

Diagnose the Starting System

Fender Covers !



You must have a strong battery to test the starter





286

AMPS

10.4

VOLTS
EXTERNAL

LOAD
15
SECONDS

ALTERNATOR
DIODE TEST

ON/OFF

AMPS

ZERO

VOLTS

EXTERNAL

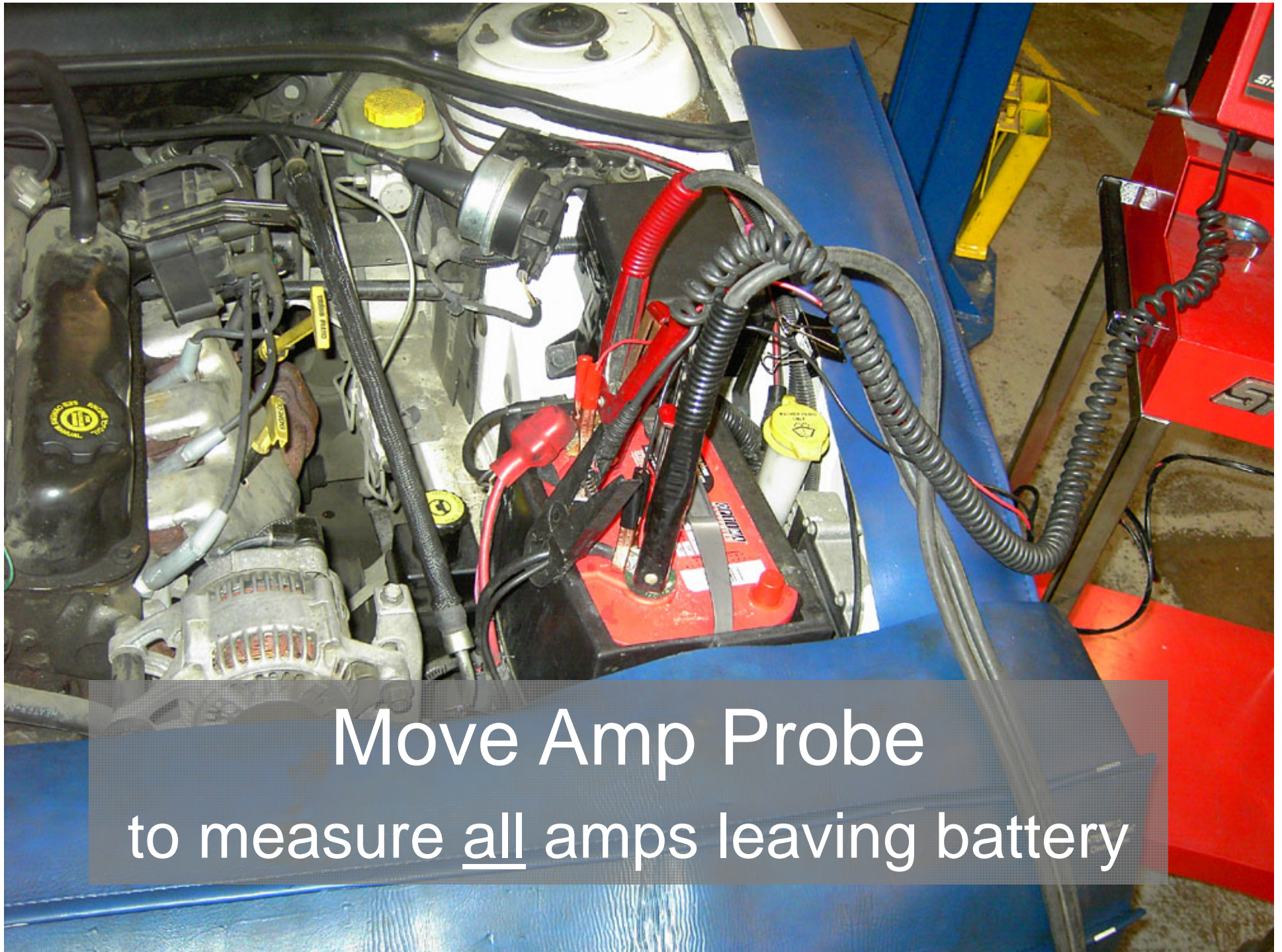
BATTERY

Snap-on.

Heavy Duty Charging & Charging Systems Tester

Test the Starter Circuit

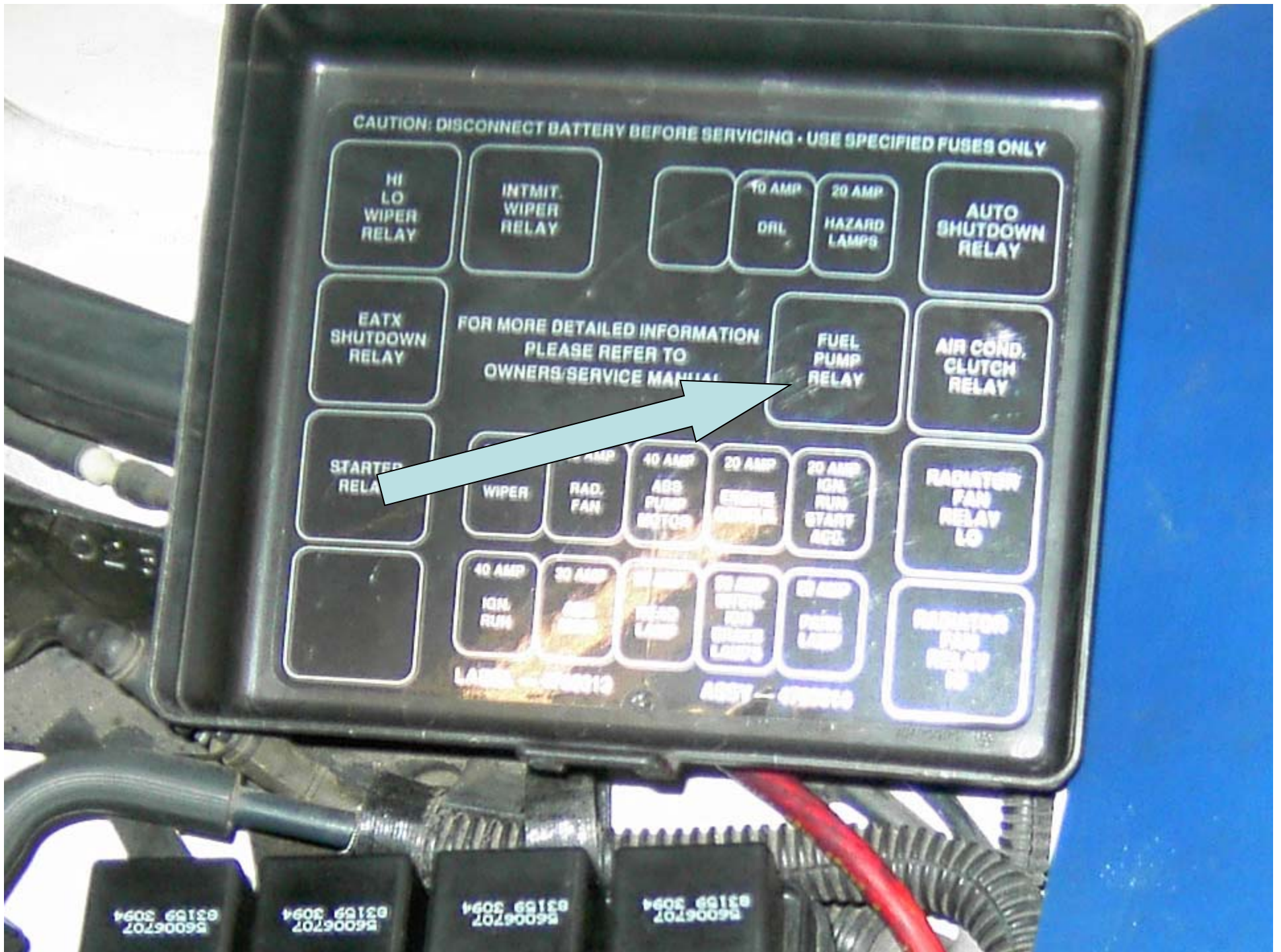
- Cranking Voltage
- Cranking R. P. M.
- Cranking Amps

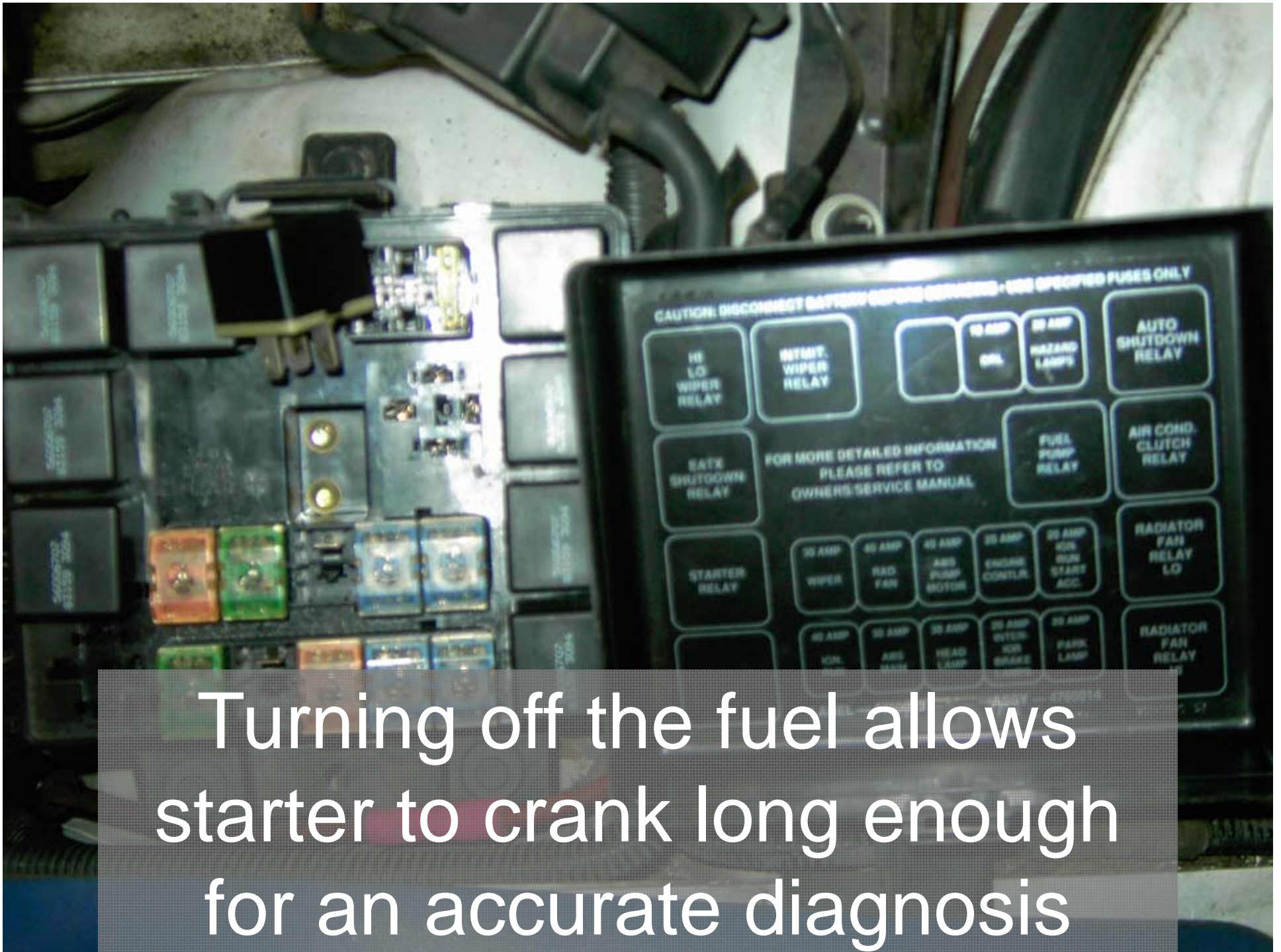


Move Amp Probe
to measure all amps leaving battery

Disable Fuel System





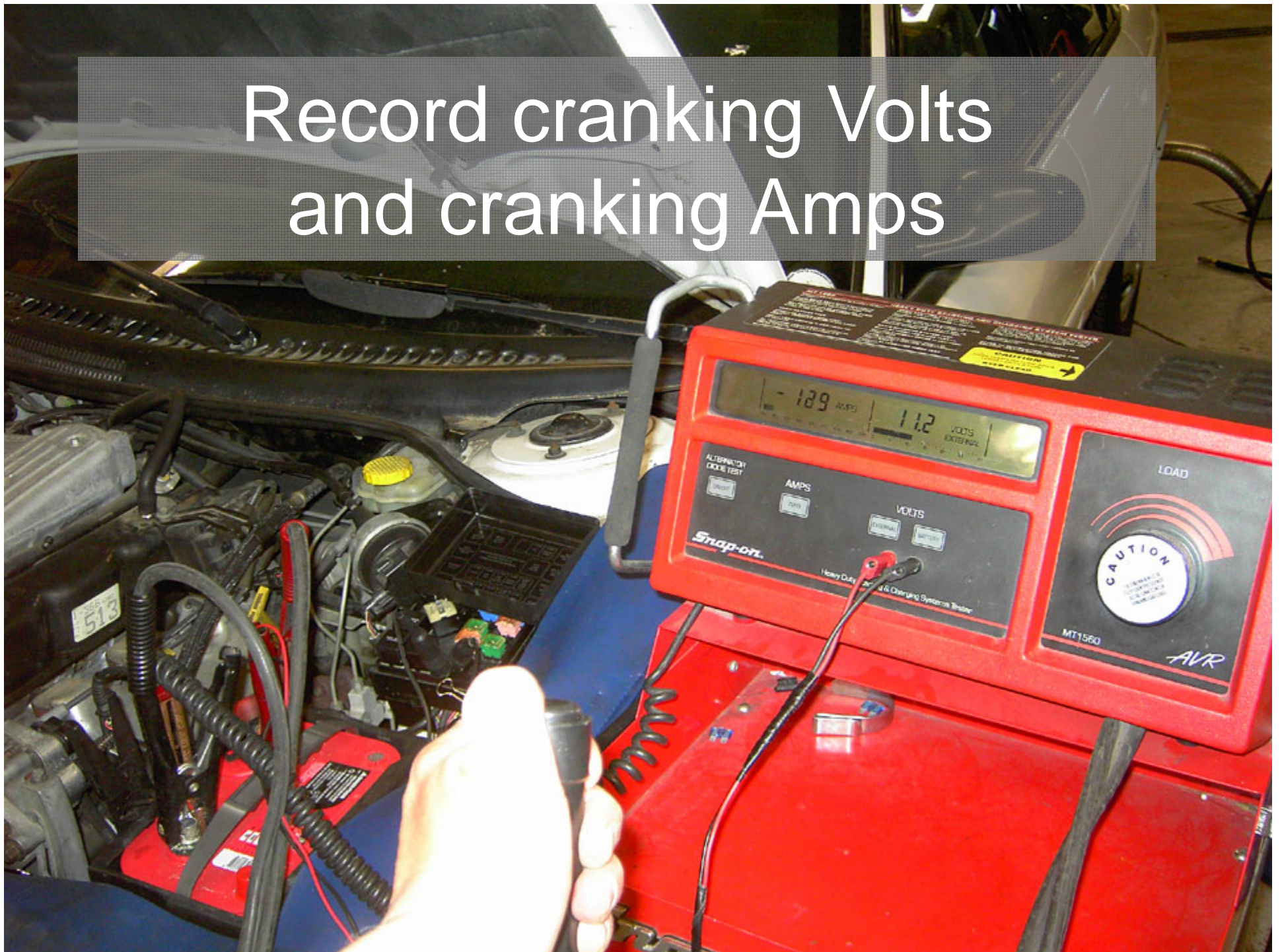


Turning off the fuel allows starter to crank long enough for an accurate diagnosis

If it is easy....
...use a remote starter



Record cranking Volts and cranking Amps





MT 1560
HEAVY DUTY STARTING AND CHARGING SYSTEMS TESTER

CAUTION
KEEP CLEAN



ALTERNATOR
DIODE TEST

ON/OFF

AMPS

ZERO

VOLTS

EXTERNAL

BATTERY

Snap-on.

Heavy Duty Starting & Charging Systems Tester

LOAD



CAUTION
THE LOAD KNOB MUST BE
FULLY OPEN PRIOR TO
STARTING THE ENGINE
UNDER LOADS

MT1560

AVR

- Starter amp draw will be high until the starter motor reaches maximum RPM
- Cranking longer than 10 or 15 seconds will overheat the starter
- Starter motors that crank slowly lead to starter and battery problems

Listen for slow cranking





- Cranking voltage **MUST** stay above 10 volts
- Maximum Cranking Amps
 - 4 cylinder = 150 Amp
 - 6 cylinder = 200 Amp
 - 8 cylinder = 250 Amp
- These are **ONLY** approximate specifications and not valid on diesel engines.

Slow turning starters cause trouble

- Engines will be harder to start requiring longer cranking times
- Starters will tend to overheat
- Batteries will wear out sooner
- By carefully listening to many different engines, you will learn to identify slow cranking R.P.M.'s
- Scan Tool provides exact cranking R.P.M.

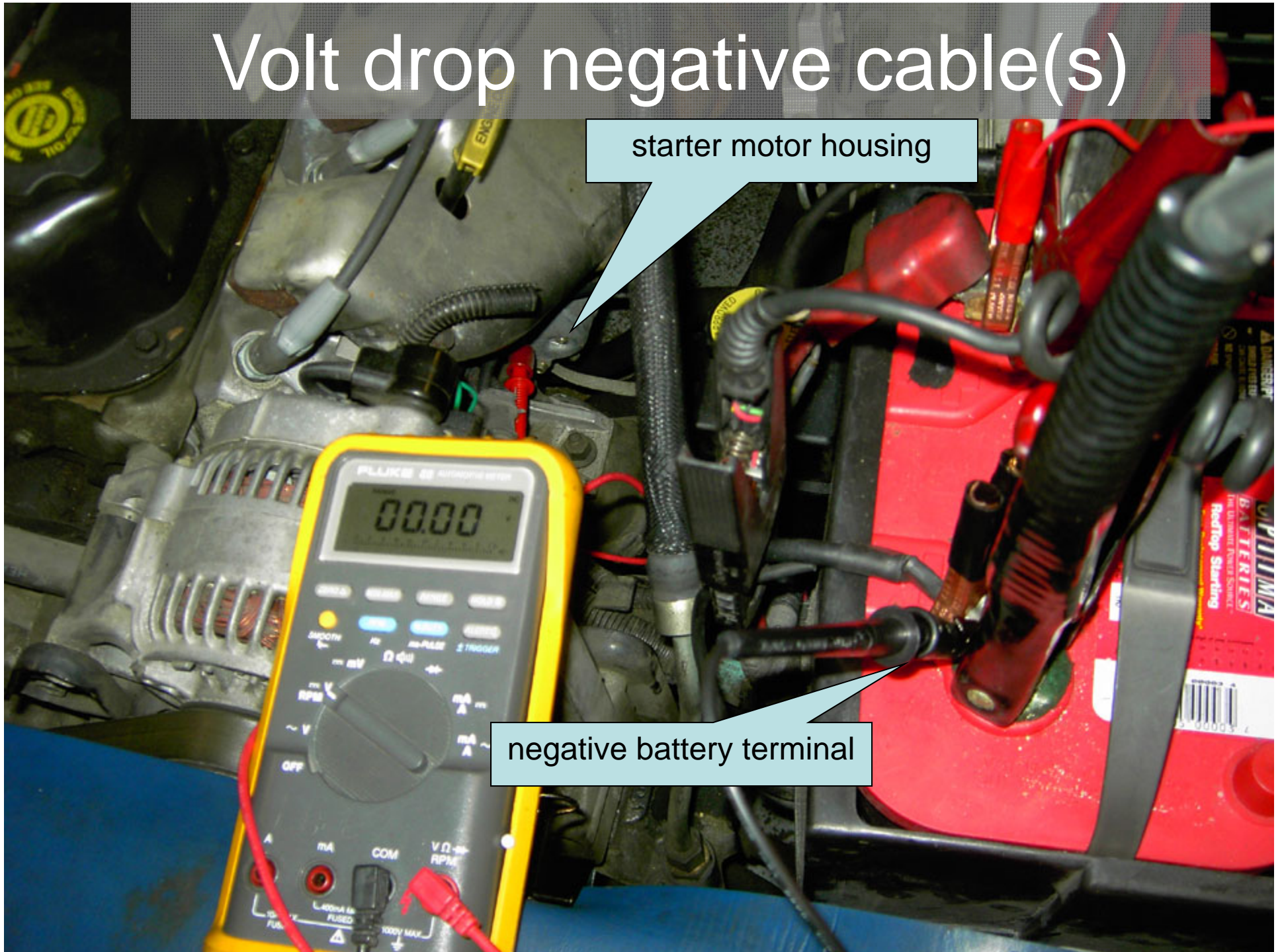
Volt Drop Starter Cables

- Resistance in the high amp starter (battery) cables will cause slow cranking
- Replacing a starter motor without checking volt drop may cause the new starter to fail
- High amp starter cables should have less than $\frac{1}{2}$ volt drop.

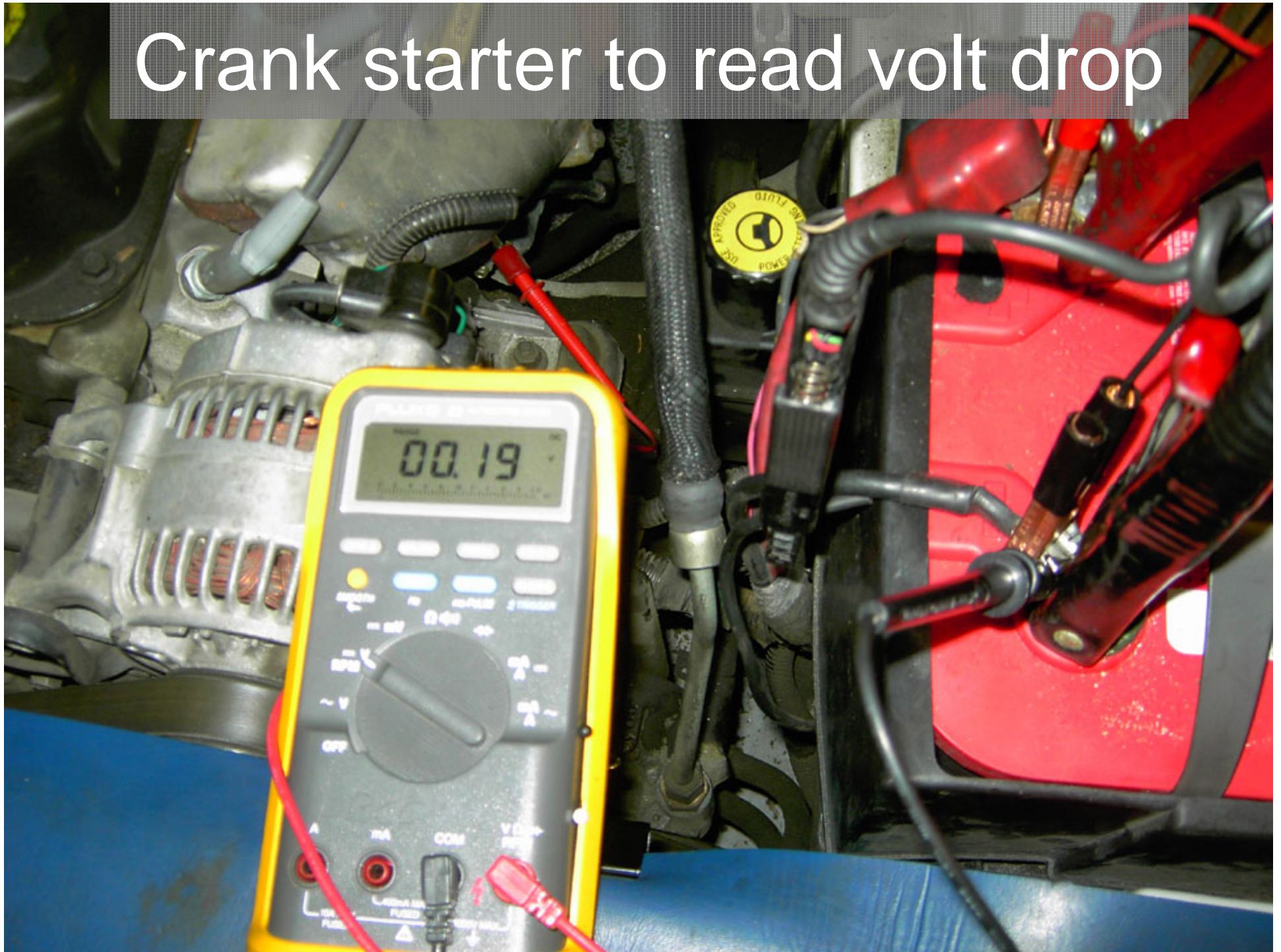
Volt drop negative cable(s)

starter motor housing

negative battery terminal



Crank starter to read volt drop

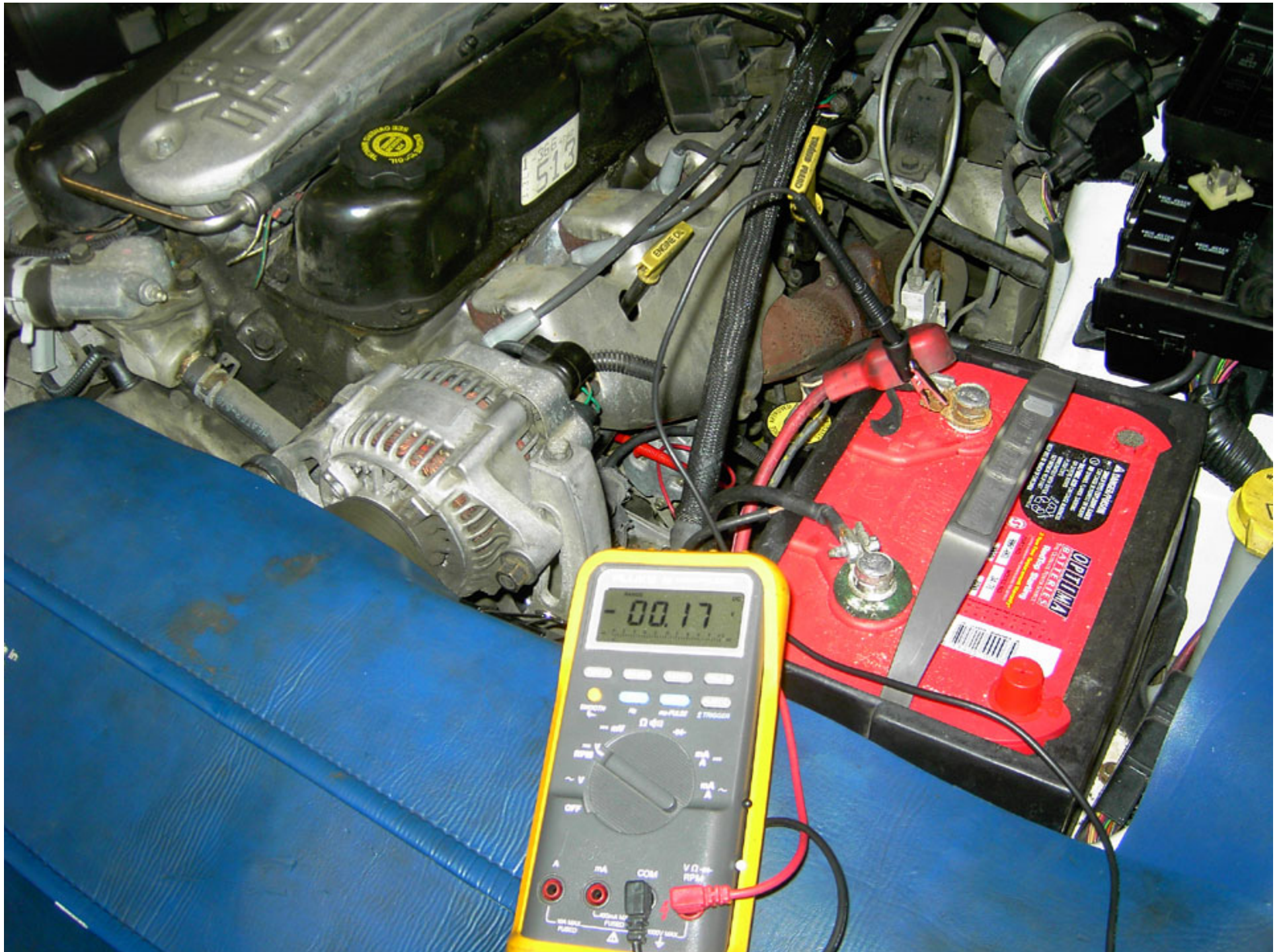




Volt drop positive cable(s)



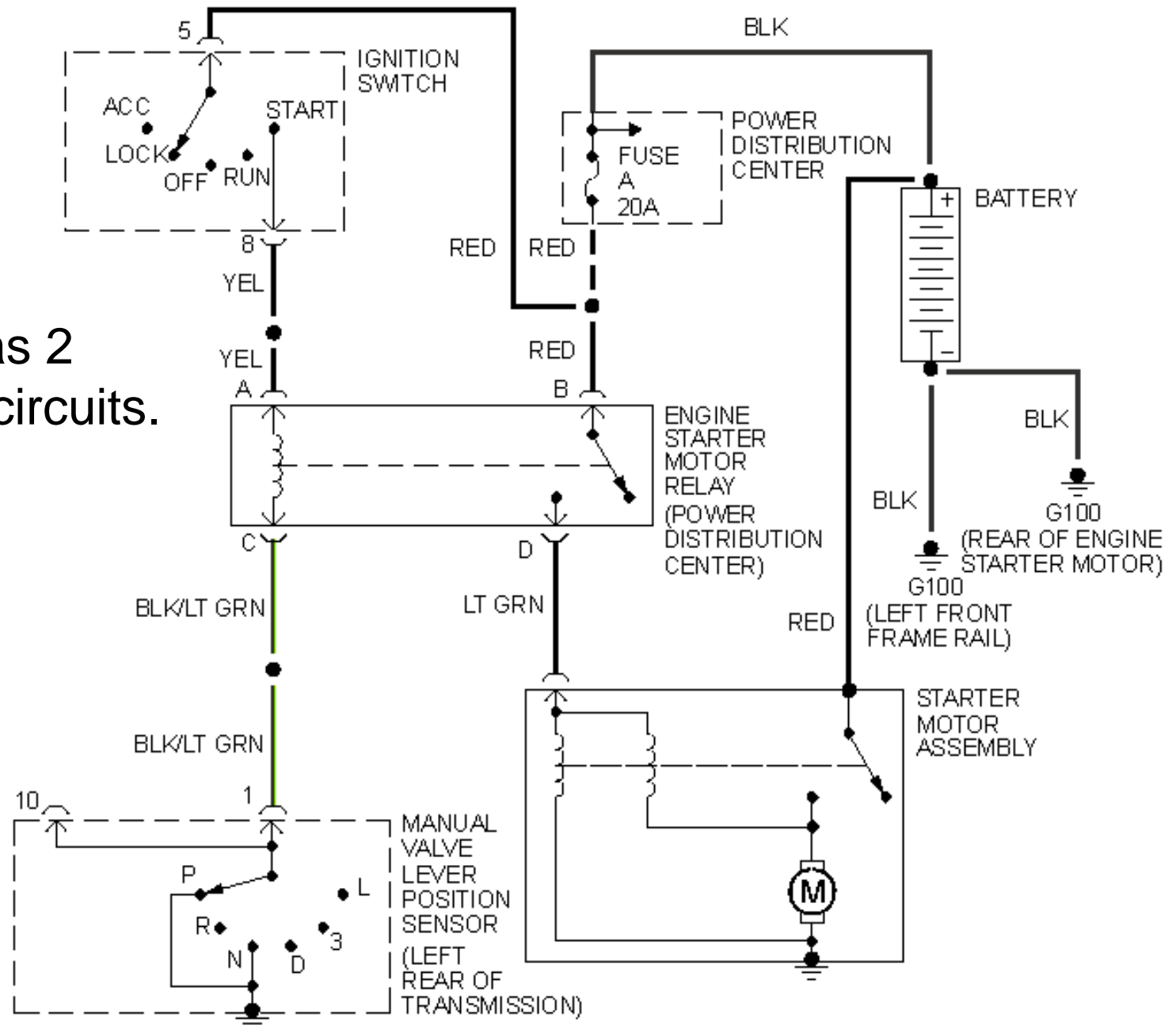
Hook to high amp cable

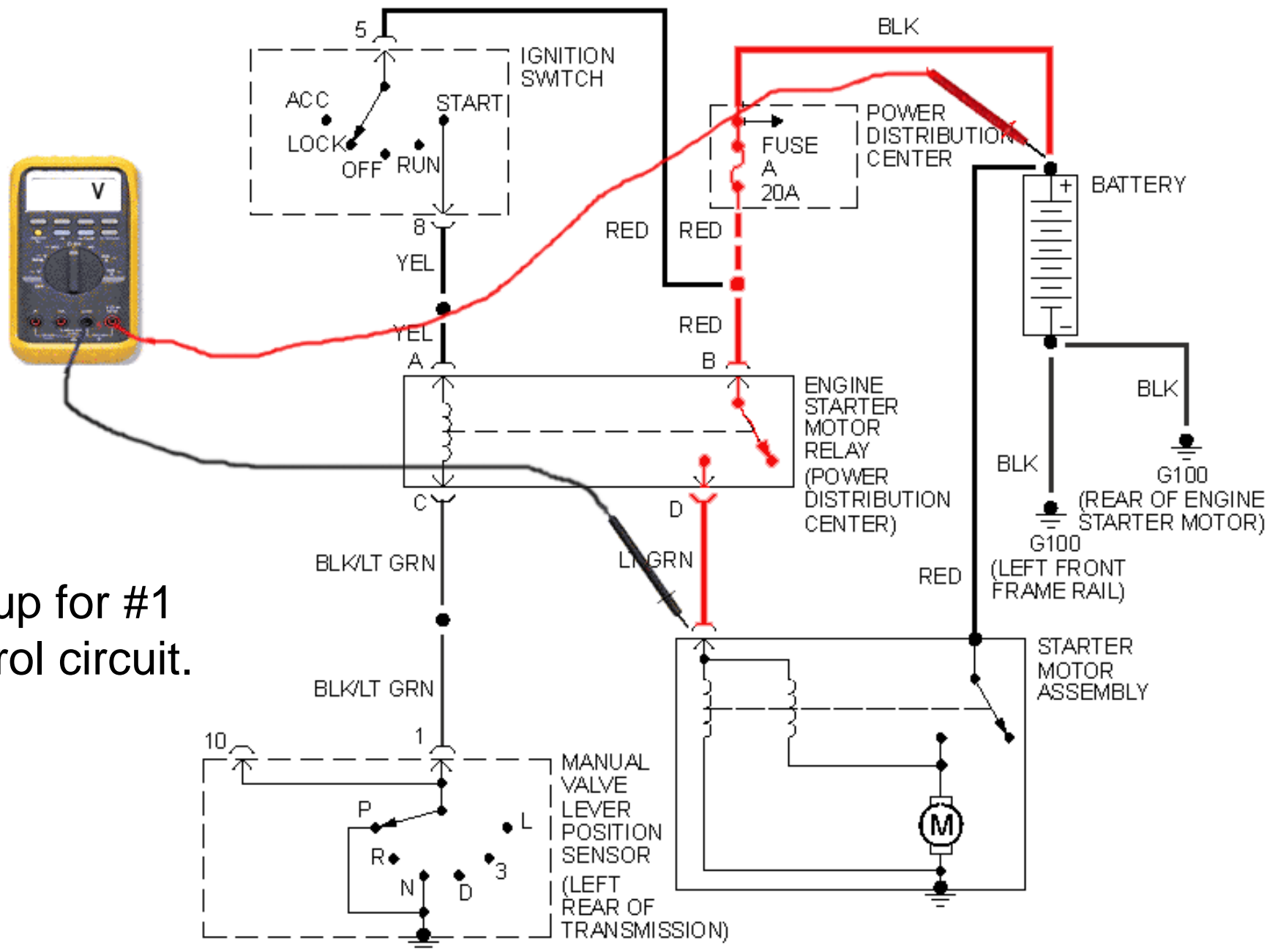


Diagnose Intermittent or No Crank

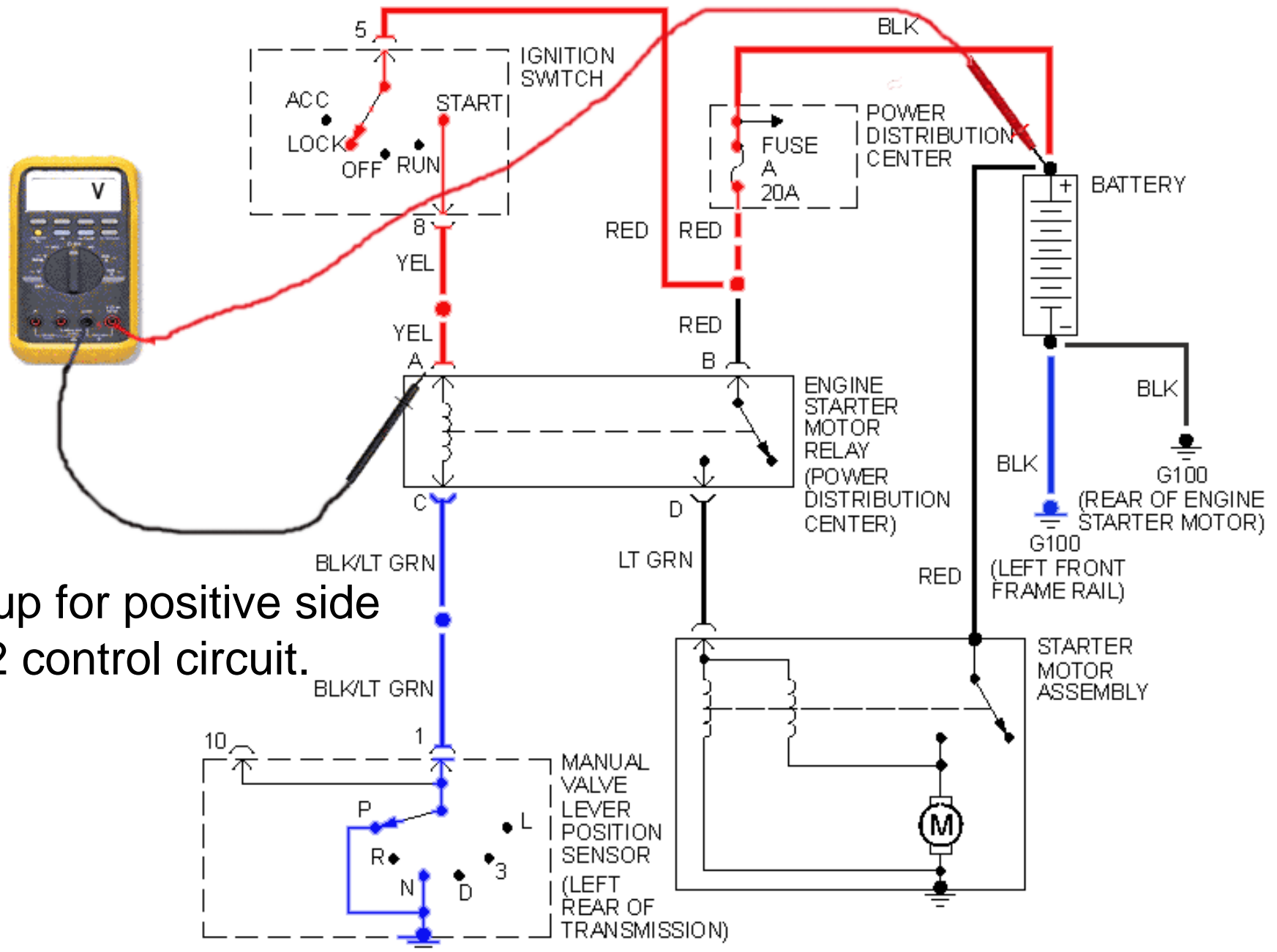
- Intermittent, or no starter motor operation may be caused by a defect in the starter control circuit
- Begin by understanding the system

This system has 2 starter control circuits.

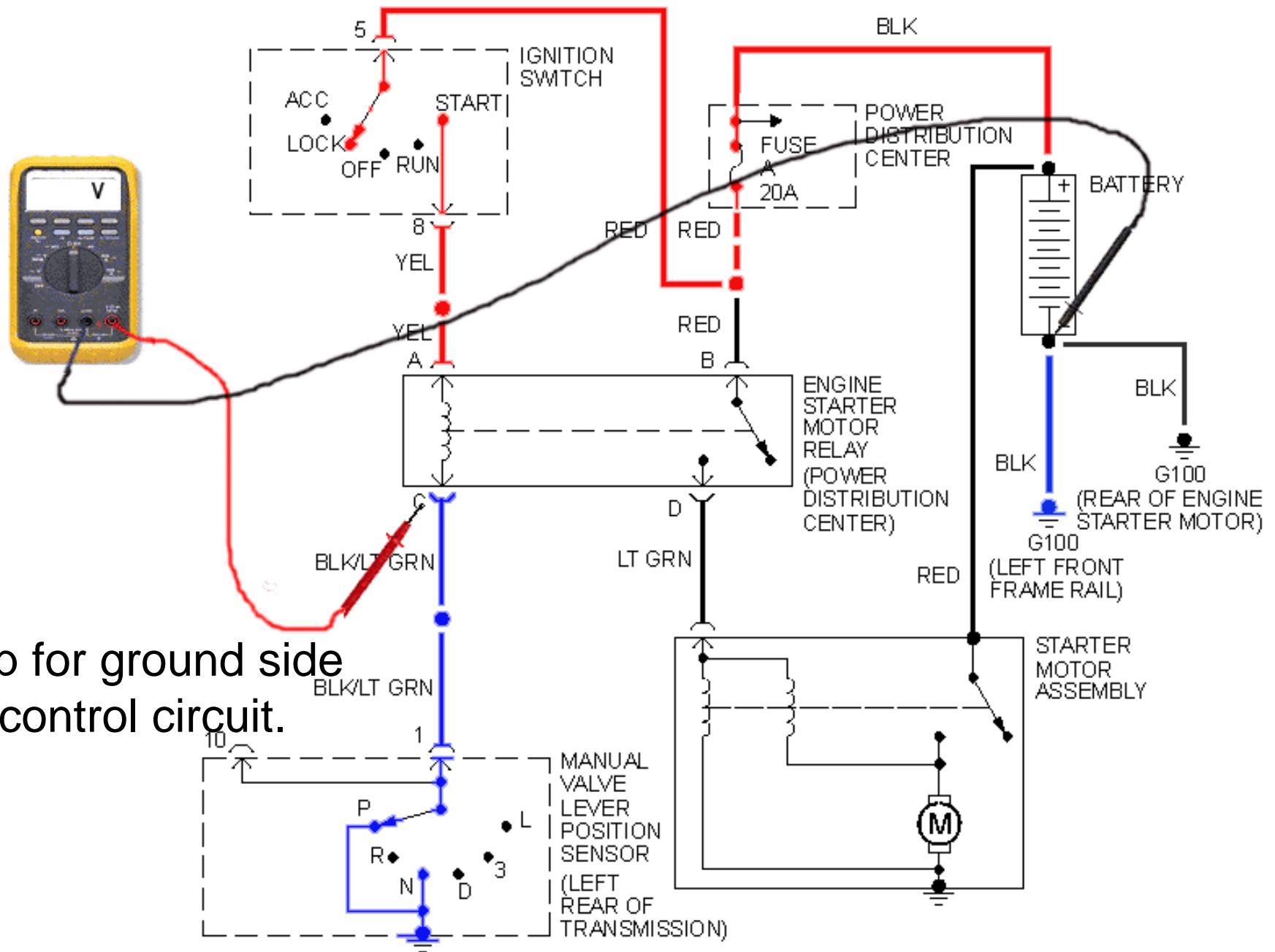




Set-up for #1 control circuit.



Set-up for positive side of #2 control circuit.



Set-up for ground side
of #2 control circuit.

Defects in control circuit #1, or control circuit #2, will cause intermittent or No Start

