

英语阅读材料

ENGLISH READING MATERIAL

昆明工学院外语教研组翻印

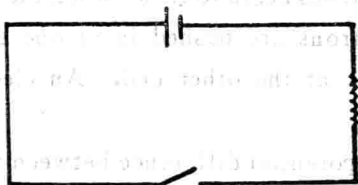
PART 1

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A CIRCUIT

This is a circuit diagram. It¹ shows a simple circuit. The circuit is made of a battery, a switch and a resistor. The current flows in the circuit if we turn on the switch. This makes a close circuit. In the close circuit, the current flows out of the battery, through the resistor and back into the battery again. If we turn off the switch the current cannot flow. This makes an open circuit. So the switch can close the circuit or open the circuit.



ELECTRIC CURRENT

An electric current is the flow of electrons through a circuit². There are two kinds of electric currents³. One⁴ is

注：1. it 代替 circuit diagram。2. 前置词短语 through a circuit 作 flow of electrons 的定语。3. 这句的主语是哪个词？谓语在哪里？4. one 是代词，在句中作主语，相当于 one of the two kinds of electric currents。

the direct current (d.c.). The other is the alternating current (a.c.). If the electrons always move in the same direction through a circuit, we call the current direct current. If the electrons move first in one direction through the circuit and then in the other¹, we call the current alternating current. Batteries and certain types of generators furnish direct current. Power stations supply alternating current.

VOLTAGE

A battery, a load and a switch are connected in a circuit by a wire. Electrons begin to flow² when the switch is turned on. Free electrons are pushed in at one end of the wire and pulled out at the other end. An electric current is produced.

There is a potential difference between the two ends of the wire³. This potential difference makes the electrons flow along the wire. It is called voltage. Voltage is measured in volts⁴.

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- 注：1. then in the other, 意即 then in the other direction, 与前面的 first in one direction 并列, 都作状语, 说明谓语 move; first 和 then 这里都是付词, 译成: “最初, 首先”, “然后”。
2. 不定式 to flow 作 begin 的宾语。 3. 句中哪个词是主语? 哪个词是谓语? 4. in volts, 表示某计量单位时用前置词 in, 如 in ohms, in volts. 这句可译成: “电压以伏特来计量”, 或 “电压的测量单位是伏特”。

RESISTANCE

The electric resistance of a wire is the ratio of the potential difference between its two ends to the current in the wire¹. The equation is: $R = \frac{V}{I}$.

The electric resistance is measured in ohms². An ohm is a volt per ampere.

Example: The difference of potential between the two ends of a bulb is 6 volts. If the current is 1.5 ampere, what is the resistance?

The resistance $R = \frac{6 \text{ volts}}{1.5 \text{ ampere}} = 4 \text{ ohms}$.

CAPACITANCE

Place two metal plates close to each other³. Connect⁴ them in a circuit and charge them⁵. One is charged positively. The other is charged negatively. The electrical charges on the two plates attract each other. They are in a stationary state. The electric energy is stored in the electric field be-

注: 1. the ratio of ... to ... 译成: ...对...之比。如 the ratio of three to two, 即 the ratio 3:2, 译成: 3对2之比。 2. in ohms 的用法参看短文第2页注4。 3. 这句是命令式, 表示命令或请求。谓语用动词原形, 主语省略。 4. connect 和 charge 为什么用动词原形? 参看注3。 5. 句中两个 them 代替哪个词?

tween the plates¹. We call the two metal plates the capacitor. A capacitor is used to store electricity.

The capacitance depends upon the plate area and² the space between the plates. It also depends upon the kind of dielectric. Air is known as³ the poorest dielectric. Other dielectrics may increase the capacitance many times⁴.

ELECTROMOTIVE FORCE

The electromotive force creates the electric pressure that causes the current to flow through a conductor. Another name for this force is voltage. We can measure the voltage between any two selected points on a conductor by means of an electrical instrument,⁵ called the voltmeter.

The unit of measurement of electromotive force, or voltage, is called the volt. The volt is defined as the electromotive force that is necessary to cause one ampere of current to

注：1. 句中前置词词组 in the electric field 是什么成分？说明哪个词？前置词词组 between the plates 在句中的作用与 in the electric field 有何不同，它说明哪个词？其用法参看第1页注2。2. 连接词 and 连接哪两个成分？3. is known as... 可译成“被认为是...”。4. times 这里不译成“时间”或“次”，而译成“倍”。5. 这句有三个前置词短语，注意比较它们的用法：between any two selected points 是定语，说明名词 voltage；on a conductor 也是定语，说明 points；by means of 是前置词词组，引起的短语 by means of an electrical instrument 是状语，说明谓语 can measure。

flow through a resistance of one ohm¹. Where the volt is too large a unit², we may use the millivolt or the microvolt. In an electrical formula, the capital letter E stands for voltage.

SERIES CIRCUIT

In the series circuit, the electrons can follow only one path from the high-potential to the low-potential point. Figure 1 shows such a circuit³. In this figure, the high-potential, (negative) point is indicated by the symbol (-) and the low-potential (positive) point by the symbol (+). The direction of electron flow is indicated by the symbol $e \rightarrow$.

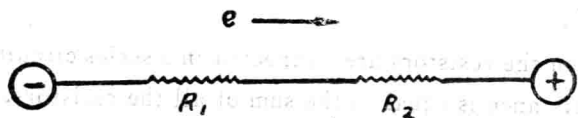


Figure 1. The series circuit, showing two resistors connected in series.

注：1. as the electromotive force 是句中主语 volt 的主语补足语；that is necessary ... 是定语从句，说明 electromotive force；动词不定式短语 to cause one ampere of current to flow ... 是付句中的目的状语。2. where the volt is too large a unit 是表示地点的状语付句，关系付词 where 在付句中作状语。too large a unit 是冠词 a 的一种习惯用法，因为形容词 (large) 之前有付词 too，这时冠词 a 不放在 too + 形容词之前，而是放在 too + 形容词之后，位于名词 (unit) 之前。3. 这是冠词 a 的一种习惯用法，因为这里名词之前有形容词 such，这时冠词 a 不放在 such 之前，而是放在 such 之后，位于名词之前，参看注 2。

Although all substances offer some resistance to the current, we sometimes desire to introduce a resistance into a circuit¹. Such a resistance² is called a resistor and is indicated by the symbol ω . In Figure 1, you will see that we have two such resistors (R_1 and R_2) connected together³. Since there is only one path⁴, all the electrons must flow through the entire circuit. Thus, the current is the same⁵ in all parts of the circuit.

The entire electric pressure, or voltage, is required to force⁶ the electrons from the negative to the positive end of the circuit. A portion of this voltage is required to force the electrons through each resistor. The amount of voltage used up⁷ for each resistor is called the voltage drop across that resistor⁸.

When the resistors are connected in a series circuit, the total resistance is equal to the sum of all the resistors. This rule can be shown as follows:

$$R_{\text{total}} = R_1 + R_2 + R_3 + \dots$$

注：1. 动词不定式短语 to introduce a resistance into a circuit 是 desire 的宾语。2. 这里 such 的位置为什么在 a resistance 之前？参看第 5 页注 3。3. 过去分词短语 connected together 是定语，说明 two such resistors。4. 这句主语是哪个词？there is 怎么译？5. 这里 same 是什么词？作什么成分？6. 这里 force 是名词还是动词？怎么译？7. used up 是过去分词词组，作定语，译成“所消耗的”，“所用完的”。8. 这里 that 作什么用？怎么译？这里前置词短语 across that resistor 是什么成分？说明哪个词？

PARALLEL CIRCUIT

In a parallel circuit, the electrons can follow two or more paths at the same time from the high¹ to the low-potential point. Figure 2 shows such a circuit. The electron stream

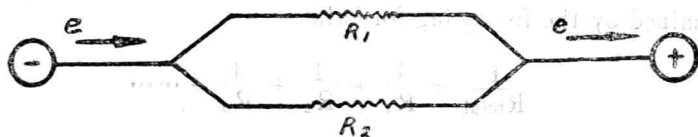


Figure 2. The parallel circuit, showing two resistors connected in parallel.

flowing from the high-potential (negative) point divides at X. Part flows through resistor R_1 . The other flows through resistor R_2 . Both parts of the electron stream join at Y and the combined stream then flows on² to the low-potential (positive) point.

Since current will flow more readily through a low-resistance than through a high-resistance path, if R_2 has twice the resistance of R_1 , twice as much current will flow through R_1 as through R_2 ³. Thus, if the total current is equal to nine

注：1. high- 后面省去了 potential 一词，即 high-potential。2. flow on 是词组，译成“继续流动”。3. twice as much current ... as through R_2 ，“为通过 R_2 两倍那样多的电流...” as much ... as ... 译成“同...一样多”。

amperes, six amperes will flow through R_1 and three amperes through R_2 . Since each resistor has the same difference of potential between its ends, the voltage drop across each resistor is the same.

When resistors are connected in a parallel circuit, we do not add their resistances to obtain the total. Instead, the total resistance for several resistors in parallel¹ is determined by the following formula:

$$\frac{1}{R_{\text{total}}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

注：1. 这句有两个前置词短语。for several resistors 和 in parallel, 是它们什么成分？分别说明哪个词？

参 考 译 文

电 路

这是一个电路图。它表示的是一个简单的电路。这个电路由一个电池，一个开关和一个电阻器组成。倘若我们合上开关，电流就在电路里流动。这就形成一个通路。在这通路里，电流从电池流出，通过电阻器再回到电池内。倘若我们关掉开关，电流就不能流动，这就形成断路。因此开关能够闭合此电路或断开此电路。

电 流

电流是通过电路的电子流。电流有两种：一种是直流电（d.c.），另一种是交流电（a.c.）。如果电子在电路中始终向同一方向流动，我们称此种电流为直流电。如果电子在电路里先向一个方向，然后又向另一个方向流动，我们就称之为交流电。电池及某些类型的发电机产生直流电。发电厂则供应交流电。

电 压

电池，负载和开关用导线连接在电路中。打开开关，电子

开始流动。自由电子从导线一端推进去，在另一端拉出来。因而就产生了电流。

导线两端之间有电位差。这电位差使电子沿导线流动。就叫做电压。电压的测量单位是伏特。

电 阻

导线的电阻是该导线两端之间电位差同导线里电流的比值。其公式是：

$$R = \frac{V}{I}$$

电阻的测量单位是欧姆。1 欧姆是每安培 1 伏特。

例：一灯泡两头之间的电位差为 6 伏特。若电流为 1.5 安培，电阻是多少？

$$\text{电阻 } R = \frac{6 \text{ 伏特}}{1.5 \text{ 安培}} = 4 \text{ 欧姆。}$$

电 容

将两块金属板相互靠近。把它们联到一个电路里并使它们带电。一块金属板带正电，另一块带负电。两块板上的电荷互相吸引。它们处于一种稳定状态。电能储存在两块金属板之间的电场中。我们把这两块金属板就叫做电容器，电容器是用来蓄电的。

电容的大小取决于金属板的面积以及金属板之间的间隙。

它也取决于介质的种类。空气被认为是一种最差的介质。其他的介质可以使电容增加许多倍。

电 动 势

电动势产生电的压力，它能使电流流过导体。电动势又名电压。我们能够用一个称为伏特计的电工仪表来测量导体内任何两个点之间的电压。

电动势或电压的测量单位称为伏特。伏特的定义是使1安培电流流过1欧姆电阻所需要的电动势。在用伏特做单位太大的地方，我们可以用毫伏特或微伏特。电学公式中用大写 E 表示电压。

串 联 电 路

在串联电路中，电子只能沿着一条路线从高电位点流向低电位点。图1所示，就是这样的电路。高电位点（负极）用（-）号表示，而低电位点（正极）则用（+）号表示。电子流动的方向以（ $e \rightarrow$ ）表示。

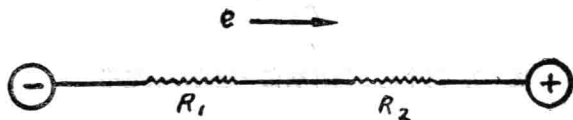


图 1: 两个电阻器串联在一起的串联电路

虽然，所有物质对电流都会产生某种阻力，但我们还是希望在电路上加一个电阻。这个电阻叫做电阻器，并用（ $\sim\sim\sim$ ）号表示。在图 1 中，你可以看到有两个串联在一起的电阻器（ R_1 和 R_2 ）。既然只有一条线路，因而所有电子都必须通过整个电路。由此得出，电路上各个部分的电流大小是相等的。

电流的总压力即电压迫使电子从电路的负极流向正极。其分电压则迫使电子通过各个电阻器。每个电阻器所消耗的电压数叫做该电阻器的电压降。

当一些电阻器接在一个串联电路上时，其总电阻等于所有这些电阻器的总和。此规则可用下式表示：

$$R_{\text{总}} = R_1 + R_2 + R_3 + \dots$$

并 联 电 路

并联电路中，电子能够同时沿着两条或两条以上的线路从高电位点流向低电位点。图 2 就表示这种电路。电流从高电位

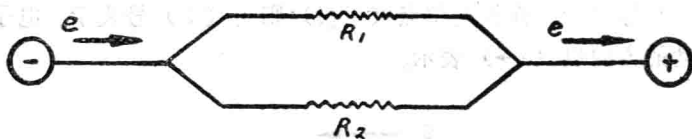


图 2：两个电阻器并联在一起的并联电路

点（负极）流出，流到 x 点分开。一部分通过电阻器 R_1 ，另一部分则通过电阻器 R_2 。这两部分电子流在 y 点上汇合，而

汇合的电子流继续流向低电位点（正极）。

由于电流通过低电阻线路比通过高电阻线路来得容易，如果 R_2 的电阻二倍于 R_1 ，则通过 R_1 的电流也是通过 R_2 的电流的两倍。这样，如果总电流为 9 安培，则 6 安培的电流通过 R_1 ，而 3 安培的电流通过 R_2 。由于每个电阻器两端的电位差相同，所以每个电阻器的电压降也是相同的。

当一些电阻器接在一个并联电路里时，我们不是把这些电阻相加来求总电阻，而是用下式来求出几个并联电阻器的总电阻：

$$\frac{1}{R_{\text{总}}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

单 词 表

alternate ['ɔ:lteɪneɪt]	v.	交互, 交替, 轮流
alternating current		交流电
ampere ['æmpɪə]	n.	安培
area ['ɛəriə]	n.	面积, 区域, 范围
attract [ə'trækt]	vt.	吸引, 牵引
battery ['bætəri]	n.	电池
bulb [bʌlb]	n.	灯泡, 球
capacitance [kə'pæsɪtəns]	n.	电容
capacitor [kə'pæsɪtə]	n.	电容器
capital letter ['kæpɪtl 'letə]		大写
cause [kɔ:z]	vt. n.	引起, 使, 使……发生; 原因, 理由, 根本; 目的
certain ['sə:tin]	a.	某, 一些
charge [tʃɑ:dʒ]	vt. n.	给……充电; 装载; 电荷
circuit ['sə:kɪt]	n.	路, 线路, 电路
close [klaʊz]	vt. a.	关, 闭; 接通; 靠近; 闭的, 密的
close circuit		通路, 闭合线路
combine [kəm'beɪn]	vt.	合并, 结合, 联合, 化合
conductor [kən'dʌktə]	n.	导体, 导线
connect [kə'nekt]	vt.	连接
create [kri'eɪt]	vt.	产生, 引起, 创造, 设立

current ['kʌrənt] n.	流, 流束, 电流
define [di'fain] vt.	规定, 下定义
desire [di'zaiə] vt.	想, 希望, 要求
determine [di'tə:mi:n] vt.	决心, 决定
diagram ['daɪəgrəm] n.	图, 图解
dielectric [daii'lektrik] n.	介质
direct [di'rekt] a.	直线的, 直接的, 笔直的
direction [di'rekʃən] n.	方向, 方位
in the direction of ...	向...方向
divide [di'vaɪd] vt.	分, 分配; 分裂, 区分, 分开; 除
drop [drɒp] n.	滴, 微量; 降, 落下距离
electrical [i'lektrikəl] a.	电的
electricity [ilek'trisiti] n.	电, 电学
electromotive force	电动势
[i'lektroumoutiv fɔ:s]	
electron [i'lektrɒn] n.	电子
entire [in'taɪə] n.	全, 完全, 全体, 总
equal ['i:kwəl] a.	相等的, 均等的
equation [i'kweiʃən] n.	方程式, 等式
field [fi:ld] n.	场, 田地; 范围, 方面
figure ['figə] n.	图, 插图
flow [fləʊ] vt. n.	流, 流动, 流出; 流量
follow ['fɒləʊ] vt.	沿着, 跟着
force [fɔ:s] vt. n.	强迫, 使; 力, 武力, 力量
formula ['fɔ:mjulə] n.	公式
free electron	自由电子