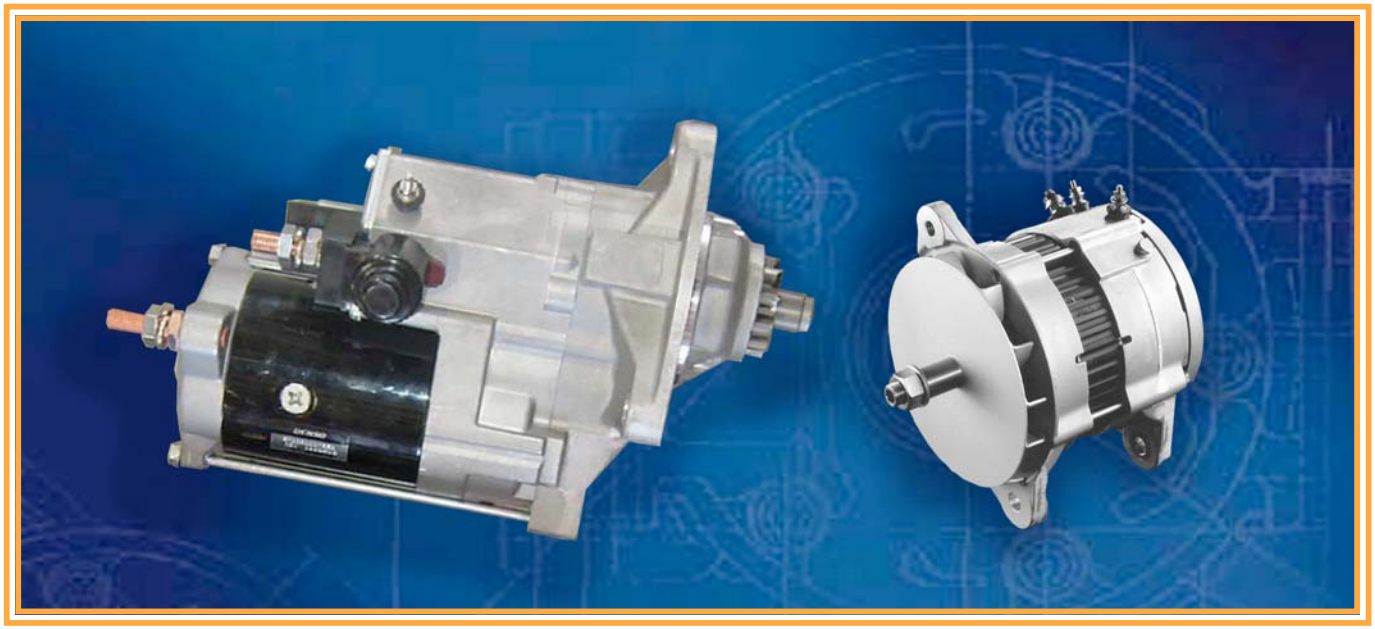


Starter and Alternator

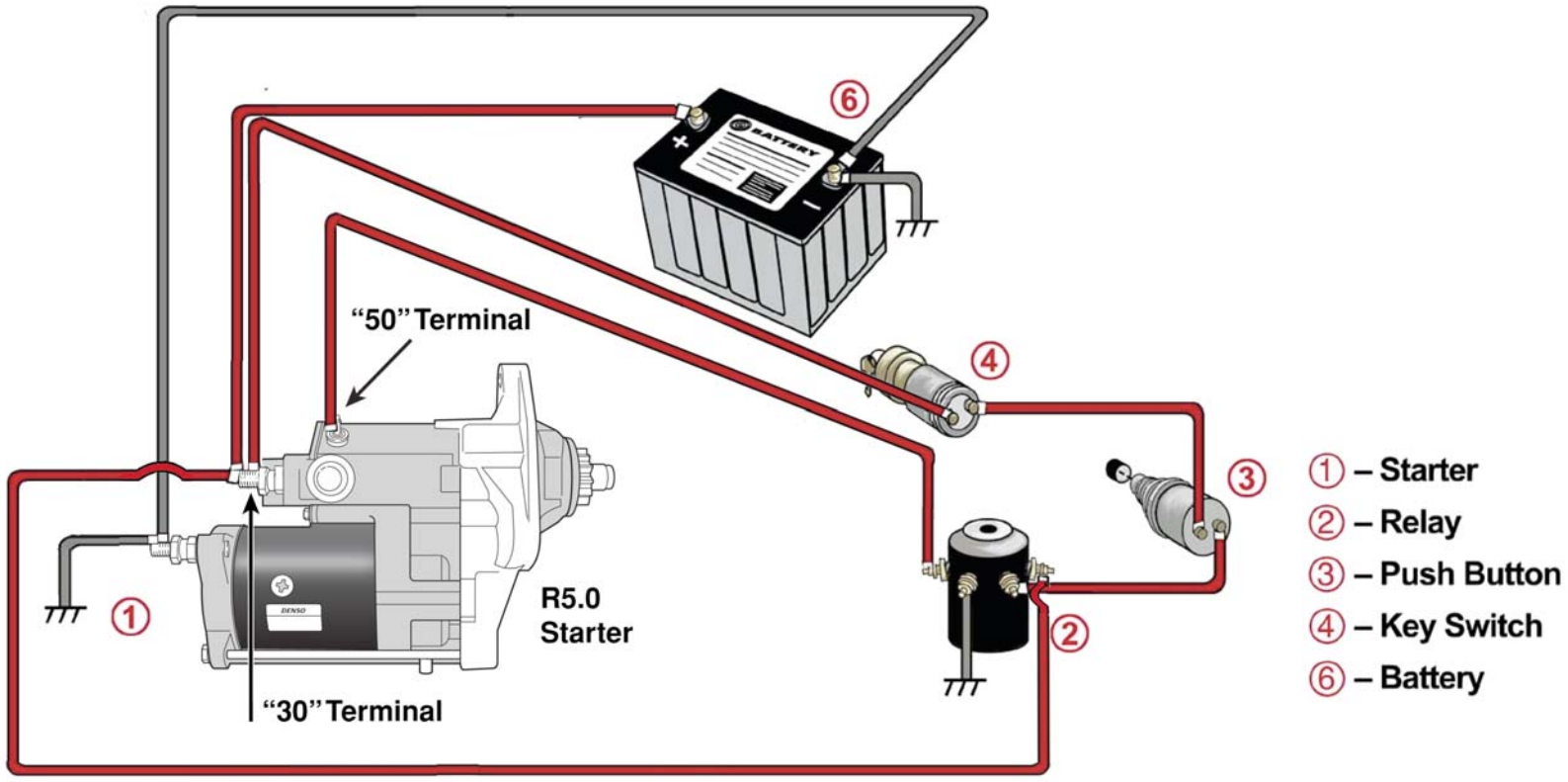
Troubleshooting & Diagnostics

DENSO

your Ultimate Fleet Solution

Starting System Troubleshooting

Starting problems may be electrical (e.g., faulty switch) or mechanical (e.g., faulty ring gear, wrong engine oil viscosity).System problems, their possible cause and the action required to correct them follow.



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Starting System Troubleshooting Chart

Symptom	Possible Cause	Corrective Action
Engine will not crank	Dead battery	Check battery state of charge. Recharge if possible. Replace if necessary
	Melted fusible link	Replace fusible link
	Loose connections	Clean and tighten connections
	Key switch or start switch contacts in poor condition	Polish contacts if possible, replace switch as necessary
	Solenoid hold-in coil open. Pull-in coil open or shorted.	Replace solenoid or starter
	Solenoid contacts worn away	Replace solenoid or starter
	Mechanical problem in engine	Check engine

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Starting System Troubleshooting Chart

Symptom	Possible Cause	Corrective Action
Engine cranks too slowly to start	Weak battery	Check battery. Recharge if possible. Replace if necessary
	Loose or corroded connections	Clean and tighten connections
	Faulty starter	Test starter, Replace if necessary
	Improper engine oil viscosity or problem with engine	Change oil. Check engine
Starter spins, but engine will not crank	Faulty over-running clutch	Check over-running clutch, replace starter if necessary
	Damaged or worn starter pinion gear or engine ring gear.	Check gears for damage or wear. Replace starter or ring gear

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Starting System Troubleshooting Chart

Symptom	Possible Cause	Corrective Action
Starter does not engage / disengage properly	Faulty starter solenoid,	Test starter. Replace if necessary
	Damaged or worn starter pinion gear or engine ring gear	Check gears for damage or wear. Replace starter or ring gear
Starter does not stop running	Key switch, start switch or starter relay contacts keep closing or stick.	Replace faulty component
	Over-running clutch sticks to shaft	Replace starter

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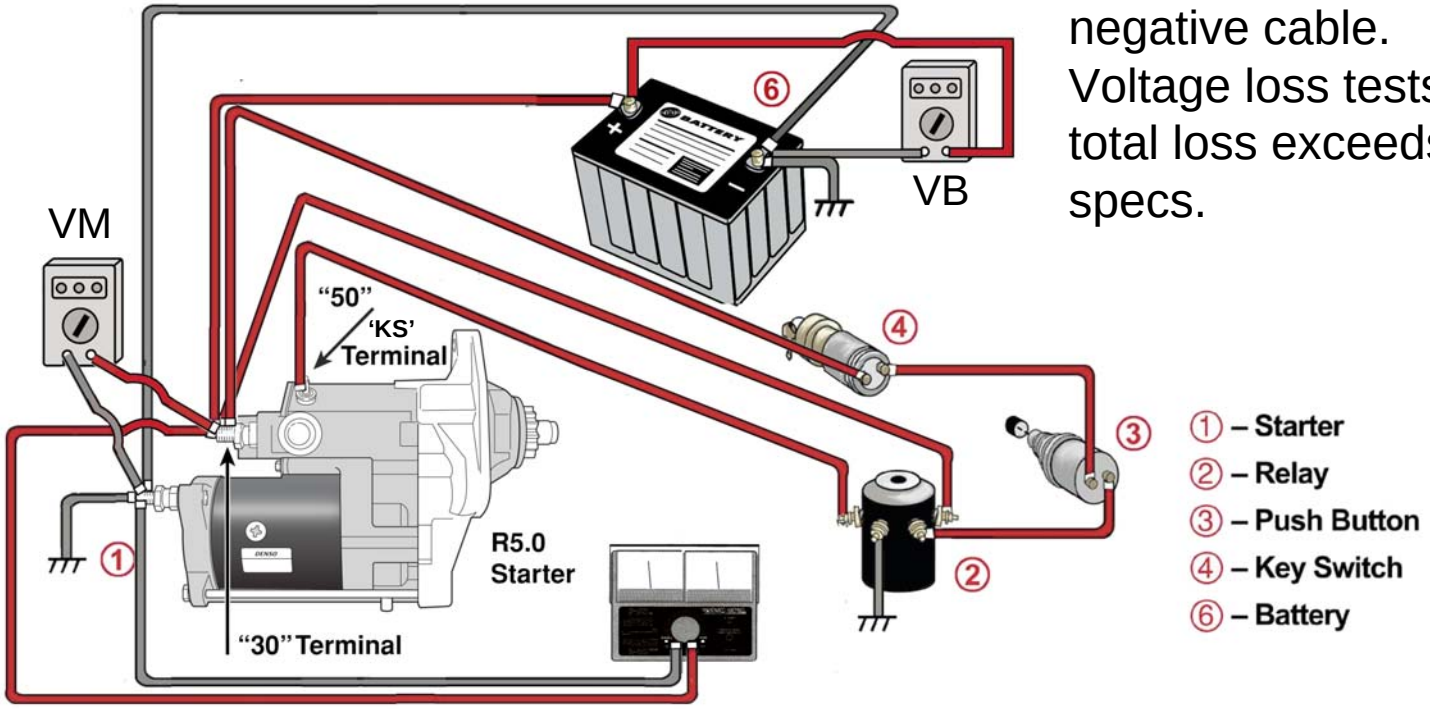
Starting System

System Voltage Loss Test

1. Adjust load to be 500 A. Record VB value.
2. Adjust load to 500 A. Record VM.
3. Subtract (-) VM from VB. Loss not to exceed 0.5V.

❖ Proceed to positive & negative cable. Voltage loss tests if total loss exceeds specs.



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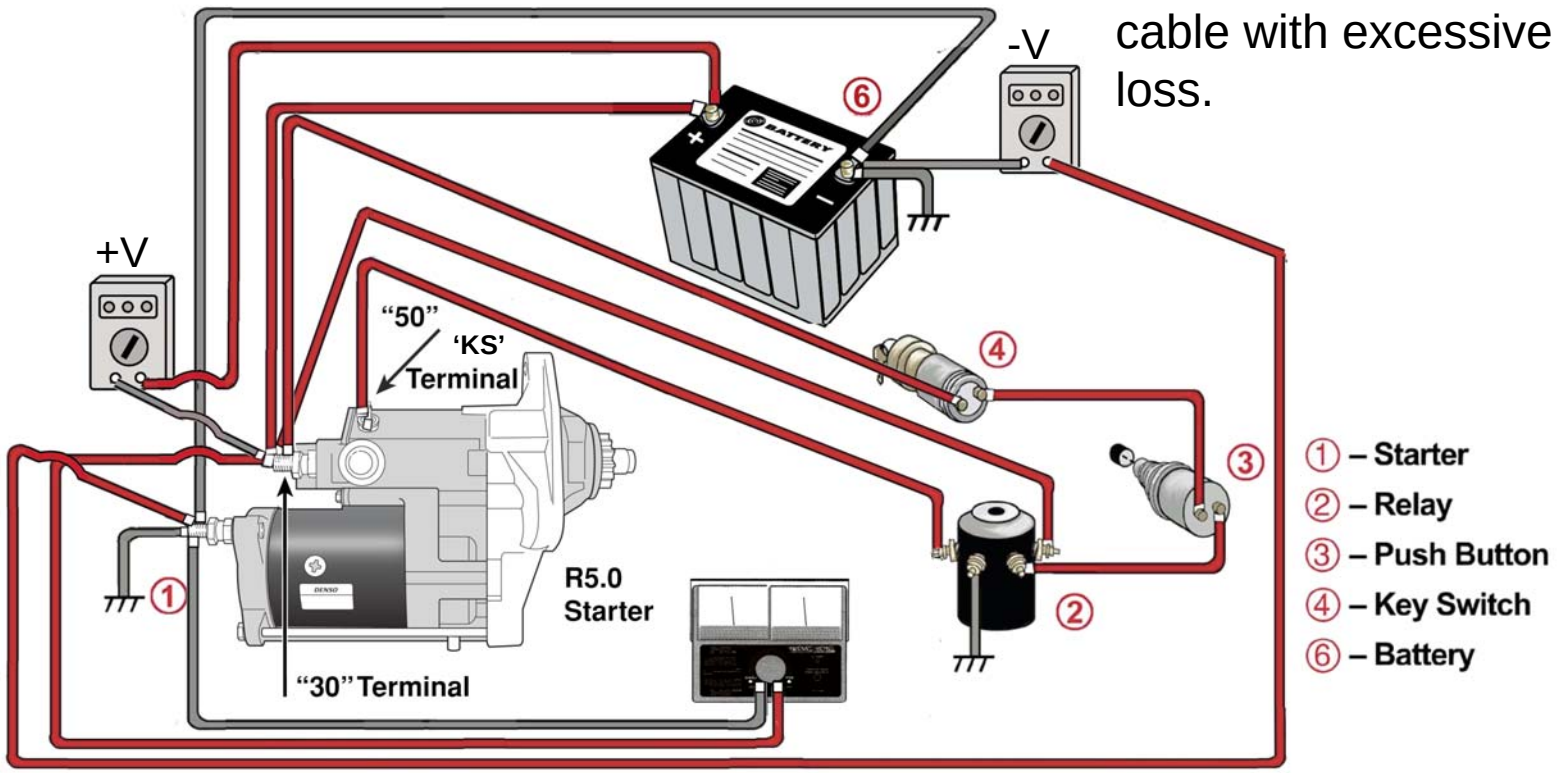
Starting System

Cable Voltage Loss Tests

1. Adjust load to 500 A. Record +V value.
2. Adjust load to 500 A. Record -V.
3. Add +V and –V.
4. Total loss not to exceed 0.5V. Repair or replace cable with excessive loss.



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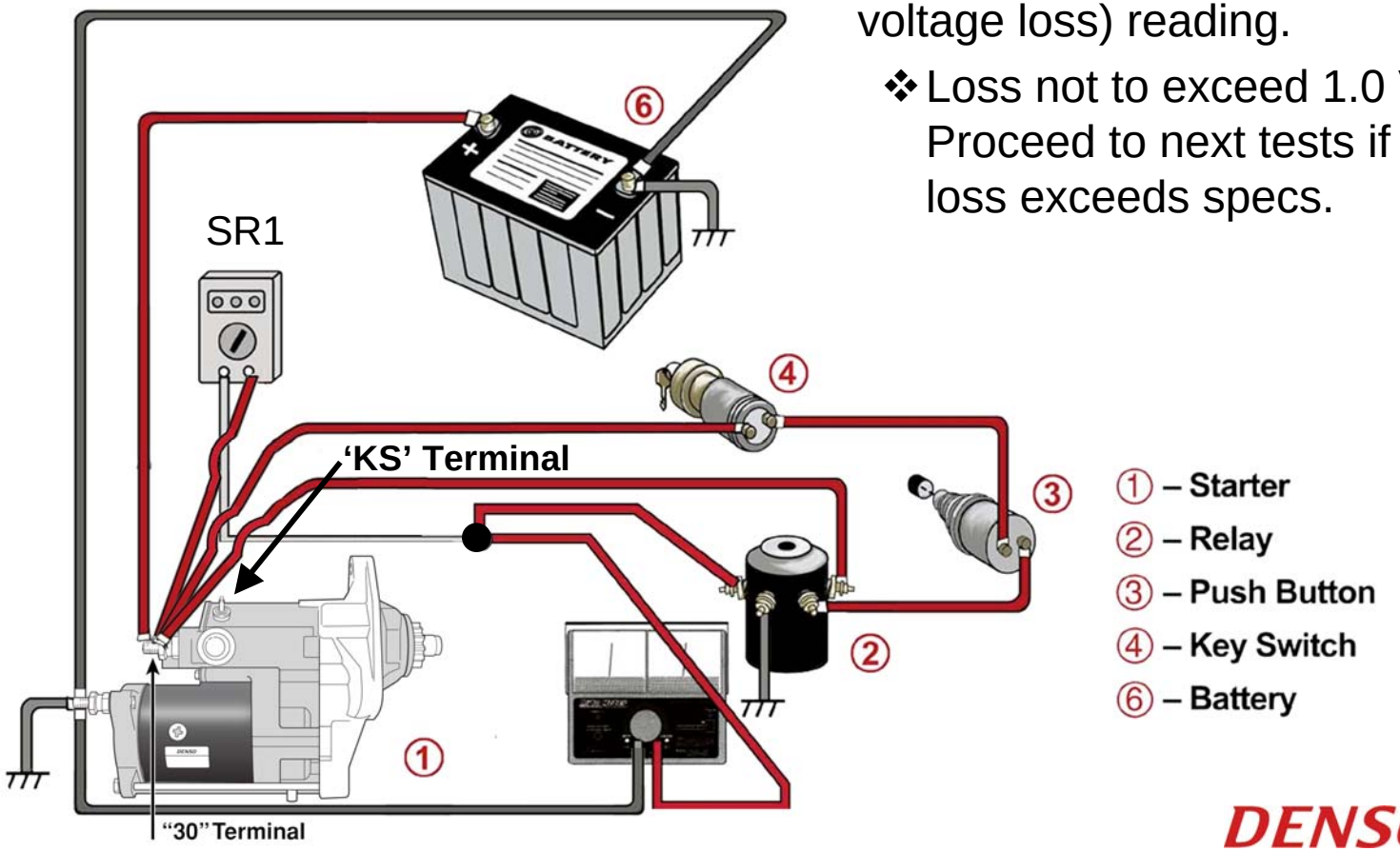
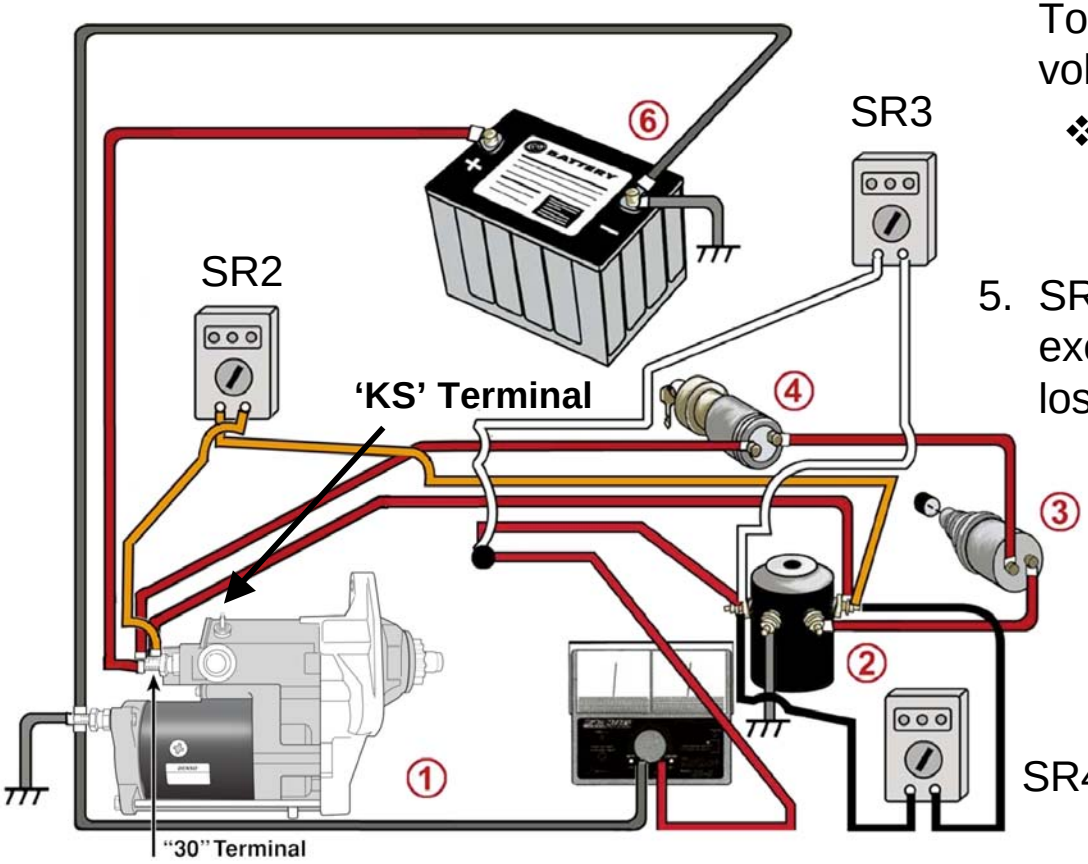
Relay Circuit Voltage Loss

1. Disconnect " KS" terminal from starter relay as illustrated.
2. Connect load tester and voltmeter as illustrated.
3. Turn on key switch, press start button. Listen for relay to close. Adjust load to 100 amps.
4. Record SR1 (starter relay voltage loss) reading.
   - ❖ Loss not to exceed 1.0 V. Proceed to next tests if loss exceeds specs.



Relay Circuit Voltage Loss

1. Connect load tester as illustrated (same as previous test)
2. Turn on key switch, press start button. Adjust load to 100 amps.
3. Connect volt meter to test points as illustrated. Record voltage reading at SR2, SR3 and SR4.
4. Add readings SR2 and SR3. Total equals relay wire voltage loss.
   - ❖ Loss not to exceed 0.8 V. Repair or replace wire with excessive loss.
5. SR4 (Relay Contact) not to exceed 0.2 V. Replace relay if loss exceed specs.



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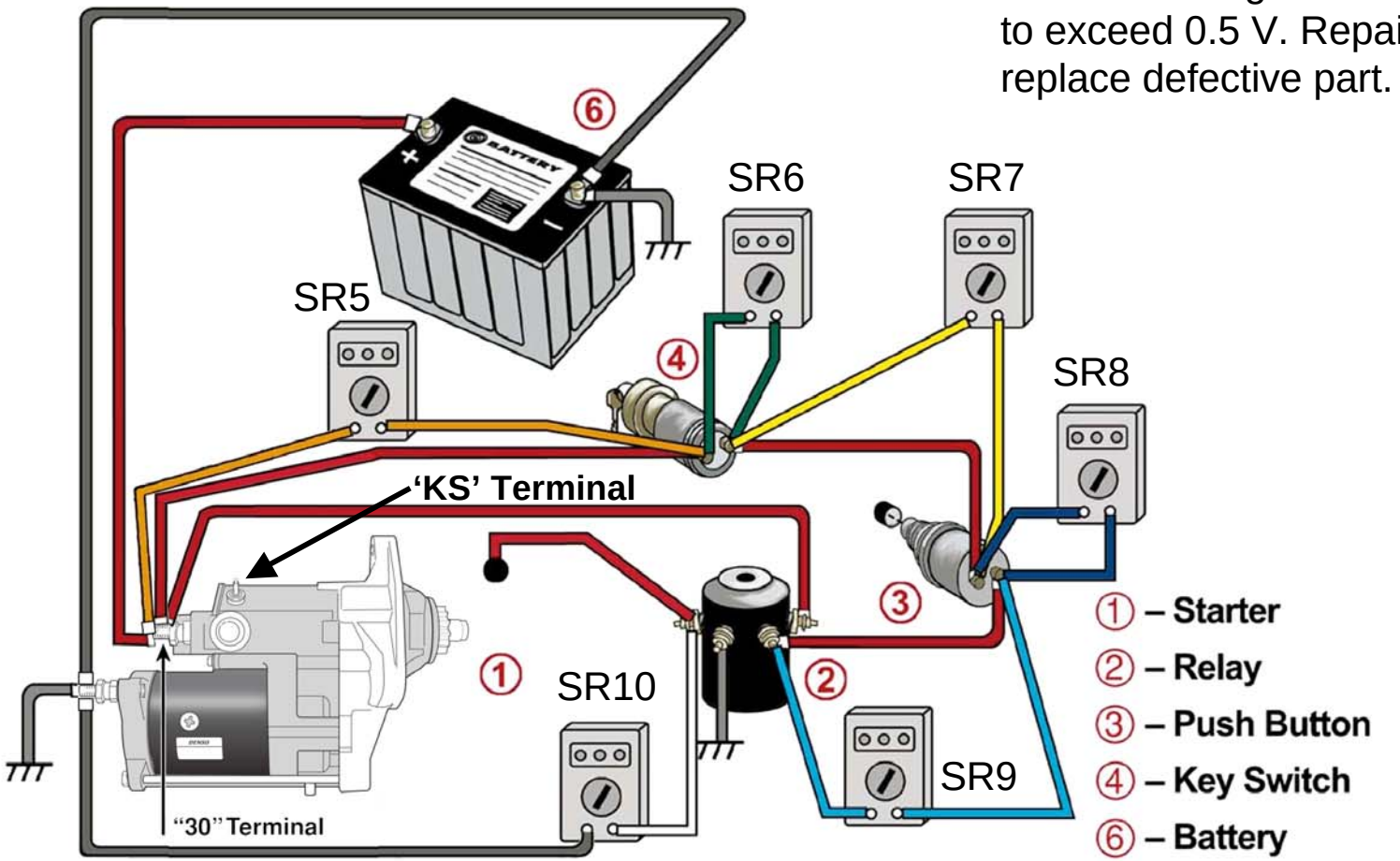
Relay Circuit Voltage Loss

1. Disconnect “KS” terminal wire
2. Turn key switch on, press start button.
3. Connect voltmeter to test points SR5 – SR10.
4. Record voltage readings at specified test points.

❖ Add all readings. Total not to exceed 0.5 V. Repair or replace defective part.



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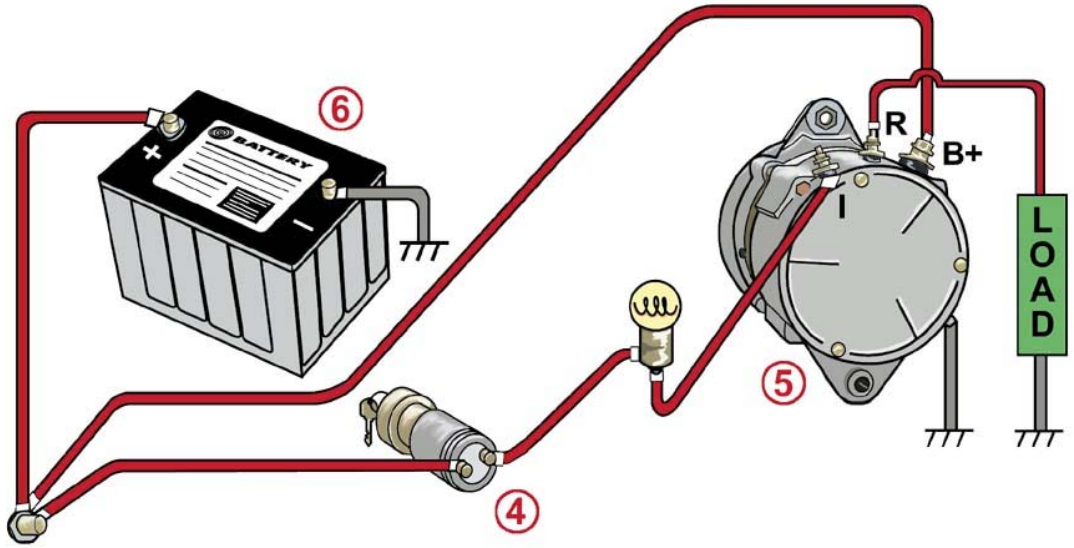
Charging System Troubleshooting

Precautions

- Do not operate the alternator with its B+ terminal disconnected.
- Do not disconnect the battery while the alternator is rotating.
- Never ground the alternator B+ terminal, It has battery voltage at all times.
- Never use a Mega-Ohm tester on an alternator.
- Never expose the alternator to water.



④ – Key Switch
⑤ – Alternator
⑥ – Battery

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Charging System Troubleshooting Chart

Symptom	Possible Cause	Corrective Action
Indicator lamp does not light with key switch on	1. Blown fuse	1. Check charge, Ignition and Engine fuses, replace as needed.
	2. Lamp burned out	2. Replace lamp
	3. Wiring connections loose	3. Tighten loose connections
	4. Defective relay	4. Check relays, if used, for continuity and proper operation
	5. Defective regulator	5. Replace regulator or alternator

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Charging System Troubleshooting Chart

Symptom	Possible Cause	Corrective Action
Batteries not charging	1. Insufficient belt tension	1. Tighten or replace
	2. Defective battery(s) or battery connections	2. Check battery(s0 and battery terminal connections
	3. Blown fuse or fusible link	3. Check fuse and fusible link;replace as needed
	4. Defective wiring	4. Check voltage drop
	5. Faulty alternator	5. Replace alternator
	6. Excessive electrical load	6. Reduce load by turning off all unnecessary accessories

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Charging System Troubleshooting Chart

Symptom	Possible Cause	Corrective Action
Constantly overcharging (battery electrolyte is depleted in a short time)	Battery Poor contact at voltage detection point of alternator Faulty voltage regulator	Faulty battery; replace Clean contact area Replace regulator or alternator
Abnormal Noise	Insufficient belt tension Faulty bearing	Tighten or replace Replace alternator

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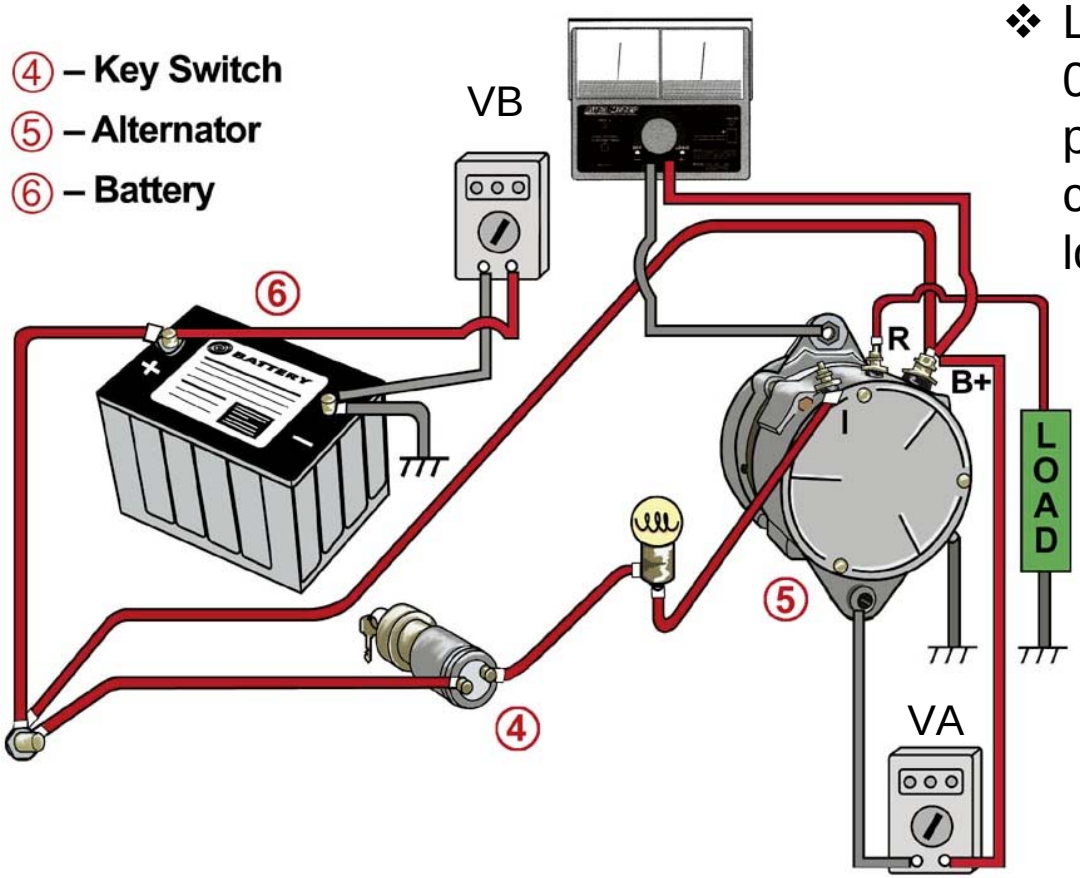
Charging System

System Voltage Loss

1. Adjust load to rated alternator output. Record VB (Battery Voltage) reading.
2. Adjust load to rated alternator output. Record VA (Alternator Voltage) reading.



3. Subtract VA (Alternator Voltage) from VB (Battery Voltage).

❖ Loss not to exceed 0.5V. Proceed to positive and negative cable loss tests if loss exceeds specs.

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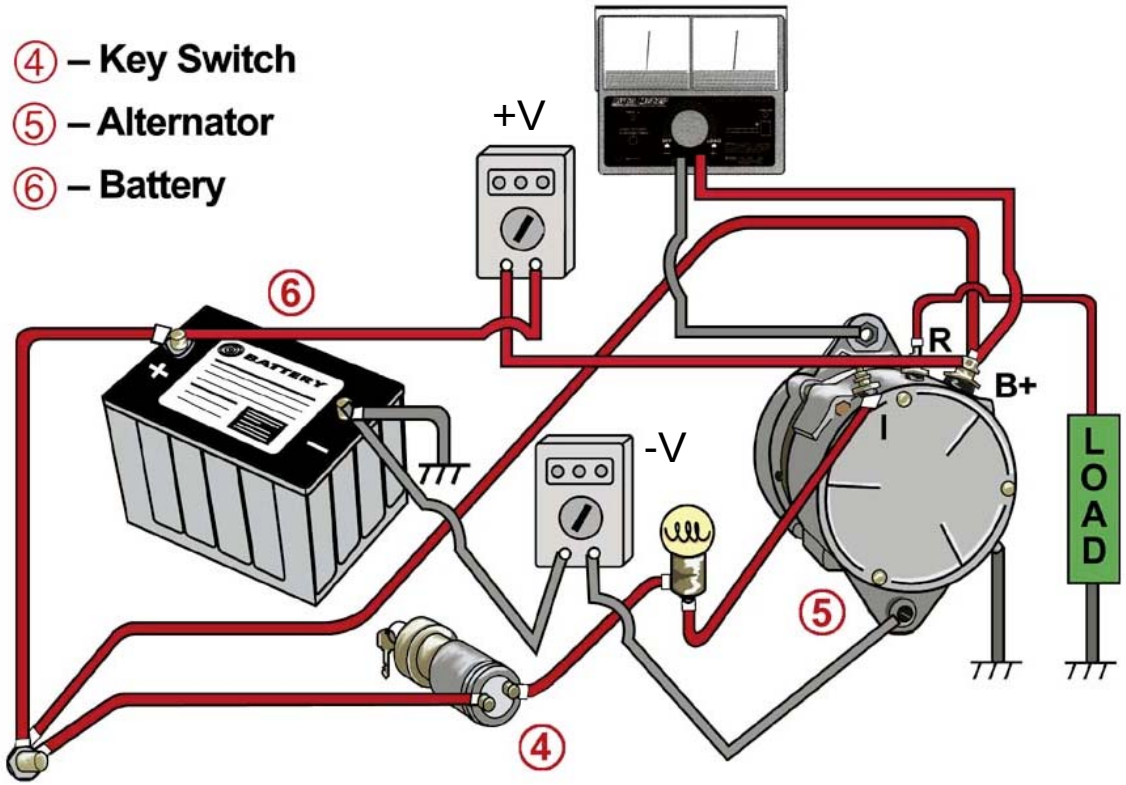
Charging System

Cable Voltage Loss Test

1. Adjust load to rated alternator output. Record +V (Positive Cable Loss) reading.
2. Adjust load to rated alternator output. Record –V (Negative Cable Loss) reading.

❖ Loss not to exceed 0.5V.
Repair or replace cable with excessive loss.



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New Technology

The DENSO R5.0 starter does not generate the same amount of heat as our competitors.

Overcrank protection not necessary.

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