

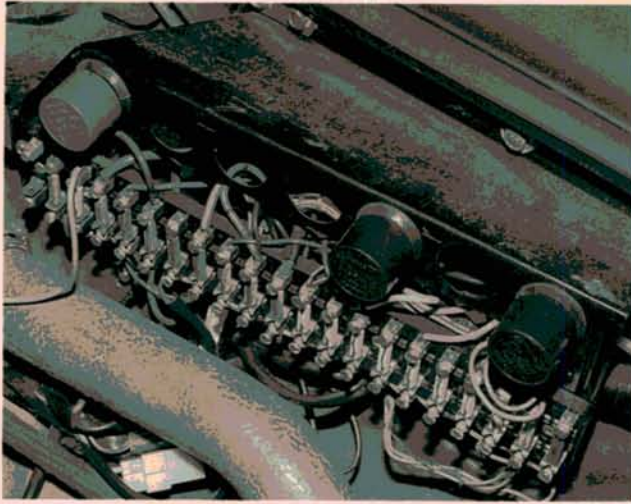


Many of us received our earliest Electrical Service training as youngsters during the winter holiday season. When we were old enough, we helped unpack the strings of colored lights used to decorate the tree. One by one the strings were added, until the branches sagged under the weight of the assembled candlepower.

After all the strings were hung, it was time for Dad to plug the tangled mass of electrical plugs into the wall outlet. Each year at least one string of lights refused to light, introducing the young technician to the series circuit.

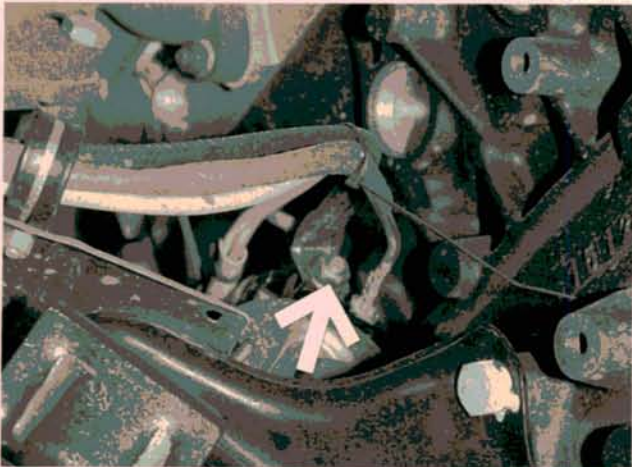
Dad worked diligently to find the dead bulb that was interrupting the circuit, sending a shower of pine needles to the floor in the process. Finally, the culprit was located and all the lights glowed, until the following year when the dead bulb ritual was repeated.

Life would be pretty easy if troublesome Christmas tree lights were all we had to deal with. But winter always seems to bring a new assortment of electrical problems that are unique to the season. We hope the following tips will help the months before spring pass a little easier.



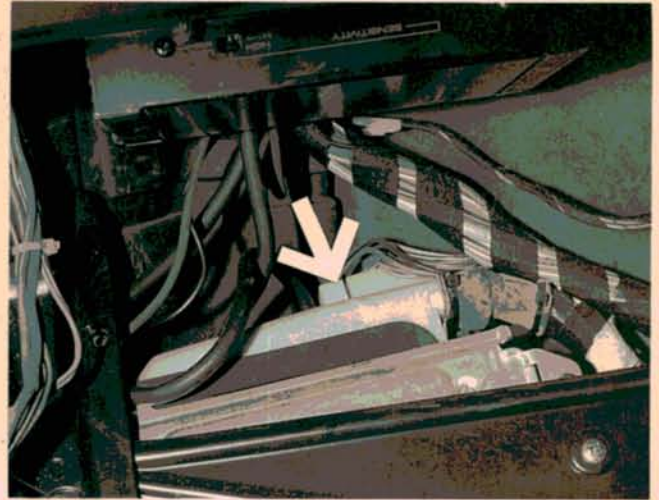
REVISED PORSCHE FUSE RATINGS

The recommended fuse ratings have been changed from 25 to 30 amps for three circuits on 1989-90 Porsche 911 models. Increased amperage fuses (30 amp) may be used for fuse 2 (oil cooler blower), fuse 13 (sunroof/cab top), and fuse 39 (A/C condenser blower). The circuits protected by these fuses may draw current greater than 25 amps without causing damage to the electrical system wiring. As a result, 30 amp fuses may be installed without additional modification.



VOLKSWAGEN FOX CRANKING PROBLEMS

A loose nut at starter terminal 30 may cause a no start or discharged battery on some Volkswagen Fox models. Disconnect the battery ground terminal, then inspect and clean the starter connections as necessary. Torque the terminal 30 nut to 10 Nm (7.5 ft-lb) and reconnect the battery ground terminal. If the starter won't engage, check the fuse box for proper seating of the wire bridge between terminals 36 and 38. The bridge supplies power to the starter solenoid.



PORSCHE CONTROL UNIT MEMORY

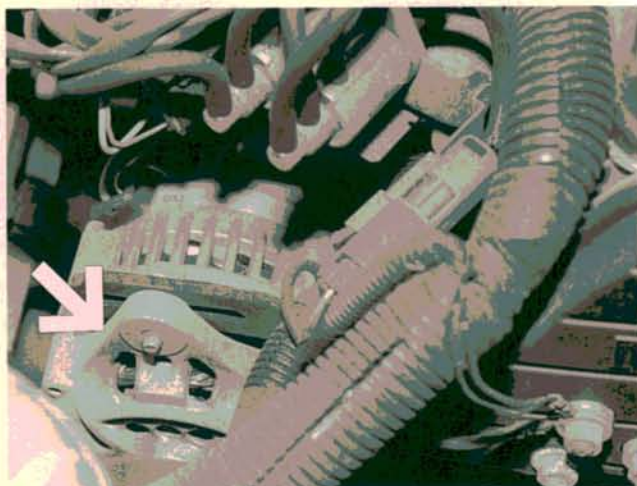
Porsche 928 S4 and 944S models with DME or EZK/LH injection control units have a performance curve memory which is maintained by supplying battery voltage to ECU terminal 30. This memory is lost if the battery or ECU are disconnected. Run the engine for at least 10 minutes to restore the performance curve memory. Engine performance may be erratic during this period. Specifications such as idle speed, air/fuel ratio, and ignition timing should not be checked or adjusted until the memory has been restored.



FLICKERING VOLKSWAGEN BATTERY INDICATOR LIGHT

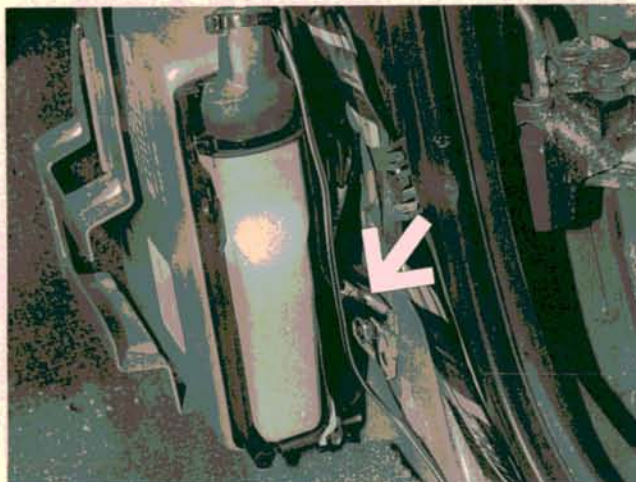
The battery indicator light may flicker on some 1983-87 Volkswagen models, except Vanagons. The flickering light may be caused by loose wiring eyelet connectors at the alternator. Inspect the eyelet connectors for a brownish discoloration caused by high resistance. If discoloration is visible, replace the nut and eyelet connectors. To make sure the alternator nuts don't loosen, torque the small nut at alternator terminal D+ to 3 Nm (2.2 ft-lb). Torque the large nut at the alternator B+ terminal to 16 Nm (12 ft-lb).

Electrical Service



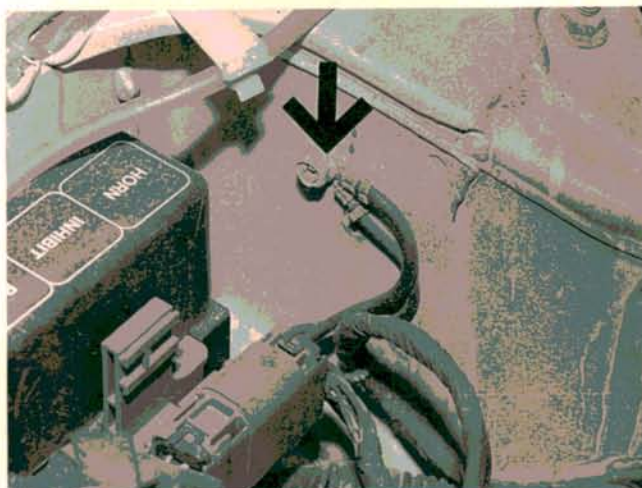
NISSAN PULSAR NX NO RESTART

A 70 amp alternator (P/N 23100-70A00R), adjusting bar (P/N 11715-01M03), and fan belt (P/N 11720-67A00) are available to correct low charging rates on some 1987-88 Pulsar XE and Sentra models. Low speed driving, heavy accessory loads, and low alternator output may cause a low or dead battery and no restart condition on these models. Before replacing the alternator, test the charging system to make sure that low alternator output is causing the discharged battery.



VOLVO 7 SERIES GROUND CONNECTIONS

Many of the electrical components on Volvo 7 series models are grounded at a central grounding terminal located at the right kick panel. If any of these components fail, check the harness connectors at the bottom of the kick panel for proper attachment to the ground terminal. A loose, corroded, or damaged ground connection at this point can cause any number of electrical problems. Begin any electrical diagnosis by removing the A pillar trim (for a quick inspection of the grounding terminal.)



OVERHEATED NISSAN GROUND WIRE

A damaged throttle body fuel injection mixture heater may cause an overheated ground wire on some 1987 Nissan Pulsar NX and 4WD Sentra wagon models. The ground wire is located in the main harness and runs between the mixture heater and a grounding point at the right strut tower. If the mixture heater shorts, the harness may be destroyed by the overheated wiring. These models were recalled for mixture heater replacement under warranty, but there's a chance that some were not replaced.



VOLVO BATTERY REPLACEMENT

There may be insufficient clearance for the ignition control unit when replacing the battery on Volvo 760 Turbo models. Relocate the control unit approximately two inches upward to ensure proper contact with the sheet metal. Drill new mounting holes, then install the control unit using the original screws. Do not alter the control unit's electrical connector direction. The connector must point downward and the aluminum cooling plate must be properly installed.

Electrical Service



SAAB 900 FUEL PUMP AND GAUGE MALFUNCTION

Overheated electrical terminals at the sending unit may cause erratic fuel gauge and fuel pump operation on some Saab 900 models. Remove the trunk floor and sending unit rubber cover. Perform a continuity check while moving the sending unit wire leads. If a poor connection is found, replace the damaged terminal with a new terminal (P/N 85-82-090). Reconnect the sending unit and test the fuel gauge and fuel pump operation. Install the sending unit rubber cover and trunk floor.



VOLKSWAGEN COLD START

Some 1986-88 Volkswagen Jetta GLI and Scirocco models equipped with 16-valve engines may be hard to start at below freezing temperatures. This condition may be caused by an inadequate ground circuit to the ignition system. The weak ground causes a voltage drop to the ignition system during cranking. To repair this condition, an additional ground wire (P/N 533 971 235) is available for installation between the battery ground post and the upper transaxle mounting bolt.



SAAB 900 ENGINE GROUND POINTS

Loose or dirty fuel injection system ground wires may cause poor driveability and starting difficulties on some Saab 900 Turbo models. The main fuel injection ground wires are bolted to the engine lifting lug at the front of the engine (arrow). Make sure that the bolts and wire terminals are clean and correctly tightened to 10 Nm (7.4 ft-lb). The ground wires should not be moved from these ground point locations.



BMW 7 SERIES CHARGING RATES

Under certain driving conditions, particularly during winter, the battery in BMW 735 and 750 models produced between January 1987 and September 1988 may not receive a sufficient charge and the engine may not restart when turned off. Smaller diameter alternator pulleys are available to correct these low charging rates. On 735 series vehicles, install pulley P/N 12 31 1 722 983. On 750 series vehicles, replace the existing alternator pulley with P/N 12 31 1 720 368, and fan wheel P/N 12 31 1 725 734.