes from damaging the charging system and the specially designed 12V bridge clamps voltage spikes at 40 Volts to protect other electronic devices.

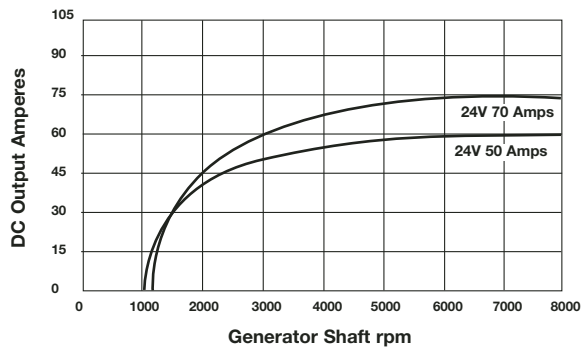


23SI Brushless Alternator

23SI Performance Curves
(14V @ 25°C)



23SI Performance Curves
(28V @ 25°C)



Specifications

Performance Output:

50 Amps - 24 Volts
70 Amps - 24 Volts
100 Amps - 12 Volts
130 Amps - 12 Volts
145 Amps - 12 Volts

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Rotation:

Clockwise

Temperature Limits:

-30° F or -34° C Ambient
+200°F or +93° C Ambient

Polarity:

Negative Ground

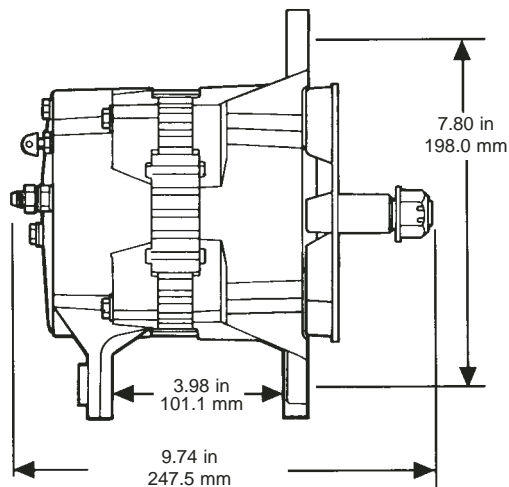
Mounting:

SAE J180 Standard

Weight:

19.0 lbs or 8.60 kg

Dimensions



24SI Heavy-Duty Alternator

Dual internal fan design ensures superior air flow to cool internal components.

Built-in protection from water and other contaminants using patent-pending bearing protection system.

Multi-function regulator offers optional auto-start and remote sense capabilities.

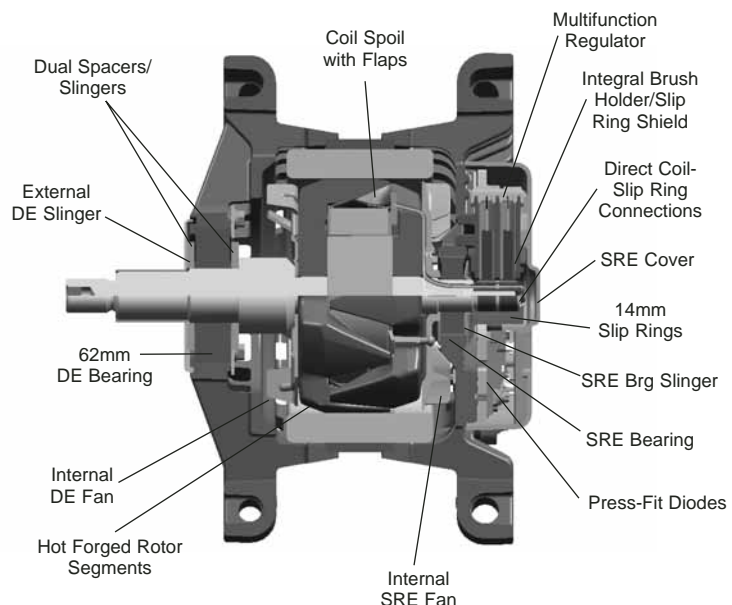
Single-wire connection with environmentally sealed terminal connectors.

Optimal brush life by design

24SI Alternators feature dual internal fans coupled with front and rear air vents that provide a controlled air flow, keeping brushes cooler. The brushes also feature a shielded design that protects against road contaminants. These features result in optimized brush performance and extended life. Heavy Duty Viton sealed bearings provide high-heat tolerance and protect the bearings from brush dust and the environment.

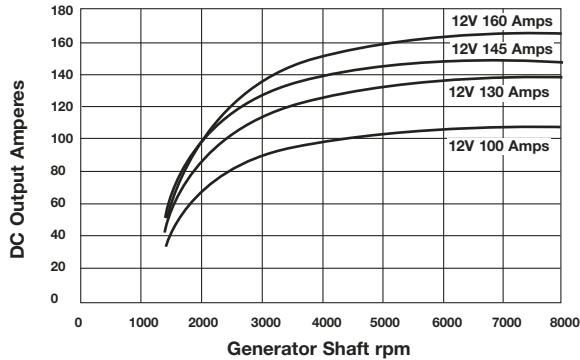
Dual internal fans for high temperature environments

External fan brush alternators draw air from the back (terminal end), through the alternator, toward the fan. The 24SI draws air from both the terminal and drive ends of the alternator, toward the middle. This design provides superior cooling of key internal electronics, bearings, brushes and other components for optimal performance and durability over a temperature range of -40°C/-40°F to 105°C/221°F.

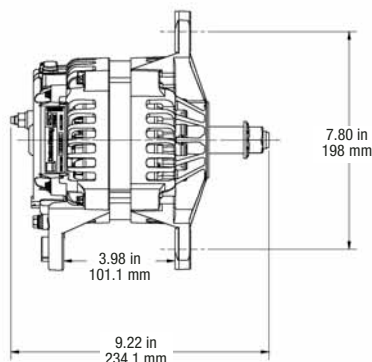
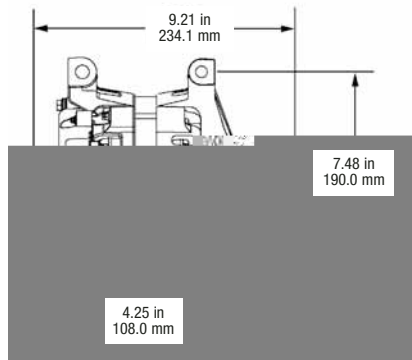
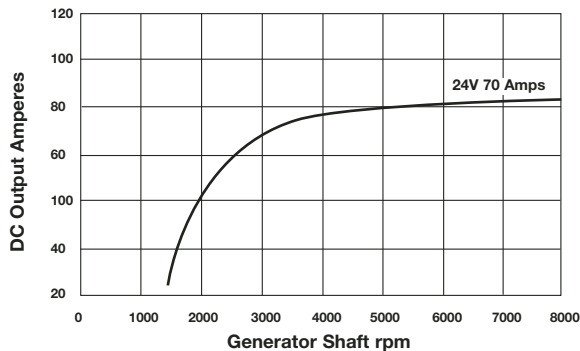


24SI Heavy-Duty Alternator

24SI Performance Curves
(12V)



24SI Performance Curves
(24V)



Specifications

Performance Output:

100 Amps - 12 Volts
130 Amps - 12 Volts
145 Amps - 12 Volts
160 Amps - 12 Volts
70 Amps - 24 Volts

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Rotation:

Clockwise

Temperature Limits:

Low: -40°C / -40°F
High: 105°C / 221°F

Polarity:

Negative Ground

Construction:

Brush

Weight:

7.6 kg / 16.7 lbs

Length: (to end of shaft)

234.1 mm

Stator Diameter:

144mm

DE Bearing Size:

62mm

26SI Brushless Alternator

Mid-range output

Sealed electronics

Load dump protection

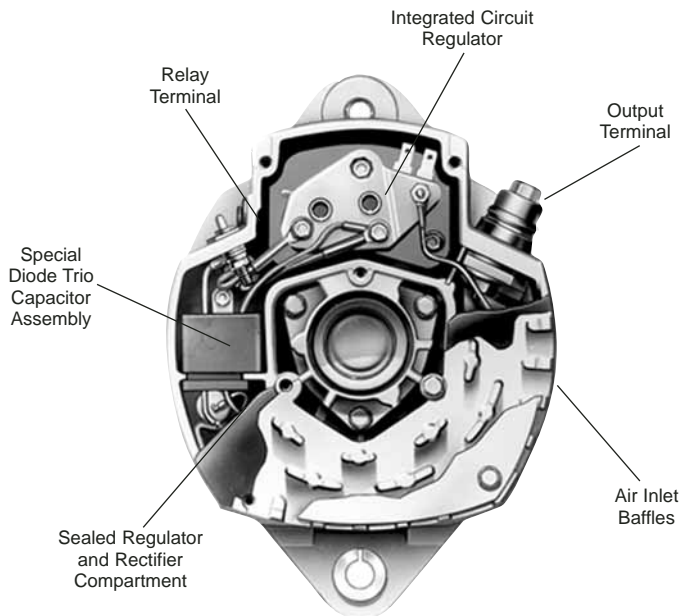
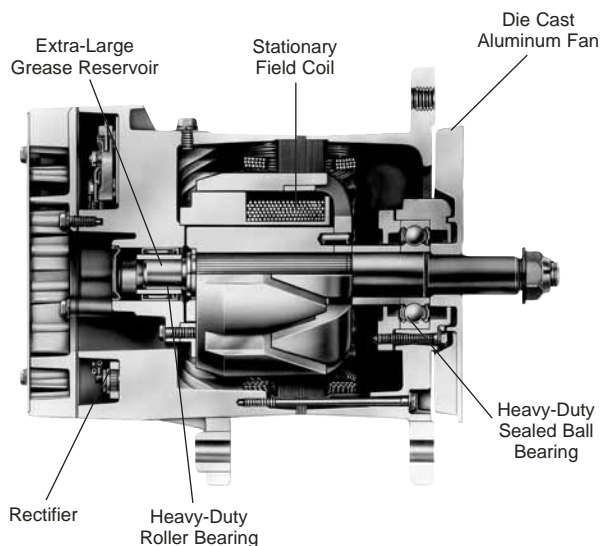
RFI suppression

Recommended for Line-Haul Diesel Trucks, Large Commercial Diesel Engines, Harsh Environments, Heavy Belt Loads and Vibrations

With its brushless construction, the 26SI has substantially increased service life over brush type units. The absence of moving electrical connections eliminates sparks from brush-slip ring contact.

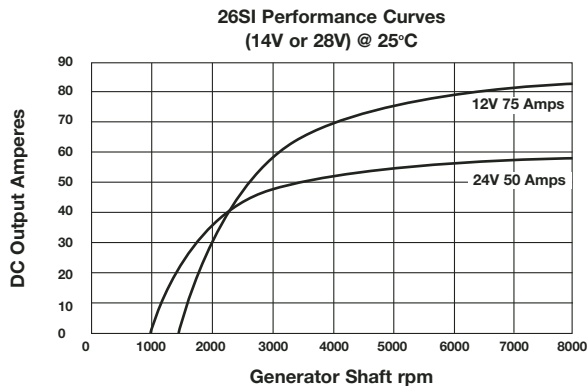
The **integrated-circuit regulator** is designed for low parasitic draw and features a low turn-on speed. A **special diode-trio/capacitor assembly** provides superior radio frequency interference (RFI) suppression. The 26SI's electronics are protected two ways. Standard load dump protection guards the generator against voltage spikes caused by loose connections or interruptions in the charging line, and total environmental sealing protects against dirt, road salt, and other corrosives.

Brushless construction, reliable state-of-the-art electronics, and environmental protection make the 26SI the best choice for line haul truck, construction, and off-highway applications.



**See 26SI Series
Original to Service
Cross Reference Section
for OEM Part Numbers**

26SI Brushless Alternator



Specifications

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Ambient Temperature Limits:

-40°C to +85°C
(-40°F to +185°F)

Transient Voltage Limits

100V - 300 ms (12 Volt)
250V - 300 ms (24 Volt)

Polarity:

Negative Ground

Rotation:

Clockwise or Counterclockwise

Weight:

27.6 lbs (12.5 kg)

Mounting:

SAE J180 Standard

Built-In Voltage Regulator

Solid-State Integrated Circuit
Flat Temperature-Compensated
Low Parasitic Draw
Low Turn-On Speed
Improved RFI Suppression
Load Dump Protection

Brushless Construction:

Stationary Field Coil
No Brushes or Slip Rings

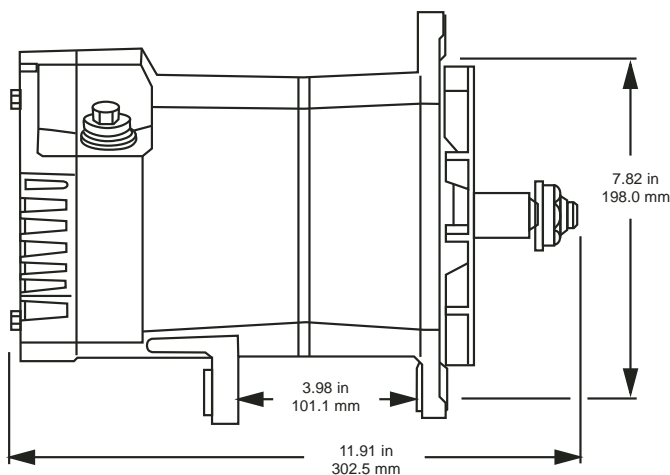
“Inside-Cooled” System

Baffled Air Inlet
Sealed Live Parts
Prevents entry of large or foreign material

Corrosion Protection:

Sealed Rectifier-End Assembly
Brass Output Terminal Hardware

Dimensions



30SI Brushless Alternator

High output

Corrosion protection

Load dump protection

RFI Suppression

Recommended for Large Heavy-Duty Diesel Vehicles, Mid-Range Diesel Vehicles, Heavy Belt Loads and Vibrations, High Electrical Loads

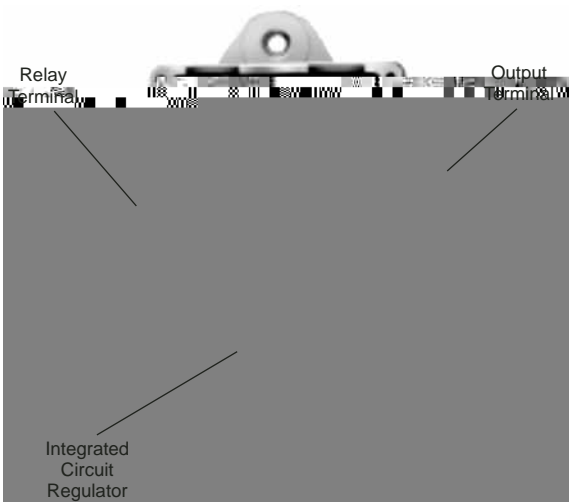
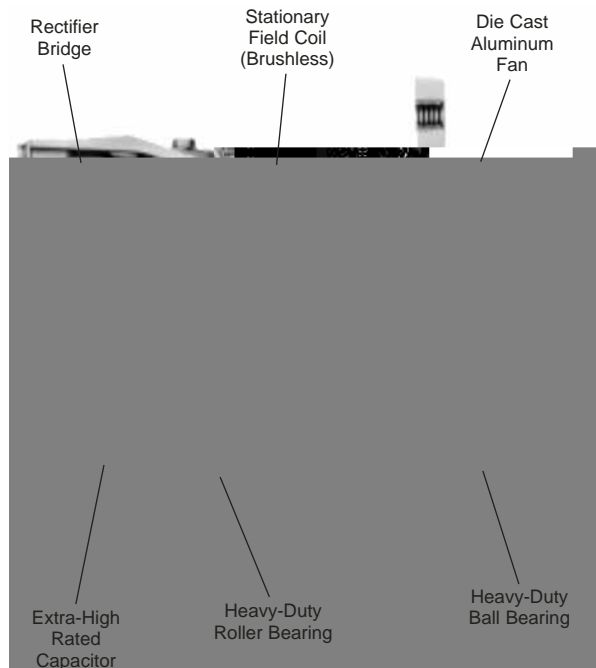
The 30SI high-output generator is an integral part of Delco Remy. Its brushless construction gives it substantially increased service life over brush-type units. This absence of moving electrical connections eliminates sparks from brush/slip ring contact.

The generator has a built-in integrated circuit regulator which features low parasitic draw, low turn-on speed, and provides excellent radio frequency interference (RFI) suppression. Standard load dump protection guards against voltage spikes caused by loose connections or interruptions in the charging line.

The 30SI's rectifier-end electronics are specially coated to protect them against dirt, road salt and other corrosives. The drive-end ball bearing assembly easily handles heavy belt loads and is designed to withstand the vibrations of diesel engines.

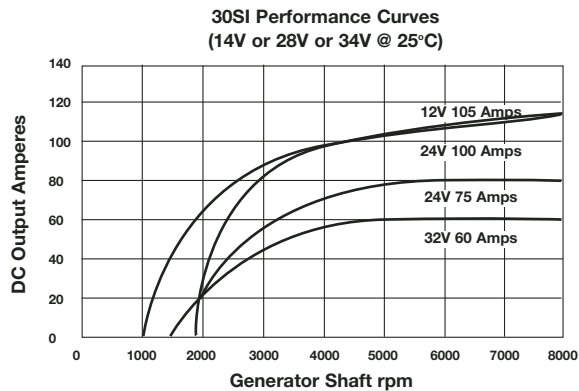
The one-wire system of the 30SI prevents wiring errors that may occur from multiple connections, making generator replacement simple. A standard SAE mounting span makes the 30SI interchangeable with most competitive units and other Delco Remy units.

NOTE: Structural integrity has been enhanced

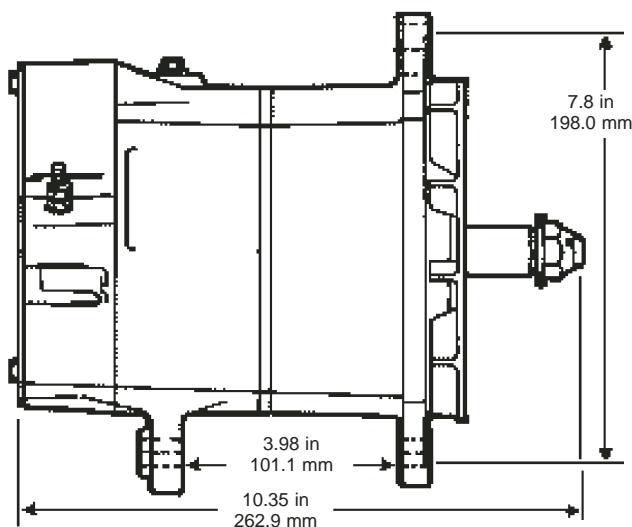


**See 30SI Series
Original to Service
Cross Reference Service
for OEM Part Number**

30SI Brushless Alternator



Dimensions



Specifications

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Ambient Temperature Limits:

-40°C to +93°C
(-40°F to +200°F)

Polarity:

Negative Ground
Insulated Models Available

Rotation:

Clockwise or Counterclockwise

Weight:

26.2 lbs (11.9 kg)

Mounting:

SAE J180 Standard

Built-In Voltage Regulator:

Solid-State Integrated Circuit
Flat Temperature-Compensated
Low Parasitic Draw
Low Turn-On Speed
Improved RFI Suppression
Load Dump Protection
Brushless Construction
Stationary Field Coil
No Brushes or Slip Rings

(RFI) Radio Frequency Interference Suppression:

Improved Regulator Switching
Increased Capacitor Rating

Corrosion Protection:

Coated Rectifier-End Frame Assembly
Connectors are Plated or Brass
Brass Output Terminal Hardware

One-Wire Charging System:

Prevents Wiring Errors, Damage

30SI/TR Brushless Alternator (integrated transformer)

Recommended for high-mileage heavy-duty, extra-large line haul diesel engine applications

24 Volt starting and 12 Volt accessories no series parallel switch needed

Simplifies wiring with only two charge leads to connect

Brushless construction with stationary field and stator windings

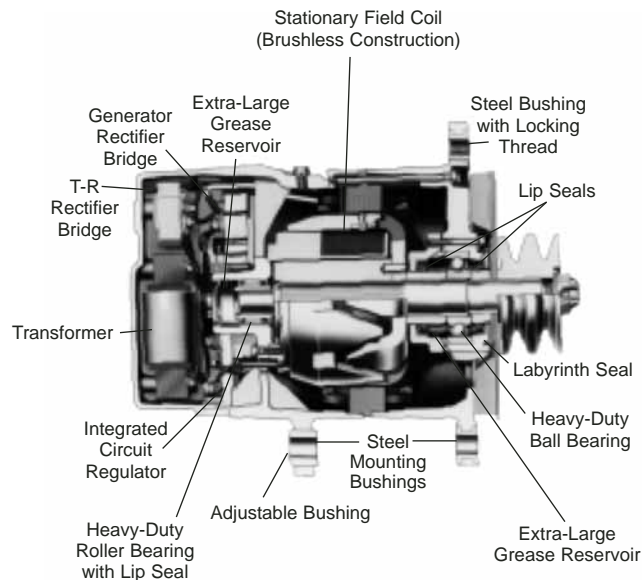
Large 25 mm ball bearing at the drive-end and heavy-duty roller bearing at the opposite end

Heavy-Duty double mounting lug with spring-it adjustable bushing

Built-In integrated circuit regulator

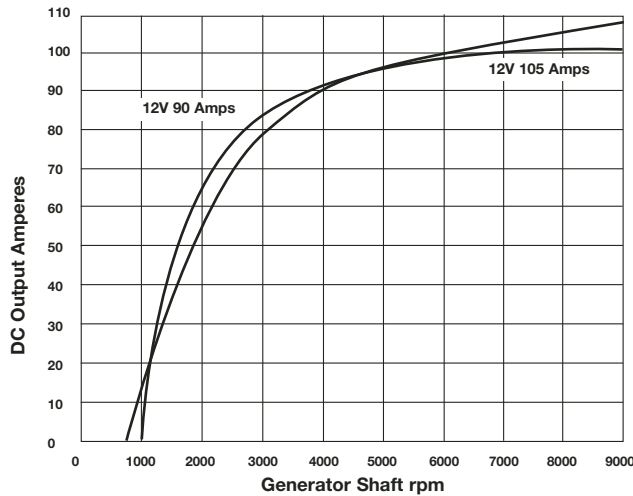
The 30SI/TR Series /Type 450 is a complete power generating system designed for high-mileage extra-large heavy-duty line haul diesel applications with 24 Volt cranking and 12 Volt accessories. The 30SI/TR (Transformer Rectifier) is supplied in both 12 Volt negative or positive models with a rated output of 90 Amps. These units are equipped with an integral solid state transformer-rectifier which provides an additional charging circuit. With two separate charging circuits, two sets of 12 Volt batteries can be charged separately at the same time and yet they are permanently connected in the series with a conventional magnetic starting switch for 24 Volt cranking. This eliminates the problems associated with the series parallel switch. The brushless construction with both stator and field stationary, eliminates potential failures. Building the regulator into the generator, with all wires between the generator and regulator inside, prevents wiring errors.

Bridge this design has heavy-duty double mounting lugs with a spring fit, tolerance compensating, adjustable bushing to insure a tight mounting without generator end frame stress. The 30SI/TR construction has a large 25 mm drive end ball bearing and an extra long roller bearing at the opposite end which are permanently lubricated by large grease reservoirs.



30SI/TR Brushless Alternator

30SI/TR Type 450 Performance Curves
(12V @ 25°C)



30SI/TR SERIES/TYPE 450
D.C. AMPERES OUTPUT

| NEW SERVICE | REMAN | VOLTAGE | RATED OUTPUT | GENERATOR OUTPUT AT APPROX 1600 RPM |
|-------------|----------|---------|--------------|-------------------------------------|
| 1117481 | 10459009 | 12 V | 90 Amps | 44 Amps |
| 1117807 | 10459368 | 12V | 105 Amps | 48 Amps |

Weight: 11.2 lbs

1-wire system — w/ fan only

Pulley

In many cases the original pulley can be reused if not damaged

See generator installation hardware section.

Wiring Information

For correct charge lead gauge see Generator Installation Hardware & Component Part Section.

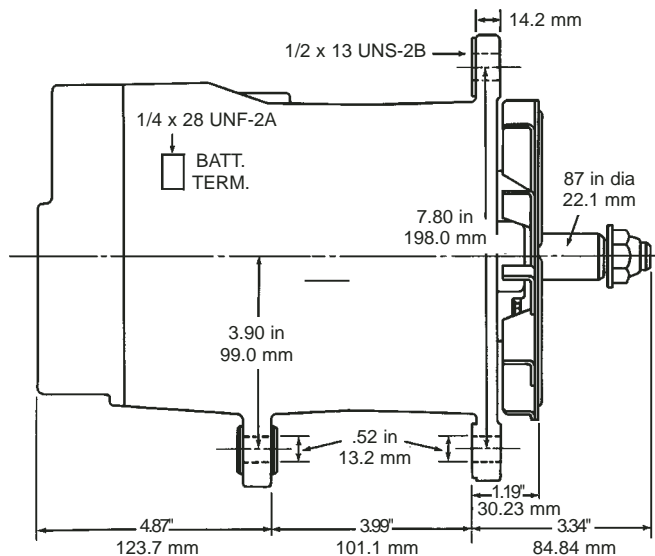
If a new pulley is required see Generator Installation Hardware & Component Part Section.

For proper wiring circuit diagram see page 132 to eliminate series parallel switch.

Mounting Information

Purchase from your engine or vehicle manufacturer the proper generator mounting bracket and adjusting brace for your specific generator/engine combination.

SAE J180 Standard



33SI Brushless Alternator

High Output

Corrosion Protection

Voltage Clamp Protection

Delco Remy's 33SI Alternator

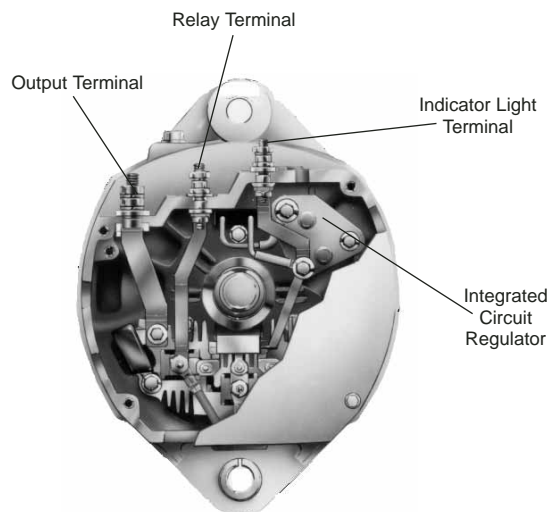
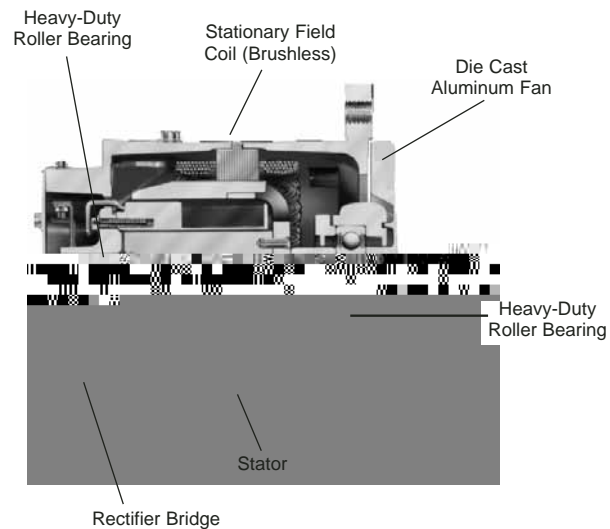
provides more output and service life for today's diesel powered vehicles with large electrical load requirements. With the increased demand for extended service life products, Delco Remy's Brushless Generators are quickly becoming the standard of the industry. The standard load dump protection prevents voltage spikes from damaging the alternator due to loose connections or charging line interruptions.

Environmental Protection

A special coating for environmental protection against dirt, road salt and other corrosives is applied to the electronics. Relay and indicator terminals are conveniently located together atop the rectifier end frame.

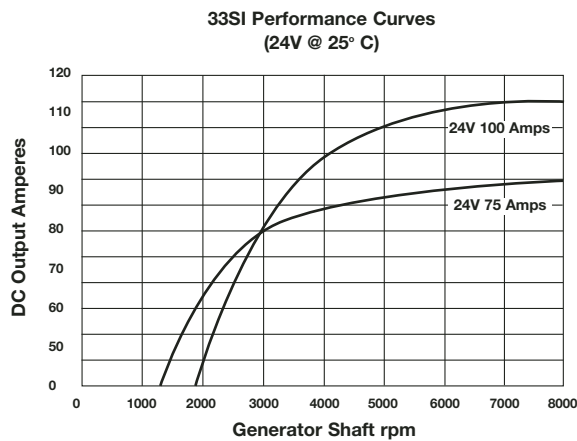
Durable Frame

The end frames each have a sealed heavy-duty bearing for environmental protection and to withstand severe belt loads. Sturdy vibration resistant lugs mount according to SAE J180. These durable frames are assembled with grade 8, 1/4"-20 bolts for added rigidity.

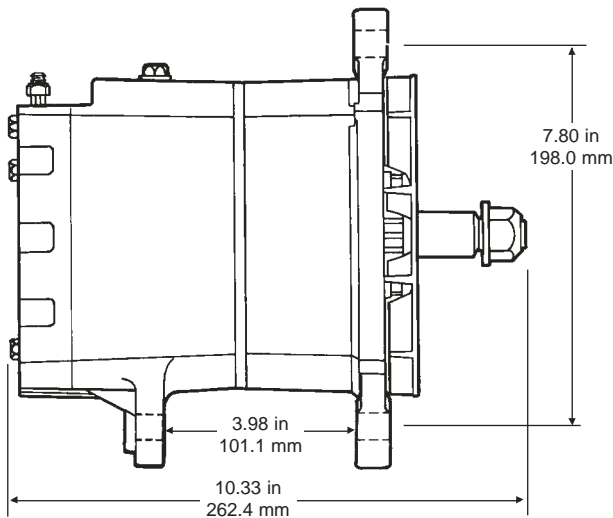


**See 33SI Series
Original to Service
Cross Reference Section
for OEM Part Numbers**

33SI Brushless Alternator



Dimensions



Specifications

Performance Output:

75 Amps - 24 Volts
100 Amps - 24 Volts

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Rotation:

Clockwise or Counterclockwise

Temperature Limits:

-30° F or -34° C Ambient
+200° F or +93° C Ambient

Polarity:

Negative Ground Standard
Insulated Models Available

Mounting:

SAE J180 Standard

Weight:

24.5 lbs or 11.1 kg

34SI & 34SI PAD Mount Brushless Alternator

Brushless Reliability

Load Dump Protection

High Output

The Answer Is Here!

Delco Remy's 34SI is the answer to more output and durability for diesel powered vehicles with large electrical load requirements. Since it is actually engineered for high vibration applications, the 34SI generates a new standard of quality and performance.

The sturdy frames are assembled with grade 8, 1/4"-20 bolts for added rigidity and the output, relay and indicator terminals are standard on every machine.

Built-in environmental protection

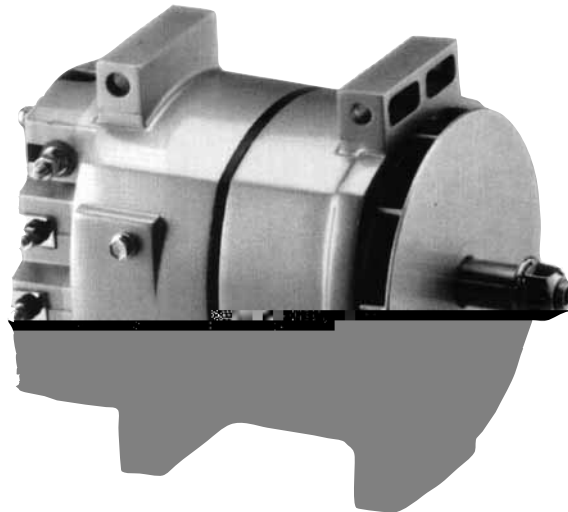
A special coating protects the electronics from dirt, road salt and other corrosives. The heavy-duty bearings are sealed with plenty of lubricant. Load dump protection prevents external voltage spikes from damaging the unit.

Brushless Construction Increases Service Life

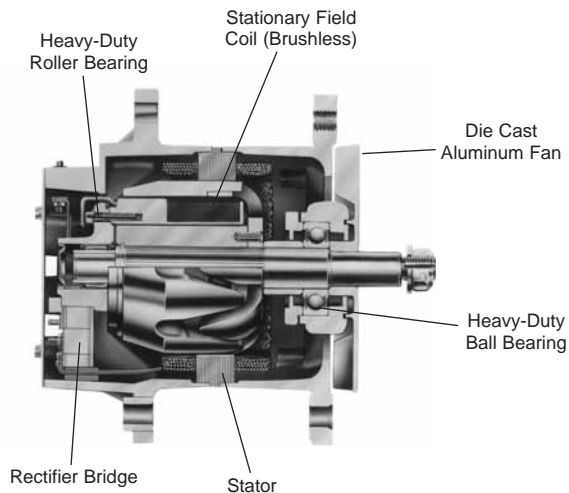
The absence of moving electrical connections eliminates sparks. The 34SI has excellent radio frequency interference (RFI) suppression with very little parasitic draw and allow turn-on speed.



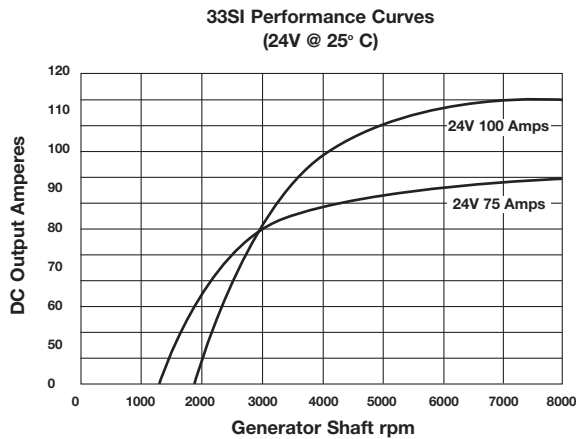
34SI



34SI PAD Mount



34SI & 34SI PAD Mount Brushless Alternator



Specifications

Performance Output:

75 Amps - 24 Volts
100 Amps - 24 Volts

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Rotation:

Clockwise or Counterclockwise

Temperature Limits:

-30° F or -34° C Ambient
+200° F or +93° C Ambient

Polarity:

Negative Ground Standard
Insulated Models Available

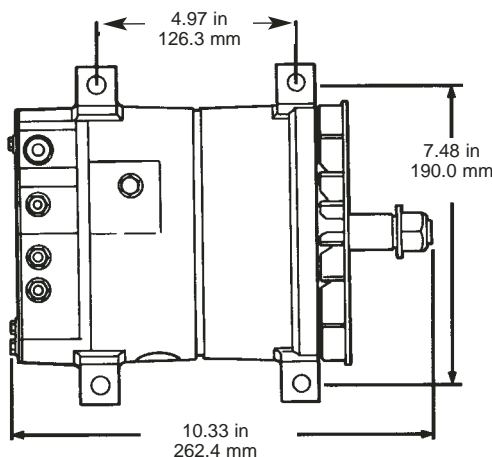
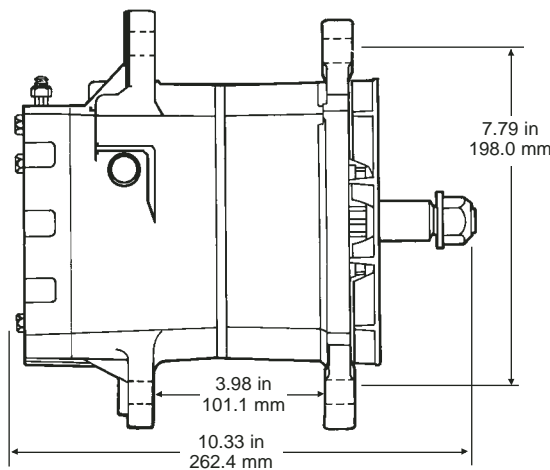
Mounting:

QuaDRAmount® Mounting Systems
PAD Mount Systems

Weight:

25.4 lbs or 11.5 kg

Dimensions



35SI

Strategically placed radiant vents cool internal components in high-temperature underhood environments.

Premium brushless design extends service life and optimizes performance.

High efficiency stator windings and optimized rotor design deliver high output while limiting internal heat production.

Heavy duty bearings and premium-quality steel shaft withstand high vibration and heavy belt loads.

High thermal-capacity design stands up to extreme temperatures and thermal stress for extended service life.

35SI Alternators offer optional Remote Sense Technology, capable of optimizing the state-of-charge of the batteries.

In today's Heavy Duty environment, it is no secret engine compartments have become more compact, raising the operating temperatures under the hood. The introduction of the latest emissions-compliant engines has resulted in even higher temperatures, and created a new challenge for leading Heavy Duty component and system manufacturers.

Delco Remy has responded to this challenge through the introduction of the 35SI family of alternators, the first Heavy Duty alternators engineered specifically to address the increased underhood temperatures found on today's vehicles.

The 35SI, available in 110 and 135-amp models, features design enhancements that ensure high current production at the rated underhood temperature (105°C) of today's emission-compliant engines. The rugged 35SI has passed brutal testing at this level for over 2,000 hours at 3,000 RPM, the hottest operating conditions for any heavy duty alternator.

The new 35SI alternator features strategically-placed radiant casting and back-plate vents, designed to maximize heat transfer and air flow. The 35SI also features advanced design high-efficiency stator windings, an optimized rotor, and an oversized rectifier bridge that results in high output and reduced heat production.



PAD Mount



QUAD Mount



Hinge Mount



36SI

Radiant vents and thermally tolerant internal components allow the 36SI to produce high output in high temperature environments, up to 105°C / 221°F.

Optional Remote Sense™ compensates for charging system voltage drops and maintains required voltage levels to optimize battery state of charge

High efficiency, fuel saving design reduces required engine horsepower to run alternator

Ideal for the most demanding high amperage and frequent idling applications, including: sleeper cabs, car haulers, refuse pick-up and cement trucks.

The all-new Delco Remy 36SI combines the best of all worlds: Premium Brushless Technology, 165 amps of power, 100 amps at idle, the ability to handle the high temperature demands of today's emissions compliant diesel engines, all in a high efficiency fuel-saving design.

The high output of the 36SI meets the ever-increasing amperage requirements of hotel loads, exterior add-on electronics and application specific electrical drains such as pick-up and delivery or vocational trucks. The performance of the 36SI results in superior maintenance of the batteries and electrical system reliability, supporting critical vehicle components such as the Electronic Control Unit (ECU).

The high efficiency design requires minimal engine horsepower to turn the alternator, increasing fuel efficiency and decreasing overall fuel costs per mile for your fleet.

PAD Mount



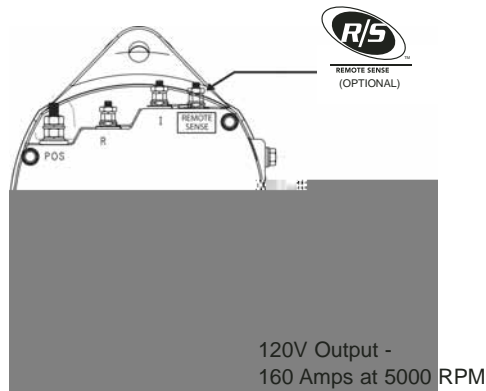
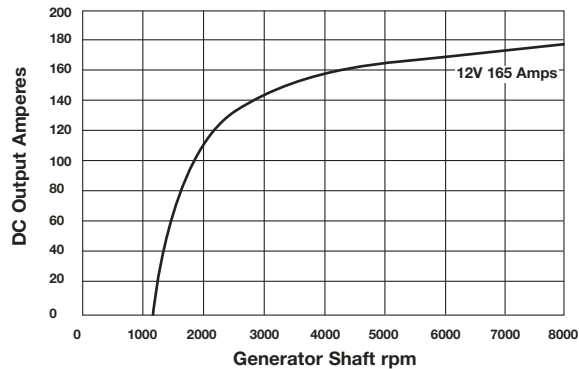
QUAD Mount



Hinge Mount

36SI

36SI Performance Curves



Some 36SI alternators feature Remote Sense Technology that senses the voltage level at the batteries and adjusts alternator output accordingly. A direct connection from the alternator's fourth terminal to the batteries provides highly accurate voltage readings and optimizes battery state of charge.

Specifications

Performance Output:

165Amps - 12 Volts

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Rotation:

Clockwise or Counterclockwise

Temperature Limits:

Low: -40°C / -40°F
High: 105°C / 221°F

Polarity:

Negative Ground

Construction:

Brushless

Weight:

12.1 lbs or 26.67 kg

Length:

262mm

Stator Diameter:

152mm

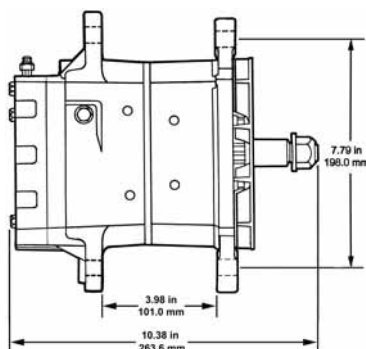
DE Bearing Size:

62mm

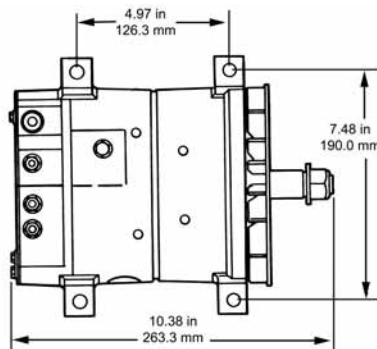
Rotor Inertia:

44 kg — cm²

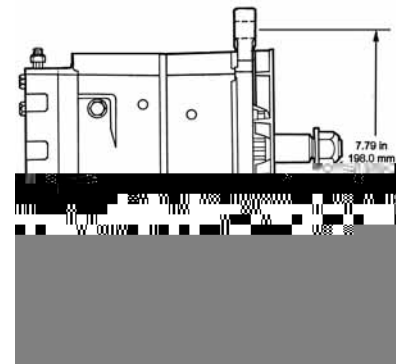
Dimensions



QUAD Mount



PAD Mount



Hinge Mount

50DN Belt Drive Brushless Generator

Long-life brushless construction

Proven heavy-duty design

Totally sealed for environmental protection

Oil-cooled belt drive

Recommended for Large Commercial Diesel Bus/Coach, Industrial Applications, Handles High Continuous Electrical Loads, High Output at Engine Idle, Suitable for Stop and Go Service, Maximum Durability in Severe Environments

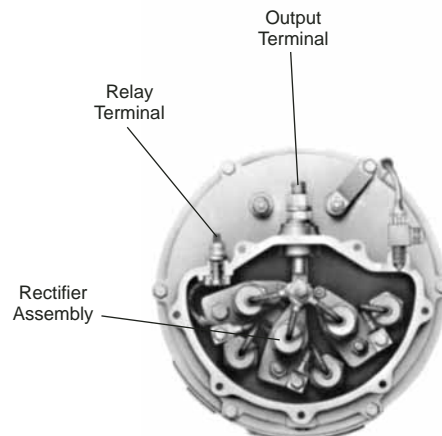
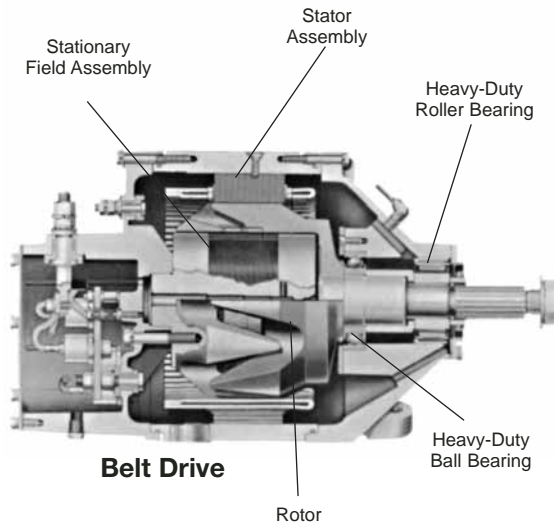
For heavy-duty motor coach applications, Delco Remy's 50DN generator features brushless construction, a heavy-duty design and an oil cooling principle proven with over 35 years of service. All this is combined in a compact, very high output package.

Brushless construction increases durability and service life. There are no rotating windings the field and stator are stationary. The 50DN is resistant to high levels of contamination and vibration. The windings have high-temperature insulation and varnish impregnation to seal out moisture.

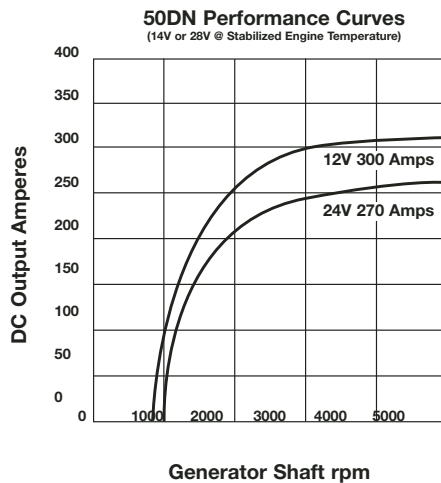
The rectifier assembly and diodes are readily accessible for diagnostics under the o-ring sealed, die cast aluminum cover plate. The heavy-duty bearings, extra long 30 mm roller bearing outboard, and 45 mm ball bearing inboard are constantly lubricated.

The belt drive allows the 50DN to be bolted to the engine using a radius pad mounting, eliminating the need for an external fan. Engine oil flow passages ensure excellent bearing lubrication and efficient generator cooling. The 50DN is rated at 93°C.

**See 50DN
Original to Service
Cross Reference**



50DN Belt Drive Brushless Generator



Specifications

Maximum Speed:

6,500 rpm Continuous
7,000 rpm Intermittent

Ambient Temperature Limits:

Cooling Oil: 121°C (250°F) Maximum

Required Oil Flow:

2.0 gal / min (Provide Minimum 1 in Drain Line.
Positive Vent Required)

Polarity:

Negative Ground

Rotation:

Clockwise or Counterclockwise

Weight:

100 lbs (45.3 kg)

Mounting:

Radius Pad

Availability:

Cummins L10, M11 and C Series
Detroit Diesel Series 50 and 60

Very-High Output Models:

300 Amps, 12 Volt @ 5000 rpm
270 Amps, 24 Volt @ 5000 rpm
Rated at Stabilized Engine Temperature

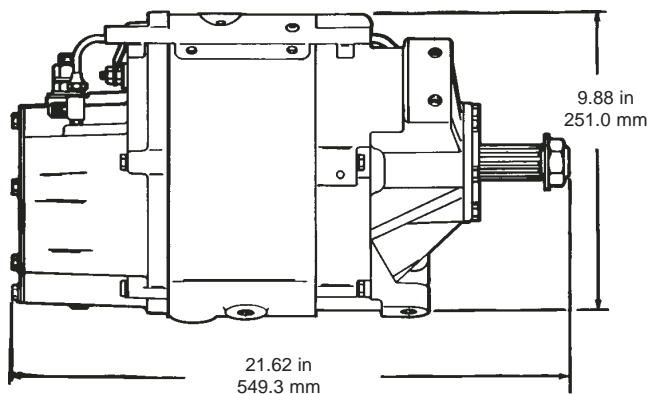
Oil-Cooled, Belt Drive:

Cooled by Engine Oil
Belt Drive

Brushless Construction:

No Rotating Windings
No Brushes or Slip Rings
Reduced Mechanical Noise

Dimensions



50DN Direct Drive Brushless Generator

Long-life brushless construction

Proven heavy-duty design

**Totally sealed for
Environmental Protection**

Oil-cooled direct drive

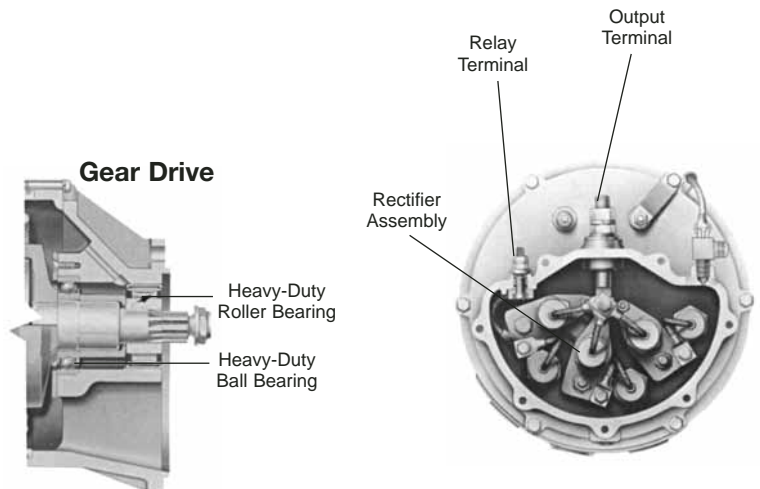
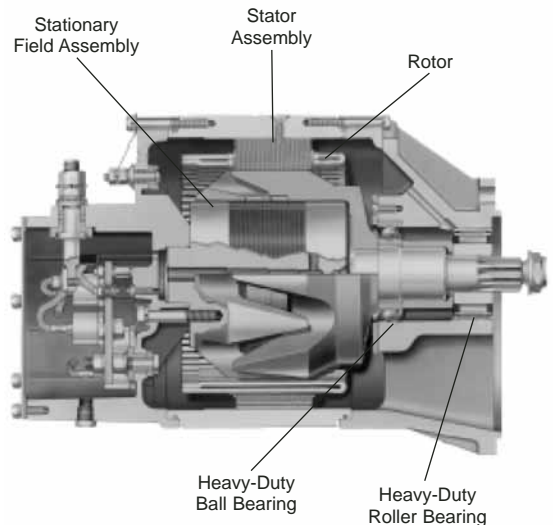
**Large Commercial Diesel Bus/Coach,
Industrial Applications, Handles High
Continuous Electrical Loads, High
Output at Engine Idle, Suitable for Stop
and Go Service, Maximum Durability in
Severe Environments**

For heavy-duty motor coach applications, Delco Remy's 50DN generator features brushless construction, a heavy-duty design and an oil cooling principle proven with over 35 years of service. All this is combined in a compact, very high output package.

Brushless construction increases durability and service life. There are no rotating windings the field and stator are stationary. The 50DN is resistant to high levels of contamination and vibration and only regular maintenance between engine overhauls is required.

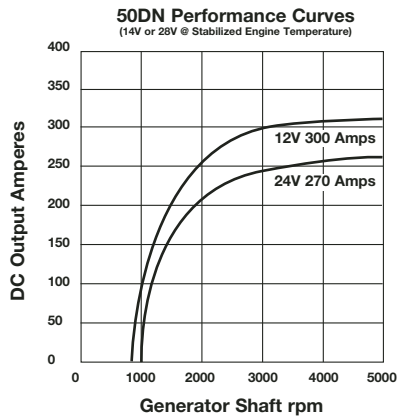
The rectifier assembly and diodes are readily accessible for diagnostics under the o-ring sealed, die cast aluminum cover plate. The heavy-duty bearings extra long 30 mm roller bearing outboard and 45 mm ball bearing inboard are constantly lubricated.

The 50DN bolts directly to the flywheel housing, eliminating shaft seals, external fan, mounting bracket, pulley or belts. Engine oil flow passages ensure excellent bearing lubrication and efficient generator cooling. The 50DN is rated at 93°C.

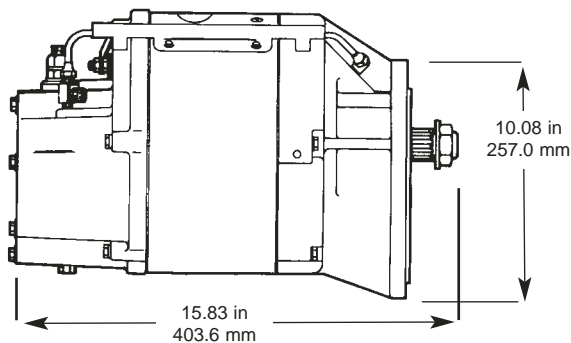


**See 50DN
Original to Service
Cross Reference**

50DN Direct Drive Brushless Generator



Dimensions



Gear Drive

Specifications

Maximum Speed:

6,500 rpm Continuous
7,000 rpm Intermittent

Ambient Temperature Limits:

Cooling Oil: 121°C (250°F) Maximum

Required Oil Flow:

2.0 gal / min

Polarity:

Negative Ground

Rotation:

Clockwise or Counterclockwise

Weight:

100 lbs (45.3 kg)

Mounting:

Flange

Availability:

Detroit Diesel V-Series Engines

Very-High Output Models:

300 Amps, 12 Volt @ 5000 rpm
270 Amps, 24 Volt @ 5000 rpm
Rated at Stabilized Engine Temperature

Oil-Cooled, Belt Drive:

Cooled by Engine Oil
Direct Drive, Gear Driven

Brushless Construction:

No Rotating Windings
No Brushes or Slip Rings
No Rubbing Shaft Oil Seals
No Periodic Maintenance

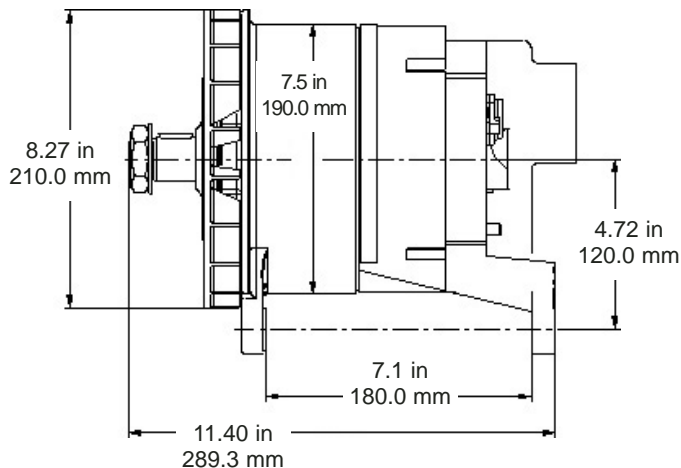
T1 Heavy Duty Brush Alternator

Interchangeable With The *Bosch T1*

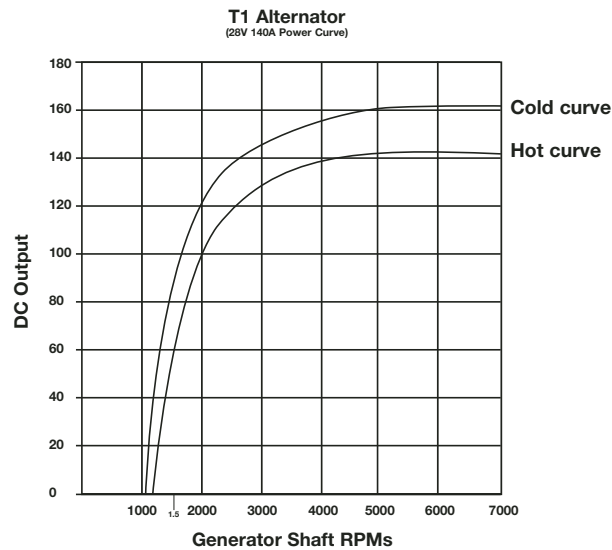
Recommended For Large and Mid-Range On-Highway Diesel Coach, Bus and Truck Engines with High Electrical Loads!

Delco Remy's T1 interchangeable brush type Alternator has been designed to provide a combination of high performance and durability.

- 140 Amps On 24 Volt Systems
- Built-in Solid State Integrated Circuit Voltage Regulator For Low Parasitic Draw
- Provides Temperature Compensation
- Excellent Radio Frequency Interference (Rfi) Suppression



T1 Heavy Duty Brush Alternator



Nominal Voltage:

24 Volt
 Nominal Current at 1500 1/min.
 65 A 70A
 Nominal Current at 6000 1/min.
 120A 140A

Maximum RPM:

7000

Rotation:

Clockwise or Counterclockwise

Frame Diameter:

7.5 in (190 mm)

Weight:

Approx. 33 lbs (14.8 kg)

Environmental Temperature:

-22°F (-30°C)
 176°F (+80°C)

| DR Part Number | 19025330 | 19025331 | 19025333 | 19025335 | 19025336 | 19025337 |
|-------------------------------|--|--|--|------------------------------------|------------------------------------|--------------------------------------|
| Amperage | 70/140A | 70/140A | 70/140A | 70/140A | 70/140A | 70/140A |
| | | | | | | |
| Based on type T1 | 0-120-689-535 T1-28V-70/140A 0-120-689-533 T1-RL-28V-65/120A | 0-120-689-548 T1-RL-28V-70/140A 0-120-689-543 T1-RL-28V-65/120A | 0-120-689-541 T1-R/L-28V-70/140A | 0-120-689-526 T1-RL-28V-65/120A | 0-120-689-506 T1-RL-28V-70/120A | 0-120-689-552 T1-RL-28.5V-70/140A |
| Replaces Bosch OEM number: | 0-120-689-530 0-120-689-513 0-120-689-520 0-120-689-503 0-120-689-508 0-120-689-512 | 0-120-689-591 0-120-689-511 | 0-120-689-522 0-120-689-517 0-120-689-527 0-120-689-540 | | | 0-120-689-566 |
| Replaces Bosch | 0-986-038-290 | 0-986-034-610 | 986-039-530 | 0-986-039-140 | | |
| | 0-986-034-910 0-986-037-420 0-986-033-520 0-986-031-600 0-986-033-550 | | | | | |
| Replacing Bosch DE Shield: | 1-125-827-013 2-Threads | 1-125-827-021 Thread+Hole | 1-125-827-013 2-Threads | 1-125-827-021 Thread+Hole | 1-125-827-013 2-Threads | 1-125-827-021 Thread+Hole |
| Replacing Bosch S.R.E. Shield | 1-125-887-013 | 1-125-887-019 With-Bushing | | 1-125-887-013 | | 1-125-887-019 With-Bushing |

50VR Regulator

**Over Voltage & Short
Circuit Protection**

Optimum Field Current

Environmentally Protected

More control and service life

is available with the Delco Remy 50VR voltage regulator. It is designed to infinitely control today's very high output motor coach alternators with IC and MOSFET technology. The 50VR features fail-safe electronics to protect against short circuits that routinely ruin other regulators.

Durable construction

of the potted electronics package means environmental protection for severe surroundings. The small size and light weight enhance the mounting configurations available and the 50VR easily bolts right in on retrofit applications.

Integrated circuit voltage regulator

is designed with low parasitic draw and can be activated using ignition or relay switch circuits. Voltage can be set per standard setting procedures with the built-in voltage adjustment screw. Additionally, the 50VR has a fixed offset feature in the overvoltage logic.

Generating a new standard of reliability.

Whether you're specifying a new or retrofit voltage regulator, remember, the Delco Remy 50VR is backed up with an outstanding warranty.

Warranty.

The 50VR voltage regulator is warranted for two-years for OE applications and one-year for retrofit applications. See your OEM for details.

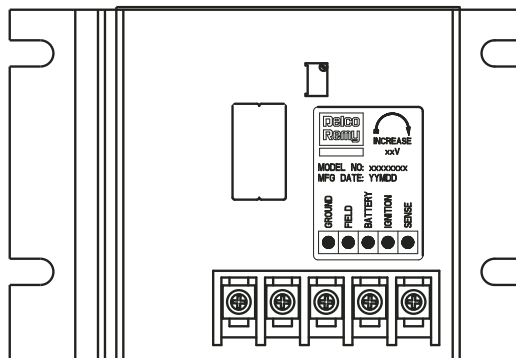
Capacitor and Harness Assembly Part #10512460

This capacitor and harness assembly can be used in conjunction with the Delco Remy 50 VR Voltage Regulator when a vehicle application is experiencing higher than normal systems voltage related to excessive electrical noise (erratic voltages) in the application. The addition of the capacitor will reduce the noise to the regulator, allowing it to function properly.



| 50VR Regulator | | |
|---|---------|-----------|
| Part Number | Voltage | Set Point |
| 8600024 (Deutsch connector) | 24V | 28V |
| 8600025 (Deutsch connector with cover) | 24V | 28V |
| 10503806 | 24V | 28V |
| 10503807 | 12V | 13.85V |
| 10503805 | 24V | 27.6V |
| 10504491 (Flat terminal with cover) | 24V | 28V |

Note: Circuit Diagram on page 135



Specifications

Ambient Temperature Limits:

160°F or 72°C Maximum

Polarity:

Negative Ground or Positive Ground

Weight:

15 oz or 0.42 kg

19SI Series

| Model | Series | Volts | Amps | Grd | No. of Wires | Battery Term | R-Term | I-Term | Service Part Number | Reman Part Number |
|----------|----------|-------|------|-----|--------------|--------------|--------|--------|---------------------|-------------------|
| 19009950 | 19SI-350 | 12 | 105 | N | 3 | M6 | M4 | - | 19009950 | 10459469 |
| 19009951 | 19SI-350 | 12 | 105 | N | 3 | M6 | M4 | - | 19009950 | 10459469 |
| 19009952 | 19SI-350 | 12 | 105 | N | 3 | M6 | M4 | - | 19009950 | 10459469 |
| 19009958 | 19SI-350 | 12 | 130 | N | 3 | M6 | BLADE | BLADE | - | 10459304 |
| 8600120 | 19SI-350 | 12 | 105 | N | 3 | M6 | M4 | - | 8600120 | - |

21SI Series

| Model | Series | Volts | Amps | Grd | No. of Wires | Battery Term | R-Term | I-Term | Service Part Number | Reman Part Number |
|----------|----------|-------|------|-----|--------------|--------------|--------|--------|---------------------|-------------------|
| 1117880 | 21SI-350 | 12 | 100 | N | 1 | 1/4 | PIN | | 19010181 | 10459013 |
| 1117886 | 21SI-350 | 12 | 100 | N | 1 | 5/16 | #10 | | 19010105 | 10459013 |
| 1117897 | 21SI-350 | 24 | 50 | N | 1 | M6 | M4 | M4 | 19010108 | NA |
| 1117900 | 21SI-350 | 24 | 70 | N | 1 | M6 | M4 | M4 | 19010182 | 10461235 |
| 1117909 | 21SI-355 | 12 | 130 | N | 1 | 5/16 | #10 | | 19010126 | 10459037 |
| 1117911 | 21SI-355 | 12 | 130 | N | 1 | 1/4 | PIN | | 19020310 | 10459037 |
| 1117915 | 21SI-350 | 24 | 70 | N | 1 | 5/16 | | #10 | 1117915 | NA |
| 1117919 | 21SI-355 | 12 | 160 | N | 1 | 5/16 | PIN | | 19020310 | NA |
| 1117920 | 21SI-355 | 12 | 160 | N | 1 | 5/16 | #10 | #10 | 19010126 | NA |
| 1117921 | 21SI-355 | 12 | 145 | N | 1 | 5/16 | #10 | | 19020310 | 10459051 |
| 1117926 | 21SI-355 | 12 | 160 | N | 3 | 5/16 | #10 | | 19020310 | 10459460 |
| 1117938 | 21SI-355 | 12 | 160 | N | 3 | 5/16 | #10 | | - | 10459457 |
| 1117943 | 21SI-355 | 12 | 130 | N | 1 | 5/16 | #10 | #10 | 19010147 | 10459037 |
| 1117944 | 21SI-350 | 24 | 70 | N | 3 | M6 | M4 | | 19010111 | NA |
| 1117946 | 21SI-355 | 12 | 130 | N | 1 | 1/4 | #10 | #10 | 1117965 | 10459037 |
| 1117964 | 21SI-355 | 12 | 145 | N | 1 | 5/16 | #10 | #10 | 19010126 | 10459051 |
| 1117965 | 21SI-355 | 12 | 130 | N | 1 | 5/16 | #10 | #10 | 1117965 | 10459037 |
| 1117966 | 21SI-355 | 12 | 130 | N | 1 | 5/16 | #10 | #10 | 1117965 | 10459037 |
| 19010100 | 21SI-350 | 12 | 100 | N | 1 | 1/4 | PIN | | - | 10459013 |
| 19010105 | 21SI-350 | 12 | 100 | N | 1 | 5/16 | #10 | #10 | 19010105 | 10459013 |
| 19010108 | 21SI-350 | 24 | 50 | N | 1 | M6 | M4 | M4 | 19010108 | 10459461 |
| 19010110 | 21SI-355 | 12 | 160 | N | 3 | 5/16 | #10 | | 19010110 | 10459457 |
| 19010111 | 21SI-350 | 24 | 70 | N | 1 | M6 | M4 | M4 | - | 10461235 |
| 19010112 | 21SI-355 | 12 | 100 | N | 3 | 5/16 | #10 | | 19010112 | 10459046 |
| 19010113 | 21SI-355 | 12 | 130 | N | 3 | 5/16 | #10 | | 19010110 | NA |
| 19010125 | 21SI-355 | 12 | 160 | N | 1 | 5/16 | PIN | | - | 10459051 |
| 19010126 | 21SI-355 | 12 | 160 | N | 1 | 5/16 | #10 | #10 | 19010126 | 10459336 |
| 19010147 | 21SI-355 | 12 | 130 | N | 1 | 5/16 | #10 | #10 | 19020302 | 10459037 |
| 19010154 | 21SI-350 | 12 | 100 | N | 2 | 1/4 | PIN | #10 | 19020308 | 10459013 |
| 19010156 | 21SI-355 | 12 | 145 | N | 2 | 1/4 | PIN | #10 | 19020310 | 10459051 |
| 19010166 | 21SI-355 | 12 | 115 | N | 1 | 1/4 | PIN | | 19010166 | 10459037 |
| 19010168 | 21SI-355 | 12 | 145 | N | 1 | 5/16 | #10 | #10 | 19010126 | 10459462 |
| 19010181 | 21SI-350 | 12 | 100 | N | 1 | 5/16 | #10 | #10 | 19010181 | 10459013 |
| 19010182 | 21SI-350 | 24 | 70 | N | 1 | M6 | M4 | M4 | 19010182 | 10461235 |
| 19010197 | 21SI-355 | 12 | 100 | N | 3 | 5/16 | #10 | | 19020386 | 10459374 |
| 19010200 | 21SI-350 | 24 | 70 | N | 1 | 1/4 | PIN | #10 | 19010200 | 10459261 |
| 19010210 | 21SI-355 | 12 | 115 | N | 1 | 1/4 | PIN | | - | 10459037 |

22SI Series

| Model | Series | Volts | Amps | Grd | Mounting | No. of Wires | Battery Term | R-Term | I-Term | Service Part Number | Reman Part Number |
|----------|----------|-------|------|-----|----------|--------------|--------------|--------|--------|---------------------|-------------------|
| 19020300 | 22SI-355 | 12 | 100 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19020300 | 10459188 |
| 19020302 | 22SI-355 | 12 | 130 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19020302 | 10459189 |
| 19020303 | 22SI-355 | 12 | 145 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19020303 | 10459190 |
| 19020304 | 22SI-355 | 12 | 130 | N | 3-LUG | 2 | 1/4 | PIN | #10 | 19020304 | - |
| 19020305 | 22SI-355 | 12 | 100 | N | 3-LUG | 2 | 1/4 | PIN | #10 | 19020305 | 10459204 |
| 19020306 | 22SI-355 | 12 | 145 | N | 3-LUG | 2 | 1/4 | PIN | #10 | 19020306 | 10459205 |
| 19020307 | 22SI-355 | 24 | 70 | N | 3-LUG | 1 | M6 | M4 | M4 | 19020307 | 10459306 |
| 19020308 | 22SI-355 | 12 | 100 | N | 3-LUG | 1 | 1/4 | #10 | #10 | 19020308 | - |
| 19020309 | 22SI-355 | 12 | 130 | N | 3-LUG | 1 | 1/4 | #10 | #10 | 19020309 | - |
| 19020310 | 22SI-355 | 12 | 150 | N | 3-LUG | 1 | 1/4 | #10 | #10 | 19020310 | - |
| 19020311 | 22SI-355 | 24 | 70 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19020346 | - |
| 19020312 | 22SI-355 | 12 | 100 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19020312 | 10459360 |
| 19020345 | 22SI-355 | 12 | 145 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19020345 | - |
| 19020346 | 22SI-355 | 24 | 70 | N | 3-LUG | 1 | M6 | M4 | M4 | 19020346 | 10459333 |
| 19020356 | 22SI-355 | 12 | 130 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19020309 | - |
| 19020360 | 22SI-355 | 12 | 100 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19020312 | 10459360 |
| 19020362 | 22SI-355 | 12 | 100 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19020312 | 10459360 |
| 19020364 | 22SI-355 | 12 | 145 | N | 3-LUG | 1 | 1/4 | PIN | #10 | - | 10459190 |
| 19020366 | 22SI-355 | 24 | 50 | N | 3-LUG | 1 | M6 | M4 | M4 | 19020346 | 10459468 |
| 19020377 | 22SI-355 | 12 | 100 | N | 3-LUG | 1 | 5/16 | #10 | #10 | - | 10459188 |
| 19020386 | 22SI-355 | 12 | 130 | N | 3-LUG | 3 | 5/16 | #10 | BLADE | 19020386 | - |
| 19020387 | 22SI-355 | 12 | 100 | N | PAD | 1 | 5/16 | #10 | #10 | 19020387 | 10459318 |
| 19020388 | 22SI-355 | 12 | 130 | N | PAD | 1 | 5/16 | #10 | #10 | 19020388 | 10459320 |
| 19020389 | 22SI-355 | 12 | 145 | N | PAD | 1 | 5/16 | #10 | #10 | 19020389 | 10459321 |
| 19020391 | 22SI-355 | 24 | 70 | N | 3-LUG | 3 | M6 | M4 | BLADE | 19020307 | 10459334 |
| 19020396 | 22SI-355 | 12 | 100 | N | 3-LUG | 1 | 5/16 | #10 | - | 19020396 | - |
| 19020800 | 22SI-355 | 12 | 130 | N | 3-LUG | 1 | 5/16 | - | #10 | 19020800 | - |
| 19020801 | 22SI-355 | 12 | 130 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19020801 | 10459189 |
| 19020802 | 22SI-355 | 12 | 145 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19020802 | 10459190 |
| 19020803 | 22SI-355 | 12 | 130 | N | PAD | 1 | 5/16 | #10 | #10 | 19020803 | 10459320 |
| 19020804 | 22SI-355 | 12 | 145 | N | PAD | 2 | 5/16 | #10 | #10 | 19020804 | 10459321 |
| 19020806 | 22SI-355 | 12 | 100 | N | 3-LUG | 1 | 5/16 | #10 | #10 | - | 10459188 |
| 19020808 | 22SI-355 | 12 | 100 | N | PAD | 1 | 5/16 | #10 | #10 | - | 10459318 |
| 19020888 | 22SI-355 | 12 | 130 | N | PAD | 1 | 5/16 | #10 | #10 | 19020888 | - |
| 19020889 | 22SI-355 | 12 | 150 | N | PAD | 1 | 5/16 | #10 | #10 | 19020889 | - |

23SI Series

| Model | Series | Volts | Amps | Grd | Mounting | No. of Wires | Battery Term | R-Term | I-Term | Service Part Number | Reman Part Number |
|----------|----------|-------|------|-----|----------|--------------|--------------|--------|--------|---------------------|-------------------|
| 19011003 | 23SI-455 | 12 | 145 | N | 3-LUG | 1 | 1/4 | #10 | #10 | - | 10459277 |
| 19011009 | 23SI-455 | 12 | 100 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19011009 | 10459275 |
| 19011015 | 23SI-450 | 24 | 50 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19011015 | - |
| 19011016 | 23SI-455 | 12 | 100 | N | 3-LUG | 1 | 5/16 | #10 | #10 | - | 10459294 |
| 19011017 | 23SI-455 | 12 | 130 | N | 3-LUG | 1 | 5/16 | #10 | #10 | - | 10459303 |
| 19011019 | 23SI-450 | 24 | 70 | N | 3-LUG | 1 | 5/16 | #10 | #10 | 19011019 | - |
| 19011022 | 23SI-455 | 12 | 130 | N | PAD | 1 | 1/4 | #10 | #10 | 19011022 | 8700015 |
| 19011023 | 23SI-455 | 12 | 100 | N | PAD | 1 | 1/4 | PIN | #10 | 19011023 | 8700014 |



33SI Series

| Model | Series | Volts | Amps | Grd | Mounting | No. of Wires | Battery Term | R-Term | I-Term | Service Part Number | Reman Part Number |
|----------|----------|-------|------|-----|----------|--------------|--------------|--------|--------|---------------------|-------------------|
| 19011150 | 33SI-455 | 12 | 110 | N | 3-LUG | 1 | 1/4 | #10 | #10 | 19011228 | 8700023 |
| 19011151 | 33SI-455 | 12 | 110 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19011228 | 8700024 |
| 19011152 | 33SI-455 | 12 | 135 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19011229 | 10459609 |
| 19011153 | 33SI-450 | 24 | 100 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19011153 | 10459196 |
| 19011154 | 33SI-455 | 12 | 110 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 8600064 | 8700024 |
| 19011155 | 33SI-455 | 12 | 135 | N | 3-LUG | 1 | 1/4 | #10 | #10 | 19011232 | 8700000 |
| 19011156 | 33SI-455 | 12 | 135 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 8600064 | 10459609 |
| 19011158 | 33SI-455 | 12 | 110 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19011228 | 8700024 |
| 19011159 | 33SI-455 | 12 | 135 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19011229 | 10459609 |
| 19011160 | 33SI-455 | 12 | 110 | N | 3-LUG | 1 | 1/4 | PIN | #10 | - | 8700024 |
| 19011161 | 33SI-455 | 12 | 135 | N | 3-LUG | 1 | 1/4 | PIN | #10 | - | 10459609 |
| 19011165 | 33SI-450 | 24 | 100 | I | 3-LUG | 1 | 1/4 | PIN | #10 | 19011165 | 10459359 |
| 19011166 | 33SI-450 | 32 | 60 | I | 3-LUG | 1 | 1/4 | PIN | #10 | 19011166 | - |
| 19011171 | 33SI-455 | 12 | 135 | N | 3-LUG | 2 | 1/4 | #10 | #10 | 19011248 | - |
| 19011200 | 33SI-455 | 12 | 135 | N | 3-LUG | 2 | 1/4 | #10 | #10 | 19011260 | 10459612 |
| 19011210 | 33SI-450 | 24 | 75 | N | 3-LUG | 1 | 1/4 | PIN | #10 | 19011210 | - |
| 19011211 | 33SI-455 | 12 | 110 | N | 3-LUG | 1 | 1/4 | #10 | #10 | 19011263 | 8700023 |
| 19011212 | 33SI-455 | 12 | 135 | N | 3-LUG | 1 | 1/4 | #10 | #10 | 19011264 | 8700016 |
| 19011223 | 33SI-450 | 24 | 100 | N | 3-LUG | 1 | 1/4 | #10 | #10 | 19011223 | - |

34SI Series

| Model | Series | Volts | Amps | Grd | Mounting | No. of Wires | Battery Term | R-Term | I-Term | Service Part Number | Reman Part Number |
|-----------|----------|-------|------|-----|------------|--------------|--------------|--------|--------|---------------------|-------------------|
| 19011157 | 34SI-455 | 12 | 110 | N | Quad Mount | 1 | 1/4 | #10 | #10 | 19011228 | 8700025 |
| 19011167 | 34SI-455 | 12 | 135 | N | Quad Mount | 1 | 1/4 | #10 | #10 | 19011244 | 10459610 |
| 19011168 | 34SI-450 | 24 | 100 | N | Quad Mount | 1 | 1/4 | PIN | #10 | 19011168 | 10459199 |
| 19011169 | 34SI-455 | 12 | 110 | N | Quad Mount | 1 | 1/4 | PIN | #10 | 8600065 | 8700017 |
| 19011170 | 34SI-455 | 12 | 135 | N | Quad Mount | 1 | 1/4 | PIN | #10 | 8600064 | 8700016 |
| 19011172* | 34SI-455 | 12 | 135 | N | Quad Mount | 2 | 1/4 | #10 | #10 | 8600065 | - |
| 19011176 | 34SI-455 | 12 | 110 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011176 | 10459608 |
| 19011177 | 34SI-455 | 12 | 135 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011177 | 10459611 |
| 19011179* | 34SI-455 | 12 | 135 | N | Quad Mount | 2 | 1/4 | #10 | #10 | 19011255 | 8700003 |
| 19011187* | 34SI-455 | 12 | 135 | N | Pad Mount | 2 | 1/4 | #10 | #10 | 19011258* | 8700004 |
| 19011191 | 34SI-450 | 24 | 75 | N | Quad Mount | 1 | 1/4 | PIN | #10 | 19011191 | - |
| 19011201* | 34SI-455 | 12 | 135 | N | Quad Mount | 2 | 1/4 | #10 | #10 | 19011255* | 10459613 |
| 19011202* | 34SI-455 | 12 | 135 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011202* | 10459614 |
| 19011214 | 34SI-455 | 12 | 135 | N | Quad Mount | 1 | 1/4 | #10 | #10 | 19011266 | 10459610 |
| 19011215 | 34SI-455 | 12 | 110 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011267 | 10459608 |
| 19011216 | 34SI-455 | 12 | 135 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011268 | 10459611 |

* Remote Sense

35SI Series

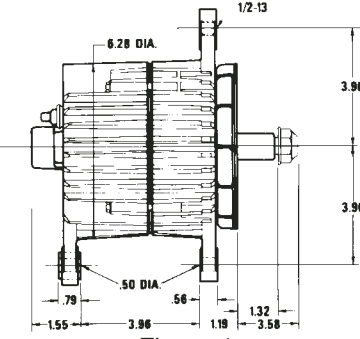
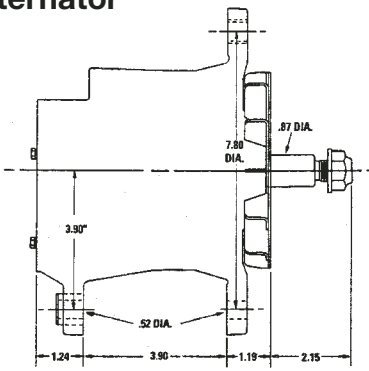
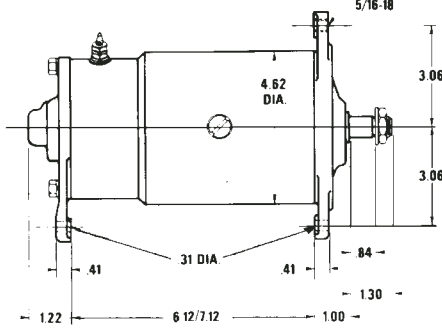
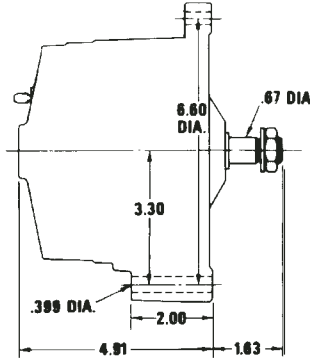
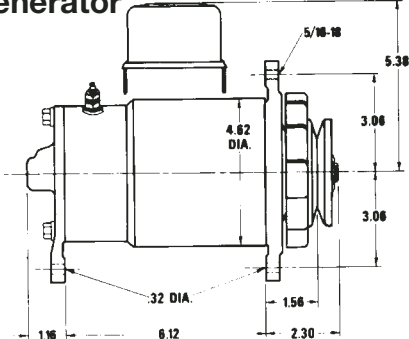
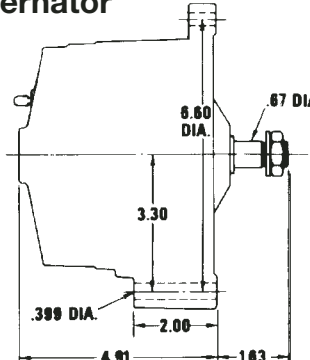
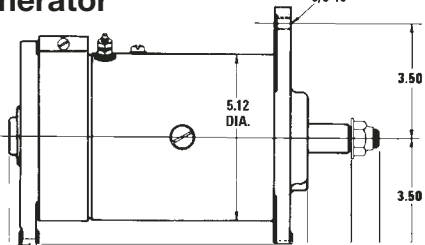
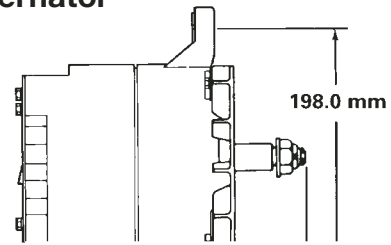
| Model | Series | Volts | Amps | Grd | Mounting | No. of Wires | Battery Term | R-Term | I-Term | Service Part Number | Reman Part Number |
|-----------|----------|-------|------|-----|------------|--------------|--------------|--------|--------|---------------------|-------------------|
| 19011227 | 35SI-455 | 12 | 110 | N | 3-Lug | 1 | 1/4 | #10 | #10 | 19011227 | 8700023 |
| 19011228 | 35SI-455 | 12 | 110 | N | 3-Lug | 1 | 1/4 | PIN | #10 | 19011228 | 10459606 |
| 19011229 | 35SI-455 | 12 | 135 | N | 3-Lug | 1 | 1/4 | PIN | #10 | 19011229 | 10459609 |
| 19011231 | 35SI-455 | 12 | 110 | N | 3-Lug | 1 | 1/4 | PIN | #10 | 19011231 | 8700024 |
| 19011232 | 35SI-455 | 12 | 135 | N | 3-Lug | 1 | 1/4 | #10 | #10 | 19011232 | 8700000 |
| 19011233 | 35SI-455 | 12 | 135 | N | 3-Lug | 1 | 1/4 | PIN | #10 | 19011233 | - |
| 19011234 | 35SI-455 | 12 | 110 | N | Quad Mount | 1 | 1/4 | #10 | #10 | 19011234 | 10459607 |
| 19011244 | 35SI-455 | 12 | 135 | N | Quad Mount | 1 | 1/4 | #10 | #10 | 19011244 | 10459610 |
| 19011246 | 35SI-455 | 12 | 110 | N | Quad Mount | 1 | 1/4 | PIN | #10 | 19011246 | 8700025 |
| 19011247 | 35SI-455 | 12 | 135 | N | Quad Mount | 1 | 1/4 | PIN | #10 | 19011247 | - |
| 19011248* | 35SI-455 | 12 | 135 | N | 3-Lug | 2 | 1/4 | #10 | #10 | 19011248* | 8700026 |
| 19011249* | 35SI-455 | 12 | 135 | N | Quad Mount | 2 | 1/4 | #10 | #10 | 19011249* | 8700027 |
| 19011252 | 35SI-455 | 12 | 110 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011252 | 10459608 |
| 19011253 | 35SI-455 | 12 | 135 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011253 | 10459611 |
| 19011255* | 35SI-455 | 12 | 135 | N | Quad Mount | 2 | 1/4 | #10 | #10 | 19011255* | 8700003 |
| 19011258* | 35SI-455 | 12 | 135 | N | Pad Mount | 2 | 1/4 | #10 | #10 | 19011258* | 8700004 |
| 19011260* | 35SI-455 | 12 | 135 | N | 3-Lug | 2 | 1/4 | #10 | #10 | 19011260* | 10459612 |
| 19011261* | 35SI-455 | 12 | 135 | N | Quad Mount | 2 | 1/4 | #10 | #10 | 19011261* | 10459613 |
| 19011262* | 35SI-455 | 12 | 135 | N | Pad Mount | 2 | 1/4 | #10 | #10 | 19011262* | 10459614 |
| 19011263 | 35SI-455 | 12 | 110 | N | 3-Lug | 1 | 1/4 | #10 | #10 | 19011263 | 8700028 |
| 19011264 | 35SI-455 | 12 | 135 | N | 3-Lug | 1 | 1/4 | #10 | #10 | 19011264 | 8700005 |
| 19011265 | 35SI-455 | 12 | 110 | N | Quad Mount | 1 | 1/4 | #10 | #10 | 19011265 | 8700029 |
| 19011266 | 35SI-455 | 12 | 135 | N | Quad Mount | 1 | 1/4 | #10 | #10 | 19011266 | 8700006 |
| 19011267 | 35SI-455 | 12 | 110 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011267 | 8700030 |
| 19011268 | 35SI-455 | 12 | 135 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011268 | 8700007 |
| 19011272 | 35SI-455 | 12 | 110 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011272 | 8700001 |
| 19011273 | 35SI-455 | 12 | 135 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 19011273 | 8700002 |
| 8600145* | 35SI-455 | 12 | 135 | N | Pad Mount | 2 | 1/4 | #10 | #10 | 8600145* | - |

* Remote Sense

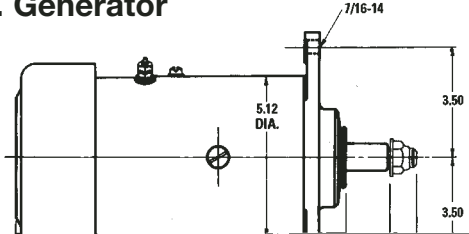
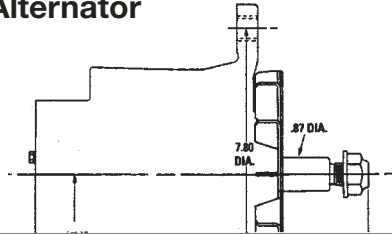
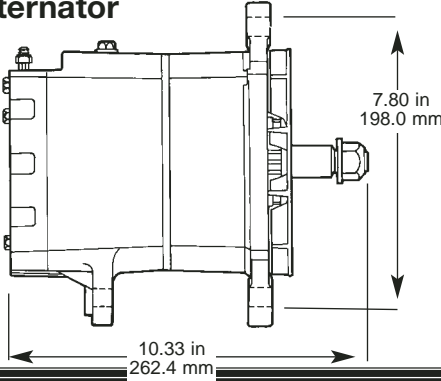
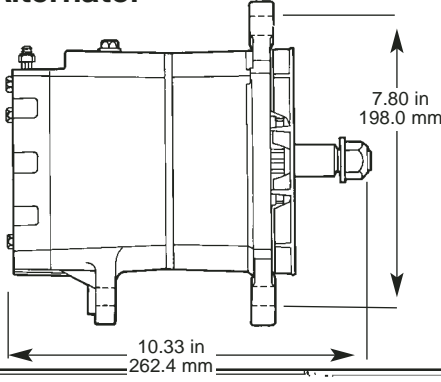
36SI Series

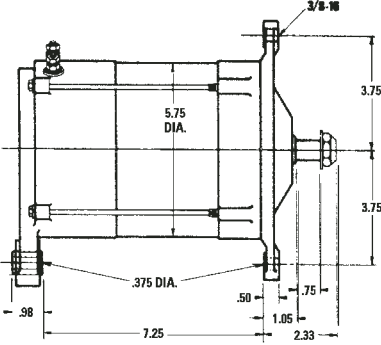
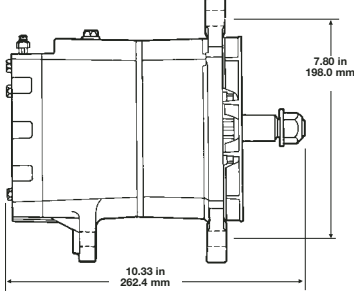
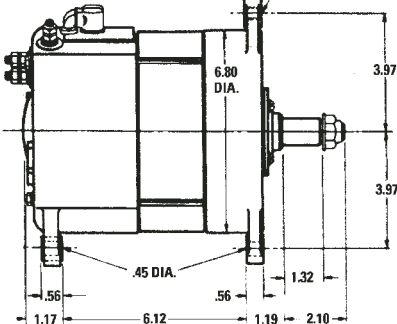
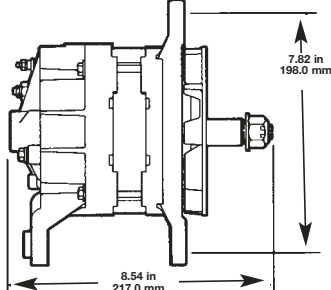
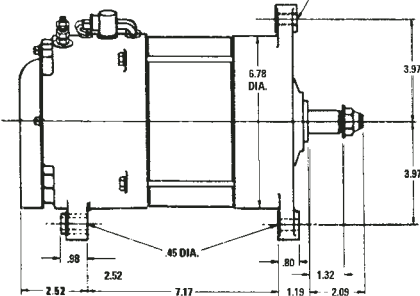
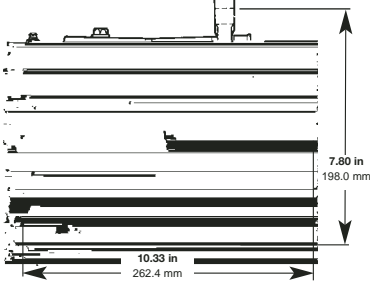
| Model | Series | Volts | Amps | Grd | Mounting | No. of Wires | Battery Term | R-Term | I-Term | Service Part Number | Reman Part Number |
|----------|--------|-------|------|-----|------------|--------------|--------------|--------|--------|---------------------|-------------------|
| 8600015 | 36SI | 12 | 165 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 8600015 | 8700039 |
| 8600060* | 36SI | 12 | 165 | N | Pad Mount | 2 | 1/4 | #10 | #10 | 8600060* | 8700040 |
| 8600071* | 36SI | 12 | 165 | N | Quad Mount | 2 | 1/4 | #10 | #10 | 8600071* | - |
| 8600072* | 36SI | 12 | 165 | N | 3-Lug | 2 | 1/4 | #10 | #10 | 8600072* | - |
| 8600073* | 36SI | 12 | 165 | N | Pad Mount | 2 | 1/4 | #10 | #10 | 8600073* | - |
| 8600082* | 36SI | 12 | 165 | N | 3-Lug | 2 | 1/4 | #10 | #10 | 8600082* | 8700041 |
| 8600110 | 36SI | 24 | 95 | N | Quad Mount | 1 | 1/4 | PIN | #10 | 8600110 | - |
| 8600202 | 36SI | 12 | 165 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 8600202 | 8700047 |
| 8600203 | 36SI | 12 | 160 | N | Pad Mount | 2 | 1/4 | #10 | #10 | 8600203 | 8700067 |
| 8600248 | 36SI | 12 | 165 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 8600248 | 8700047 |
| 8600252 | 36SI | 12 | 165 | N | Pad Mount | 1 | 1/4 | #10 | #10 | 8600252 | 8700047 |

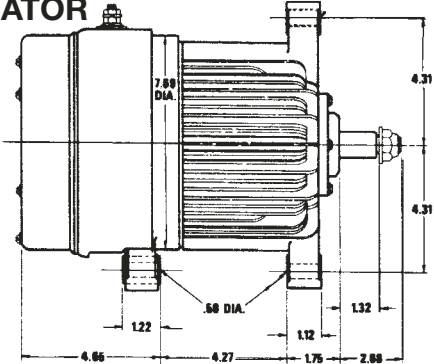
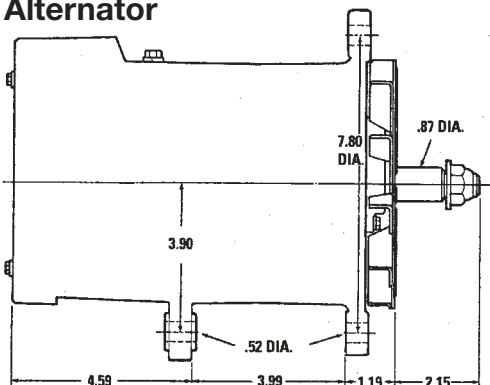
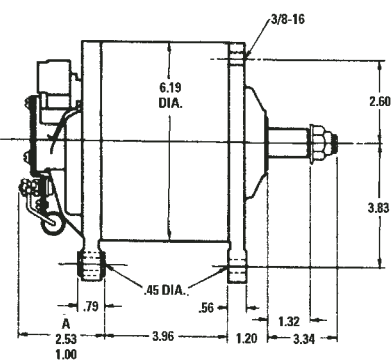
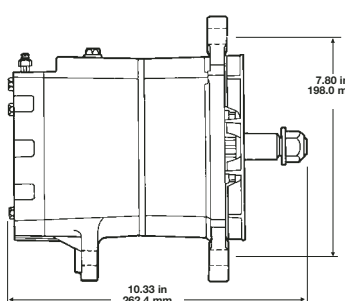
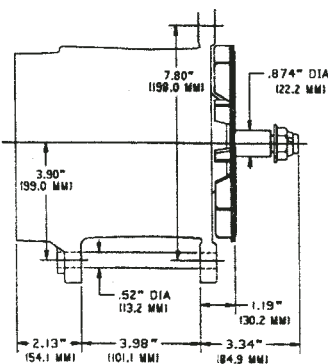
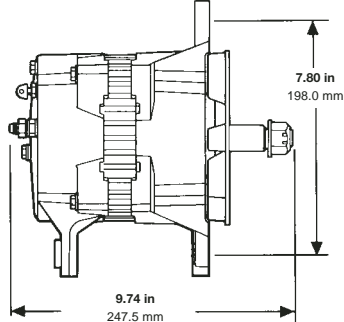
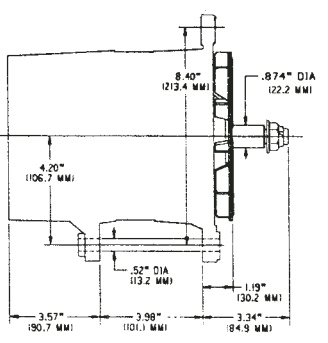
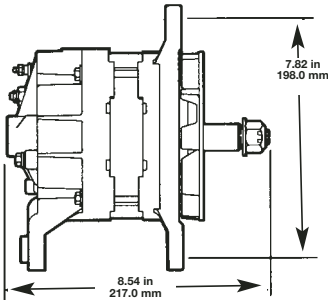
* Remote Sense

| Discontinued Models | Recommended Replacement Models |
|--|--|
| <p>10DN Generator</p>  <p>Figure 1</p> | <p>20SI Alternator</p>  |
| <p>D.C. Generator</p>  <p>Figure 2</p> | <p>10SI Alternator</p>  |
| <p>D.C. Generator</p>  <p>Figure 3</p> | <p>10SI Alternator</p>  |
| <p>D.C. Generator</p>  <p>Figure 4</p> | <p>20SI Alternator</p>  |

Discontinued Generators

| Discontinued Models | Recommended Replacement Models |
|--|---|
| <p>D.C. Generator</p>  <p>Figure 5</p> | <p>20SI Alternator</p>  |
| <p>D.C. Generator</p> <p>Figure 6</p> | <p>20SI Alternator</p> |
| <p>D.C. Generator</p> <p>Figure 7</p> | <p>33SI Alternator</p>  |
| <p>D.C. Generator</p> <p>Figure 8</p> | <p>33SI Alternator</p>  |

| Discontinued Models | Recommended Replacement Models |
|---|--|
| <p>30DN Generator</p>  <p>Figure 10</p> | <p>33SI Alternator</p>  |
| <p>40DN Generator</p>  <p>Figure 11</p> | <p>22SI Alternator</p>  |
| <p>41DN Generator</p>  <p>Figure 12</p> | <p>33SI Alternator</p>  |

| Discontinued Models | Recommended Replacement Models |
|--|---|
| <p>GENERATOR</p>  <p>Figure 13</p> | <p>26SI Alternator</p>  |
| <p>20DN</p>  <p>Figure 14</p> | <p>33SI Alternator</p>  |
| <p>29SI</p>  <p>Figure 15</p> | <p>23SI Alternator</p>  |
| <p>40SI</p>  <p>Figure 16</p> | <p>22SI Alternator</p>  |

Discontinued Models

Recommended Replacement Models

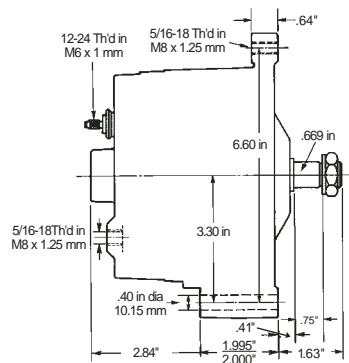
10SI


Figure 17

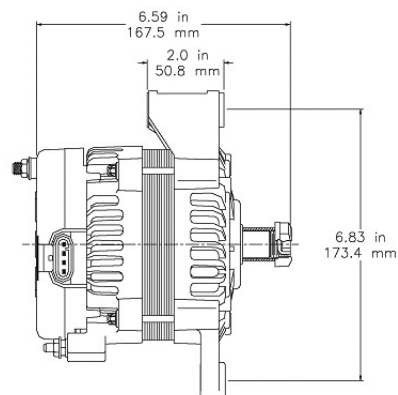
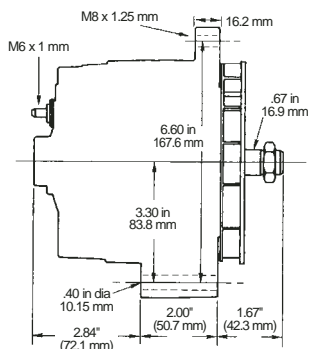
11SI

12SI


Figure 18

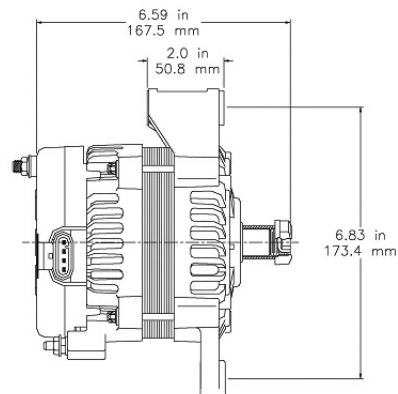
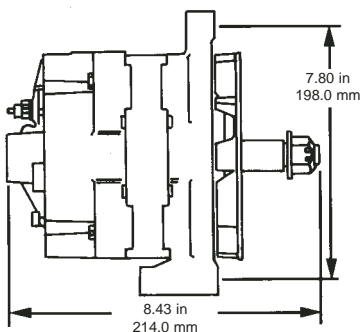
11SI

19SI


Figure 19

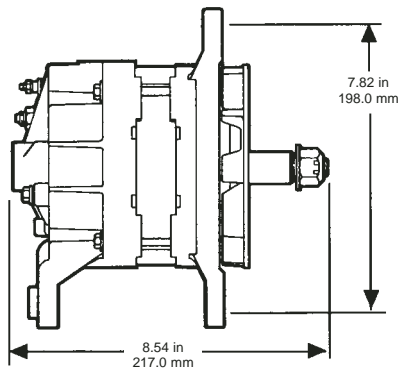
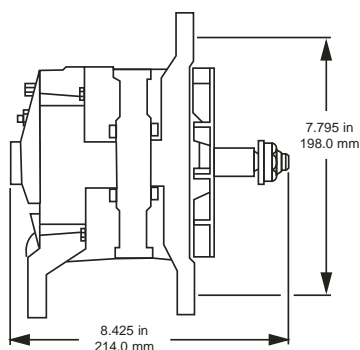
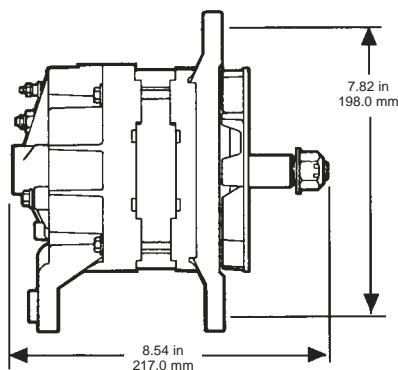
22SI

21SI


Figure 20

22SI


25/26SI Regulator Retrofit Kit

Make a Good Thing Better...

Make your 25SI generator better than new! The next time your trusted Delco Remy 25SI brushless generator is scheduled for overhaul or repair, you can significantly improve it by adding the proper 25/26SI Regulator Retrofit Kit. No matter how old your 25SI is, this kit will upgrade its electronics to current state-of-the-art 26SI technology.

The integrated-circuit regulator is designed for low parasitic draw and features a low turn-on speed. A special diode-trip/capacitor assembly provides superior radio frequency interference (RFI) suppression. Standard load dump protection guards the generator against voltage spikes caused by loose connections or interruptions in the charging line.

Easy to Install

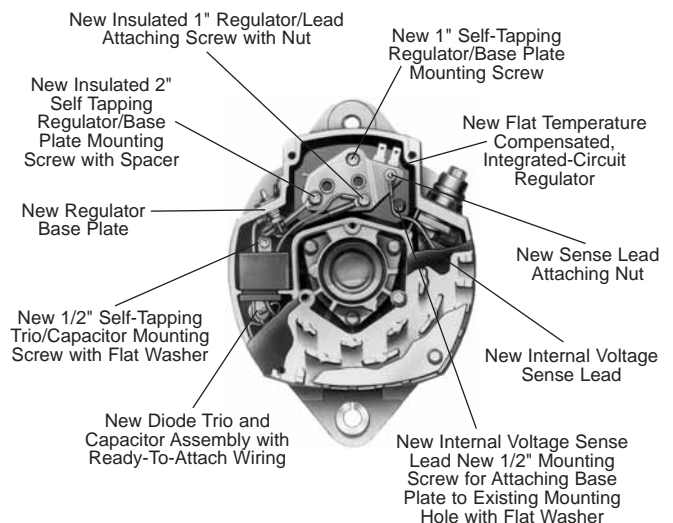
To add these improved features, we've replaced the old circuit board 25SI regulator with a new integrated circuit regulator and a separate, encapsulated diode tri/capacitor assembly. After drilling three simple holes, everything fits like a glove under the rectifier end cover. Wires are all pre-made to precise lengths and fitted with ready-to-attach terminals. All necessary hardware is included (thread seal-ant and silicone dielectric grease are sold separately). Each kit has illustrated, step-by-step instructions that make installation a snap!

Make A Good Thing Better

When your 25SI generator is due for overhaul or repair, call your Delco Remy parts supplier and order the proper 25/26SI Regulator Retrofit Kit (see table). Incorporate this kit into your rebuild process and you'll end up with a generator that's better than ever.

| System | Regulator Set Point Voltage | Retrofit Kit Part Number |
|--------------------|-----------------------------|--------------------------|
| 24 Volt (standard) | 27.8 | 10457127 |

NOTE: Requires high temperature thread adhesive/sealant compound and silicon and electric grease, sold separately.



35SI, 35SI HP and 36SI HP Upgrade Program

Many trucks on the road today are equipped with Delco Remy 33SI, 34SI and 35SI premiums brushless alternators. The truck OEM's and truck owners know that these products offer exceptional cost per mile benefits. To keep these trucks operating with the best charging system, it is important to maintain this specification upon replacement.

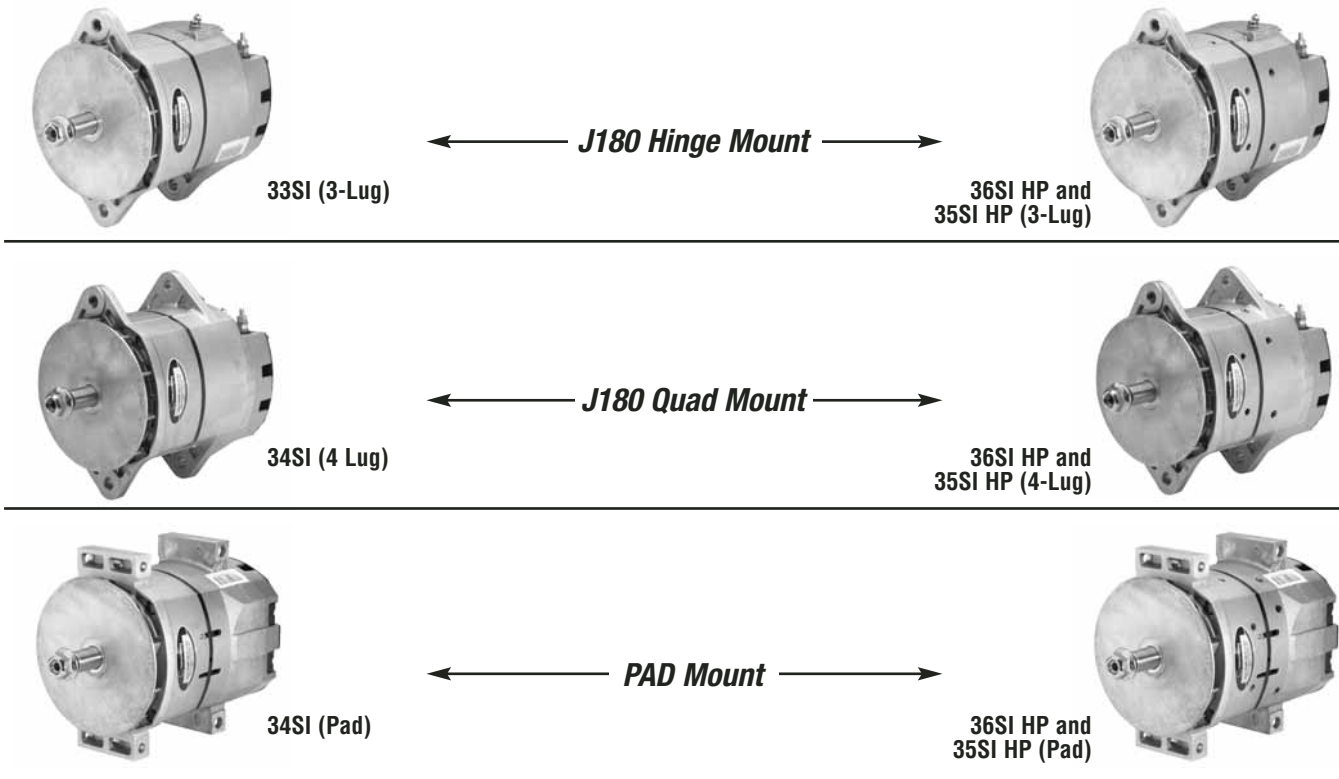
Now, in addition to the 35SI HP upgrade program, the 170 Amp-100 Amp at Idle 36SI HP with heat resistant design, has been added to the upgrade program and includes a core consolidation policy. With the addition of the 36SI HP Upgrade Program, you can convert any 33SI, 34SI or 35SI to either the 35SI HP or the 36SI HP and receive full core credit for each 33SI, 34SI, or 35SI core returned.

Effective 1/1/06, 33SI, 34SI, 35SI, 35SI HP, 36SI and 36SI HP will become one core group based on mounting style.

Three Core Groups Separated By Similar Mounting Style

| REMOVED UNIT | REPLACEMENT UNIT 35SI OR 35SI HP | AMOUNT OF CORE CREDIT UP TO ELIGIBILITY |
|--------------|-------------------------------------|--|
| 33SI Hinge | See Chart on page 69 | Full Core Credit |
| 34SI QUAD | See Chart on page 69 | Full Core Credit |
| 34SI PAD | See Chart on page 69 | Full Core Credit |

Mounting Compatible Core Groups



35SI, 35SI HP and 36SI HP Upgrade Program

J180 Hinge Mount Upgrade and Core Group

| 33SI OE | 33SI Reman | Amps | 35SI Reman | 35SI HP Reman | 35SI HP New | Amps | 36SI HP Reman | 36SI HP New | Amps |
|----------------|-------------------|-------------|-------------------|----------------------|--------------------|-------------|----------------------|--------------------|--------------------|
| 19011150 | 10459144 | 110 | 8700023 | 8700016 | 8600064 | 140 | 8700046 | 8600126 | 170 (110@ Idle) |
| 19011151 | 10459143 | 110 | 10459606 | | | | | | |
| 19011152 | 10459142 | 135 | 10459609 | | | | | | |
| 19011154 | 10459143 | 110 | 8700024 | | | | | | |
| 19011155 | 10459141 | 135 | 8700000 | | | | | | |
| 19011156 | 10459142 | 135 | 8700005 | | | | | | |
| 19011171 | — | 135 | — | | | | | | |
| 19011174 | 10459143 | 110 | 10459606 | | | | | | |
| 19011200* | 10459450* | 135 | 10459612 | | | | | | |
| 19011211 | 10459144 | 110 | 8700028 | | | | | | |
| 19011212 | 10459141 | 135 | 8700005 | | | | | | |
| 35SI OE | 35SI Reman | Amps | 35SI Reman | 35SI HP Reman | 35SI HP New | Amps | 36SI HP Reman | 36SI HP New | Amps |
| 19011227 | 8700023 | 110 | Or | 8700016 | 8600064 | 140 | 8700046 | 8600126 | 170 (110@ Idle) |
| 19011228 | 10459606 | 110 | | | | | | | |
| 19011229 | 10459609 | 135 | | | | | | | |
| 19011231 | 8700024 | 110 | | | | | | | |
| 19011232 | 8700000 | 135 | | | | | | | |
| 19011233 | — | 135 | | | | | | | |
| 19011248 | 8700026 | 135 | | | | | | | |
| 19011260* | 10459612* | 135 | | | | | | | |
| 19011263 | 8700028 | 110 | | | | | | | |
| 19011264 | 8700005 | 135 | | | | | | | |

Quad Mount Upgrade and Core Group

| 34SI OE | 34SI Reman | Amps | 35SI Reman | 35SI HP Reman | 35SI HP New | Amps | 36SI HP Reman | 36SI HP New | Amps |
|----------------|-------------------|-------------|-------------------|----------------------|--------------------|-------------|----------------------|--------------------|--------------------|
| 19011157 | 10459145 | 110 | 10459607 | 8700017 | 8600065 | 140 | 8700045 | 8600125 | 170 (110@ Idle) |
| 19011167 | 10459206 | 135 | 10459610 | | | | | | |
| 19011169 | 10459145 | 110 | 8700025 | | | | | | |
| 19011170 | 10459206 | 135 | 10459610 | | | | | | |
| 19011172 | — | 135 | 8700027 | | | | | | |
| 19011213 | 10459145 | 110 | 8700029 | | | | | | |
| 19011214 | 10459206 | 135 | 8700006 | | | | | | |
| 19011179 | 10459287 | 135 | 8700003 | | | | | | |
| 19011201* | 10459451* | 135 | 10459613 | | | | | | |
| 19011214 | 10459206 | 135 | 8700006 | | | | | | |
| 35SI OE | 35SI Reman | Amps | 35SI Reman | 35SI HP Reman | 35SI HP New | Amps | 36SI HP Reman | 36SI HP New | Amps |
| 19011234 | 10459607 | 110 | Or | 8700017 | 8600065 | 140 | 8700045 | 8600125 | 170 (110@ Idle) |
| 19011244 | 10459610 | 135 | | | | | | | |
| 19011246 | 8700025 | 110 | | | | | | | |
| 19011247 | — | 135 | | | | | | | |
| 19011249 | 8700027 | 135 | | | | | | | |
| 19011255 | 8700003 | 135 | | | | | | | |
| 19011261* | 10459613* | 135 | | | | | | | |
| 19011265 | 8700029 | 110 | | | | | | | |
| 19011266 | 8700006 | 135 | | | | | | | |

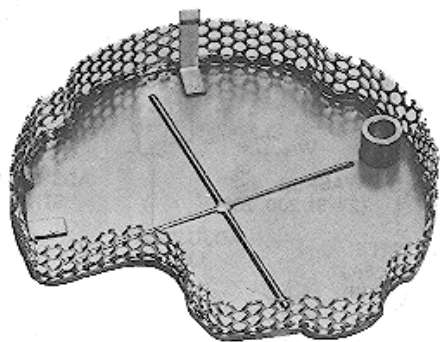
Pad Mount Upgrade and Core Group

| 34SI OE | 34SI Reman | Amps | 35SI Reman | 35SI HP Reman | 35SI HP New | Amps | 36SI HP Reman | 36SI HP New | Amps |
|----------------|-------------------|-------------|-------------------|----------------------|--------------------|-------------|----------------------|--------------------|--------------------|
| 19011176 | 10459279 | 110 | 10459608 | 8700018 | 8600066 | 140 | 8700047 | 8600127 | 170 (110@ Idle) |
| 19011177 | 10459278 | 135 | 10459611 | | | | | | |
| 19011187 | 10459288 | 135 | 8700004 | | | | | | |
| 19011202* | 10459449* | 135 | 10459614 | | | | | | |
| 19011215 | 10459279 | 110 | 8700030 | | | | | | |
| 19011216 | 10459278 | 135 | 8700007 | | | | | | |
| 35SI OE | 35SI Reman | Amps | 35SI Reman | 35SI HP Reman | 35SI HP New | Amps | 36SI HP Reman | 36SI HP New | Amps |
| 19011252 | 10459608 | 110 | Or | 8700018 | 8600066 | 140 | 8700047 | 8600127 | 170 (110@ Idle) |
| 19011253 | 10459611 | 135 | | | | | | | |
| 19011258 | 8700004 | 135 | | | | | | | |
| 19011262* | 10459614* | 135 | | | | | | | |
| 19011267 | 8700030 | 110 | | | | | | | |
| 19011268 | 8700007 | 135 | | | | | | | |
| 19011272 | 8700001 | 110 | | | | | | | |
| 19011273 | 8700002 | 135 | | | | | | | |

* Road Gang Model

All 35SI HP and 36 SI HP Models feature Remote Sense Technology™

| Chaff Shields | |
|---------------|-------------|
| Model | Part Number |
| 15SI/116 | 1979410 |
| 21SI | 10474067 |
| 34SI | 10500019 |



Protects generator from loose debris when harvesting normal crops. It is self-cleaning except when harvesting cotton, soybeans, etc. Under these conditions inspect and clean periodically. Easily detached for cleaning by removing one bolt.

| Wiring Relay Cable R-terminal | |
|-------------------------------|-------------|
| Size | Part Number |
| 34 gauge X 6' | 1969007 |



How to Select the Proper Alternator/Generator Pulley

A pulley ratio should be selected which allows the generator to carry 50% of the electrical load at engine idle. Higher output at idle may be required to obtain maximum battery life, by reducing battery cycling. Lower rpm should be used **only** if engine is at idle 10% or less of operating time. Required generator rpm vs output can be obtained from performance curve for each series.

To determine required pulley ratio:

Dividing required generator idle rpm by the engine idle rpm = the pulley ratio. Example — $1600 \div 650 = 2.5$; this means the generator must turn 2.5 times faster than the engine; therefore, the pulley ratio is 2.5:1 is considered minimum.

To determine required pulley size:

Generator pulley diameter (O.D.) is determined by the engine drive pulley. Divide engine pulley diameter by the pulley ratio determined above.

Example: $[9" \div 2.5 = 3.6" (3-5/8")]$ generator pulley diameter.

Pulley bore diameter is determined by the generator shaft diameter.

Belt width (W), number of grooves, and groove spacing (C&D) must match corresponding dimensions of the engine pulley.

Pulley hub to first groove (B) should provide good belt alignment with generator mounted to the engine.

The correct pulley part number can be obtained from the appropriate selection chart, if not, one can be machined from the corresponding pulley blank.

To check for generator over speed:

Multiply the top engine rpm at transmission shift points and/or top engine speed times the pulley ratio to determine generator rpm. The optimum rotor speed is approximately 6500 rpm for passenger and 5000 rpm for heavy-duty; however, speeds upward to 18,000 rpm for passenger car application and 12,000 rpm for heavy-duty at transmission shift points will not damage the generator.

Short battery life is often caused by excessive cycling, resulting from inadequate output at engine idle or maximum charging system rating. Changing pulley ratio and/or generator selection may be required to improve battery life.

To determine the present pulley ratio:

Divide the engine crank shaft pulley diameter by the generator pulley diameter.

To determine the output at engine idle:

Multiply the engine idle rpm times the pulley ratio to determine the generator rpm, and refer to the proper generator performance curve.

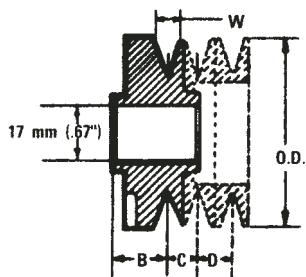
To determine the maximum charge rate:

Multiply the normal engine operating rpm by the pulley ratio to determine the generator rpm and refer to the performance curve.

Pulley Selection

Pulleys for 17 mm (.67") Diameter Shaft Alternators

10SI, 12SI, 15SI, 17SI, 27SI-100



OD - Outside Diameter

W - Groove Width

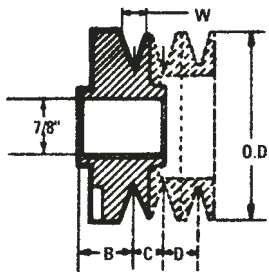
B - Hub to 1st Groove Center

C - 1st Groove to 2nd Groove Center

| Part No. | Grooves | Angle | OD | | W | | B | | C | | Material |
|----------|---------|-------|----|------|------|-----|------|-----|------|-----|----------|
| | | | MM | IN | MM | IN | MM | IN | MM | IN | |
| 1846529 | 1 | 38 | 76 | 3.30 | 15.7 | .62 | 14.2 | .56 | 15.7 | .62 | BS |
| 1949916 | 1 | 36 | 79 | 3.12 | 12.7 | .50 | 21.3 | .84 | 15.7 | .62 | BS |
| 1961261 | 1 | 36 | 76 | 3.00 | 12.7 | .50 | 14.2 | .56 | — | — | BS |
| 1962590 | 2 | 38 | 76 | 3.00 | 15.7 | .62 | 14.2 | .56 | 15.7 | .62 | BS |
| 1970830 | 2 | 36 | 66 | 2.60 | 9.6 | .38 | 12.7 | .50 | 15.7 | .62 | BS |

Pulleys for 22 mm (.87") Diameter Shaft Alternators

10SI, 20SI, 21SI, 22SI, 25SI, 26SI, 27SI, 29SI, 30SI & 40SI



OD - Outside Diameter

W - Groove Width

B - Hub to 1st Groove Center

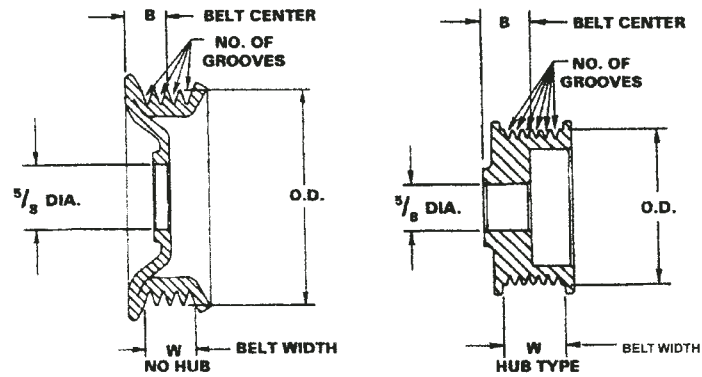
C - 1st Groove to 2nd Groove Center

| Pulley Part No. | No. Of Grooves | Groove Angle | OD | | W | | B | | C | | Material |
|-----------------|----------------|--------------|----------------|------|------|-----|--------------------|-----|------|-----|----------|
| | | | MM | IN | MM | IN | MM | IN | MM | IN | |
| BS = Bar Steel | | | CI = Cast Iron | | | | SS = Stamped Steel | | | | |
| 830279 | 2 | 36 | 83 | 3.27 | 12.7 | .50 | 16.8 | .66 | 17.3 | .68 | BS |
| 1893058 | 2 | 36 | 63 | 2.48 | 12.7 | .50 | 12.2 | .48 | 15.7 | .62 | BS |
| 1962567 | 2 | 36 | 76 | 3.00 | 12.7 | .50 | 14.2 | .56 | 15.7 | .62 | BS |

* 4 fan holes 12-24 UNC on .8125 radius

Multi-Pulleys for 17 mm (.67") Diameter Shaft Alternators

10SI, 12SI, 15SI, 17SI & 27SI



Multi-Pulleys for 17 mm (.67") Diameter Shaft Alternators

| Pulley Part No. | No. Of Grooves | OD=Dia | | W=Width | | B=Location | | Hub | Material |
|--------------------|-------------------|----------------|------|---------|------|-------------------|------|-----|----------|
| | | MM | IN | MM | IN | MM | IN | | |
| | | BS = Bar Steel | | | | RS = Rolled Steel | | | |
| 10498016 | 8K | 60 | 2.37 | 28.5 | 1.12 | 26.5 | 1.06 | Y | BS |

Multi-Vee Pulleys for 21SI, 22SI (.87") Diameter

| Pulley Part No. | No. Of Grooves | OD=Dia | | W=Width | | B=Location | | Hub | Material |
|--------------------|-------------------|----------------|------|---------|------|-------------------|-----|-----|----------|
| | | MM | IN | MM | IN | MM | IN | | |
| | | BS = Bar Steel | | | | RS = Rolled Steel | | | |
| 10468526 | 8K | 87 | 3.43 | 24.9 | .98 | 20.3 | .80 | Y | BS |
| 10499362 | 8K | 57 | 2.24 | 28.5 | 1.12 | 20.3 | .80 | Y | BS |

©1987810 - Use with 1987801 Tapered Collar.

Pulley Selection

Fans for SI Alternators

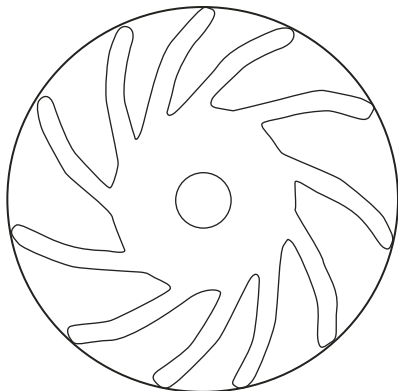
| Series/Type | Fan No. | Rotation | Shaft Size | Fan Dia |
|-----------------------------|------------|----------|------------|---------|
| 10SI/100, 102, 116 | 1959703 | EITHER | 5/8" | 5.5" |
| 10SI/136, 20SI | 1970593 | EITHER | 7/8" | 5.5" |
| 12SI/100 | 1959703 | CW | 5/8" | 5.5" |
| 15SI/100, 116; 17SI100 | 1959703 | CW | 5/8" | 5.75" |
| 30SI & 33SI, 34SI, 40SI/150 | 10467133 | EITHER | 7/8" | 6.5" |
| 20SI, 21SI, 22SI | 10467272* | EITHER | 7/8" | 5.75" |
| 20SI & 21SI, 22SI | 10471121** | CW | 7/8" | 5.75" |

* Cast Aluminum

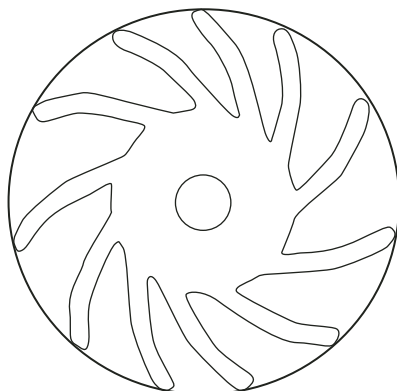
CW — Clockwise

**Quiet Fan

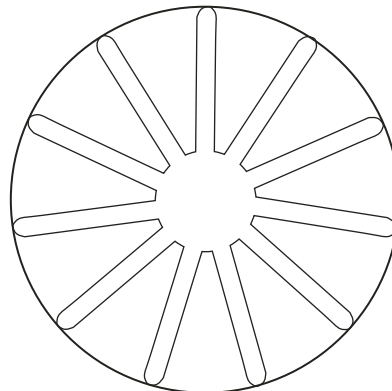
NOTE: In high debris areas, ensure that the screen is kept clear to ensure adequate air flow or use flexible hosing to direct sufficient clean air flow for cooling.



CW Fan



CCW Fan



REV Fan

NOTE: When looking down into fan blades, a CCW rotation fan will have a blade on the right portion welded-on blade while a CW fan will have the blade in the left portion. Note position of aligning slot.

Mounting Hardware Recommendations

Mounting Hardware Recommendations

20SI; 21SI; 26SI; 27SI/200, 202, 205 and 29SI Series

Heavy-Duty Alternator Integral Charging System

The most successful mounting position for the alternator is close in and central on the engine. Mounting brackets and adjusting braces must have strong and large enough attaching hardware to stay secure and rigid to the engine.

To maximize bearing and belt life, use dynamically balanced pulleys and as short of distance between engine and pulleys as possible.

To secure the generator to the mounting brackets and adjusting brace, use the following flanged bolts, flanged nuts and hardened steel flatwashers where applicable:

1. **Bolt Grade SAE #5.** Use grade #5 or higher. Bolt grades can be identified by markings on the bolt head as illustrated below. The SAE bolt grade is the number of marks plus 2. Bolts should be torqued to 60-70 foot-pounds.
2. **Bolts should be torqued to 60-70 foot pounds.**



SAE #5

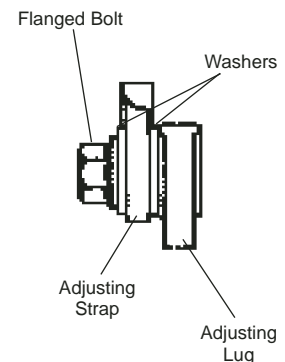
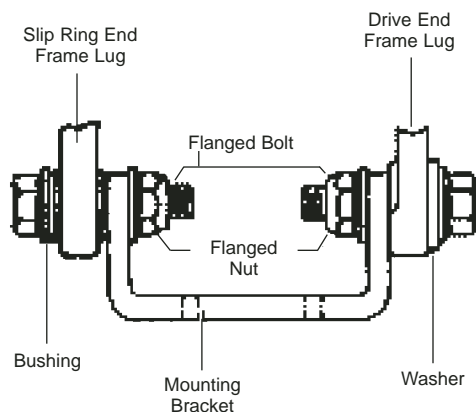
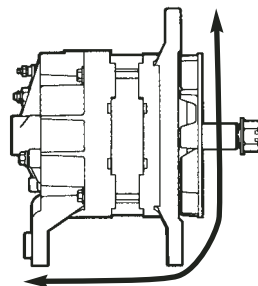


SAE #7



SAE #8

SAE: J180 Mounting



22SI HP Brush Alternator

Optimized stator and winding design results in a high performance unit that produces 150 Amps of high-end current

Radial brush construction has the highest brush volume and length in the class for exceptional durability

Advanced slip-ring assembly and rotor machining process minimizes brush bounce and reduces dynamic wear

Built-in single-wire “auto-start” immediately energizes system at start-up

“Avalanche” diodes help protect the unit and other electronics from potential electrical spike damage

62mm heavy duty drive-end bearings are capable of enduring heavy belt loads and high-vibration environments

Internal shaft construction features high-strength steel for durable performance

The re-engineered 22SI HP™ high performance heavy duty alternator from Remy Inc. combines 150 Amps of power with low internal heat production and rugged construction. The 22SI HP provides the most efficient weight-to-output ratio of any brush- type alternator in its class.



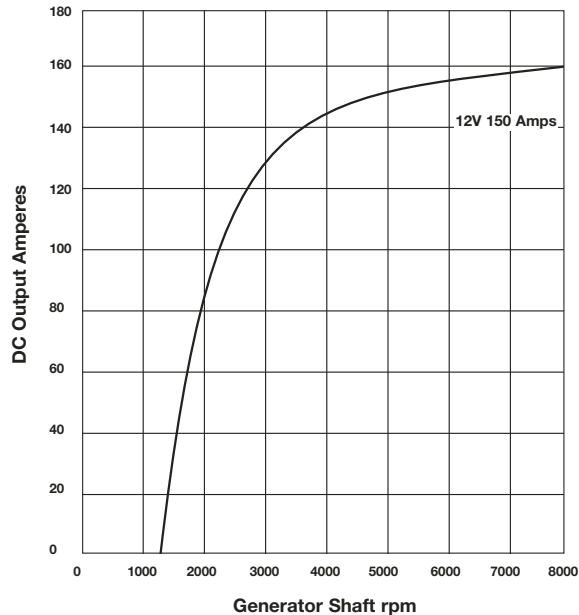
PAD Mount



J180 Mount

22SI HP Brush Alternator

22SI HP Performance Curves



Specifications

Performance Output:

150 Amps - 12 Volts

Maximum Speed:

10,000 rpm Continuous

12,000 rpm Intermittent

Rotation:

Clockwise

Temperature Limits:

Low: -34°C

High: 93°C

Polarity:

Negative Ground

Weight:

14.1 lbs or 6.4 kg

Length:

217mm

Stator Diameter:

144mm

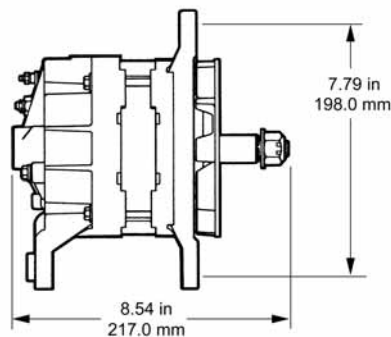
Rotor Inertia:

30 kg — cm²

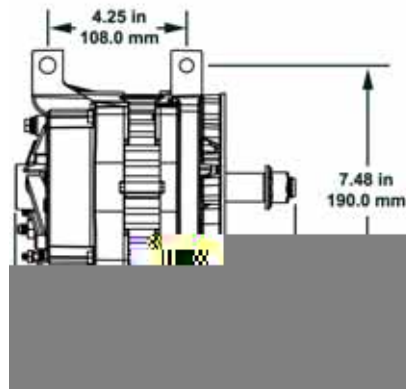
DE Bearing Size:

62mm

Dimensions



J180 Mount



PAD Mount

24SI HP Brush Alternator**Heavy Duty Alternator****New Service Aftermarket Program****Maximum Performance - 160 Amps****Maximum Cooling Technology****Cool New Standard for the Aftermarket**

For many years, the Delco Remy '310 has been recognized as the standard for brush-style alternators in the heavy duty aftermarket. Now, we are proud to introduce the 24SI, an updated replacement for the '310 with a host of new advanced engineering features. Leading the list is a new Maximum Cooling Technology™ that's specially designed for today's higher under-hood temperatures.

Maximum Cooling Technology™

The 24SI HP has a Dual Internal Fan (DIF) design that provides Maximum Cooling Technology. Dual fans mean greater air circulation over the alternator electronics. That allows the alternator to run at lower temperatures which improves the operating efficiency and durability of the unit

Maximum Performance

The 24SI HP has been designed to cope with the ever increasing electrical loads on today's trucks and school busses. It produces 160 Amps of output at road speeds, and an industry leading 100 Amps at low engine speeds.

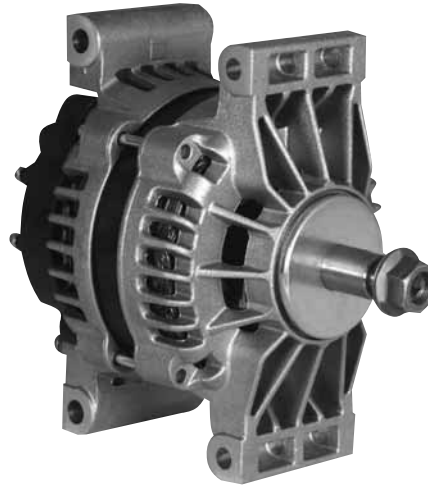
Competitive Features

The 24SI HP enjoys the following significant design advantages over the Leece Neville 110-555 model alternator:

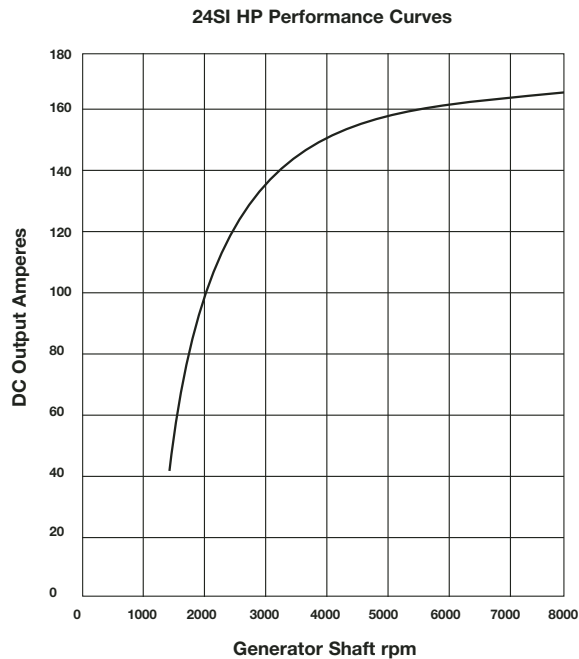
- Dual Internal Fan cooling
- Greater output at low RPM
- Smaller in size and weight
- Greater efficiency for fuel savings
- OE Approved. Over 450,000 24SI HP alternators have been installed as original equipment. The 110-555 is not currently spec'd as original equipment.

The 24SI HP enjoys a significant advantage over the Bosch LH due to its durable design. It was designed to meet the requirements of the demanding US and Canadian truck market.

- Larger bearing with a slinger for contamination protection.
- Larger rotor shaft
- Greater output at low RPM



24SI HP Brush Alternator



Specifications

Performance Output:

160 Amps - 12 Volts

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Rotation:

Clockwise

Temperature Limits:

Low: -40°C
High: 105°C

Polarity:

Negative Ground

Weight:

16.2 lbs or 7.7 kg

Mounting:

J180 Hinge Mount
Pad Mount

Length:

213.7mm

Overall Diameter:

150.0mm

DE Bearing Size:

62mm

35SI HP Brushless Alternator

Strategically placed radiant vents ensure maximum cooling of internal components in high-temperature underhood environments

Premium brushless design extends service life and optimizes performance

High-efficiency stator windings and optimized rotor design deliver high output

Oversized heavy duty bearings and premium-quality steel shaft withstand high vibration and heavy belt loads

High thermal-capacity design stands up to extreme temperatures, thermal stress for extended service life

All 35SI HP Alternators include Remote Sense Technology, optimizing the state of charge of the batteries

This premium brushless long life alternator is ideal for high-temperature applications.

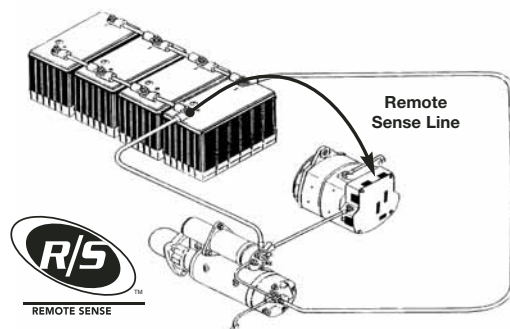
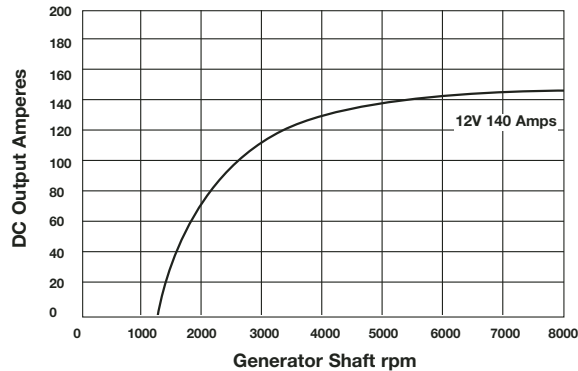
The Delco Remy 35SI HP Heavy Duty Alternator features heat-dissipating radiant vents and thermally tolerant internal components. These design features allow the 35SI HP to produce high output in high-underhood temperature environments, up to 105° C/221° F. Remy engineers have demonstrated the reliability and performance of the 35SI HP under extreme heat conditions for 2,000 hours at 3,000 alternator RPM. These stringent tests prove this advanced unit delivers optimal output in even the most demanding operating environments.

The 35SI HP features a premium brushless design with fewer moving parts and internal connections, resulting in superior performance, contamination resistance and longer life than traditional brush-type alternators.

**PAD Mount****QUAD Mount****J180 Mount**

35SI HP Brushless Alternator

35SI HP Performance Curves



All 35SI HP alternators feature Remote Sense Technology that senses the voltage level at the batteries and adjusts alternator output accordingly. A direct connection from the alternator's fourth terminal to the batteries provides highly accurate voltage readings and optimizes state of charge.

Specifications

Performance Output:

140 Amps - 12 Volts

Maximum Speed:

10,000 rpm Continuous
12,000 rpm Intermittent

Rotation:

Clockwise or Counterclockwise

Temperature Limits:

Low: -40°C
High: 105°C

Polarity:

Negative Ground

Construction:

Brushless

Weight:

25.4 lbs or 11.5 kg

Length:

262mm

Stator Diameter:

152mm

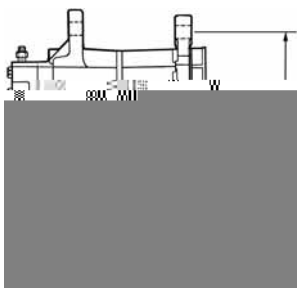
Rotor Inertia:

44 kg — cm²

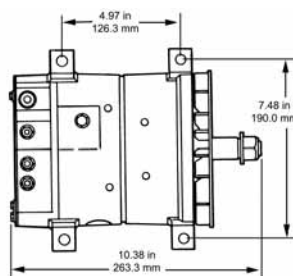
DE Bearing Size:

62mm

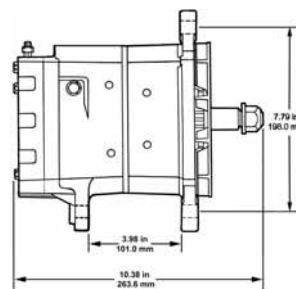
Dimensions



QUAD Mount



PAD Mount



J180 Mount

36SI HP Brushless Alternator

Long life brushless construction

Extended life

Reduced fuel costs

Optimized performance

Heat resistant construction

Strategically placed radiant vents

Performance tested to 105°C

**Remote sense technology optimizes
battery state-of-charge**

Extended warranty

The performance of the 36SI HP with 170 Amps of power results in superior maintenance of the batteries and electrical system, reliability, supporting critical components.

The high efficiency design requires minimal engine horsepower to turn the alternator, increasing fuel efficiency and decreasing overall fuel costs per mile for your fleet.

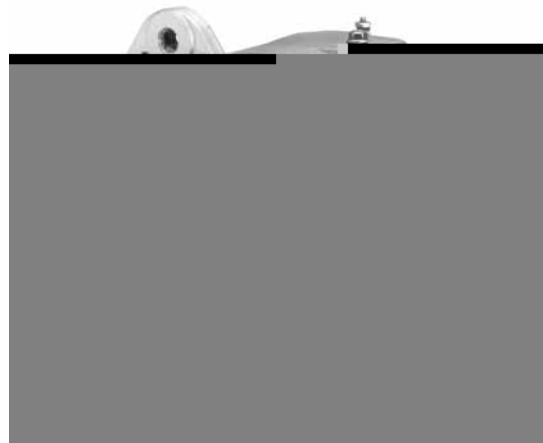
Now, in addition to the 35SI HP upgrade program, the 170 Amp-100 Amp at idle 36SI HP with heat resistant design, has been added to the upgrade program and includes a core consolidation policy. With the addition of the 36SI HP Upgrade Program, you can convert any 33SI, 34SI or 35SI to either the 35SI HP or the 36SI HP and receive full core credit for each 33SI, 34SI or 35SI core returned.



PAD Mount



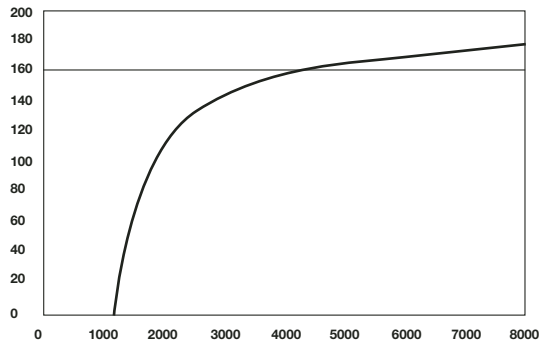
QUAD Mount



J180 Mount

36SI HP Brushless Alternator

36SI HP Performance Curves

**Specifications****Performance Output:**

170 Amps - 12 Volts

Maximum Speed:

10,000 rpm Continuous

12,000 rpm Intermittent

Rotation:

Clockwise or Counterclockwise

Temperature Limits:

Low: -40°C / -40°F

High: 105°C / 221°F

Polarity:

Negative Ground

Construction:

Brushless

Weight:

12.1 lbs or 26.67 kg

Length:

262mm

Stator Diameter:

152mm

DE Bearing Size:

62mm

Rotor Inertia:44 kg — cm²

42MT HD™ Premium Starter

Mechanical soft start drive engagement system ensures proper pinion teeth to ring gear engagement prior to cranking and minimizes the potential for milling.

High thermal capacity that stands up to high temperature environments and thermal stress.

Semi-Solid Link Solenoid™ – a patented design that utilizes the “Slide Hammer” effect; releases 1100 pounds of force to disconnect contact disc from the battery and motor terminals. Also avoids solenoid contact welding due to low system voltage conditions.

Extended warranty –

- **2 Years/250,000 Miles on Reman Units**
- **3 Years/350,000 Miles on New Service Units**

The 42MT Starter has long been the industry standard, providing billions of starts for millions of Heavy Duty trucks. This reliable performance has been improved over the years with industry leading technology such as the patented Semi-Solid Link Solenoid (SSL™) and mechanical soft-start engagement system. Now this dedication to reliability and increased vehicle uptime is extended even further with the 42MT HD™ Premium Heavy Duty Starter.

The 42MT HD™ starter helps correct the three largest contributors to starter failure, degraded or inadequate wiring, thermal damage, or solenoid mechanical failure, increasing vehicle uptime. Combining an Integral Magnetic Switch (IMS™) that restores degraded electrical circuitry to TMC specifications along with Over-Crank Protection (OCP) protecting the starter from internal component thermal damage. The 42MT HD™ starter also incorporates the patented Semi-Solid Link Solenoid (SSL™), avoiding solenoid mechanical failures caused by low system voltage.



INTEGRAL MAGNETIC SWITCH

Integral Magnetic Switch™

- Places the solenoid control circuit directly on the starter
- Allows starter to receive proper voltage during the cranking cycle
- Limits the effects of low system voltage



OVERCRANK PROTECTION

Over-Crank Protection

- Temperature sensitive circuit breaker prevents starter from cranking when at high internal temperature
- Protects the starter in adverse starting conditions: cold weather cranking, low battery capacity, or circuit-resistance
- Avoids thermal damage

42MT HD™ Premium Starter



Specifications

Engine Size:

Diesel: Up to 15.0 L

System Voltage:

12 Volts

Pinion Data:

SAE: No. Teeth/Pinion Blank (Pitch)
11/12 (6-8)

Weight:

58 lbs (26.3 kg)

Medium Duty Applications:

On- and Off-Road Vehicles
Large Diesel and Gasoline Engines

Dimensions:

L: 496.4mm (19.54 in)
H: 248.4mm (9.78 in)

Heavy-Duty Drive:

Mechanical Soft Start Engagement

Battery CCA:

12V: 4x 625 CCA

Control Circuit Amperage Draw:

12V: 97 Amps (max)

| Popular 42MT Part Numbers | Upgrade to 42MT HD™ |
|-------------------------------|------------------------------|
| 10461052-Reman 1990483-New | 8300031-Reman 8200164-New |
| 10461053-Reman 1990490-New | 8300033-Reman 8200168-New |
| 10461055-Reman 1990484-New | 8300032-Reman 8200163-New |
| 10461075-Reman 1990489-New | 8300034-Reman 8200165-New |

SOLENOIDS

Semi Solid Link Solenoid



PATENTED
SEMI-SOLID LINK SOLENOID

New Solenoid Technology Means...

- **Higher Contact Weld Breaking Force**
- **Reduces Stuck Contact Failures Caused by Low System Voltage!**
- **Patented Design**

Plunger moves this distance and impacts the link producing the **Slide Hammer Effect!**



All 42MT and 50MT new service and remanufactured starters feature patented Delco Remy SSL Solenoids.

| Conventional Part # | SSL Part# | Motor Family | Voltage | Conventional Part # | SSL Part# | Motor Family | Voltage | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|--------------|-----------------|---------|---|------------------------|-----------------|-----------------|---------|---------|---------|------|------|----------|---------|------|-----|----------|----------|------|-----|----------|---------|------|-----|----------|----------|------|-----|----------|--|--|--|
| 1115593 | 1115701 | 42MT | 12 | 1115655 | 1115677 | 37MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115595 | 1115673 | 42MT | 24 | 1115656 | 10511212 | 42MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115597 | 10511217 | 42MT | 24 | 1115657 | 1115683 | 41MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115598 | 10511210 | 42MT | 12 | 1115667 | 1115673 | 42MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115601 | 10511219 | 42MT | 24 | 1115668 | 1115673 | 42MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115602 | 10511214 | 42MT | 12 | 1115671 | 1115673 | 42MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115609 | 1115689 | 37MT | 12 | 1115687 | 10511210 | 42MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115610 | 1115690 | 37MT | 12 | 1115689 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115611 | 1115689 | 37MT | 12 | 1115690 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115617 | 1115693 | 37MT | 12 | 1115693 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115618 | 1115694 | 37MT | 12 | 1115694 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115619 | 1115675 | 37MT | 24 | 1115695 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115621 | 1115676 | 37MT | 24 | 1115696 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115622 | 1115674 | 37MT | 24 | 1115693 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115623 | 1115695 | 37MT | 12 | 1115700 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115624 | 10511213 | 42MT | 12 | 1115704 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115625 | 1115683 | 42MT | 24 | 10456392 | 1115689 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115627 | 1115676 | 37MT | 24 | 10456394 | 1115673 | 37MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115628 | 1115697 | 37MT | 12 | 10461516 | 10511210 | 42MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115633 | 10511215 | 42MT | 12 | <div>REMAN SSL</div> <table><tr><th>Conventional Part #</th><th>SSL Part#</th><th>Motor Family</th><th>Voltage</th></tr><tr><td>1115673</td><td>1115673</td><td>42MT</td><td>24MT</td></tr><tr><td>10456392</td><td>1115689</td><td>37MT</td><td>12V</td></tr><tr><td>10456393</td><td>10512653</td><td>42MT</td><td>12V</td></tr><tr><td>10456394</td><td>1115673</td><td>42MT</td><td>24V</td></tr><tr><td>10461516</td><td>10511210</td><td>42MT</td><td>12V</td></tr><tr><td colspan="4">Rev Term</td></tr></table> | Conventional Part # | SSL Part# | Motor Family | Voltage | 1115673 | 1115673 | 42MT | 24MT | 10456392 | 1115689 | 37MT | 12V | 10456393 | 10512653 | 42MT | 12V | 10456394 | 1115673 | 42MT | 24V | 10461516 | 10511210 | 42MT | 12V | Rev Term | | | |
| Conventional Part # | SSL Part# | Motor Family | Voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115673 | 1115673 | 42MT | 24MT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10456392 | 1115689 | 37MT | 12V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10456393 | 10512653 | 42MT | 12V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10456394 | 1115673 | 42MT | 24V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10461516 | 10511210 | 42MT | 12V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rev Term | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115633 | 1115673 | 42MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115634 | 1115682 | 41MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115638 | 1115701 | 41MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115639 | 1115702 | 41MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115640 | 1115678 | 41MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115641 | 1115673 | 41MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115642 | 10511211 | 42MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115643 | 1115704 | 37MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115652 | 1115672 | 37MT | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1115653 | 1115706 | 41MT | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

10MT Starter

Medium duty design

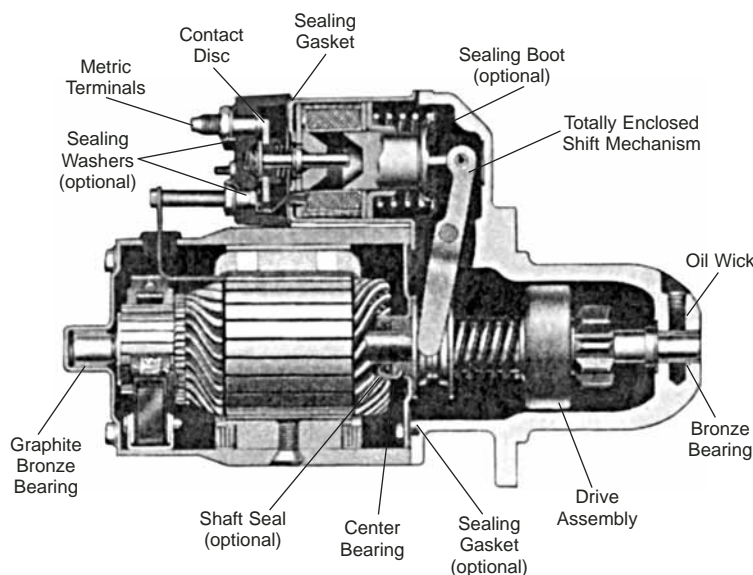
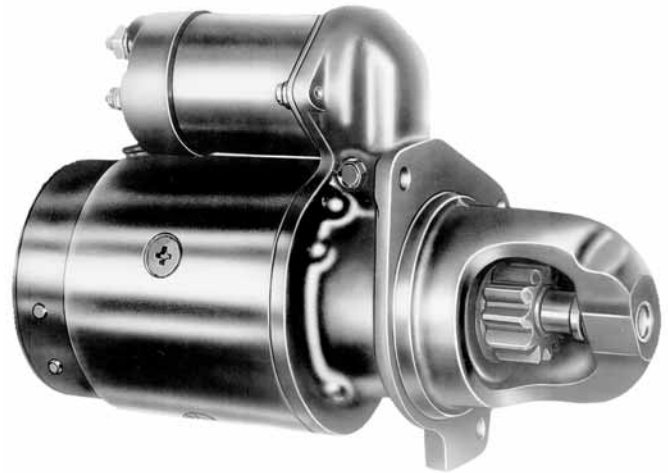
Enclosed shift lever and overrunning clutch

High temperature heavy-duty solenoid

Increased service life

The 10MT is available as "New Service" or a factory remanufactured starter. It is specially designed for high start delivery vehicles. This starter features a design to increase the brush and bushing life. The special field coils effectively limit the top cranking speed, yet still provide adequate cranking speed. The armature coast down time is reduced with the use of brake washer. This unit utilizes a high temperature heavy-duty solenoid.

All components in this starter go through thorough testing before assembly begins. Exacting manufacturing procedures and testing are utilized in the remanufacturing of this 10MT starter.



**See 1A-100
For Complete Application
And Reference Guide**

Specifications:

System Voltage:

12 Volt

Rotation:

Clockwise

Mounting:

Special Flange

Pinion:

SAE 12-14 Pitch

Application:

Recommended for gas engines in high start commercial vehicles.

28MT Medium Duty Starter

Environmental protection

Gear reduction

Solid link solenoid

Available jump start protection

Delco Remy's 28MT gear reduction starter offers heavy-duty performance for pick-up and delivery operations, or applications using light and medium duty diesel engines.

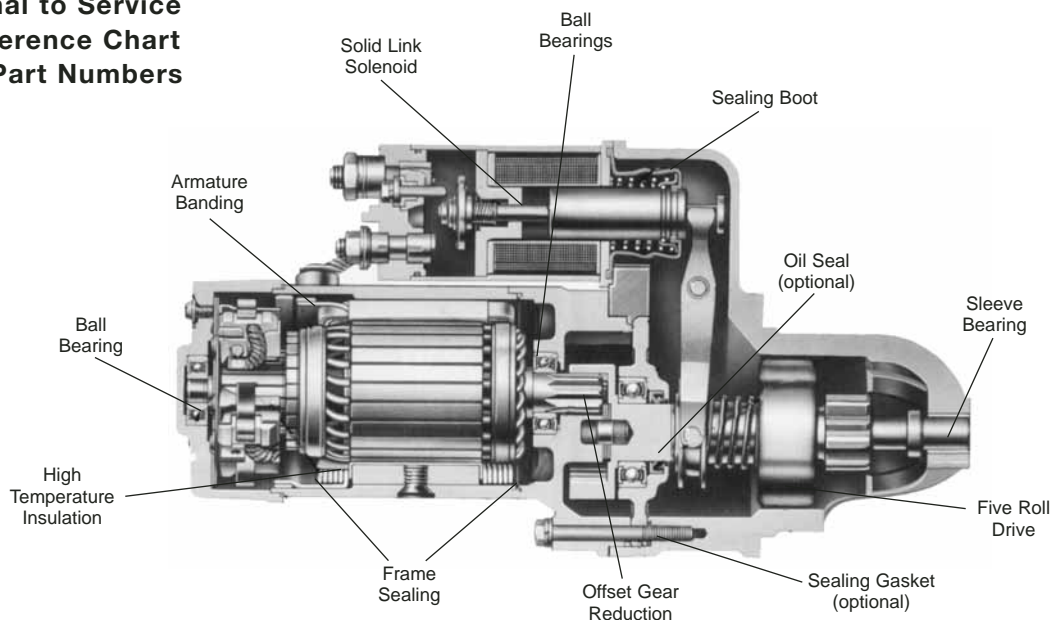
The 28MT's solenoid features a seamless one-piece case design to prevent corrosion and entry of foreign matter. A solenoid sealing boot prevents oil entry on wet clutch applications. The switch contact's waffle design and solid-link shift operation, eliminate sticking of contacts.

Radial line brush holders, with four one-piece brushes and constant pressure springs, give even brush wear, uniform pressure, and excellent service life.

The dynamically balanced armature utilizes a molded commutator, steel banding, and varnish impregnation for added strength. Three sealed ball bearings and a bronze sleeve bearing lubricate and support the armature and drive shaft.

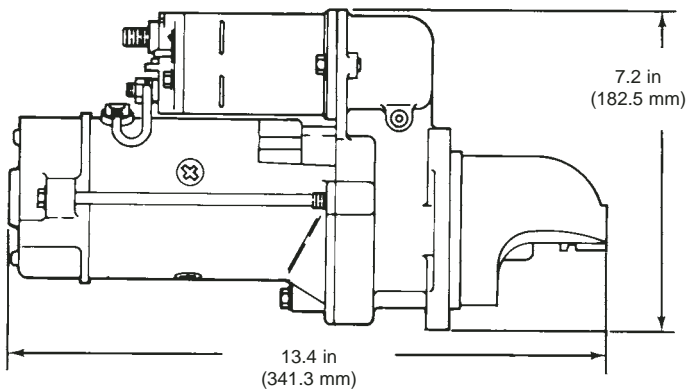
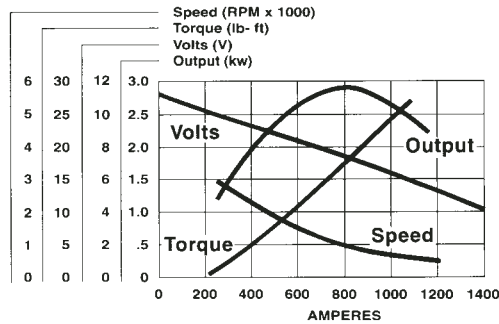


**See Original to Service
Cross Reference Chart
for 28MT Part Numbers**



28MT Medium Duty Starter

**28MT Starting Motor Performance
(@ 12V, 25°C)**



Specifications

Engine Size:

Diesel: 6.5 L (397 cu in)

System Voltage:

12 or 24 Volts

Rotation:

Clockwise

Mounting:

SAE #1, #4 & Automotive Pad Mount

Pinion Data:

SAE: No. Teeth/Pinion Blank (Pitch):
10/11 (10-12), 10/11 (8-10),
12/13 (8-10), 9/10 (Module 3)

Weight:

18.5 lbs (8.4 kg)

Medium Duty Applications:

Diesel Powered Light Trucks and Passenger Cars, Low-range Diesel Engines

High Reliability Armature

Molded Commutator • Steel Banded
Varnish Impregnated • Dynamically Balanced

Gear Reduction

Gear Ratio: 3.875/1 • Two Ball Bearings

Field Coils:

Nomex Covered Conductors
Insulation Between Coils and Pole Shoes

Totally Enclosed Shift Mechanism:

Solenoid Sealing Boot
Shaft Sealing for Wet Clutch Applications
"O" Ring Seals

Sealed Solenoid:

Layer Wound Coil
Waffle Design Contact Face
Solid Link Design

Long Life Brushes:

Four One-piece Brushes
Constant Pressure Brush Springs
Radialine Brush Holders

Jump Start Protection:

Special Shield and Solenoid Cap Available to Meet SAE J1493 Recommendations

Output:

12V: 4.0kW
24V: 2.9kW

29MT Heavy Duty Starter

MxT gearing system delivers high torque output and starting power in a low mass, lightweight design.

Sealed Solid-Link Solenoid eliminates contact welding in low system voltage situations, providing enhanced corrosion protection.

Sealed noseless configuration reduces debris accumulation and contamination-related maintenance and expense.

Electrical Soft-Start Engagement System rotates pinion for proper ring-gear engagement before cranking, minimizing tooth abutment-related damage.

Forged gear support and high strength steel shafts provide superior durability.

Labyrinth drain housing design utilizes multiple drain points with O-Ring seals for protection from environmental contaminants.

Heavy duty bearing and bushing system increases motor life and reliability.

Cast aluminum drive and commutator end housings provide high strength, lightweight construction.



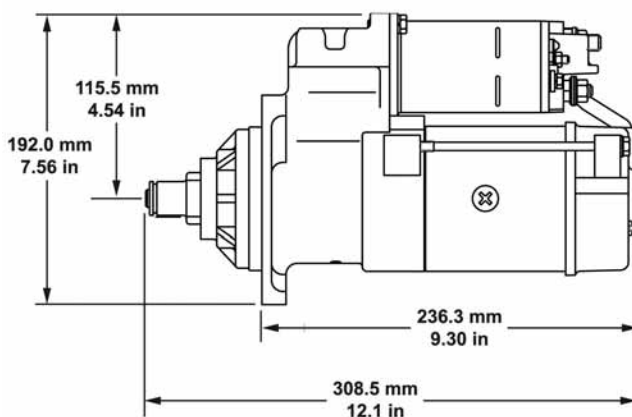
The Delco Remy 29MT with Maximum Torque Technology is the next-generation starting solution for today's demanding Medium Duty diesel applications. Utilizing the advanced MxT gearing system, the lightweight 29MT produces the torque and speed necessary to crank diesel engines up to 6.6 liters for the 12 Volt unit and 8.0 liters for the 24 Volt.

The 29MT features a lightweight aluminum housing resistant to high vibration environments. These features reduce overall vehicle weight and provide durable construction for reliability and long service life.

The sealed noseless design resists shaft and pinion exposure to contaminants reducing the possibility of corrosion and promoting hassle-free starter operation. The 12 Volt 29MT utilizes Positive Shift Engagement while the 24 Volt unit incorporates the advanced Electrical Soft Start system. Electrical Soft Start ensures proper pinion to ring-gear engagement that protects your starter and on-vehicle components.

A sealed solid link solenoid construction protects against solenoid contact welding and exposure to contaminants, prolonging service life. Delco Remy Heavy Duty product features such as large bearings and high quality steel shafts are incorporated into the 29MT making it the reliable choice for your medium duty fleet applications.

29MT Heavy Duty Starter



Specifications

Engine Size:

Diesel: 12V up to 6.6 liters
24V up to 8.0 liters

System Voltage:

12 or 24 Volt

Rotation:

Clockwise

Mounting:

SAE #1

Pinion Data:

SAE: No. Teeth (Pitch):
9 (Mod 3-metric); 10 (8-10);
10 (10-12); 11 (Mod 3-metric)

Weight:

17.6 lbs (8 kg)

Diameter:

3.5 in (90 mm)

Heavy-Duty Drive:

12V: Positive shift engagement system
24V: Electrical soft start engagement
system overrunning clutch

Output

12V: peak at 3.3kW
24V: peak at 4.0kW



IMS option ensures the highest quality control circuit, reducing vehicle control circuit requirement to less than 5 Amps.

Overcrank protection

Environmental protection

Positive shift engagement

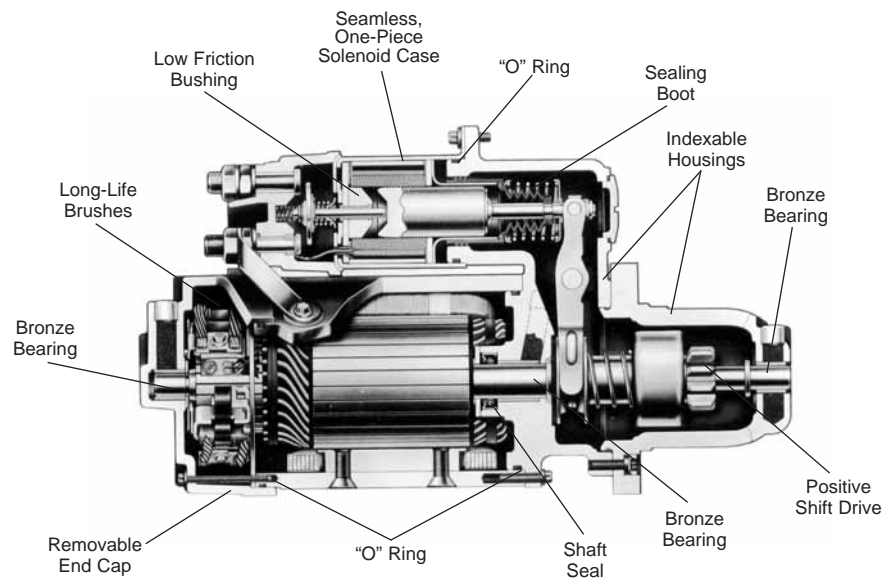
The 37MT Delco Remy heavy-duty starter is designed specifically for mid-range diesel applications and is well suited for farm and construction operations that experience long periods between starts.

The 37MT has a positive shift overrunning clutch system. The optional overcrank protection (OCP) is a valuable feature during potentially adverse starting conditions, such as cold weather cranking, low battery capacity, high starting circuit resistance, or operator misuse. A temperature-sensitive circuit breaker protects the 37MT from overcrank heat damage. The circuit breaker automatically resets after the motor cools to a safe temperature.

The highly durable epoxy-impregnated armature provides more power and increased reliability. Our finest seamless, one-piece solenoid case protects against corrosion.

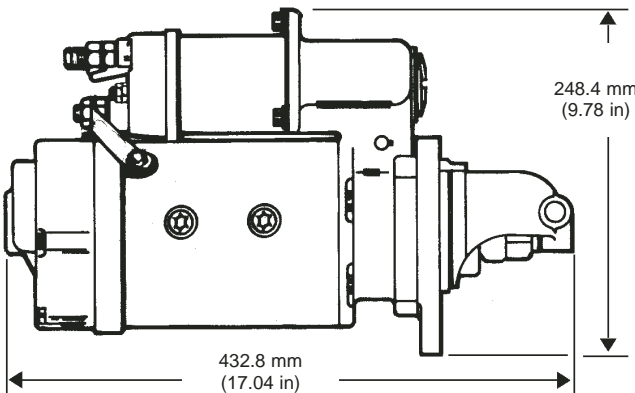
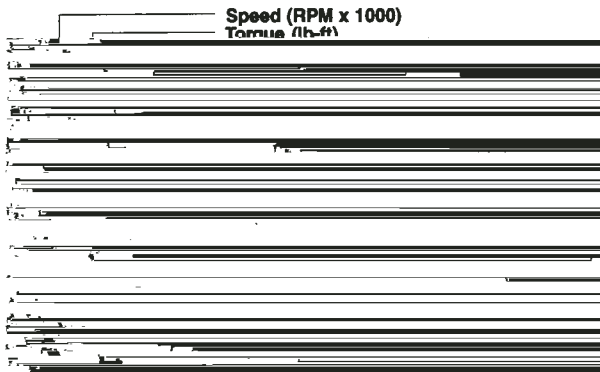


See Original to Service Cross Reference Chart For 37MT Part Numbers



37MT Starter

**37MT Starting Motor Performance Curve
(@ 12V, 25°C)**



| Engine Temp | Cranking Time | Cooling Time |
|-------------|---------------|--------------|
| -10° | 1 minute | 1.5 minutes |
| 70°F | 3.5 minutes | 4.5 minutes |
| 160°F | 3.0 minutes | 6.0 minutes |

Specifications

Engine Size:

Up to Diesel: 8.3 (503 cu in)

System Voltage:

12 or 24 Volt

Rotation:

Clockwise or Counterclockwise

Mounting:

SAE #1 or #3

Pinion Data:

SAE: No. Teeth/Pinion Blank (Pitch):
10/11; 12/13; (8-10) 11/12 (Module 3)

Weight:

50 lbs (22.7 kg)

Heavy-Duty Applications:

Trucks, Farm & Construction, Stand-By
Power, and Industrial Vehicles
Mid-Range Diesel Engines

High Durability Armature:

Welded Commutator
Glass Banded
Epoxy Impregnated

Totally Enclosed Shift Mechanism

Solenoid Sealing Operated Shift Lever
"O" Ring Seals

Shaft Sealing for Wet Clutch
Applications

Rotatable Drive Housing:

Two-piece Rotatable Drive Housing
12 Positions Available

Heavy-Duty Drive

Positive-shift
Overrunning Clutch

Overcrank Protection

Prevents Overcrank Damage
Circuit Breaker Automatically Resets
After It Has Cooled

Output

12V: 4.5kW
24V: 7.5kW

38MT Heavy Duty Starter

MxT gearing system delivers high torque output and starting power in a low mass, lightweight design.

Sealed Solid-Link Solenoid eliminates contact welding in low-system-voltage situations, providing enhanced reliability.

Sealed noseless configuration reduces debris accumulation and contamination-related maintenance and expense.

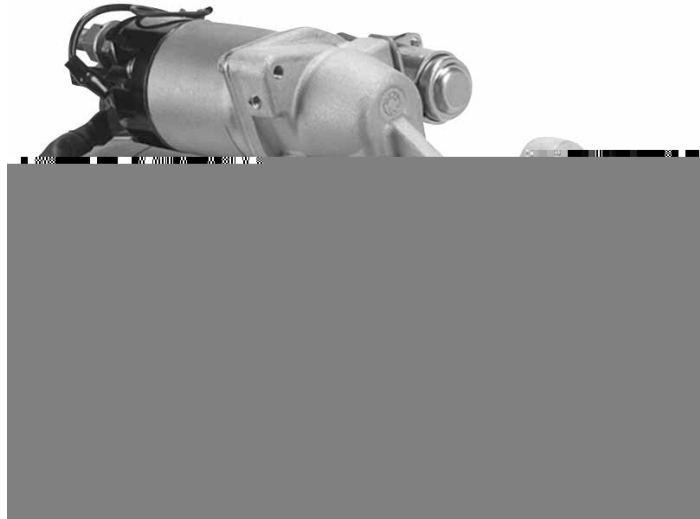
Electrical Soft-Start Engagement System rotates pinion for proper ring-gear engagement before cranking, minimizing tooth abutment-related damage.

Forged gear support and high strength steel shafts provide superior durability.

Labyrinth drain housing design utilizes multiple drain points with O-Ring seals for protection from environmental contaminants.

Heavy duty bearing and bushing system increases motor life and reliability.

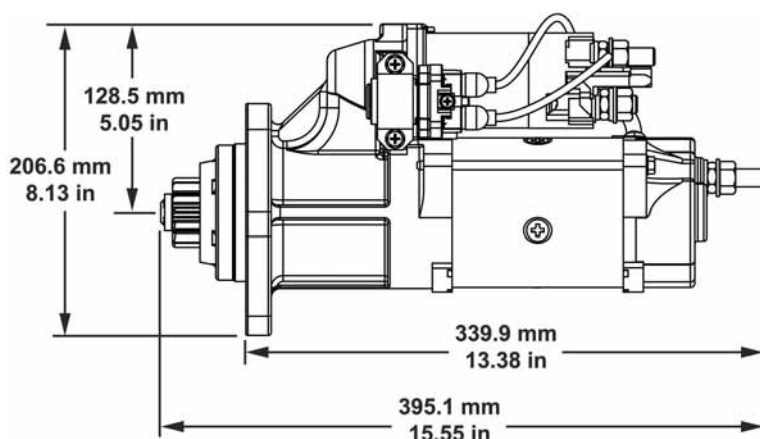
Cast aluminum drive and commutator end housings provide high strength, light weight construction.



The 38MT™ MxT (Maximum Torque Technology) heavy duty starter from Remy Inc. is the next-generation starting solution for today's demanding heavy duty applications. Utilizing the advanced MxT gear reduction system, the 38MT produces the torque and speed necessary to crank your diesel engine. Weighing only 22 pounds, the 38MT is more than 50 percent lighter than comparable straight-drive starters. This low mass design reduces overall vehicle weight and eases service.

The 38MT also features a highly reliable design advantage – the Electrical Soft-Start Engagement System. This feature, included in every 38MT, slowly rotates the pinion until it is properly engaged to the ring gear before cranking, minimizing milling issues.

38MT Heavy Duty Starter



Optional IMS (Integral Magnetic Switch) mounting locations to accommodate spatial issues (some 38MTs include third position top-mount option)



IMS option ensures the highest quality control circuit, reduces vehicle control circuit requirement to less than 5 Amps

Specifications

Engine Size:

Diesel: 12V up to 10.0 liters
24V up to 12.0 liters

System Voltage:

12 or 24 Volt

Rotation:

Clockwise

Mounting:

SAE #1 or #3

Pinion Data:

SAE: No. Teeth (Pitch):
10 (8-10); 11 (Mod 3-metric);
12 (8-10)

Weight:

22 lbs (10 kg)

Diameter:

3.9 in (100 mm)

Heavy-Duty Drive:

Electrical soft-start engagement
system overrunning clutch

Output:

12V: peak at 4.6kW
24V: peak at 7.5kW

Overcrank Protection: (optional)

Built-in circuit breaker protects starter from thermal damage and automatically resets at safe operating temperature



39MT Heavy Duty Starter

Specifications

Engine Size:

Diesel: 12V up to 15 liters
24V up to 16 liters

System Voltage:

12 or 24 Volt

Rotation:

Clockwise

Mounting:

SAE #1

Pinion Data:

SAE: No. Teeth (Pitch): 11 (6-8);
12 (8-10); 12 (Mod 3-metric)

Weight:

30.8 lbs (14 kg)

Diameter:

4.5 in (114 mm)

Heavy-Duty Drive:

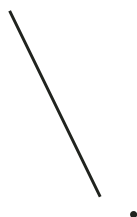
Electrical soft-start engagement
system overrunning clutch

Output:

12V: peak at 6.4kW
24V: peak at 7.2kW

Overcrank Protection: (optional)

Built-in circuit breaker protects starter
from thermal damage and automatically
resets at safe operating temperature



Available overcrank protection

Environmental protection

Mechanical soft start

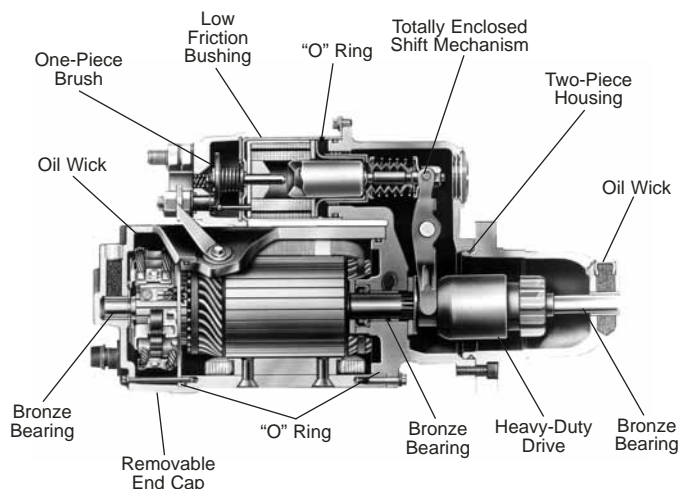
Available jump start protection

The 41MT is the latest evolution of Delco Remy's heavy-duty starters. It is designed specifically for mid-range diesel applications and is well suited for pick-up and delivery operations that experience high frequency starts.

The 41MT's positive-engagement shift mechanism assures pinion-to-ring gear engagement prior to cranking, minimizing milled ring gears and pinions.

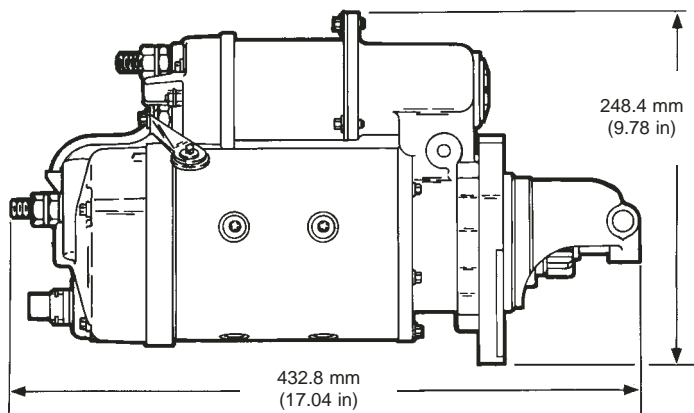
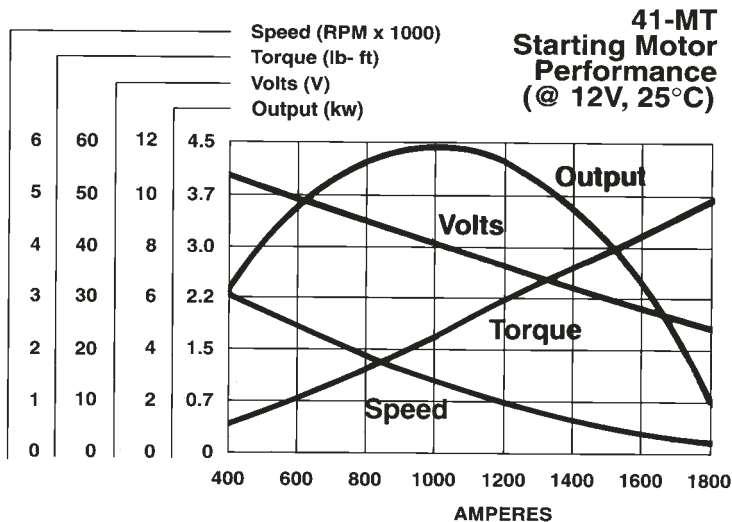
A temperature-sensitive circuit breaker protects the 41MT from overcrank heat damage. The circuit breaker automatically resets after the motor cools to a safe temperature. This optional overcrank protection (OCP) is a valuable feature during potentially adverse starting conditions, such as cold weather cranking, low battery capacity, high starting circuit resistance, or operator misuse.

A new epoxy-impregnated armature provides more power and protects against vibration related failures. Our finest seamless, one-piece solenoid case protects against corrosion. The 41MT is built to last with more power for its size.



**See Original to Service
Cross Reference Chart
For 41-MT Part Numbers**

41MT Starter



| Engine Temp | Cranking Time | Cooling Time |
|-------------|---------------|--------------|
| -10° | 1 minute | 1.5 minutes |
| 70°F | 3.5 minutes | 4.5 minutes |
| 160°F | 3.0 minutes | 6.0 minutes |

Specifications

Engine Size:

Gasoline: 6.6 to 16.4 L
(400 to 1000 cu in)

System Voltage:

12 or 24 Volt

Rotation:

Clockwise or Counterclockwise

Mounting:

SAE #1 or #3

Pinion Data:

SAE: No. Teeth/Pinion Blank (Pitch):
12/13 (8-10); 11/12 (6-8)

Weight:

50 lbs (22.7 kg)

Heavy-Duty Applications:

Trucks, Farm & Construction, Stand-By Power, and Industrial Vehicles
Mid-Range Diesel Engines

High Durability Armature:

Welded Commutator
Glass Banded
Epoxy Impregnated

Totally Enclosed Shift Mechanism:

Solenoid Sealing Boot
Shaft Sealing for Wet Clutch Applications
"O" Ring Seals

Rotatable Drive Housing:

Two-piece Rotatable Drive Housing 12 or 24 Positions

Heavy-Duty Drive:

Positive Engagement
Overrunning Clutch
Rubber Shock Absorber

Overcrank Protection:

Prevents Overcrank Heat Damage
Circuit Breaker Automatically Resets After It Has Cooled

Jump Start Protection:

Special Shield and Solenoid Cap
Available to Meet SAE J1493 Recommendations

Available overcrank protection

Environmental protection

Mechanical soft start

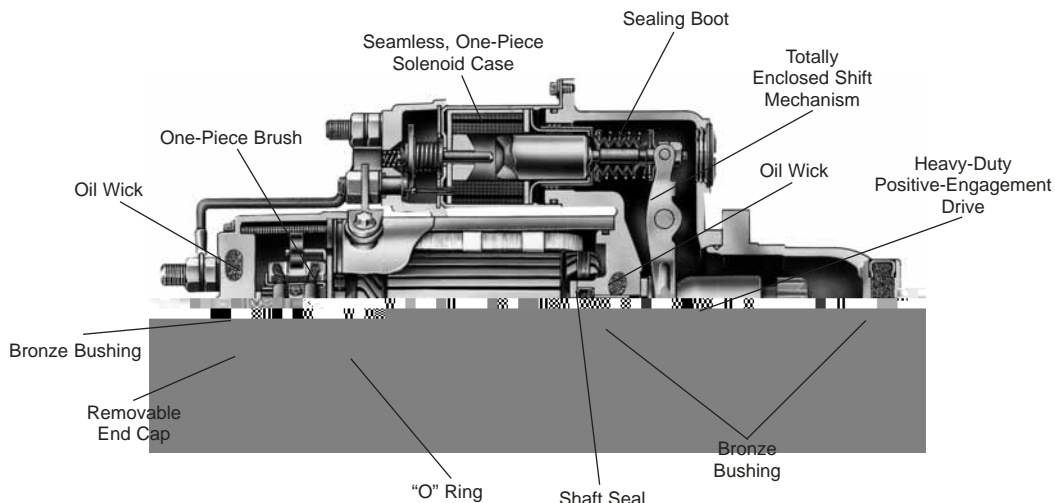
Available jump start protection

The 42MT/OCP starter is an integral part of Delco Remy, and has become the industry standard for performance and durability in heavy-duty applications.

Optional overcrank protection (OCP) protects the 42MT in adverse starting conditions, such as cold weather cranking, low battery capacity, high starting circuit resistance, or operator misuse. A temperature-sensitive circuit breaker prevents overcrank heat damage and automatically resets after the motor cools to a safe temperature.

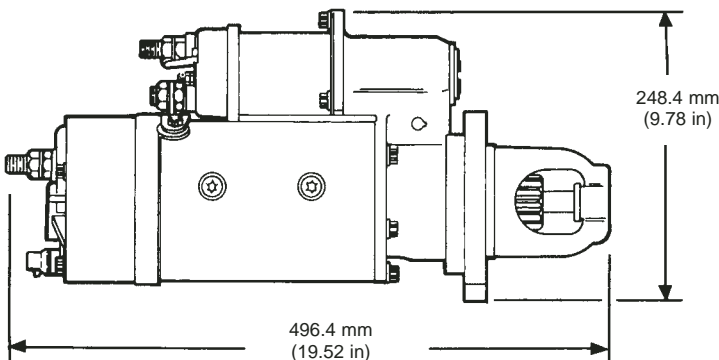
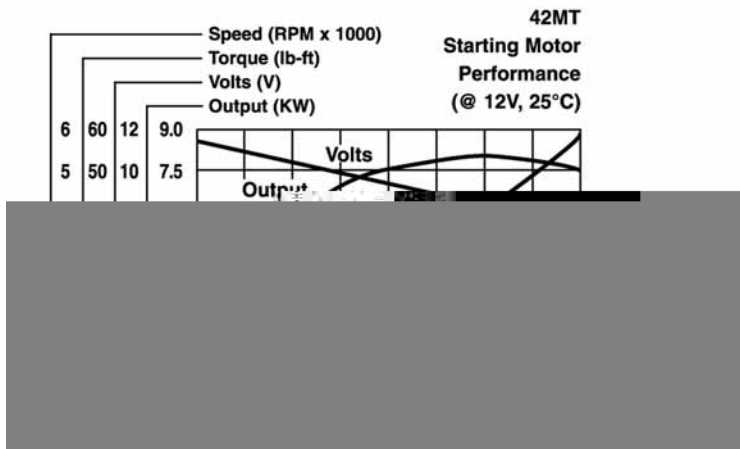
A positive-engagement shift mechanism assures pinion-to-ring gear engagement prior to cranking, minimizing milled ring gears and pinions. A seamless, one-piece solenoid case and totally enclosed shift mechanism with "O" Ring seals prevent water entry. Special alloys used in the solenoid contact disk and in the four one-piece brushes give exceptional service life.

The 42MT is splash-proof, environmentally protected, built to last and ready to perform.



**See Original to Service
Cross Reference Chart
For 42MT Part Numbers**

42MT Starter



| Engine Temp | Cranking Time | Cooling Time |
|-------------|---------------|--------------|
| -10° | 1 minute | 1.5 minutes |
| 70°F | 3.5 minutes | 4.5 minutes |
| 160°F | 3.0 minutes | 6.0 minutes |

Specifications

Engine Size:

Gasoline: 9.8 to 26.2 L
(600 to 1600 cu in)
Diesel: 6.6 to 14.8 L
(400 to 900 cu in)

System Voltage:

12 or 24 Volt

Rotation:

Clockwise or Counterclockwise

Mounting:

SAE #3 or #1, or Special

Pinion Data:

SAE: No. Teeth/Pinion Blank (Pitch):
11/12 (6-8); 12/13 (8-10); 13/14 (8-10)

Weight:

58 lbs (26.3 kg)

Heavy-Duty Applications:

On- and Off-road Vehicles
Large Diesel and Gasoline Engines

High Durability Armature:

Welded Commutator
Glass Banded
Epoxy Impregnated

Totally Enclosed Shift Mechanism:

Solenoid Sealing Boot
Shaft Sealing for Wet Clutch Applications
"O" Ring Seals

Rotatable Drive Housing:

Two-piece Rotatable Drive Housing 12 or 24 Positions

Heavy-Duty Drive:

Positive Engagement
Overrunning Clutch
Rubber Shock Absorber

Overcrank Protection:

Prevents Overcrank Heat Damage
Circuit Breaker Automatically Resets After It Has Cooled

Jump Start Protection:

Special Shield and Solenoid Cap
Available to Meet SAE J1493 Recommendations

Output:

7.5kW

50MT Starter

**High horsepower
diesel applications**

Environmental protection

Positive engagement

The 50MT is Delco Remy's most powerful starter. Splash-proof and environmentally protected, it is designed to tackle off-highway, electromotive, and high-horsepower diesel applications.

The 50MT's seamless one-piece solenoid case is sealed for corrosion protection. Its positive-engagement



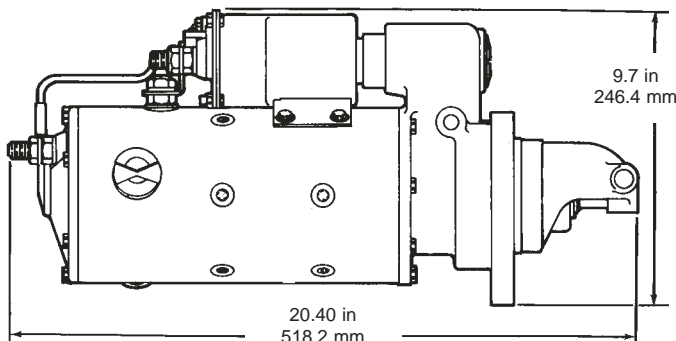
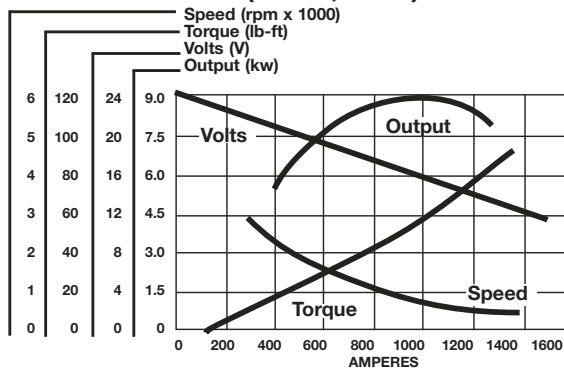
R e m y ' s m o s t p o w e r f u l

P o s i t i v e e n g a g e m e n t

**See Original to Service
Cross Reference Chart
For 50MT Part Numbers**

50MT Starter

**50MT Starting Motor Performance
(@ 24V, 25°C)**



Specifications

Engine Size:

Gasoline: 49.2 L (3000 cu in)

Diesel: 29.5 L (1800 cu in)

System Voltage:

12, 24, 32, 64 Volt

Rotation:

Clockwise or Counterclockwise

Mounting:

SAE #3 and Special

Pinion Data:

SAE: No. Teeth/Pinion Blank (Pitch):

11/12 (6-8); 12/13 (8-10)

Weight:

75 lbs (34.0 kg)

Heavy-Duty Applications:

On- and Off-road Vehicles

Large Diesel and Gasoline Engines

Two or More Units Can Be Tandem-mounted for Starting Very Large Engines

Bearing Lubrication and Sealing:

Three Sintered-bronze Bearings

Extra Large Oil Reservoirs

High Durability Armature:

Welded Commutator

Glass Banded

Epoxy Impregnated

Tubular Stock Frame:

Uniform Air Gap Tolerances

Improved Sealing

Totally Enclosed Shift Mechanism:

Solenoid Sealing Boot

Shaft Sealing for Wet Clutch

Applications

"O" Ring Seals

Rotatable Drive Housing:

Two-piece Rotatable Drive Housing 12 or 24 Positions

Output:

12V: 8.5kW

24V: 9.0kW

STARTING MOTORS

Original to Service

Feature Codes

1. Special solenoid (terminal reversed)
2. 24 position nose housing standard
3. 24 position nose housing 7 1/2 degrees CCW from standard
4. Mudder style nose housing
5. 12 position nose housing 6 degrees CW from standard
7. Dust cap on nose housing bushing
8. Rear support on frame
9. Machined flange
10. Flat in D.E. bearing housing
11. Viton middle bearing seal
12. Electrographic brushes
13. Drain hole at commutator end frame
14. Special commutator end frame
15. Commutator end rotated 180 degrees
16. Reversed solenoid terminals
17. Special contact disc terminal
18. 3/8 inch battery terminal
19. Loose bolt in flange
20. Frame has ground stud
21. Has 54 degrees C features
22. Climatized treatment
23. Fungus & corrosion treatment
24. Military
25. Special insulation
26. Submersion proof
27. Special lever housing
28. Special nose housing
29. Shielded solenoid
30. 24V terminal in 12V solenoid
31. Special sealing
32. Special battery terminal in solenoid
33. Integral magnetic switch
34. Boot clamp
35. Tall shield between solenoid terminals
36. CE has ground stud.
37. Diode suppressed integral magnetic switch

All 37, 41, 42 and 50MT Models Type 200 and up are External Rotatable.
See Rotating Nose Housing Instruction Section.
Type 350, 450 and or (OCP) denote Over Crank Protection.
See NON-OCP vs OCP page.

28MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Ser. Code Features | Service Part Number | Reman Part Number |
|----------|----------|-------|-----|-----|--------------|-----------------|-----|-----------|--------------------|---------------------|-------------------|
| 1113271 | 28MT-171 | 12 | G | CW | 10 | 316 | 04 | 0.48 | "28,35" | 10479630 | 10461443 |
| 1113272 | 28MT-171 | 24 | G | CW | 10 | 316 | 04 | 0.48 | "28,35" | 1113272 | - |
| 1113273 | 28MT-171 | 12 | G | CW | 12 | 300 | 01 | 0.41 | | 1113273 | 10461445 |
| 1113274 | 28MT-171 | 12 | G | CW | 10 | 300 | 01 | 0.41 | | 1113274 | 10465295 |
| 1113275 | 28MT-171 | 12 | G | CW | 10 | 315 | 01 | 0.41 | | 1113275 | 10461446 |
| 1113276 | 28MT-171 | 12 | G | CW | 10 | 315 | 01 | 0.41 | | 1113276 | 10465043 |
| 1113277 | 28MT-171 | 24 | G | CW | 10 | 315 | 01 | 0.41 | | 1113277 | 10461486 |
| 1113281 | 28MT-171 | 12 | G | CW | 10 | 055 | 01 | 0.41 | | 1113281 | 10461450 |
| 1113283 | 28MT-171 | 12 | G | CW | 10 | 316 | 4M | 0.48 | "28,35" | 1113283 | 10461443 |
| 1113284 | 28MT-171 | 12 | G | CW | 10 | 120 | 01 | 0.41 | | - | 10461483 |
| 1113285 | 28MT-171 | 12 | G | CW | 10 | 055 | 01 | 0.41 | "7,35" | 1113285 | - |
| 1113288 | 28MT-171 | 12 | G | CW | 10 | 045 | 1M | 0.41 | 17 | 1113288 | - |
| 1113289 | 28MT-171 | 12 | G | CW | 10 | 045 | 1M | 0.41 | | 1113289 | 10465239 |
| 1113290 | 28MT-171 | 12 | G | CW | 10 | 300 | 01 | 0.41 | | 1113290 | - |
| 1113291 | 28MT-171 | 24 | G | CW | 10 | 315 | 01 | 0.41 | | 1113291 | 10461486 |
| 1113292 | 28MT-171 | 12 | G | CW | 10 | 315 | 01 | 0.41 | | 1113292 | 10465043 |
| 1113296 | 28MT-171 | 12 | G | CW | 10 | 304 | PD | 0.44 | "7,8" | 1113296 | 10465168 |
| 10479605 | 28MT-171 | 24 | G | CW | 10 | 315 | 01 | 0.41 | | 10479605 | 10461486 |
| 10479606 | 28MT-171 | 12 | G | CW | 12 | 055 | 01 | 0.41 | 17 | - | 10461462 |
| 10479607 | 28MT-171 | 12 | G | CW | 10 | 300 | 01 | 0.41 | 17 | 1113274 | 10465295 |
| 10479613 | 28MT-171 | 12 | G | CW | 12 | 300 | 01 | 0.41 | "7,35" | 10479613 | - |
| 10479614 | 28MT-171 | 12 | G | CW | 10 | 120 | 01 | 0.41 | 35 | 10479614 | 10465150 |
| 10479615 | 28MT-171 | 12 | G | CW | 10 | 055 | 01 | 0.41 | 35 | 10479615 | 10465151 |
| 10479616 | 28MT-171 | 24 | G | CW | 10 | 315 | 01 | 0.41 | 17 | 10479616 | 10461486 |
| 10479617 | 28MT-171 | 12 | G | CW | 10 | 315 | 01 | 0.41 | 17 | 10479617 | - |
| 10479618 | 28MT-171 | 12 | G | CW | 10 | 055 | 01 | 0.41 | 35 | 10479618 | 10465151 |
| 10479630 | 28MT-171 | 12 | G | CW | 10 | 316 | 04 | 0.48 | "28,35" | 10479630 | 10461443 |
| 10479634 | 28MT-171 | 12 | G | CW | 10 | 315 | 01 | 0.41 | "28,35" | 10479634 | 10461474 |
| 10479637 | 28MT-171 | 12 | G | CW | 9 | 233 | 01 | 0.41 | | 10479637 | - |
| 10479638 | 28MT-171 | 12 | G | CW | 10 | 055 | 01 | 0.41 | | 10479638 | 10465151 |
| 10479642 | 28MT-171 | 12 | G | CW | 10 | 315 | 01 | 0.41 | 32 | 10479642 | 10461481 |
| 10479643 | 28MT-171 | 12 | G | CW | 10 | 315 | 01 | 0.41 | 29 | - | 10465043 |
| 10479644 | 28MT-171 | 12 | G | CW | 10 | 055 | 01 | 0.41 | 29 | - | 10465151 |
| 10479645 | 28MT-171 | 12 | G | CW | 9 | 233 | 01 | 0.41 | 36 | 10479645 | 10461454 |
| 10479655 | 28MT-171 | 24 | G | CW | 10 | 315 | 01 | 0.41 | | 10479655 | - |

29MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Part Number | Reman Part Number |
|----------|----------|-------|-----|-----|--------------|-----------------|-----|-----------|---------------------|-------------------|
| 8200014 | 29MT-500 | 12 | GND | CW | 10 | 315 | 01 | 0.43 | 8200014 | - |
| 8200103 | 29MT-500 | 12 | GND | CW | 9 | 315 | 01 | 0.41 | 8200103 | - |
| 8200196 | 29MT-500 | 12 | GND | CW | 10 | 315 | 01 | 0.43 | 8200196 | - |
| 8200271 | 29MT-500 | 12 | GND | CW | 10 | 055 | 01 | 0.43 | 8200271 | |
| 19011400 | 29MT-500 | 12 | GND | CW | 10 | 315 | 01 | 0.43 | 19011400 | 10461770 |
| 19011402 | 29MT-500 | 12 | GND | CW | 10 | 055 | 01 | 0.43 | 19011402 | 10461771 |
| 19011403 | 29MT-500 | 12 | GND | CW | 9 | 315 | 01 | 0.43 | 19011403 | 10461772 |
| 19011404 | 29MT-500 | 12 | GND | CW | 10 | 055 | 01 | 0.43 | 19011407 | 10461764 |
| 19011407 | 29MT-500 | 12 | GND | CW | 10 | 055 | 01 | 0.43 | 19011407 | 10461764 |
| 19011409 | 29MT-500 | 12 | GND | CW | 10 | 315 | 01 | 0.43 | 19011409 | 10461765 |

37MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Code Features | Service Part Number | Reman Part Number |
|----------|----------|-------|-------|-----|-----------------|--------------------|-----|--------------|--------------------------|---------------------------|-------------------------|
| 1993850 | 37MT-300 | 12 | Gnd | CW | 10 | 068 | 03 | 0.66 | "6,20" | - | 10461044 |
| 1993854 | 37MT-300 | 12 | Gnd | CW | 10 | 308 | 03 | 0.66 | "1,6" | 1993854 | 10461058 |
| 1993869 | 37MT-300 | 12 | Gnd | CW | 12 | 038 | 03 | 0.66 | | - | 10461089 |
| 1993871 | 37MT-300 | 12 | Gnd | CW | 12 | 082 | 03 | 0.66 | | 1993871 | 10461089 |
| 1993873 | 37MT-300 | 12 | Gnd | CW | 12 | 030 | 03 | 0.66 | "3,15,27" | - | 10461013 |
| 1993874 | 37MT-300 | 12 | Gnd | CW | 12 | 082 | 03 | 0.53 | | 1993874 | 10461089 |
| 1993878 | 37MT-300 | 12 | Gnd | CW | 12 | 330 | 03 | 0.66 | 3 | 1993878 | 10461013 |
| 1993879 | 37MT-300 | 12 | Gnd | CW | 10 | 322 | 01 | 0.41 | 6 | 1993879 | 10461526 |
| 1993880 | 37MT-300 | 12 | Gnd | CW | 10 | 278 | 03 | 0.53 | | - | 10461108 |
| 1993881 | 37MT-300 | 12 | Gnd | CW | 10 | 052 | 01 | 0.41 | | - | 10461225 |
| 1993886 | 37MT-300 | 12 | Gnd | CW | 10 | 308 | 01 | 0.41 | | 8200076 | 10461225 |
| 1993887 | 37MT-300 | 12 | Gnd | CW | 12 | 308 | 03 | 0.53 | | - | 10461066 |
| 1993891 | 37MT-300 | 12 | Gnd | CW | 12 | 052 | 01 | 0.41 | "18,35" | 1993891 | - |
| 1993894 | 37MT-300 | 12 | Gnd | CW | 10 | 038 | 01 | 0.41 | 29 | 1993894 | 10461416 |
| 1993901 | 37MT-300 | 24 | Gnd | CW | 12 | 308 | 03 | 0.66 | "6,20" | - | 10461016 |
| 1993903 | 37MT-300 | 24 | Gnd | CW | 10 | 322 | 01 | 0.41 | | 1993903 | 10461525 |
| 1993917 | 37MT-300 | 24 | Gnd | CW | 10 | 038 | 01 | 0.41 | 35 | 1993917 | - |
| 1993920 | 37MT-300 | 24 | Gnd | CW | 12 | 082 | 03 | 0.53 | | 8200072 | 10461016 |
| 1993930 | 37MT-300 | 24 | Gnd | CW | 10 | 038 | 01 | 0.45 | "20,22,26,35" | 1993930 | - |
| 1993947 | 37MT-300 | 12 | Insl. | CW | 10 | 308 | 01 | 0.41 | 20 | 1993947 | 10461110 |
| 1993953 | 37MT-300 | 24 | Gnd | CW | 12 | 322 | 03 | 0.53 | | 1993953 | - |
| 1993954 | 37MT-300 | 24 | Gnd | CW | 10 | 322 | 01 | 0.41 | | 8200078 | 10461525 |
| 1993955 | 37MT-300 | 24 | Gnd | CW | 10 | 052 | 01 | 0.41 | 35 | - | 10461015 |
| 1993958 | 37MT-300 | 12 | Gnd | CW | 12 | 322 | 03 | 0.53 | | 1993958 | - |
| 1993963 | 37MT-300 | 12 | Gnd | CW | 10 | 308 | 01 | 0.41 | 14 | 1993963 | 10461098 |
| 1993964 | 37MT-300 | 12 | Gnd | CW | 10 | 128 | 01 | 0.41 | 14 | 1993964 | 10461098 |
| 1993969 | 37MT-300 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 1993969 | 10461169 |
| 1993974 | 37MT-350 | 12 | Insl. | CW | 12 | 308 | 03 | 0.53 | | - | 10461274 |
| 1993988 | 37MT-300 | 12 | Gnd | CW | 10 | 308 | 01 | 0.41 | 35 | 1993988 | 10461416 |
| 1993994 | 37MT-300 | 12 | Gnd | CW | 10 | 128 | 01 | 0.41 | 20 | - | 10461094 |
| 1993997 | 37MT-350 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 1993997 | 10461276 |
| 10478814 | 37MT-300 | 24 | Gnd | CW | 10 | 322 | 01 | 0.45 | | 10478819 | - |
| 10478819 | 37MT-300 | 24 | Gnd | CW | 10 | 038 | 01 | 0.45 | | 10478819 | - |
| 10478831 | 37MT-300 | 12 | Gnd | CW | 10 | 128 | 01 | 0.41 | | 10478831 | 10461225 |
| 10478890 | 37MT-300 | 12 | Insl. | CW | 10 | 278 | 03 | 0.53 | | 10478890 | 10461170 |
| 10478921 | 37MT-350 | 12 | Insl. | CW | 10 | 278 | 03 | 0.53 | | 10478921 | - |
| 10478953 | 37MT-350 | 12 | Insl. | CW | 10 | 128 | 01 | 0.41 | | 10478953 | - |
| 10478957 | 37MT-300 | 12 | Gnd | CW | 10 | 038 | 01 | 0.45 | | 10478957 | - |
| 10479036 | 37MT-300 | 12 | Gnd | CW | 10 | 322 | 01 | 0.41 | | 10479036 | - |
| 10479047 | 37MT-350 | 12 | Insl. | CW | 10 | 128 | 01 | 0.41 | | 10479047 | 10461209 |
| 10479054 | 37MT-300 | 12 | Gnd | CW | 10 | 038 | 01 | 0.41 | | 10479054 | 10461416 |
| 10479068 | 37MT-300 | 12 | Gnd | CW | 10 | 128 | 01 | 0.41 | | - | 10461207 |
| 10479169 | 37MT-350 | 12 | Insl. | CW | 10 | 128 | 01 | 0.41 | | - | 10461209 |
| 10479170 | 37MT-350 | 12 | Insl. | CW | 10 | 322 | 01 | 0.41 | | 10478953 | - |
| 10479176 | 37MT-300 | 12 | Gnd | CW | 12 | 315 | 03 | 0.66 | | - | 10461316 |
| 10479187 | 37MT-350 | 12 | Insl. | CW | 12 | 315 | 03 | 0.66 | | - | 10461330 |
| 10479188 | 37MT-300 | 24 | Gnd | CW | 10 | 308 | 01 | 0.41 | | 1993917 | - |
| 10479204 | 37MT-350 | 12 | Insl. | CW | 10 | 322 | 01 | 0.41 | | 10479204 | - |

38MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Part Number | Reman Part Number |
|----------|----------|-------|-----|-----|--------------|-----------------|-----|-----------|---------------------|-------------------|
| 8200000* | 38MT-500 | 24 | Gnd | CW | 12 | 082 | 03 | 0.53 | 8200000* | - |
| 8200005* | 38MT-500 | 12 | Gnd | CW | 12 | 082 | 03 | 0.53 | 8200005* | 8300005* |
| 8200007* | 38MT-500 | 12 | Gnd | CW | 10 | 038 | 01 | 0.43 | 8200007* | 8300022* |
| 8200072* | 38MT-500 | 24 | Gnd | CW | 12 | 082 | 03 | 0.53 | 8200072* | 8300025* |
| 8200075* | 38MT-500 | 12 | Gnd | CW | 11 | 315 | 01 | 0.43 | 8200075* | 8300026* |
| 8200076* | 38MT-500 | 12 | Gnd | CW | 10 | 128 | 01 | 0.43 | 8200076* | 8300021* |
| 8200077* | 38MT-500 | 12 | Gnd | CW | 10 | 315 | 01 | 0.43 | 8200077* | 8300024* |
| 8200078* | 38MT-500 | 24 | Gnd | CW | 10 | 315 | 01 | 0.43 | 8200078* | 8300023* |
| 8200217* | 38MT-500 | 12 | Gnd | CW | 12 | 082 | 03 | 0.53 | 8200217* | - |
| 19026027 | 38MT-500 | 12 | Gnd | CW | 10 | 128 | 01 | 0.42 | 19026027 | 10461768 |
| 19026028 | 38MT-500 | 12 | Gnd | CW | 12 | 082 | 03 | 0.53 | 19026028 | 10461769 |
| 19026035 | 38MT-500 | 12 | Gnd | CW | 11 | 315 | 01 | 0.43 | 19026035 | - |

*IMS

39MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Code Features | Service Part Number | Reman Part Number |
|----------|----------|-------|-------|-----|--------------|-----------------|-----|-----------|-----------------------|---------------------|-------------------|
| 8200009 | 39MT-500 | 24 | Insl. | CW | 11 | 278 | 03 | 0.66 | 29 | 8200009 | - |
| 8200022 | 39MT-500 | 24 | Insl. | CW | 11 | 052 | 03 | 0.66 | 33 | 8200022 | - |
| 8200037* | 39MT-500 | 12 | Insl. | CW | 11 | 052 | 03 | 0.66 | 33 | 8200037 | 8300020 |
| 8200058 | 39MT-500 | 12 | Insl. | CW | 12 | 052 | 03 | 0.53 | 33 | 8200058 | - |
| 8200081 | 39MT-550 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | 33 | 8200081 | 8300007 |
| 8200082 | 39MT-550 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | 33 | 8200082 | 8300008 |
| 8200084 | 39MT-500 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | 33 | 8200084 | 8300013 |
| 8200085 | 39MT-500 | 12 | Insl. | CW | 12 | 308 | 03 | 0.53 | 33 | 8200085 | 8300012 |
| 8200086 | 39MT-500 | 24 | Insl. | CW | 12 | 082 | 03 | 0.53 | 33 | 8200086 | 8300011 |
| 8200087 | 39MT-500 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | 33 | 8200087 | 8300015 |
| 8200088 | 39MT-500 | 12 | Insl. | CW | 11 | 278 | 03 | 0.66 | 33 | 8200088 | 8300017 |
| 8200090 | 39MT-550 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 33 | 8200090 | - |
| 8200091 | 39MT-550 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 33 | 8200091 | 8300009 |
| 8200104 | 39MT-500 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 37 | 8200104 | - |
| 8200140 | 39MT-500 | 12 | Insl. | CW | 11 | 231 | 01 | 0.43 | 33 | 8200223 | - |
| 8200170 | 39MT-550 | 12 | Insl. | CW | 12 | 128 | 01 | 0.43 | 33 | 8200170 | - |
| 8200182 | 39MT-500 | 12 | Insl. | CW | 12 | 052 | 03 | 0.53 | 33 | 8200058 | - |
| 8200186 | 39MT-550 | 12 | Insl. | CW | 12 | 038 | 03 | 0.53 | 33 | 8200186 | - |
| 8200200 | 39MT-500 | 12 | Insl. | CW | 12 | 278 | 03 | 0.66 | 33 | 8200200 | - |
| 8200201 | 39MT-500 | 24 | Insl. | CW | 11 | 082 | 03 | 0.66 | 29,37 | 8200201 | - |
| 8200210 | 39MT-550 | 12 | Insl. | CW | 12 | 278 | 03 | 0.66 | 37 | 8200210 | - |
| 8200218 | 39MT-500 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | 37 | 8200218 | - |
| 8200219 | 39MT-550 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | 37 | 8200219 | - |
| 8200233 | 39MT-500 | 12 | Insl. | CW | 12 | 128 | 01 | 0.43 | 33 | 8200233 | - |
| 8200298 | 39MT-500 | 12 | Insl. | CW | 12 | 292 | 03 | 0.66 | 33 | 8200298 | - |
| 8200314 | 39MT-500 | 24 | Insl. | CW | 11 | 082 | 03 | 0.66 | 37 | 8200314 | - |
| 8200321 | 39MT-550 | 24 | Insl. | CW | 11 | 278 | 03 | 0.66 | 33 | 8200321 | - |
| 8200327 | 39MT-500 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 29,33 | 8200327 | - |
| 8200329 | 39MT-550 | 12 | Insl. | CW | 12 | 292 | 03 | 0.66 | 33 | 8200329 | - |
| 8200337 | 39MT-550 | 24 | Insl. | CW | 11 | 278 | 03 | 0.66 | 33 | 8200337 | - |
| 8200360 | 39MT-550 | 12 | Insl. | CW | 12 | 082 | 03 | 0.66 | 37 | 8200360 | - |
| 19011514 | 39MT-500 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 19011514 | 10461773 |
| 19011515 | 39MT-500 | 12 | Insl. | CW | 12 | 038 | 03 | 0.53 | 33 | 19011515 | 8300004 |
| 19011516 | 39MT-500 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 33 | 19011516 | 10461777 |
| 19011517 | 39MT-500 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 19011517 | 10461757 |
| 19011518 | 39MT-500 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | | 19011518 | 10461753 |
| 19011519 | 39MT-500 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | | 19011519 | - |

Original to Service

39MT Series (cont.)

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Code Features | Service Part Number | Reman Part Number |
|----------|----------|-------|-------|-----|-----------------|--------------------|-----|--------------|-----------------------------|---------------------------|-------------------------|
| 19011521 | 39MT-550 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 29 33 33 | 19011521 | 8300009 |
| 19011522 | 39MT-500 | 24 | Insl. | CW | 11 | 082 | 03 | 0.66 | | 19011522 | 8300018 |
| 19011523 | 39MT-500 | 24 | Insl. | CW | 11 | 278 | 03 | 0.66 | | 19011523 | 8300016 |
| 19011524 | 39MT-500 | 24 | Insl. | CW | 12 | 308 | 03 | 0.53 | | 19011524 | 8300014 |
| 19011525 | 39MT-550 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 19011525 | 8300008 |
| 19011526 | 39MT-550 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 19011526 | 8300007 |
| 19011527 | 39MT-500 | 24 | Insl. | CW | 11 | 082 | 03 | 0.66 | | 19011527 | - |
| 19011529 | 39MT-500 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | | 19011529 | 8300019 |
| 19011530 | 39MT-500 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | | 19011530 | 8300019 |
| 19011531 | 39MT-500 | 12 | Insl. | CW | 11 | 052 | 03 | 0.66 | | 19011531 | 10461334 |

41MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Code Features | Service Part Number | Reman Part Number |
|----------|----------|-------|-------|-----|-----------------|--------------------|-----|--------------|-----------------------------|---------------------------|-------------------------|
| 8200055 | 41MT-450 | 12 | Insl. | CW | 12 | 128 | 01 | 0.41 | 15 | 8200055 | - |
| 8200080 | 41MT-450 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 8200080 | - |
| 8200107 | 41MT-400 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 8200107 | - |
| 8200155 | 41MT-400 | 24 | Insl. | CW | 12 | 038 | 01 | 0.41 | | 8200155 | - |
| 8200178 | 41MT-400 | 24 | Insl. | CW | 12 | 128 | 01 | 0.41 | 29 | 8200178 | - |
| 8200197 | 41MT-400 | 12 | Insl. | CW | 12 | 052 | 03 | 0.53 | 15, 37 15, 37 | 8200197 | - |
| 8200251* | 41MT-400 | 12 | Gnd | CW | 12 | 082 | 03 | 0.53 | | 8200252* | - |
| 8200252* | 41MT-450 | 12 | Gnd | CW | 12 | 082 | 03 | 0.53 | | 8200252* | - |
| 10478812 | 41MT-450 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 10478812 | 10461304 |
| 10478818 | 41MT-400 | 12 | Gnd | CW | 12 | 322 | 03 | 0.53 | 15 | 10478818 | 10461240 |
| 10478897 | 41MT-400 | 12 | Insl. | CW | 11 | 052 | 03 | 0.66 | | 10478897 | - |
| 10478898 | 41MT-400 | 24 | Insl. | CW | 11 | 052 | 03 | 0.66 | | 10478898 | 10461333 |
| 10478999 | 41MT-400 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | | 10478999 | 10461171 |
| 10479024 | 41MT-400 | 24 | Insl. | CW | 11 | 052 | 03 | 0.66 | 13,15 | - | 10461408 |
| 10479060 | 41MT-400 | 12 | Insl. | CW | 12 | 292 | 03 | 0.53 | | 10479060 | - |
| 10479071 | 41MT-400 | 12 | Gnd | CW | 12 | 038 | 01 | 0.41 | | 10479071 | - |
| 10479079 | 41MT-450 | 24 | Insl. | CW | 11 | 322 | 03 | 0.66 | | 10479079 | 10461504 |
| 10479098 | 41MT-400 | 12 | Gnd | CW | 12 | 308 | 01 | 0.41 | 14,36 | 10479098 | - |
| 10479206 | 41MT-400 | 12 | Gnd | CW | 12 | 308 | 01 | 0.41 | | 10479206 | 10461434 |
| 10479207 | 41MT-400 | 12 | Gnd | CW | 12 | 128 | 01 | 0.41 | | 10479207 | - |
| 10479215 | 41MT-450 | 12 | Insl. | CW | 12 | 128 | 01 | 0.41 | | 10479215 | 10461431 |
| 10479226 | 41MT-400 | 12 | Gnd | CW | 12 | 128 | 01 | 0.41 | 20 | 10479226 | 10461282 |
| 10479242 | 41MT-400 | 12 | Gnd | CW | 12 | 128 | 01 | 0.41 | | 10479242 | 10461496 |
| 10479243 | 41MT-450 | 12 | Insl. | CW | 12 | 128 | 01 | 0.41 | | 10479243 | 10461439 |
| 10479246 | 41MT-450 | 12 | Insl. | CW | 12 | 308 | 01 | 0.41 | | 10479246 | 10461436 |
| 10479250 | 41MT-400 | 12 | Gnd | CW | 12 | 082 | 03 | 0.53 | 18 | - | 10461435 |
| 10479262 | 41MT-400 | 12 | Insl. | CW | 12 | 322 | 01 | 0.41 | | 10479262 | - |
| 10479263 | 41MT-450 | 12 | Insl. | CW | 12 | 322 | 01 | 0.41 | | 10479263 | - |
| 10479269 | 41MT-400 | 12 | Insl. | CW | 11 | 278 | 03 | 0.53 | | 10479269 | - |
| 10479283 | 41MT-400 | 12 | Gnd | CW | 11 | 052 | 01 | 0.41 | 20 | 10479283 | - |
| 10479299 | 41MT-450 | 12 | Insl. | CW | 11 | 052 | 01 | 0.41 | | 10479299 | - |
| 10479307 | 41MT-400 | 12 | Insl. | CW | 12 | 322 | 01 | 0.41 | | 10479307 | - |
| 10479363 | 41MT-450 | 24 | Insl. | CW | 12 | 202 | 03 | 0.053 | | 10479363 | - |

42MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Code Features | Service Part Number | Reman Part Number |
|----------|----------|-------|-------|-----|--------------|-----------------|-----|-----------|-----------------------|---------------------|-------------------|
| 1990352 | 42MT-400 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | | 1990352 | 10461052 |
| 1990355 | 42MT-450 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | | 1990355 | 10461055 |
| 1990366 | 42MT-400 | 24 | Insl. | CW | 12 | 292 | 03 | 0.66 | 21 | 1990366 | 10461025 |
| 1990370 | 42MT-400 | 12 | Insl. | CW | 12 | 322 | 03 | 0.66 | | 1990379 | 10461021 |
| 1990372 | 42MT-400 | 12 | Insl. | CW | 12 | 082 | 03 | 0.66 | 10 | - | 10461077 |
| 1990377 | 42MT-400 | 12 | Insl. | CW | 13 | 082 | 03 | 0.66 | | - | 10461133 |
| 1990379 | 42MT-400 | 12 | Insl. | CW | 12 | 082 | 03 | 0.66 | 2 | 1990379 | 10461050 |
| 1990397 | 42MT-450 | 12 | Insl. | CW | 12 | 082 | 03 | 0.66 | | - | 10461078 |
| 1990402 | 42MT-400 | 24 | Insl. | CW | 12 | 082 | 03 | 0.53 | 15 | 1990402 | 10461025 |
| 1990405 | 42MT-400 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | 15 | 1990405 | 10461050 |
| 1990406 | 42MT-450 | 12 | Insl. | CW | 12 | 082 | 03 | 0.53 | 15 | 1990406 | 10461233 |
| 1990415 | 42MT-400 | 24 | Insl. | CW | 12 | 322 | 03 | 0.53 | 21,23,26 | 1990415 | - |
| 1990418 | 42MT-400 | 24 | Insl. | CW | 11 | 052 | 03 | 0.66 | | 1990418 | 10461068 |
| 1990424 | 42MT-400 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 30 | 1990424 | 10461052 |
| 1990428 | 42MT-450 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 30 | - | 10461055 |
| 1990429 | 42MT-400 | 12 | Insl. | CW | 12 | 292 | 03 | 0.66 | 30 | - | 10461021 |
| 1990432 | 42MT-400 | 24 | Insl. | CW | 12 | 278 | 03 | 0.66 | 2 | 1990432 | - |
| 1990435 | 42MT-400 | 24 | Insl. | CW | 13 | 322 | 03 | 0.66 | | - | 10461137 |
| 1990447 | 42MT-400 | 24 | Insl. | CCW | 11 | 052 | 03 | 0.66 | 11 | 1990447 | - |
| 1990453 | 42MT-400 | 24 | Insl. | CW | 12 | 278 | 03 | 0.66 | 2 | 1990453 | 10461025 |
| 1990483 | 42MT-400 | 12 | Insl. | CW | 11 | 052 | 03 | 0.66 | 2,21 | 1990483 | 10461052 |
| 1990484 | 42MT-450 | 12 | Insl. | CW | 11 | 052 | 03 | 0.66 | 2,21 | 1990484 | 10461055 |
| 1990489 | 42MT-450 | 12 | Insl. | CW | 11 | 088 | 03 | 0.66 | 5 | 1990489 | 10461075 |
| 1990490 | 42MT-400 | 12 | Insl. | CW | 11 | 088 | 03 | 0.66 | 5 | 1990490 | 10461053 |
| 1990491 | 42MT-400 | 24 | Insl. | CW | 11 | 088 | 03 | 0.66 | 5 | - | 10461054 |
| 1990492 | 42MT-400 | 12 | Insl. | CW | 12 | 052 | 03 | 0.66 | 2,15 | - | 10461050 |
| 1993788 | 42MT-450 | 24 | Insl. | CW | 11 | 052 | 03 | 0.66 | | 1993788 | 10461141 |
| 1993795 | 42MT-400 | 12 | Insl. | CW | 12 | 322 | 03 | 0.53 | | 1993795 | 10461021 |
| 1993796 | 42MT-400 | 24 | Insl. | CW | 12 | 322 | 03 | 0.53 | | 1993796 | 10461025 |
| 1993797 | 42MT-400 | 24 | Insl. | CW | 12 | 308 | 03 | 0.66 | 14 | 1990453 | - |
| 1993824 | 42MT-450 | 12 | Insl. | CW | 12 | 322 | 03 | 0.53 | 1 | - | 10461329 |
| 1993856 | 42MT-400 | 12 | Insl. | CW | 12 | 082 | 03 | 0.66 | | - | 10461077 |
| 1993924 | 42MT-400 | 24 | Insl. | CW | 11 | 038 | 03 | 0.66 | 2 | 1993924 | - |
| 1993933 | 42MT-400 | 24 | Insl. | CW | 11 | 082 | 03 | 0.66 | 35 | 1993933 | - |
| 1993940 | 42MT-400 | 24 | Insl. | CW | 12 | 082 | 03 | 0.53 | 21,35 | 1993940 | 10461025 |
| 1993973 | 42MT-450 | 12 | Insl. | CW | 12 | 082 | 03 | 0.66 | | - | 10461078 |
| 1993982 | 42MT-400 | 12 | Insl. | CW | 11 | 038 | 03 | 0.66 | 2,35 | 10478895 | - |
| 8200068 | 42MT-450 | 24 | Insl. | CW | 12 | 052 | 03 | 0.53 | 15 | 8200068 | - |
| 8200089 | 42MT-450 | 24 | Insl. | CW | 12 | 52 | 03 | 0.53 | | 8200089 | - |
| 8200110 | 42MT-400 | 12 | Insl. | CW | 11 | 088 | 03 | 0.66 | 5,33 | 8200110 | - |
| 8200115 | 42MT-450 | 12 | Insl. | CW | 12 | 088 | 03 | 0.53 | 5,33 | 8200115 | - |
| 8200116 | 42MT-400 | 12 | Insl. | CW | 12 | 088 | 03 | 0.53 | 5,33 | 8200116 | - |
| 8200117 | 42MT-400 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 33 | 8200117 | - |
| 8200122 | 42MT-450 | 12 | Insl. | CW | 11 | 088 | 03 | 0.66 | 5,33 | 8200122 | - |
| 8200163 | 42MT-450 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 2,33 | 8200163 | 8300032 |
| 8200164 | 42MT-450 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 2,33 | 8200164 | 8300031 |
| 8200165 | 42MT-450 | 12 | Insl. | CW | 11 | 088 | 03 | 0.66 | 5,33 | 8200165 | 8300034 |
| 8200168 | 42MT-450 | 12 | Insl. | CW | 11 | 088 | 03 | 0.66 | 5,33 | 8200168 | 8300033 |
| 10478810 | 42MT-400 | 12 | Insl. | CW | 11 | 308 | 03 | 0.66 | 13 | - | 10461592 |
| 10478832 | 42MT-400 | 12 | Insl. | CW | 11 | 082 | 03 | 0.66 | 35 | 10478832 | - |
| 10478837 | 42MT-400 | 24 | Insl. | CW | 11 | 082 | 03 | 0.66 | 2 | - | 10461102 |
| 10478841 | 42MT-400 | 24 | Insl. | CW | 12 | 308 | 03 | 0.66 | 2 | 10478841 | 10461101 |
| 10478895 | 42MT-400 | 12 | Insl. | CW | 11 | 038 | 03 | 0.66 | 2 | 10478895 | 10461052 |
| 10478896 | 42MT-400 | 12 | Insl. | CW | 11 | 278 | 03 | 0.66 | 2,14,16 | 10478896 | - |
| 10478983 | 42MT-400 | 12 | Insl. | CW | 11 | 278 | 03 | 0.66 | 16 | - | 10461778 |
| 10478988 | 42MT-400 | 24 | Insl. | CW | 11 | 278 | 03 | 0.66 | | 10478988 | 10461360 |
| 10478997 | 42MT-400 | 12 | Gnd | CW | 12 | 038 | 03 | 0.66 | 2 | 10478997 | - |
| 10478998 | 42MT-400 | 24 | Insl. | CW | 11 | 038 | 03 | 0.66 | 2 | 10478998 | 10461068 |
| 10479003 | 42MT-400 | 12 | Insl. | CW | 12 | 278 | 03 | 0.66 | 2,16 | - | 10461051 |
| 10479004 | 42MT-400 | 12 | Insl. | CW | 12 | 082 | 03 | 0.66 | 2,29,35 | - | 10461414 |

Original to Service

42MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Code Features | Service Part Number | Reman Part Number |
|----------|----------|-------|------|-----|--------------|-----------------|-----|-----------|-----------------------|---------------------|-------------------|
| 10479009 | 42MT-400 | 24 | InsL | CW | 12 | 308 | 03 | 0.66 | 2,29,35 | 10479009 | 10461031 |
| 10479010 | 42MT-400 | 24 | InsL | CW | 11 | 082 | 03 | 0.66 | 2,29,35 | 10479010 | - |
| 10479011 | 42MT-400 | 24 | InsL | CW | 12 | 308 | 01 | 0.41 | 29,3" | 10479011 | - |
| 10479053 | 42MT-400 | 24 | InsL | CW | 12 | 038 | 03 | 0.53 | 35 | 1990453 | - |
| 10479062 | 42MT-450 | 12 | InsL | CW | 11 | 278 | 03 | 0.66 | 2,13 | 10479062 | 10461055 |
| 10479067 | 42MT-450 | 24 | InsL | CW | 11 | 038 | 03 | 0.66 | 2,15 | 10479067 | - |
| 10479072 | 42MT-400 | 12 | InsL | CW | 11 | 082 | 03 | 0.66 | 30 | 10479072 | 10461052 |
| 10479130 | 42MT-450 | 24 | InsL | CW | 11 | 308 | 03 | 0.66 | 2 | 10479130 | 8300036 |
| 10479131 | 42MT-450 | 12 | InsL | CW | 12 | 082 | 03 | 0.53 | | 10479131 | 10461329 |
| 10479132 | 42MT-450 | 24 | InsL | CW | 11 | 322 | 03 | 0.66 | | 10479132 | 8300036 |
| 10479150 | 42MT-400 | 12 | InsL | CW | 11 | 278 | 03 | 0.66 | 2,16 | - | 10461778 |
| 10479151 | 42MT-450 | 12 | InsL | CW | 11 | 278 | 03 | 0.66 | 1,2,13 | 10479151 | 8300035 |
| 10479178 | 42MT-400 | 24 | InsL | CW | 12 | 322 | 03 | 0.53 | 35 | 10479178 | 10461031 |
| 10479191 | 42MT-400 | 12 | InsL | CW | 12 | 038 | 03 | 0.53 | 2 | 10479191 | 10461328 |
| 10479209 | 42MT-400 | 12 | InsL | CW | 11 | 322 | 03 | 0.66 | 29 | 10479209 | - |
| 10479211 | 42MT-400 | 24 | InsL | CW | 11 | 052 | 03 | 0.66 | | 1993924 | - |
| 10479213 | 42MT-450 | 24 | InsL | CW | 12 | 082 | 03 | 0.53 | 15 | 10479213 | - |
| 10479228 | 42MT-450 | 24 | InsL | CW | 12 | 322 | 03 | 0.53 | | 10479228 | - |
| 10479238 | 42MT-400 | 24 | InsL | CW | 12 | 082 | 03 | 0.53 | | 10479238 | - |
| 10479265 | 42MT-450 | 12 | InsL | CW | 11 | 082 | 03 | 0.66 | | 10479265 | 10462155 |
| 10479266 | 42MT-450 | 12 | InsL | CW | 11 | 052 | 03 | 0.66 | | 10479266 | 10462196 |
| 10479267 | 42MT-450 | 12 | InsL | CW | 11 | 088 | 03 | 0.66 | | 10479267 | 10461075 |
| 10479281 | 42MT-400 | 12 | InsL | CW | 11 | 082 | 03 | 0.66 | | 10479281 | - |
| 10479282 | 42MT-450 | 12 | InsL | CW | 12 | 088 | 03 | 0.53 | 33 | 10479282 | 8300037 |
| 10479289 | 42MT-400 | 12 | InsL | CW | 12 | 088 | 03 | 0.53 | | 10479289 | - |
| 10479357 | 42MT-400 | 12 | InsL | CW | 12 | 278 | 03 | 0.66 | | 10479357 | - |

50MT Series

| Model | Series | Volts | Pol | Rot | Pinion Teeth | SW Pos. Degrees | SAE | Mtg. Hole | Service Code Features | Service Part Number | Reman Part Number |
|----------|----------|-------|------|-----|--------------|-----------------|-----|-----------|-----------------------|---------------------|-------------------|
| 8200016 | 50MT-400 | 24 | InsL | CW | 11 | 082 | 03 | 0.66 | 2,34 | 8200016 | 10461744 |
| 10478827 | 50MT-400 | 32 | InsL | CW | 11 | 308 | 03 | 0.66 | 17,25 | 10478827 | 10461159 |
| 10478828 | 50MT-400 | 32 | InsL | CW | 11 | 308 | 03 | 0.66 | 17,25 | 10478828 | 10461161 |
| 10478829 | 50MT-400 | 64 | InsL | CW | 11 | 308 | 03 | 0.66 | 12,25 | 10478829 | 10461160 |
| 10478830 | 50MT-400 | 64 | InsL | CW | 11 | 308 | 03 | 0.66 | 12,25 | 10478830 | - |
| 10478916 | 50MT-400 | 64 | InsL | CW | 11 | 308 | 03 | 0.66 | 12,17,25 | - | 10461160 |
| 10478919 | 50MT-400 | 64 | InsL | CW | 11 | 322 | 03 | 0.66 | 2,17,25 | - | 10461160 |
| 10479258 | 50MT-400 | 64 | InsL | CW | 11 | 038 | 03 | 0.66 | 17,25 | 10479258 | - |
| 10479323 | 50MT-400 | 24 | InsL | CW | 11 | 068 | 03 | 0.66 | 1,2,34 | 10479323 | 10461739 |
| 10479324 | 50MT-400 | 24 | InsL | CW | 11 | 158 | 03 | 0.66 | 1,2,34 | 10479324 | - |
| 10479327 | 50MT-400 | 24 | InsL | CCW | 11 | 038 | 03 | 0.66 | 2,34 | 10479327 | - |
| 10479328 | 50MT-400 | 12 | InsL | CW | 11 | 038 | 03 | 0.66 | 2 | 10479328 | 10461738 |
| 10479329 | 50MT-400 | 24 | InsL | CW | 11 | 292 | 03 | 0.66 | 2 | 10479329 | - |
| 10479330 | 50MT-400 | 24 | InsL | CW | 11 | 082 | 03 | 0.66 | 34 | 10479330 | - |
| 10479331 | 50MT-400 | 32 | InsL | CW | 11 | 038 | 03 | 0.66 | 2,34 | 10479331 | - |
| 10479332 | 50MT-400 | 24 | InsL | CW | 11 | 322 | 03 | 0.66 | 2 | 10479332 | - |
| 10479333 | 50MT-400 | 24 | InsL | CW | 11 | 278 | 03 | 0.66 | 2 | 10479333 | - |
| 10479335 | 50MT-400 | 24 | InsL | CW | 11 | 068 | 03 | 0.66 | | 10479335 | 10461381 |
| 10479336 | 50MT-400 | 12 | InsL | CW | 11 | 308 | 03 | 0.66 | 2 | - | 10461738 |
| 10479337 | 50MT-400 | 24 | InsL | CW | 11 | 038 | 03 | 0.66 | 34 | 10479337 | - |
| 10479338 | 50MT-400 | 12 | InsL | CW | 11 | 082 | 03 | 0.66 | 2 | 10479338 | 10461738 |
| 10479339 | 50MT-400 | 24 | InsL | CW | 11 | 038 | 03 | 0.66 | 2 | 10479339 | 10461739 |
| 10479342 | 50MT-400 | 24 | InsL | CW | 11 | 052 | SP | 0.66 | 2,29,34 | 10479342 | - |
| 10479343 | 50MT-400 | 24 | InsL | CW | 11 | 082 | 03 | 0.66 | 2,29,34 | 10479343 | 10461744 |
| 10479344 | 50MT-400 | 24 | InsL | CW | 11 | 038 | 03 | 0.66 | | 10479344 | 10461493 |
| 10479345 | 50MT-400 | 24 | InsL | CW | 11 | 038 | 03 | 0.66 | | 10479345 | 10461493 |
| 10479346 | 50MT-400 | 24 | InsL | CW | 11 | 322 | 03 | 0.66 | 2 | 10479346 | 10461493 |
| 10479352 | 50MT-400 | 12 | InsL | CW | 12 | 082 | 03 | 0.66 | 2 | 10479352 | - |
| 10479353 | 50MT-400 | 24 | InsL | CW | 11 | 322 | 03 | 0.66 | 2 | 10479353 | - |

Some dual engine applications utilize engines which operate in opposite rotation, one clockwise (CW) and one counter-clockwise (CCW). Therefore, matching cranking motors with opposite rotation are necessary. Cross-referenced models may have external wiring differences such as standard solenoid terminals vs reversed solenoid terminals or insulated vs internally grounded. All are insulated unless indicted by their special features.

| CW vs CCW ^① | | | | | | | | | |
|------------------------|--------|---------|--------------|------------------|---------------|--------|---------|--------------|------------------|
| Counter Clockwise | | | | | Clockwise | | | | |
| Service Model | Series | Voltage | Pinion Teeth | Special Features | Service Model | Series | Voltage | Pinion Teeth | Special Features |
| 1990430 | 42MT | 12 | 11 | - | 10478895 | 42MT | 12 | 11 | - |
| 1993884 | 37MT | 12 | 10 | - | 1993881 | 37MT | 12 | 10 | - |
| 1993979 | 37MT | 12 | 12 | 3 | 1993878 | 37MT | 12 | 12 | 3 |
| 10479327 | 50MT | 24 | 11 | 34 | 10479343 | 50MT | 24 | 11 | 34 |
| 10478978 | 42MT | 12 | 11 | - | 10478895 | 42MT | 12 | 11 | - |
| 10478981 | 42MT | 24 | 11 | - | 10478998 | 42MT | 24 | 11 | - |

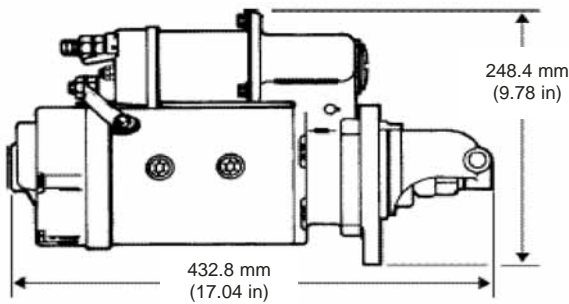
^① See Feature Code Listing page 102

STARTING MOTORS

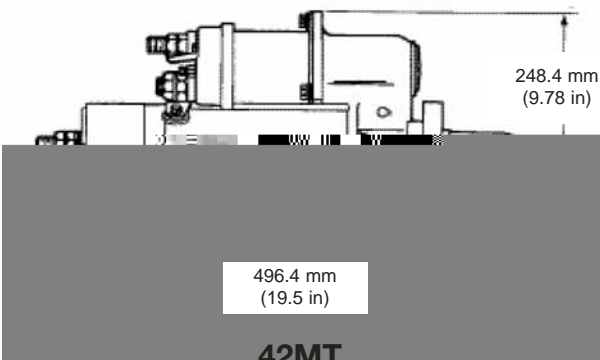
Overcrank Protected Service Models

| OCP vs. Non-OCP ^① | | | | | | | | | |
|------------------------------|--------|---------|--------------|------------------|-------------------------|--------|---------|--------------|------------------|
| Overcrank Protection | | | | | Non-Overcrank Protected | | | | |
| OEM/Serv Model | Series | Voltage | Pinion Teeth | Special Features | OEM/Serv Models | Series | Voltage | Pinion Teeth | Special Features |
| 1990484 | 42MT | 12 | 11 | 2,21 | 1990483 | 42MT | 22 | 11 | 2,21 |
| 1990489 | 42MT | 12 | 11 | 5 | 1990490 | 42MT | 22 | 11 | 5 |
| 10478812 | 41MT | 12 | 12 | — | 10478999 | 41MT | 22 | 12 | — |
| 10478921 | 37MT | 12 | 10 | 32 | 10478890 | 37MT | 22 | 10 | 32 |

① See Feature Code Listing page 102



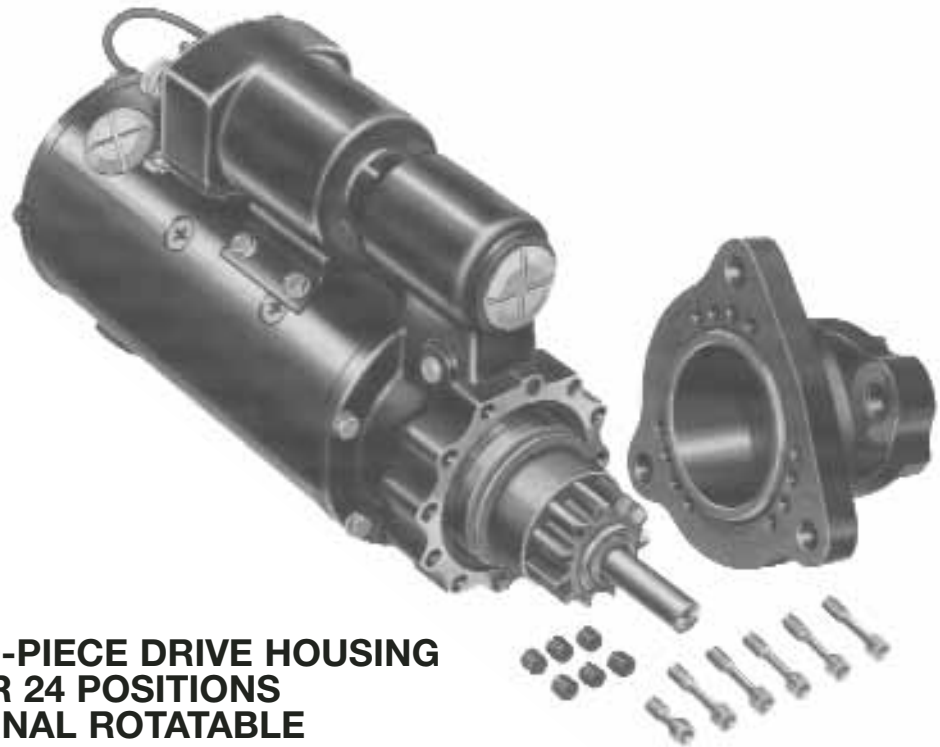
37MT



42MT

EXTERNAL ROTATABLE MODELS

37MT, 40MT, 41MT, 42MT & 50MT



TYPICAL TWO-PIECE DRIVE HOUSING 12 OR 24 POSITIONS EXTERNAL ROTATABLE

It may be necessary to rotate the drive housing of a replacement starting motor to match the solenoid position of the original starting motor.

It is recommended solenoid position be horizontal or above horizontal when mounted to the engine.

To change solenoid position, separate the drive housing from the lever housing by removing recessed allen head bolts located on the starting motor mounting surface.

Drive housing may be rotated every 30° (12 position) or 15° (24 position) with respect to the lever housing. Position the drive housing to match as close as possible the position of the starting original motor. Position of original starting motor can be obtained from original to replacement model cross reference.

When properly positioned, reattach drive housing and tighten allen head bolts to 13-17 foot pounds torque.

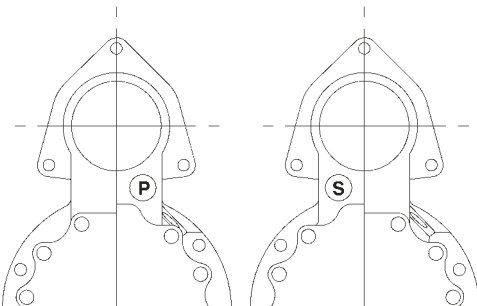
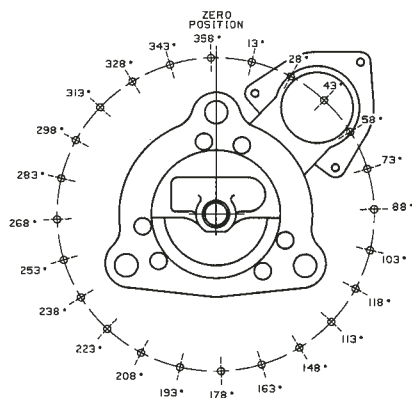
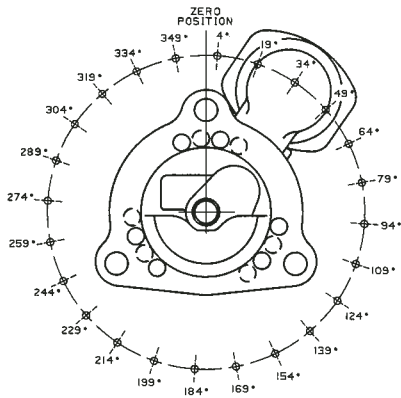
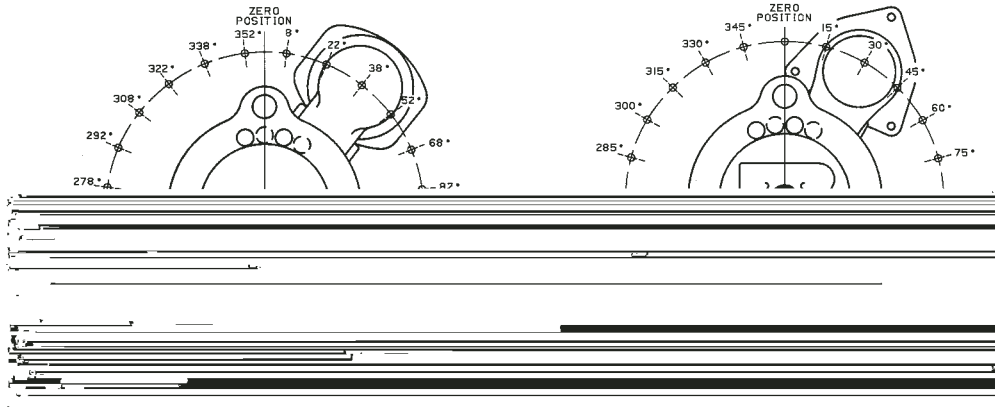
Replace rubber plugs (if removed) on 24 position starting motors.

After rotating the drive housing on 24 position starting motors (12 allen head bolt holes) and an allen head bolt is in the hole closest to (inline with) a starting motor mounting bolt hole, a 12 POINT HEAD MOUNTING BOLT WILL BE NECESSARY. Refer to Recommended Mounting Hardware section.

Drive Housing Rotation Description

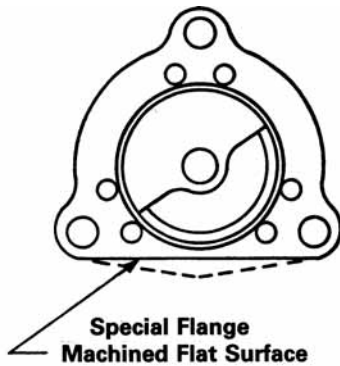
Viewing a starting motor from the drive end solenoid switch position is determined by using motor mounting hole opposite the flywheel opening as the beginning or 0 degree reference point.

Rotating the drive housing counter-clockwise increases solenoid switch position degrees.

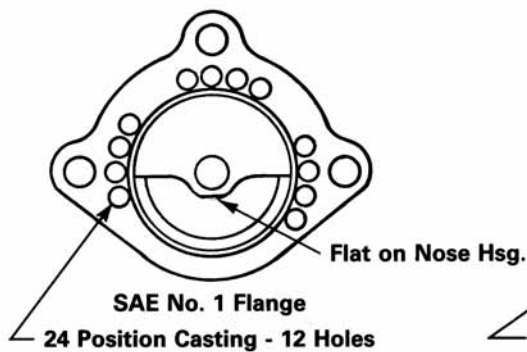


Any starter motor model may have combinations of these features.

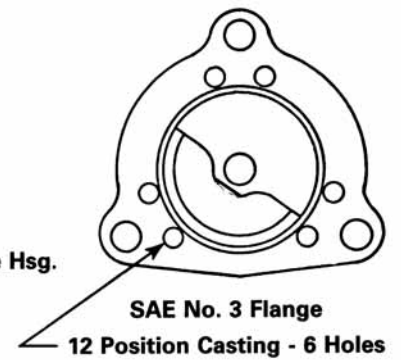
145° Flywheel Opening



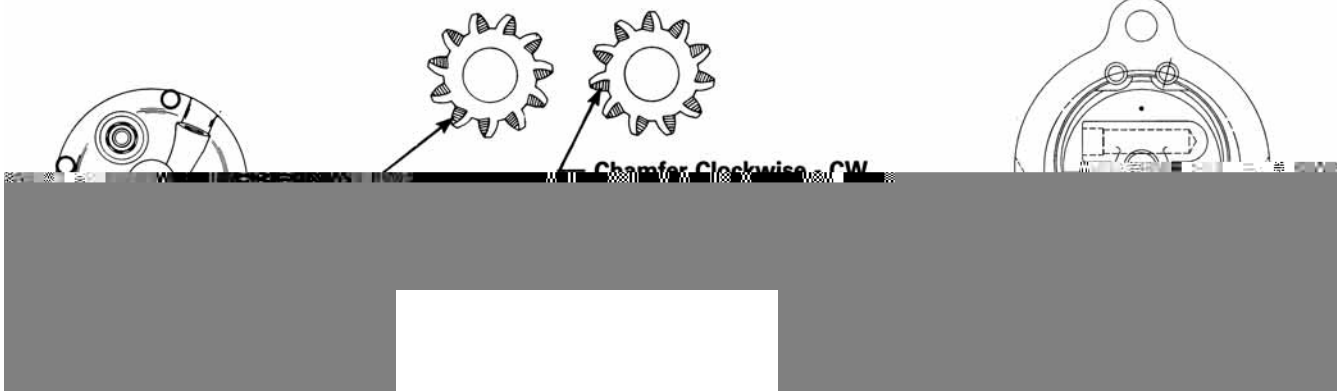
180° Flywheel Opening



215° Flywheel Opening

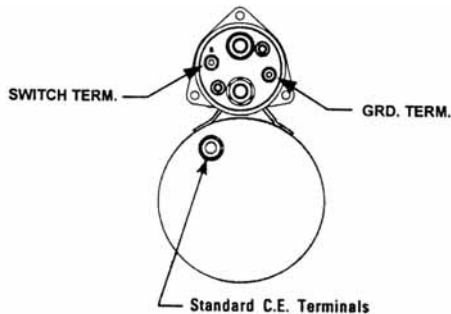


Starter Rotation

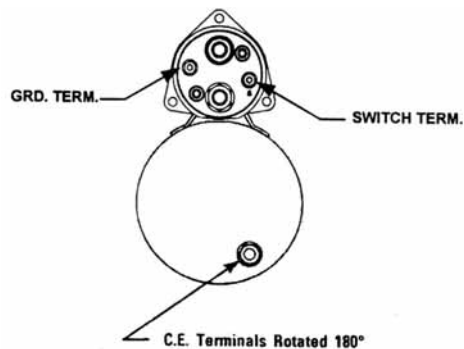


37MT, 41MT & 42MT SERIES

Solenoid Terminals Reversed

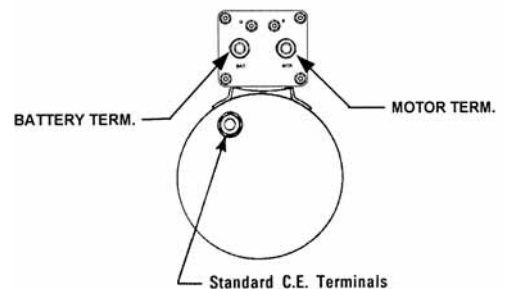


Standard Solenoid Terminals

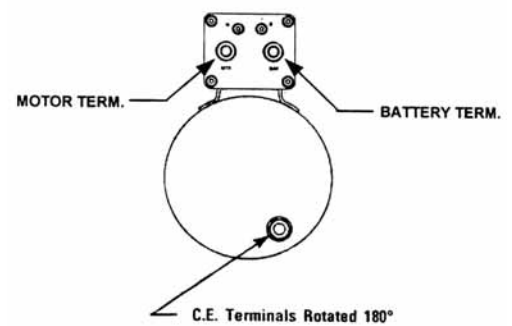


40MT & 50MT SERIES

Solenoid Terminals Reversed



Standard Solenoid Terminals



STARTING MOTORS

Circuit Control Switches



Magnetic Switches (Insulated)

These models are recommended for use in starting motor solenoid control circuits to reduce high current circuit length.

Switch should be mounted in a horizontal position 90° to the fore and aft centerline of the vehicle. It should not be mounted on the engine or engine accessories.

Features:

- Splash proof design – fungus & corrosion resistant.
- Sealed, rugged construction.
- Large copper contacts.
- Sufficient carrying capacity of heavy-duty solenoid current.
- Flat mounting bracket with mounting holes 2 3/32" between centers.
- Terminals are: Small 8-32 UNC, large 15/16-24 UNF.

| Part Number | Volts | Terminals | Mounting | Intermittent / Continuous Voltage | Fungus & Corrosion |
|-------------|-------|-----------|----------|-----------------------------------|--------------------|
| 1114532 | 12 | 3 | Dash | Intermittent | |
| 1114534 | 12 | 4 | Dash | Continuous | |
| 1114536 | 24 | 4 | Dash | Intermittent | x |
| 1114537 | 12 | 4 | Dash | Intermittent | x |
| 1114538 | 12 | 3 | Dash | Continuous | |
| 1114540 | 6 | 3 | Dash | Intermittent | |
| 1114545 | 12 | 3 | Motor | Intermittent | |
| 1114547 | 12 | 4 | Dash | Continuous | |
| 1114549 | 12 | 4 | Motor | Intermittent, Special Circuit | |
| 1115615 | 24 | 4 | Dash | Intermittent | |
| 1115616 | 12 | 4 | Dash | Intermittent | x |
| 1115636 | 24 | 4 | Dash | Intermittent | |

DIAGNOSTIC TEST EQUIPMENT

Remy

The Remy Alternator & Starter Bench Top Tester



Diagnostic Bench Top Tester

Provides the ability to test alternators and generators up to 160 Amps with integral or remote regulation. Heavy-duty starters can be free spun to test basic circuit integrity. The unit is designed for fast, simple operation.

Tester features are as follows:

- Digital meters to display voltage and amperage.
- 3" DC ammeter 10-0-10 for testing field current.
- Battery operation duplicates circuitry found in vehicles.
- Indicator light for alternators using diode trios.
- Heavy-duty rheostat to control alternator and generator output.
- Field circuit protection – 10 Amp breaker, push to reset.
- Test 12 & 24 Volt units.
- A or B circuit selections.
- Motor reverse switch.
- External volt meter leads for checking voltage at the starter alternator and regulator terminals.
- Heavy-duty V-block and multiple spindles allow for quick, easy mounting and removal.
- Three step pulley (3", 4" & serpentine) for various speeds and pulley applications.
- Six step load control (20A-40A-70A-100A-130A-160A).
- Starter test switch to free spin starters.
- Unit weight: 285 lbs.
- Dimensions: 24" W x 27" H x 48" D.

| Part Number | Description |
|-------------|------------------------------------|
| 10457728 | 5 H.P. 230 Volt Single Phase Motor |
| 10457729 | 5 H.P. 230 Volt Three Phase Motor |
| 10457771 | 5 H.P. 480 Volt Three Phase Motor |
| 10500123 | Pad Mount Alternator Bracket |
| 10503932 | Pulley |

Key-off Protection, Guaranteed!

Delco Remy introduces the Low Voltage Disconnect control module to protect you from those no-start conditions that result from batteries that have been drained by the key-off creature-comfort electrical loads, prevalent in today's class 8 over-the-road trucks.

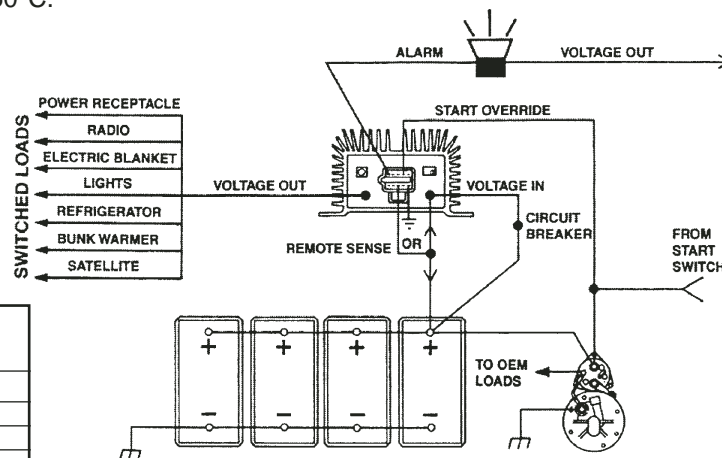
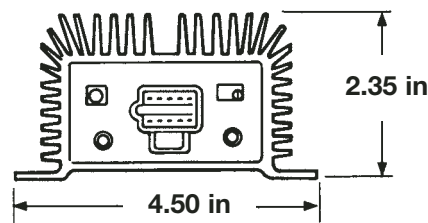
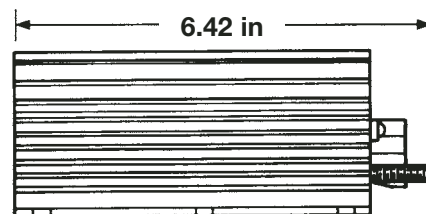
The Low Voltage Disconnect

is a fail-safe device that automatically disconnects noncritical electrical loads during a power drain, then reconnects them after the engine is started. A signal activates a one minute alarm before the electronic system disconnects. This unit's 100% solid state circuitry uses 8mA or less for load switching, which normally is a 300 to 750mA draw from the batteries. The "LVD" ensures adequate electrical power for engine cranking.

Available as an OEM option

or as a retrofit kit from your Delco Remy heavy-duty parts supplier, the Low Voltage Disconnect is a tremendous advantage when there are key-off electrical requirements, while maintaining reserve starting power!

- Automatically disconnects noncritical electrical loads before deeply discharging the battery system.
- Automatically reconnects loads after vehicle's engine is started.
- Improves conventional battery system cycle life.
- Eliminates the need for an isolated battery system.
- Adjustable set point indicator range: 11.8-12.3 Volts.
- Alarm activates one minute before shut off. Duration is selectable between one minute or continuous.
- Maximum load 35 Amps at 85°C or 50 Amps at 50°C.
- 8mA standby current.



| O.E. # | Service By (Pkg) Part # | Description |
|----------|----------------------------|-------------|
| 19020490 | 10500242 | 50A 12.1V |
| 19020492 | 10502363 | 70A 12.3V |
| 19020496 | 10500242 | 50A 12.1V |
| 19020494 | 10500389 | 50A 12.3V |
| 19020498 | 10500389 | 50A 12.3V |
| 19020499 | 10503670 | 100A 12.3V |

Starting any engine requires being cranked at a minimum speed. Minimum speed varies with each different engine design and characteristics.

The following charts show the minimum temperature 100 rpm cranking speed can be obtained with a variety of cranking systems and engine oils. Since other factors such as parasitic engine load will change cranking speed, this chart illustrates a comparison of only these conditions.

Engine oil viscosity has the greatest effect on changes in cranking speed. Battery capacity rating and cable resistance are also major factors as to whether or not an engine will crank fast enough to start.

Comparison Examples:

Two systems show very little advantage of 24 Volt over 12 Volt cranking with any oil.

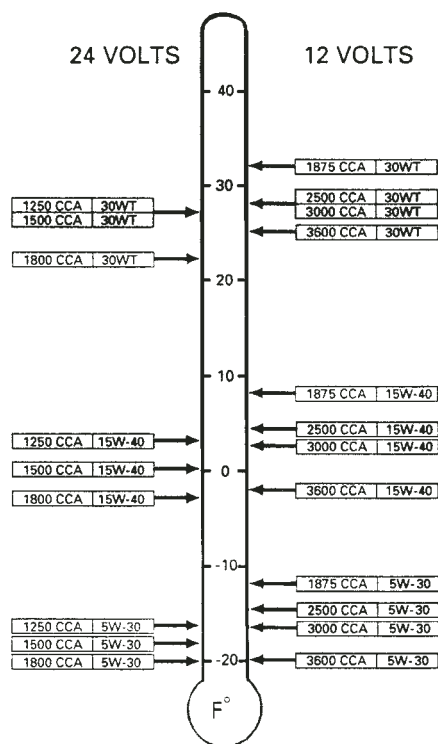
Two systems show an average change of 25°F minimum starting temperature when comparing engine oil viscosity of 30W with 15W-40 with both 12 and 24 Volt cranking.

All tests were performed with all components at the same stabilized temperature.

Cranking motors, cable resistance, batteries, engines and engine oils used to perform tests

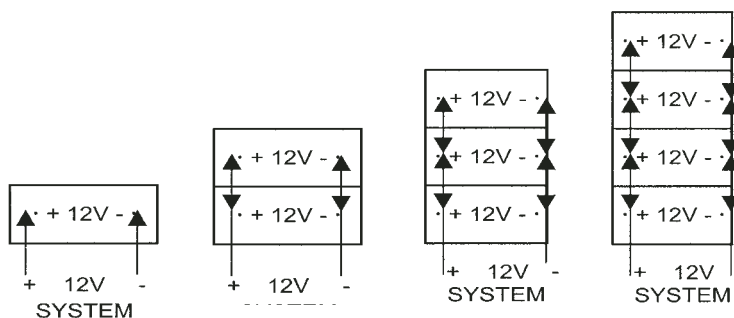
| STARTING SYSTEMS | | | | ENGINE 4CYCLE-6CYLINDER | |
|----------------------------|--------------------------|---|--|-------------------------|---------------------------|
| MOTORS | CABLE RESISTANCE | BATTERIES | | SIZE | OILS |
| | | 24 VOLTS | 12 VOLTS | | |
| 42-MT - 24V 42-MT - 12V | .002 OHMS .00075 OHMS | 4 X 1150 (1250 CCA) 4 X 1110 (1500 CCA) 4 X 31-900 (1800 CCA) | 3 X 1150 (1150 CCA) 4 X 1150 (2500 CCA) 4 X 1110 (3000 CCA) 4 X 31-900 (3500 CCA) | 850+ CU IN | 30W 15W - 40 5 - 30 |

100 R.P.M. CRANKING SPEED (NO STARTING AIDS)



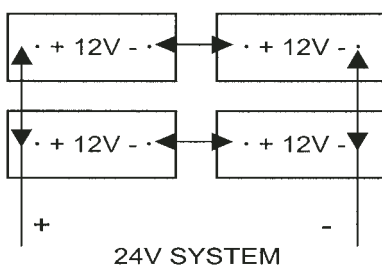
Following are examples of 1, 2, 3, & 4 batteries of various models connected in series, parallel and series-parallel.

Parallel Connected



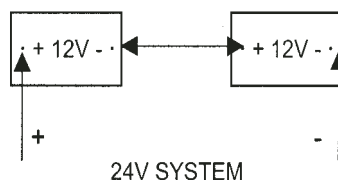
| SYSTEM RATING | | SYSTEM RATING | | SYSTEM RATING | | SYSTEM RATING | |
|---------------|-----|---------------|-----|---------------|-----|---------------|-----|
| CCA | RC | CCA | RC | CCA | RC | CCA | RC |
| 700 | 180 | 1400 | 400 | 2100 | 636 | 2800 | 878 |
| 750 | 160 | 1500 | 356 | 2250 | 565 | 3000 | 780 |
| 950 | 170 | 1900 | 378 | 2850 | 601 | 3800 | 829 |
| 600 | 140 | 1200 | 311 | 1800 | 495 | 2400 | 683 |
| 950 | 250 | 1900 | 556 | — | — | — | — |
| 1050 | 350 | 2100 | 778 | — | — | — | — |

SERIES-PARALLEL CONNECTED



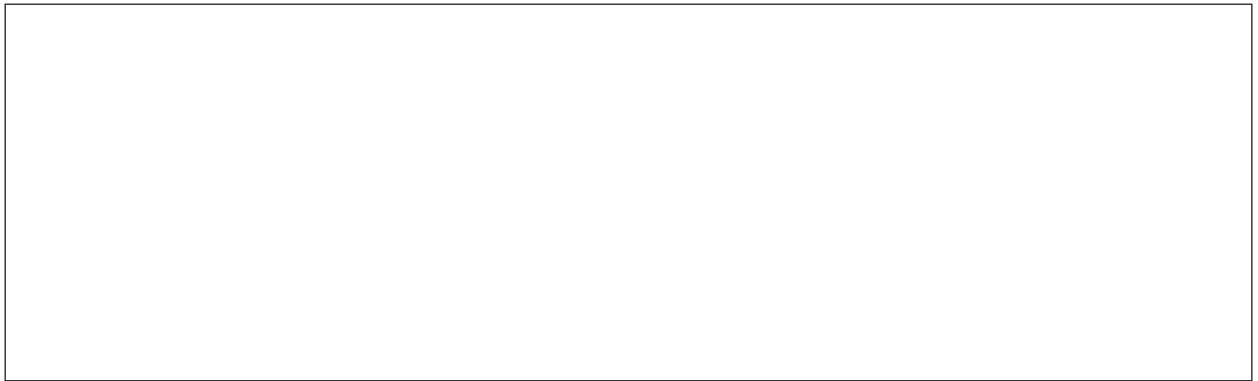
| BATTERY RATING | | SYSTEM RATING | |
|----------------|-----|---------------|-----|
| CCA | RC | CCA | RC |
| 600 | 140 | 1200 | 324 |
| 700 | 180 | 1400 | 400 |
| 750 | 160 | 1500 | 362 |
| 950 | 170 | 1900 | 390 |
| 950 | 250 | 1900 | 580 |
| 1050 | 350 | 2100 | 945 |

SERIES CONNECTED



| MODEL RATING | | SYSTEM RATING | |
|--------------|-----|---------------|-----|
| CCA | RC | CCA | RC |
| 600 | 140 | 600 | 140 |
| 700 | 180 | 700 | 180 |
| 750 | 160 | 750 | 160 |
| 950 | 170 | 950 | 170 |
| 950 | 250 | 950 | 250 |
| 1050 | 350 | 1050 | 350 |

Rating Specifications

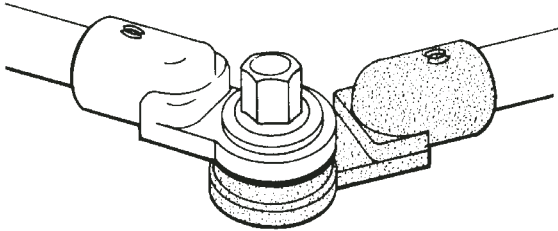


STACKABLE BATTERY CABLE

For Top Stud Batteries

For Heavy-Duty (Top Stud) Batteries

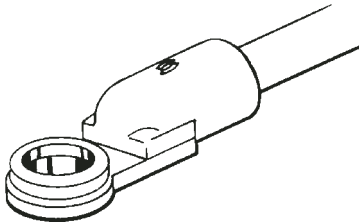
(For Commercial Applications Including Trucks, Marine, Industrial and Off-Highway)



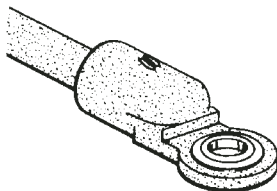
Sealed Battery Connections



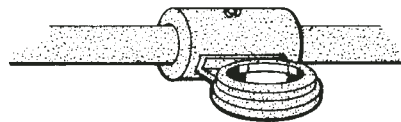
Stainless Steel Nut



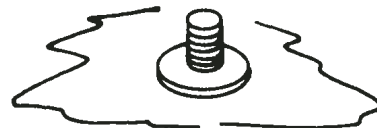
Sealed Terminal



Stacking Terminal



Sealed Inline Terminal



Battery Post (Top Stud)

Stackable battery cable termination offers the following benefits to the heavy-duty battery fleet user:

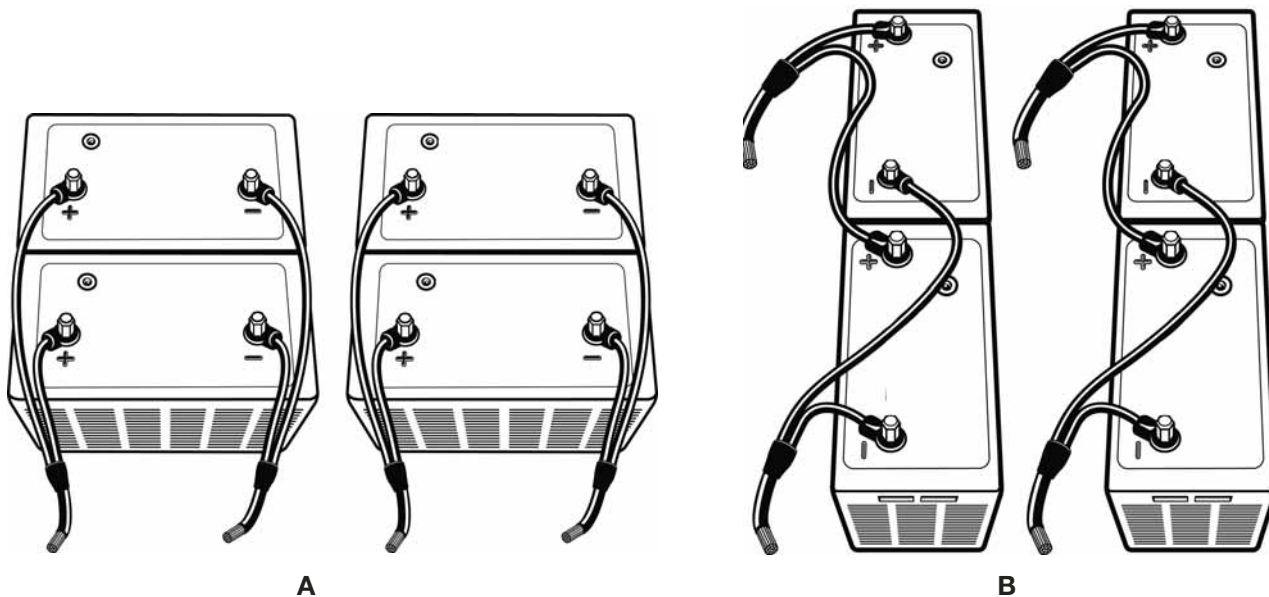
- **Stacking Terminal Connection** – terminals are copper alloy-dip soldered that fit on flat-wide lead pads under hold down nut pressure of 10 to 15 lbs-ft (13-20N•m) torque to provide good electrical contact and resistance to vibration.
- **Sealed Terminal Connection** – Precision factory molded terminal insulation forms maintenance-free seal mating both terminal ends and stainless steel nut.
- **Easy Stack Assemblies** – molds both stacking terminal and sealed terminal for a custom fit.
- **Neat, Tailored Fit . . .** On two, three and four Heavy-Duty (Top Stud) Battery installations.

MAINTENANCE-FREE BATTERY

Cable Assemblies

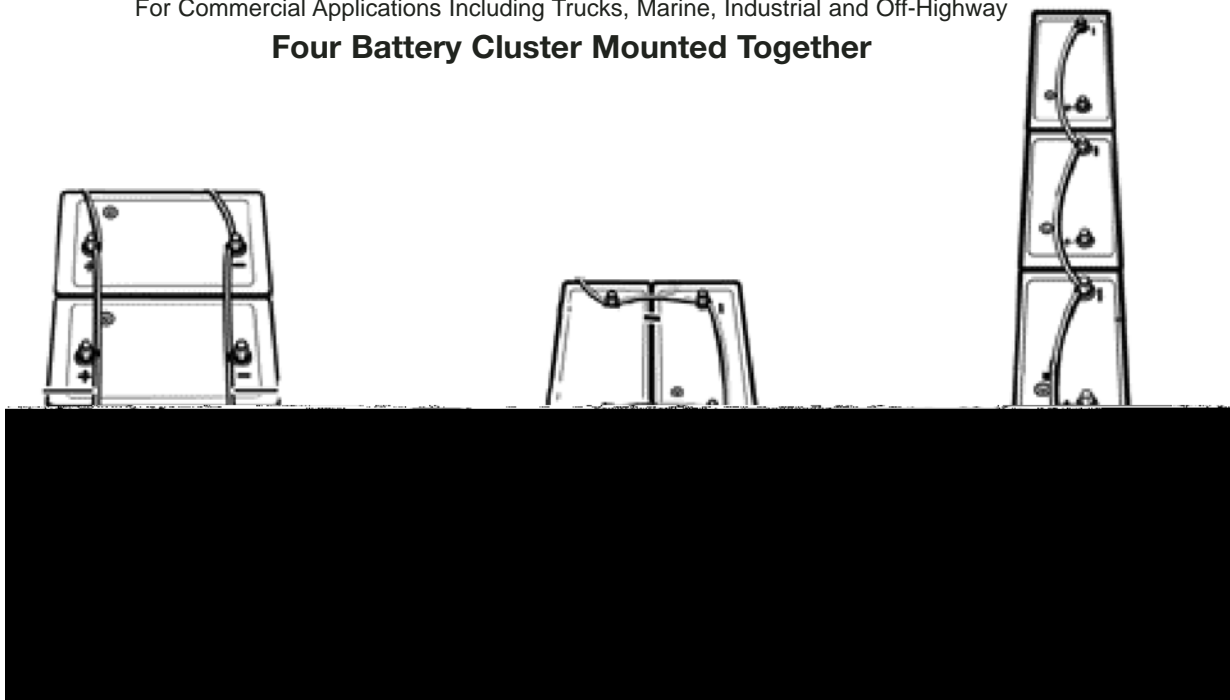
Delco
Remy

Maintenance-Free Batteries Must be Kept in an Upright Position
Widely Separated Bars

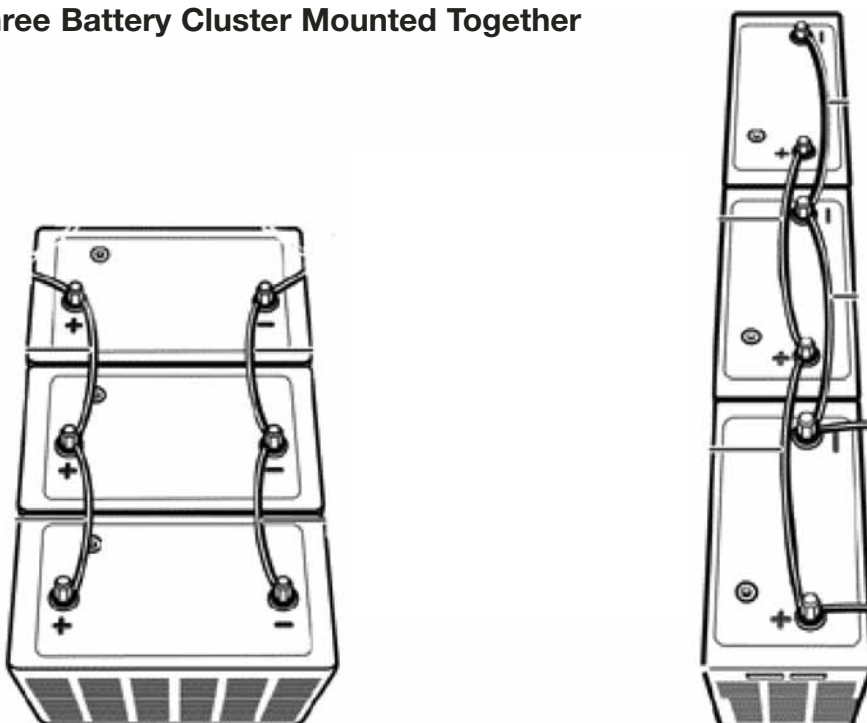


For Commercial Applications Including Trucks, Marine, Industrial and Off-Highway

Four Battery Cluster Mounted Together



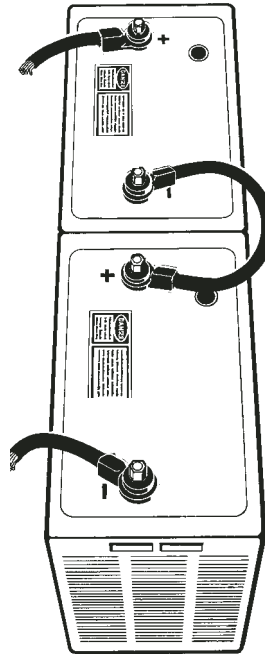
Three Battery Cluster Mounted Together



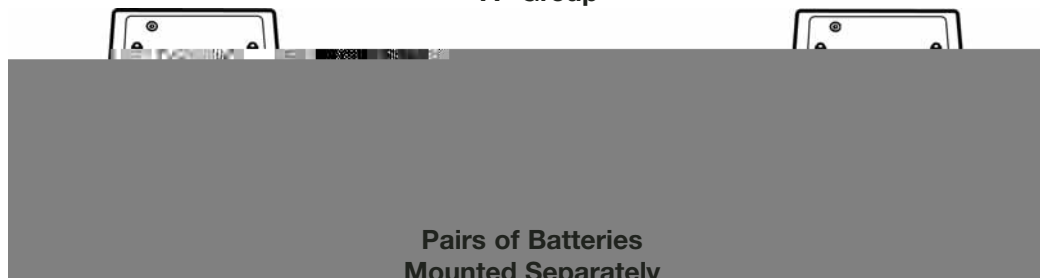
Maintenance-Free Batteries Must be Kept in an Upright Position

Maintenance-Free Batteries Must be Kept in an Upright Position

24 VOLT



"A" Group

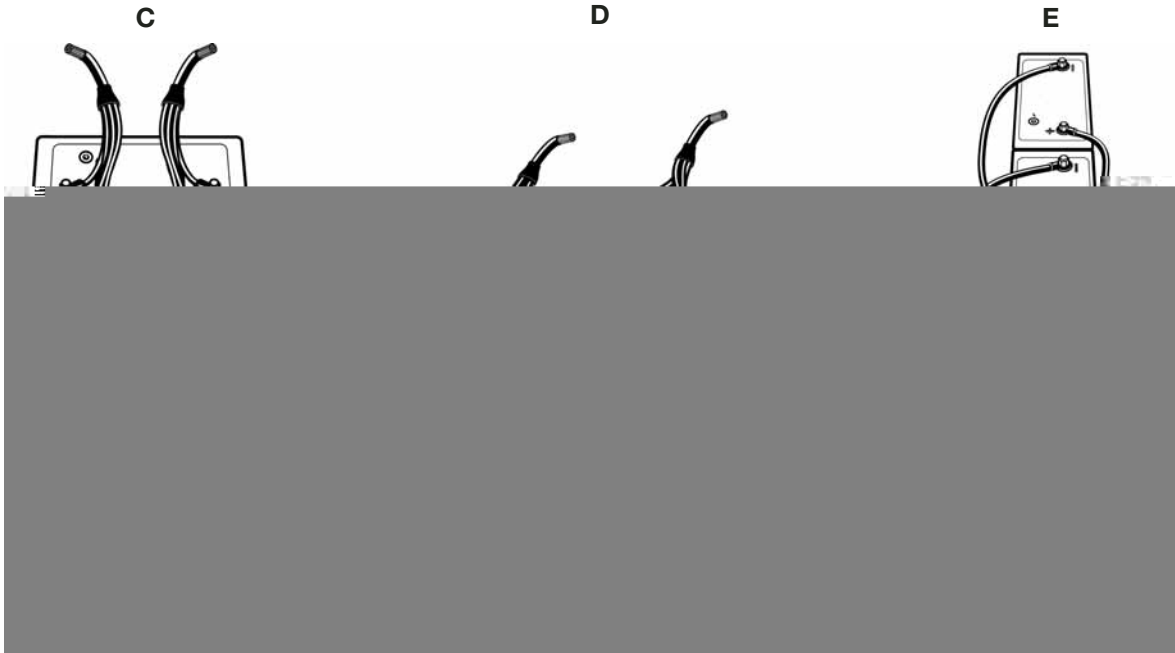


**Pairs of Batteries
Mounted Separately**

"B" Group



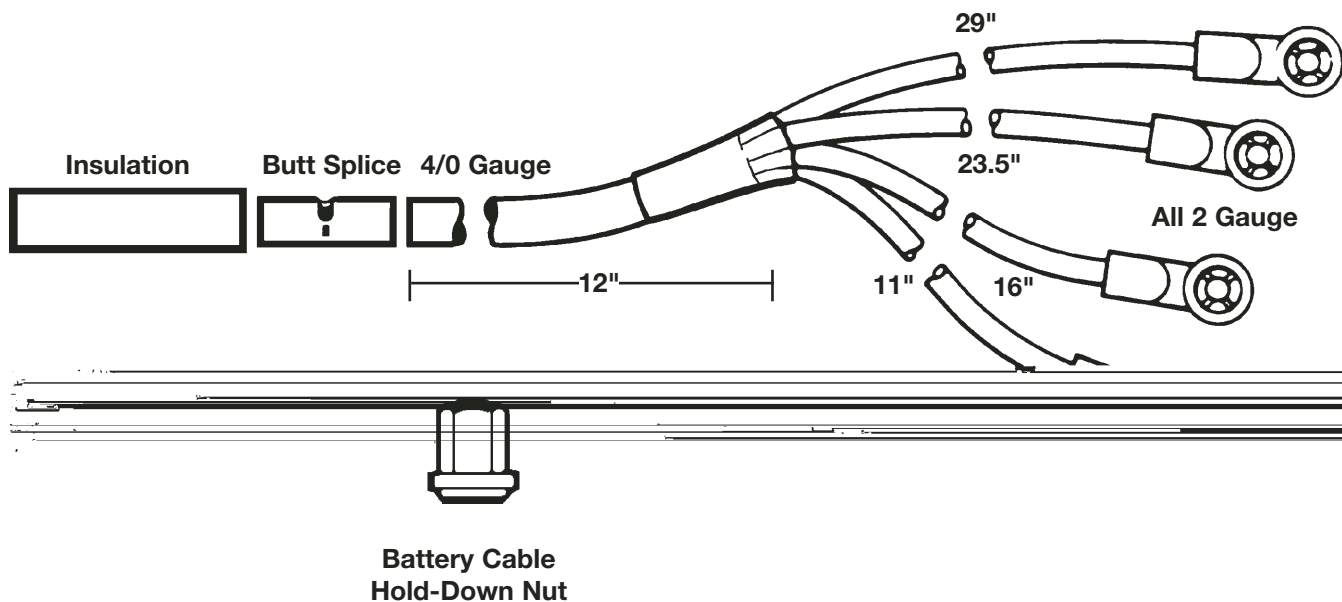
Mounted Together



Maintenance-Free Batteries Must be Kept in an Upright Position

In instances in which four batteries are grouped closely together, two assemblies are required — one to contact the four positive terminals to the starter cable and one to connect the four negative terminals to ground. See

illustrations "C," "D," "E." 25% of all trucks can utilize one of these retro-fit arrangements and will require the following items per truck.



Starting Systems

Power required to crank and start an engine is determined by engine size, characteristics, temperature, fuel, oil viscosity and parasitic loads.

Available power from the battery systems is determined by its CCA rating, age, temperature, battery state of charge and cables connecting batteries together in a multi-battery system.

Cable system then must have adequate capacity to

conduct starting power from the battery system to the starting motor.

Power available to the starting motor from the battery and cable system must equal or exceed engine requirements to crank and start an engine.

Cable gauge size verses length for various starting motors and system voltage can be determined from the chart below.

Determining Starting Circuit Cable System Cable Size

| | | Total Cranking Circuit Length in Inches | | | | | | | | | |
|-------------------------|---|--|--|--|--|--|--|--|--|--|--|
| System Voltage and Type | Maximum Circuit Voltage Drop Per 100 Amps | 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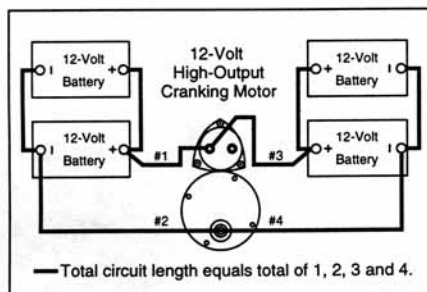


Fig. 1: Dual Path Circuit

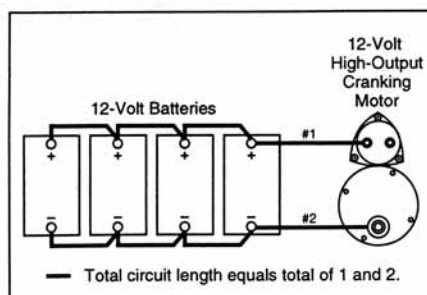


Fig. 2: Single Path Circuit

APPENDIX 2

| Replacement Wire Size Selection | | | |
|---------------------------------|--------------------|------------------------|--------------------|
| SAE Wire Size | | Minimum Conductor Area | |
| No. | (mm ²) | CMA | (mm ²) |
| 6 | 13 | 24538 | 12.1 |
| 4 | 19 | 37360 | 18.3 |
| 2 | 32 | 62450 | 31.1 |
| 1 | 40 | 77790 | 38.1 |
| 0 | 50 | 98980 | 48.3 |
| 2/0 | 62 | 125100 | 59.8 |
| 3/0 | 81 | 158600 | 77.6 |
| 4/0 | 103 | 205500 | 98.5 |

Starting Systems

Battery Cable Selection and Installation Cables

Cranking system cable insulation must meet application requirements where special protection is required.

Polyvinyl chloride (PVC) or neoprene for temperatures up to 220° F is recommended. For temperatures exceeding 220°F -linked polyethylene is recommended.

Core stranding should be concentric or bunched for gages 6 thru 0. Rope stranded core is recommended for gages 00, 000 and 0000. Due to its many small wire strands, rope stranded core will result in more rapid migration of corrosion in corrosive applications such as marine. All soldered connections should be made using rosin core solder or rosin flux, and sealed with head shrink tubing.

Terminals

Physical size of conductors may vary for the same gage size depending on stranding design. Therefore, cable ends should be selected which will best physically fit the conductor.

Routing

Routing of cables should avoid heat abrasion and vibration.

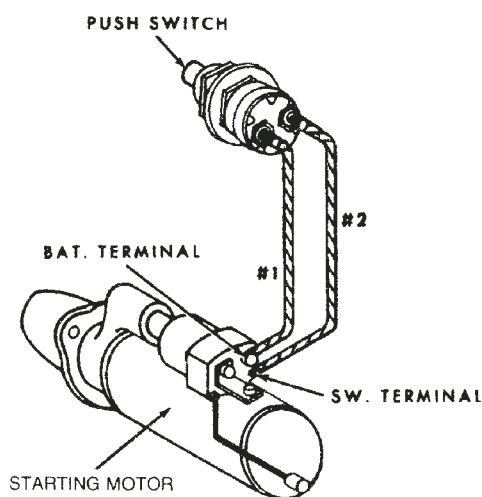
Cable should be protected by grommets when routed through sheet metal or frame holes.

Support

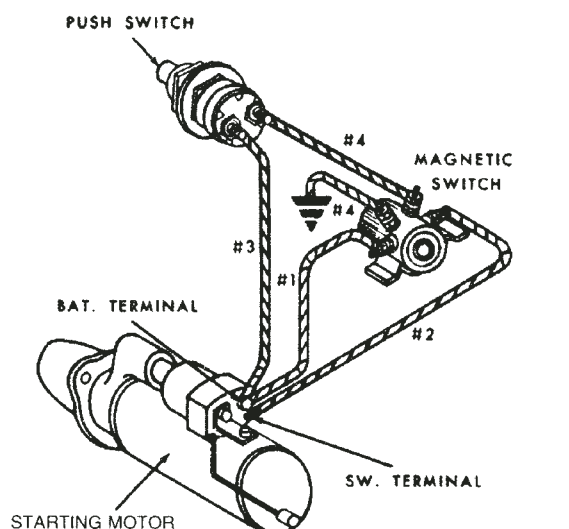
Due to physical size and weight, cables should be securely anchored as close as practical to each terminal connection. Reliability is improved by preventing terminal damage caused by ice accumulation, road shock, and vibration. Large cables should be supported every 2-3 feet.

Starting Motor Solenoid Control Circuit Wire Size Table

| TOTAL LENGTH OF WIRE IN START-SWITCH CONTROL CIRCUIT | | | WIRE SIZE |
|--|----------------------|----------------------|-----------------|
| 12 Volt System | 24 Volt System | 32 Volt System | (Stranded Wire) |
| Less than 26 inches | Less than 122 inches | Less than 272 inches | No. 14 |
| 26" to 41" | 112" to 197" | 272" to 450" | No. 12 |
| 41" to 57" | 197" to 310" | 450" to 720" | No. 10 |
| 57" to 106" | 310" to 490" | 720" to 1120" | No. 8 |
| 106" to 214" | — | — | No. 6 |



w/o Magnetic Switch



w/ Magnetic Switch

Generator Charging Systems Cable Size Chart

| SYSTEM VOLTAGE | RATED OUTPUT IN AMPERES | RECOMMENDED MINIMUM CHARGING CABLE GAUGE SIZE | | | | | | | |
|----------------|-------------------------|---|------------|-------------|--------------|--------------|--------------|--------------|--------------|
| | | UP TO 4 FT. | 4 TO 7 FT. | 7 TO 10 FT. | 10 TO 13 FT. | 13 TO 16 FT. | 16 TO 19 FT. | 19 TO 22 FT. | 22 TO 28 FT. |
| 12 VOLT | 0-20 | -4 | -2 | -2 | -0 | -0 | 8 | 8 | 8 |
| | 20-35 | -2 | -0 | 8 | 8 | 6 | 6 | 6 | 4 |
| | 35-50 | -0 | 8 | 8 | 6 | 6 | 4 | 4 | 4 |
| | 50-55 | 8 | 8 | 6 | 4 | 4 | 4 | 4 | 2 |
| | 55-65 | 6 | 6 | 4 | 4 | 2 | 2 | 2 | 0 |
| | 65-105 | 6 | 6 | 4 | 2 | 2 | 2 | 2 | 0 |
| | 105-125 | 4 | 4 | 4 | 2 | 2 | 0 | 0 | 0 |
| | 125-150 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 00 |
| 24 VOLT | 0-20 | -4 | -4 | -4 | -2 | -2 | -2 | -0 | -0 |
| | 20-35 | -2 | -2 | -2 | -0 | -0 | 8 | 8 | 8 |
| | 35-50 | -0 | -0 | -0 | -0 | 6 | 6 | 6 | 6 |
| | 50-55 | 8 | 8 | 8 | 8 | 6 | 4 | 4 | 4 |
| | 55-85 | 6 | 6 | 6 | 6 | 6 | 6 | 4 | 4 |
| | 85-105 | 6 | 6 | 6 | 6 | 4 | 4 | 4 | 2 |
| | 105-125 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 |
| | 125-150 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

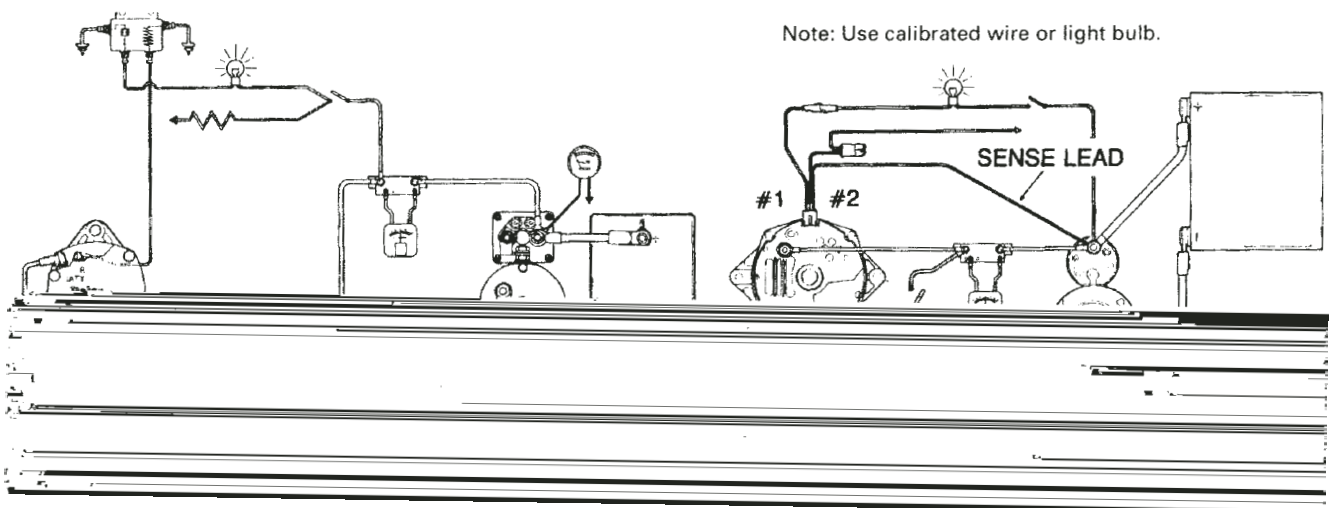
Maximum difference between battery voltage and generator voltage is 0.5 Volt for 12 Volt and 1.0 Volt for 24 Volt systems, at full rated output.

Maximum voltage drop in the sense (#2-terminal-lead) must not exceed 0.2 Volt for 12 and 24 Volt 3-wire systems.

Cable gauge size calculation takes into account terminal connection resistance.

(1) Use for 24 Volt battery charging circuit for 30SI-TR (ref. fig. 5 circuit diagram).

When an insulated (no frame ground) charging system is installed, length of return circuit must be included to obtain total circuit length to determine proper wire size.



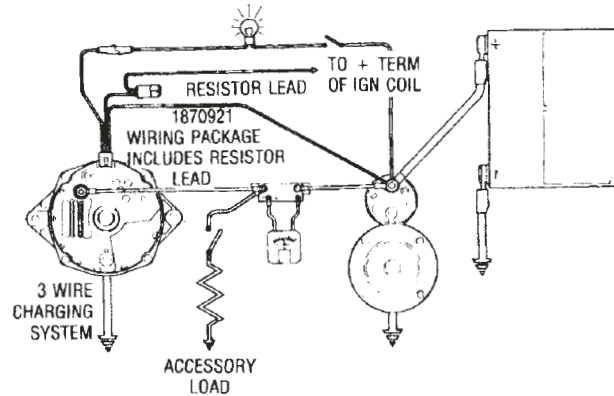
Charging Systems

This circuit is to be used when converting from a d.c. generator or DN generator (external regulator) to a 3-wire SI generator model, on a vehicle having an indicator light.

An ammeter or voltmeter may be used instead of an indicator light; however, the lead connecting the starting motor to generator No. 2 terminal must be used for proper generator operation.

Indicator light, ammeter and voltmeter may be used in any combination without affecting operation of the other.

Models for 3-wire systems are shown in "SI Generator Selection".



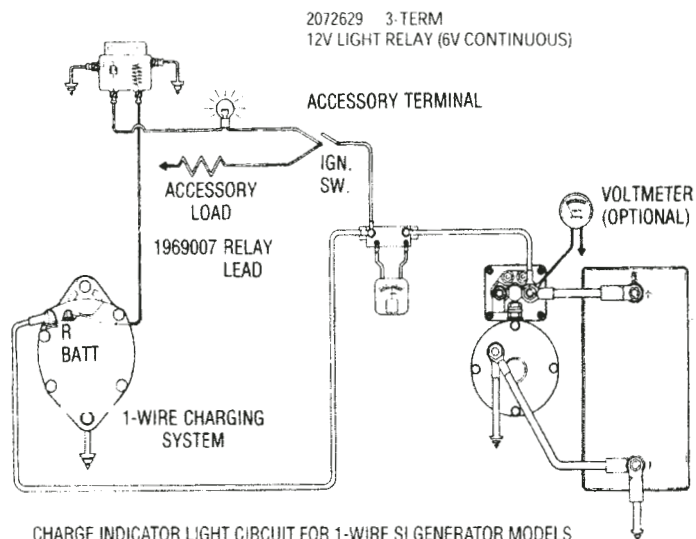
CHARGE INDICATOR LIGHT CIRCUIT FOR 1-WIRE GENERATOR MODELS

FIGURE 1

This circuit is to be used when converting from a d.c. generator or DN generator (external regulated) to a 1-wire SI generator model on a vehicle having an indicator light.

An ammeter or voltmeter may be used instead of an indicator light, or in any combination, without affecting the operation of the other.

Models for 1-wire systems are shown in "SI Generator Selection". Relays used in 12 Volt systems are stamped "6 V" (continuous operation); in 24 Volt systems, "12 V" (continuous operation). Three terminal relays have the "fourth" terminal grounded internally.



CHARGE INDICATOR LIGHT CIRCUIT FOR 1-WIRE SI GENERATOR MODELS

FIGURE 2

Charging Systems (continued)

Some applications require a charging system with unusually high output. A single generator may not be adequate. Two generators may be connected in parallel as shown.

System output rating will be the sum of each. Generators with the same, or different, ratings may be used.

Each should be driven by a separate belt system, not by the same belt(s). Also mounting on opposite sides of the engine is recommended. Both must have the same ground polarity.

Separate indicator lights or ammeters may be connected to each, in the normal manner, showing operation of each SI generator. A voltmeter will show total system operation.

Vehicles requiring an unusually high output charging system may also require an auxiliary battery system. See "Auxiliary Battery" circuit.

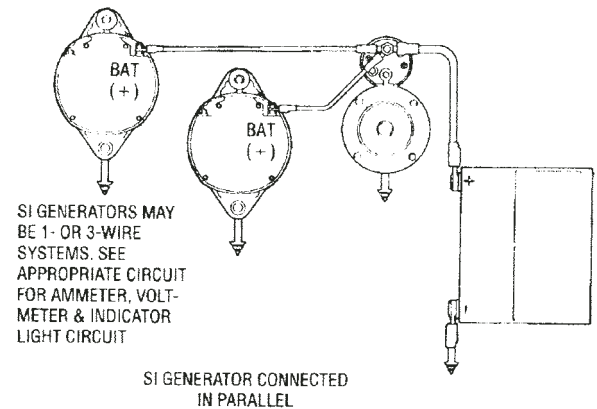


FIGURE 3

Some applications require an insulated electrical system. When an insulated SI generator is used, length of wire on the return "ground" side must be added to the length of output side, to determine necessary wire size.

Refer to proper wire chart to determine wire size required.

Insulated SI generators may also be used in positive or negative ground systems. In this event, it is recommended the above procedure for determining wire size be used and vehicle ground be made at the starting motor.

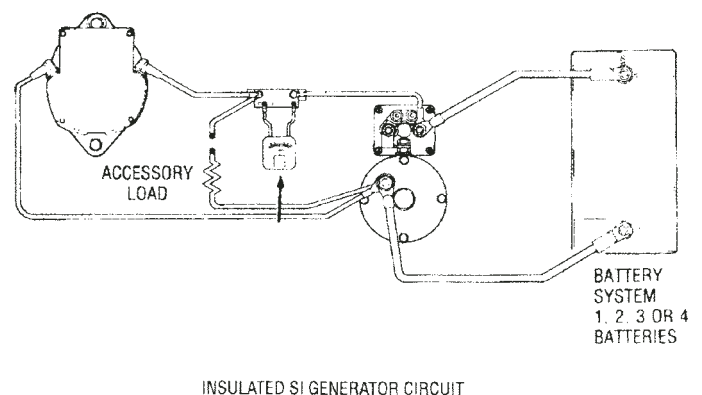
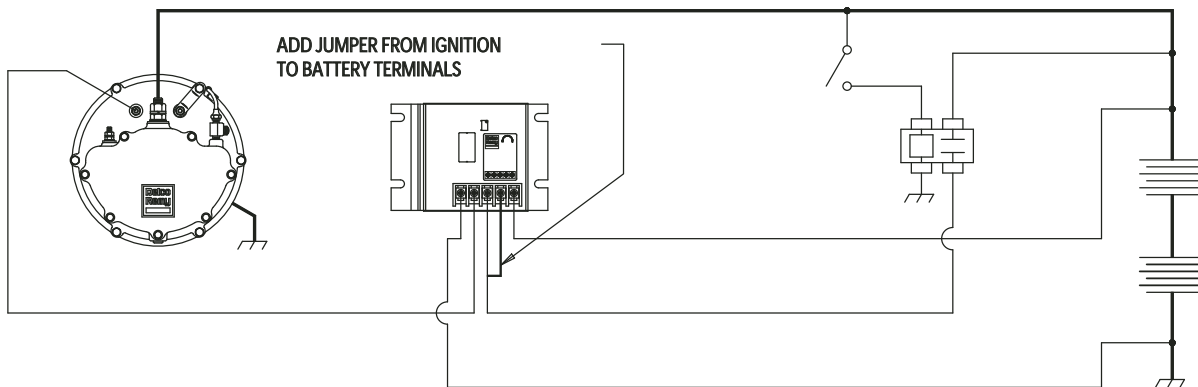


FIGURE 4

NOTE: Two output leads must be same length to ensure that both generators turn on.

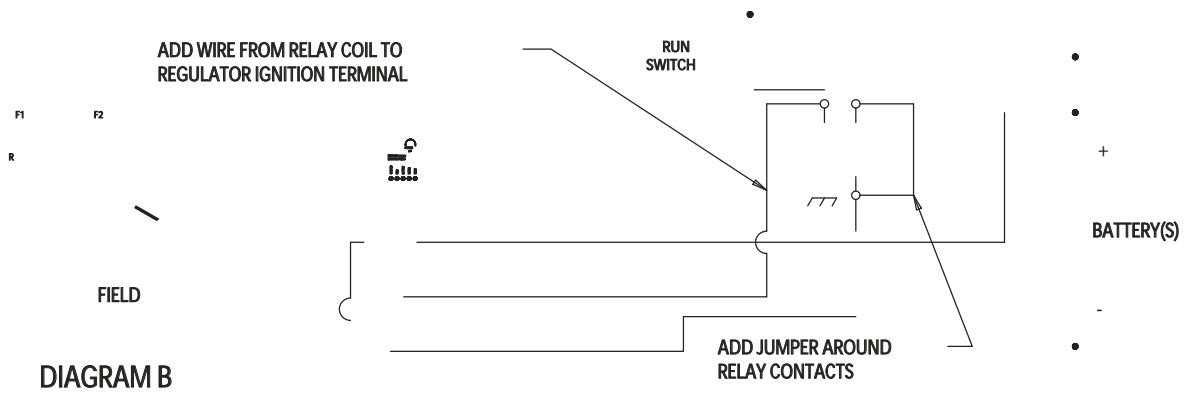
Charging Systems (continued)

50VR



Option Two - Removing the present relay (see Diagram B):

1. Connect a wire between the relay coil positive and new regulator Ignition ter



Charging Systems (continued)

SI-TR (transformer rectifier) generators are designed to be used on vehicles requiring 12 Volts for accessories and 24 volts for cranking large diesel engines.

The 12 Volt output circuit is connected to the 12 Volt connection of a 24 Volt battery system, and provides power for 12 Volt accessories and charges the 12 Volt portion of the battery system.

The 24 Volt output terminal is connected to the 24 Volt side of the battery system, usually at the battery terminal of the starting motor solenoid.

Also the 24 Volt output side is intended for battery charging only.

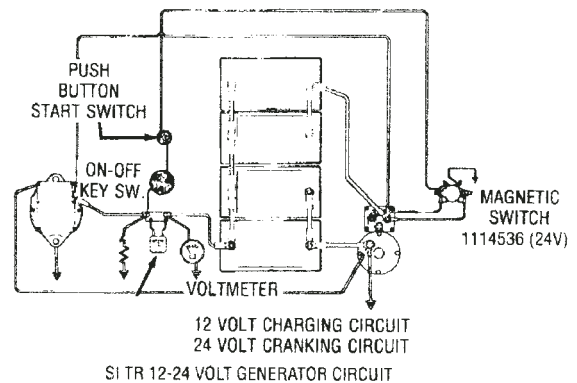
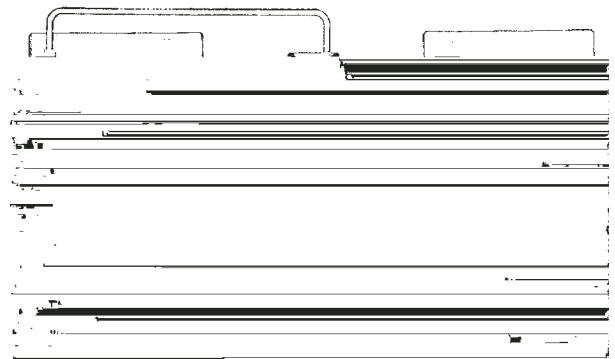


FIGURE 11

Cranking Systems (continued)

Four 12 Volt batteries are connected in parallel, two each in two separate battery boxes, in a 12 Volt cranking system. When testing for voltage loss (resistance), one set of batteries should be disconnected, while checking voltage loss in the other. Voltage loss for each set can be up to two times more than what is recommended in a system using only one set (1 positive, 1 negative) of cables.

All four batteries may also be mounted in the same battery box, using two sets of cables. This allows the use of smaller cable size for each cable than if only one cable set were used.

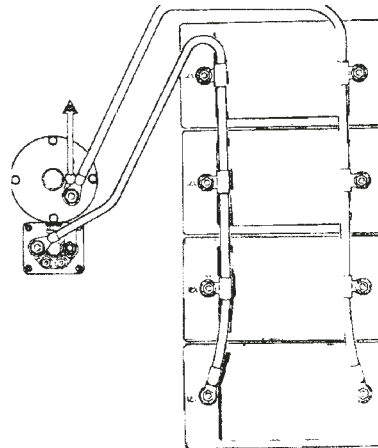


Cranking Systems (continued)

Four 12 Volt batteries are connected in parallel, all positive battery terminals are connected to the starting motor solenoid "BAT" terminal. All negative battery terminals are connected to the starting motor end frame or ground terminal.

12 VOLT CRANKING SYSTEM
4-12 VOLT BATTERIES CONNECTED IN PARALLEL
MOUNTED IN 1 BATTERY BOX

FIGURE 13



Cranking Systems (continued)

Good, reliable components, properly connected, using correct cable size in the starting motor control circuit are essential.

Reliable starting and maximum cranking motor life can be assured only when a good control circuit is used.

Any compromise is done at the risk of destroying a starting motor.

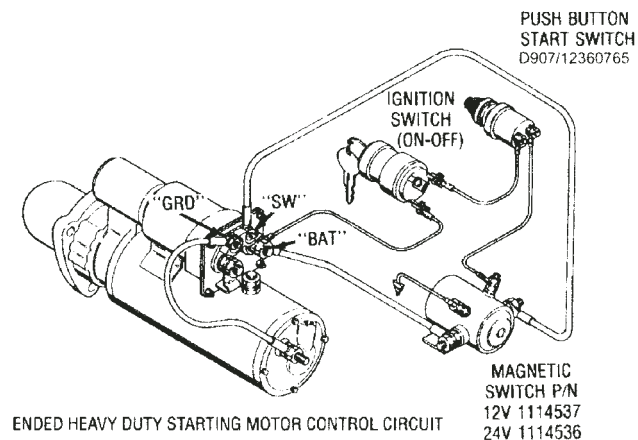


FIGURE 14

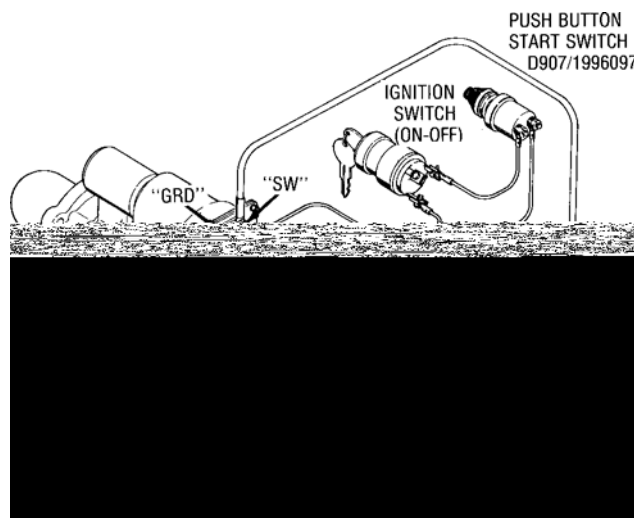
Cranking Systems (continued)

Some starting motor models have an OCP (over-crank protected) circuit breaker (thermal switch) built inside.

Instead of being connected directly to ground, one of the coil (small) terminals of the magnetic switch is connected to one of the OCP harness wires. The other harness wire is grounded.

When excess temperatures are reached inside the starting motor due to extended cranking periods, the circuit breaker opens. The magnetic switch coil no longer has a complete circuit to ground. Therefore, the magnetic switch disengages the starting motor, preventing burn up.

When the starting motor cools, the circuit breaker closes. Normal cranking motor operation can then be repeated.



Auxiliary Battery

Some vehicles with engines requiring one passenger car size battery for starting have accessory loads added which are operated when the engine is not running.

When the added accessories are powered by the engine starting battery, it may be too discharged to start the engine.

An auxiliary battery (second battery) may be used to power any accessory normally used when the engine is not running. A magnetic switch is used to disconnect the auxiliary battery from the vehicles normal system; therefore, the engine starting battery will not be discharged.

Normal engine operation will recharge the auxiliary battery.

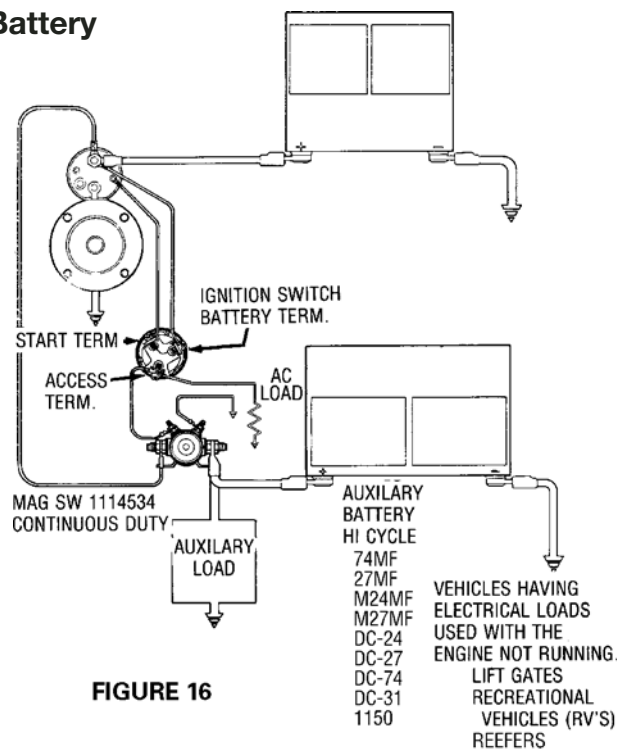
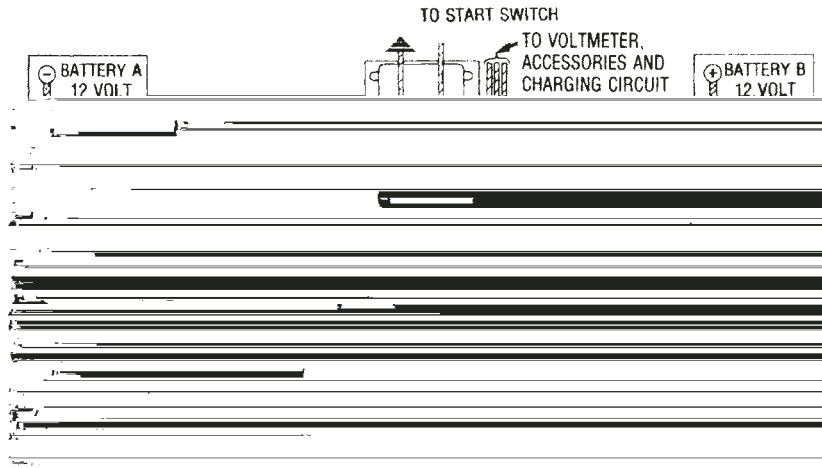


FIGURE 16

Series — Parallel Switch Circuits

Refer to Service Bulletin 1S-135

"A" CIRCUIT CRANKING



"B" CIRCUIT CHARGING

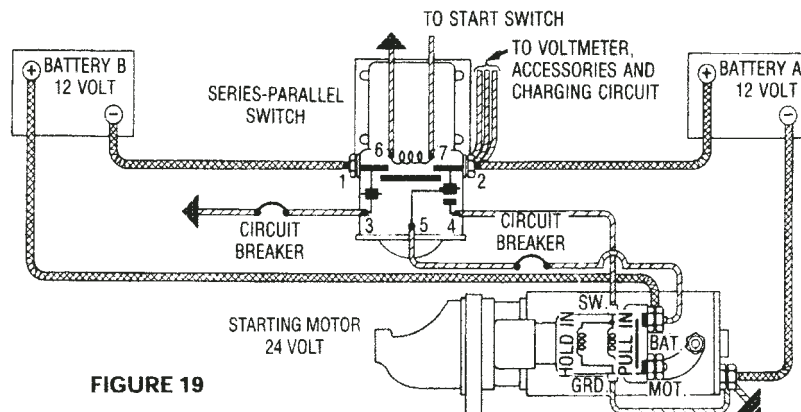


FIGURE 19

COMBINED SERIES-PARALLEL & MAGNETIC SWITCH CHARGING

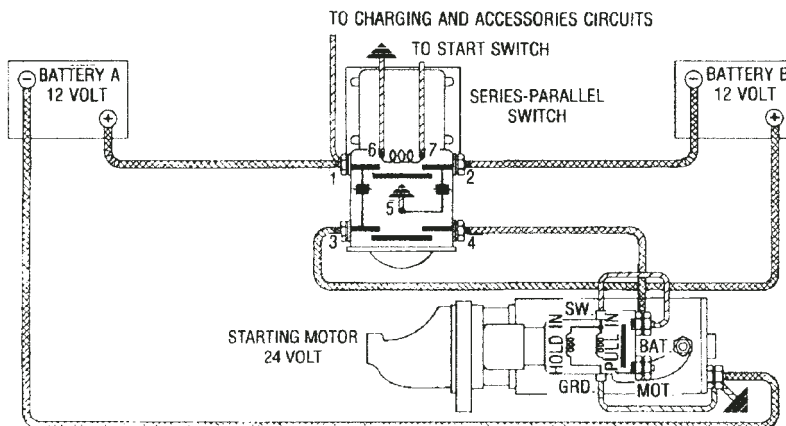


FIGURE 20

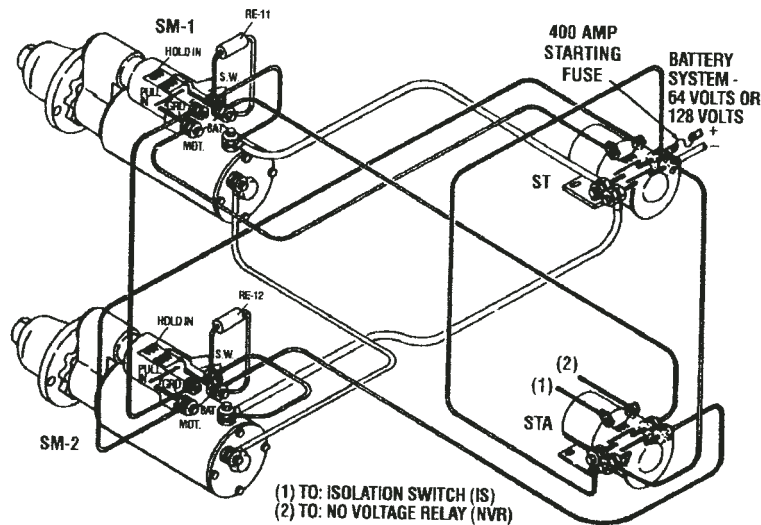


FIGURE 21

Circuit for two Starting Motors Connected in Series

Description

Circuit is designed to assure the pinion of both starting motors are fully engaged in to the engine ring before battery circuit is connected to their cranking circuit.

Function of each component is as follows:

1. Engine control circuits NVR or IS activates STA winding
2. STA contacts activates SM-1 and SM-2 solenoid winding
3. SM-1 and SM-2 solenoid contacts activate ST winding
4. ST contacts activate cranking circuit SM-1 and SM-2

Pull-in winding of SM-1 and SM-2 solenoid are connected in series. Hold-in winding of SM-1 and SM-2 solenoid are connected in series. Cranking circuit of SM-1 and SM-2 are connected in series.

Operation

Pull-in Circuit

When engine control systems activate STA winding, STA contacts close. Current flows from battery positive through 1 set of STA contacts to "BAT" terminal of SM-1 solenoid. Current flow continues through the pull-in winding, out the "SW" terminal to frame terminal of SM-1, through SM-1 internal motor circuit (armature, field coils and brushes) to the SM-1 C.E. terminal. Current flows to SM-2 C.E. terminal, through SM-2 internal circuit to SM-2 frame terminal, to SM-2 solenoid SW terminal, through the pull-in winding to the SM-2 BAT terminal, to STA, through closed contacts back to battery negative.

Hold-In Circuit

Since battery positive is applied to SM-1 solenoid BAT terminal, current flows through hold-in winding, out the GRD terminal, to GRD terminal of SM-2 solenoid, through the hold-in winding to the BAT terminal: through the other set of closed contacts of STA and back to battery negative, closing contacts of SM-1 and SM-2 solenoids, engaging pinion of both motors into engine ring gear.

ST Coil Circuit

With battery positive still applied to SM-1 solenoid BAT terminal, current flows through the closed contacts to the MOT terminal, through ST coil, to SM-2 solenoid MOT terminal, through the closed contacts to the BAT terminal through STA closed contacts, to battery negative, closing the contacts of STA. Contacts of both motor solenoids must be closed (pinions engaged with engine ring gear) before ST coil is activated.

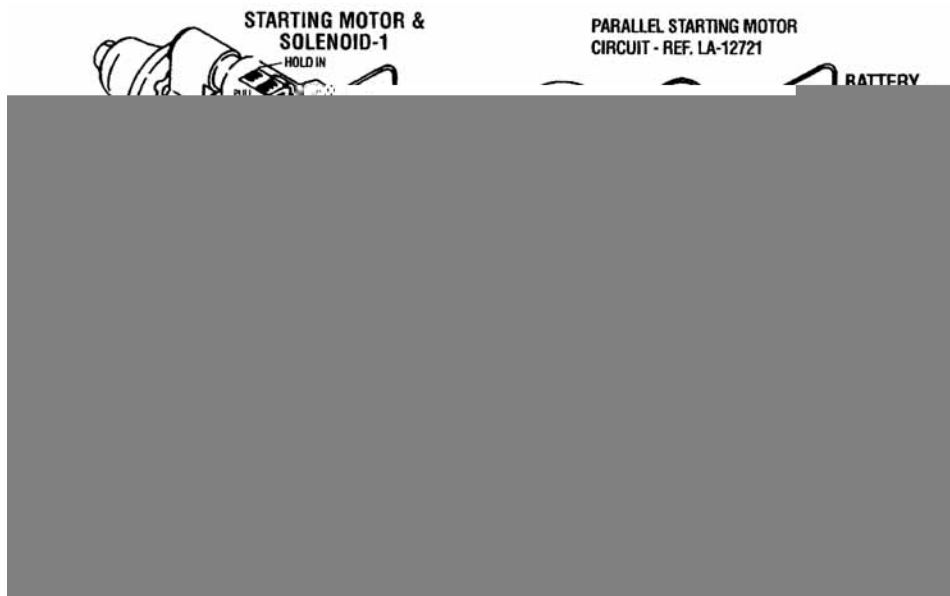
Cranking Circuit

With ST contacts closed, current flows to SM-1 frame terminal through the internal circuits to the C.E. terminal, to SM-2 C.E. terminal through the internal circuits, to the frame terminal, through closed contacts of ST back to battery negative, cranking the engine.

Shorting Out Pull-In Winding

When ST and STA contacts are closed, battery positive circuit is connected to SM-1 solenoid SW and BAT terminals. With equal voltage at each end of pull-in winding, no current flows in the pull-in coil.

When ST and STA contacts are closed, battery negative circuit is connected to SM-2 solenoid SW and BAT terminals. With equal voltage at each end of pull-in winding, no current flows in the pull-in coil.



Circuit for Two Starting Motors Connected in Parallel

Description

Circuit is designed to assure the pinion of both starting motors are fully engaged into the engine ring gear before batteries are connected to the motors cranking circuit.

Function of each component is as follows:

1. Start switch activates CTR-1 (control relay)
2. CTR-1 contacts activate MOTOR SOLENOID-1&2
3. Motor Solenoid - 1&2 contacts activate CTR-2
4. CTR-2 contacts activate the cranking circuit of motor 1&2

Operation

Pull-in Circuit

When start switch is closed, current flows from battery positive terminal through CTR-1 winding back to battery negative closing two sets of contacts. Current then flows from battery positive through one set of CTR-1 contacts to SOLENOID – BAT terminal through pull-in winding to SW terminal to MOTOR-1 frame terminal through the motor circuit (field coils, armature and brushes) from MOTOR-1 C.E. terminal to MOTOR-2 C.E. terminal to SOLENOID-2SW terminal to SOLENOID –2SW terminal through the pull-in winding to the BAT terminal through CTR-1 contacts back to battery negative.

Hold-in Circuit

Since battery positive is applied to SOLENOID-1BAT terminal current flows through hold-in winding to GRD terminal to SOLENOID-2 GRD terminal through hold-in winding to BAT terminal through CTR=1 contacts back to battery negative.

CTR-2 Coil Circuit

With battery positive still applied to SOLENOID-1 bat terminal current flows through closed contacts to MOT terminal through CTR-2 winding to MOT terminal of SOLENOID-2 through closed contacts to BAT terminal through closed contacts of CTR-1 back to battery negative, closing CTR-2 contacts.

Cranking Circuit

CLOSED CTR-2 contacts applied battery positive to frames terminals of MOTOR-1 & 2 through motor circuits to MOTOR=1 & 2 C.E. terminal through motor circuits to MOTOR=1 & 2 C.E. terminal through closed contacts of CTR-2 back to battery negative.

Shorting Out Pull-in Winding

With battery positive applied to SOLENOID-1 BAT and SW terminal SOLENOID-1 pull-in winding is shorted out.

With battery negative applied to SOLENOID-2 pull-in winding is shorted out.

Typical Electrical Component Specifications For Diesel Line Haul Vehicle

The following is a list of recommendations for electrical component specification to insure adequate power availability to handle vehicle electrical load requirements, provide adequate cold weather cranking performance and maximize component life.

For 12 Volts Cranking and 12 Volt Charging

Diesel 2 Cycle Engines with Displacement up to 600 cu. Inch.

Diesel 4 Cycle Engines with Displacement up to 900 cu. Inch.

| Components | Mounting |
|--|---|
| 42MT Type OCP 12 Volt starting motor overcranking protection | SAE-J542c |
| Four Maintenance-Free 700 CCA (2500 total), batteries with sealed terminations (BCI Group 31) Meets TMC RP-109A | TMC Mounting RP-125 |
| Battery-motor cables with rope stranded core and cross-linked polyethylene (SXL) insulation | TMC Practice 105, plus copper ground return |
| Starting Switch Push button | |
| 1.Belt-driven - 34SI Brushless, 105 Amp, with minimum 2.5:1 drive ratio | TMC Practice 101-A |

For 24 Volt Cranking and 12 Volt Charging

Diesel 2 Cycle Engines with Displacement over 600 cu. Inch.

Diesel 4 Cycle Engines with Displacement over 900 cu. Inch.

| Components | Mounting |
|---|--|
| 50MT Type 400 24 Volt starting motor with C.E. Frame Support | SAE-J542c |
| Four 700 CCA, HD Batteries with sealed terminations (BCI Group 31 of SAE 31-580) Meets TMC rp\P-109A | TMC Mounting RP-125 (Parallel series connected) |
| Battery-motor cables with rope stranded core and polyethylene (SXL) insulation | TMC Practice 105, plus copper ground return |
| Belt Driven 30SI Brushless, 12V/24V, 90 Amp, air-cooled, with a minimum 2.5:1 drive ratio | TMC Practice 101-A |

NOTE: Battery compliment for 12 Volts systems must have a minimum of 1800 CCA (cold cranking amperes at 0° F) and 24 Volt systems, a minimum of 900 CCA.

"Grounding of storage batteries SAE J358A-SAE Standard, the negative side of the storage battery shall be securely and adequately grounded."

Charge indicators are a matter of personal preference and driver's acceptance. If you wish to use ammeters, specify "shunt type" to avoid having long heavy charging lead that increases charging circuit resistance.

Volt meter indicators are good system indicators if not misinterpreted.

Generator Mounting

Heavy-Duty Truck Generator Mounting

RP 101A

VMRS 31-001-024

Preface

The following Recommended Practice is subject to the Disclaimer found on the bottom of the last page of the index. Users are urged to read the Disclaimer before considering adoption of any portion of this Recommended Practice.

Purpose

To provide for heavy-duty truck alternative mountings that give satisfactory vehicle charging system life.

Introduction

Charging system location and installation can greatly affect life expectancy. A typical mounting assembly includes a mounting bracket that matches the alternator mounting lugs, an adjusting strap or rod, and other assorted hardware. All mounting assembly components must be properly selected to provide resistance to vibration. Extensive experience has shown that the following general recommendations should be followed to achieve satisfactory charging system life.

Charging System Mounting

1. The charging system should be mounted on the engine as close to the engine centerline as possible.
2. Brackets should be firmly attached to the engine with enough capscrews of at least 1/2 inch in diameter and of sufficient strength to insure that the bracket does not come loose due to bolt stretch or breakage. Bolts must not bottom out in tapped holes in the bracket or in the engine.
3. The alternator should be rigidly supported in such a manner that pulley grooves are aligned with, and in the same plane, as the grooves on the driving pulley. Provision must be made for belt tension adjustment.
4. Mounting brackets should limit alternator vibration within the levels specified or recommended by the alternator manufacturer.
5. All bracket clamping surfaces should be machined.
6. All bolts and locknuts attaching the alternator to the bracket, and the bracket to the engine, should have coarse threads and be Grade 5 or better.
7. Fasteners with hardened washers or flanged fasteners should be used for alternator mounting.
8. Any washer used in alternator mounting must be a hardened steel washer (Rc 35-50) with a minimum diameter of 1 inch.
9. Hardened steel washers (Rc 35-50) with a minimum diameter of 1 inch should be used on each side of any adjusting strap slot and also under any fastener which clamps directly against any aluminum alternator ear or lug.
10. Lockwashers should be avoided because their trapezoidal cross section does not provide enough area for proper clamping. Locking type nuts should be used instead.
11. The alternator lug with the slip bushing should be tightened last so the slip bushing can adjust for bracket tolerances.
12. Pulleys should be dynamically balanced to within 0.125 inch-ounce.
13. The following are considered preferred alternator mounting practices.:

- a. Cast "spool" type alternator brackets are recommended.
- b. The mounting bracket and adjusting strap or rod should be thick and short. Both the bracket and strap should be connected to the same part of the engine.
- c. Single-piece brackets are recommended.
- d. The mounting brackets should not overhang the front of the engine. Offset adjusting straps should have gussets.
- e. Spacers should be avoided.
- f. Pulleys should position drive belts as close as possible to the generator end frame.
- g. Alternator mounting should comply with SAE J-180.
- h. Truck manufacturers should follow all recommendations of alternator manufacturers when mounting alternators.

Double Lug Mounted Alternators

When installing a double lug mounted alternator, one can utilize existing brackets or design a new bracket. Recommendations are as follows:

1. Utilize existing brackets (Malleable iron is preferred).
2. The bracket span (portion that attaches to the alternator) should be per Figure 1, below.
3. The adjusting arm and mounting bracket yield strength should be 35,000 PSI, minimum.
4. In all cases with existing brackets or a new design bracket, the location of the bracket lugs must be in a position so that the pulley grooves are close to the alternator fan. Try to maintain 1/8 to $\frac{1}{4}$ inch between the belt edge and the alternator fan.

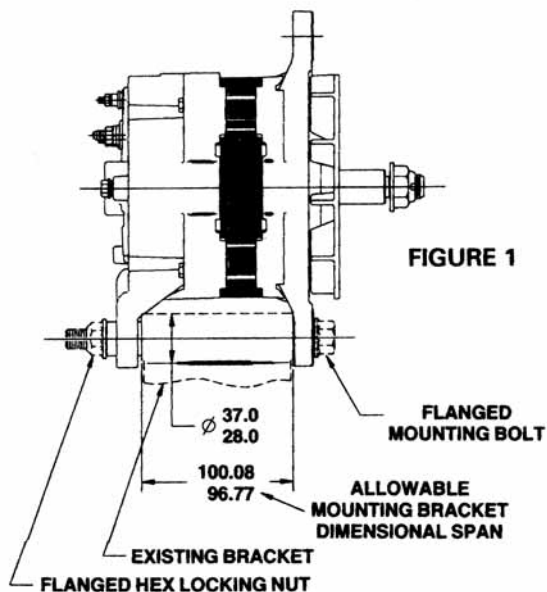


FIGURE 1

Battery Vibration Standards

RP 125

VMRS 32-001-001

Preface

The following Recommended Practice is subject to the Disclaimer found on the bottom of the last page of the index. Users are urged to read the Disclaimer before adopting this Recommended Practice.

Background

Fleet managers have long known that excessive vibration causes short battery life. In 1974, Truck Maintenance Council (TMC) adopted battery mounting practices 102, 103, 104, and in 1975 RP 117 was added. At this time, the move was to place the battery between or above the frame rails for best resistance to vibration. The objective was to induce the vehicle manufacturers to get away from cantilevered battery mountings where the batteries were often placed with their long axis located perpendicular to the frame rails.

The battery mounting practices were successful for those fleets that insisted upon the recommended practices. They increased battery life by two-fold in many cases. In the 14 years since the RP's were established, the trucking industry has seen many changes. With the extensive use of "Maintenance Free" batteries, there is no need to service them on a weekly basis. Low profile tires, aerodynamics and the need for close coupling has introduced "trailer dipping" problems which makes it impractical, in some cases, to place batteries between the frame rails. Adapting to the vehicle configurations brought on by the Surface Transportation Act of 1982 created more problems for the vehicle manufacturer. End results ---- Vehicle OEM's either found it impractical to abide by the Recommended Practices or charged extra to place the batteries between the frame rails.

Some truck OEM's took a different approach toward combating battery vibration by conducting their own bench and field vibration tests. The results were eye-opening. Lowest mean life on batteries being tested for vibration resistance was 6.4 minutes with the highest mean life of 3600 minutes, as reported by one truck manufacturer. They concluded that a vibration resistance battery was as important as proper mounting procedures.

Objective

The objective of this recommended practice is to offer both the truck manufacturers and the fleets an alternative to mounting batteries between the frame rails by placing the responsibility on the battery manufacturer to provide batteries that will withstand vibration. Using today's technology, the vast majority of battery manufacturers can beat the proposed requirements.

Battery Manufacturers

Heavy-duty batteries sold for class 6, 7, and 8 trucks and tractors must meet all requirements of SAE J-930, dated August 1984, and SAE J-537, dated June 1982. **Compliance with TMC Recommended Practice 125 should be identified on the battery label.**

Abstract of Standards (**Complete tests procedures attached.**)

1. Shaker time: Nine 2-hour intervals.
2. 5 G acceleration
3. 30 to 35 Hz frequency

4. Battery plates oriented parallel to the axis of rotating shafts of vibration machine
5. At conclusion of test, batteries to sustain no mechanical damage.
6. Batteries must meet their specified cranking capacity.
7. There must be no electrolyte loss.

Vehicle Manufacturers

Vehicle manufacturers must ensure that batteries supplied to them meet all requirements of SAE J930, dated August 1984, and SAE J537 dated June 1982. Compliance TMC Recommendation Practice 125 should be identified on the battery label.

1. Preferred location for the battery box as set forth in TMC Recommended Practices 102, 103, 104 and 117 still continue whenever practical. For vibration considerations and environmental protection, comply with SAE J930, August 1984.
2. The following standards should apply to the battery carrier:
 - a. Horizontal mounting with 2 degree level.
 - b. Mounting surface-within 0.63 mm Flat.
 - c. Rubber under pads not recommended between battery and carrier.
 - d. Installation-remove access-Max. 45 degree battery tilt.
3. The following standards should apply to the battery hold down:
 - a. Maximum clamp pressure -7 kg / sq cm
 - b. Minimum retention force-600 kg
 - c. Vibration input-mounted battery assembly
4. Maximum 3G's accel, all axes 0° to peak.
5. Minimum resonant Frequency-80 Hz.

Vehicle Users

To assure maximum battery life, fleets should follow the below listed procedures:

1. Ensure that the original equipment and replacement batteries they purchase meet TMC Recommended Practice 125.
2. Keep battery boxes clean and all hold downs secure.
3. Follow the battery manufacturer's recommendations concerning charging, testing, and handling procedures
4. Follow the battery manufacturer's storage recommendations.
5. Adhere to TMC Recommended Practice RP-121 on Jump Start Procedures
6. Ask the OEM about available battery box options. Use an installation that mounts the batteries with their long axes parallel, and close in, to the frame whenever practical.

RP 105A

VMRS 32-001, -002, -003, -004

Battery Cable Assemblies

Preface

The following Recommended Practice is subject to the Disclaimer found on the bottom of the last page of the index. Users are urged to read the Disclaimer before considering adoption of any portion of this Recommended Practice.

Purpose and Scope

The cranking circuit is the lifeline of any vehicle. To obtain maximum performance, batteries, starter, and battery cables must be matched and fitted to the vehicle. The vital link in this system, the battery cables, must be selected carefully to ensure reliable, long-life service. Experience has shown that the following recommendations, when followed, will result in cables that will do the job.

Routing

1. Routing of cables should avoid heat, abrasion, and vibration.
2. Grommets must be provided when cable passes through holes in the sheet metal or frame.
3. All bare metal edges must be shielded.
4. Cables should be supported every 24 inches.
5. Strain relief or an anchor point must be provided a short distance from the battery terminal.
6. Routing must avoid exposed frame members and traffic areas. Channel routing is preferred.

Gauge

1. Circuit voltage drop must not exceed the following SAE (J-541a) values:
 - a. 6 Volt light and medium duty – 0.12 Volts per 100 Amps.
 - b. 12 Volt heavy-duty-0.12 Volts per 100 amps.
 - c. 12 Volt light and medium duty-0.20 Volts per 100 Amps.
 - d. 24 and 32 Volt heavy-duty-0.20 Volts per 100 Amps.
 - e. 24 Volt light and medium duty-0.40 Volts per 100 Amps.
 - f. 12 Volt high-output heavy-duty-0.075 Volts per 100 Amps.
 - g. 12 Volt super heavy-duty-0.060 Volts per 100 Amps.
2. Cable gauge must be sufficient to conform to the above values.
3. Minimum gauge size for 12 Volt high-output systems must be 00. Dual path circuitry is preferred.
4. Metric vs. AWG Wire Size – See Table 1.

Cable

1. Cable insulation characteristics must, at a minimum, meet application requirements where special protection is required. Insulation recommendations are:
 - a. 220°F polyvinyl chloride (PVC) or neoprene.
 - b. Cross-linked polyethylene where heat exceeds 220°F.
2. Core stranding should be concentric or bunched for gauges 6 through 0. Rope stranded core is recommended for gauges 6 through 0. Rope stranded core is recommended for gauges 00,000 and 0000.

Battery Terminals– Sealable, Threaded, Post and Side Terminals, SAE Types S and T

1. Use ring tongue terminals only. Open eyelet terminals not recommended.
2. Ring tongue terminals should include anti-rotation feature.
3. Sealed cable connectors should conform to standard dimensions specified by the battery manufacturer.
4. Terminals used to connect cables to the battery should be corrosion resistant and include molded insulation environmental seal.
5. Cable fasteners to the battery should be torqued to battery manufacturer recommendations.
6. Terminals to be attached to cable by crimping. The wire entry to the terminal is to be sealed against in-line corrosion with heat shrink tubing or tapes with sealant.
7. Spacer washers used with stackable type T sealed terminals must be captive with terminal assembly.

Battery Terminals– SAE Type A, Tapered Post, and Other BCI Types

1. Lead plated copper battery terminals should be used. Tin plating does not withstand sulphuric acid environmental conditions. Lead plating is the primary protection against sulphuric acid fumes.
2. Bolt-on repair terminals are not recommended.
3. Terminals to be attached to cable by crimping. The wire entry to the terminal is to be sealed against in-line corrosion. Preferable methods are: heat shrink tubing or tapes with sealant, or cable insulation molded into terminal.

RP 105A (Cont'd)

Terminals – For Solenoid, frame, or switch connections

All terminals should be crimp-type, ring-tongue terminals. Terminals should be sealed at the cable connection barrel against moisture entry by one of the following methods:

1. Sealing from wire insulation over connection barrel (crimped area), completely encapsulating connection barrel with thick wall heat shrink tubing with sealant and/or heat shrinkable tape with sealant, or cold shrink tape with sealant (electrical PVC tape or friction tape is not recommended.) There should be at least 1-1/2" coverage of wire insulation, which will also provide insulation support.
2. Molded cover encapsulating connector barrel.

General

1. Nylon conduit or heat shields are required in routing areas where temperature exceeds wire insulation rating.
2. Added abrasion protection is required where the cable is exposed to traffic or rough edges. Polyethylene, polypropylene, nylon conduit, and thick wall heat shrink tubing are recommended.
3. All frame contact areas must be free of paint, dirt and grease to bare metal and wire brushed before connection is made.
4. Frame ground connections must be made using hardened flat washers (RC-50) of at least 1" diameter under the bolt head and self locking type nut. Corrosion preventive grease or compound is to be applied to the terminal area of the frame connection. (Lockwashers, especially star washer type, should not be used. Lockwashers do not give complete surface contact).
5. Frame cross members are not recommended as part of the ground return.
6. Standardized polarity grounds are recommended.
7. Full copper circuitry is preferred (cables run from battery to starter with return cabling to battery). Aluminum cables, including ground straps, are not recommended because of corrosion problems associated with dissimilar metals and work hardening of the aluminum caused by flexure and vibration.
8. A common ground point on engine block of all vehicle electrical accessory circuits with one properly

sized fusible link connecting the common accessory "block" ground point to ground cable on starter, is recommended with full copper circuitry.

9. All cable ends of cable insulation should be sealed to terminals with heat shrink tubing with sealant, or heat shrinkable tubing with sealant, or heat shrinkable tape with sealant, or cold shrink tape with sealant to prevent in-line corrosion to cable strands. Exposed cable strands through insulation deterioration due to abrasion or chafing, should be immediately covered with thick wall heat shrink tubing with sealant for elimination of in-line corrosion and cable strand damage.
10. No accessories are to be added directly to the battery. (Proper installation of accessories should come from the hot side of the starter motor to a fused terminal block. Filters and proper location away from the starter motor will eliminate noise.)

**Table I:
Replacement Wire Size Selection**

| Metric size (square millimeters) | CMA (Circular Mil Area) | American wire gauge replacement |
|--|----------------------------|---------------------------------------|
| 1 | 1,974 | 16 |
| 2 | 3,947 | 14 |
| 3 | 5,921 | 12 |
| 4-5 | 7,894-9,868 | 10 |
| 6-8 | 211,841-15,788 | 8 |
| 9-13 | 17,762-25,655 | 6 |
| 14-21 | 27,629-41,444 | 4 |
| 22-33 | 43,417-65,126 | 2 |
| 34-42 | 67,099-82,887 | 1 |
| 43-53 | 84,861-104,596 | 1/0 |
| 54-67 | 106,569-132,225 | 2/0 |
| 68-85 | 134,198-167,748 | 3/0 |
| 86-107 | 169,721-211,165 | 4/0 |

RP 109A

VMRS 32-001-001

Battery Ratings and Engine Cranking Requirements

Preface

The following Recommended Practice is subject to the Disclaimer found on the bottom of the last page of the index. Users are urged to read the Disclaimer before considering adoption of any portion of this Recommended Practice.

Purpose

The older familiar ampere-hour ratings of the past do not reflect modern day engine cranking requirements. Because of this, SAE and Battery Council International (BCI) changed over to a more meaningful rating system. This system, described in SAE J-537, is based on cold cranking ampere (CCA) and reserve capacity (RC) ratings and can be keyed directly to cranking requirements.

Likewise, diesel engine cranking specifications have changed. Using the new battery ratings, the engine manufacturers have issued minimum cold engine cranking specifications for each engine at a specific oil viscosity.

Cold Cranking Ampere Rating (CCA)

Cold cranking ampere (CCA) rating is the current a battery can supply at 0°F. The requirement for this standard is that the battery be cold soaked until the center cell reaches 0°F. and then discharged at a specific rate for 30 seconds while providing at least 1.2 Volts per cell at the end of this time. This discharge rate is the "Cold Cranking Amperes," which measures the battery's ability to provide high rate of discharge at 0°F.

In systems where the batteries are connected in parallel, the CCA ratings should be added while the voltage remains constant. In systems where the batteries are connected in series, the voltage should be added while the CCA's remain constant.

Reserve Capacity Rating (RC)

Reserve Capacity (RC) is the number of minutes a battery can supply 25 Amps of current at 80°F (27°C.), then be discharged at a constant 25 Amps for a specific time in minutes while maintaining at least 1.75 Volts per cell. This test simulates a condition of night time operation with a minimum of electrical loads and no alternator output. This discharge rate is the "Reserve Capacity" which measures the battery's inability to supply a lower rate of constant discharge.

In systems where the batteries are connected in parallel, the RC's are additive while the voltage remains constant. In systems where the batteries are connected in the series, the voltage is additive while the RC remains constant.

Recommendations

Experience has shown that the recommendations listed below should be followed to achieve minimum engine cranking performance and to provide reasonable long term reliability of the cranking system. It should be noted that as batteries age (losing some cranking capacity) or when they are less than 100% state of

charge, failure to achieve a start at low temperature could occur. Consideration should be given to additional CCA capacity to compensate for this. Also, if you do not change oil grades as indicated, per manufacturer's oil recommendations, additional CCA capacity will be required to obtain reliable cold weather starts (see Table 1).

1. All batteries must be permanently identified or labeled with the new SAE cold Cranking Ampere (CCA) Rating. (Load test amps identification also preferred.)
2. Battery complement must meet or exceed the engine company's minimum CCA requirement at 0°F. for each engine. Refer to engine company bulletins (see figures 1 to 3).
3. Mid-sized and smaller (Up to 450 cu in / 2 cycle or 650 cu in / 4 cycle) diesel engines may use one or two (connected in parallel) 12 Volt batteries where the engine manufacturers' minimum CCA ratings permit. However, if one battery fails in this system, it will result in a significantly greater percent (50 to 100%) of total system capacity loss. Three (3) heavy-duty batteries in a 12 Volt parallel system are preferred because additional reserve capacity improves cycle life and accessory load-carrying ability, while maintaining a higher state of charge for repeated starting (see figure 1).
4. For large (up to 600 cu in / 2 cycle or 900 cu in / 4 cycle) diesel engines requiring 1800 CCA or more, four (4) heavy-duty batteries in a 12 Volt cranking parallel system are preferred because additional reserve capacity improves cycle life and accessory load-carrying ability, while maintaining a higher rate of charge for repeated starting (see figure 1, last column).
5. For extra (over 600 cu in / 2cycle or 900 cu in / 4cycle) diesel engines, and on applications where user desires or where extreme operating conditions dictate, such as prolonged severe cold ambient temperatures, a 24 Volt cranking system is used which consists of a four (4) battery complement of the 12 Volt parallel series will be required. High cycling type batteries are preferred where 12/24 Volt "transformer rectifier" charging systems are used (see figures 2 and 3).

For the best total system performance, the following must also be included:

1. TMC Recommended Practice 105, Battery Cable Assemblies, to insure that cable resistance values are not exceeded.
2. TMC Recommended Practice 1025, Battery Vibration Standards, which can improve battery life by reducing the rate of capacity loss during use.

NOTE: Specify battery capacity, mounting and cables by recommended practice number.

HEAVY-DUTY BATTERIES



To Match Truck Needs

| Catalog No. No. | BCI Group Size | Terminal Type* | Cold-Cranking Amps - CCA @0° - For - 18°C SAE Spec J537hA | Reserve Capacity minutes | Length | Maximum Dimensions Inches/mm | Height | Approx. Weight lbs/kg | Load Test Amps |
|-----------------|----------------|----------------|---|--------------------------|------------|------------------------------|-----------|-----------------------|----------------|
| 31-900CT | 31 | TS | 900 | 160 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 55.0/25.1 | 450 |
| 31-901CT | 31 | TP | 900 | 160 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 55.0/25.1 | 450 |
| 1110 | 31 | TS | 750 | 160 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 53.0/24.1 | 375 |
| 1111 | 31 | TP | 750 | 160 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 53.2/24.2 | 375 |
| 1150 | 31 | TS | 625 | 180 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 56.2/25.5 | 310 |
| 1151 | 31 | TP | 625 | 180 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 56.4/25.6 | 310 |
| 1200 | 31 | TS | 550 | 130 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 49.3/22.4 | 275 |
| 1201 | 31 | TP | 550 | 130 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 49.5/22.5 | 275 |
| DC-31 | 31 | TS | 625 | 165 | 13.0/331.0 | 6.8/173.0 | 9.6/239.5 | 56.7/25.8 | 310 |

The vehicle starting requirements below are stated as minimally acceptable cold-cranking amperes (CCAs). These recommendations come from heavy-duty diesel engine manufacturers.

Vehicle Starting Requirements

| Manufacturers | Engine Model Number | Starting System Voltages | Required Battery CCAs @0°F |
|------------------------------------|---------------------|--------------------------|----------------------------|
| Caterpillar Tractor Company | 3208 | 12 | 1600 |
| | 3206 | 12 | 1800 |
| | 3406 | 12 | C |
| | 3126 | 12 | 1800 |
| | C7 | 12 | 1800 |
| | C9 | 12 | 1800 |
| | C10 | 12 | 1520 |
| | C12 | 12 | 1520 |
| | C15 | 12 | 1600 |
| | C16 | 12 | 1600 |
| | 3306 | 24 | 800 |
| | 3406 | 24 | 900 |
| | 3408 | 24 | 1040 |
| Cummins Engine Company | 855 CID | 12 | 1800 |
| | B5.9 | 12 | 800 |
| | ISB | 12 | 660 |
| | ISC | 12 | 1250 |
| | ISL | 12 | 1500 |
| | ISM | 12 | 1800 |
| | NTC-290 | 12 | 1800 |
| | F-300, etc. | 12 | 1800 |
| | VT-903 | 12 | 1800 |
| | V8-210 | 12 | 1800 |

| Manufacturers (Foreign) | Engine Model Number | 12 Volt Start Recommended CCAs | 24 Volt Start Recommended CCAs |
|-------------------------|--|--------------------------------|--------------------------------|
| Deutz | F5L912 (289 Cubic In) | 750 | NA |
| | F5L912 (289 Cubic In) For 1984 Models | 980 | NA |
| Fiat | 8060.04 (335.5 Cubic In) | 750 | NA |
| | 8060.04 (335.5 Cubic In) For 1984 Models | 980 | NA |
| | 8369.05 (494.3 Cubic In) | 1430 | NA |
| | 8220.02 (584 Cubic In) | 1430 | NA |
| Mercedes | 352 and 352A (346 Cubic In) | 800 | NA |
| | 355 (589 Cubic In) | 1160 | NA |
| Renault | 06.02.12 (335 Cubic In) | 950 | NA |
| | 06.02.30 (537 Cubic In) | 1740 | NA |
| Volvo | TD60B (334 Cubic In) | 1200 | NA |
| | TD100G (586 Cubic In) | NA | 950 |
| | TD120G (732 Cubic In) | NA | 950 |
| | TD70C and TD70F (409 Cubic In) | NA | 600 |

Battery Ratings and Engine Cranking Requirements

AV 1-8A

VMRS 32-001-001

Preface

The following Advisory is subject to the Disclaimer found on the bottom of the last page of the index. Users are urged to read the Disclaimer before considering adoption of any portion of this Advisory.

Purpose and Scope

High performance batteries in the range of 900 and above CCA (Cold Cranking Amps) are now available in the market. This Advisory is intended to clarify questions concerning the use of the high CCA battery(s) on Class 7 & 8 commercial vehicles.

Effects on the Starter

It is recognized the cranking current is determined by the cranking conditions such as temperature, oil viscosity, and battery state of charge. Given those same conditions, the cranking current will be approximately the same with the use of either the high CCA battery(s) or standard battery(s). The user must be able to be cognizant of the fact that high CCA battery(s) enable the operator to crank for a longer period of time while attempting to start the engine, which could result in high starter temperatures. Starter burnout can occur under abusive cranking conditions, regardless of the type of battery(s) used.

Starter burnout can be prevented by following the starter manufacturer's recommendations, i.e., crank for a maximum of 30 seconds followed by a rest period of two minutes; or by using a starter that is equipped with a thermal protector.

The mechanical integrity of the starter can be severely taxed by greatly exceeding the CCA's recommended by the engine manufacturer.

Effects in the Connections

High CCA batteries have no effect on the connections. Tight and clean connections are essential regardless of the type of batteries used.

Effects on the Battery Cables.

High CCA batteries have no effect on the battery cables. Follow TMC Recommended Practice RP 105A on Battery Cable Assemblies.

Effects on Battery Cycling Capability and Battery Life

The cycling capability and life of batteries are determined by many factors such as battery design, rating, number of batteries, and application condition. With an existing battery system for a given application, increasing the reserve capacity and the CCAs of the system generally increasing the cycling capability and life of the batteries.

Reducing the number of batteries with the use of high CCA battery(s) may be quite satisfactory for cranking in some operations. However, they may not provide the same life expectancy and reliability that the standard battery(s) provided due to the loss in reserve capacity, especially in P&D operations.

| Multiply | by | | Multiply | by | |
|-------------------|---------|---|-----------------------|--------------------|--|
| Inch | LENGTH | | Foot/sec ² | ACCELERATION | meter/sec ² (m/s ²) |
| Foot | 25.4 | millimeters (mm) | Inch/sec ² | 0.304 8 | meter/sec ² |
| Yard | 0.304 8 | meters (m) | | 0.025 4 | |
| Mile | 0.914 4 | kilometers (km) | | TORQUE | |
| | 1.609 | | Pound-inch | 0.112 98 | newton-meters (N·m) |
| | AREA | | Pound-foot | 1.355 8 | newton-meters |
| Inch ² | 645.2 | millimeters ² (mm ²) | | POWER | |
| Foot ² | 6.45 | centimeters ² (cm ²) | Horsepower | 0.746 | kilowatts (kW) |
| Yard ² | 0.092 9 | meters ² (m ²) | | PRESSURE OR STRESS | |
| | 0.836 1 | | | | |
| | VOLUME | | | | |

Decimal and Metric Equivalents

| Fractions | | Decimal In. | Metric MM. | Fractions | | Decimal In. | Metric MM. |
|-----------|-----------|-----------------|---------------|-----------|-----------|----------------|---------------|
| 1/64 | | .015625 | .39688 | 33/64 | | .515625 . . . | 13.09687 |
| 1/32 | | .03125 | .79375 | 17/32 | | .53125 | 13.49375 |
| 3/64 | | .046875 | 1.19062 | 35/64 | | .546875 . . . | 13.89062 |
| 1/16 | | .0625 | 1.58750 | 9/16 | | .5625 | 14.28750 |
| 5/64 | | .078125 | 1.98437 | 37/64 | | .578125 . . . | 14.68437 |
| 3/32 | | .09375 | 2.38125 | 19/32 | | .59375 | 15.08125 |
| 7/64 | | .109375 | 2.77812 | 39/64 | | .609375 . . . | 15.47812 |
| 1/8 | | .125 | 3.1750 | 5/8 | | .625 | 15.87500 |
| 9/64 | | .140625 | 3.57187 | 41/64 | | .640625 . . . | 16.27187 |

CORE RETURN POLICY

CORE CREDIT POLICY

With the purchase of any remanufactured exchange unit, the appropriate core eligibility is reflected on your core statement. Credit is on a like for like basis and will be issued upon receipt, pending eligibility, for up to 13 months. Cores returned in excess of eligibility will not receive credit and will be recorded in your core bank or returned to you at your request. This applies to all eligible Delco Remy program cores.

100% Core Credit is issued on returned cores with eligibility

Example:

- **Purchase 10 units of 42MT starters, 10 units of 42MT starter eligibility are generated.**
- **Return 10 units of 42MT starters, 10 units of 42MT starters are credited.**

Returned cores without eligibility or excess cores will be put in the core bank or returned at your request.

Example:

- **Purchase 10 units of 42MT starters, 10 units of 42MT starter eligibility are generated.**
- **Return 10 units of 40MT starters, 10 units of 40MT starters are banked.**
- **Return 14 units of 42MT starters, 10 units of 42MT starters are credited and 4 units of 42MT starters are banked.**

CORE CONDITION REQUIREMENTS

- No core credit will be issued for non-Delco Remy program cores or non-remanufacturable cores.

Examples of non-returnable cores:

- disassembled cores or cores with missing parts
- rusted or junkyard cores (Contains no reusable parts)
- non-Delco Remy program cores

If core credit is denied and you would like the core returned, please let us know and it will be returned to you freight collect.

FREIGHT POLICY

Freight: 500 pounds or more prepaid - Contact Schneider Logistics at 888-283-1809 or 248-848-5771. The customer pays the freight for core returns less than 500 pounds.

Please complete the "Bill of Lading" as follows: Used auto parts, each less than 50 lbs. in package, value of reconditioning only, NMFC It 18630-3.

Core return units must never be combined in the same shipment with warranty return units.

| ALL CORES (EXCLUDING 50DN'S) | 50DN CORES |
|---|--|
| <p style="text-align: center;">Ship to: Remy Reman Core Return Center 214 Fellowship Drive Taylorsville, MS 39168</p> | <p style="text-align: center;">Ship to: Remy Reman Core Return Center C/O NC Auto Parts. LLC 420 Evans Street Reno, NV 89510</p> |

For assistance or other inquiries concerning core returns, call: 888-488-0276 or fax inquiries to 601-481-1936, Monday through Friday, 7:00 a.m. – 4:00 p.m., CST.