

## Wire Size Chart

The "Wire Size" charts are provided for easy selection of wire sizes. (The charts, however, neglect losses due to connections or switches.)

To use the chart:

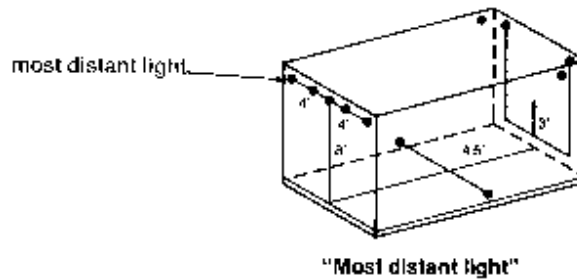
- Determine the total wire length from the power source to the most distant point in the circuit.
- Determine the total electrical load on the circuit.
- Find the load along one edge of the chart depending on the vehicle voltage in question, taking the next higher load if the indicated load falls between two points on the chart.
- Find the cable length required on the top of the chart, taking the next higher length. (if exact length is not cited).
- At the intersection of the length and load column, read the minimum size wire required for that particular circuit.

See below for a detailed example

12 Volt	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'
Amperes										
1	18g	18g	18g	18g	18g	18g	18g	18g	18g	18g
2	18g	18g	18g	18g	18g	18g	18g	16g	16g	16g
3	18g	18g	18g	18g	18g	16g	16g	16g	14g	14g
4	18g	18g	18g	16g	16g	16g	14g	14g	14g	12g
5	18g	18g	18g	16g	14g	14g	14g	12g	12g	12g
6	18g	18g	16g	16g	14g	14g	12g	12g	12g	10g
7	18g	18g	16g	14g	14g	12g	12g	12g	12g	10g
8	18g	16g	16g	14g	12g	12g	12g	10g	10g	10g
10	18g	16g	14g	12g	12g	12g	10g	10g	10g	10g
11	18g	16g	14g	12g	12g	10g	10g	10g	10g	8g
12	18g	16g	14g	12g	12g	10g	10g	10g	8g	8g
15	18g	14g	12g	12g	10g	10g	10g	8g	8g	8g
20	16g	12g	12g	10g	10g	8g	8g	8g	8g	6g

### EXAMPLE

Determine: Wire size required for the clearance light circuit having eleven lights with No. 97 bulbs



Determine: Wire size required for the clearance light circuit having eleven lights with No. 97 bulbs

SOLUTION:

- Find total ampere load in the circuit.  
There are 11 lights - No. 97 bulbs.  
Each bulb has an ampere rating of .69 amps.  
TOTAL AMP LOAD = .69 x 11 = 7.59 amps
- Find the distance from the power source to the most distant light. Total distance  
= 3 + 45 + 8 + 4 = 60 feet.
- Find the wire size in the preceding chart.  
Find the length along the top - 60'.  
Find the ampere load in the 12V column then 8 amps is the next higher load above 7.69 amps. At the intersection of these two lines a 12 gauge wire is indicated.  
This is the WIRE SIZE TO BE USED.

NOTE: The preceding information is from GROTE

### Wire Size

The wire size specification is extremely important:

A wire too small for the current flow will overheat

A wire too long will cause increased resistance resulting in voltage drop. If a wire length is doubled, resistance is also doubled.

If the wire size is doubled, resistance is halved.

As temperature increases, conductor resistance increases. For example, the resistance of 10 feet of copper wire at 70°F is 0.04, the same wire at 170°F has a resistance of 0.05, a 25% increase.

## Common light bulb ratings

# 97	0.69 amps
# 194	0.27 amps
# 1003	0.94 amps
# 1004	0.94 amp
# 1156	2.10 amp
# 1157	0.89 amp (tail light)
	2.10 amp (sig./brake light)

## Wire Size Standards

Conductor size is measured by two different standards; the old imperial size used in North America is American Wire Gauge (AWG) systems. This standard has a set value number for each size of wire used in industry. In most cases only an even number is used, a #4 wire is typical for starter cable, while a #16 wire is common for lighting circuits.

AWG standards: as the size number increases, the wire diameter decreases.

The metric standard is becoming more common today. It calculates the cross sectional conductor area in square millimeters. For example a 0.8 mm<sup>2</sup> wire may be used for a taillight, while a 13.0mm<sup>2</sup> wire would be used for a starter cable. Metric standards: as the size number increases, the wire diameter increases.

## METRIC TO AWG CONVERSION TABLE

Metric Size mm <sup>2</sup>	AWG Size
0.5	20
0.8	18
1.0	16
2.0	14
3.0	12
5.0	10
8.0	8
13.0	6
19.0	4
32.0	2
52.0	0

## WIRE GAUGE DIAMETER TABLE

American Wire Gauge	Wire Diameter in inches
20	0.03196118
18	0.040303
16	0.0508214
14	0.064084
12	0.0808081
10	0.10189
8	0.128496
6	0.16202
5	0.18194
4	0.20431
3	0.22942
2	0.25763
1	0.2893
0	0.32486
00	0.3648

## Repair Tips

- 1.> Always use the correct size of wire when repairing a circuit.
- 2.> When a common ground is used - make sure it is large enough to carry the load of all the circuits involved
- 3.> Replace stranded wire with stranded wire, it has more flexibility and has less tendency to break due to vibration.
- 4.> Lubricate sockets, pigtails, battery terminals and connections with a "nonconductive" anti-corrosion compound. The purpose of the sealant is to totally encapsulate and protect against corrosion and water. Do not use sodium-based greases. Sodium will emulsify if it ever comes in contact with water.
- 5.> Harnesses and wiring should be on the underside of top frame members rather than on the bottom where dirt and road splash collect.
- 6.> When troubleshooting electrical problems never pierce the wire insulation. Wicking action takes place which allows moisture to travel along the wire strands and causes corrosion. (*Green Death*). If probing a harness or wire is unavoidable, make sure the puncture is properly sealed. Testing should take place at each termination point or connection along the circuit.

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## Tech Tips & Information

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# TRUCK & TRAILER WIRING

