Service Manual

Section 3 (32)

Charging system

240, 260
1975-19..

Fault tracing

VOLVO

TP 30729/1
3000.03.85
Printed in U.S.A.

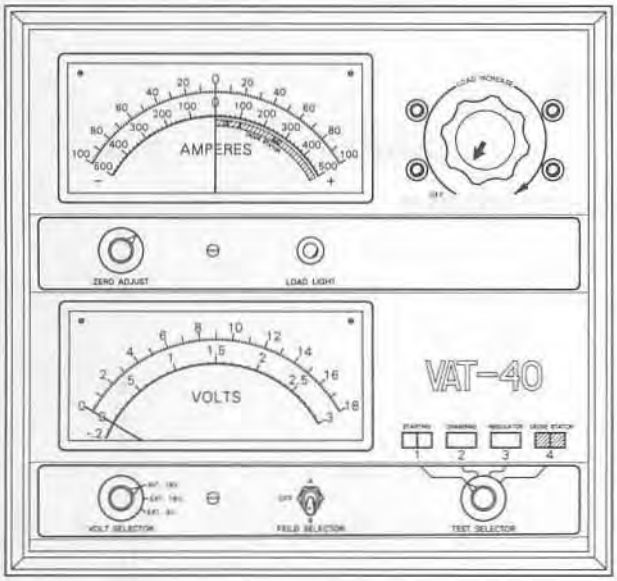
Charging System Fault Tracing

240/260; 1975 – 19..

Contents

Order number: TP 30729-1

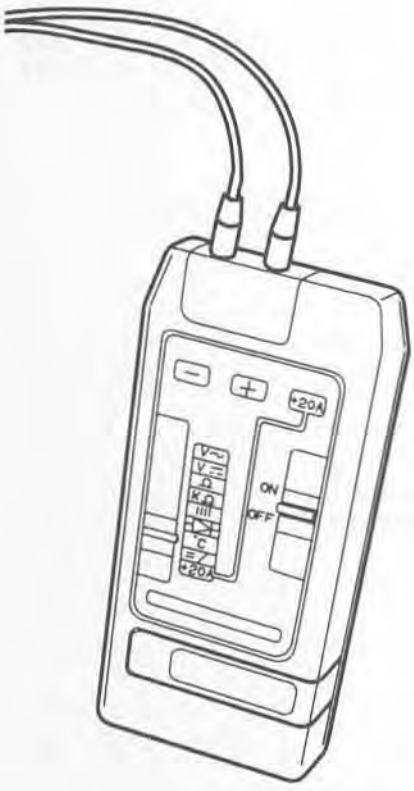
Test equipment



Marquette 42-130 volts ampere tester, Sun Vat-40 volts ampere tester (or equivalent)

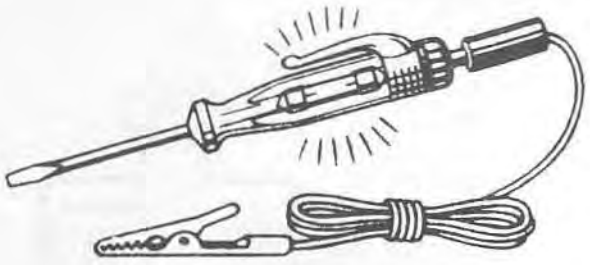
The unit contains a voltmeter, ammeter, built-in carbon pile resistor, and a diode/stator tester.

When using this equipment or similar equipment, follow the manufacturer's instructions.



Digital multimeter (Volvo 9996525-3, Fluke 8022B or equivalent)

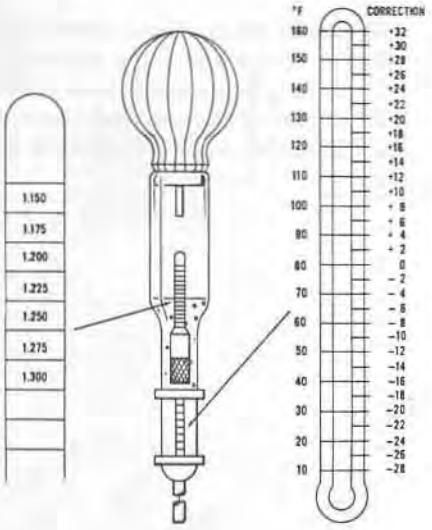
Used to measure current, voltage and resistance. Remember: To take resistance readings properly, the circuit being tested must be electrically disconnected from adjacent circuits and voltage should not be present.



133 427

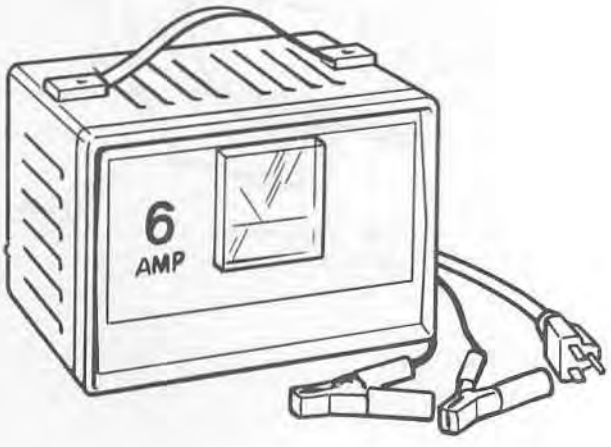
Test light

Used to check for current drain or to check for voltage present in a circuit. Test light glows when approximately 150 milliamperes flow through the light (the amount of current needed to illuminate the test light varies between test lights; 150 milliamperes is approximate.)



Hydrometer with thermometer (Volvo 998-5011-7, Snap-On BB4A or equivalent)

The hydrometer is used to measure the specific gravity of the electrolyte in battery cells. This measurement gives an indication of the battery's state of charge.

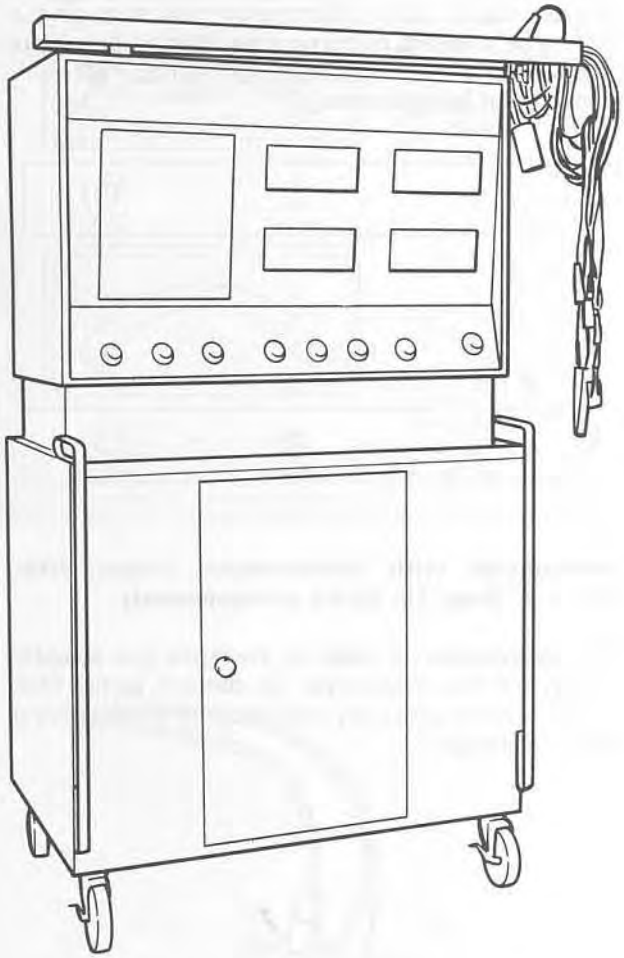


Low-amperage charger (Marquette Model 30-136, Schumaker 43141 or equivalent)

Recharges 6 and 12 volt batteries in 3 to 7 hours. Slow charge of 6 amps prevents battery damage caused by overheating.

Suggested equipment

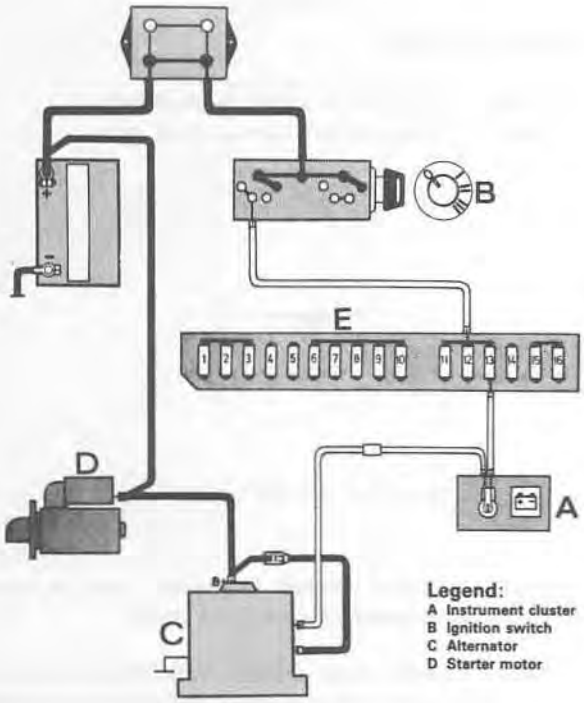
This equipment is strongly recommended.



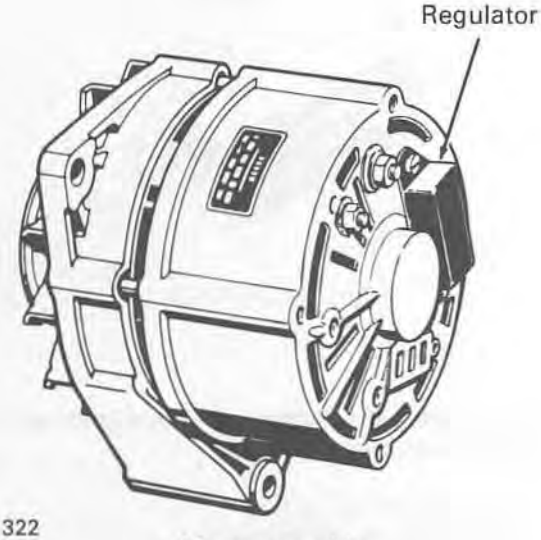
Oscilloscope (automotive)

Gives a visual indication of the alternator output. Can be used to quickly analyze alternator faults. Refer to manufacturer's instructions provided with the unit. (Examples of normal and abnormal scope patterns are included in Specifications Section.)

Charging system, brief description



NOTE
Drawing to the left is only representative of charging systems in general. Refer to specifications for specific wiring diagrams.



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Alternator with integral regulator

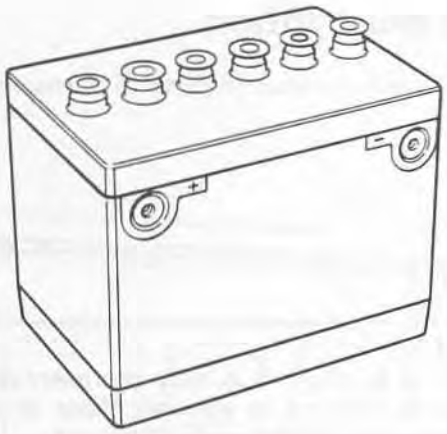
The charging system consists of three components, the alternator, battery, and voltage regulator.

A) Alternator

Converts the rotary motion of the engine into an electrical current. There are two general types of alternators used on Volvos. One type uses an external regulator and the other an integral (built-in) regulator. Shown is a representative drawing of an alternator with integral regulator.

B) Battery

Stores an electrical charge for starting the car. The battery also helps smooth out voltage fluctuations. There are three types of batteries, standard, low maintenance, and maintenance free.



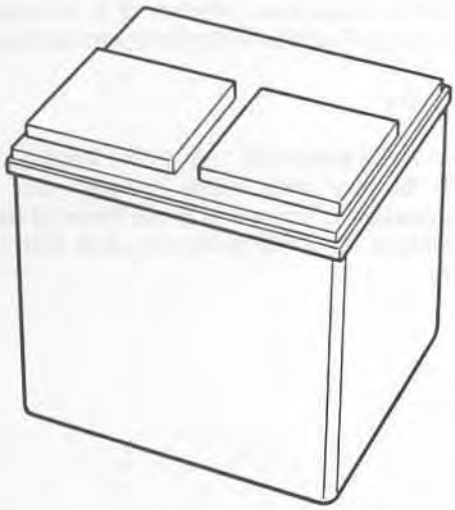
Standard battery

— Water needs to be added periodically.
— May emit significant amounts of gas.

Low-maintenance (Volvo presently equips cars with low-maintenance batteries only)

— Never needs water added undernormal conditions. Check level at normal services or at least once a year.
— Reduced gassing.
— Low self-discharge.

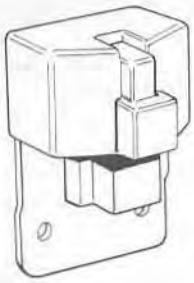
127 522



Maintenance-free (Volvo does not presently use maintenance-free batteries)

— No vent plugs.
— Water cannot be added.
— Very little gassing.

SEV external regulator

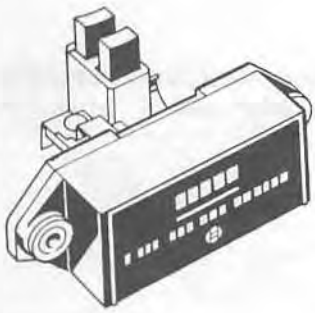


Bosch external regulator

C) Voltage regulators

External transistor regulator

— Regulates by solid-state electronics.
— No moving parts.
— Relivable, can withstand vibration.
— Can be mounted on the alternator as an integral regulator.



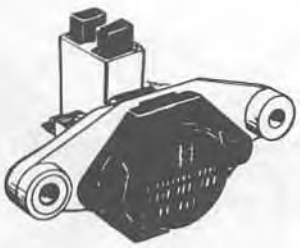
134 543

Integral regulator

Integral regulator

— Transistor-type regulator mounted on the alternator.
— Compact.

NOTE
The regulated voltage varies with the temperature of the regulator. As the temperature of the regulator increases, the regulated voltage decreases. On some 1985 and later models, the regulator is connected to a temperature sensor located beneath the battery tray; thus, the regulated voltage is more precisely matched to the system's immediate requirements.



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Integral regulator

Fault tracing

General

This section explains the fault tracing method of correcting charging system defects. All fault tracing must be done in the sequence presented in this section. "Short-cut" methods undermine the efficiency of the fault tracing method.

FIRST

Troubleshooting Pre-checks

then

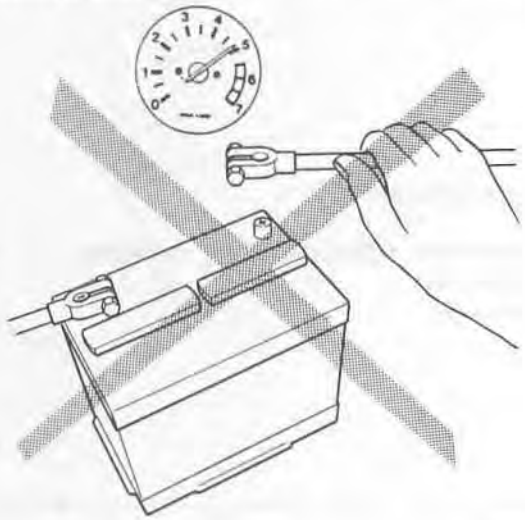
Battery Testing

then

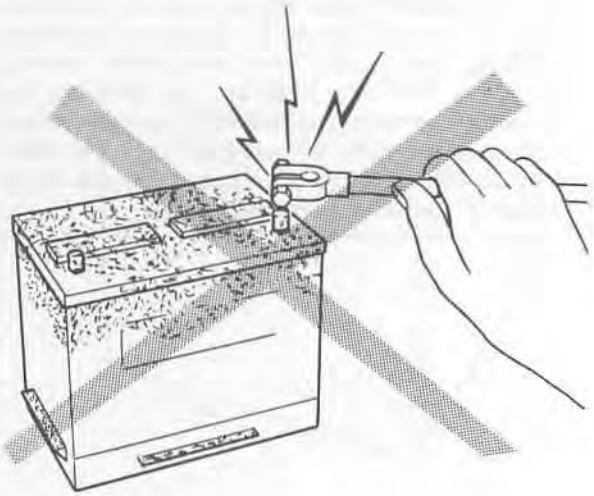
Charging System Fault Tracing

The don'ts of fault tracing

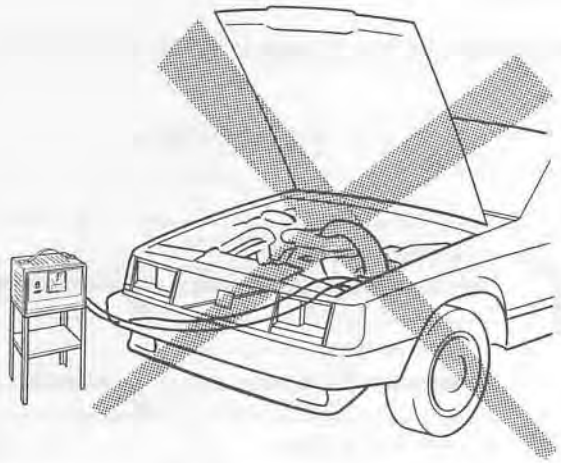
When testing or servicing an alternator, avoid damaging the unit and its regulator by carefully observing the following precautions:



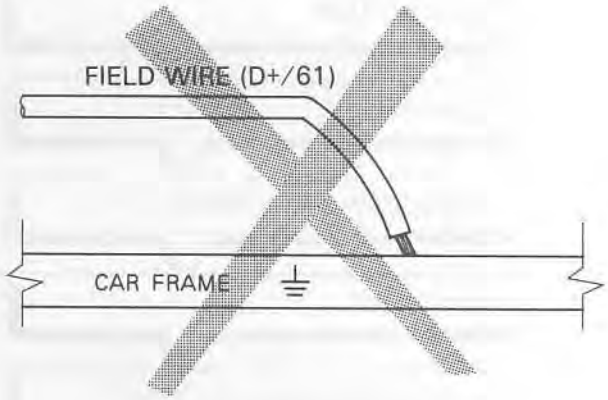
A) Never disconnect battery cables or the wires to the regulator cables while the engine is running.



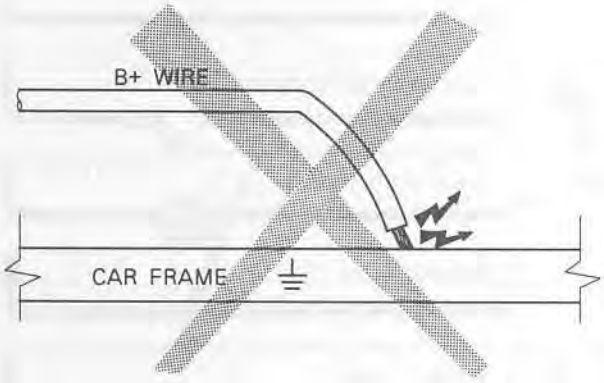
B) Never reverse battery connections. Check the battery polarity with a voltmeter before making connections if the polarity signs "+" or "-" are not visible on the battery case.



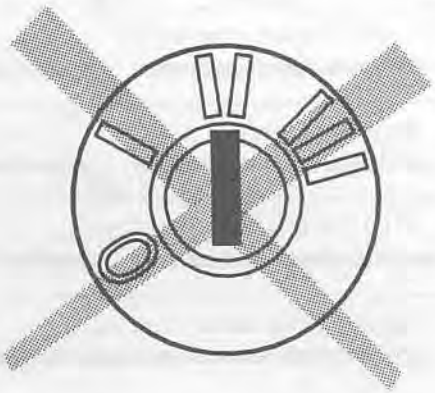
C) Disconnect the battery cables before hooking up a fast charger. Never use a fast charger as a booster for starting the car. Do not charge battery with battery installed in car; gassing can damage the paint.



D) Avoid grounding the field circuit (D+/61) between the alternator and the regulator. Grounding the field of either alternator or regulator may damage the regulator.



E) Don't ground the alternator output terminal (B+) as this may damage the alternator, the circuit, or both. This precaution must be followed even when the system is not operating, because the output terminal on the alternator is "hot" at all times. Terminals must be covered with insulating boots or tape.



F) Never leave the ignition switch "ON" when servicing the regulator.

Quick check

Table to be used ONLY in conjunction with Fault Tracing Table: **Do not** use this table as a substitute for the Fault Tracing Table!

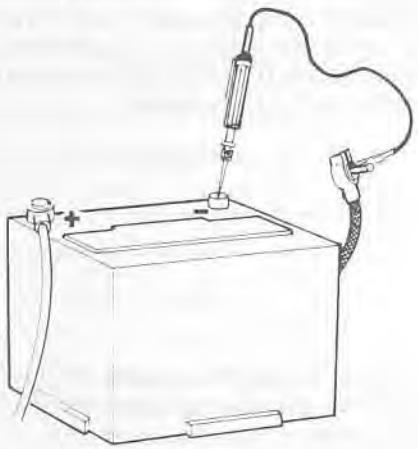
Fault	Probable Cause
Battery not being charged or not being sufficiently charged.	Current drain
	Battery fault
	Alternator fault
	Regulator fault
	V-belt loose
	Charging system overload
	Wiring fault
	Frequent short trips (see A1 on following page)
Alternator warning lamp not lit up with engine OFF and ignition switch in ON position.	Warning lamp defective
	Fuse defective
	Wiring fault
Alternator warning lamp glows dimly or flashes when engine is running.	V-belt loose
	Faulty battery connection
	Regulator fault
	Alternator fault
	Wiring fault, loose fuse

A. Mandatory troubleshooting pre-checks

A1

Vehicle operation

Analyze the operation of the vehicle. Some problems (e.g., partially-drained battery) may be the result of excessive strain on the charging system. Be aware that frequent trips of short duration constitute a severe driving condition. If this type of usage characterizes the vehicle's operation and charging system fault tracing procedures do not reveal any faults, then (on 1980 and earlier models) the installation of a "diode kit" (see last section of manual) may correct the problem.



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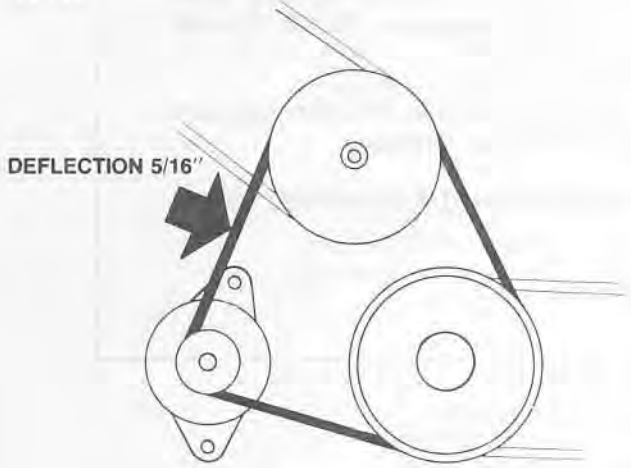
A2

Check for current drain

A short in the wiring or electrical equipment which remains on* when the ignition is off, drains the battery. Open the circuit at the negative (-) battery post and connect a test light in series. Glowing of test light indicates a current drain. If there is a current drain, isolate the faulty circuit by removing fuses one at a time until the current drain stops. Then continue isolating the problem by disconnecting the wires attached to the affected fuse. After isolating the faulty circuit, trace the circuit wiring until the fault is found. Use appropriate wiring diagrams. Proceed to A3.

*NOTE: Be aware that car's clock, or illuminated dome light, etc. may cause some test lights to glow.



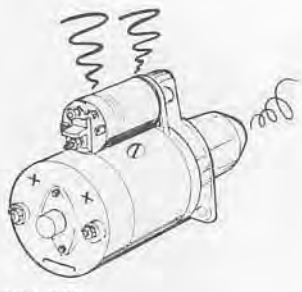
A3

Check V-belt tension

The performance of the alternator, the life of the alternator bearings, and the life of the V-belt depends heavily on maintaining the correct belt tension. Measure the tension by firmly pressing down on the alternator belt midway betwen two pulleys as shown. The belt should move 5/16 in. (8 mm). Adjust as required. Proceed to A4.

NOTE
Replace belts in sets (where applicable).

NOTE
Make sure that instrument panel **WARNING** light is on when key is in "ON" position (engine not running). If not, refer to C4.



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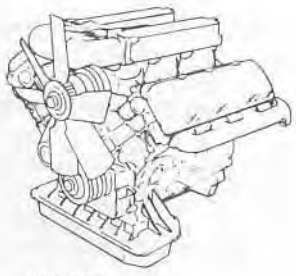

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A4

Check systems closely related to the charging system

Poor engine performance or a faulty starter may cause what appear to be charging system problems. Eliminate poor engine performance or starter faults as source(s) of the problem. Proceed to Battery Testing.

Battery Testing

General

Lack of electrolyte causes premature failure of batteries faster than anything else. Fill battery with distilled water; never with acid. Use only distilled water, battery life is extended by using the purest water available. A dirty battery should be removed and scrubbed with a baking soda and water solution to neutralize any acid present. (On a dirty battery there may be current drain between the terminals.) Caution: Be sure vent caps are tight so no solution gets into cells to neutralize the acid. Flush battery with clean water.

WARNING
Wear safety glasses when working near batteries.

All automotive batteries generate hydrogen gas which is highly flammable. If ignited by a spark or flame, the gas may explode violently causing spraying of acid, fragmentation of the battery, and possible severe personal injuries, particularly to the eyes. Avoid contact with battery acid. In case of contact, flush affected area immediately with water, and consult a physician. (NOTE: Consult Owner's Manual for correct jump-starting procedure.)

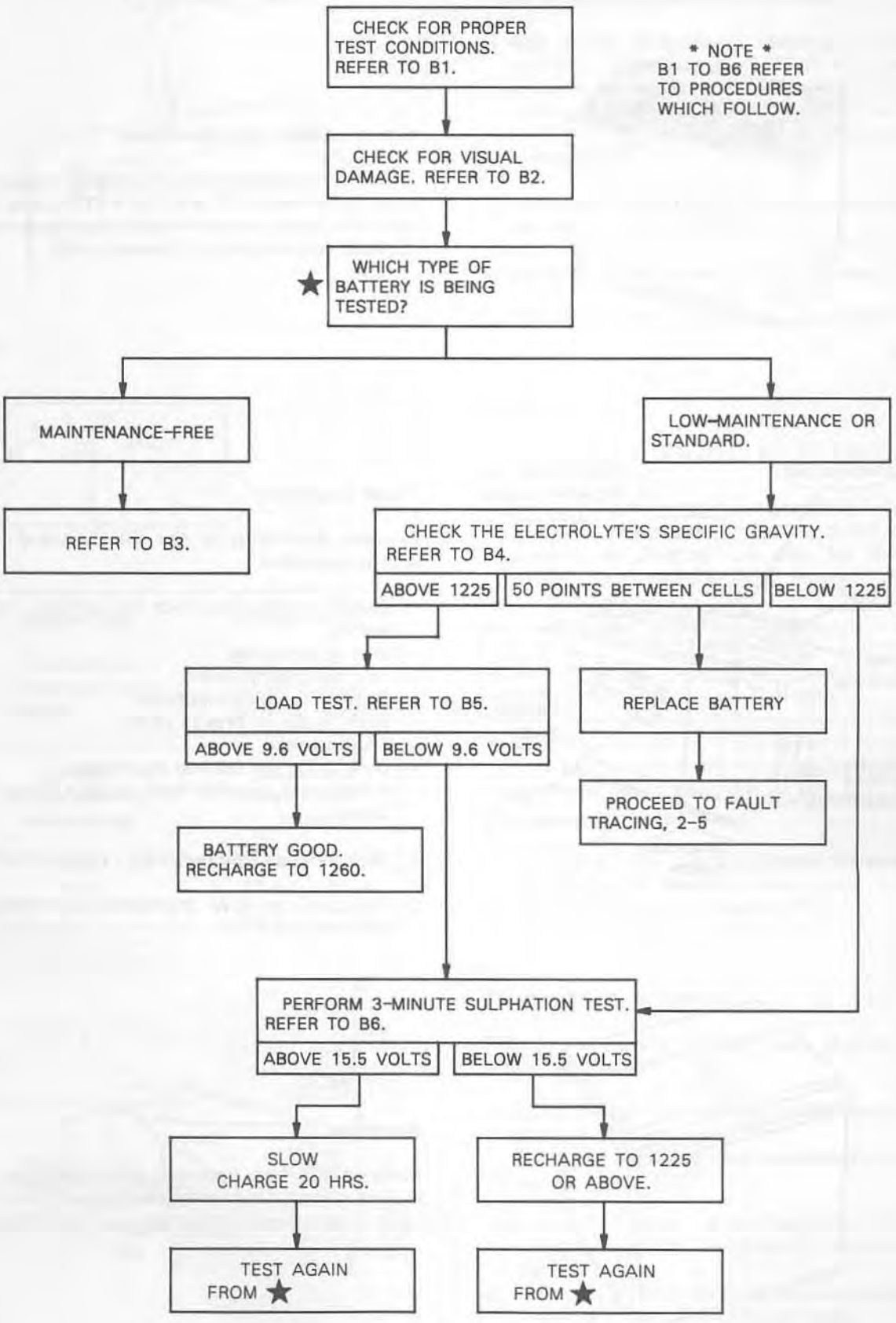
Charge batteries only in a well-ventilated area. Always be sure battery chargers are "OFF" when connecting-to or disconnecting-from batteries.

All battery tests must be done in the sequence presented in the Battery Testing Chart (next page).

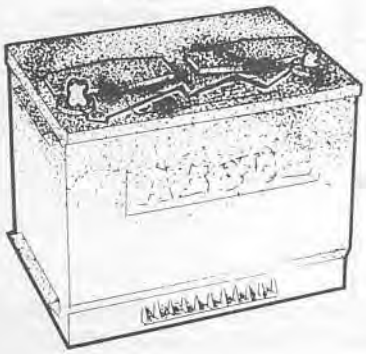
Always disconnect the negative (-) battery cable first.

Battery testing chart

(APPLIES TO STANDARD, LOW-MAINTENANCE, AND MAINTENANCE-FREE BATTERIES)



B. Battery testing procedures

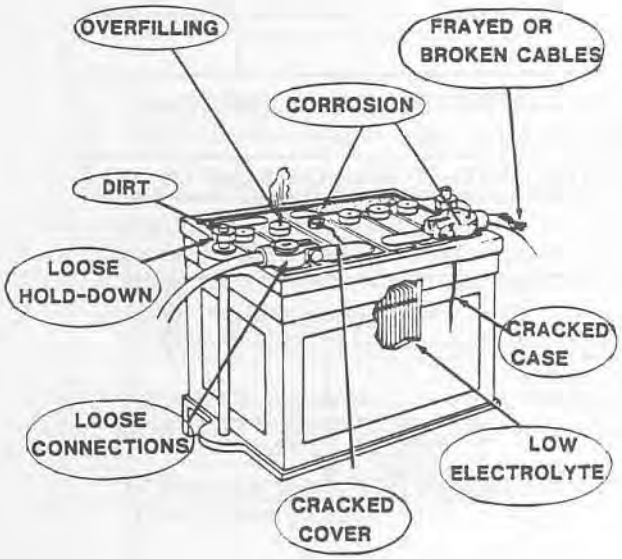


129 125

B1

Check battery test conditions

The battery must be clean. The battery temperature must be between 60° and 100°F (15°C and 30°C), allow the battery temperature to normalize in order to make accurate tests. Proceed to B2.



B2

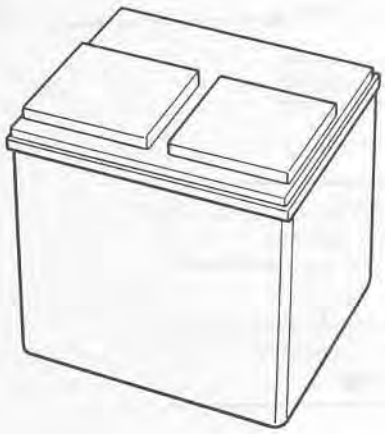
Visual inspection

Examine the battery for the following and correct where applicable:

- Battery rating incorrect for vehicle requirements.
- Wet or dirty case.
- Low electrolyte levels.
- Dirty or loose connections.
- Bent, loose, or broken posts.
- Cracked case.
- Dirty or brown colored electrolyte.
- Battery not securely held in place (loose hold-down).

A) Maintenance free batteries - proceed to B3.

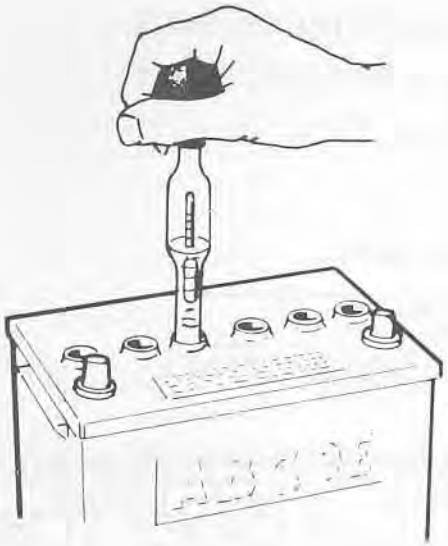
B) Standard or low maintenance batteries - proceed to B4.



B3

Batteries

Maintenance-free batteries lack filler caps. The battery is sealed except for small vent holes. Check battery according to manufacturer's specifications.



130 488

B4

Check the specific gravity

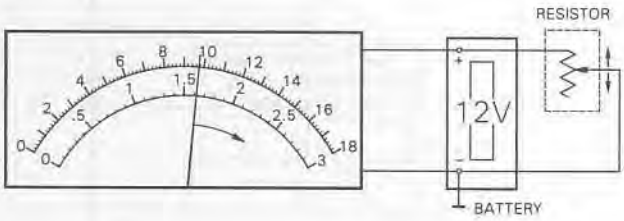
Use a temperature compensating hydrometer (Refer to manufacturer's instructions).

— Add to the hydrometer reading four gravity points (0.004) for each 10°F (5.5°C) that the ambient temperature is above 80°F (27°C).
— Subtract four gravity points (0.004) for each 10°F (5.5°C) that the ambient temperature is below 80°F (27°C).

A) More than 50 points between highest and lowest cells -- replace battery.

B) Specific gravity above 1225 -- proceed to B5.

C) Specific gravity below 1225 -- proceed to B6.



B5

Load test

— Determine the amp-hour rating of the battery being tested.
— Multiply the amp-hour rating times 3. This is the load current required for testing. (Load current required for testing can also be found by dividing the "cold-cranking" ampere rating by 2.)

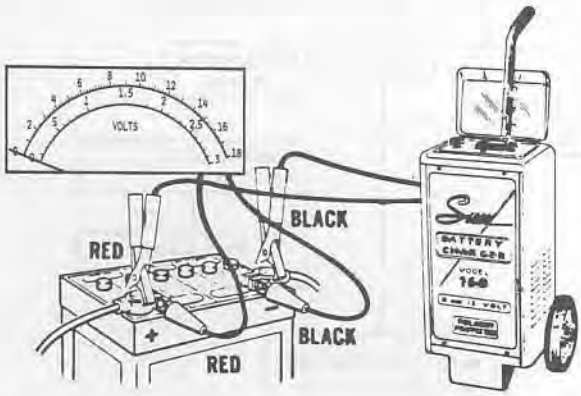
NOTE
If Amp/hour rating cannot be found, use charts at left to determine battery rating.

Engine type	Battery rating
4 cylinder gas	60 Amp/hour
6 cylinder gas	70 Amp/hour
Diesel	88 Amp/hour

Battery cold-cranking Amp rating	Equivalent Amp/hour rating
360	60 Amp/hour
450	70 Amp/hour
600	88 Amp/hour

— Attach a load (carbon pile resistor or variable high-rate battery discharger) across the battery terminals for 15 seconds.
— Observe the voltmeter:

A) Above 9.6 volts - battery is good recharge and proceed to the charging system fault tracing.
B) Below 9.6 volts - proceed to B6.



B6

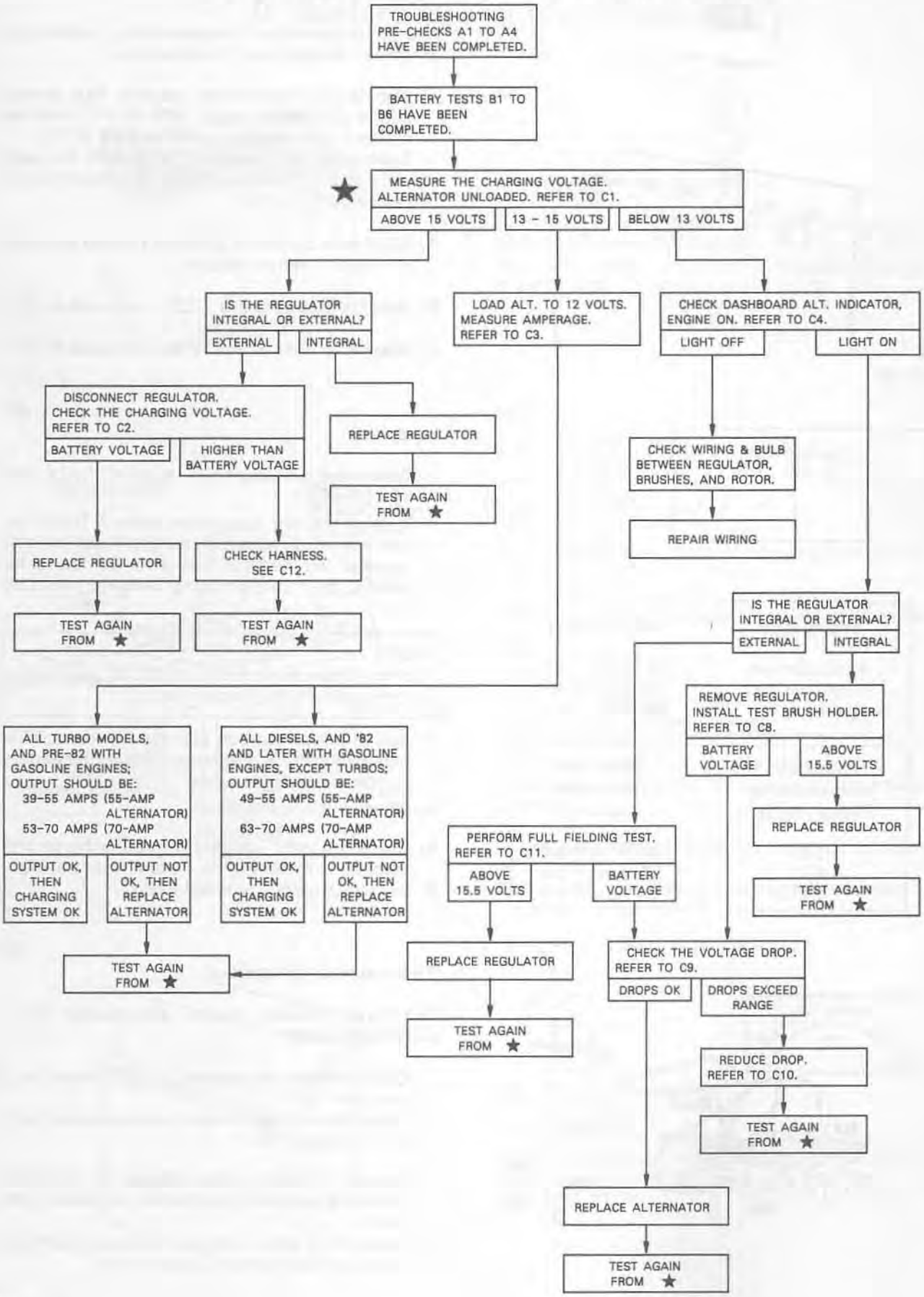
Three-minute charge test

The three minute charge test checks for a sulphated battery.

— Quick-charge the battery at 40 amps for 3 minutes.
— Check the voltage across the battery terminals, with charger "ON."

A) Above 15.5 volts - slow charge for 20 hrs to reverse a possible "sulphation" condition; test again.
B) Below 15.5 volts - recharge and proceed to the charging system fault tracing chart.

Fault tracing chart, charging system



Fault tracing procedures, charging system
Operations C1 to C12

Before testing

Troubleshooting prechecks A1 to A4

and

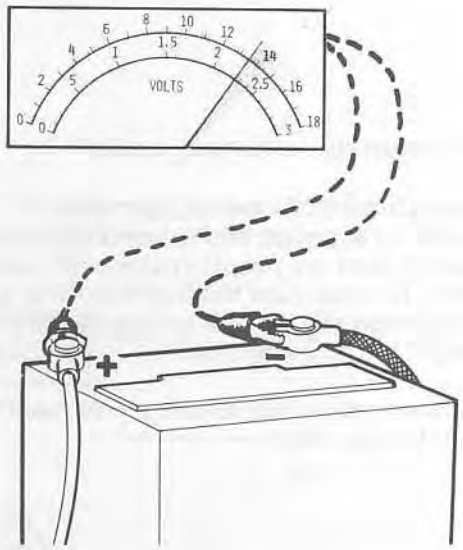
Battery tests B1 to B6 must be *completed*

NOTE: Consult the "Fault tracing chart" on the previous page prior to following the procedures listed here.

C1

Charging voltage, alternator unloaded

— Run engine at 2,000 rpm.
— No accessory electrical equipment on.
— Connect a voltmeter across the battery terminals as shown.
— Observe the voltage.



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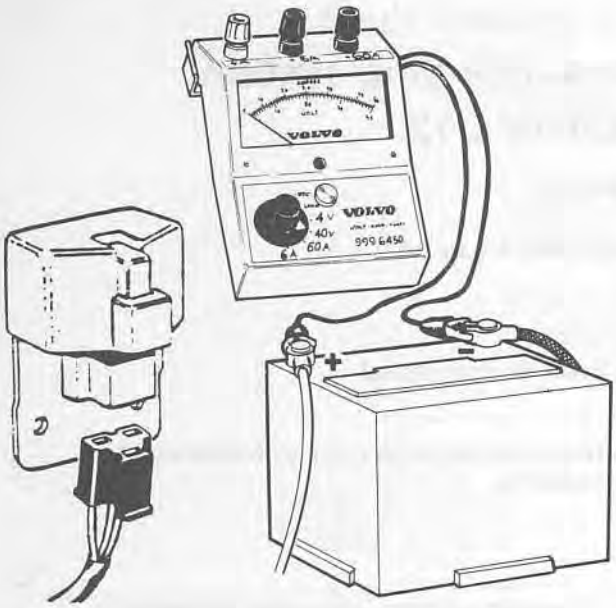
Higher than 15.0 volts	— External regulator proceed to C2 — Integral regulator Replace regulator Test again
13.0 to 15.0 volts	Proceed to C3
Lower than 13.0 volts	Proceed to C4

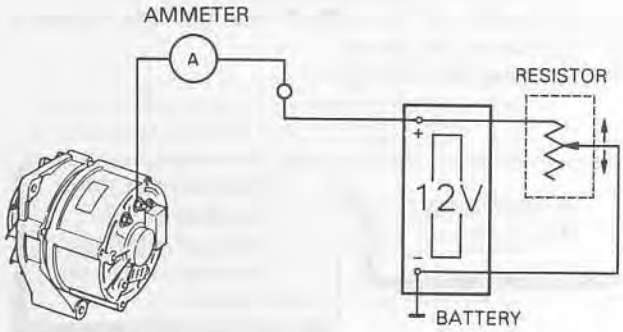


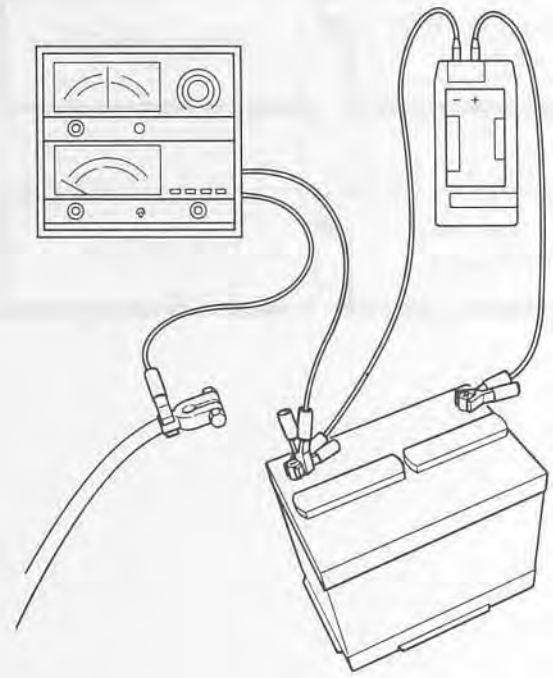
C2

Charging voltage, regulator disconnected

— Turn off ignition (key at position 0).
— Disconnect the harness at the regulator.
— Attach a voltmeter across the battery.
— With engine running at approximately 2000 rpm observe the voltage.

Battery voltage	Replace regulator Test again
Higher than battery voltage	Replace harness Test again





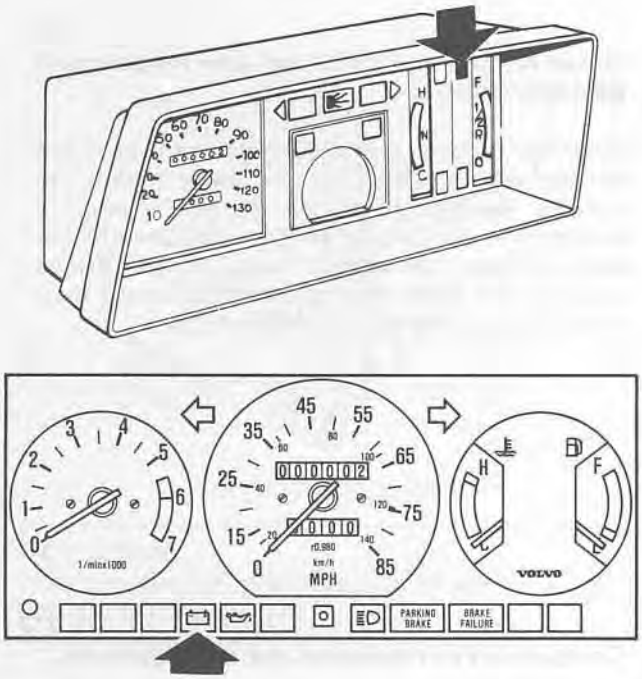
C3

Check amperage, alternator loaded

— Open circuit at B+ battery terminal.
— Install an ammeter and voltmeter as shown.
— Place a load on the alternator until voltmeter reads 12 volts. (Use the Sun Vat-40 or equivalent carbon pile resistor to load the alternator.)
— Record the amperage (A).

— Compare measured reading with readings on fault tracing chart.

C4

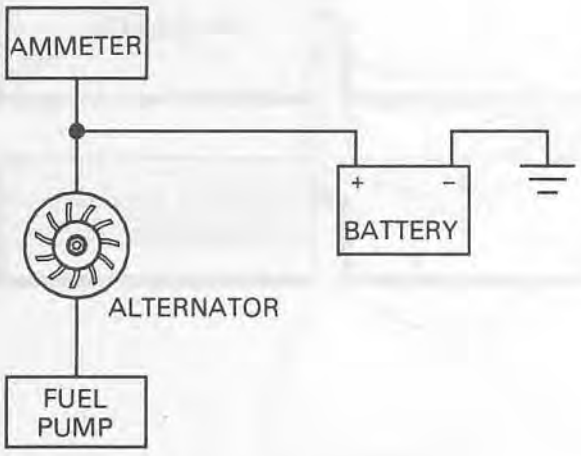


Check warning lights

— Engine ON
— Observe the alternator warning lamp
Note: Other warning lamps may be illuminated at the same time due to the design of the system.
— Is the alternator warning lamp on?

No	Check wiring between regulator, brushes and rotor. Check lamp.
Yes	— External Regulator Proceed to C11 — Integral Regulator Proceed to C8

TURBO MODELS AND PRE-82 WITH GASOLINE ENGINE



C5-C7 serve as an explanation of the methods used to determine correct charging system output (see Charging System Fault Tracing Chart).

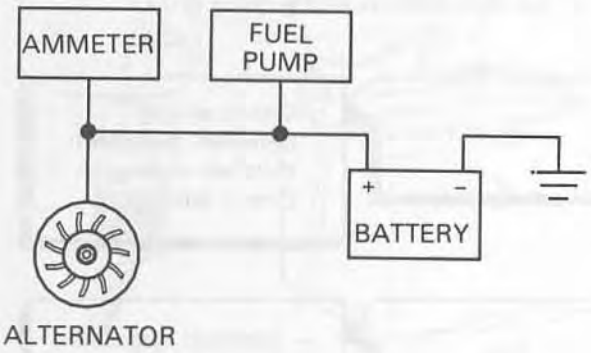
C5

All Turbo Models, and Pre-1982 Models with gasoline engines

On these models the current used to operate the fuel pumps is drawn directly from the alternator. Thus, on these models, it is not possible to read total alternator output at the battery. The output measured at the battery, then, will reflect total alternator output minus the current necessary to operate the fuel pumps.

NOTE
The output specifications given in the fault tracing chart have been adjusted to reflect the above factors.

DIESEL MODELS AND 1982 AND LATER WITH GASOLINE ENGINES



C6

Diesel Models and 1982 and later models with gasoline engines

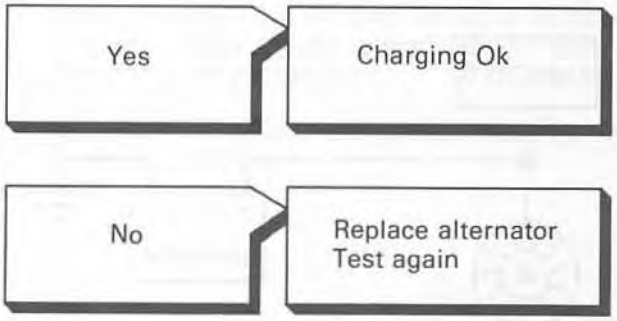
On these models, the total alternator output can be read at the battery, i.e., on these models the current needed to operate the fuel pumps is included in the current output measured at the battery. Thus, the correct output specifications given in the fault tracing chart are higher than those for the models described in C5.

C7

Comparison of measured and rated outputs

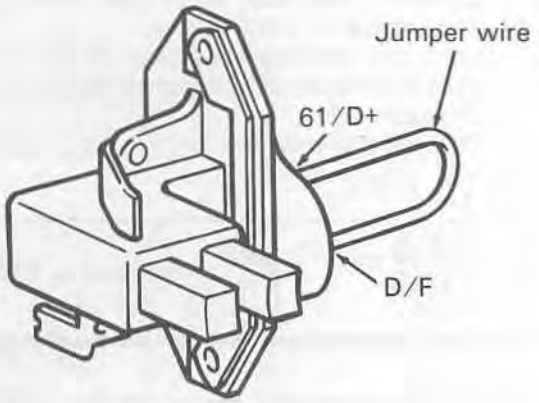
— Refer to the fault tracing chart and find the alternator's correct output (as measured at the battery).

— Is the measured output within the range given on the chart?



C8

Check alternator, using test brush holder



Test brush holder

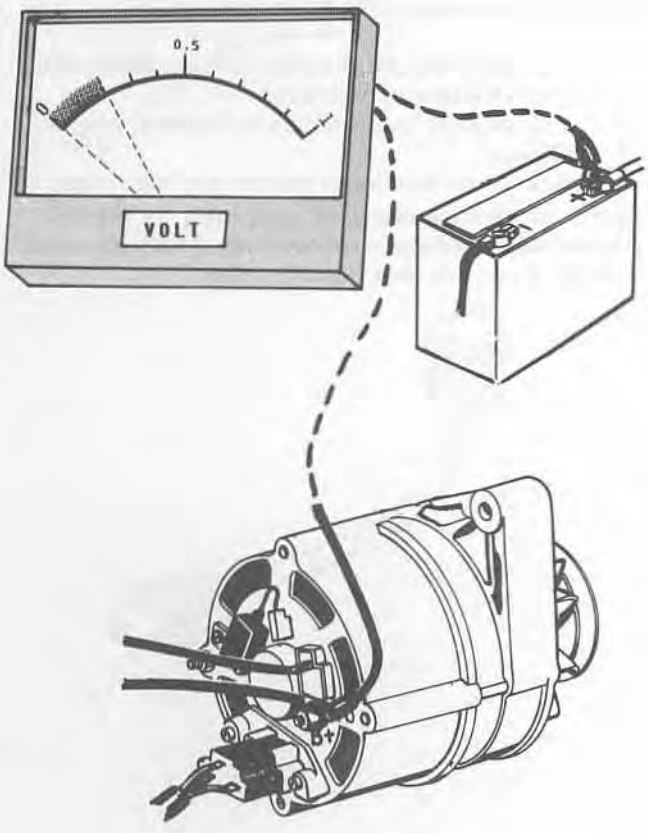
CAUTION
Do not allow voltage to exceed 16 volts; damage to the car may result.

— Connect a voltmeter across the battery.
— Remove regulator.
— Install test brush holder.

Battery voltage	Proceed to C9
Above 15.5 volts	Replace regulator Test again

C9

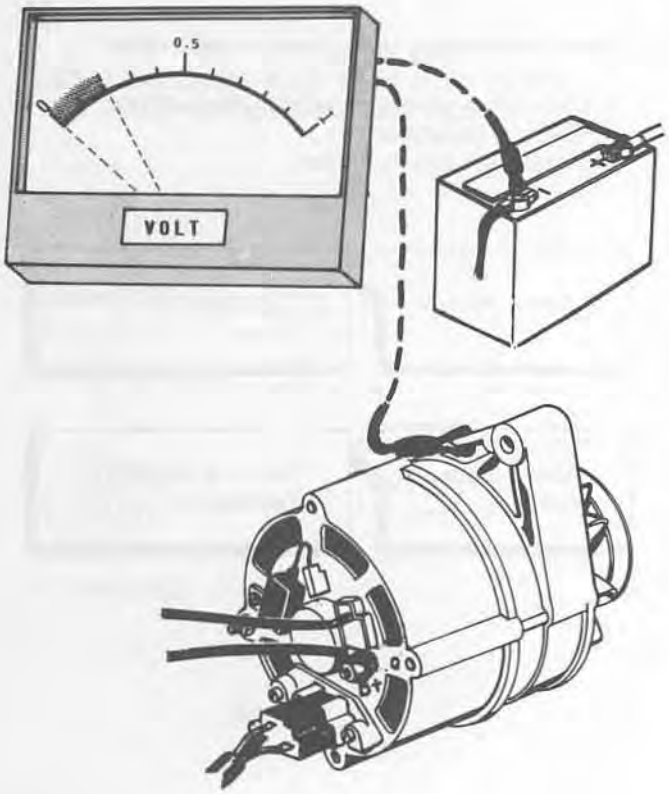
Check voltage drops



Positive Circuit Test

— Connect a voltmeter across the alternator B+ terminal and the battery's positive (+) terminal.
— Run engine at 2,000 rpm.
— Load the alternator by turning on electrical equipment such as headlights, fan, and window defroster, etc.
— Observe the voltmeter.

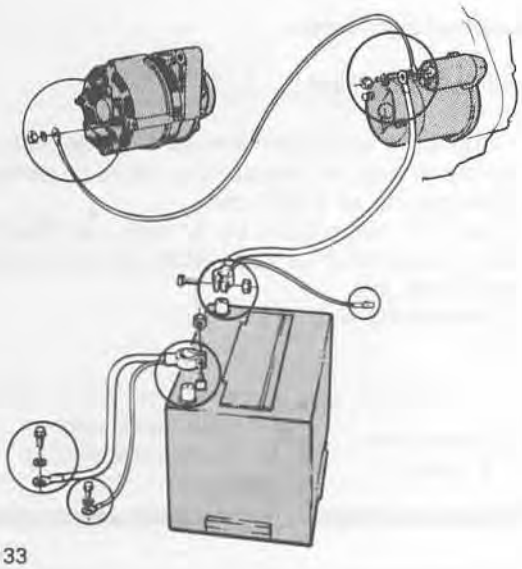
Lower than .3 volts	Proceed with negative circuit test
Higher than .3 volts	Proceed to C10



Negative Circuit Test

— Connect a voltmeter as shown.
— Run engine at 2,000 rpm.
— Load the alternator by turning on electrical equipment such as headlights, fan, and window defroster, etc.
— Observe the voltmeter.

Higher than .2 volts	Proceed to C10
Lower than .2 volts	Drop OK Replace alternator



129 133

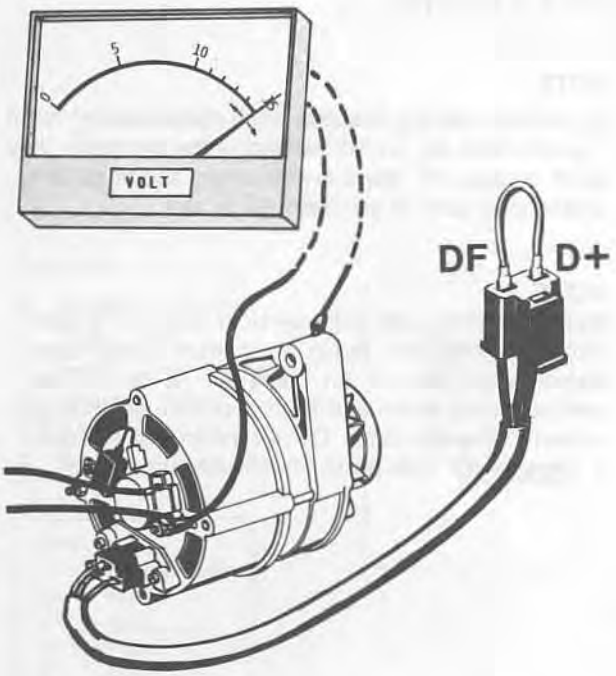
C10

Eliminate (reduce) voltage drops

— If necessary scrape and clean battery terminals.
— Tighten battery connections.
— Check ground leads between battery, engine, and body.
— Check B+ terminals on starter and alternator.

Repair or replace leads as necessary so that the positive voltage drops are less than .3 and negative voltage drops are less than .2 volts.

C11



Full fielding test, external regulators

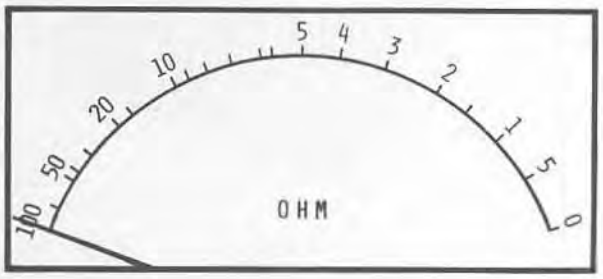
NOTE: This test serves to distinguish between alternator faults and regulator faults.

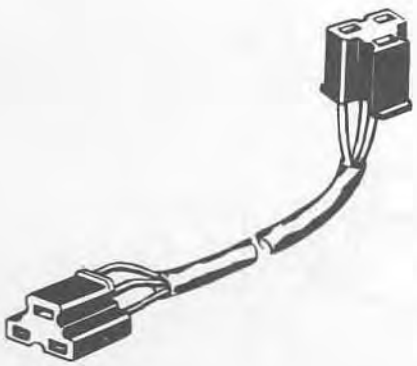
Turn ignition OFF. (Key at position "0.")

— Disconnect the regulator wire harness from the regulator.
— Connect a jumper wire from the D+ terminal to the DF terminal.
— Connect a voltmeter across the alternator B+ terminal and ground.
— Start and run engine at 2,000 rpm.
— Observe the voltage.

Above 15.5 volts	Replace regulator Test again
Battery voltage	Proceed to C9

C12



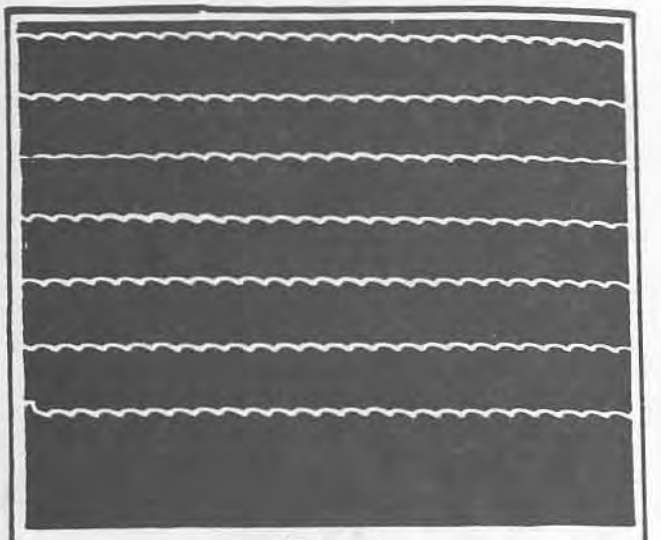


Alternator wiring harness test (removable harness only)

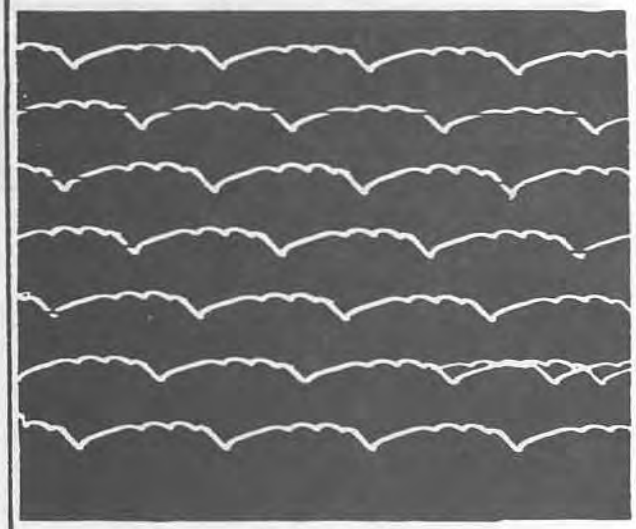
— Remove harness and check for shorts or opens with an ohmmeter.
— Clean connectors.

Harness open or shorted	Replace harness Test again
Harness is good	Replace regulator Test again

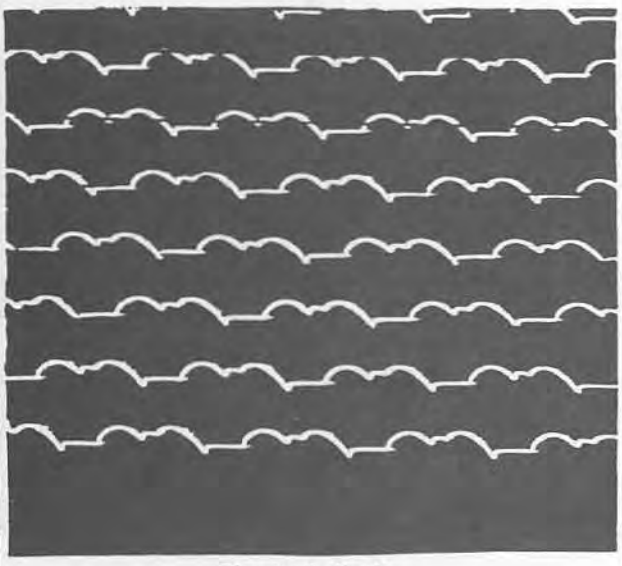
Alternator scope patterns



Normal



Open diode



Shorted diode

NOTE
On Volvos, the oscilloscope trace measurement must be taken from the D+/61 terminal of the alternator. Any other hookup will result in misleading scope patterns, which could lead to incorrect diagnoses.

NOTE
Be aware that a periodic vertical trace (of lesser intensity than the main horizontal trace) may appear as a part of the "normal" pattern. This vertical trace is caused by the on-off switching action of the regulator. Do not misinterpret such a trace as an indication of an alternator fault.

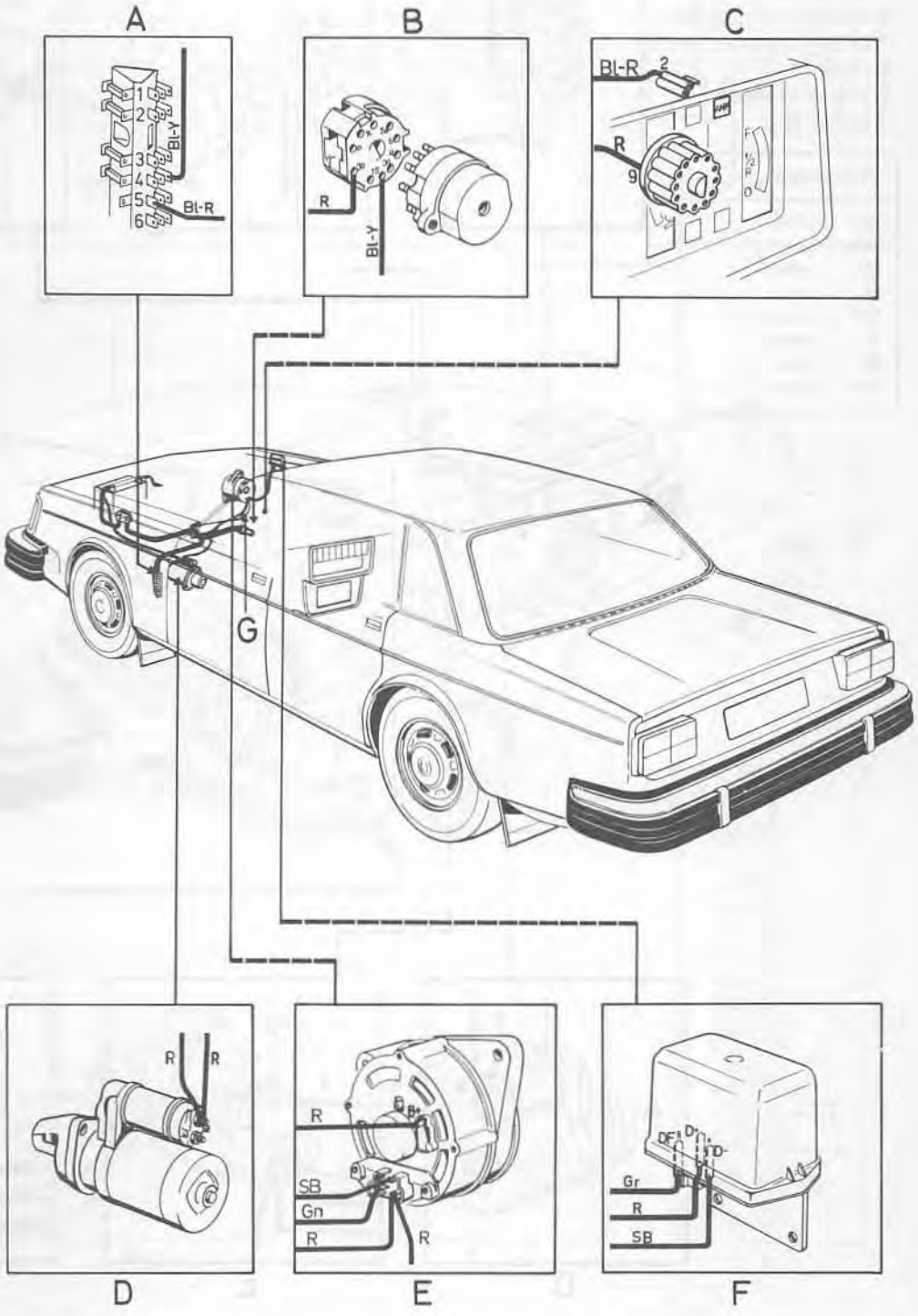
Wiring diagrams

1975-1976 Group 32 Charging System
Wiring Diagram 1975-1976

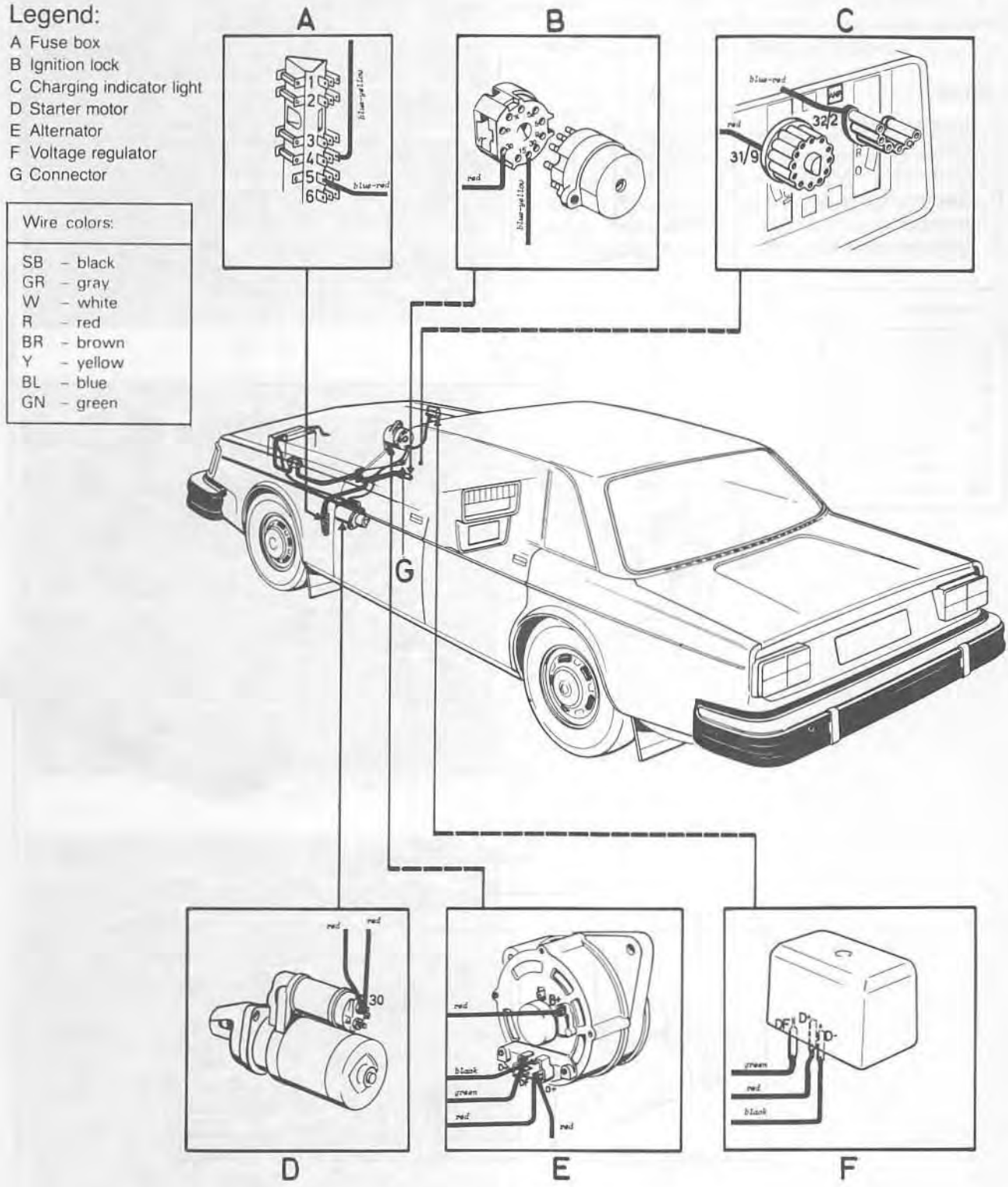
Legend:

A Ignition switch
B Fuse box
C Instrument cluster
D Starter motor
E Alternator
F Voltage regulator

Wire colors:	
SB	– black
GR	– gray
W	– white
R	– red
BR	– brown
Y	– yellow
BL	– blue
GN	– green



1977-1978 Group 32 Charging System
Wiring Diagram 1977-1978

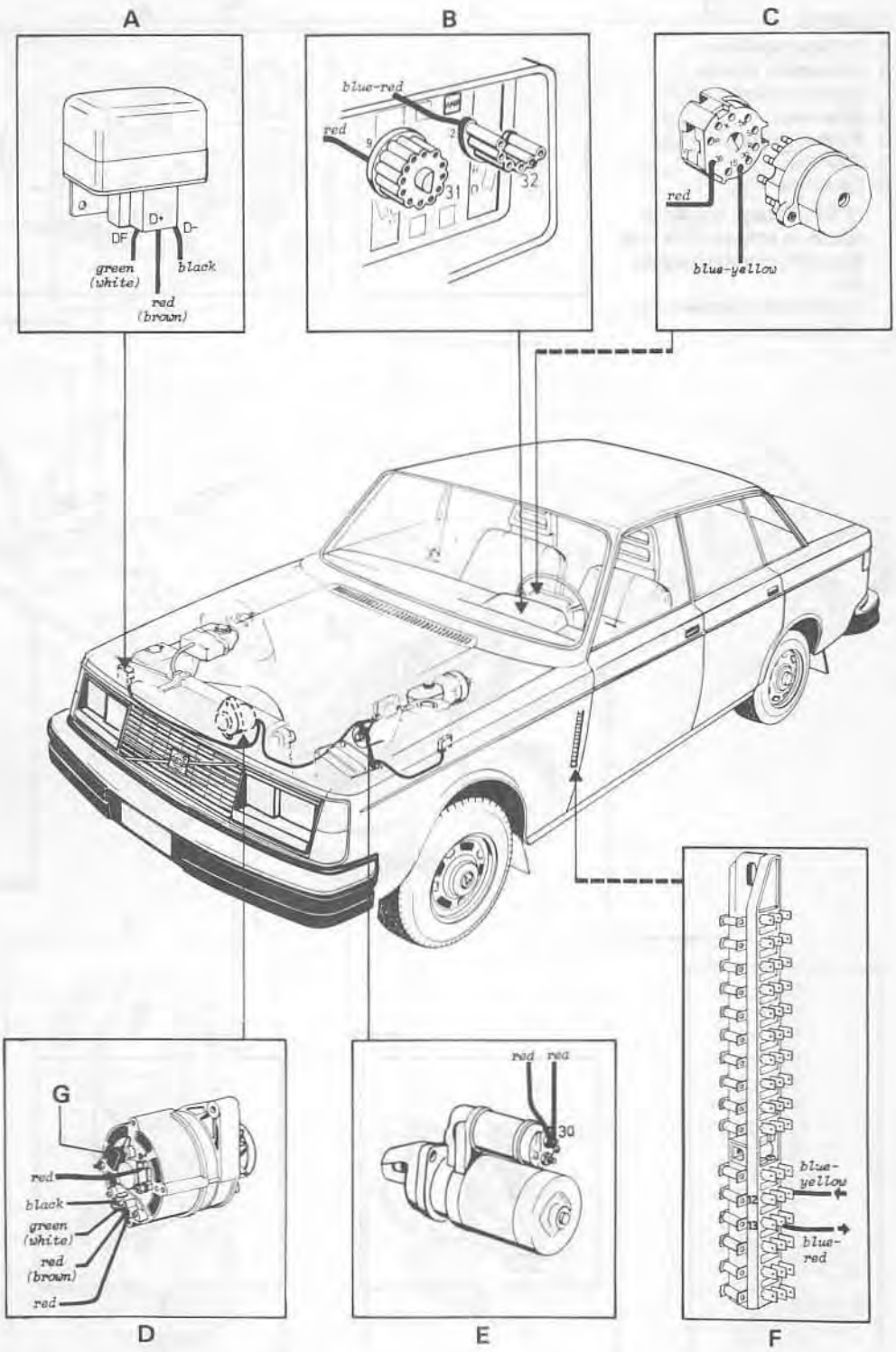


1979-1980 Group 32 Charging System
Wiring Diagram 1979-1980

Legend:

A Voltage regulator
B Instrument cluster
C Ignition switch
D Alternator
E Starter motor
F Fuse box
G Capacitor

NOTE: The voltage regulator shown in schematic is symbolic of and not the actual regulator. A solid state regulator is presently used.

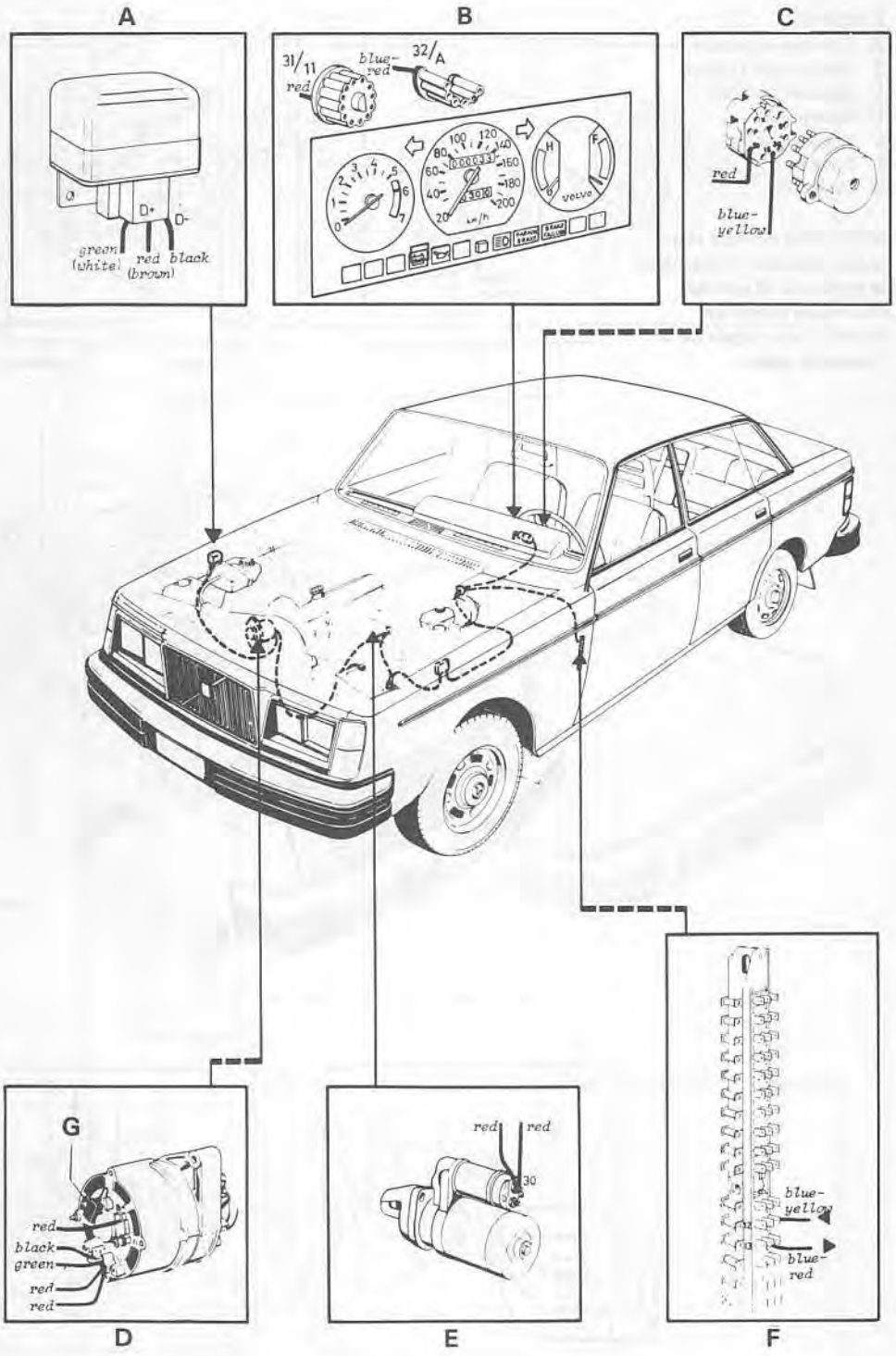


1981 Group 32 Charging System
Wiring Diagram 1981

Legend:

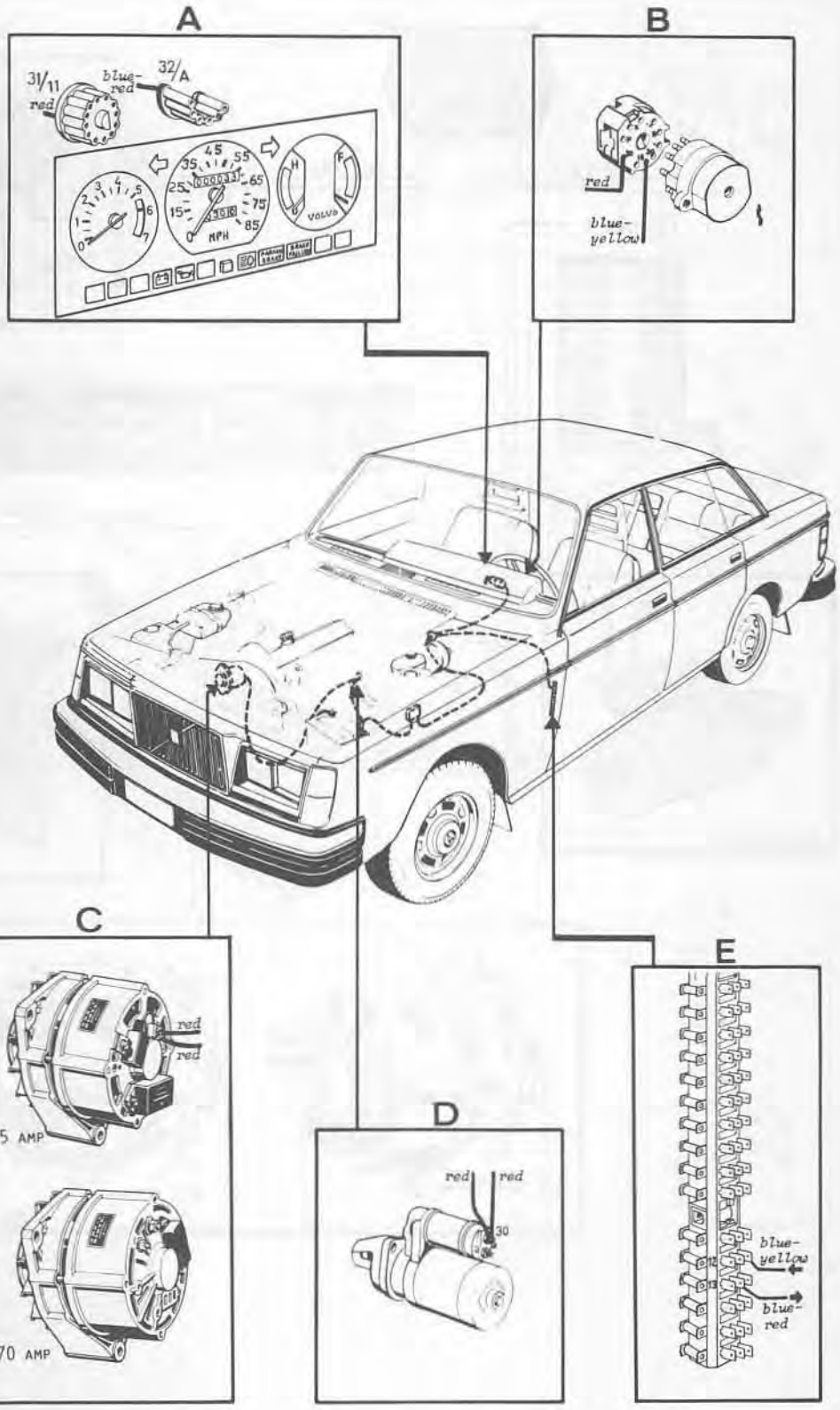
- **A** Voltage regulator
- **B** Instrument cluster
- **C** Ignition switch
- **D** Alternator
- **E** Starter motor
- **F** Fuse box
- **G** Capacitor

NOTE: Voltage regulator shown in schematic is only symbolic of actual regulator.
A solid state regulator is actually used.

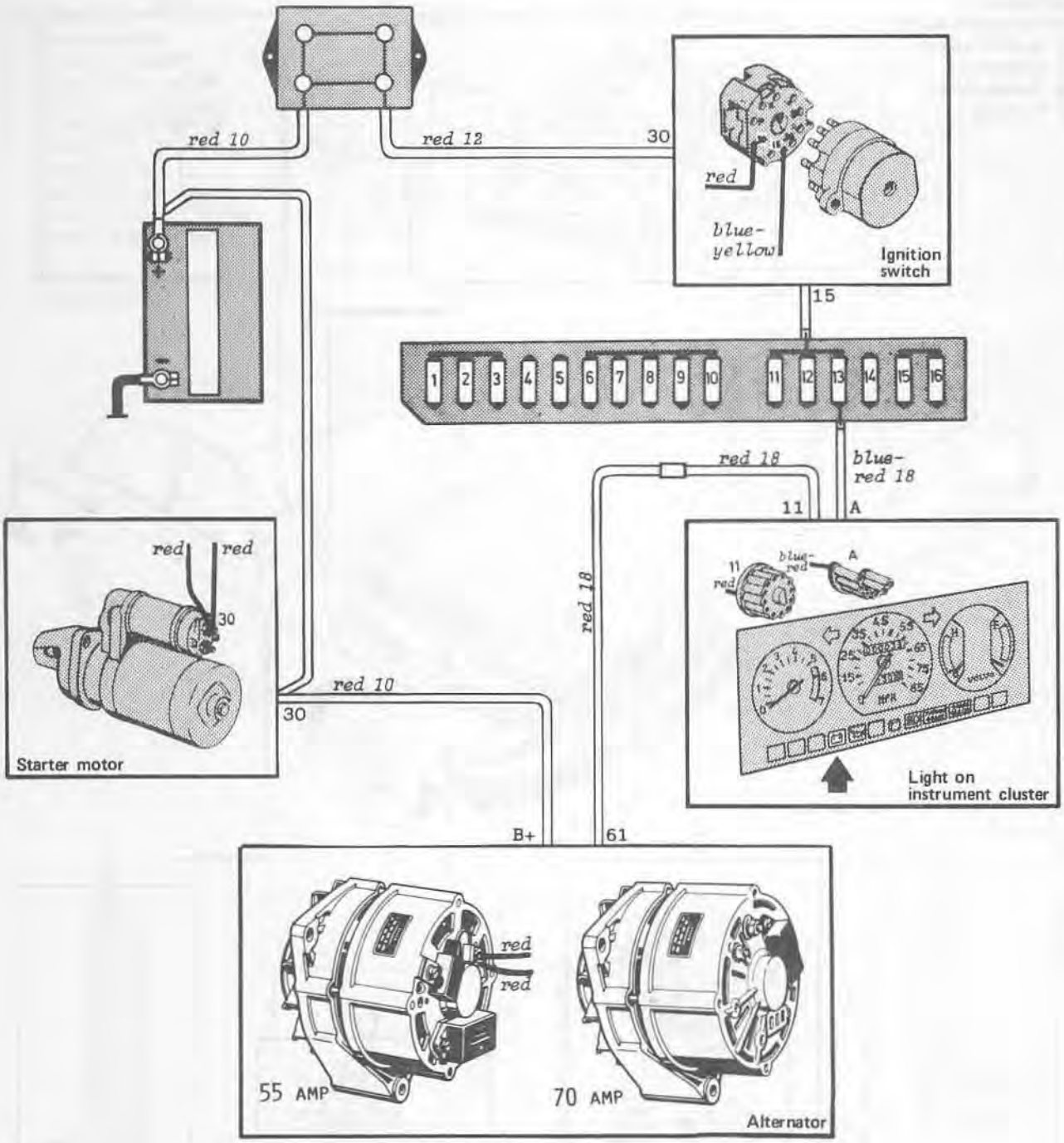


1982 Group 32 Charging System
Wiring Diagram 1982

Legend:
- **A Instrument cluster**
- **B Ignition switch**
- **C Alternator**
- **D Starter motor**
- **E Fuse box**



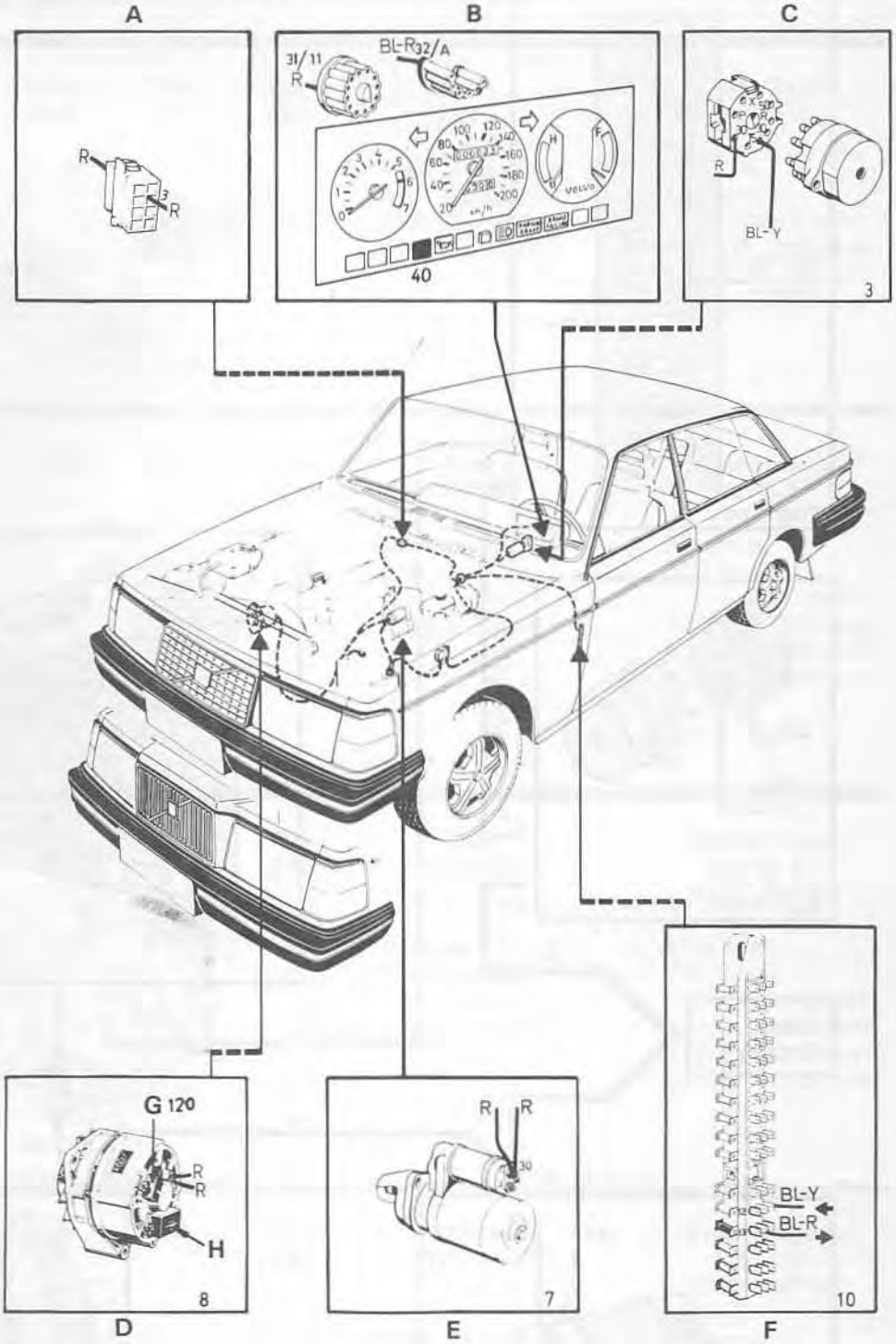
1983 Group 32 Charging System
Wiring Diagram 1983



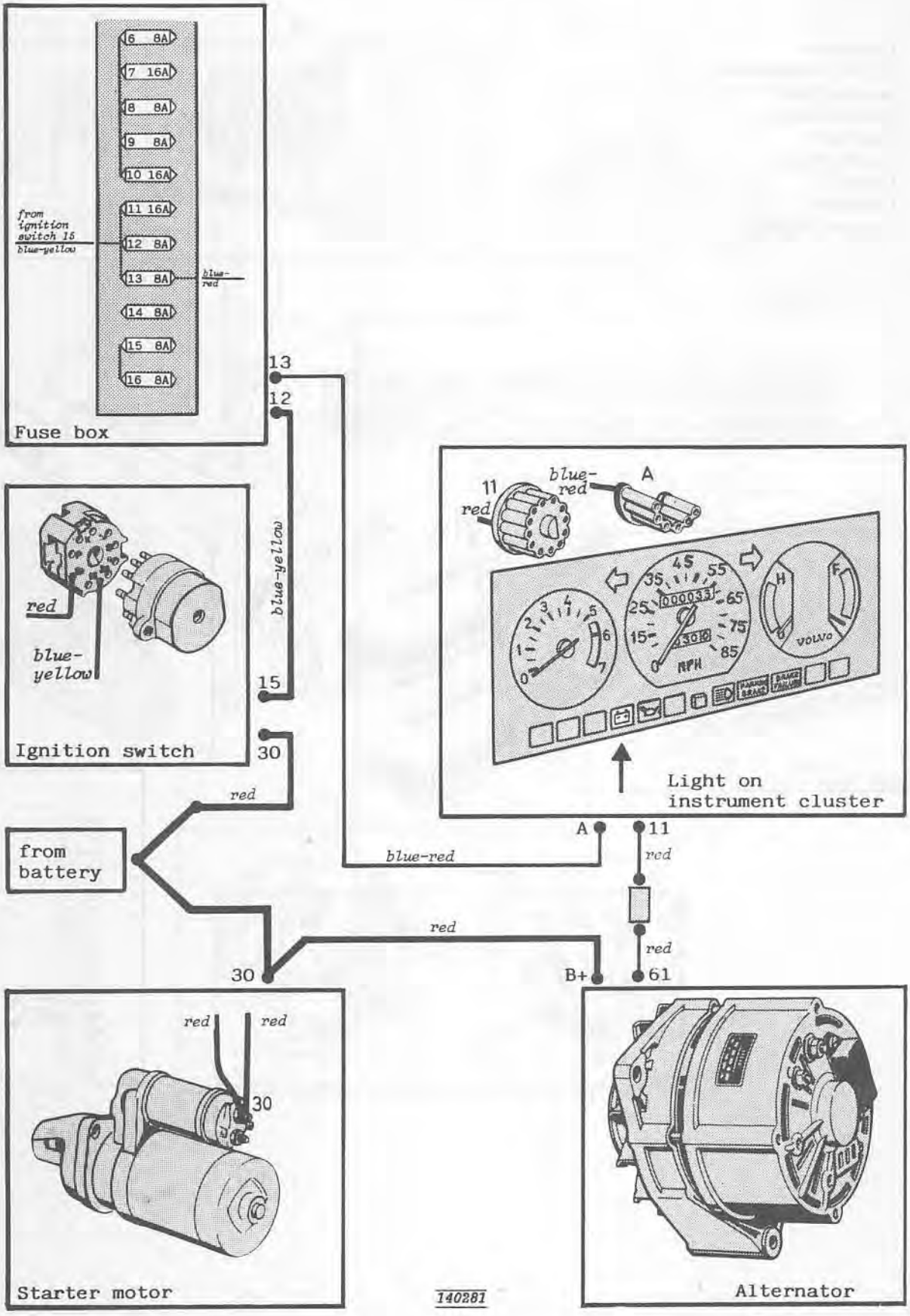
133 737

1984 Group 32 Charging System
Wiring Diagram 1984

A Connector
B Battery charge failure warning light
C Ignition switch
D Alternator
E Starter motor
F Fusebox
G Capacitor
H Integral regulator



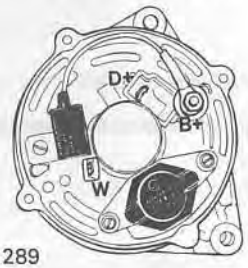
1985 Group 32 Charging System
Wiring Diagram 1985



Specifications

3-2 Alternator Specifications (*Specifications are given for off-car testing only)

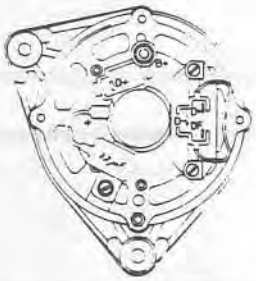
Bosch	0120 0120	400 400	756 757	Car 240	Year 1975	Engine Type B20F



135 289

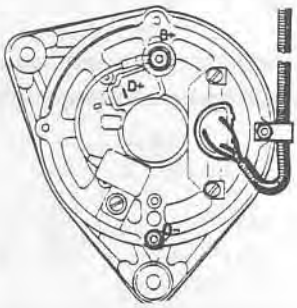
Max. amperage	— 55 amps
Max. wattage	— 770 watts
Min. Current Output at 14V	Alt. Speed — 36A at 2,000 rpm — 40A at 2,350 rpm — 55A at 6,000 rpm

Bosch	0120	400	912	Car 240	Year 1976-77	Engine Type B21A,F



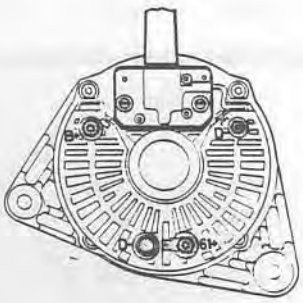
Max. amperage	— 55 amps
Max. wattage	— 770 watts
Min. Current Output at 14V	Alt. Speed — 36A at 2,000 rpm — 47A at 3,000 rpm — 52A at 4,000 rpm

Bosch	0120	400	932	Car 240	Year 1978-81	Engine Type B21A,F EXCL MPG



Max. amperage	— 55 amps
Max. wattage	— 770 watts
Min. Current Output at 14V	Alt. Speed — 36A at 2,000 rpm — 47A at 3,000 rpm — 52A at 4,000 rpm

S.E.V. Marchal	716	55	02	Car 240	Year 1978-1981	Engine Type B21A,F EXCL MPG



Max. amperage	— 55 amps
Max. wattage	— 770 watts
Min. Current Output at 14V	Alt. Speed — 36A at 2,000 rpm — 48A at 3,000 rpm — 36A at 4,000 rpm

Specifications

Bosch 0120 450 008 — **Car 240** — **Year 1981-** — **Engine Type B21F, MPG**

133 323

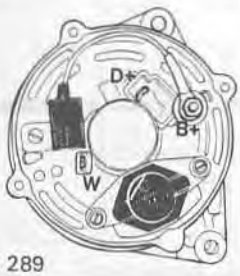
Max. amperage	— 70 amps
Max. wattage	— 980 watts
Min. Current	Alt. Speed
Output at 14V	— 30A at 1,500 rpm
	— 48A at 2,000 rpm
	— 67A at 6,000 rpm

Bosch 0120 469 567 (B21F, B23F)
0120 469 670 (B230F) — **Car 240** — **Year 1982-** — **Engine Type B21F (Excl Turbo) B23F, B230F**

133 323

Max. amperage	— 70 amps
Max. wattage	— 980 watts
Min. Current	Alt. Speed
Output at 14V	— 46A at 2,000 rpm
	— 58A at 3,000 rpm
	— 64A at 4,000 rpm

Bosch 0120 489 066 — **Car 240** — **Year 1982-** — **Engine Type B21A, B23E, B21F Turbo**



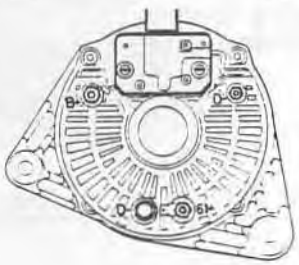
135 289

Max. amperage	— 55 amps
Max. wattage	— 770 watts
Min. Current	Alt. Speed
Output at 14V	— 35A at 2,000 rpm
	— 48A at 3,000 rpm
	— 53A at 4,000 rpm

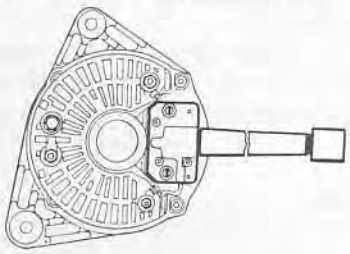
S.E.V. Marchal 712 126 02 — **Car 260** — **Year 1976-77** — **Engine Type B27F**

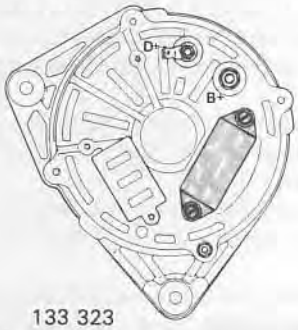
Max. amperage	— 55 amps
Max. wattage	— 770 watts
Min. Current	Alt. Speed
Output at 14V	— 35A at 2,000 rpm
	— 48A at 3,000 rpm
	— 53A at 4,000 rpm

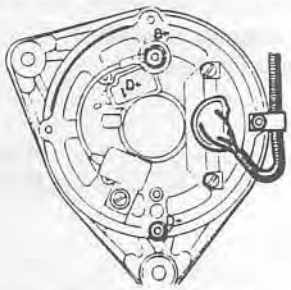
S.E.V. Marchal 716 551 02 — **Car 260** — **Year 1978** — **Engine Type B27F**

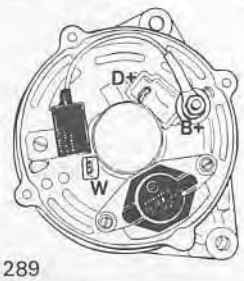


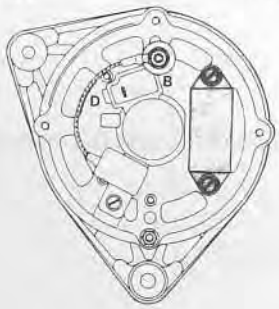
Max. amperage	— 55 amps
Max. wattage	— 770 watts
Min. Current	Alt. Speed
Output at 14V	— 35A at 2,000 rpm
	— 48A at 3,000 rpm
	— 53A at 4,000 rpm

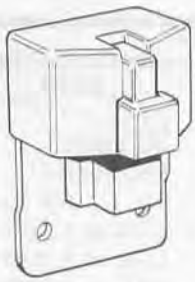
S.E.V. Marchal	717	700	02	Car 260	Year 1979-1981	Engine Type B28F, B21F
					Max. amperage Max. wattage Min. Current Output at 14V	— 55 amps — 770 watts Alt. Speed — 35A at 2,000 rpm — 48A at 3,000 rpm — 53A at 4,000 rpm

Bosch	0120	469	563	Car 260	Year 1982-	Engine Type B28F
	 133 323				Max. amperage Max. wattage Min. Current Output at 14V	— 70 amps — 980 watts Alt. Speed — 46A at 2,000 rpm — 58A at 3,000 rpm — 64A at 4,000 rpm

Bosch	0120	400	939	Car 260	Year 1980	Engine Type D24
					Max. amperage Max. wattage Min. Current Output at 14V	— 55 amps — 770 watts Alt. Speed — 36A at 2,000 rpm — 47A at 3,000 rpm — 52A at 4,000 rpm

Bosch	0120	400	942	Car 260	Year 1981	Engine Type D24
	 135 289				Max. amperage Max. wattage Min. Current Output at 14V	— 55 amps — 770 watts Alt. Speed — 36A at 2,000 rpm — 40A at 2,350 rpm — 55A at 6,000 rpm

Bosch	0120	489	069	Car 260	Year 1982-	Engine Type D24
					Max. amperage Max. wattage Min. Current Output at 14V	— 55 amps — 770 watts Alt. Speed — 36A at 2,000 rpm — 47A at 3,000 rpm — 52A at 4,000 rpm



Transistor voltage regulator Specifications

Type ..... Bosch EF 14V 3B or Marchal 723 171 02

Test conditions

Fully charged battery
Temperature at voltage regulator ..... +25°C.

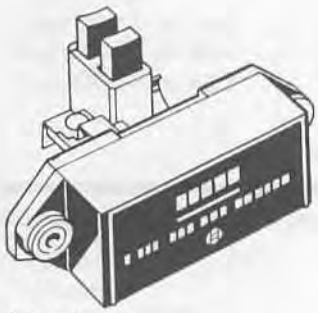
Test values

Alternator speed ..... 6,000 rpm
Engine speed ..... approx. 3,000 rpm
Alternator load ..... 5-10 A
Voltage measured across terminals B+ and D- on alternator:
Cold voltage regulator
(reading within 1 min. after starting) 13.7-14.5V
Warm voltage regulator
(reading after running for 30 min.) 13.5-14.1V

Control tolerance

Load
55A alternator with 47A (rating x 0.85)
70A alternator with 60A
Control voltage should now be 0 to 0.3 volt lower than the previous reading.

Integral voltage regulator Specifications



134 543

Type
early type ..... Bosch 0 192 052 027
late type ..... Bosch 1 197 311 008

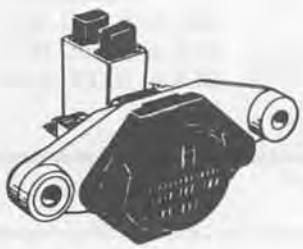
Test conditions ..... In car
State of battery charge ..... min 3/4
Air temperature ..... +25°C (77°F)
Temperature, warm regulator ..... +60-80°C (140-176°F)

Test values

Alternator speed ..... 6,000 rpm
Engine speed ..... 3,000 rpm
Alternator load 30-50A*
Control voltage, between B+ and D– alternator terminals:
Cold regulator (reading taken within 1 min) 14.4-14.8V
Warm regulator (run minimum 15 min at 3,000 rpm) 13.8-14.3V

Control tolerance

Load
55A alternator to 47A
50A 60A
90A 77A



135 288

The control voltage should now be between 0 and 0.3 volts lower than the previous reading.

*Load achieved when engine running

Charging a battery

Check the level of the electrolyte, and if necessary top-up with distilled water. Charge the battery for a minimum of 10 hours at the recommended charging current. The maximum recommended charging current is 0.1 x the capacity of the battery.

EXAMPLE:
Capacity is 60 Ah, recommended maximum charging current is: 0.1 x 60 = 6A.

After charging the battery, measure the specific gravity of the electrolyte in all the cells. The maximum permissible deviation between the highest and lowest values measured is 0.03.

It is recommended to always slow-charge a battery. Fast-charging causes battery damage by overheating. The plates may warp and buckle which can cause separator damage and short circuit a cell.

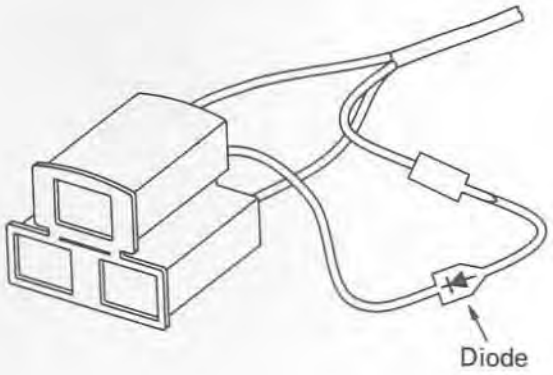
Violent bubbling and gasing of the electrolyte when fast-charging washes the active material from the plates; this reduces the battery capacity, and can cause internal shorts.

If sulphation is present, charge at a lower amperage rate (max. 3 AMPS) for a longer period of time, in order to remove any lead sulfate from the plates.

In no case may surfated batteries be fast-charged at high current rate. Sulfated batteries gas excessively during initial charging period, therefore, observe safety precautions outlined in the battery check section (2-4).

A charging time of 10 hours at a low current level insures that the battery is not damaged by the charging process. If this is an inconvenient amount of time to have the car inoperable, a substitute battery may be installed temporarily.

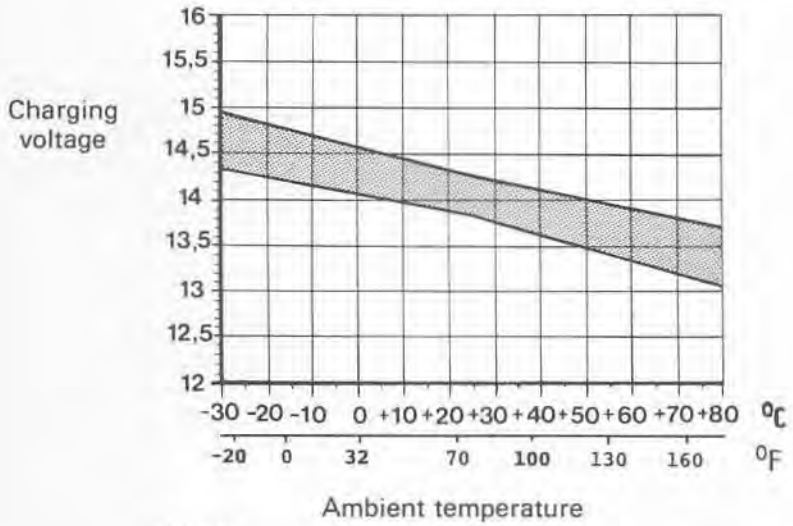
Diode kit



The Volvo diode kit P/N 75903-5 may be used to raise the charging rate.

CAUTION
Do not use diode kit if charging voltage is above the shaded band in the graph.

— Install diode as shown.
— Check that system is not overcharging.



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