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# Electrical Specifications & Selection Guide

## Starters and Alternators

2006

GENERAL INFORMATION .....	6
CHARGING SYSTEMS .....	7-81
SEMI-SOLID LINK .....	84
STARTING MOTORS .....	82-118
DIAGNOSTIC TEST EQUIPMENT .....	119-120
MISCELLANEOUS .....	121-122
BATTERIES .....	123-129
ELECTRIC SYSTEMS CIRCUITS .....	130-142
ELECTRICAL COMPONENT RECOMMENDATIONS .....	143-149
OTHER INFO .....	150-152

## CHARGING SYSTEMS

	PAGE
<b>SELECTING A CHARGING SYSTEM</b> .....	8-11
<b>SERIES/TYPE FEATURES</b>	
5SI AND 7SI ALTERNATORS .....	12-13
10SI ALTERNATOR .....	14-15
11SI OFF-HIGHWAY ALTERNATOR .....	16-17
12SI TYPE 100 ALTERNATOR .....	18-19
19SI BRUSH ALTERNATOR .....	20-21
20SI BRUSHLESS ALTERNATOR .....	22-23
21SI BRUSH ALTERNATOR .....	24-25
22SI AND 22SI PAD MOUNT BRUSH ALTERNATORS .....	26-27
23SI BRUSHLESS ALTERNATOR .....	28-29
24SI HEAVY-DUTY ALTERNATOR .....	30-31
26SI BRUSHLESS ALTERNATOR .....	32-33
27SI ALTERNATOR .....	34-35
30SI BRUSHLESS ALTERNATOR .....	36-37
30SI/TR BRUSHLESS ALTERNATOR .....	38-39
31SI BRUSH ALTERNATOR .....	40-41
33SI BRUSHLESS ALTERNATOR .....	42-43
34SI AND 34SI PAD MOUNT BRUSHLESS ALTERNATORS .....	44-45
35SI BRUSHLESS ALTERNATOR .....	46-47
36SI BRUSHLESS ALTERNATOR .....	48-49
50DN BELT DRIVE BRUSHLESS GENERATOR .....	50-51
50DN DIRECT DRIVE BRUSHLESS GENERATOR .....	52-53
T1 HEAVY-DUTY BRUSH ALTERNATOR .....	54-55
50VR REGULATOR .....	56-57
O.E. TO SERVICE AND REMANUFACTURED NUMBERS .....	58-61
DISCONTINUED DC GENERATORS .....	62-66
25/26SI REGULATOR RETROFIT KIT .....	67
35SI, 35SI HP AND 36SI HP UPGRADE PROGRAM .....	68-69
ACCESSORIES .....	70
PULLEY SELECTION .....	71-74
MOUNTING HARDWARE RECOMMENDATIONS .....	75
22SI HP BRUSH ALTERNATOR .....	76-77
35SI HP BRUSHLESS ALTERNATOR .....	78-79
36SI HP BRUSHLESS ALTERNATOR .....	80-81

## STARTING MOTORS

	PAGE
<b>PREFERRED SERIES/TYPE FOR NEW APPLICATIONS</b>	
STARTING MOTORS	
42MT HD™ PREMIUM STARTER .....	82-83
SEMI SOLID LINK SOLENOID .....	84
10MT STARTER .....	85
28MT MEDIUM DUTY STARTER .....	86-87
29MT HEAVY DUTY STARTER .....	88-89
37MT STARTER .....	90-91
38MT HEAVY DUTY STARTER .....	92-93
39MT HEAVY DUTY STARTER .....	94-95
41MT STARTER .....	96-97
42MT STARTER .....	98-99
50MT STARTER .....	100-101
O.E. TO SERVICE AND REMANUFACTURED NUMBERS .....	102-110
<b>SERVICE MODEL FEATURES</b>	
OPPOSITE ROTATION MODELS .....	111
OVER-CRANK PROTECTED SERVICE MODELS (OCP) .....	112
ELIMINATING SERIES PARALLEL SWITCH .....	113-114
DRIVE HOUSING ROTATION .....	115-116
FEATURE IDENTIFICATION .....	117
CIRCUIT CONTROL SWITCHES .....	118

## MISCELLANEOUS

### DIAGNOSTIC TEST EQUIPMENT

BENCH TOP TESTER .....	119
INTELLI-CHECK2 .....	120
LOW VOLTAGE DISCONNECT (LVD) .....	121
STARTING TAKES TEAMWORK .....	122

### BATTERIES

BATTERY RATINGS .....	123-124
BATTERY CABLES AND ASSEMBLIES .....	125-129

### ELECTRICAL SYSTEMS

ELECTRICAL SYSTEM CIRCUITS .....	130-141
LINE HAUL DIESEL .....	142
12 VOLT CRANKING - 12 VOLT STARTING	
24 VOLT CRANKING - 12 VOLT STARTING	
ELECTRICAL COMPONENTS RECOMMENDATIONS .....	143-147
ENGINE CODE IDENTIFICATION CHART .....	148
BATTERY RATINGS AND ENGINE CRANKING REQUIREMENTS .....	149
CONVERSION CHARTS .....	150-151
CORE POLICIES .....	152

	PAGE
	TMC*
	PRACTICE
GENERATOR MOUNTING. ....	RP 101A .....143
BATTERY MOUNTING (VIBRATION STANDARDS).....	RP 125 .....144
BATTERY CABLES. ....	RP 105A .....145
BATTERY RATINGS VS ENGINE REQUIREMENTS .....	RP 109A .....147
EFFECT OF HIGH CCA BATTERY ON CLASS 7 & 8 TRACTORS .....	AV1-8A .....149

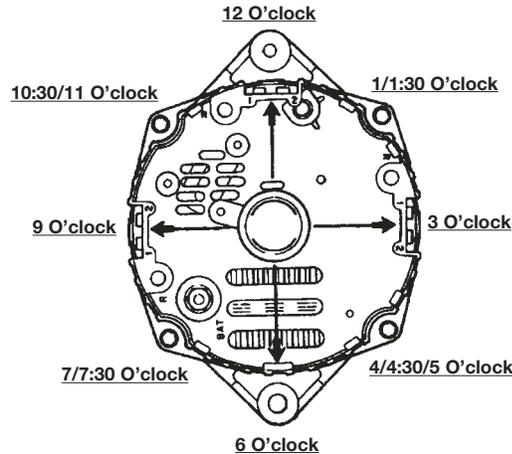
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## ALTERNATORS/GENERATORS

### 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
10459069	80	27SI-200	12:00
10459244	65	27SI-200	12:00
10459351	72	10SI-136	12:00
10463072	80	27SI-200	12:00
10463074	80	27SI-200	12:00
10463073	65	27SI-200	12:00
10463161	100	27SI-205	12:00
19020500	72	10SI-116	3:00
19020501	63	10SI-100	3:00
19020504	100	27SI-100	12:00
19020505	78	12SI-100	3:00
19020506	70	15SI-100	3:00
19020506	70	15SI-100	6:00
19020506	70	15SI-100	9:00
19020506	70	15SI-100	12:00
19020525	40	10SI-116	12:00
19020528	94	12SI-100	12:00

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
<b>Gas Engine</b> 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
<b>Diesel Engine</b> 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

### 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		24	NEG	40	0
	100	12	NEG	66,78,94	30
		12	NEG	70,85	35,40
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
27SI	100	12	NEG	80,100	44,30	
			POS	65,80	40,40	
	200	12	NEG	80	40	
			24	NEG	65	0
	202	24	NEG	30	14	
	205	12	NEG	65,80,100	40,50,44	
30SI	450	12	NEG	90,105	44,53	
			POS	90	44	
			24	INS	60	25
			30/32	INS	60	0
30SI/TR			NEG	90	44	
31SI		12/24	POS	90,105	44,40	
33SI	450	24	NEG	100,82	0,20	
34SI	455	12	NEG	122,137	50,38	
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 } GF = 10  
40SI, 50DN }

14 Poles

10SI }  
12SI } GF = 8.57  
20SI }

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

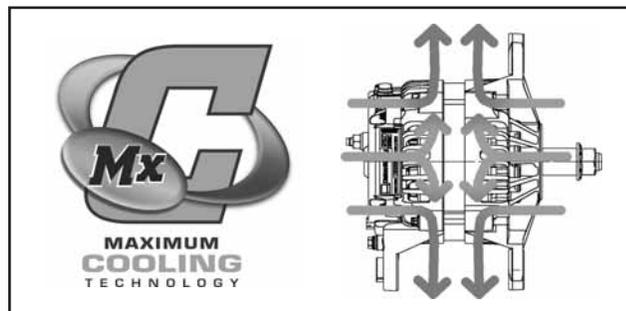
Increases in under-hood temperatures can cause premature wear of components within the alternator, potentially shortening service life and reducing amperage output. Maximum Cooling Technology (MxC) provides the answer to this dilemma. MxC's heat-reducing design begins with a fully vented case, allowing 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**

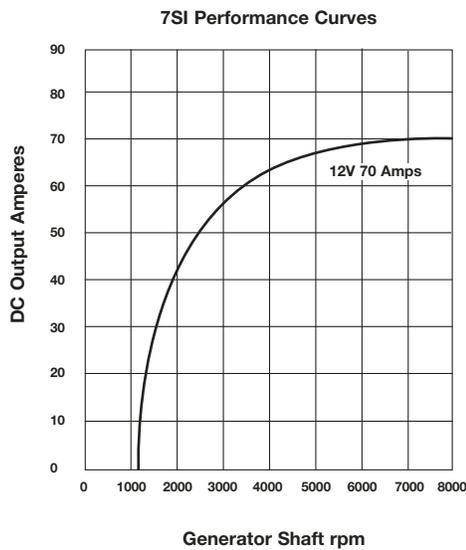
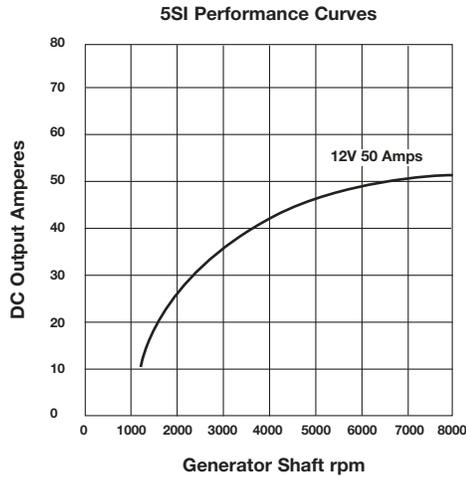


**7SI**



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:** 175.0 mm / 6.89 in

### Weight:

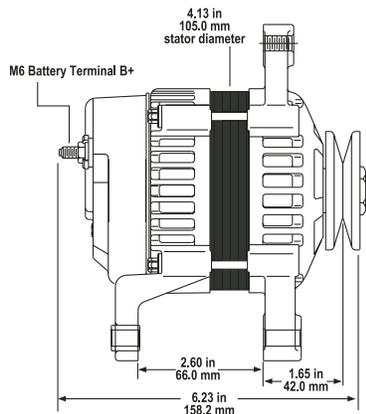
**5SI:** 3.3 kg / 7.27 lbs

**7SI:** 4.0 kg / 8.8 lbs

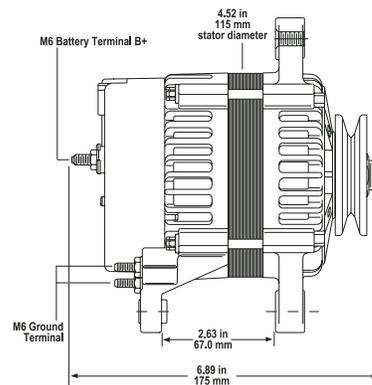
### DE Bearing Size:

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.**

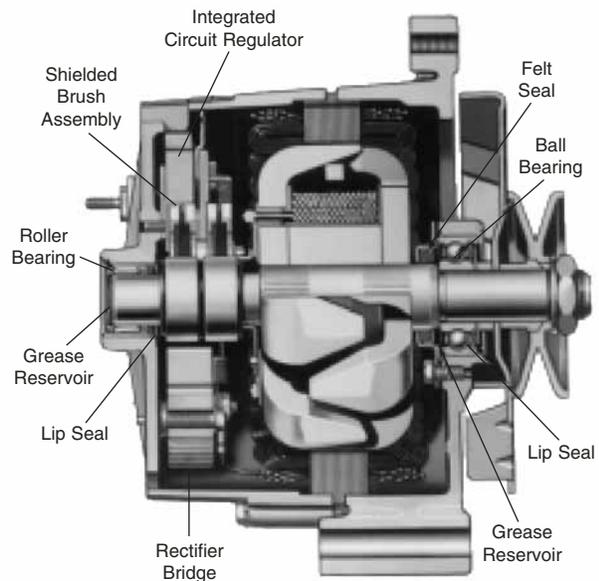


### Recommended for Farm and Industrial Applications

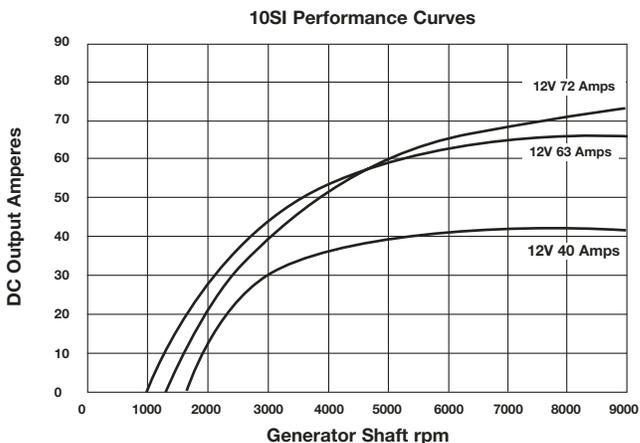
The 10SI Series/Type 116 is a complete power generating system designed for normal electrical and belt loads and tough environmental requirements of farm and industrial equipment.

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				
NEW SERVICE	REMAN	VOLTAGE	RATED OUTPUT	GENERATOR OUTPUT AT APPROX 1600 RPM
1105360*	190220501	12V	63 Amps	23 Amps
1105423	19020500	12V	72 Amps	0 Amps
1105431	19020525	24V	40 Amps	0 Amps
1105510	19020527	24V	40 Amps	0 Amps
1105586	10459351	12V	72 Amps	0 Amps

Weight: 10.5 lbs

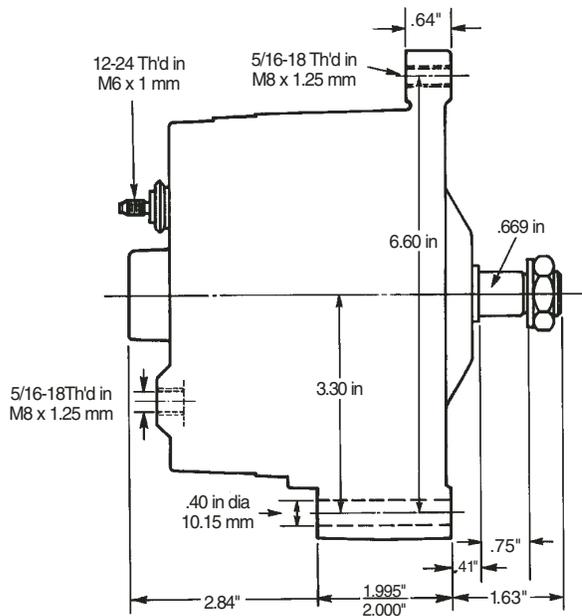
3-wire system — w/o fan and pulley

### Wiring Information

For R-terminal, purchase Part Number 1852519 kit and 1969007 lead.

See generator instruction hardware pages.

### Dimensions



## 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.**

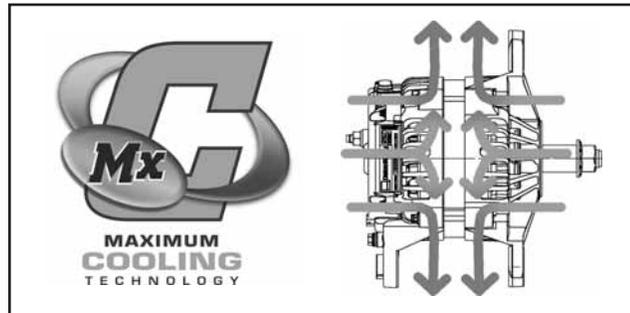


### High Output in a Compact Frame

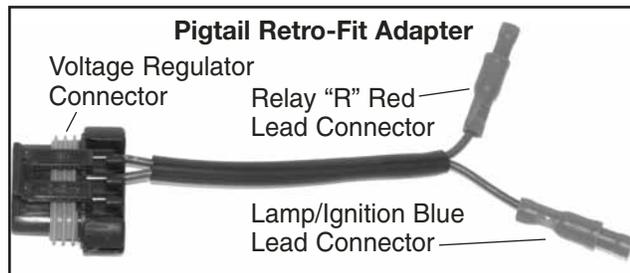
As the Off-Highway heavy duty industry moves toward higher-efficiency, smaller displacement diesel engines, the need has arisen for a small frame alternator to fit within these new space restraints. The addition of lights and electronics to these applications has also significantly increased the amperage 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.

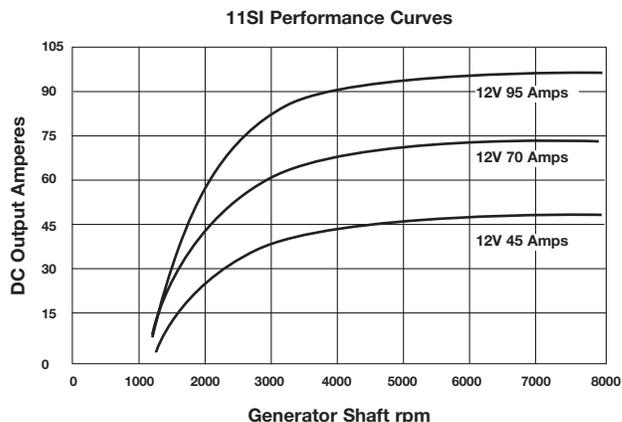


Draws air from drive end and terminal end over electronics and internal components and out frame air vents for cooler internal alternator temperature. These design enhancements also make MxC alternators exceptionally resistant to debris and contamination.

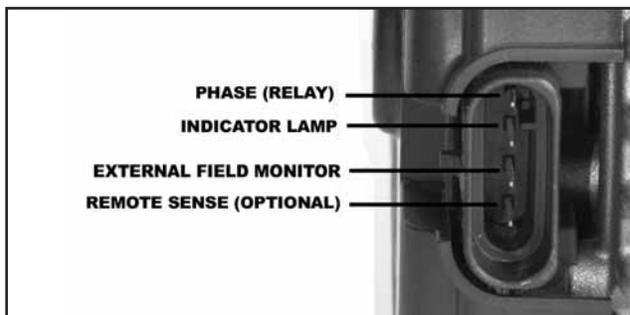
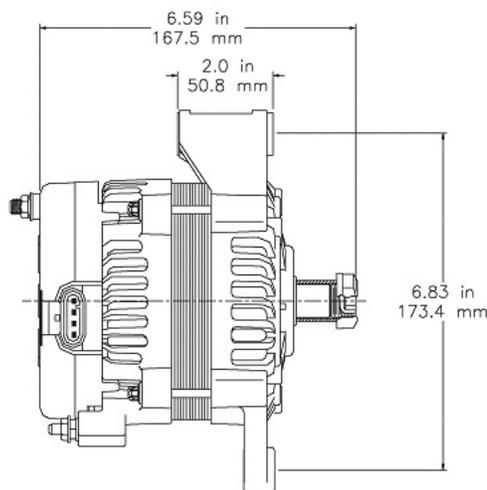


Delco Remy has designed a pigtail adapter to retro-fit the 11SI to standard connector terminals. Contained in every aftermarket package is the pigtail connector, accompanied by full instructions to ensure that replacing your older, existing alternator with the Delco Remy 11SI goes smoothly.

## 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
Cummins	19020203	12	70
Non-Cummins	19020207	12	70
Cummins	8600030	12	95
Non-Cummins	19020208	12	95
Cummins	8600031	24	45
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**

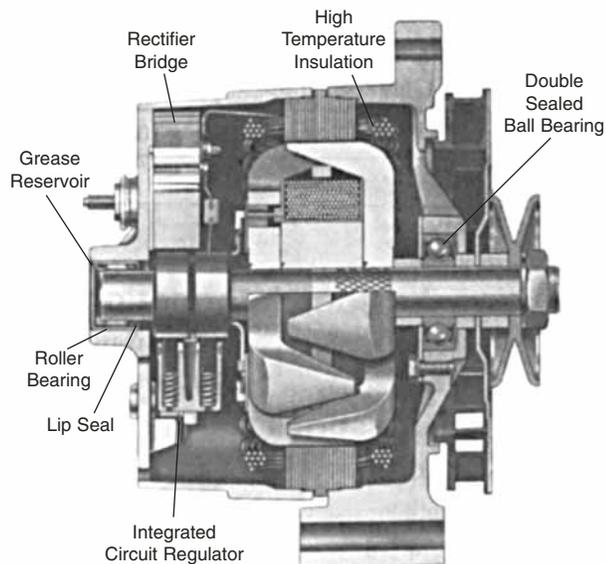
**\*Easy installation**

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



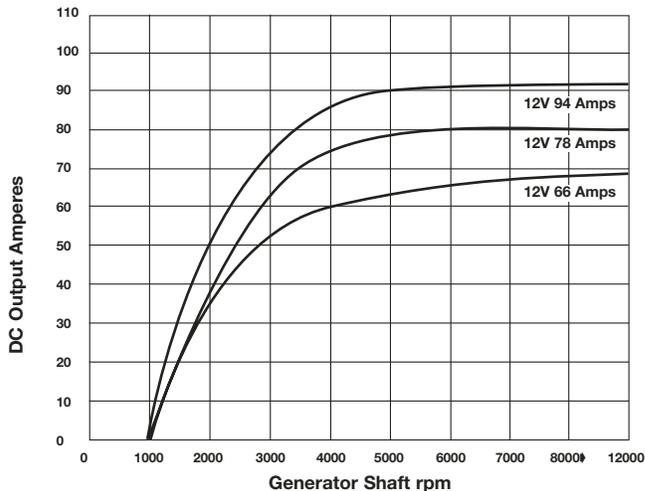
### **Recommended for Passenger Cars and Light Trucks with Gasoline or Small Diesel Engines**

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

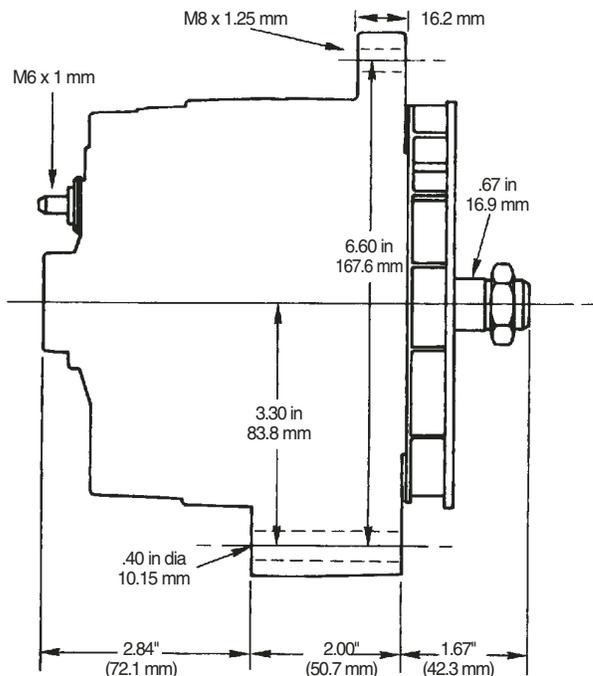
NEW SERVICE	REMAN	VOLTAGE	RATED OUTPUT	GENERATOR OUTPUT AT APPROX 1600 RPM
1101307*	19020505	12V	66 Amps	23 Amps
1101308**	19020528	12V	94 Amps	32 Amps
1101345**	10459350	12V	78 Amps	23 Amps
Weight: 11.2 lbs				

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

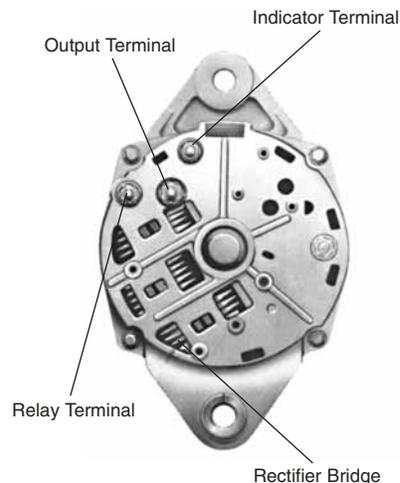
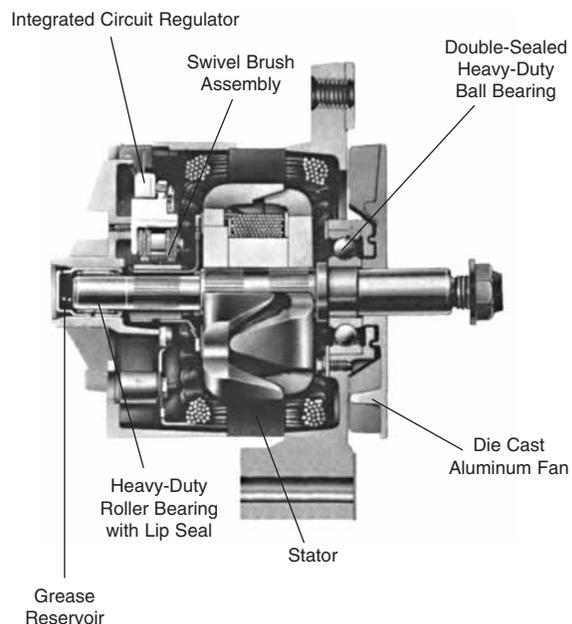
Performance and reliability is what you get with the 19SI brush alternator from Delco Remy. It's the smart choice for medium-duty farm, construction, and industrial applications.

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.

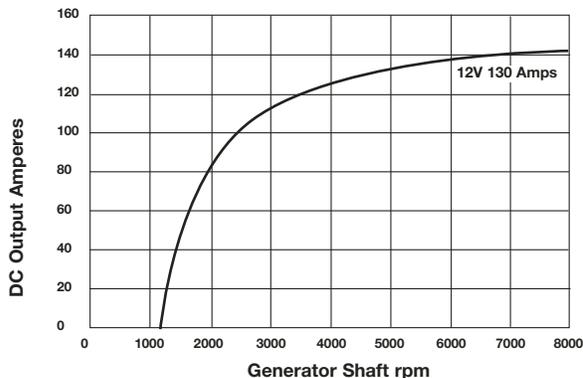
The 19SI offers high output in a small rugged package with integrated circuit regulator, low parasitic draw provides excellent radio frequency interference (RFI) suppression. Standard load dump protection guards against voltage spikes caused by loose connections or charging line interruptions.

NOTE: See generator instruction hardware pages.



## 19SI Brush Alternator

19SI Performance Curves



### 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

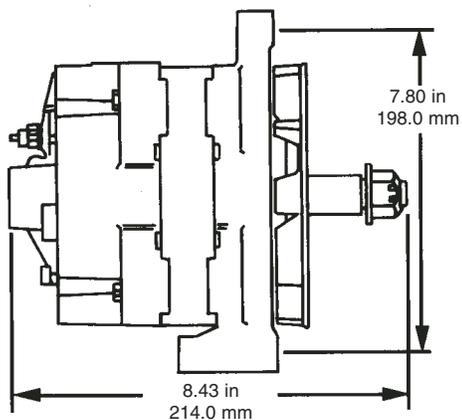
#### Mounting:

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**

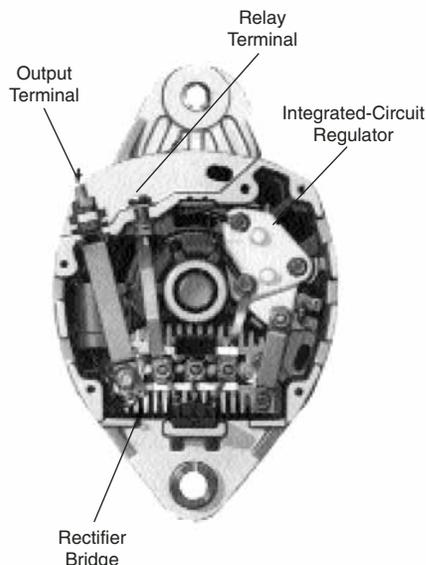
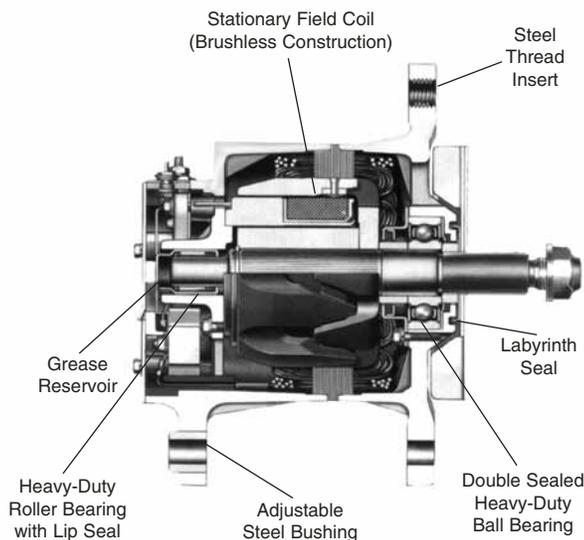
Delco Remy's 20SI, 60 Amp generator combines brushless construction and state-of-the-art electronics in a small high-efficiency package.

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.

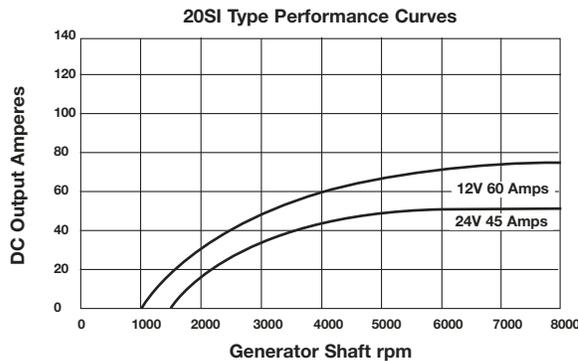
A one-wire charging system prevents wiring errors that can occur from multiple connections, making generator replacement simple. Standard SAE mounting makes the 20SI interchangeable with most competitive units and other Delco Remy generators.



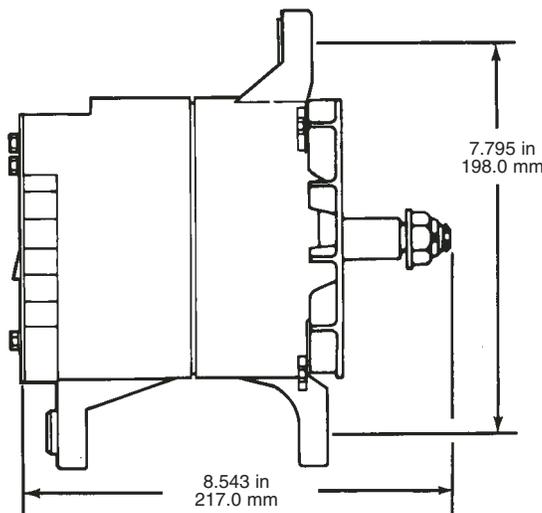
## 20SI Brushless Alternator

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**

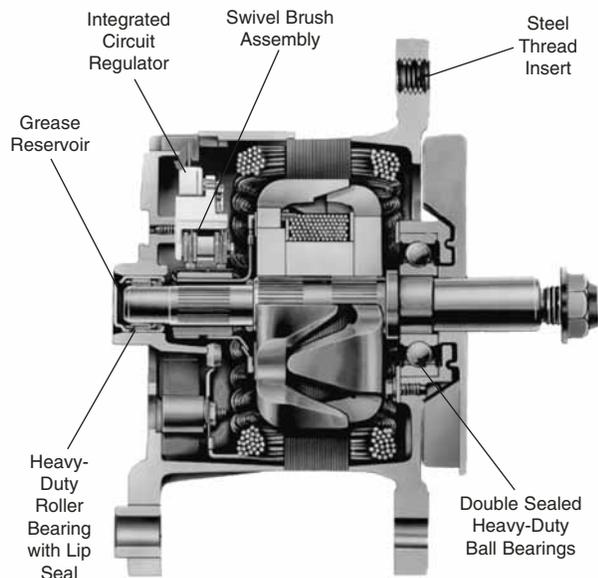
**Recommended for Large and Mid-Range On-Highway Diesel and Gasoline Engines, Off-Road, Farm, Construction High Electrical Loads**

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.

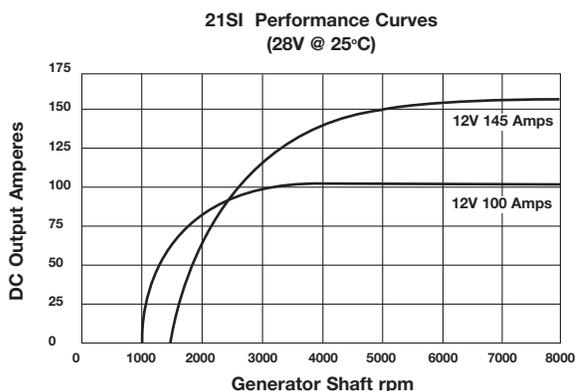
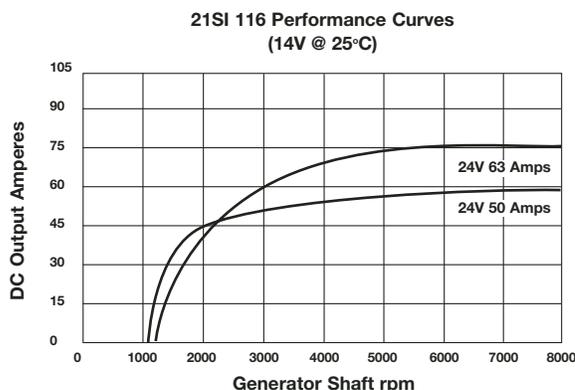
A specially designed bridge provides protection for other electronic devices on the vehicle by effectively clamping voltage surges up to 40 Volts. This feature is standard on the 130 and 145 Amp models.

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.

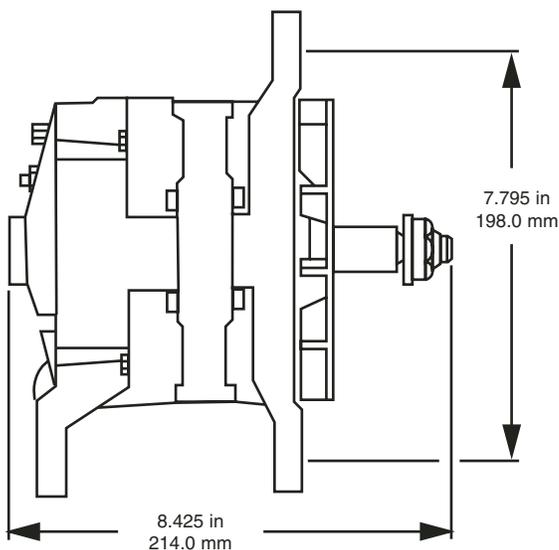


**See 21SI Series  
Original to Service  
Cross Reference Section  
for OEM Part Numbers**

## 21SI Brush Alternator



### 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

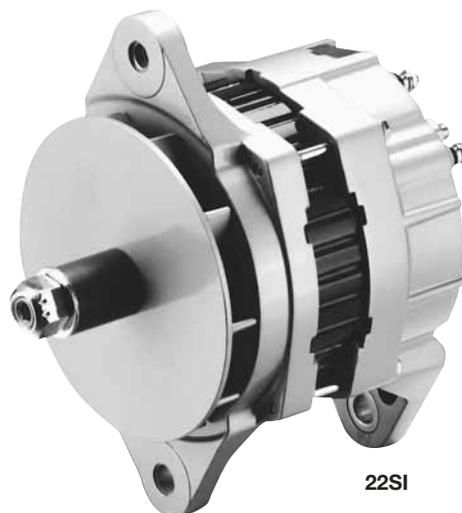
**Instant turn-on with “Auto-Start”**

**Long Brush Life**

**Vibration-Resistant Frame Design**

### The Advantage Fleets and Owner Operators Want

Delco Remy’s 22SI is the standard of quality and performance for a brush-type alternator for today’s electrical loads and durability requirements.



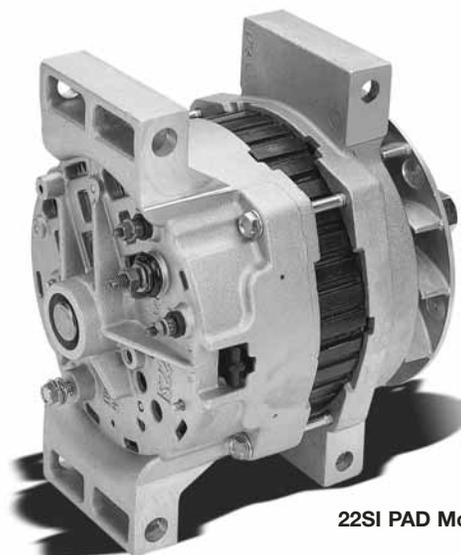
22SI

### Radial Brush Construction Increases Service Life

This system has more brush volume and length than any unit of its size; more brush volume equals longer life. Combined with an advanced slip-ring assembly and our innovative rotor machining process, brush bounce and dynamic wear are virtually eliminated.

### “Auto-Start” Instantly Turns On The Alternator

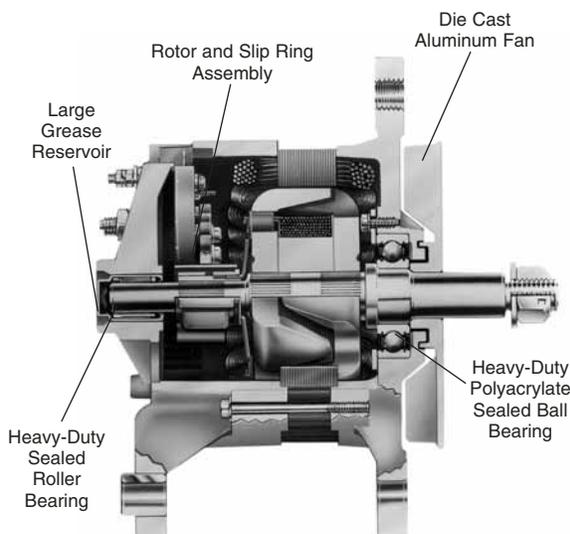
This system allows charging immediately after starting. On 12 Volt models, the diodes prevent electric spikes, clamped at 40 Volts, from damaging the unit or other electronics. The Delco Remy 22SI heavy-duty alternator has indicator light I- and R-terminals standard for quick installation and excellent RFI suppression.



22SI PAD Mount

### Structural Integrity Is Enhanced

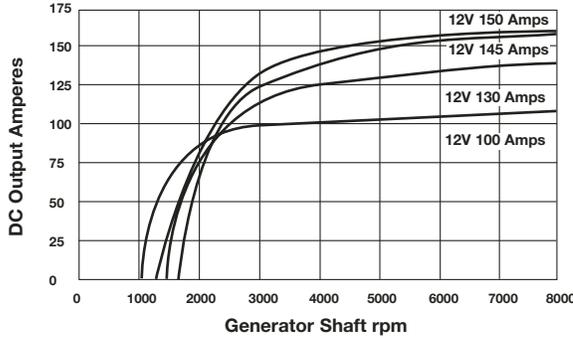
The robust end frames have heavy-duty environmentally sealed bearings to withstand severe belt loads and vibration resistant mounting lugs. These durable frames are assembled with SAE grade 8, and vibration resistant mounting lugs. 1/4"-20 bolts for added rigidity.



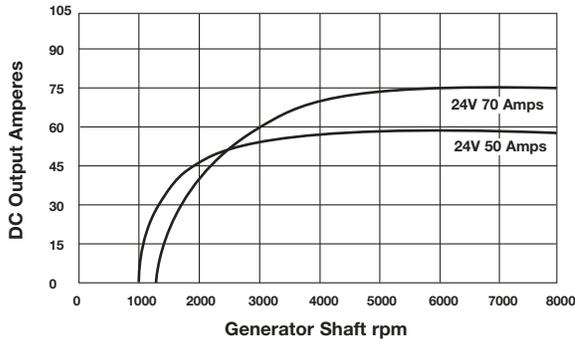
**See 22SI Series  
Original to Service  
Cross Reference Section  
for OEM Part Numbers**

## 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

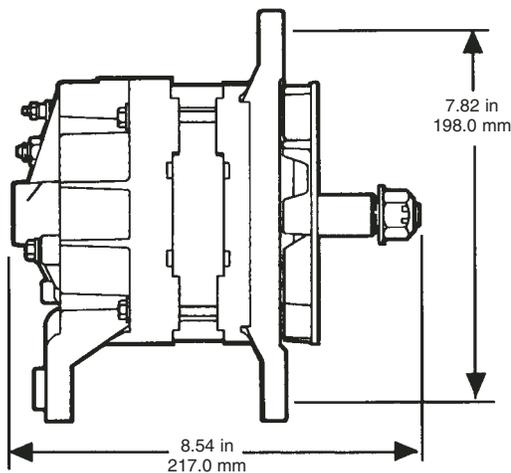
#### Mounting:

- SAE J180 Standard
- PAD Mount Mounting System

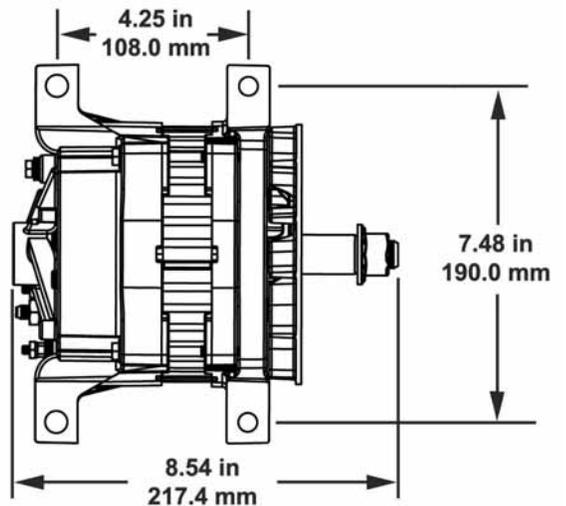
#### Weight:

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

### Dimensions



22SI



22SI PAD Mount

## 23SI Brushless Alternator

**Brushless Reliability**

**Vibration Resistant**

**Load Dump Protection**

**Durable Frame**

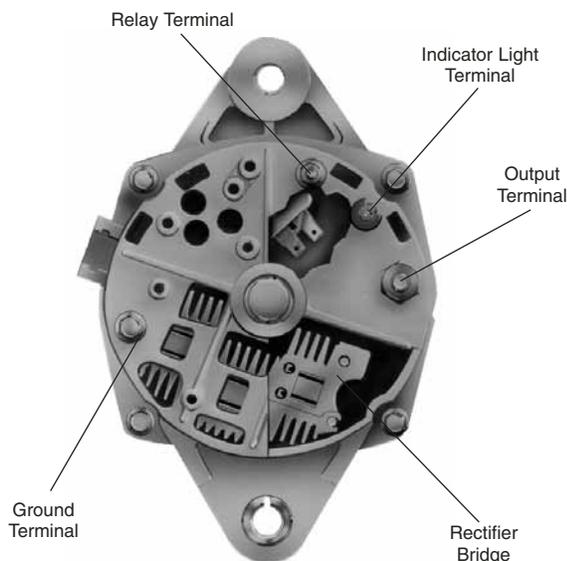
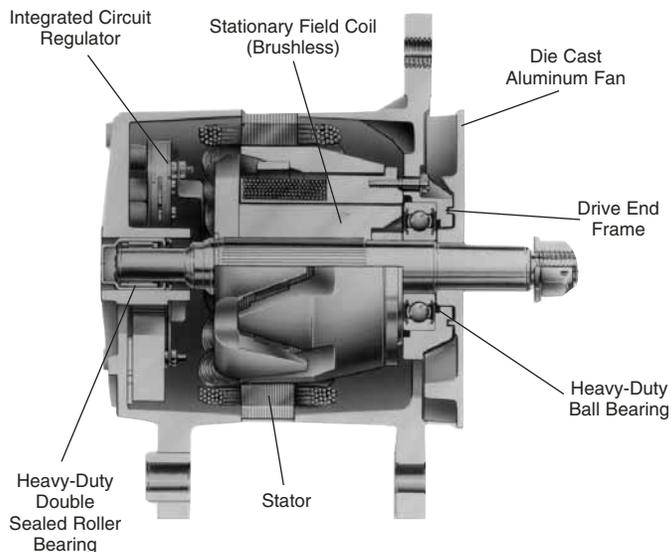
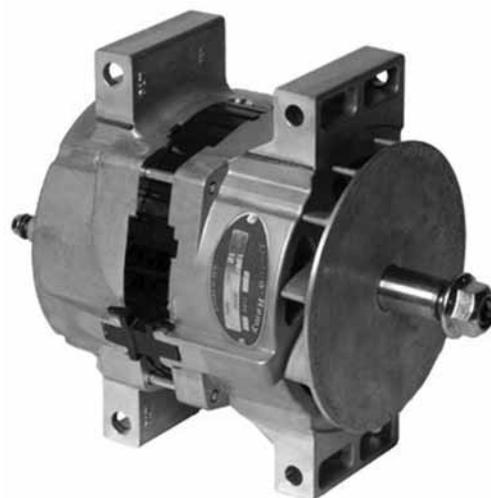


Experience more output and service life for today's mid-range diesels with high electrical load requirements. The brushless design eliminates moving electrical connections. The 23SI offers 70 and 50 Amp outputs in 24 Volt models and up to 130 Amp output in the 12 Volt models, all suitable for most off-highway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

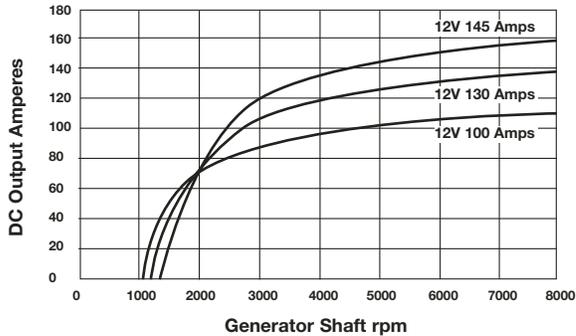
The Single Wire Charging Line prevents errors that could occur from multiple connections on the 23SI, yet is ideal for agricultural, industrial and medium duty vehicles.

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.

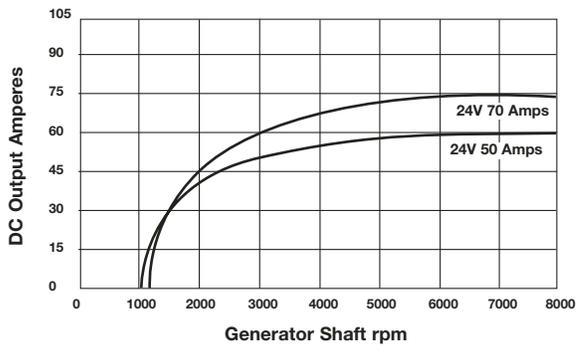


## 23SI Brushless Alternator

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

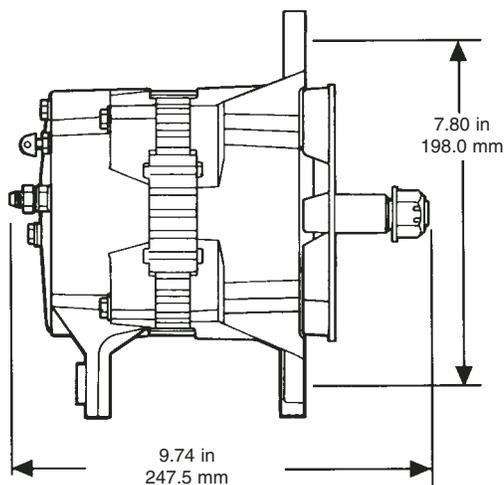
#### Mounting:

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.**

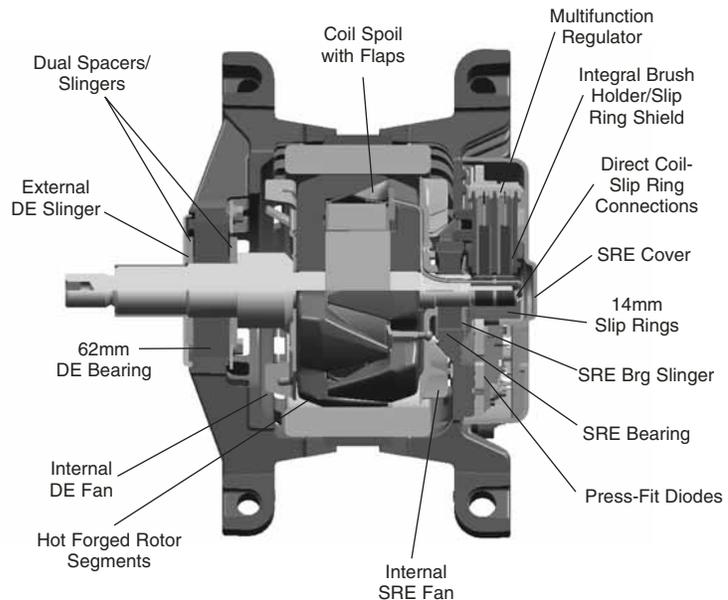


### Optimal brush life by design

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.

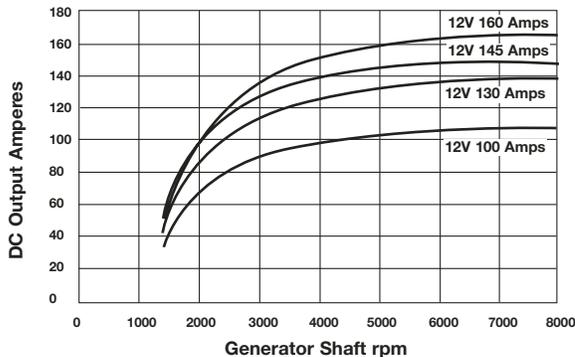
### Dual internal fans for high temperature environments

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.

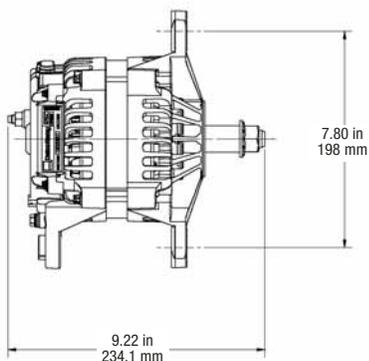
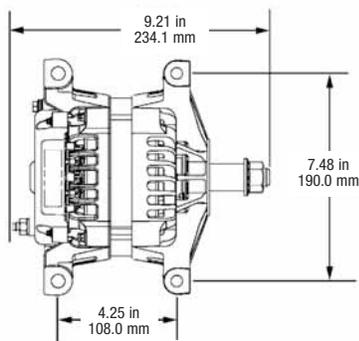
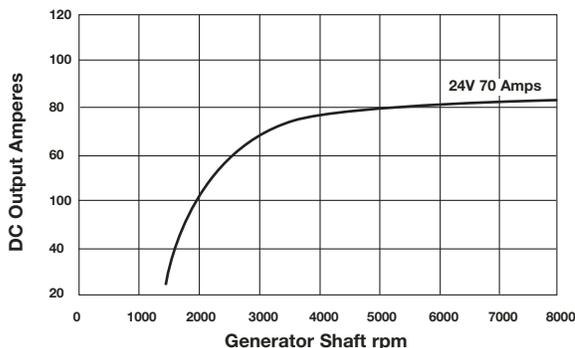


## 24SI Heavy-Duty Alternator

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)

223mm

#### Stator Diameter:

144mm

#### DE Bearing Size:

62mm

## 26SI Brushless Alternator

**Mid-range output**

**Sealed electronics**

**Load dump protection**

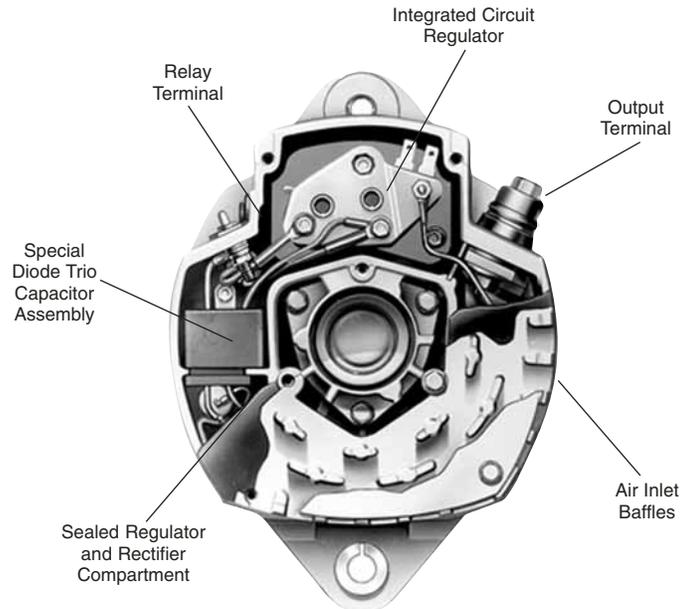
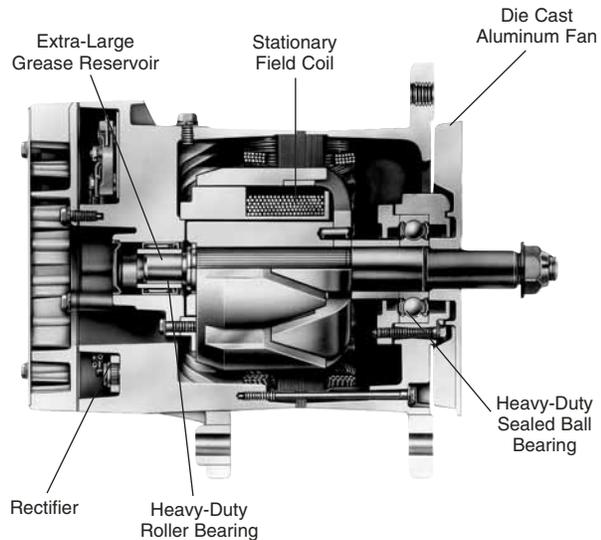
**RFI suppression**

**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.

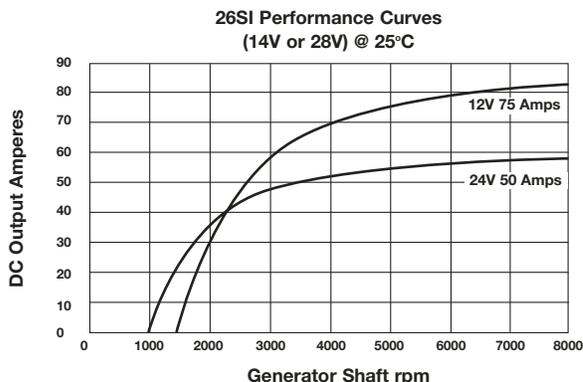
The **integrated-circuit regulator** is designed for low parasitic draw and features a low turn-on speed. A **special diode-trio/capacitor assembly** provides superior radio frequency interference (RFI) suppression. The 26SI's electronics are protected two ways. Standard load dump protection guards the 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

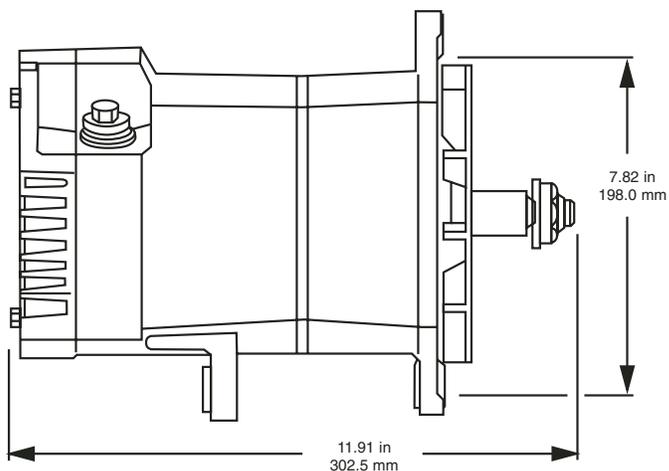
#### “Inside-Cooled” System

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

#### Corrosion Protection:

Sealed Rectifier-End Assembly  
Brass Output Terminal Hardware

### Dimensions



**27SI** Alternator

**High ampere output at idle**

**Built-in integrated-circuit regulator**

**Simplified wiring**

**Light weight (16 lbs)**

**No periodic lubrication  
or service required**

**Recommended for Passenger Car and  
Light Trucks when high output at idle is  
necessary**

The 27SI Series provides up to 100 Amps continuous output. The unit is recommended for specialized service to provide high charge at idle during stop and go operation, or for extra electrical power to supply large accessory loads.

The built-in regulator offers ease of installation as well as added durability.

A special R-terminal on the 80 Amp model only is provided for use with electric tachometers, tach hour meters and other devices.

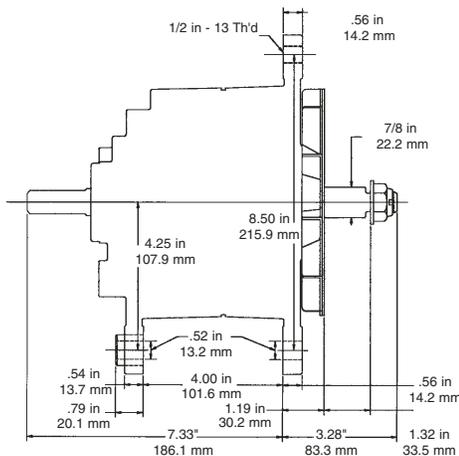
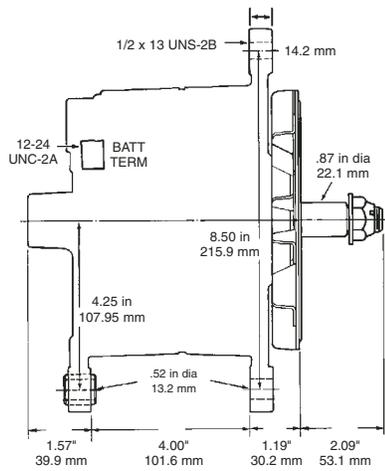
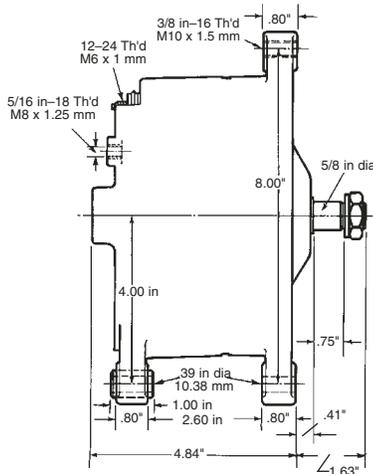
Also available in Type 200 1 wire configuration, and Type 205 extended shaft for applications with a hydraulic vacuum pump.



**See 27SI Series  
Original to Service  
Cross Reference Section for  
OEM Part Numbers**

## 27SI Alternator

### Dimensions



### Pulley Information:

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

### Mounting & Wiring Information:

To replace externally regulated generators with SI units, use wire package Part Number 1870921 or as required.

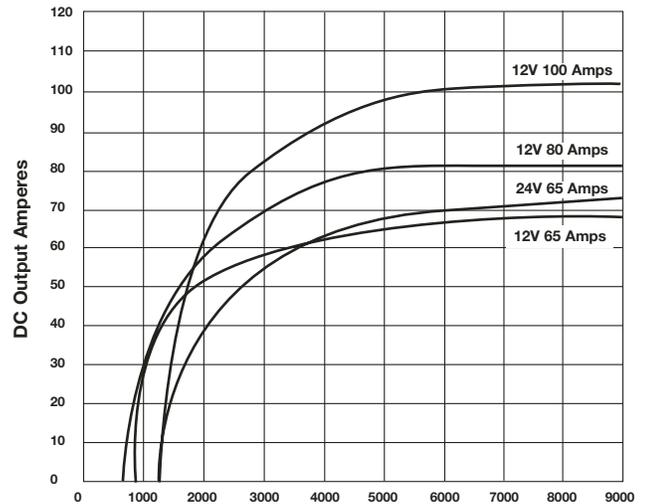
If an additional bracket is required use Part Number 1961205.

See Generator Installation Hardware pages.

### Mounting:

J180 Compact Mount SAE J180 Hinge

127SI Performance Curves  
(14V or 28V @ 25°C)



## 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**

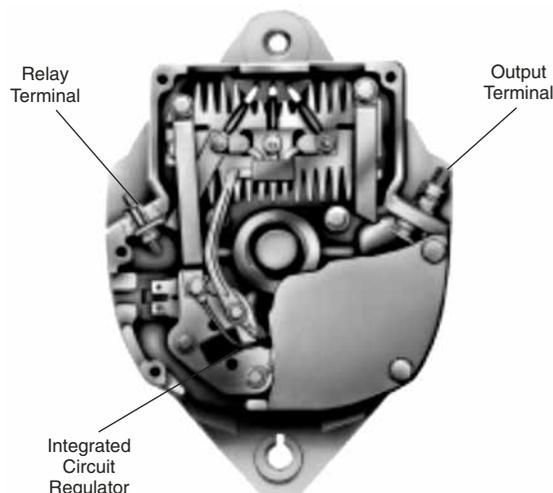
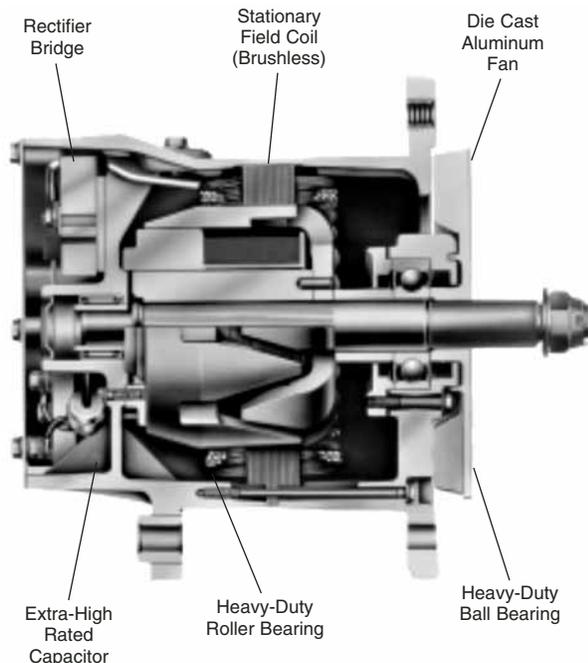
The 30SI high-output generator is an integral part of Delco Remy. Its brushless construction gives it substantially increased service life over brush-type units. This absence of moving electrical connections eliminates sparks from brush/slip ring contact.

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.

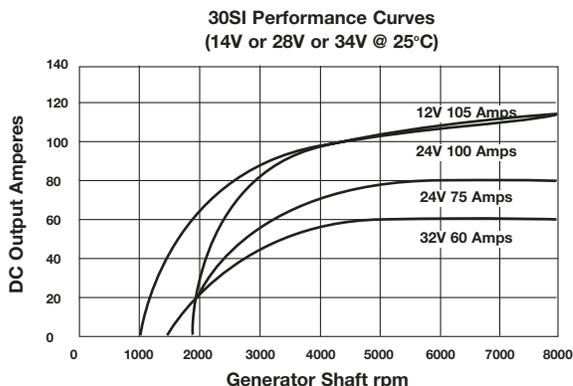
The one-wire system of the 30SI prevents wiring errors that may occur from multiple connections, making generator replacement simple. A standard SAE mounting span makes the 30SI interchangeable with most competitive units and other Delco Remy units.

NOTE: Structural integrity has been enhanced

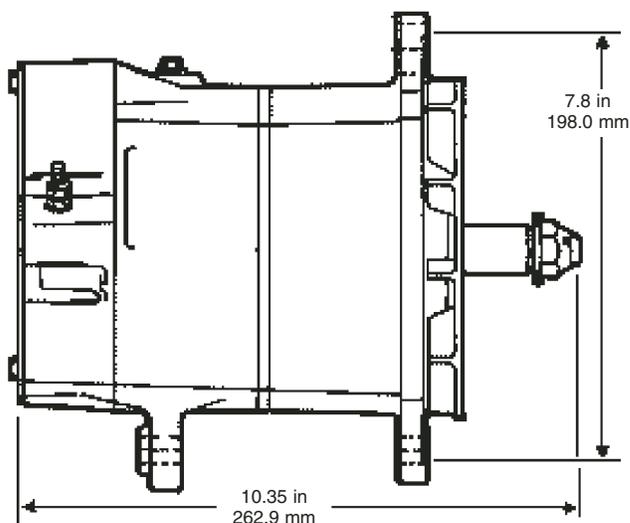


**See 30SI Series  
Original to Service  
Cross Reference Service  
for OEM Part Number**

## 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**

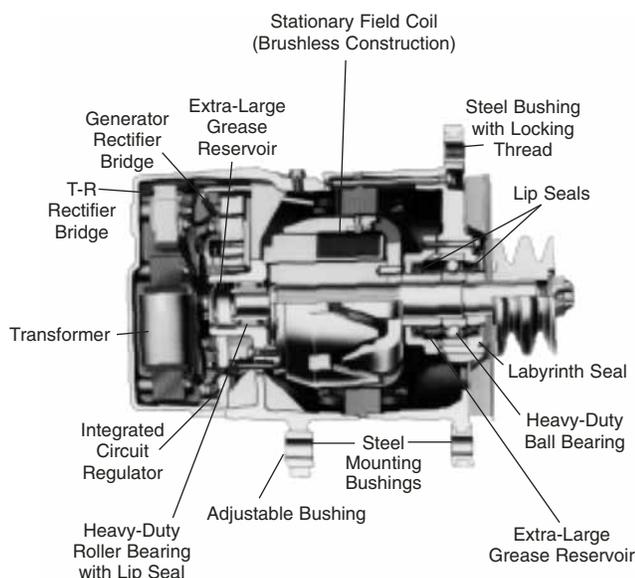
**Large 25 mm ball bearing at the drive-end and heavy-duty roller bearing at the opposite end**

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

**Built-In integrated circuit regulator**

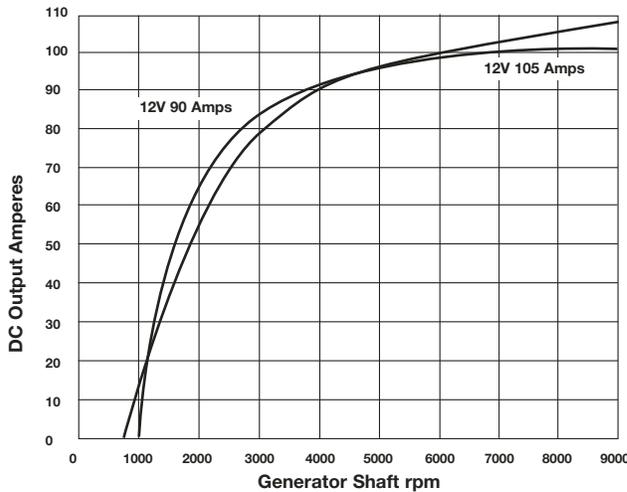
The 30SI/TR Series /Type 450 is a complete power generating system designed for high-mileage extra-large heavy-duty line haul diesel applications with 24 Volt cranking and 12 Volt accessories. The 30SI/TR (Transformer Rectifier) is supplied in both 12 Volt negative or positive models with a rated output 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 constructions 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/TYPER 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.

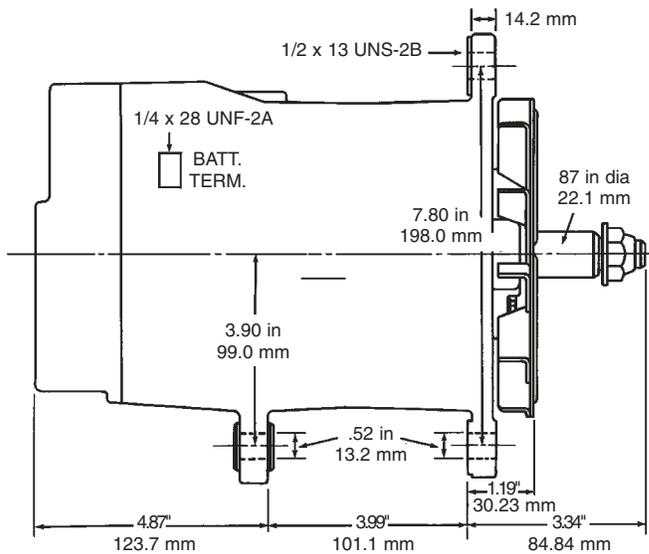
If a new pulley is required see Generator Installation Hardware & Component Part Section.

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



## 31SI Brush Alternator

### High Output

### Core Free

### High Output Requirements, Require...

the Delco Remy 31SI Brush Alternator. With 12 Volt outputs of 160 or 200 Amps and 24V at 150 Amps, the 31SI can handle severe electrical loads and demands for durability

### The Special Integrated Circuit Regulator

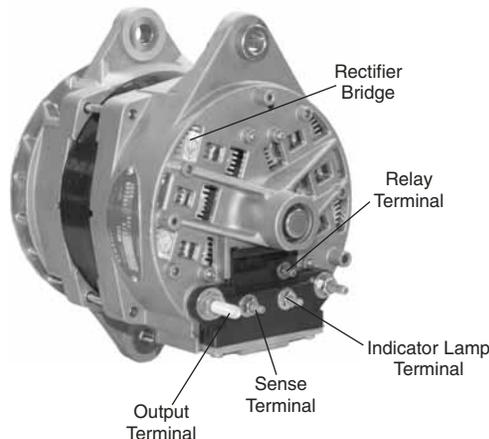
provides the standard low parasitic draw and radio frequency interference (RFI) suppression found on all of our alternators; while eliminating the need for load dump protection. This design also adds external fault detection and communicates with the ECM or indicator light.

### The New Diode Rectified Bridges

protect the vehicle's electronic devices from voltage surges on 12V models, by effectively clamping voltage spikes at 40 Volts. Two methods of voltage sensing, external (battery) or internal (alternator) are designed for either a one wire or a three wire system. The internal voltage sense acts as backup to the external voltage sense should a wiring or connection failure occur.

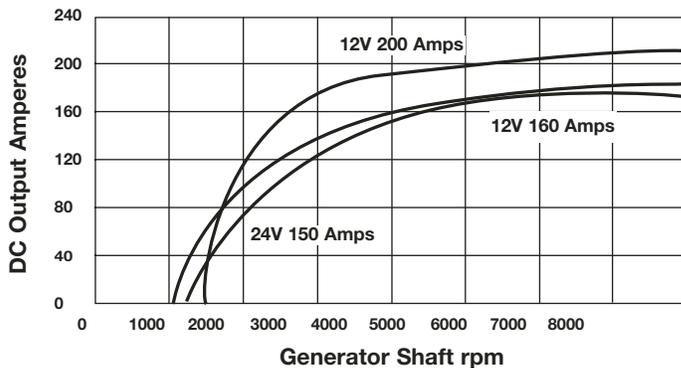
### Structural Integrity Is Enhanced...

by the robust end frames and vibration resistant mounting lugs. The frames are assembled with durable, SAE grade 8, 1/4" 20 thru bolts fore added rigidity. The environmentally sealed heavy-duty bearings withstand severe belt loads.



## 31SI Brush Alternator

31SI Performance Curves  
(14V or 28V @ 25° C)



### Specifications

#### Performance Output:

200 Amps - 12 Volts  
160 Amps - 12 Volts  
150 Amps - 24 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 Standard

#### Mounting:

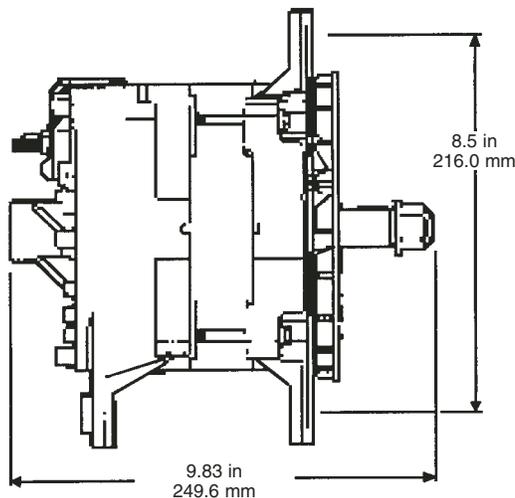
SAE J180 Standard

#### Weight:

22 lbs or 9.8 kg

New Service Part Number	Volts	Output Terminal	R Terminal	Amps
19011107	12V	5/16	#10	160A
19011100	12V	1/4	Pin	160A
19011101	12V	1/4	#10	160A
19011104	12V	5/16	Pin	200A
19011105	12V	5/16	#10	200A
19011108	24V	1/4	#10	150A

### Dimensions



## 33SI Brushless Alternator

**High Output**

**Corrosion Protection**

**Voltage Clamp Protection**

### Delco Remy's 33SI Alternator

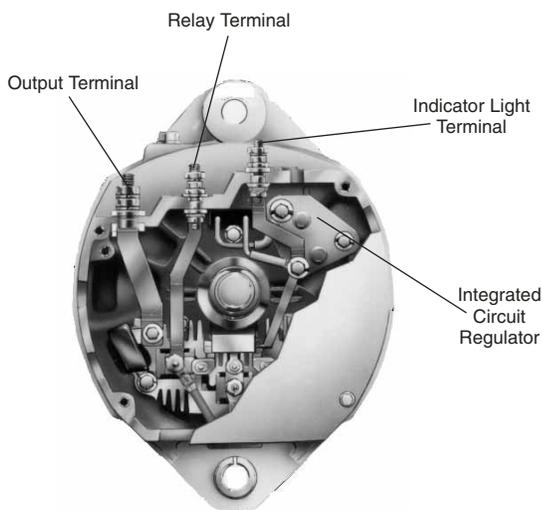
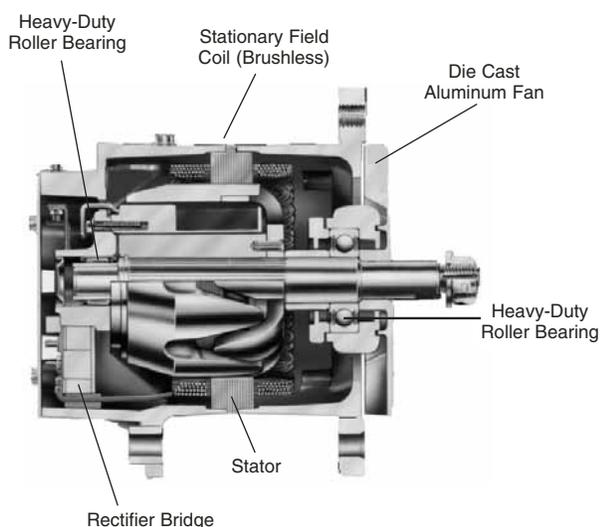
provides more output and service life for today's diesel powered vehicles with large electrical load requirements. With the increased demand for extended service life products, Delco Remy's Brushless Generators are quickly becoming the standard of the industry. The standard load dump protection prevents voltage spikes from damaging the alternator due to loose connections or charging line interruptions. In 12 Volt models, a specially designed bridge limits voltage spikes to 40 Volts to protect other vehicle electronic devices.

### 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

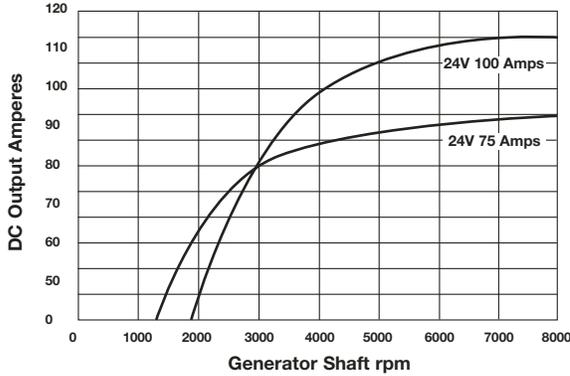
The end frames each have a sealed heavy-duty bearing for environmental protection and to withstand severe belt loads. Sturdy vibration resistant lugs mount according to SAE J180. These durable frames are assembled with grade 8, 1/4"-20 bolts for added rigidity.



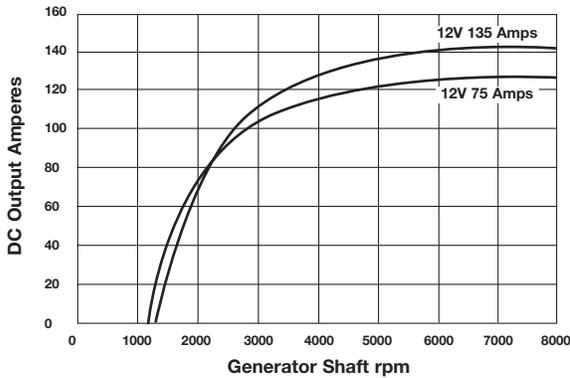
**See 33SI Series  
Original to Service  
Cross Reference Section  
for OEM Part Numbers**

## 33SI Brushless Alternator

33SI Performance Curves  
(24V @ 25° C)



33SI Performance Curves  
(12V @ 25° C)



### Specifications

#### Performance Output:

- 110 Amps - 12 Volts
- 135 Amps - 12 Volts
- 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

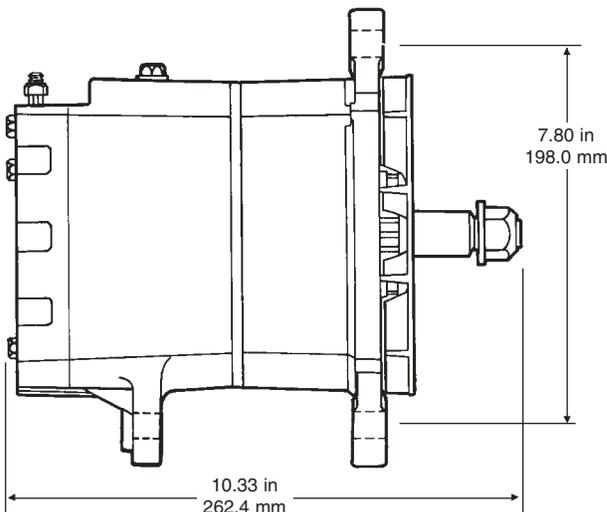
#### Mounting:

SAE J180 Standard

#### Weight:

24.5 lbs or 11.1 kg

### Dimensions



## 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

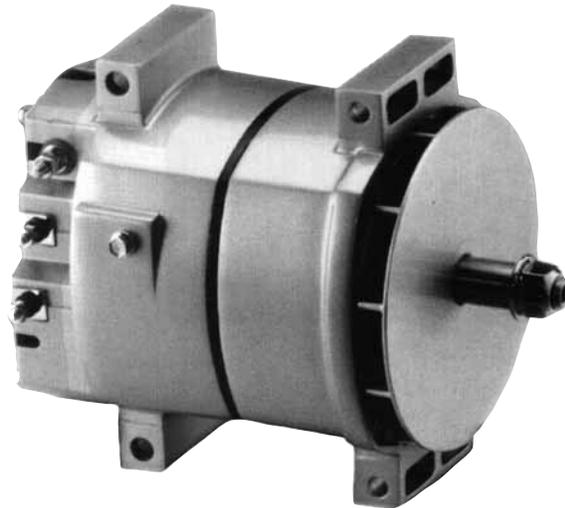
A special coating protects the electronics from dirt, road salt and other corrosives. The heavy-duty bearings are sealed with plenty of lubricant. Load dump protection prevents external voltage spikes from damaging the unit. The rectifier bridge limits voltage spikes to 40 Volts to protect vehicle electronic devices.

### Brushless Construction Increases Service Life

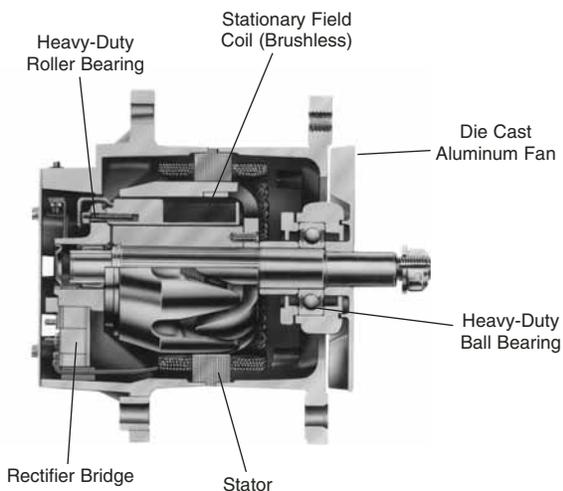
The absence of moving electrical connections eliminates sparks. The 34SI has excellent radio frequency interference (RFI) suppression with very little parasitic draw and allow turn-on speed.



34SI

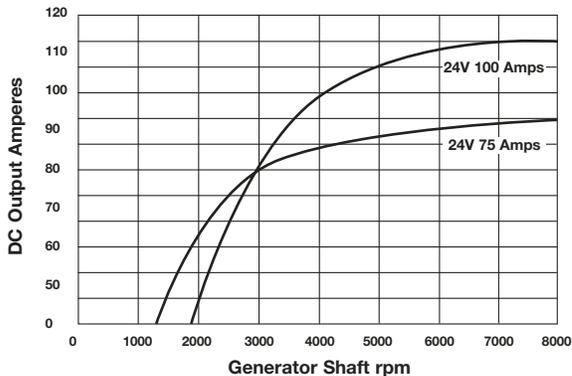


34SI PAD Mount

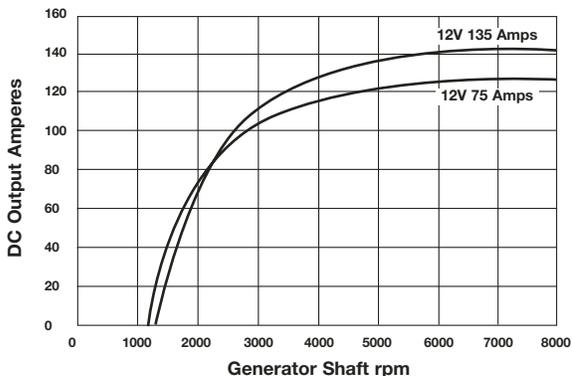


## 34SI & 34SI PAD Mount Brushless Alternator

33SI Performance Curves  
(24V @ 25° C)



33SI Performance Curves  
(12V @ 25° C)



### Specifications

#### Performance Output:

- 135 Amps - 12 Volts
- 110 Amps - 12 Volts
- 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

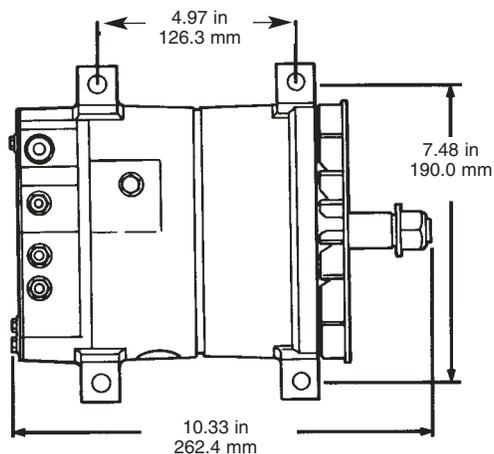
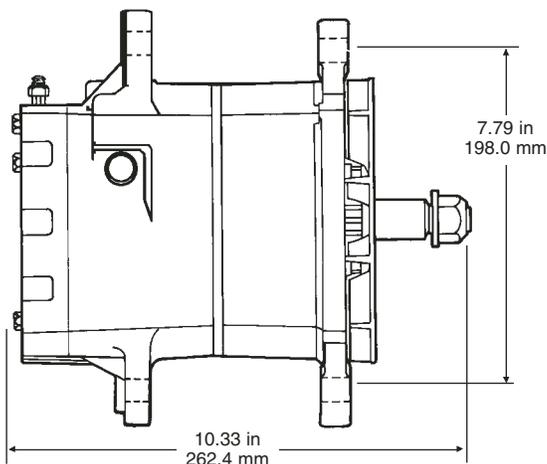
#### Mounting:

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.**

**All 35SI HP 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



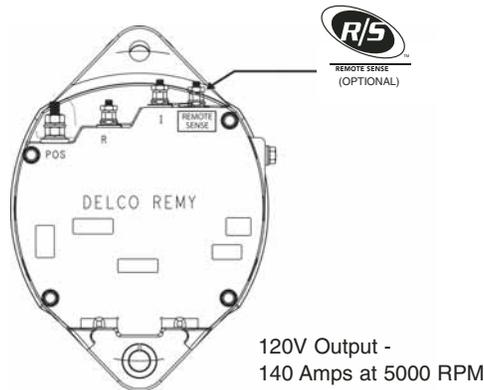
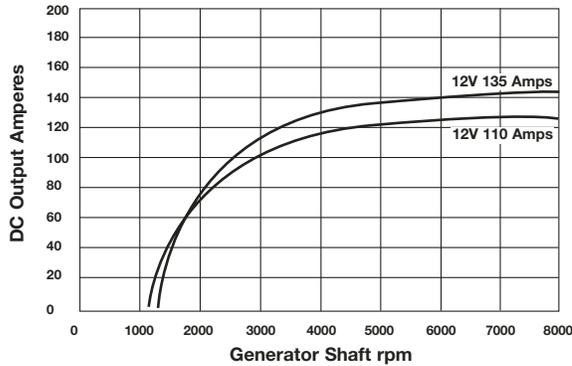
QUAD Mount



Hinge Mount

## 35SI

35SI Performance Curves



Some 35SI 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:

110Amps - 12 Volts  
135Amps - 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 Standard

#### Construction:

Brushless

#### Weight:

25.4 lbs or 11.5 kg

#### Length:

262mm

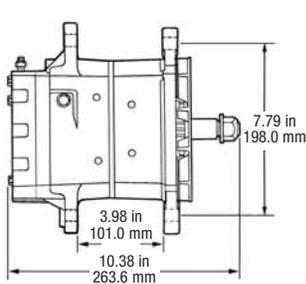
#### Stator Diameter:

152mm

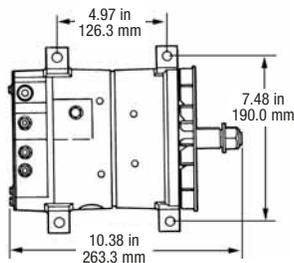
#### Rotor Inertia:

44 kg — cm<sup>2</sup>

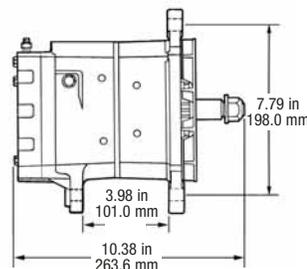
### Dimensions



QUAD Mount



PAD 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

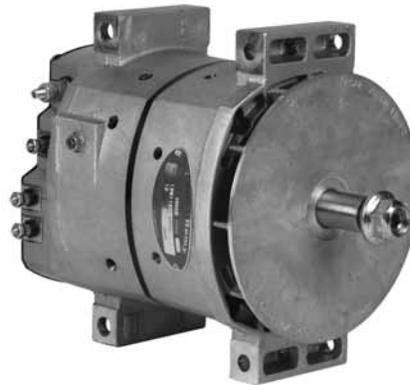
High efficiency, fuel saving design reduces required engine horsepower to run alternator

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



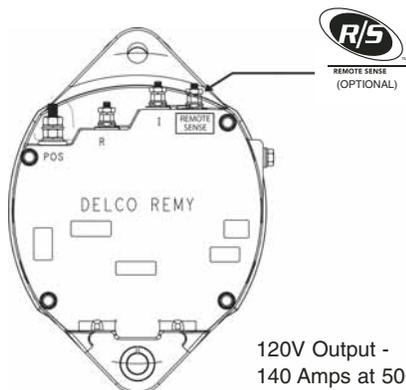
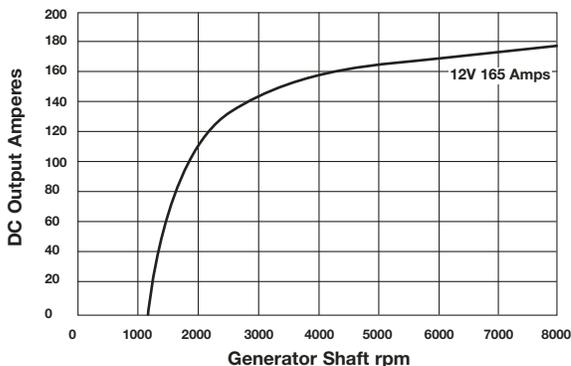
QUAD Mount



Hinge Mount

## 36SI

36SI Performance Curves



120V Output -  
140 Amps at 5000 RPM

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

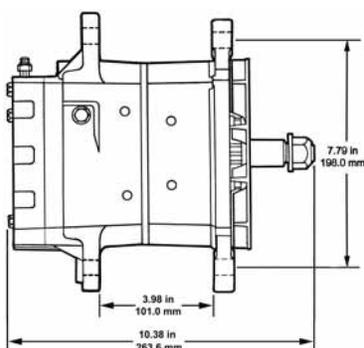
#### DE Bearing Size:

62mm

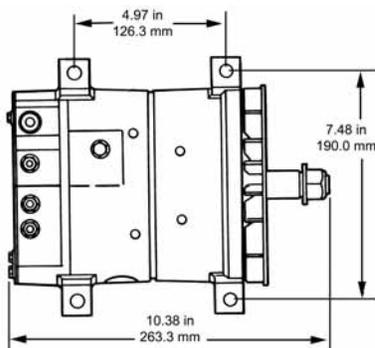
#### Rotor Inertia:

44 kg — cm<sup>2</sup>

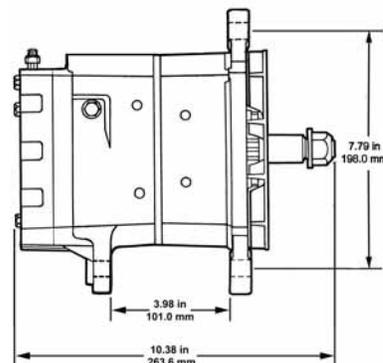
### Dimensions



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**

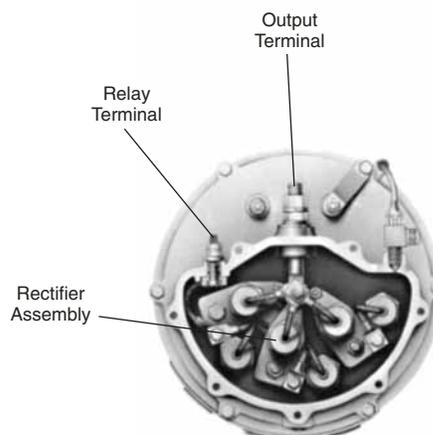
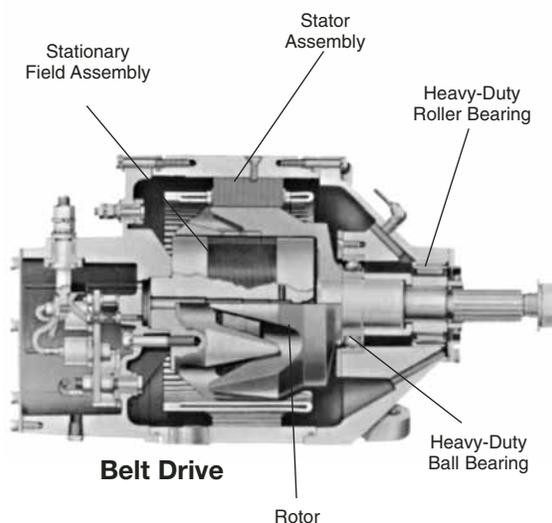
**Recommended for Large Commercial Diesel Bus/Coach, Industrial Applications, Handles High Continuous Electrical Loads, High Output at Engine Idle, Suitable for Stop and Go Service, Maximum Durability in Severe Environments**

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.

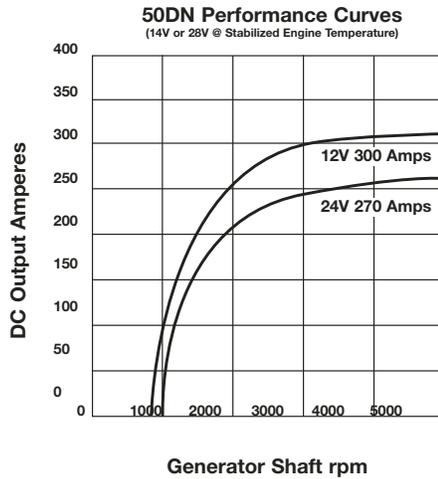
The rectifier assembly and diodes are readily accessible for diagnostics under the o-ring sealed, die cast aluminum cover plate. The heavy-duty bearings, extra long 30 mm roller bearing outboard, and 45 mm ball bearing inboard are constantly lubricated.

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.

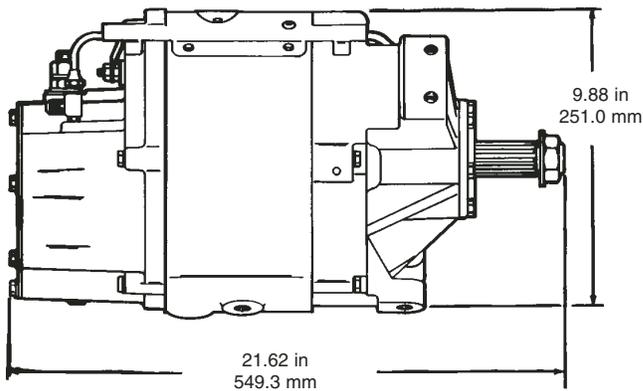


**See 50DN  
Original to Service  
Cross Reference**

## 50DN Belt Drive Brushless Generator



### Dimensions



### Specifications

#### Minimum 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

## 50DN Direct Drive Brushless Generator

**Long-life brushless construction**

**Proven heavy-duty design**

**Totally sealed for  
Environmental Protection**

**Oil-cooled direct drive**

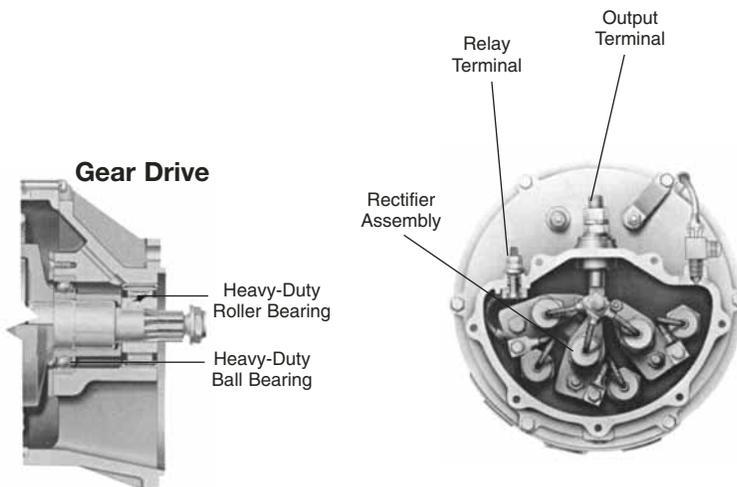
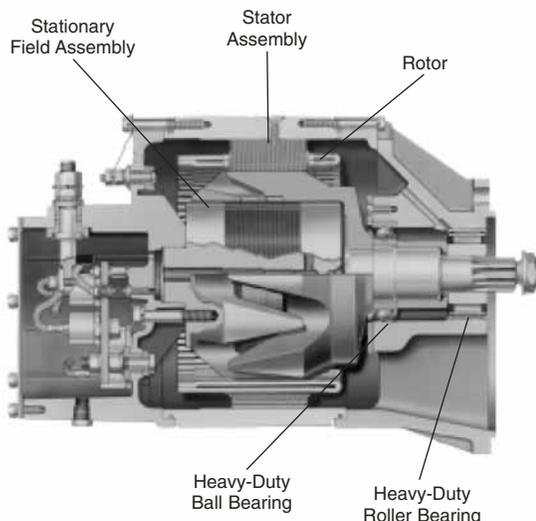
**Large Commercial Diesel Bus/Coach,  
Industrial Applications, Handles High  
Continuous Electrical Loads, High  
Output at Engine Idle, Suitable for Stop  
and Go Service, Maximum Durability in  
Severe Environments**

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.

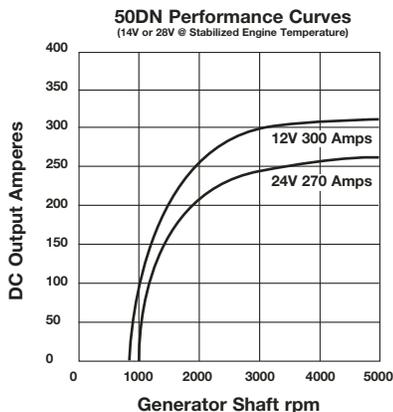
The rectifier assembly and diodes are readily accessible for diagnostics under the o-ring sealed, die cast aluminum cover plate. The heavy-duty bearings extra long 30 mm roller bearing outboard and 45 mm ball bearing inboard are constantly lubricated.

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.

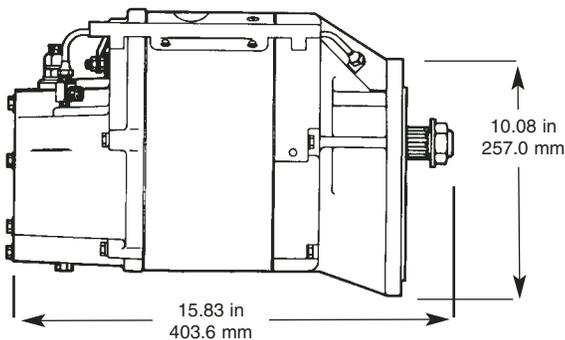


**See 50DN  
Original to Service  
Cross Reference**

## 50DN Direct Drive Brushless Generator



### Dimensions



**Gear Drive**

### Specifications

**Minimum 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

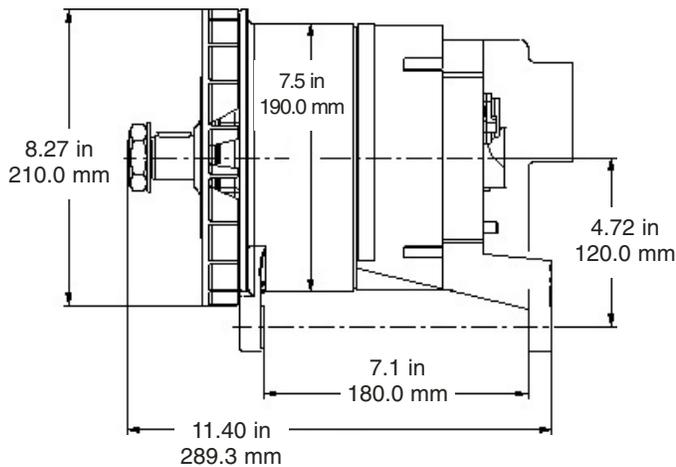
**T1** Heavy Duty Brush Alternator

**Interchangeable  
With The  
Bosch T1**

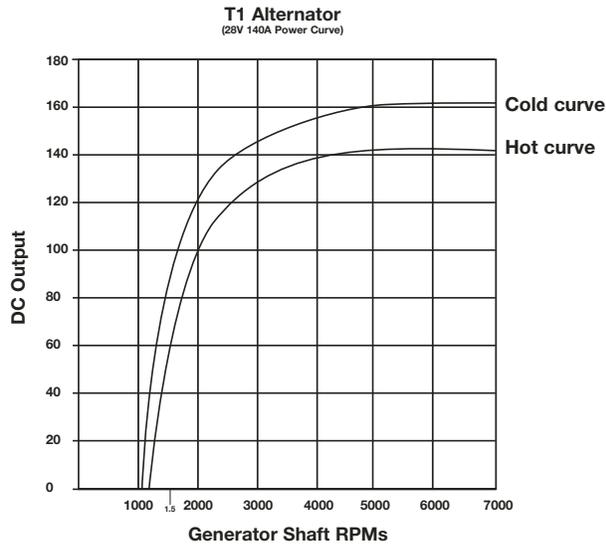
**Recommended For Large and Mid-Range On-Highway Diesel Coach, Bus and Truck Engines with High Electrical Loads!**

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 0-986-034-910 0-986-037-420 0-986-033-520 0-986-031-600 0-986-033-550	0-986-034-610	986-039-530	0-986-039-140		
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.**

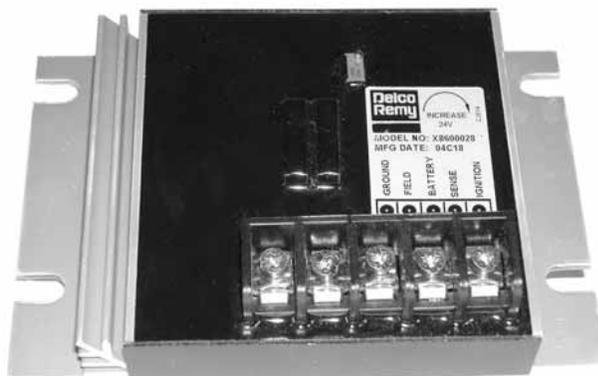
Whether you're specifying a new or retrofit voltage regulator, remember, the Delco Remy 50VR is backed up with an outstanding warranty.

**Warranty.**

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

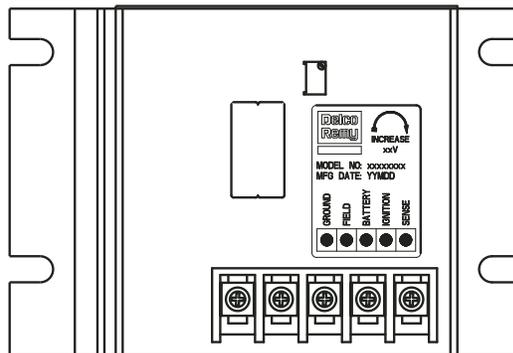
**Capacitor and Harness Assembly  
Part #10512460**

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
10503806	24V
10503807	12V
10503805	24V
10504491	24V

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	-	19009951	-
19009952	19SI-350	12	105	N	3	M6	M4	-	19009952	10459469
19009958	19SI-350	12	130	N	3	M6	BLADE	BLADE	19009958	10459304
19009959	19SI-350	12	105	N	3	M6	M4	-	19009959	-
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		1117926	10459460
1117938	21SI-355	12	160	N	3	5/16	#10		1117938	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	1117946	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		19010100	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	19010111	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		19010125	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	19010147	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		19010210	10459037

Original to Service

## 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	10459212
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	19020311	-
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
19020349	22SI-355	12	100	N	3-Lug	2	1/4	PIN	#10	19020349	-
19020356	22SI-355	12	130	N	3-Lug	1	1/4	PIN	#10	19020356	-
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	19020364	10459190
19020366	22SI-355	24	50	N	3-Lug	1	M6	M4	M4	19020366	10459468
19020377	22SI-355	12	100	N	3-Lug	1	5/16	#10	#10	19020377	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	19020391	10459334
19020392	22SI-355	12	100	N	3-Lug	2	1/4	PIN	#10	19020392	-
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	-
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	19020806	10459188
19020808	22SI-355	12	100	N	Pad	1	5/16	#10	#10	19020808	10459318
19020809	22SI-355	24	70	N	3-Lug	1	MG	M4	M4	19020809	-
19020820	22SI-355	12	100	N	3-Lug	1	5/16	PIN	#10	19020820	-
19020821	22SI-355	12	100	N	3-Lug	1	5/16	PIN	#10	19020821	-
19020837	22SI-355	12	130	N	3-Lug	3	5/16	#10	-	19020837	10459318
19020839	22SI-355	12	100	N	3-Lug	1	5/16	#10	-	19020839	-
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
19011000	23SI-455	12	100	N	3-Lug	1	1/4	#10	#10	19011000	10459218
19011002	23SI-455	12	130	N	3-Lug	1	1/4	#10	#10	19011002	-
19011003	23SI-455	12	145	N	3-Lug	1	1/4	#10	#10	19011003	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	10459372
19011016	23SI-455	12	100	N	3-Lug	1	5/16	#10	#10	19011016	10459294
19011017	23SI-455	12	130	N	3-Lug	1	5/16	#10	#10	19011017	10459303
19011019	23SI-450	24	70	N	3-Lug	1	5/16	#10	#10	19011019	10459274
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

Original to Service

## 24SI Series

Model	Series	Volts	Amps	Grd	Mounting	No. of Wires	Battery Term	R-Term	I-Term	Service Part Number	Reman Part Number
19020900	24SI-375	12	145	N	Pad	1	5/16	CONN	CONN	19020900	8700008
8600032	24SI-375	12	100	N	3-Lug	1	5/16	CONN	CONN	8600032	8700011
8600096	24SI-375	12	100	N	Pad	1	5/16	CONN	CONN	8600096	-
8600166	24SI-375	12	100	N	Pad	1	5/16	CONN	CONN	8600166	-
8600167	24SI-375	12	130	N	Pad	1	5/16	CONN	CONN	19020902	8700012
19020902	24SI-375	12	130	N	Pad	1	5/16	CONN	CONN	19020902	8700012
19020903	24SI-375	12	130	N	3-Lug	1	5/16	CONN	CONN	19020903	8700010
8600100	24SI-375	12	145	N	Pad	1	5/16	CONN	CONN	8600100	-
8600168	24SI-375	12	145	N	Pad	1	5/16	CONN	CONN	19020900	8700008
19020901	24SI-375	12	145	N	3-Lug	1	5/16	CONN	CONN	19020901	8700009
8600043	24SI-375	12	160	N	Pad	1	5/16	CONN	CONN	8600043	8700013
8600068	24SI-375	12	160	N	3-Lug	1	5/16	CONN	CONN	8600068	8700021
8600017	24SI-375	24	70	N	3-Lug	1	5/16	CONN	CONN	8600017	8700019

## 26SI Series

Model	Series	Volts	Amps	Grd	Mounting	No. of Wires	Battery Term	R-Term	I-Term	Service Part Number	Reman Part Number
19010001	26SI-450	24	50	N	3-Lug	1	7/16	PIN	-	19010001	10459064
19010002	26SI-450	24	75	N	3-Lug	1	7/16	PIN	-	19010002	10459076
19010003	26SI-450	12	85	N	3-Lug	1	7/16	PIN	-	19010003	10459065
19010004	26SI-450	24	50	N	3-Lug	1	7/16	-	#10	19010004	10459245
19010005	26SI-450	12	85	N	3-Lug	1	7/16	-	#10	19010005	10459066
19010007	26SI-450	12	85	N	3-Lug	1	1/4	PIN	-	19010007	10459067
19010012	26SI-450	12	85	N	3-Lug	1	1/4	PIN	-	19010012	10459067
19010013	26SI-450	12	85	N	3-Lug	1	1/4	PIN	-	19010013	10459067
19010014	26SI-450	12	85	N	3-Lug	1	1/4	PIN	-	19010014	10459067
19010018	26SI-450	12	85	N	3-Lug	1	1/4	-	#10	19010018	10459161
19010019	26SI-450	12	85	N	3-Lug	1	7/16	PIN	-	19010019	10459065
19010024	26SI-450	24	80	N	3-Lug	1	7/16	PIN	-	19010024	10459076

## 30SI Series

Model	Series	Volts	Amps	Grd	Mounting	No. of Wires	Battery Term	R-Term	I-Term	Service Part Number	Reman Part Number
1117481	30SI-450	12	90	N	3-Lug	1	1/4	PIN	-	1117481	10459009
1117485	30SI-450	12	90	N	3-Lug	1	1/4	PIN	-	19011164	10459009
1117732	30SI-450	12	90	N	3-Lug	1	1/4	PIN	-	1117732	10459001
1117733	30SI-450	32	60	I	3-Lug	1	1/4	-	-	1117733	10459325
1117734	30SI-450	24	60	I	3-Lug	1	1/4	-	-	1117734	1117746
1117738	30SI-450	12	90	I	3-Lug	1	1/4	-	-	1117738	10459247
1117801	30SI-450	12	105	N	3-Lug	1	1/4	PIN	-	1117801	10459008
1117805	30SI-450	24	75	N	3-Lug	1	1/4	PIN	-	1117805	10459057
1117807	30SI-450	12	105	N	3-Lug	1	1/4	PIN	-	1117807	10459368
1117809	30SI-450	12	105	N	3-Lug	1	1/4	PIN	-	1117809	10459258
1117816	30SI-450	12	105	N	3-Lug	1	1/4	PIN	-	1117816	10459008
1117817	30SI-450	24	100	N	3-Lug	1	1/4	PIN	-	1117817	10459120

Original to Service

## 31SI Series

Model	Series	Volts	Amps	Grd	Mounting	No. of Wires	Battery Term	R-Term	I-Term	Service Part Number	Reman Part Number
19011100	31SI-355	12	160	N	3-Lug	1	1/4	PIN	LAMP	19011100	-
19011101	31SI-355	12	160	N	3-Lug	1	1/4	#10	LAMP	19011101	-
19011104	31SI-355	12	200	N	3-Lug	1	5/16	PIN	LAMP	19011104	-
19011105	31SI-355	12	200	N	3-Lug	1	5/16	#10	LAMP	19011105	-
19011107	31SI-355	12	160	N	3-Lug	1	5/16	#10	LAMP	19011107	-
19011108	31SI-355	24	140	N	3-Lug	1	1/4	PIN	LAMP	19011108	-

## 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	19011150	10459144
19011151	33SI-455	12	110	N	3-Lug	1	1/4	PIN	#10	19011151	10459143
19011152	33SI-455	12	135	N	3-Lug	1	1/4	PIN	#10	19011152	10459142
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	19011154	10459143
19011155	33SI-455	12	135	N	3-Lug	1	1/4	#10	#10	19011155	10459141
19011156	33SI-455	12	135	N	3-Lug	1	1/4	PIN	#10	19011156	10459142
19011158	33SI-455	12	110	N	3-Lug	1	1/4	PIN	#10	19011158	10459143
19011159	33SI-455	12	135	N	3-Lug	1	1/4	PIN	#10	19011159	10459142
19011160	33SI-455	12	110	N	3-Lug	1	1/4	PIN	#10	19011160	10459143
19011161	33SI-455	12	135	N	3-Lug	1	1/4	PIN	#10	19011161	10459142
19011164	33SI-455	12	110	N	3-Lug	1	1/4	PIN	#10	19011164	10459473
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	19011171	-
19011200	33SI-455	12	135	N	3-Lug	2	1/4	#10	#10	19011200	10459450
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	19011211	-
19011212	33SI-455	12	135	N	3-Lug	1	1/4	#10	#10	19011212	-
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	19011157	10459145
19011167	34SI-455	12	135	N	Quad Mount	1	1/4	#10	#10	19011167	10459206
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	19011169	10459145
19011170	34SI-455	12	135	N	Quad Mount	1	1/4	PIN	#10	19011170	10459206
19011172*	34SI-455	12	135	N	Quad Mount	2	1/4	#10	#10	19011172*	-
19011176	34SI-455	12	110	N	Pad Mount	1	1/4	#10	#10	19011176	10459279
19011177	34SI-455	12	135	N	Pad Mount	1	1/4	#10	#10	19011177	10459278
19011179*	34SI-455	12	135	N	Quad Mount	2	1/4	#10	#10	19011179*	10459287
19011187*	34SI-455	12	135	N	Pad Mount	2	1/4	#10	#10	19011187*	10459288
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	19011201*	10459451
19011202*	34SI-455	12	135	N	Pad Mount	1	1/4	#10	#10	19011202*	10459449
19011213	34SI-455	12	110	N	Quad Mount	1	1/4	#10	#10	19011213	10459145
19011214	34SI-455	12	135	N	Quad Mount	1	1/4	#10	#10	19011214	10459206
19011215	34SI-455	12	110	N	Pad Mount	1	1/4	#10	#10	19011215	10459279
19011216	34SI-455	12	135	N	Pad Mount	1	1/4	#10	#10	19011216	10459278

\* Remote Sense

### 35SI Series

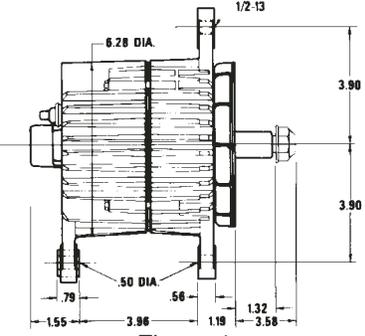
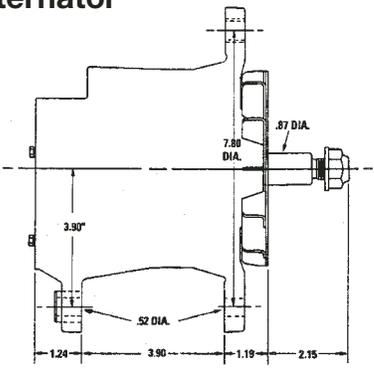
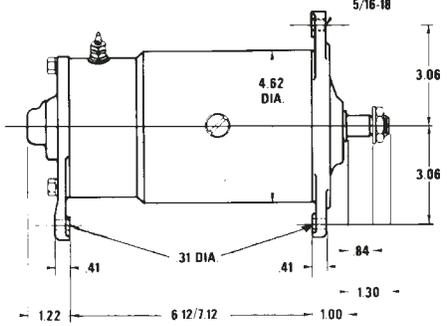
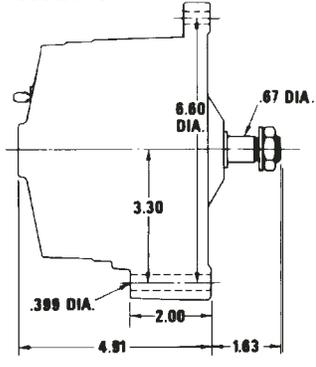
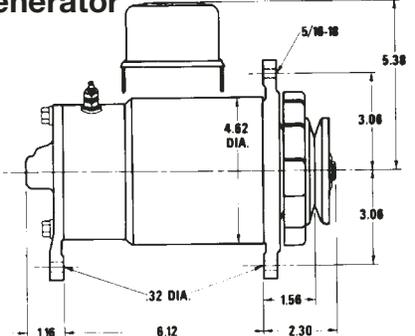
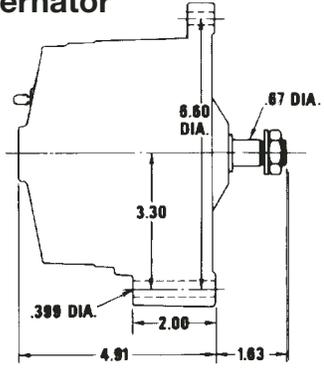
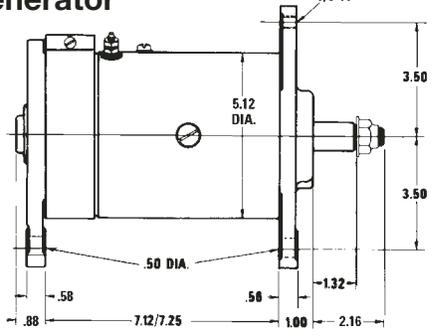
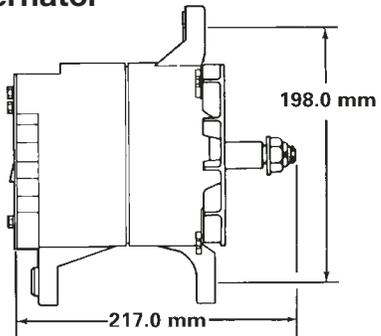
Model	Series	Volts	Amps	Grd	Mounting	No. of Wires	Battery Term	R-Term	I-Term	Service Part Number	Reman Part Number
19011227	35SI-455	12	110	N	3-Lug	1	1/4	#10	#10	19011227	8700023
19011228	35SI-455	12	110	N	3-Lug	1	1/4	PIN	#10	19011228	10459606
19011229	35SI-455	12	135	N	3-Lug	1	1/4	PIN	#10	19011229	10459609
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

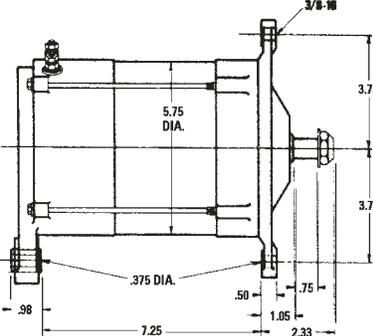
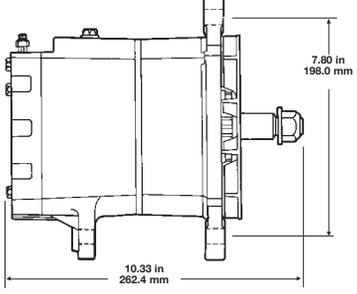
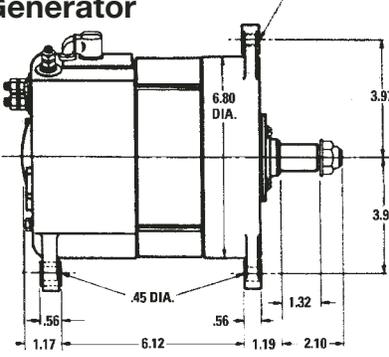
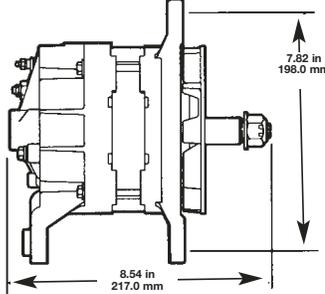
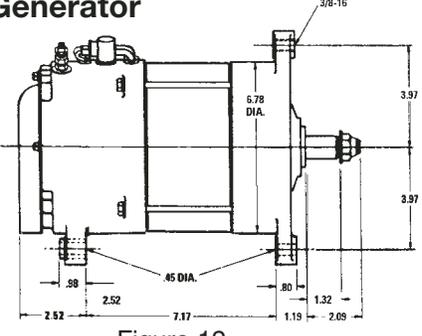
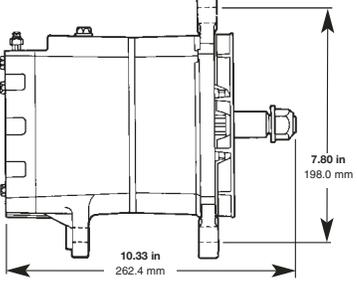
### 36SI Series

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
8600055	36SI	12	165	N	Pad Mount	1	1/4	#10	#10	8600055	-
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	-
8600171	36SI	12	155	N	Pad Mount	1	1/4	#10	#10	8600171	-
8600177	36SI	12	155	N	3-Lug	1	1/4	#10	#10	8600177	-
8600178*	36SI	12	155	N	Pad Mount	2	1/4	#10	#10	8600178*	-

\* Remote Sense

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

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

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

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

### Discontinued Models

### Recommended Replacement Models

**10SI**

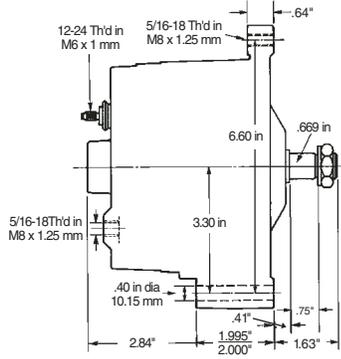
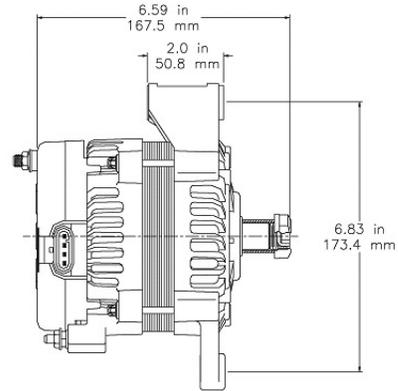


Figure 17

**11SI**



**12SI**

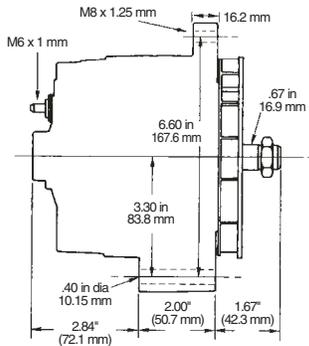
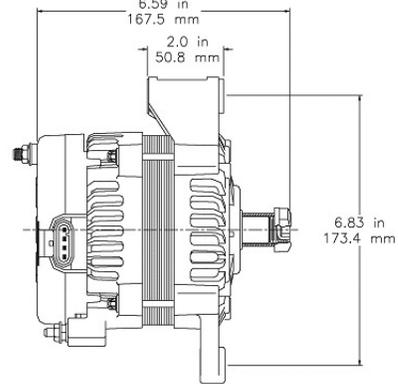


Figure 18

**11SI**



**19SI**

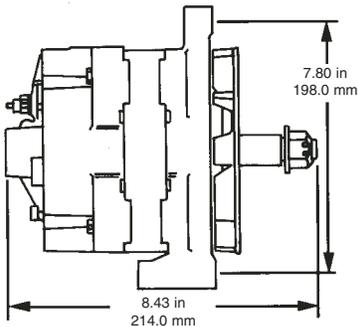
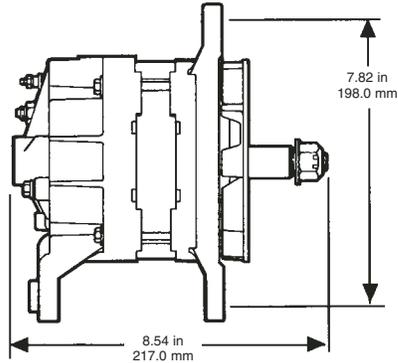


Figure 19

**22SI**



**21SI**

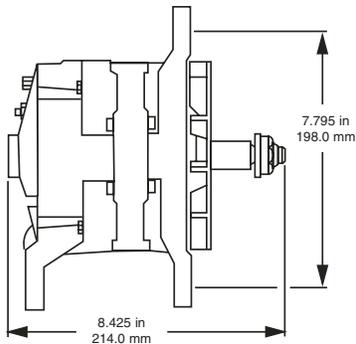
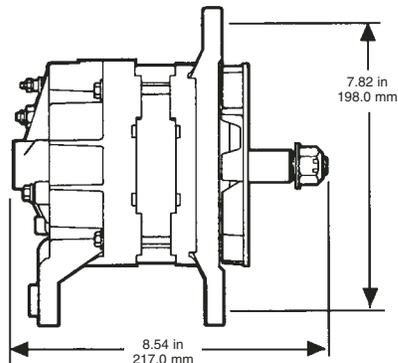


Figure 20

**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.

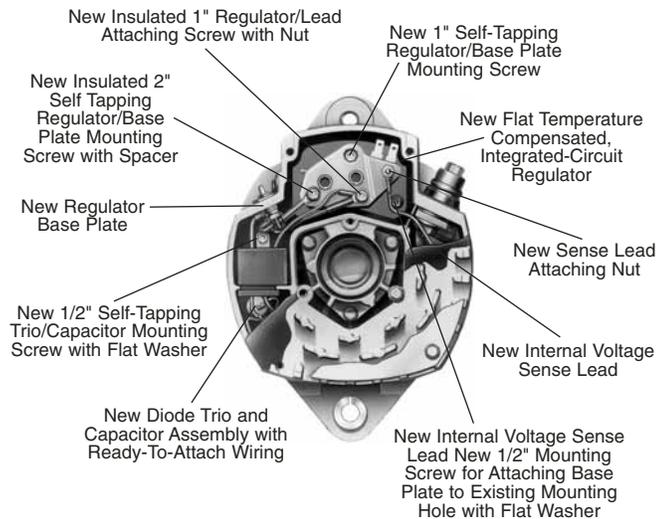
The integrated-circuit regulator is designed for low parasitic draw and features a low turn-on speed. A special diode-trip/capacitor assembly provides superior radio frequency interference (RFI) suppression. Standard load dump protection guards the generator against voltage spikes caused by loose connections 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
12 Volt (optional)	13.8	10457126
12 Volt (standard)	14.0	10457103
24 Volt (standard)	27.8	10457127
32 Volt (standard)	36.5	10457128

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



33SI (3-Lug)

← **J180 Hinge Mount** →



36SI HP and  
35SI HP (3-Lug)



34SI (4 Lug)

← **J180 Quad Mount** →



36SI HP and  
35SI HP (4-Lug)



34SI (Pad)

← **PAD Mount** →



36SI HP and  
35SI HP (Pad)

# CHARGING SYSTEMS



## 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						
<b>35SI OE</b>	<b>35SI Reman</b>	<b>Amps</b>	<b>Upgrade to:</b>	<b>35SI HP Reman</b>	<b>35SI HP New</b>	<b>Amps</b>	<b>36SI HP Reman</b>	<b>36SI HP New</b>	<b>Amps</b>
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						
<b>35SI OE</b>	<b>35SI Reman</b>	<b>Amps</b>	<b>Upgrade to:</b>	<b>35SI HP Reman</b>	<b>35SI HP New</b>	<b>Amps</b>	<b>36SI HP Reman</b>	<b>36SI HP New</b>	<b>Amps</b>
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

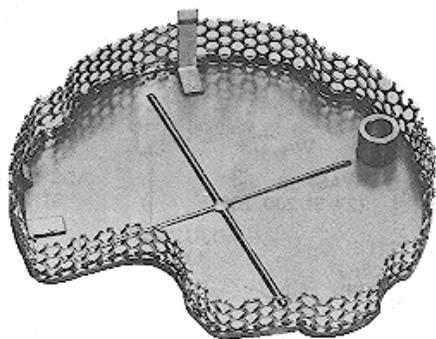
34SI OE	34SI Reman	Amps	35SI Reman	35SI HP Reman	35SI HP New	Amps	36SI HP Reman	36SI HP New	Amps
19011176	10459279	110	10459608	8700018	8600066	140	8700047	8600127	170 (110@ Idle)
19011177	10459278	135	10459611						
19011187	10459288	135	8700004						
19011202*	10459449*	135	10459614						
19011215	10459279	110	8700030						
19011216	10459278	135	8700007						
<b>35SI OE</b>	<b>35SI Reman</b>	<b>Amps</b>	<b>Upgrade to:</b>	<b>35SI HP Reman</b>	<b>35SI HP New</b>	<b>Amps</b>	<b>36SI HP Reman</b>	<b>36SI HP New</b>	<b>Amps</b>
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

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



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.



## 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.

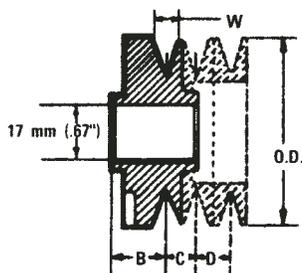
### To determine the maximum charge rate:

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

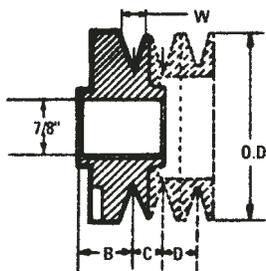


OD - Outside Diameter  
 W - Groove Width  
 B - Hub to 1st Groove Center  
 C - 1st Groove to 2nd Groove Center

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
1880895	1	38	83	3.25	15.7	.62	19.0	.75	24.4	.96	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
1961291	1	36	66	2.60	12.7	.50	14.2	.56	14.2	.56	BS
1961408	2	36	63	2.48	9.6	.38	12.7	.50	15.9	.63	BS
1961812	2	36	76	3.00	12.7	.50	14.2	.56	—	—	BS
1962505	2	36	69	2.72	12.7	.50	14.2	.56	22.1	.87	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
1984572	2	36	61	2.40	9.6	.38	13.9	.55	—	—	—
10476211	1	36	79	3.12	19.0	.75	19.8	.78	—	—	SS

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

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



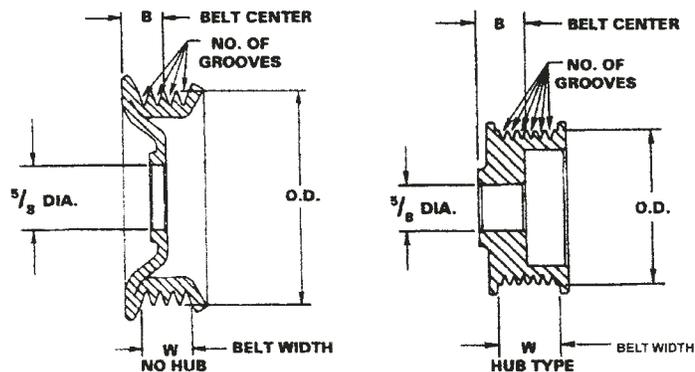
OD - Outside Diameter  
 W - Groove Width  
 B - Hub to 1st Groove Center  
 C - 1st Groove to 2nd Groove Center

Pulley Part No.	No. Of Grooves	Groove Angle	OD		W		B		C		Material
			MM	IN	MM	IN	MM	IN	MM	IN	
<b>BS = Bar Steel</b>			<b>CI = Cast Iron</b>				<b>SS = Stamped Steel</b>				
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
1962592	2	38	76	3.00	15.7	.62	18.3	.72	22.1	.87	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			
1987810®	8K	62	2.44	28.5	1.12	26.5	1.06	Y	BS
10470322	4-4	57	2.24	14.2	.56	14.2	.56	Y	BS
10495514	4K	57	2.24	14.2	.56	6.3	.25	N	RS
10497174	5K	54	2.12	17.8	.70	6.9	.27	N	RS
10497175	6K	54	2.12	21.4	.84	9.1	.36	N	RS
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			
10497911	5K	87	3.43	17.8	.70	15.2	.60	Y	BS
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.

### Fans for SI Alternators

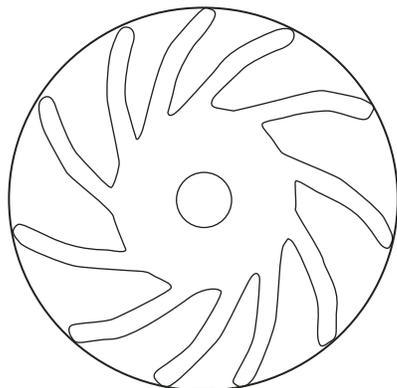
Series/Type	Fan No.	Rotation	Shaft Size	Fan Dia
10SI/100, 102, 116	800594	CW	5/8"	5.5"
10SI/100, 102, 116	1959703	EITHER	5/8"	5.5"
10SI/136, 20SI	1970593	EITHER	7/8"	5.5"
12SI/100	1959703/1984430	CW	5/8"	5.5"
15SI/100, 116; 17SI100	1959703	CW	5/8"	5.75"
27SI/10	801808	CW	5/8"	6.5"
25SI/400, 450; 26-SI; 27SI/200,202	—	EITHER	7/8"	6.5"
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

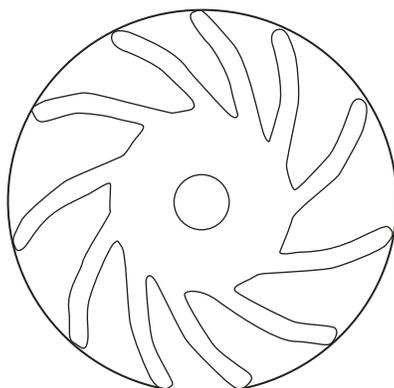
CW — Clockwise

\*\*Quiet Fan

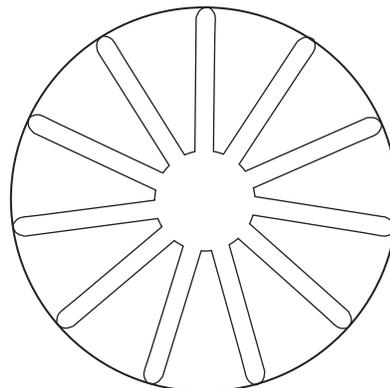
NOTE: In high debris areas, ensure that the screen is kept clear to ensure adequate air flow or use flexible hosing to direct sufficient clean air flow for cooling.



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

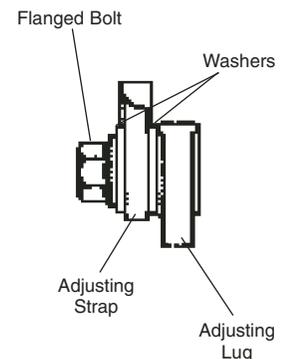
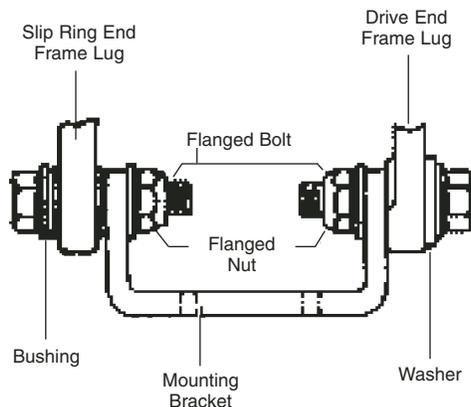
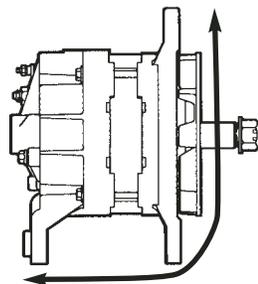


SAE #7



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.

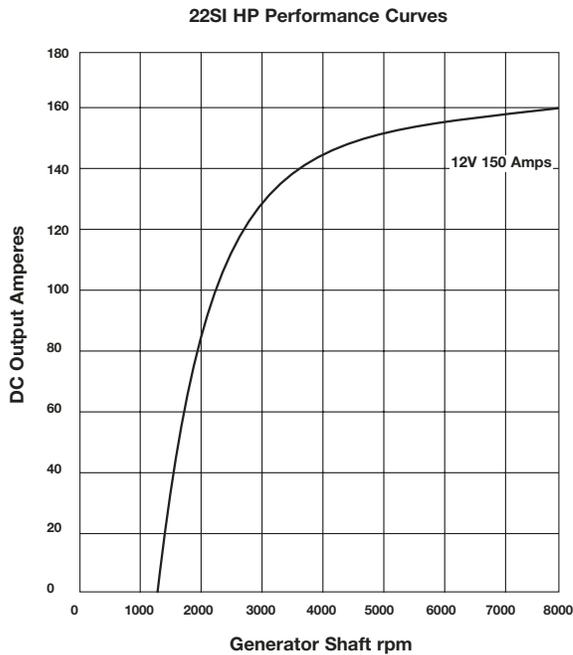


**PAD Mount**



**J180 Mount**

## 22SI HP Brush Alternator



### 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

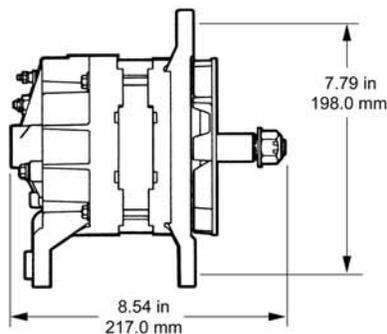
#### Rotor Inertia:

30 kg -- cm<sup>2</sup>

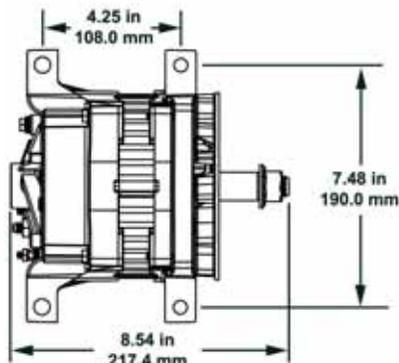
#### DE Bearing Size:

62mm

### Dimensions



J180 Mount



PAD Mount

## 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 deal 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**

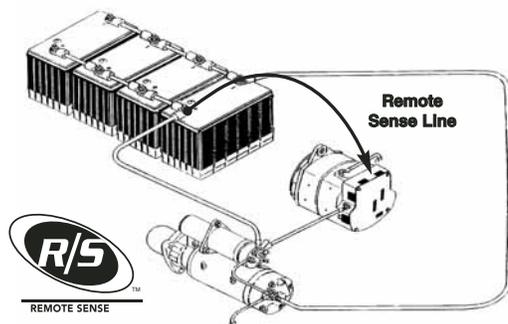
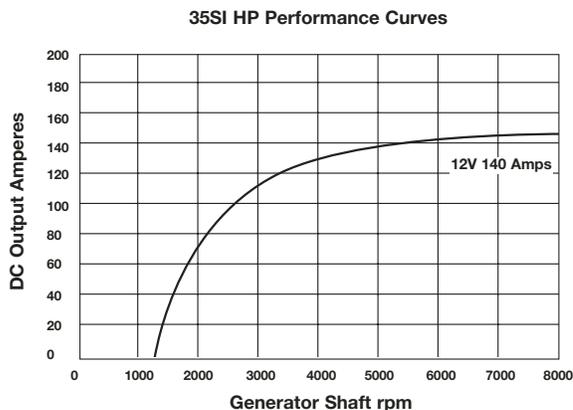


**QUAD Mount**



**J180 Mount**

## 35SI HP Brushless Alternator



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

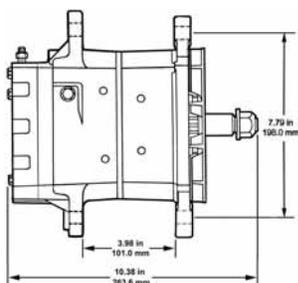
#### Rotor Inertia:

44 kg — cm<sup>2</sup>

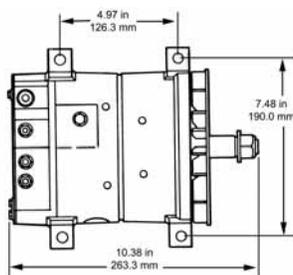
#### DE Bearing Size:

62mm

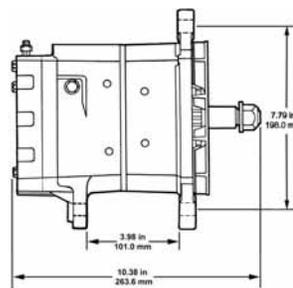
### Dimensions



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**



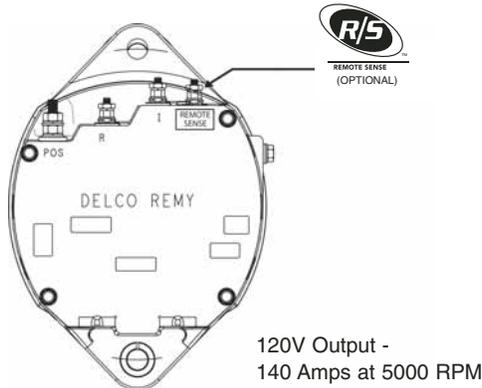
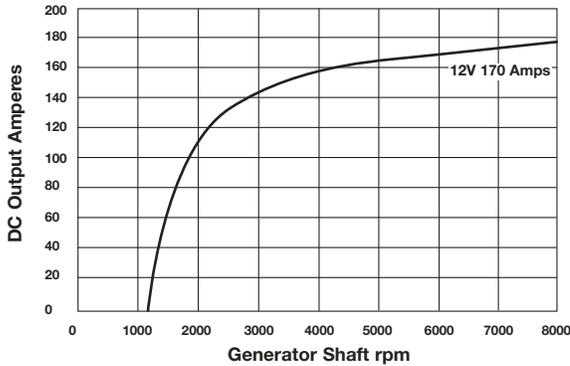
**QUAD Mount**



**J180 Mount**

## 36SI HP Brushless Alternator

36SI HP Performance Curves



Some 36SI 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 battery state of charge.

### 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

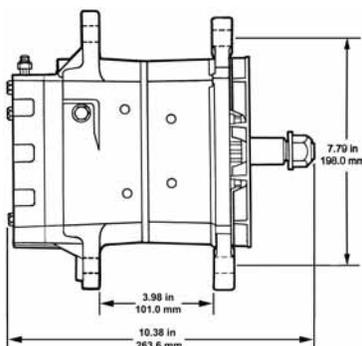
#### DE Bearing Size:

62mm

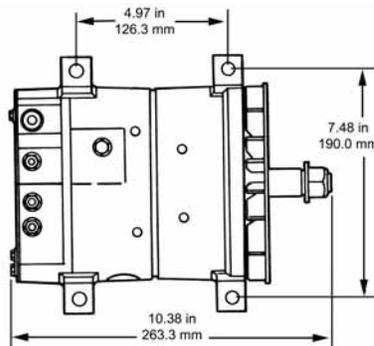
#### Rotor Inertia:

44 kg — cm<sup>2</sup>

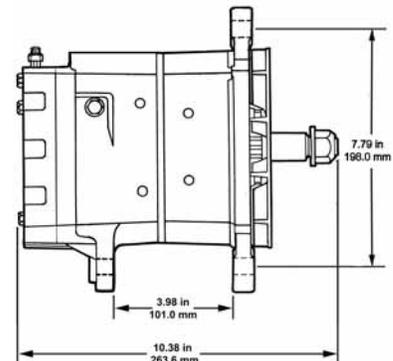
### Dimensions



QUAD Mount



PAD Mount



Hinge Mount

## 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

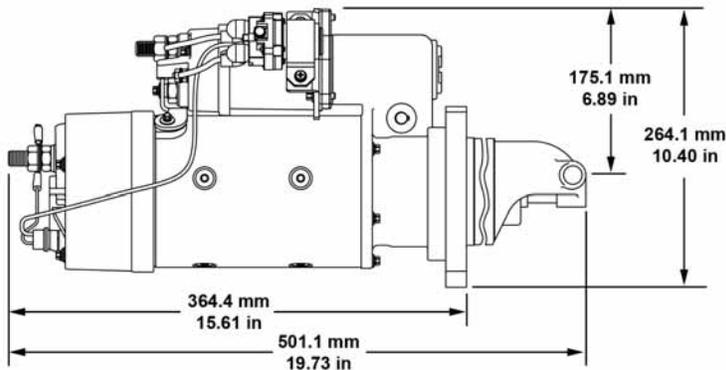


**OVERCRANK PROTECTION**

### **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

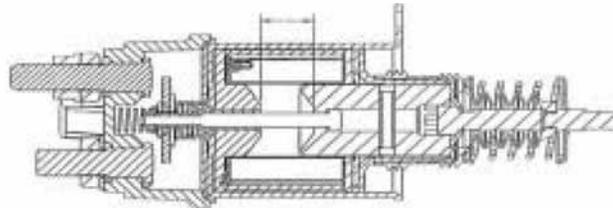


PATENTED  
SEMI-SOLID LINK SOLENOID

### 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	1115680	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				
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				

<b>REMAN SSL</b>			
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

## 10MT Starter

**Medium duty design**

**Enclosed shift lever  
and overrunning clutch**

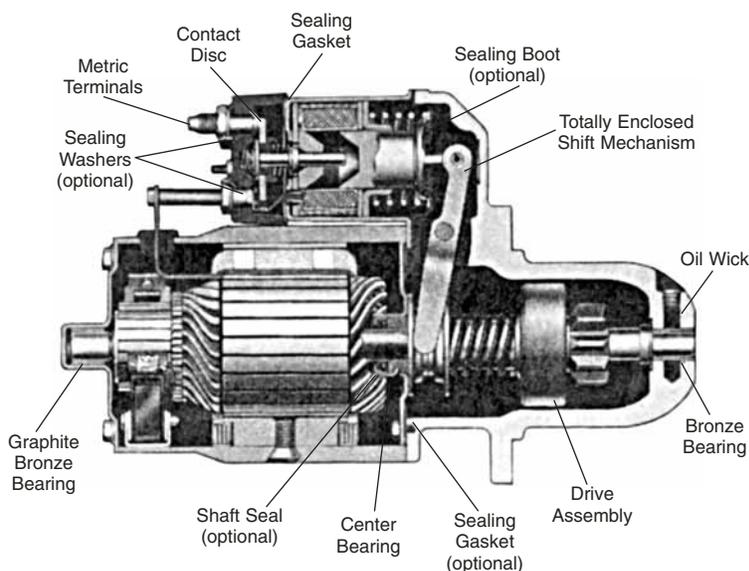
**High temperature  
heavy-duty solenoid**

**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.



**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.

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

## 28MT Medium Duty Starter

**Environmental protection**

**Gear reduction**

**Solid link solenoid**

**Available jump start protection**



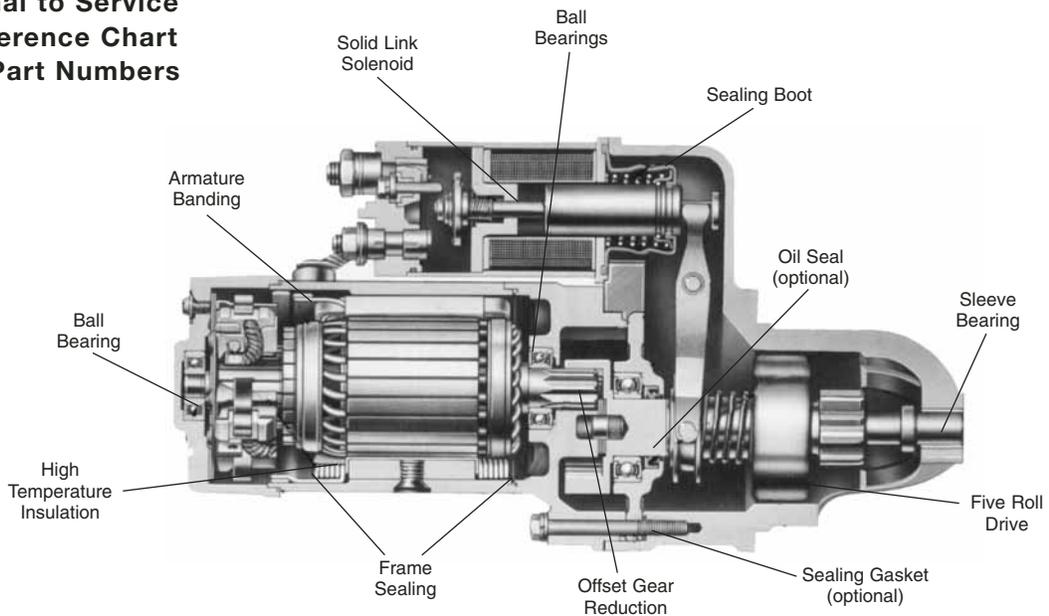
Delco Remy's 28MT gear reduction starter offers heavy-duty performance for pick-up and delivery operations, or applications using light and medium duty diesel engines.

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.

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

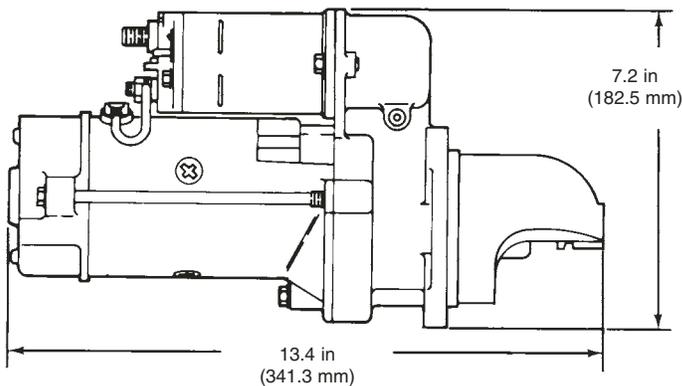
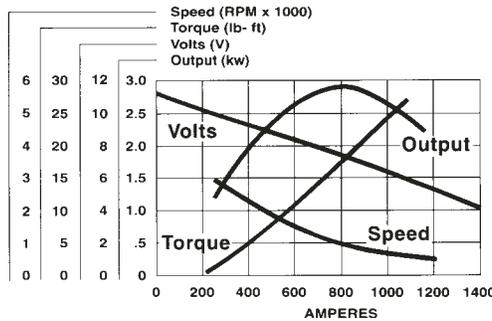
The dynamically balanced armature utilizes a molded commutator, steel banding, and varnish impregnation for added strength. Three sealed ball bearings and a bronze sleeve bearing lubricate and support the armature and drive shaft.

**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, light weight construction.**



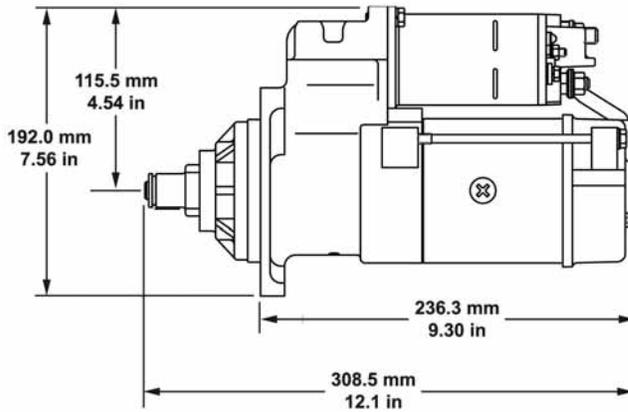
The Delco Remy 29MT with Maximum Torque Technology is the next-generation starting solution for today's demanding Medium Duty diesel applications. Utilizing the advanced MxT gearing system, the lightweight 29MT produces the torque and speed necessary to crank diesel engines up to 6.6 liters for the 12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

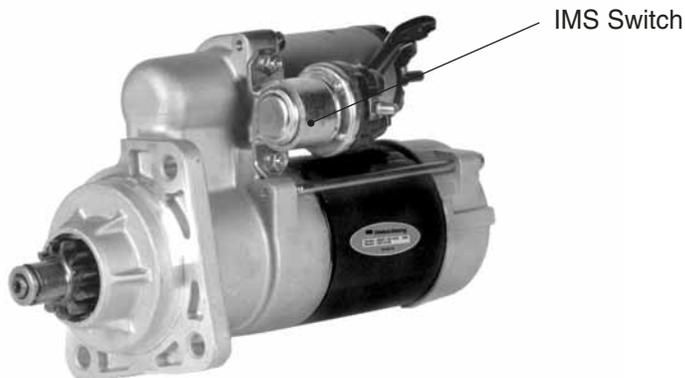
3.5 in (90 mm)

#### 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.

**37MT** Starter

**Overcrank protection**

**Environmental protection**

**Positive shift engagement**

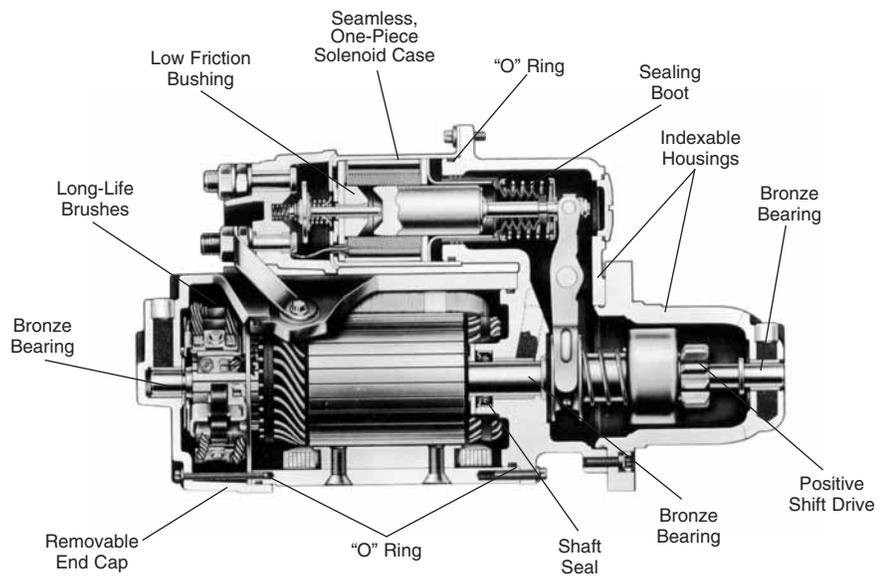
The 37MT Delco Remy heavy-duty starter is designed specifically for mid-range diesel applications and is well suited for farm and construction operations that experience long periods between starts.

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.

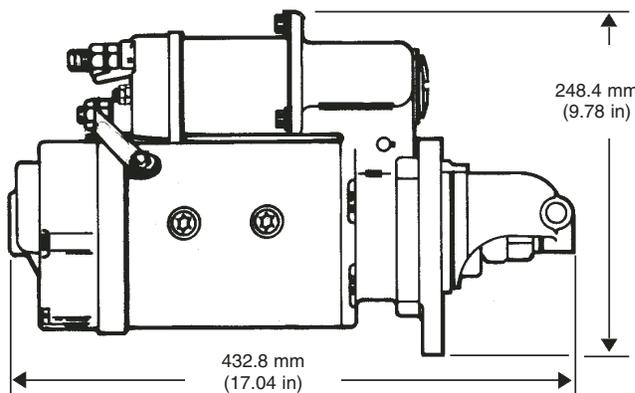
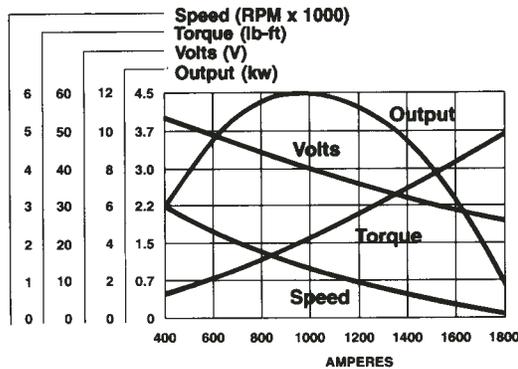


**See Original to Service  
Cross Reference Chart  
For 37MT Part Numbers**



## 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.**

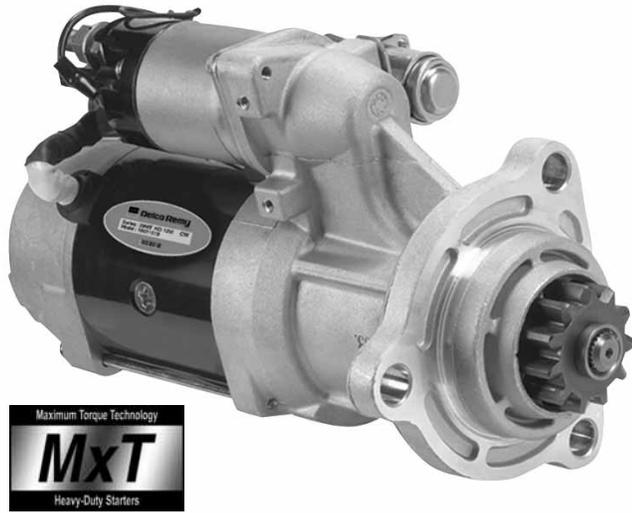
**Electrical Soft-Start Engagement System rotates pinion for proper ring-gear engagement before cranking, minimizing tooth abutment-related damage.**

**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.**

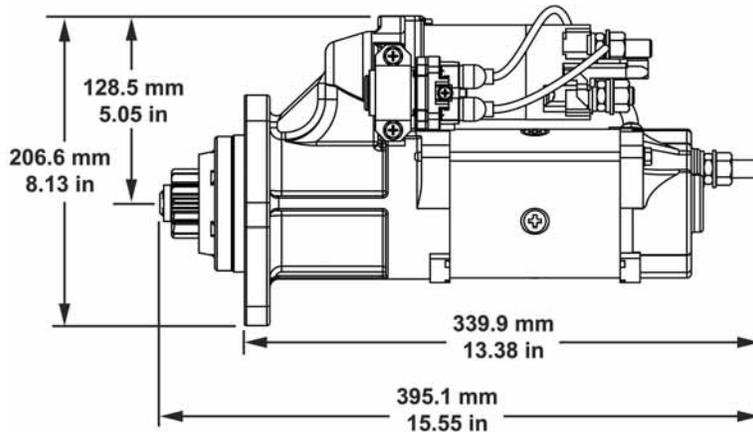
**Cast aluminum drive and commutator end housings provide high strength, light weight construction.**



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



### 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

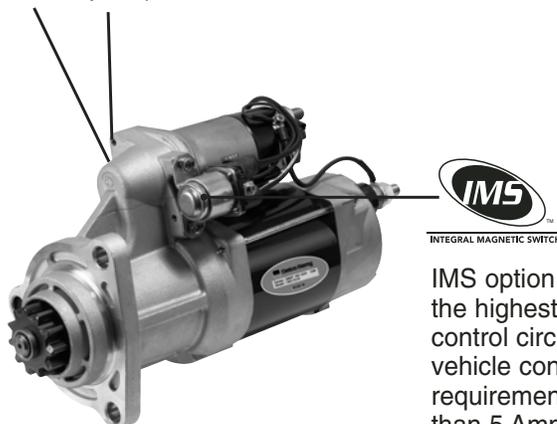
#### Output:

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

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

**39MT** Heavy Duty Starter

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

**Sealed Solid-Link Solenoid avoids 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.**

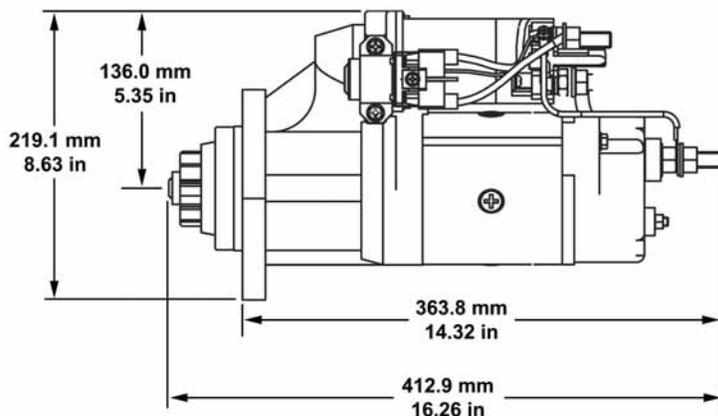
**Optional OCP (Overcrank Protection) protects stator from thermal damage and automatically resets after reaching a safe operating temperature.**



The Delco Remy 39MT™ MxT (Maximum Torque Technology) heavy duty starter is the next-generation starting solution for today's demanding heavy duty applications. Lighter and more compact than traditional straight-drive starters, the 39MT features an advanced MxT gear reduction system that produces high torque to reliably start heavy duty vehicles equipped with large displacement engines.

Every 39MT is also designed with an Electrical Soft-Start Engagement System. This feature slowly rotates the pinion until it is properly engaged to the ring gear before cranking, minimizing milling issues. Equipped with Optional Overcrank Protection (OCP), 39MT MxT is a great addition to any application.

## 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

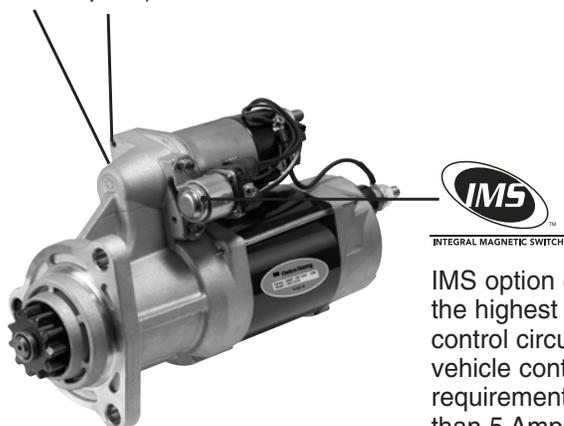
#### Output:

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

Optional IMS (Integral Magnetic Switch)  
mounting locations to accommodate spatial  
issues (some 39MTs include third position  
top-mount option)



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

## 41MT Starter

**Available overcrank protection**

**Environmental protection**

**Mechanical soft start**

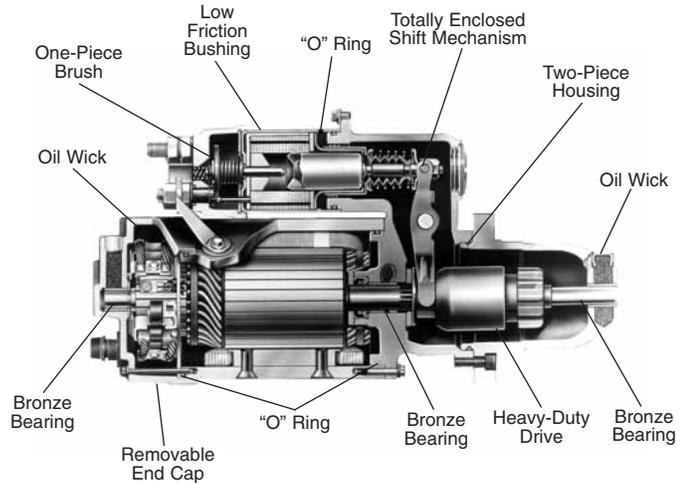
**Available jump start protection**

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.

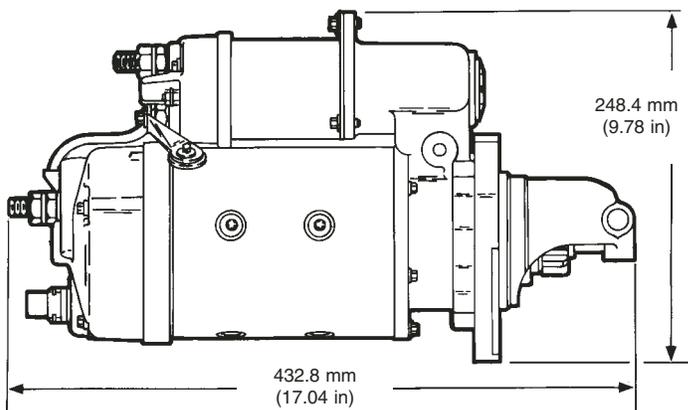
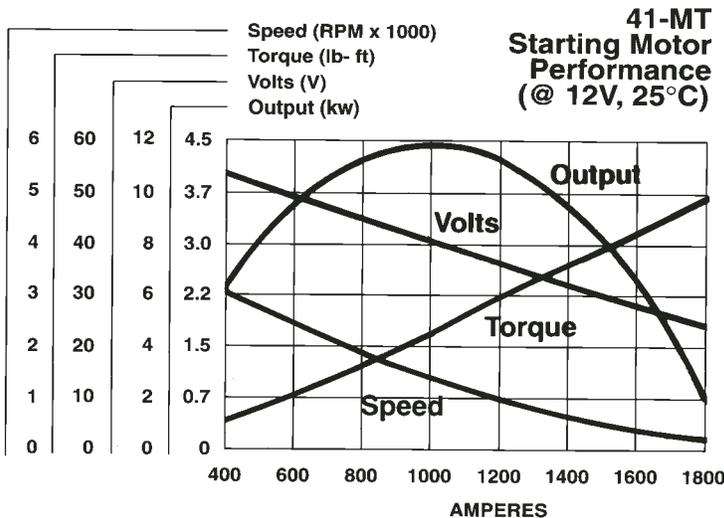
A temperature-sensitive circuit breaker protects the 41MT from overcrank heat damage. The circuit breaker automatically resets after the motor cools to a safe temperature. This optional overcrank protection (OCP) is a valuable feature during potentially adverse starting conditions, such as cold weather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

## 42MT Starter

**Available overcrank protection**

**Environmental protection**

**Mechanical soft start**

**Available jump start protection**

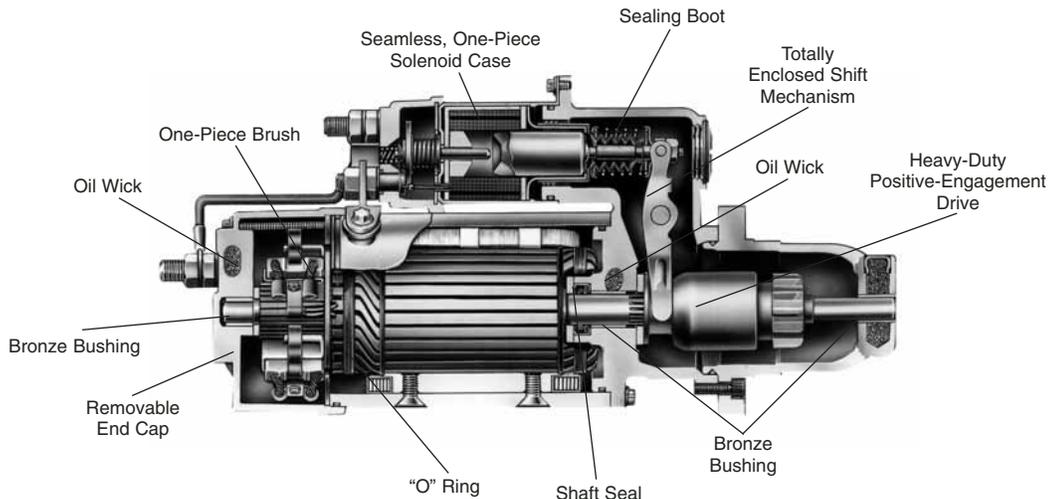


The 42MT/OCP starter is an integral part of Delco Remy, and has become the industry standard for performance and durability in heavy-duty applications.

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.

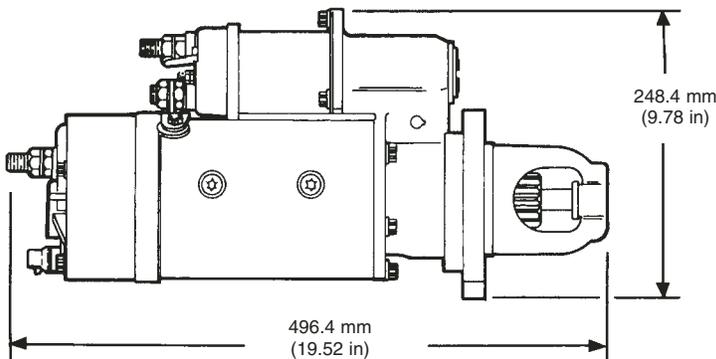
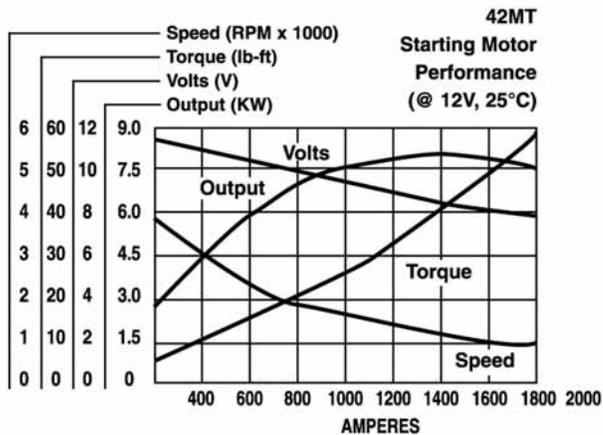
A positive-engagement shift mechanism assures pinion-to-ring gear engagement prior to cranking, minimizing milled ring gears and pinions. A seamless, one-piece solenoid case and totally enclosed shift mechanism with "O" Ring seals prevent water entry. Special alloys used in the solenoid contact disk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

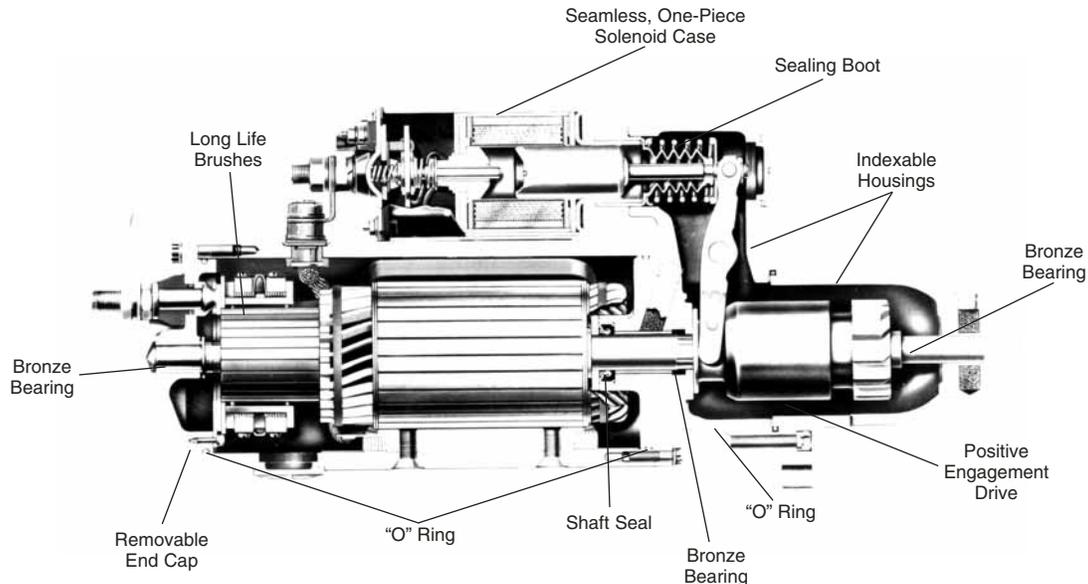
**Positive engagement**

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 shift mechanism assures pinion-to-ring gear engagement prior to cranking, minimizing milled ring gears and pinions.

Epoxy impregnation and glass banding give the 50MT's armature exceptional rotation strength. Positive spring retention on the six wide, one-piece brushes gives uniform pressure and brush wear for extended service life. Extra-large brush leads are used to handle the high current experienced during the cranking of high-horsepower diesel engines.

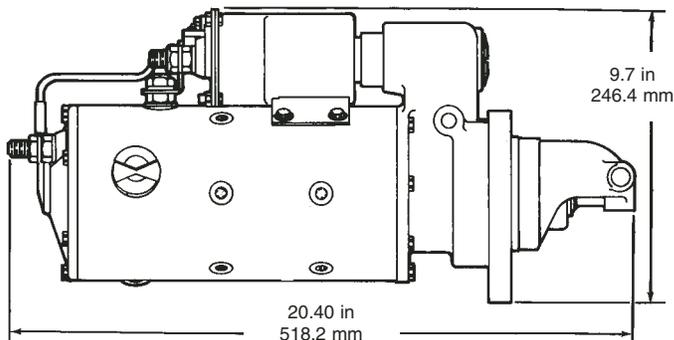
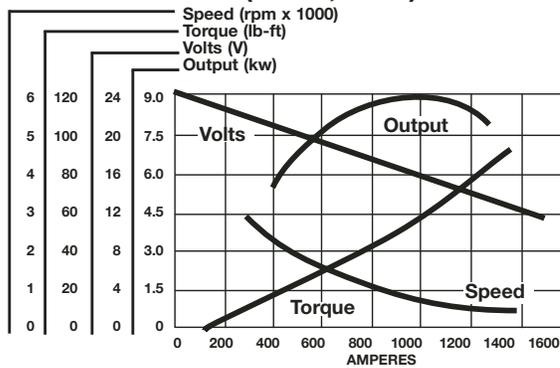
A rotatable drive housing, with 12 or 24 positions, allows for flexible mounting and easy repositioning of the solenoid switch.



**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

**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.

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	1113271	10461443
1113272	28MT-171	24	G	CW	10	316	04	0.48	28,35	1113272	10461444
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	10461468
1113280	28MT-171	12	G	CW	12	055	01	0.41		1113280	10461449
1113281	28MT-171	12	G	CW	10	055	01	0.41		1113281	10465049
1113283	28MT-171	12	G	CW	10	316	4M	0.48	28,35	1113283	10461482
1113284	28MT-171	12	G	CW	10	120	01	0.41		1113284	10461483
1113285	28MT-171	12	G	CW	10	055	01	0.41	7,35	1113285	10465349
1113286	28MT-171	12	G	CW	9	055	1M	0.41		1113286	10465315
1113288	28MT-171	12	G	CW	10	045	1M	0.41	17	1113288	10461484
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	10461485
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	10465365
1113296	28MT-171	12	G	CW	10	304	PD	0.44	7,8	1113296	10465168
1113297	28MT-171	12	G	CW	10	070	1M	0.41		1113297	10461487
10479600	28MT-171	24	G	CW	12	055	01	0.41	17	10479600	10461459
10479604	28MT-171	12	G	CW	11	300	01	0.41		10479604	10461460
10479605	28MT-171	24	G	CW	10	315	01	0.41		10479605	10461461
10479606	28MT-171	12	G	CW	12	055	01	0.41	17	10479606	10461462
10479607	28MT-171	12	G	CW	10	300	01	0.41	17	10479607	10461463
10479608	28MT-171	24	G	CW	10	300	01	0.41	17	10479608	10461464
10479611	28MT-171	24	G	CW	10	304	PD	0.44	8	10479611	10461453
10479613	28MT-171	12	G	CW	12	300	01	0.41	7,35	10479613	10465348
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	10461465
10479617	28MT-171	12	G	CW	10	315	01	0.41	17	10479617	10461465
10479618	28MT-171	12	G	CW	10	055	01	0.41	35	10479618	10465151
10479619	28MT-171	12	G	CW	10	070	SP	0.41		10479619	10461452
10479620	28MT-171	12	G	CW	9	055	1M	0.41	17	10479620	10461467
10479626	28MT-171	24	G	CW	9	233	01	0.41		-	10461470
10479628	28MT-171	12	G	CW	10	316	04	0.48	28,35	10479630	10461471
10479630	28MT-171	12	G	CW	10	316	04	0.48	28,35	10479630	10461473
10479634	28MT-171	12	G	CW	10	315	01	0.41	28,35	10479634	10461474
10479636	28MT-171	12	G	CW	10	315	01	0.41	35	10479636	10461475
10479637	28MT-171	12	G	CW	9	233	01	0.41		10479637	10461476
10479638	28MT-171	12	G	CW	10	055	01	0.41		10479638	10461477
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	10479643	10461479
10479644	28MT-171	12	G	CW	10	055	01	0.41	29	10479644	10461480
10479645	28MT-171	12	G	CW	9	233	01	0.41	36	10479645	10461415
10479653	28MT-171	12	G	CW	10	055	01	0.41	13,36	10479653	-
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
8200001	29MT-500	12	Gnd	CW	9	233	01	0.43	8200001	-
8200014	29MT-500	12	Gnd	CW	10	315	01	0.43	8200014	-
8200054*	29MT-500	24	Gnd	CW	10	315	01	0.43	8200054*	-
8200065*	29MT-500	24	Gnd	CW	9	315	01	0.43	8200065*	-
8200103	29MT-500	12	Gnd	CW	9	315	01	0.41	8200103	-
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	19011404	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	Ser. Code Features	Service Part Number	Reman Part Number
1993850	37MT-300	12	Gnd	CW	10	068	03	0.66	6,20	1993850	-
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		1993869	10461089
1993871	37MT-300	12	Gnd	CW	12	082	03	0.66		1993871	10461084
1993873	37MT-300	12	Gnd	CW	12	030	03	0.66	3,15,27	1993873	10461010
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	10461084
1993880	37MT-300	12	Gnd	CW	10	278	03	0.53		1993880	10461108
1993881	37MT-300	12	Gnd	CW	10	052	01	0.41		1993881	10461308
1993883	37MT-300	12	Gnd	CW	12	052	01	0.41		1993883	-
1993884	37MT-300	12	Gnd	CCW	10	052	01	0.41		1993884	10461302
1993885	37MT-300	12	Gnd	CW	12	308	01	0.41		1993885	10461456
1993886	37MT-300	12	Gnd	CW	10	308	01	0.41		1993886	10461225
1993887	37MT-300	12	Gnd	CW	12	308	03	0.53	20	1993887	10461066
1993891	37MT-300	12	Gnd	CW	12	052	01	0.41	18,35	1993891	10461301
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	1993901	10461016
1993902	37MT-300	24	Gnd	CW	12	322	03	0.66		1993902	10461018
1993903	37MT-300	24	Gnd	CW	10	322	01	0.41		1993903	10461525
1993905	37MT-300	24	Gnd	CW	10	068	03	0.66		1993905	10461130
1993910	37MT-300	24	Gnd	CW	12	322	03	0.53		1993910	-
1993914	37MT-300	24	Gnd	CW	10	308	03	0.66		1993914	-
1993917	37MT-300	24	Gnd	CW	10	038	01	0.41	35	1993917	10461457
1993918	37MT-300	24	Gnd	CW	12	308	01	0.41	20,35	1993918	10461405
1993919	37MT-300	24	Gnd	CW	10	322	01	0.41		1993919	-
1993920	37MT-300	24	Gnd	CW	12	082	03	0.53		1993920	10461500
1993921	37MT-300	24	Gnd	CW	10	308	01	0.41		1993921	-
1993930	37MT-300	24	Gnd	CW	10	038	01	0.45	20,22,26,35	1993930	10461297
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		1993954	10461525
1993955	37MT-300	24	Gnd	CW	10	052	01	0.41	35	1993955	10461015
1993956	37MT-300	12	Gnd	CW	10	322	01	0.41		1993956	-
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
1993972	37MT-300	24	Gnd	CW	11	052	01	0.41	20	1993972	10461296
1993974	37MT-350	12	Insl.	CW	12	308	03	0.53		1993974	10461274
1993979	37MT-300	12	Gnd	CCW	12	330	03	0.66		1993979	10461507
1993981	37MT-300	12	Gnd	CW	10	308	03	0.66		1993981	-
1993988	37MT-300	12	Gnd	CW	10	308	01	0.41	35	1993988	10461416

## 37MT Series (cont.)

Model	Series	Volts	Pol	Rot	Pinion Teeth	SW Pos. Degrees	SAE	Mtg. Hole	Ser. Code Features	Service Part Number	Reman Part Number
1993992	37MT-300	12	Gnd	CW	12	038	03	0.53		1993992	-
1993994	37MT-300	12	Gnd	CW	10	128	01	0.41		1993994	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		10478814	-
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	10461494
10478953	37MT-350	12	Insl.	CW	10	128	01	0.41		10478953	-
10478957	37MT-300	12	Gnd	CW	10	038	01	0.45		10478957	-
10479014	37MT-300	12	Gnd	CW	12	308	01	0.41		10479014	-
10479016	37MT-300	12	Gnd	CW	10	128	01	0.41		10479016	-
10479020	37MT-300	24	Gnd	CW	10	128	01	0.41		10479020	10461295
10479036	37MT-300	12	Gnd	CW	10	322	01	0.41		10479036	-
10479047	37MT-350	12	Insl.	CW	10	128	01	0.41		10479047	-
10479054	37MT-300	12	Gnd	CW	10	038	01	0.41		10479054	10461416
10479068	37MT-300	12	Gnd	CW	10	128	01	0.41		10479068	10461207
10479135	37MT-300	12	Gnd	CW	12	052	03	0.53		10479135	-
10479166	37MT-300	12	Gnd	CW	10	322	03	0.53		10479166	-
10479169	37MT-350	12	Insl.	CW	10	128	01	0.41		10479169	10461209
10479170	37MT-350	12	Insl.	CW	10	322	01	0.41		10479170	-
10479174	37MT-300	12	Gnd	CW	12	322	03	0.53		10479174	-
10479176	37MT-300	12	Gnd	CW	12	315	03	0.66		10479176	10461316
10479187	37MT-350	12	Insl.	CW	12	315	03	0.66		10479187	10461330
10479188	37MT-300	24	Gnd	CW	10	308	01	0.41		10479188	-
10479204	37MT-350	12	Insl.	CW	10	322	01	0.41		10479204	-
10479219	37MT-300	12	Gnd	CW	10	128	01	0.41		10479219	-

## 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*
8200023*	38MT-500	12	Gnd	CW	10	315	01	0.43	8200023*	-
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*
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	-

Original to Service

## 39MT Series

Model	Series	Volts	Pol	Rot	Pinion Teeth	SW Pos. Degrees	SAE	Mtg. Hole	Service Part Number	Reman Part Number
8200009	39MT-500	24	Insl.	CW	11	278	03	0.66	8200009	-
8200022	39MT-500	24	Insl.	CW	11	052	03	0.66	8200022	-
8200037*	39MT-500	12	Insl.	CW	11	052	03	0.66	8200037*	8300020
8200058*	39MT-500	12	Insl.	CW	12	052	03	0.53	8200058*	-
8200081*	39MT-550	12	Insl.	CW	12	082	03	0.53	8200081*	8300007
8200082*	39MT-550	12	Insl.	CW	12	082	03	0.53	8200082*	8300008
8200084*	39MT-500	12	Insl.	CW	12	082	03	0.53	8200084*	8300013
8200085*	39MT-500	12	Insl.	CW	12	308	03	0.53	8200085*	8300012
8200086*	39MT-500	24	Insl.	CW	12	082	03	0.53	8200086*	8300011
8200087*	39MT-500	12	Insl.	CW	12	082	03	0.53	8200087*	8300015
8200088*	39MT-500	12	Insl.	CW	11	278	03	0.66	8200088*	8300017
8200090*	39MT-550	12	Insl.	CW	11	082	03	0.66	8200090*	-
8200091*	39MT-550	12	Insl.	CW	11	082	03	0.66	8200091*	8300009
8200140*	39MT-500	12	Insl.	CW	11	231	01	0.43	8200140*	-
8200182*	39MT-500	12	Insl.	CW	12	052	03	0.53	8200182*	-
8200186*	39MT-550	12	Insl.	CW	12	038	03	0.53	8200186*	-
19011514	39MT-500	12	Insl.	CW	12	082	03	0.53	19011514	10461773
19011515*	39MT-500	12	Insl.	CW	12	038	03	0.53	19011515*	8300004
19011516*	39MT-500	12	Insl.	CW	11	082	03	0.66	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	-
19011521	39MT-550	12	Insl.	CW	11	082	03	0.66	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	Ser. Code Features	Service Part Number	Reman Part Number
8200080	41MT-450	12	Insl.	CW	12	082	03	0.53	15	8200080	-
8200107	41MT-400	12	Insl.	CW	12	082	03	0.53	15	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	-
10478812	41MT-450	12	Insl.	CW	12	082	03	0.53		10478812	10461304
10478818	41MT-400	12	Gnd	CW	12	322	03	0.53		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
10478925	41MT-400	24	Gnd	CW	12	082	03	0.53	20	10478925	-
10478999	41MT-400	12	Insl.	CW	12	082	03	0.53		10478999	10461171
10479023	41MT-400	12	Insl.	CW	11	052	03	0.66	15	10479023	10461409
10479024	41MT-400	24	Insl.	CW	11	052	03	0.66	15	10479024	10461408
10479043	41MT-450	24	Insl.	CW	11	052	03	0.66		10479043	10461503
10479060	41MT-400	12	Insl.	CW	12	292	03	0.53	13,15	10479060	-
10479071	41MT-400	12	Gnd	CW	12	038	01	0.41	20	10479071	-
10479079	41MT-450	24	Insl.	CW	11	322	03	0.66	20	10479079	10461504
10479098	41MT-400	12	Gnd	CW	12	308	01	0.41	20	10479098	-
10479148	41MT-450	24	Insl.	CW	12	082	03	0.53		10479148	10461528
10479165	41MT-400	12	Gnd	CW	11	082	03	0.66		10479165	10461318
10479205	41MT-400	24	Gnd	CW	12	278	03	0.53	20	10479205	10461458
10479206	41MT-400	12	Gnd	CW	12	308	01	0.41	36	10479206	10461434
10479207	41MT-400	12	Gnd	CW	12	128	01	0.41	14,36	10479207	-
10479215	41MT-450	12	Insl.	CW	12	128	01	0.41	15	10479215	10461431
10479221	41MT-400	24	Gnd	CW	12	322	03	0.53		10479221	-
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	36	10479242	10461496
10479243	41MT-450	12	Insl.	CW	12	128	01	0.41		10479243	10461439
10479244	41MT-400	12	Insl.	CW	12	128	01	0.41	15	10479244	-
10479246	41MT-450	12	Insl.	CW	12	308	01	0.41	20	10479246	10461436
10479250	41MT-400	12	Gnd	CW	12	082	03	0.53	20	10479250	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	18	10479269	-
10479278	41MT-400	12	Gnd	CW	12	038	01	0.41	20	10479278	-
10479283	41MT-400	12	Gnd	CW	11	052	01	0.41		10479283	-
10479299	41MT-450	12	Insl.	CW	11	052	01	0.41	20	10479299	-
10479300	41MT-400	12	Gnd	CW	12	082	03	0.53	36	10479300	-
10479307	41MT-400	12	Insl.	CW	12	322	01	0.41	14	10479307	-
10479362	41MT-450	24	Insl.	CW	12	038	03	0.53	20	10479362	-
10479363	41MT-450	24	Insl.	CW	12	202	03	0.053		10479363	-

Original to Service

## 42MT Series

Model	Series	Volts	Pol	Rot	Pinion Teeth	SW Pos. Degrees	SAE	Mtg. Hole	Ser. 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		1990370	10461021
1990371	42MT-400	24	Insl.	CW	12	082	03	0.66	10	1990371	-
1990372	42MT-400	12	Insl.	CW	12	082	03	0.66	10	1990372	10461077
1990377	42MT-400	12	Insl.	CW	13	082	03	0.66		1990377	10461133
1990379	42MT-400	12	Insl.	CW	12	082	03	0.66	2	1990379	10461050
1990380	42MT-400	12	Insl.	CCW	11	292	03	0.66	11,16,21	1990380	10461131
1990381	42MT-400	24	Insl.	CCW	11	292	03	0.66	11,16,21	1990381	10461135
1990397	42MT-450	12	Insl.	CW	12	082	03	0.66		1990397	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	10461341
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	1990428	10461055
1990429	42MT-400	12	Insl.	CW	12	292	03	0.66	30	1990429	10461021
1990430	42MT-400	12	Insl.	CCW	11	038	03	0.66	2	1990430	10461132
1990431	42MT-400	12	Insl.	CW	11	068	03	0.66	2	1990431	10461020
1990432	42MT-400	24	Insl.	CW	12	278	03	0.66	2	1990432	10461341
1990435	42MT-400	24	Insl.	CW	13	322	03	0.66		1990435	10461137
1990447	42MT-400	24	Insl.	CCW	11	052	03	0.66	11	1990447	10461134
1990453	42MT-400	24	Insl.	CW	12	278	03	0.66	2	1990453	10461052
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	1990491	10461054
1990492	42MT-400	12	Insl.	CW	12	052	03	0.66	2,15	1990492	10461050
1993772	42MT-400	12	Insl.	CW	12	082	03	0.66		1993772	-
1993775	42MT-400	12	Insl.	CW	12	292	03	0.66	2,13	1993775	-
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	1993797	-
1993824	42MT-450	12	Insl.	CW	12	322	03	0.53	1	1993824	10461079
1993856	42MT-400	12	Insl.	CW	12	082	03	0.66		1993856	10461091
1993923	42MT-400	24	Insl.	CW	13	292	03	0.66	2,15	1993923	-
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	10461360
1993940	42MT-400	24	Insl.	CW	12	082	03	0.53	21,35	1993940	10461025
1993945	42MT-400	24	Insl.	CW	12	088	03	0.53	5,35	1993945	-
1993973	42MT-450	12	Insl.	CW	12	082	03	0.66		1993973	1046108
1993975	42MT-400	12	Insl.	CW	11	292	03	0.66	13,16,30	1993975	-
1993982	42MT-400	12	Insl.	CW	11	038	03	0.66	2,35	1993982	10461326
1993984	42MT-450	12	Insl.	CW	11	292	03	0.66	13	1993984	-
1993998	42MT-400	24	Insl.	CW	11	038	03	0.66	11,16,21	1993998	10461353
8200015	42MT-400	12	Insl.	CW	11	068	03	0.53		8200015	-
8200068	42MT-450	24	Insl.	CW	12	052	03	0.53		8200068	-
8200089	42MT-450	24	Insl.	CW	12	52	03	0.53		8200089	-
8200110	42MT-400	12	Insl.	CW	11	088	03	0.66		8200110	-
8200115	42MT-450	12	Insl.	CW	12	088	03	0.53		8200115	-
8200116	42MT-400	12	Insl.	CW	12	088	03	0.53		8200116	-
8200117	42MT-400	12	Insl.	CW	11	082	03	0.66		8200117	-
8200122	42MT-450	12	Insl.	CW	11	088	03	0.66		8200122	-
8200163	42MT-450	12	Insl.	CW	11	082	03	0.66		8200163	8300032
8200164	42MT-450	12	Insl.	CW	11	082	03	0.66		8200164	8300031
8200165	42MT-450	12	Insl.	CW	11	088	03	0.66		8200165	8300034
8200168	42MT-450	12	Insl.	CW	11	088	03	0.66		8200168	8300033

### 42MT Series (cont.)

Model	Series	Volts	Pol	Rot	Pinion Teeth	SW Pos. Degrees	SAE	Mtg. Hole	Ser. Code Features	Service Part Number	Reman Part Number
10478804	42MT-400	12	Gnd	CW	12	308	03	0.66	14	10478804	-
10478809	42MT-400	12	Insl.	CW	11	278	03	0.66		10478809	10461591
10478810	42MT-400	12	Insl.	CW	11	308	03	0.66	13	10478810	10461592
10478824	42MT-450	12	Insl.	CW	11	278	03	0.66	12,14,30	10478824	10461585
10478832	42MT-400	12	Insl.	CW	11	082	03	0.66	35	10478832	10461326
10478837	42MT-400	24	Insl.	CW	11	082	03	0.66		10478837	10461102
10478841	42MT-400	24	Insl.	CW	12	308	03	0.66		10478841	10461101
10478892	42MT-400	24	Insl.	CCW	11	038	03	0.66	2,11,16,21	10478892	10461351
10478895	42MT-400	12	Insl.	CW	11	038	03	0.66		10478895	10461052
10478896	42MT-400	12	Insl.	CW	11	278	03	0.66		10478896	-
10478978	42MT-400	12	Insl.	CCW	11	038	03	0.66		10478978	10461132
10478979	42MT-450	24	Insl.	CCW	11	038	03	0.66	2,11,16,21	10478979	10461140
10478981	42MT-400	24	Insl.	CCW	11	038	03	0.66	2	10478981	-
10478983	42MT-400	12	Insl.	CW	11	278	03	0.66	2,13	10478983	10461778
10478988	42MT-400	24	Insl.	CW	11	278	03	0.66	2,35	10478988	10461360
10478991	42MT-400	12	Insl.	CW	11	278	03	0.66		10478991	-
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	10479003	10461051
10479004	42MT-400	12	Insl.	CW	12	082	03	0.66	2,29,35	10479004	10461414
10479005	42MT-400	12	Insl.	CW	12	082	03	0.66		10479005	-
10479007	42MT-400	12	Insl.	CCW	12	322	SP	0.53	13,31,35	10479007	-
10479009	42MT-400	24	Insl.	CW	12	308	03	0.66	2,29,35	10479009	10461358
10479010	42MT-400	24	Insl.	CW	11	082	03	0.66	2,29,35	10479010	10461360
10479011	42MT-400	24	Insl.	CW	12	308	01	0.41	29,35	10479011	-
10479012	42MT-400	24	Insl.	CCW	12	052	SP	0.53	35	10479012	10461412
10479022	42MT-400	24	Insl.	CW	11	068	03	0.66	2,15	10479022	10461410
10479052	42MT-400	12	Insl.	CW	12	038	03	0.53	35	10479052	-
10479053	42MT-400	24	Insl.	CW	12	038	03	0.53	35	10479053	-
10479062	42MT-450	12	Insl.	CW	11	278	03	0.66	2,13	10479062	10461055
10479065	42MT-400	12	Insl.	CW	11	292	03	0.66		10479065	10461415
10479067	42MT-450	24	Insl.	CW	11	038	03	0.66		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	-
10479131	42MT-450	12	Insl.	CW	12	082	03	0.53		10479131	-
10479132	42MT-450	24	Insl.	CW	11	322	03	0.66		10479132	8300036
10479146	42MT-400	12	Insl.	CW	12	052	03	0.53		10479146	-
10479147	42MT-450	12	Insl.	CW	12	052	03	0.53		10479147	8081341
10479150	42MT-400	12	Insl.	CW	11	278	03	0.66		10479150	10461778
10479151	42MT-450	12	Insl.	CW	11	278	03	0.66	1,2,13	10479151	8300035
10479168	42MT-400	24	Insl.	CW	11	278	03	0.66	2,15,29	10479168	10461410
10479178	42MT-400	24	Insl.	CW	12	322	03	0.53	35	10479178	10461358
10479191	42MT-400	12	Insl.	CW	12	038	03	0.53		10479191	10461328
10479209	42MT-400	12	Insl.	CW	11	322	03	0.66		10479209	-
10479211	42MT-400	24	Insl.	CW	11	052	03	0.66		10479211	-
10479212	42MT-400	24	Insl.	CW	11	322	03	0.66		10479212	-
10479213	42MT-450	24	Insl.	CW	12	082	03	0.53		10479213	-
10479228	42MT-450	24	Insl.	CW	12	322	03	0.53		10479228	-
10479233	42MT-400	12	Insl.	CW	12	112	01	0.41		10479233	-
10479238	42MT-400	24	Insl.	CW	12	082	03	0.53		10479238	10461418
10479251	42MT-400	12	Insl.	CW	12	082	03	0.53		10479251	10461501
10479261	42MT-400	24	Insl.	CW	12	082	03	0.66		10479261	-
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	10462175
10479281	42MT-400	12	Insl.	CW	11	082	03	0.66		10479281	-
10479282	42MT-450	12	Insl.	CW	12	088	03	0.53		10479282	8300037
10479289	42MT-400	12	Insl.	CW	12	088	03	0.53		10479289	-
10479290	42MT-400	24	Insl.	CW	11	088	03	0.53		10479290	-
10479357	42MT-400	12	Insl.	CW	12	278	03	0.66		10479357	-

Original to Service

## 50MT Series

Model	Series	Volts	Pol	Rot	Pinion Teeth	SW Pos. Degrees	SAE	Mtg. Hole	Ser. 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	10461167
10478916	50MT-400	64	Insl.	CW	11	308	03	0.66	12,17,25	10478916	10461160
10478919	50MT-400	64	Insl.	CW	11	322	03	0.66	2,17,25	10478919	-
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	-
10479326	50MT-400	32	Insl.	CW	11	278	03	0.66	1,34	10479326	-
10479327	50MT-400	24	Insl.	CCW	11	038	03	0.66	2,34	10479327	10461499
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	1109797
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	-
10479334	50MT-400	24	Insl.	CW	11	322	03	0.66	1,2,34	10479334	-
10479335	50MT-400	24	Insl.	CW	11	068	03	0.66		10479335	10461382
10479336	50MT-400	12	Insl.	CW	11	308	03	0.66	2	10479336	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
10479340	50MT-400	24	Insl.	CW	11	308	03	0.66		10479340	-
10479341	50MT-400	12	Insl.	CW	11	038	03	0.66	2	10479341	-
10479342	50MT-400	24	Insl.	CW	11	052	SP	0.66	2,29,34	10479342	10461745
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
10479350	50MT-400	24	Insl.	CW	12	322	03	0.66	2,29,34	10479350	10461748
10479351	50MT-400	32	Insl.	CW	11	308	03	0.66	25	10479351	-
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	-
10479374	50MT-400	24	Insl.	CW	11	322	03	0.66	1,2,34	10479374	-
10479382	50MT-400	12	Insl.	CW	11	088	03	0.66	3	10479382	-

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.

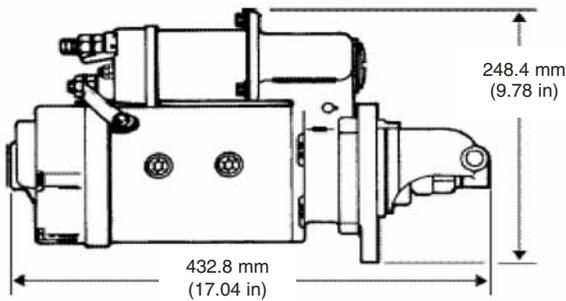
CW vs CCW <sup>①</sup>									
Counter Clockwise					Clockwise				
Service Model	Series	Voltage	Pinion Teeth	Special Features	Service Model	Series	Voltage	Pinion Teeth	Special Features
1990430	42MT	12	11	-	10478895	42MT	12	11	-
1993884	37MT	12	10	-	1993881	37MT	12	10	-
1993979	37MT	12	12	3	1993878	37MT	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	-

<sup>①</sup> See Feature Code Listing page 102

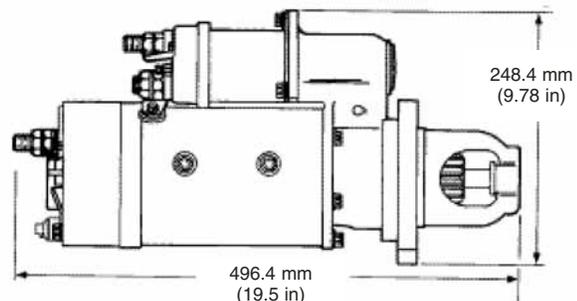
### OCP vs. Non-OCP<sup>①</sup>

Overcrank Protection					Non-Overcrank Protected				
OEM/Serv Model	Series	Voltage	Pinion Teeth	Special Features	OEM/Serv Models	Series	Voltage	Pinion Teeth	Special Features
1990397	42MT	12	12	—	1993856	42MT	22	12	—
1990406	42MT	12	12	15	1990492	42MT	22	12	2,15
1990428	42MT	12	11	30	1990424	42MT	22	11	30
1991484	42MT	12	11	2,21	1990483	42MT	22	11	2,21
1990489	42MT	12	11	5	1990490	42MT	22	11	5
1993788	42MT	24	11	—	1993933	42MT	44	11	35
1993973	42MT	12	12	—	1993856	42mt	22	12	—
1993984	42MT	12	11	13,16,30	1993975	42MT	22	11	13,16,30
1993987	42MT	24	11	—	1990456	42MT	44	11	2
10478812	41MT	12	12	—	10478999	41MT	22	12	—
10478824	42MT	12	11	13,14,30	10478809	42MT	22	11	13,14,30
10478921	37MT	12	10	32	10478890	37MT	22	10	32
10478979	42MT	24	11	2,11,16,21	10478892	42MT	44	11	2,11,16,21
10479019	42MT	12	12	3	10479018	42MT	22	12	3
10479038	42MT	12	11	2,13	10478983	42MT	22	11	2,13
10479062	42MT	12	11	2,13	10478983	42MT	12	11	2,13

① See Feature Code Listing page 102



**37MT**



**42MT**

## Eliminating Series Parallel Switch

### Converting 24 Volt to 12 Volt Cranking System On

600 CID (9.8L) 2-Cycle Diesel Engines and Smaller

900 CID (15.8L) 4-Cycle Diesel Engines and Smaller

To replace the 24 Volt original starting motor with a 12 Volt starting motor, determine the 24 Volt replacement model from the original model to replacement model cross reference. Then, determine the 12 Volt replacement model for the 24 replacement model from the cross reference below.

When revising battery cable system, a lower resistance cable system is required. Refer to Wire Size Chart and Circuit Diagram section for proper cable size and installation.

12 Volt vs 24 Volt <sup>①</sup>					
Service Model	12 Volt Series Type	Special Features	Service Model	24 Volt Series Type	Special Features
1113271	28MT171	28,35	1113272	28MT171	28,35
1113275	28MT171	—	10479605	28MT171	—
1113276	28MT171	—	1113277	28MT171	—
1113292	28MT171	—	1113291	28MT171	—
1990372	42MT400	10	1990371	42MT400	10
1990377	42MT400	—	1990371	42MT400	—
1990380	42MT400	CCW,11,16,21	1990381	42MT400	CCW,11,16,21
1990430	42MT400	CCW,2	1990436	42MT400	CCW,2
1990431	42MT400	2	NLA	42MT400	—
1990469	42MT400	—	NLA	—	—
1990489	42MT450	5	1993835	42MT450	5
1990490	42MT400	5	1990491	42MT400	5
1990494	42MT400	CCW	NLA	42MT400	CCW
1993850	37MT300	6,20	1993905	37MT300	6,20
1993869	37MT300	—	1993901	37MT300	—
1993871	37MT300	—	1993902	37MT300	—
1993874	37MT300	—	1993910	37MT300	—
1993879	37MT300	6	1993903	37MT300	6
1993934	42MT400	35	1993941	42MT400	35
1993956	37MT300	6,35	1993954	37MT300	6,35
1993957	37MT300	35	1993955	37MT300	35
1993958	37MT300	35	nla	37MT300	35
1993988	37MT300	35	1993917	37MT300	35
10478803	42MT400	2	1990453	42MT400	2
10478804	42MT400	14	1993797	42MT400	14
10478818	41MT400	—	10478817	41MT400	—
10478832	42MT400	35	1993933	42MT400	35
10478877	50MT400	2	10478909	50MT400	11
10478881	50MT400	5	10478882	50MT400	5
10478895	42MT400	2	10478998	42MT400	2
10478895	42MT400	2	1990456	42MT400	2
10478897	41MT400	—	10478898	41MT400	—
10478917	50MT400	2,21	10478911	50MT400	2,21
10478957	37MT300	20,35	10478819	37MT300	20,35
10478978	42MT400	CCW,2	10478981	42MT400	CCW,2

<sup>①</sup> See Feature Code Listing page 102

### 12 Volt vs 24 Volt<sup>①</sup>

Service Model	12 Volt Series Type	Special Features	Service Model	24 Volt Series Type	Special Features
10478983	42MT400	2,13	1990459	42MT400	2,14
10478987	42MT400	2,35	10478988	42MT400	2,35
10479004	42MT400	2,29,35	10479009	42MT400	2,29,35
10479005	42MT400	29,35	10479008	42MT400	29,35
10479006	42MT400	2,29,35	10479010	42MT400	2,29,35
10479016	37MT300	29,35	10479020	37MT300	14,29,35
10479021	42MT400	14,29,35	10479022	42MT400	2,15
10479023	41MT400	15	10479024	41MT400	15
10479052	42MT400	35	10479053	42MT400	35
10479606	28MT171	17	10479600	28MT171	17
10479607	28MT171	17	10479608	28MT171	17
10479617	28MT171	17	10479616	28MT171	17
10479618	28MT171	—	10479629	28MT171	—

<sup>①</sup> See feature code listing page 102

### Converting 50MT 24 Volt to 50MT 12 Volt Cranking System On:

Engines larger than 600 CID - (9.8L) 2-Cycle

Engines larger than 900 CID - (15.8L) 4-Cycle

In extremely cold climates, below -10 degrees fahrenheit, the 12 Volt 50MT is not recommended.

At temperatures lower than +40 degrees fahrenheit a 12 Volt 50MT will draw considerably more current than a 24 Volt 50MT, requiring a battery system rated a 2500 CCA.

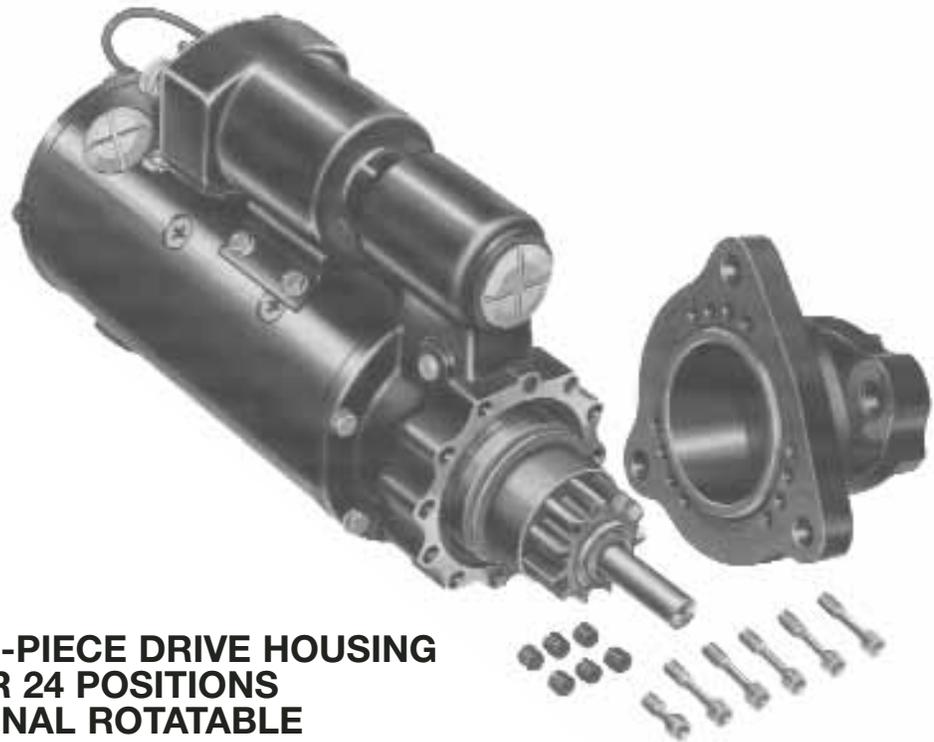
In order to obtain designed cranking performance, any cranking system must include cables of adequate size to meet maximum allowable or lower resistance.

Therefore, cables must be changed to meet resistance recommendation.

**EXAMPLE:** If the total length of starting motor to battery cable is 12 feet (6 feet each for positive and negative side), 1—#0 cable is required for each side for 24 Volt cranking. When converting to 12 Volt cranking, 2 - #000 cables are required for each side to meet maximum allowable total circuit resistance of .0006 ohms. (.3 Volts drop @ 500 Amps positive side and negative side).

### 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.

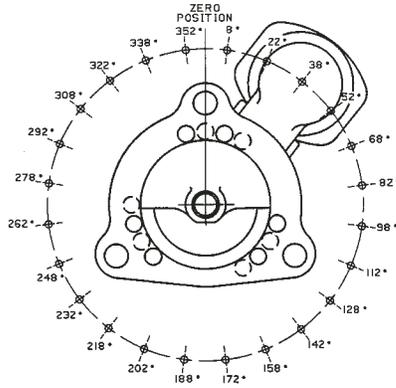
#### Drive Housing Rotation Description

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.

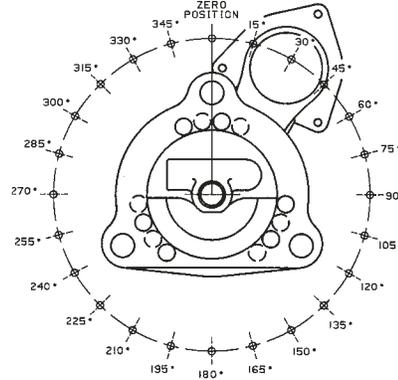
Rotating the drive housing counter-clockwise increases solenoid switch position degrees.

## Drive Housing Rotation

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



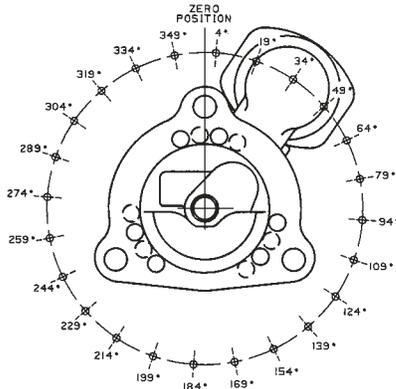
**40MT**



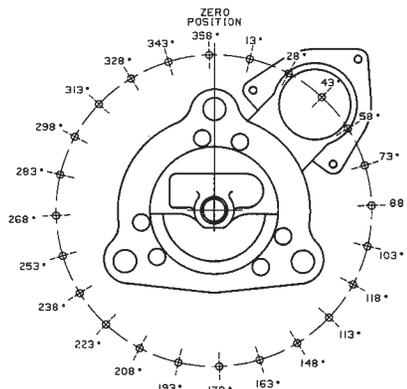
12 OR 24 POSITION  
 12 POSITION — ENDING IN 2° OR 8°  
 EVERY 30°  
 24 POSITION — ENDING IN 2° AND 8°  
 EVERY 15°

12 OR 24 POSITION  
 12 POSITION — ENDING IN 0° OR 5°  
 EVERY 30°  
 24 POSITION — ENDING IN 0° AND 5°  
 EVERY 15°

**40 & 42 MT**



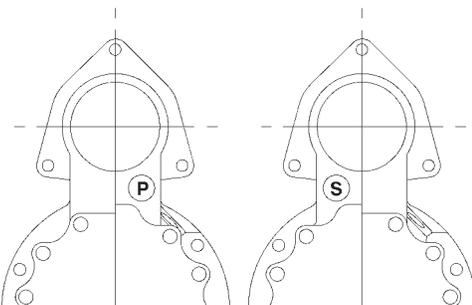
**42MT**



12 OR 24 POSITION 12 POSITION  
 12 POSITION — ENDING IN 4° OR 9°  
 EVERY 30°  
 24 POSITION — ENDING IN 4° AND 9°  
 EVERY 15°

12 POSITION  
 12 POSITION — ENDING IN 3° OR 8°  
 EVERY 30°

After nose housing has been re-positioned insert starting motor to engine mounting bolt in each mounting hole to determine if 12 point head mounting bolt may be required.

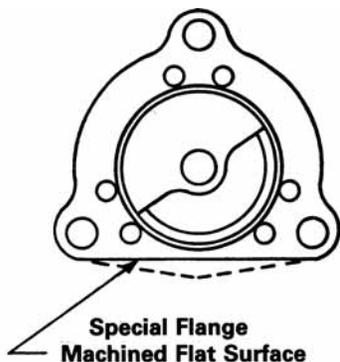


SOLENOID POSITION VIEWED FROM DRIVE END OF STARTING MOTOR.

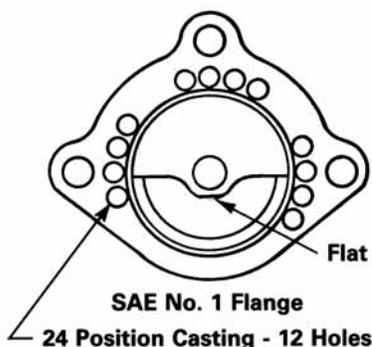
24-position nose housings (12 holes) may use either P or S lever housings. On 12-position nose housings (6 holes: all angles ending in 2 degrees use "S" lever housing and all angles ending in 8 degrees use "P" lever housing.

Any starter motor model may have combinations of these features.

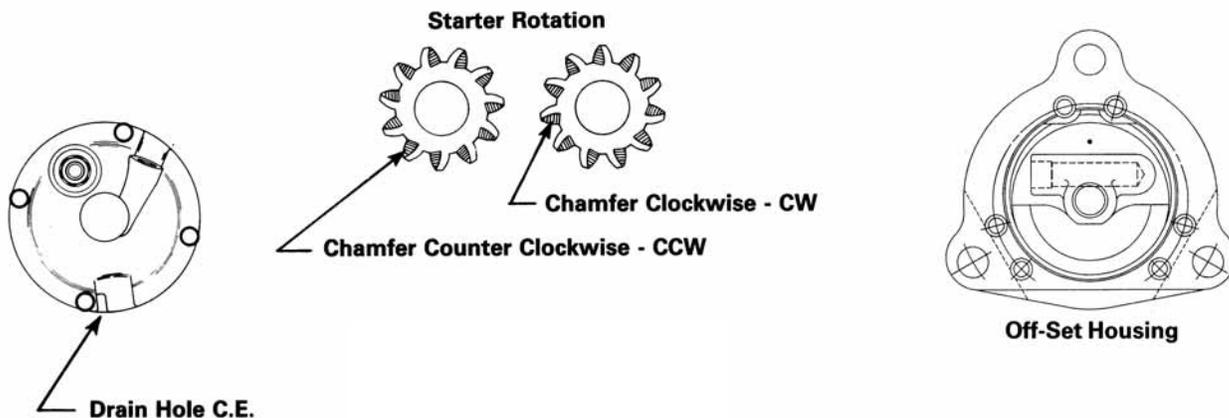
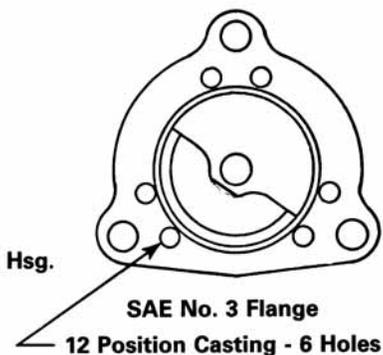
145° Flywheel Opening



180° Flywheel Opening

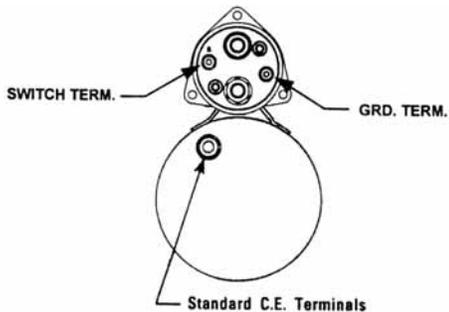


215° Flywheel Opening

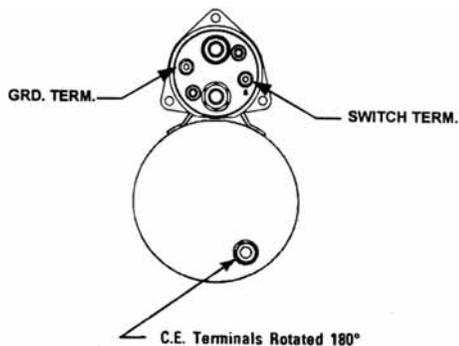


### 37MT, 41MT & 42MT SERIES

Solenoid Terminals Reversed

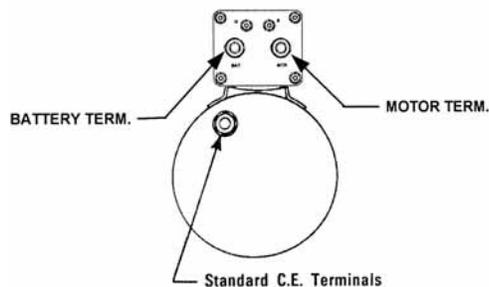


### Standard Solenoid Terminals

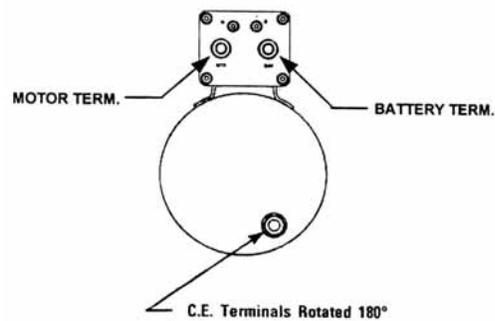


### 40MT & 50MT SERIES

Solenoid Terminals Reversed



### Standard Solenoid Terminals





### 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	
1114543	6	4	Dash	Dash	
1114545	12	3	Motor	Intermittent	
1114547	12	4	Dash	Continuous	
1114548	12	3	Motor	Intermittent	
1114549	12	4	Motor	Intermittent, Special Circuit	
1115592	36	4	Dash	Intermittent	
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

**Provides on-vehicle evaluation of charging and cranking system.**

**Measures voltage drop on multiple circuits and tests to TMC Specifications.**

**Completes electronic and load-test evaluations of heavy duty batteries, without requiring recharge.**

**Saves and retrieves data from up to 180 vehicle tests.**

**Prints test data – in the field – for vehicle service records.**

**PC adapter available.**

**J1708 compatible.**

**A Powerful Hand-Held Electrical Systems Analyzer for Heavy-Duty Vehicles**

Instantly retrieve vital on-vehicle performance data with the hand-held digital Remy Intelli-Check2™ Systems Analyzer.

This tester enables a user to detect performance-related electrical system conditions – including voltage drop, circuit resistance, low voltage conditions, and no-charge conditions.

**Reduce Costly Electrical System Downtime**

Intelli-Check2 allows fleets and service technicians to quickly diagnose a full range of potential starting and charging system issues. The Systems Analyzer instantly diagnoses electrical system problems associated with voltage drop, alternator output, starter resistance, and battery conditions.

This easy-to-use, menu-driven unit quickly provides and records accurate performance data for heavy duty electrical systems, reducing diagnostic time and related vehicle downtime.

**Impact of Voltage Drop**

Alternator	Cannot recharge batteries
Starter	Slow cranking speed/solenoid failures
Batteries	Cannot maintain a full state of charge
Mag Switch	Can cause premature starter or solenoid failure and possible ring gear milling



<b>Instantly Test:</b>
Alternators
Batteries
Cranking System
Voltage Drop

**INTELLI-CHECK2™**  
SYSTEMS ANALYZER

**Now Available! Affordable & Convenient Intelli-Check2™ Complete Systems Analysis Kit**

The popular Remy Intelli-Check2 Systems Analyzer is now offered in a complete systems analysis kit that contains the hand-held tester, PC adapter, and 25-Foot lead kit. A high-impact polyethylene carrying case is included with each kit.



Remy® Intelli-Check2™ Systems Analyzer	
Remy Intelli-Check2 Part No.	Description
10503560	Complete Systems Analysis Kit: Tester, PC Adapter, 25-Foot External Leads, and Polyethylene Carrying Case
10512657	Tester Only
10512658	Polyethylene Carrying Case Only
10512661	PC Adapter
10512660	J1708 Cable
10512659	6 to 9 Pin Adapter
10503559	45-Foot External Leads (Bus & Coach)

# ELECTRICAL SYSTEM CIRCUITS

Remy

## The Delco Remy Low Voltage Disconnect Control Module

### 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.

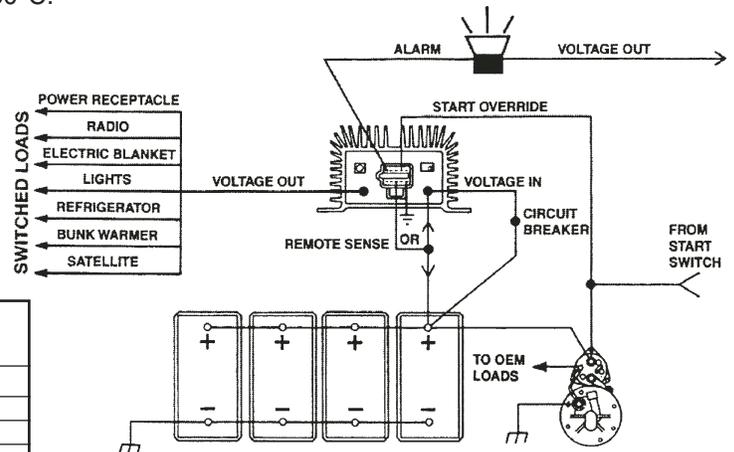
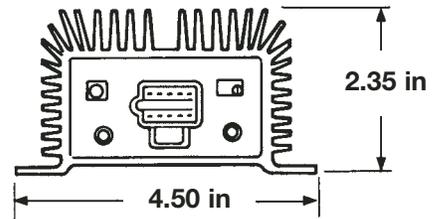
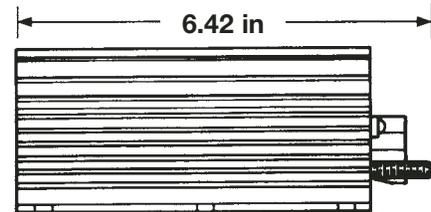
### The Low Voltage Disconnect

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
19020497	10500451	100A 12.1V
19020491	10500451	100A 12.1V
19020494	10500389	50A 12.3V
19020498	10500389	50A 12.3V
19020499	10502122	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.

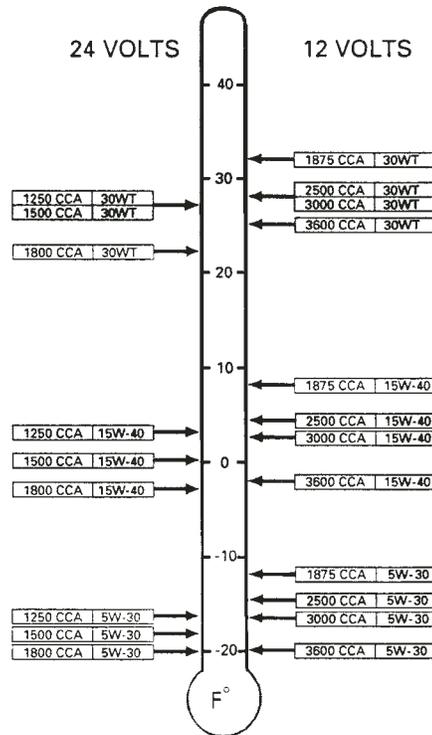
Two systems show an average change of 25°F minimum starting temperature when comparing engine oil viscosity of 30W with 15W-40 with both 12 and 24 Volt cranking.

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

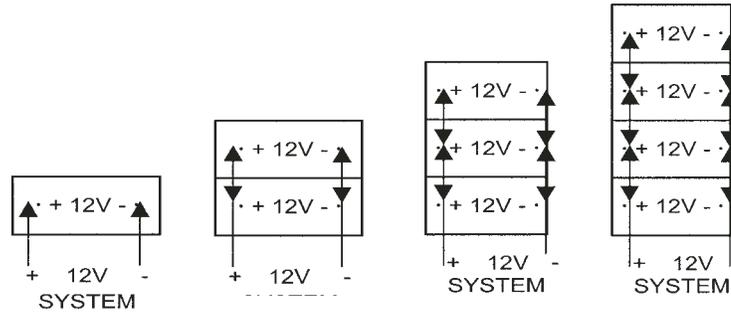
STARTING SYSTEMS				ENGINE 4CYCLE-6CYLINDER	
MOTORS	CABLE RESISTANCE	BATTERIES		SIZE	OILS
		24 VOLTS	12 VOLTS		
42-MT - 24V 42-MT - 12V	.002 OHMS .00075 OHMS	4 X 1150 (1250 CCA) 4 X 1110 (1500 CCA) 4 X 31-900 (1800 CCA)	3 X 1150 (1150 CCA) 4 X 1150 (2500 CCA) 4 X 1110 (3000 CCA) 4 X 31-900 (3500 CCA)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

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



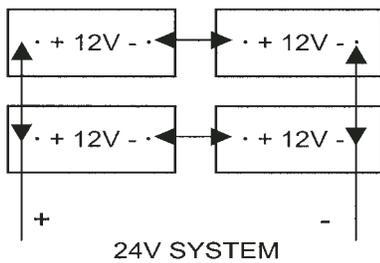
Following are examples of 1, 2, 3, & 4 batteries of various models connected in series, parallel and series-parallel.

## Parallel Connected



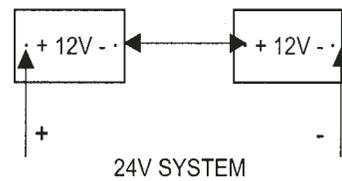
SYSTEM RATING		SYSTEM RATING		SYSTEM RATING		SYSTEM RATING	
CCA	RC	CCA	RC	CCA	RC	CCA	RC
700	180	1400	400	2100	636	2800	878
750	160	1500	356	2250	565	3000	780
950	170	1900	378	2850	601	3800	829
600	140	1200	311	1800	495	2400	683
950	250	1900	556	—	—	—	—
1050	350	2100	778	—	—	—	—

## 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

## Various Battery Rating Methods

Battery ratings are dependent on temperature, voltage and current flow during discharge. The SAE (Society of Automotive Engineers) has established two ratings for domestic made batteries; Reserve Capacity (RC) and Cold Cranking Amperes (CCA). These ratings have been adapted by Battery Council International and may be referred to as BCI ratings. Batteries in imported vehicles occasionally have ratings different than BCI reserve capacity and CCA ratings. Various battery ratings may be identified by the following:

- CA = Cranking Amperes (BCI Rating)
- RC = Reserve Capacity (BCI Rating)
- AH = Ampere Hours (20 hour rate)
- CCA = Cold Cranking Amperes (BCI Rating)
- BCI = Battery Council International
- DIN = Deutsche Industri Normen
- IEC = International Electrotechnical Commission
- BSR = British Standards Rate
- MCA = Marine Cranking Amps

## Rating Specifications

RATING METHOD	TEMPERATURE		VOLTS	RATINGS		RATED IN:
	°F	°C		TIME	AMPERES	
CA	32	0	1.20	30 sec.	(Rating)	Amperes
RC	80	27	10.5	(Rating)	25	Minutes
AH	80	27	10.5	20 hrs.	(Rating)	Ampere Hours
CCA	0	-18	7.2	30 sec.	(Rating)	Amperes
	-20	-29	7.2	30 sec.	(Rating)	Amperes
DIN	0	-18	9.0 &	30 sec.	(Rating)	Amperes
			6.0	150 sec.	(Rating)	Amperes
IEC	0	-18	8.4	60 sec.	(Rating)	Amperes
BSR	0	-18	6.0	180 sec.	(Rating)	Amperes
MCA	32	0	10.5	30 sec.	(Rating)	Amperes

## Definition

CA — Rating in amperes which a new, fully charged battery at 32°F (0°C) can continuously deliver for 30 seconds and maintain a terminal voltage equal to or higher than 1.20 Volts per cell.

RC — Rating in minutes a battery will carry a 25 Amp load at 80°F and maintain a minimum terminal voltage of 10.5.

CCA — Rating in amperes which a new, fully charged battery at 0°F (-17.8°C) can continuously deliver for 30 seconds and maintain terminal voltage equal to or higher than 1.20 Volts per cell.

AH — @ 20 hr. rate, a battery having a 100 A.H. rating must carry a 5 Amp load (100/20 hrs. = 5 Amps) for 20 hours and maintain a terminal voltage of 10.5 at 80°F.

DIN — Rating in amperes a battery cold soaked at 0°F

will carry and maintain a minimum terminal voltage of 9.0 for 30 seconds and 6.0 for 150 seconds.

BCI — Rating in amperes a battery cold soaked will carry and maintain a minimum terminal voltage of 7.2 for 30 seconds at 0°F and -20°F.

IEC — Rating in amperes a battery cold soaked at 0°F will carry for 60 seconds and maintain a minimum terminal voltage of 8.4.

BSR — Rating in amperes a battery cold soaked at 0°F will carry for 180 seconds and maintain a minimum terminal voltage of 6.0.

MCA — Rating in amperes which a new fully charged battery at 30 degrees F (0° C) can deliver for 30 seconds and maintain a voltage of 1.2 Volts per cell or higher.

## Rating Comparison

BATTERY MODEL	31-900	1200	1110	1150	E1250*	E1251*	E1210*
RATING METHOD IN ENGLISH							
RC	160	130	160	180	180	180	160
AH	—	80	93	96	102	102	100
CCA 0°	900	550	750	625	600	600	700
DIN	—	300	400	400	350	350	450
IEC	—	350	420	420	400	400	460
BSR	—	290	350	385	385	385	400

Rating comparison should not be used as specifications but are shown only to illustrate their variations. A relationship or formula to calculate one from another would not be accurate.

\* European Models

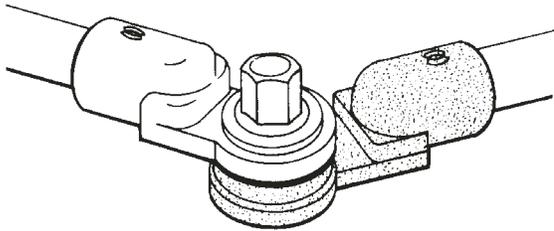
# STACKABLE BATTERY CABLE



For Top Stud Batteries

## For Heavy-Duty (Top Stud) Batteries

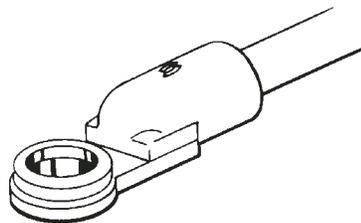
(For Commercial Applications Including Trucks, Marine, Industrial and Off-Highway)



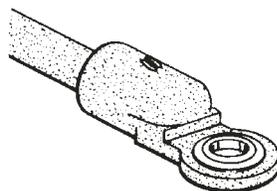
Sealed Battery Connections



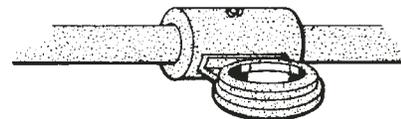
Stainless Steel Nut



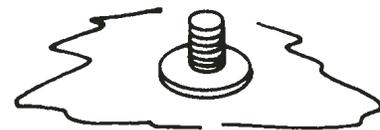
Sealed Terminal



Stacking Terminal



Sealed Inline Terminal



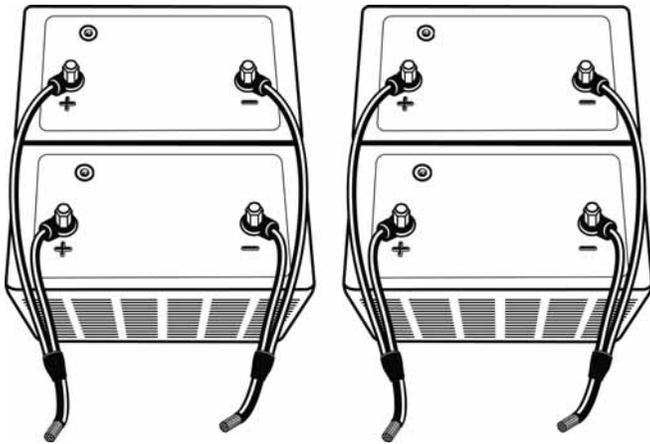
Battery Post (Top Stud)

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

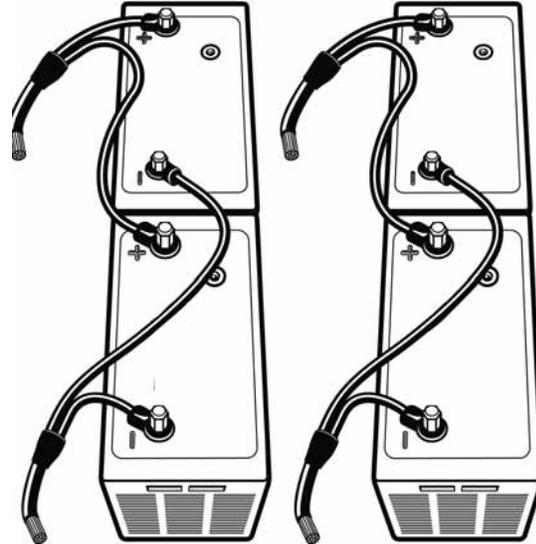
- Stacking Terminal Connection – terminals are copper alloy-dip soldered that fit on flat-wide lead pads under hold down nut pressure of 10 to 15 lbs-ft (13-20N•m) torque to provide good electrical contact and resistance to vibration.
- Sealed Terminal Connection – Precision factory molded terminal insulation 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 Batteries Must be Kept in an Upright Position**

**Widely Separated Bars**



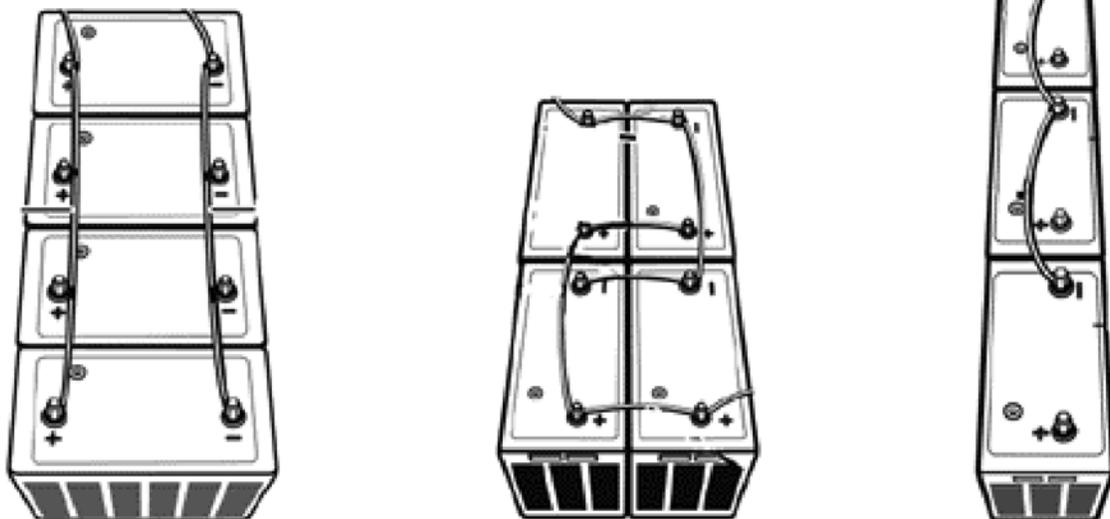
A



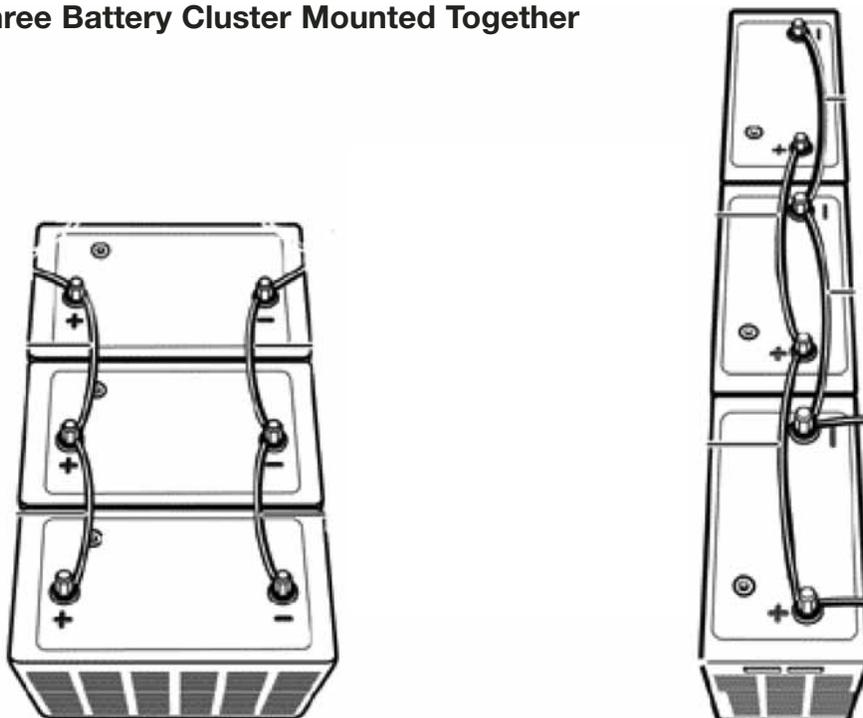
B

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

### Four Battery Cluster Mounted Together



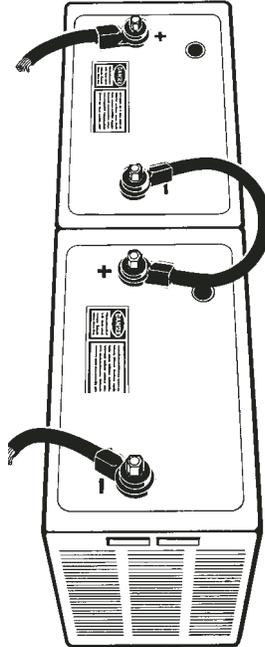
### Three Battery Cluster Mounted Together



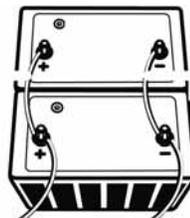
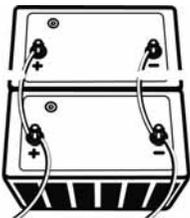
**Maintenance-Free Batteries Must be Kept in an Upright Position**

## Maintenance-Free Batteries Must be Kept in an Upright Position

24 VOLT

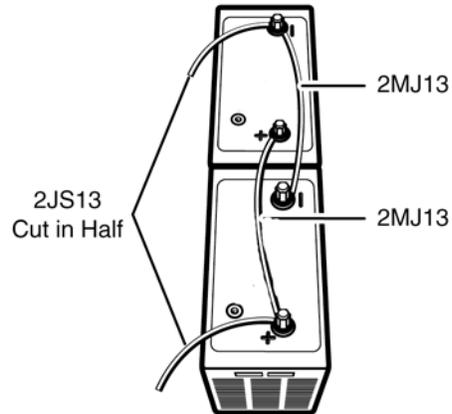
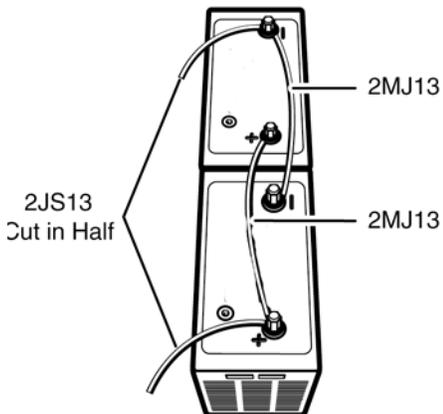


“A” Group

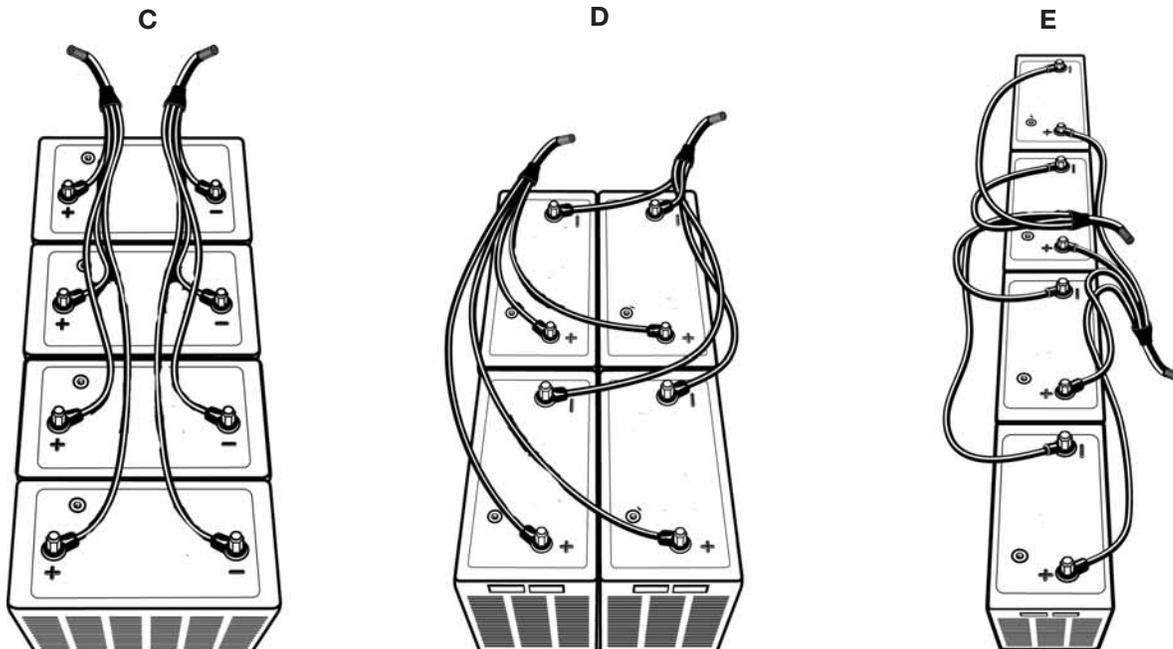


Pairs of Batteries  
Mounted Separately

“B” Group



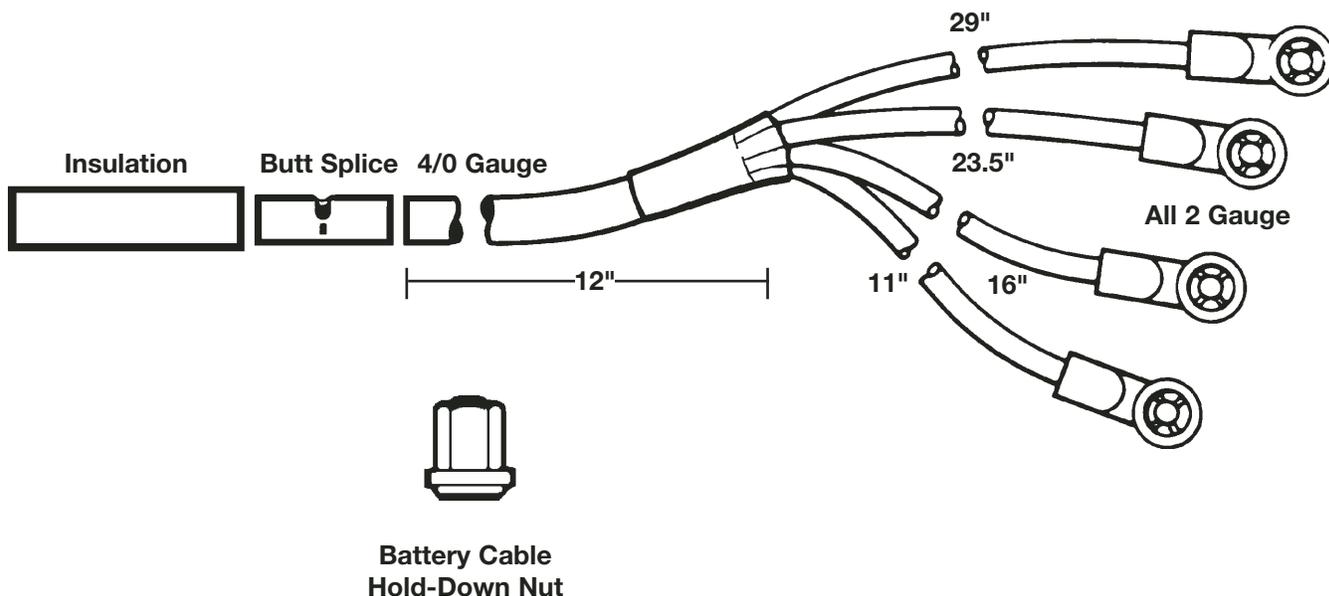
## Mounted Together



### 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

System Voltage and Type	Maximum Circuit Voltage Drop Per 100 Amps	Total Cranking Circuit Length in Inches										
		100	150	200	250	300	350	400	450	500	550	
12-Volt High-Output Heavy-Duty (4.5 - 7.8 kW)	w/Single Path** to-and-from Starter 0.075 Volts	00	000	0000 or 2-0	2-00	2-000	2-0000	In Parallel 2-0000 Positive Cables 2-0000 Negative Cables				
	w/Dual Path* to-and-from Starter 0.075 Volts (0.150 per LEG)	00			000	In Parallel 0000 or 2-0			2-00	2-000		
12-Volt Super Heavy-Duty (7.9 - 8.5 kW)	Single Path** 0.060 Volts	00	000	0000 or 2-0	2-00	2-000	2-0000	In Parallel 2-0000 Positive Cables 2-0000 Negative Cables				
	Dual Path* 0.120 per LEG	00			000	0000	In Parallel 2-00					
24-Volt Heavy-Duty (7.5 - 9.0 kW)	0.20 Volts	6	4	2	1	0	00	000	In Parallel 0000 or 2-0			

\* See Fig. 1: Dual Path Circuit  
\*\* See Fig. 2: Single Path Circuit

NOTE: Cable should meet or exceed SAE J1127.

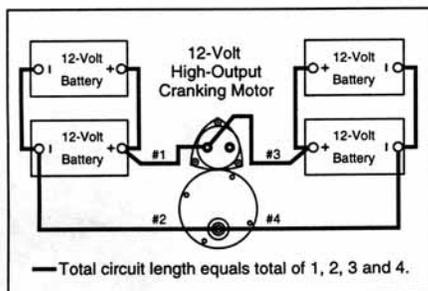


Fig. 1: Dual Path Circuit

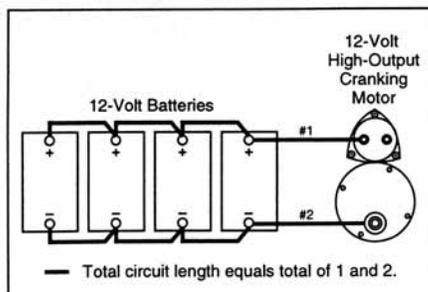


Fig. 2: Single Path Circuit

### APPENDIX 2

Replacement Wire Size Selection			
SAE Wire Size		Minimum Conductor Area	
No.	(mm <sup>2</sup> )	CMA	(mm <sup>2</sup> )
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.

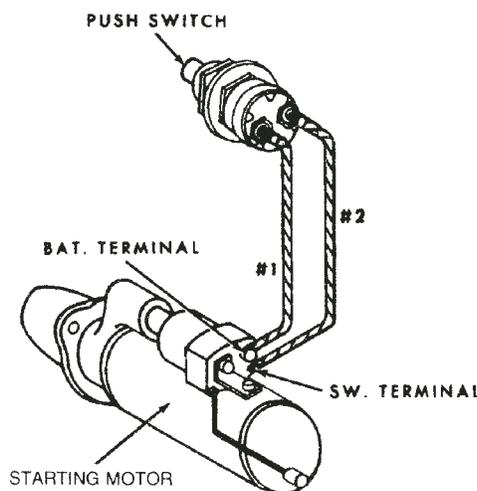
Cable should be protected by grommets when routed through sheet metal or frame holes.

#### Support

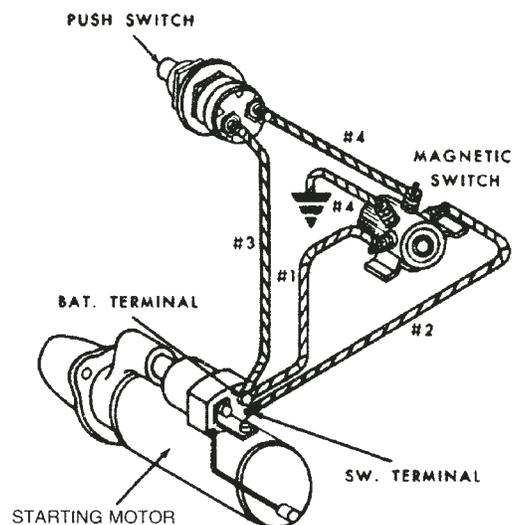
Due to physical size and weight, cables should be securely anchored as close as practical to each terminal connection. Reliability is improved by preventing terminal damage caused by ice accumulation, road shock, and vibration. Large cables should be supported every 2-3 feet.

**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
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	

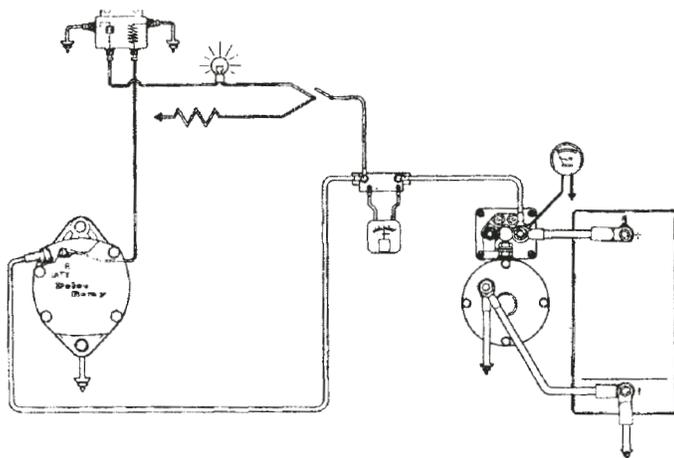
Maximum difference between battery voltage and generator voltage is 0.5 Volt for 12 Volt and 1.0 Volt for 24 Volt systems, at full rated output.

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

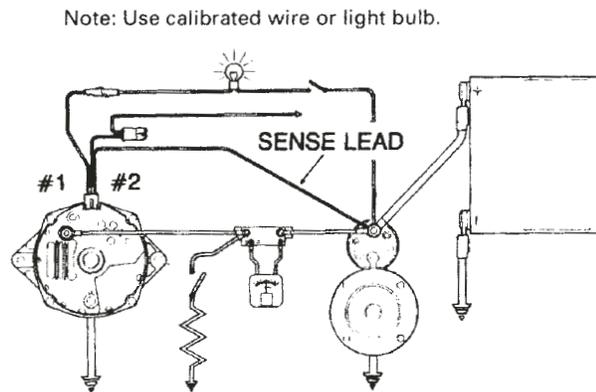
Cable gauge size calculation takes into account terminal connection resistance.

(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.**



1-WIRE SYSTEM



3-WIRE SYSTEM

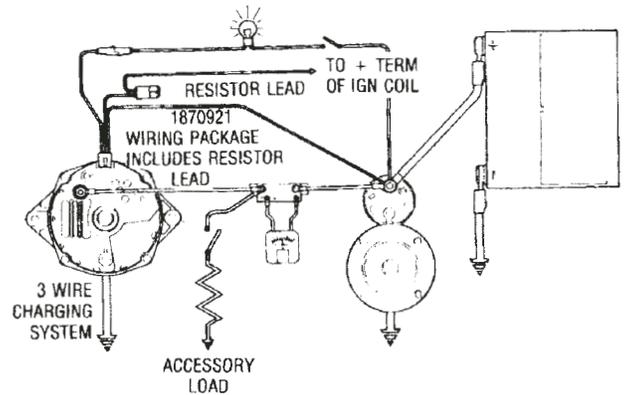
### Charging Systems

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".



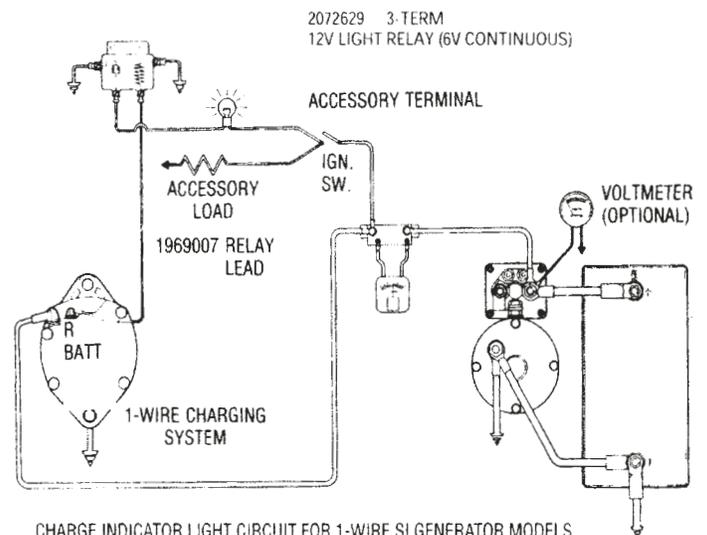
CHARGE INDICATOR LIGHT CIRCUIT FOR 1-WIRE GENERATOR MODELS

**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)

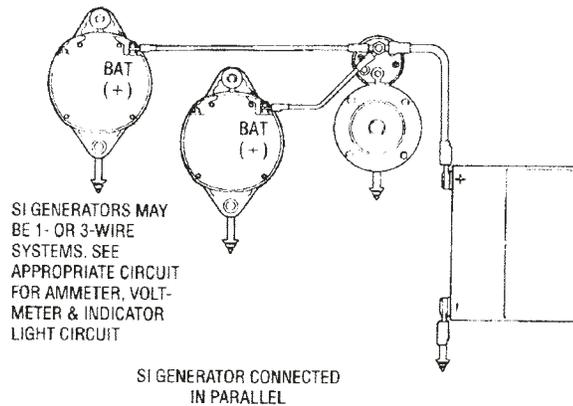
Some applications require a charging system with unusually high output. A single generator may not be adequate. Two generators may be connected in parallel as shown.

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

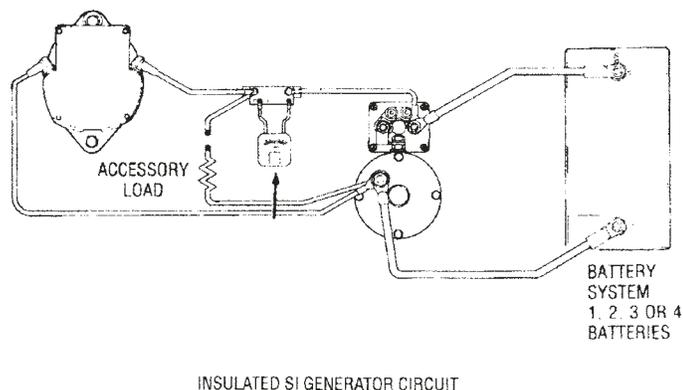
Each should be driven by a separate belt system, not by the same belt(s). Also mounting on opposite sides of the engine is recommended. Both must have the same ground polarity.

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**



**FIGURE 4**

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

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.

### Charging Systems (continued)

50VR

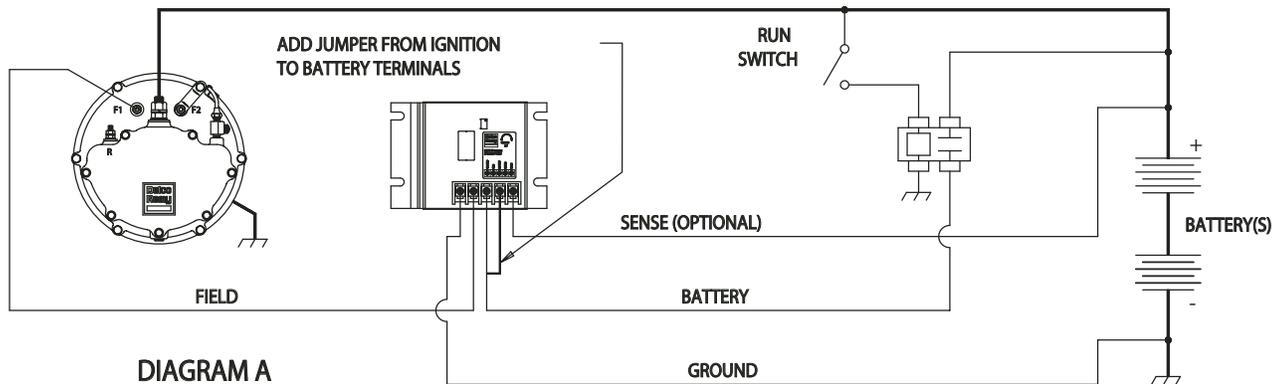


DIAGRAM A

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

1. Connect a wire between the relay coil positive and new regulator Ignition terminal.
2. Connect an appropriate gauge wire across the relay contacts. The relay may now be removed.

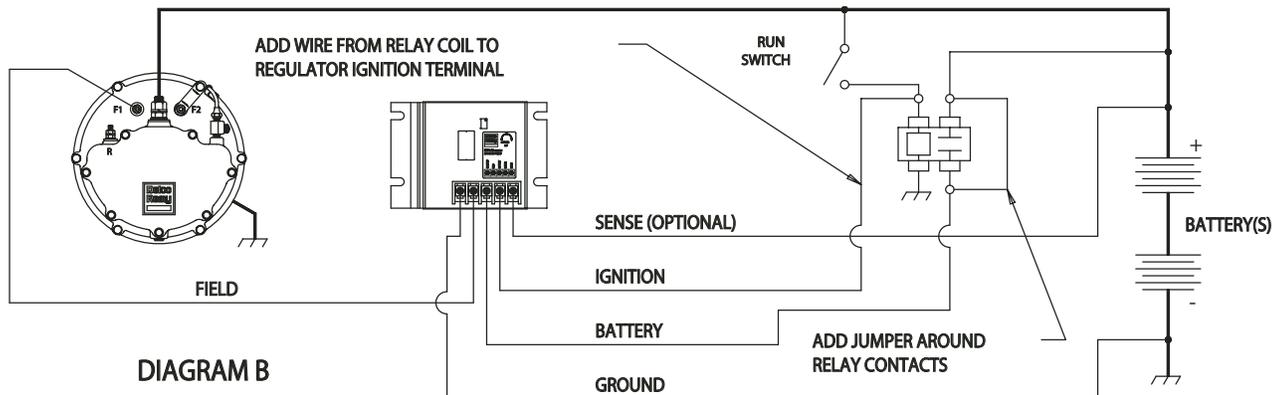


DIAGRAM B

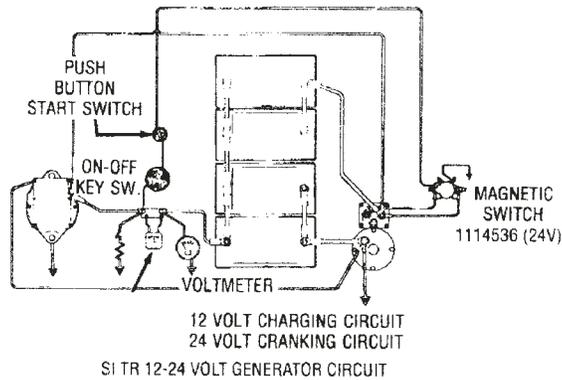
### Charging Systems (continued)

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.

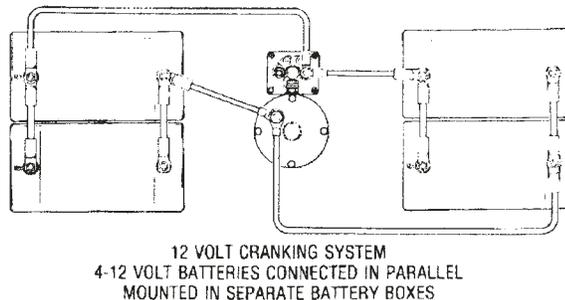


**FIGURE 11**

### 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.



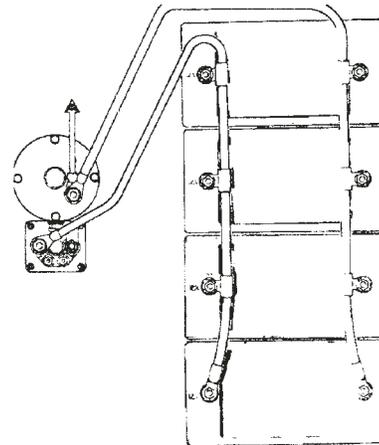
**FIGURE 12**

### 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.

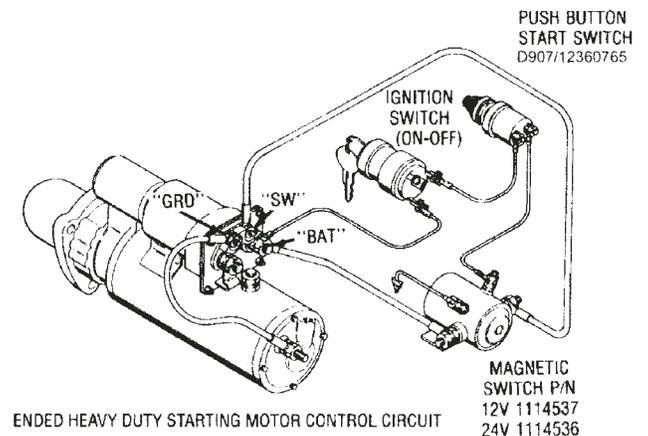


FIGURE 14

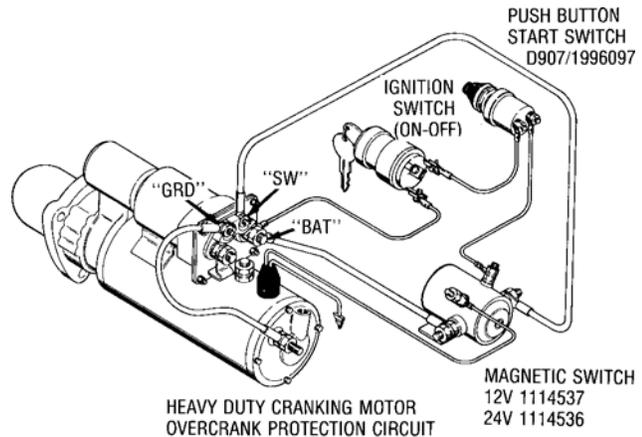
### Cranking Systems (continued)

Some starting motor models have an OCP (overcrank 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.



**FIGURE 15**

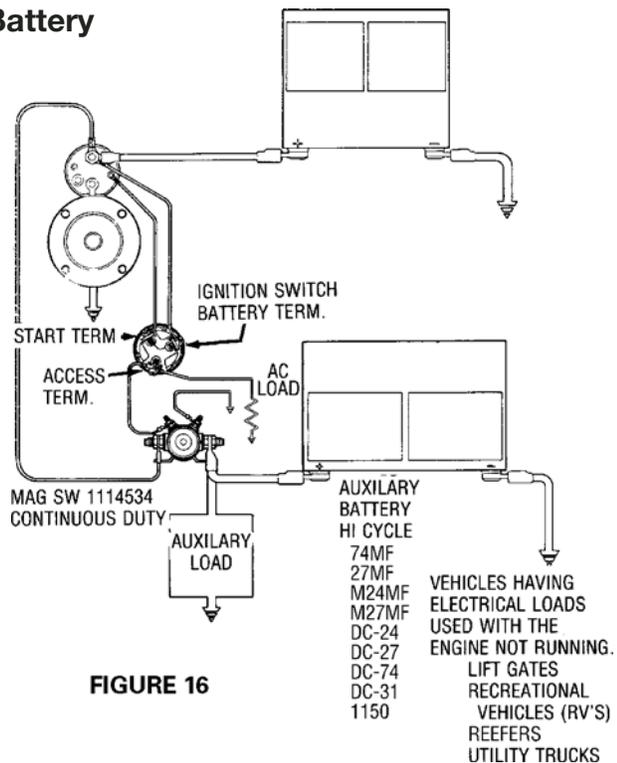
### Auxiliary Battery

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

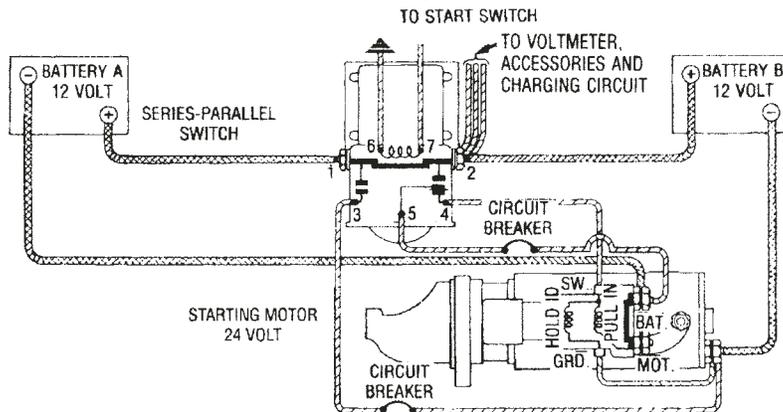


FIGURE 18

#### "B" CIRCUIT CHARGING

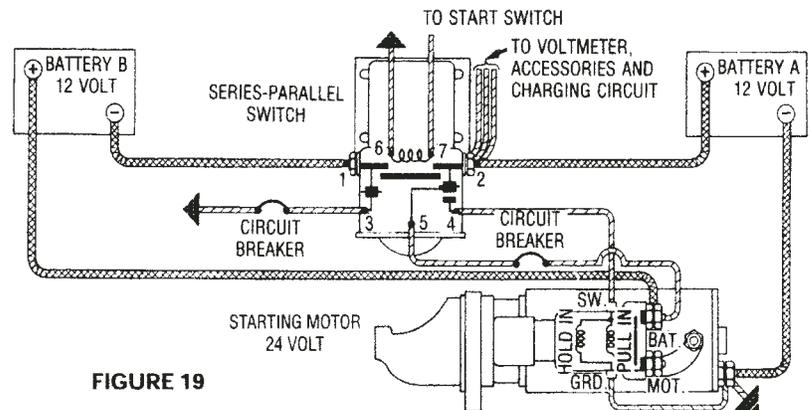


FIGURE 19

#### COMBINED SERIES-PARALLEL & MAGNETIC SWITCH CHARGING

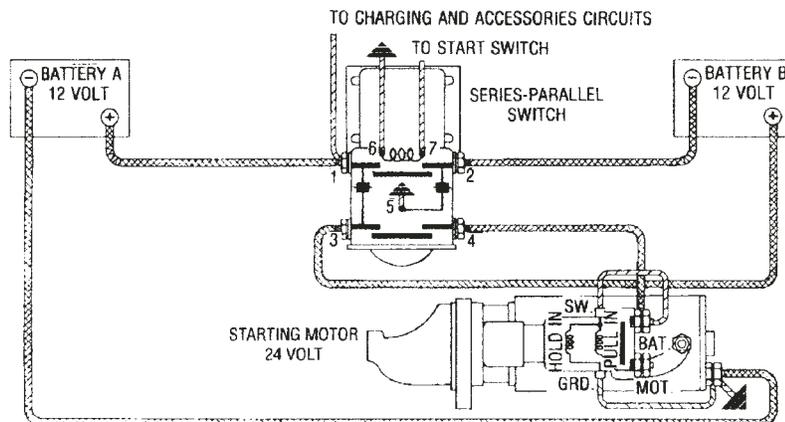


FIGURE 20

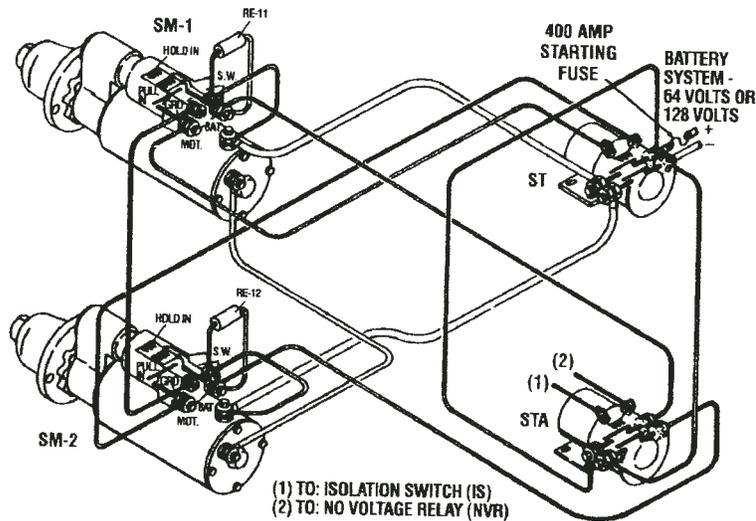


FIGURE 21

### 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 an 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 is 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.

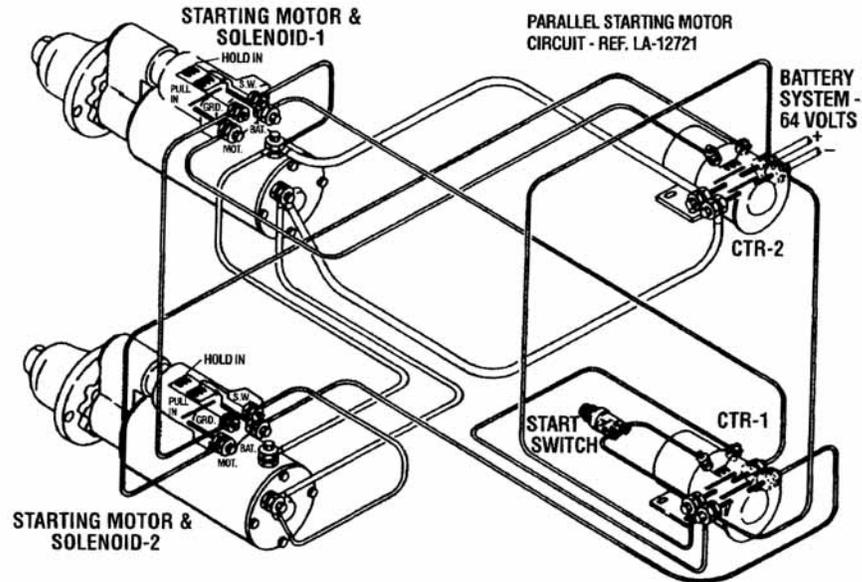
##### Cranking Circuit

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.

### 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.

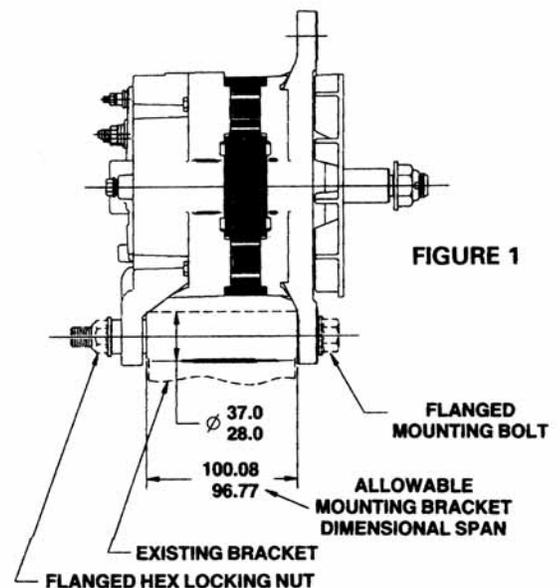


FIGURE 1

**Battery Mounting****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 manufactures 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 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 compliment 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 figure1).
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	Manufacturers	Engine Model Number	Starting System Voltages	Required Battery CCAs @0°F
<b>Caterpillar Tractor Company</b>	3208	12	1600	<b>Detroit Diesel</b>	6V53	12	900
	3206	12	1800		6V71	12	1200
	3406	12	C		671	12	1200
	3126	12	1800		8V71	12	1800
	C7	12	1800		6V92	12	1800
	C9	12	1800		8.2 liter	12	1250
	C10	12	1520		8V92	12	2500
	C12	12	1520		6.2	12	1100
	C15	12	1600		Series 50	12	2850
	C16	12	1600		Series 60	12	2850
	3306	24	800	MBE 900	12	2850	
	3406	24	900	MBE 4000	12	2850	
	3408	24	1040	8V92	24	900	
				12V92	24	900	
				12V71	24	900	
<b>Cummins Engine Company</b>	855 CID	12	1800	<b>International</b>	D150	12	1460
	B5.9	12	800		D170	12	1460
	ISB	12	660		D190	12	1460
	ISC	12	1250		DT466	12	1600
	ISL	12	1500		DT530	12	1800
	ISM	12	1800		T44E	12	1800
	NTC-290	12	1800		V800	12	1800
	F-300, etc.	12	1800		9.0 liter	12	1600
	VT-903	12	1800	<b>Mack Truck Maxidyne Engines</b>	6-cyl.	12	1360
	V8-210	12	1800		8-cyl.	12	1900
V555-BT225	12	1800					
KT-450	24	900					

Manufacturers (Foreign)	Engine Model Number	12 Volt Start Recommended CCAs	24 Volt Start Recommended CCAs
<b>Deutz</b>	F5L912 (289 Cubic In)	750	NA
	F5L912 (289 Cubic In) For 1984 Models	980	NA
<b>Fiat</b>	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
<b>Mercedes</b>	352 and 352A (346 Cubic In)	800	NA
	355 (589 Cubic In)	1160	NA
<b>Renault</b>	06.02.12 (335 Cubic In)	950	NA
	06.02.30 (537 Cubic In)	1740	NA
<b>Volvo</b>	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

NA: Not Applicable

### 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.



# CONVERSION CHARTS



## 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
5/32	.15625	3.96875	21/32	.65625	16.66875
11/64	.171875	4.36562	43/64	.671875	17.06562
3/16	.1875	4.76250	11/16	.6875	17.46250
13/64	.203125	5.15937	45/64	.703125	17.85937
7/32	.21875	5.55625	23/32	.71875	18.25625
15/64	.234375	5.95312	47/64	.734375	18.65312
1/4	.250	6.35000	3/4	.750	19.05000
17/64	.265625	6.74687	49/64	.765625	19.44687
9/32	.28125	7.14375	25/32	.78125	19.84375
19/64	.296875	7.54062	51/64	.796875	20.24062
5/16	.3125	7.93750	13/16	.8125	20.63750
21/64	.328125	8.33437	53/64	.828125	21.03437
11/32	.34375	8.73125	27/32	.84375	21.43125
23/64	.359375	9.12812	55/64	.859375	21.82812
3/8	.375	9.52500	7/8	.875	22.22500
25/64	.390625	9.92187	57/64	.890625	22.62187
13/32	.40625	10.31875	29/32	.90625	23.01875
27/64	.421875	10.71562	59/64	.921875	23.41562
7/16	.4375	11.11250	15/16	.9375	23.81250
29/64	.453125	11.50937	61/64	.953125	24.20937
15/32	.46875	11.90625	31/32	.96875	24.60625
31/64	.484375	12.30312	63/64	.984375	25.00312
1/2	.500	12.70000	1	1.00	25.40000



## DELCO REMY CORE POLICIES

### CORE CREDIT POLICY

#### 100% Core Credit

100% Credit for a purchase of an eligible Delco Remy Reman program core. 100% Core Credit on like for like product (series and voltage) purchase. Exceptions will be advertised. Twelve (12) month core credit eligibility from date of purchase.

**Example:**

1. **Purchase 10 units 42MT Starters**  
**Return 10 units 42MT Starters**  
**Receive Credit for 10 units 42MT Starters**
  
2. **Purchase 10 units 42MT Starters**  
**Return 10 units 40MT Starters**  
**Receive 0 Credit for 42MT Starters**  
**Core Bank - 10 units 40MT Starter**

Returns in excess of purchases will be put into a core bank or returned at customer's discretion.

**Example:**

1. **Purchase 10 units 42MT Starters**  
**Return 12 units 42MT Starters**  
**Receive Credit for 10 units 42MT Starters**  
**Core Bank - 2 units of 42MT Starters**

#### 0% Core Credit

0% Core Credit will be given for non-Delco Remy program cores or non-rebuildable cores.

**Examples of 0% credit:**

- Exploded armatures
- Missing or disassembled cores
- Rusted or junk yard cores
- Non-Delco Remy Reman program cores

### CORE RETURN POLICY

For cores returned through a third party, contact your company representative. For assistance with Delco Remy core returns call: 1-888-488-0276 or fax inquiries to 1-601-764-4447.

### CORE FREIGHT POLICY

Complete "Bill of Lading" as follows: Used Auto Parts. Each less than 50lbs., in package.

Value of reconditioning only, NMFC It 18630-3

**Ship Via:**

MegaSys, Inc., Instructional Letter. If no instructional letter on file, call 1-765-778-6839 or 1-765-778-6547. 7:00 a.m. to 5:00 p.m. Third party billing address: MegaSys, P.O. Box 550, Greenwood, IN 46143

#### WARRANTY RETURNS

**Ship Warranty Units to:**  
**Delco Remy Reliability Center**  
**118 Old School Drive**  
**Raleigh, MS 39153**  
**Phone: (601) 789-5784**

**Freight under 150 pounds:**

Ship UPS Ground using account no. 355-924

**Freight over 150 pounds:**

Call MegaSys, Inc., at 800-372-3555,  
 Ext. 6839 or 6547

#### NON-WARRANTY CORES

**Ship Core Only Units to:**  
**Delco Remy Reman**  
**Core Return Center**  
**715 Front Street**  
**Meridian, MS 39301**  
**Phone: 888-488-0276**

**Freight Terms:**

\*Collect: 500 lbs or more

\*Prepaid: 499 lbs or less

#### ALL 50DN UNITS

**Ship Warrantys & Cores to:**  
**A.D.E.**  
**420 Evans Ave.**  
**Reno, NV 89512**  
**Phone: 775-322-2157**

**Freight Terms:**

\*Collect: 500 lbs or more

\*Prepaid: 499 lbs or less