DOWNLOAD PDF BASIC ELECTRICAL CIRCUITS DIAGRAMS

Chapter 1 : A Beginnerâ€™s Guide to Circuit Diagrams Â» Electrical â€‹Engineering â€‹Schools

An electrical circuit diagram is a simplified schematic representation of an electric circuit. It uses standard symbols for the components in the circuit and does not show the physical arrangements of the components.

Plenty of home improvement and remodeling projects require either new wiring or replacements for old, worn, or fried connections. For extensive work, it is obviously best to hire an electrician, but some projects might be within the skill level of the average DIYer. Read this article for advice before taking on your next wiring job. Basics of Wiring When working with wiring, always cut the power supply at the breaker box first before beginning any actual work. Then, test the local area with a neon tester to make sure that the power is off and that it is safe to go ahead. Most wiring in a home is either gauge or gauge. Typically, when attaching existing wiring to a device or fixture, you will follow the color code by matching each color wire with its corresponding twin. Light switches, for example, operate on the black wire and will connect directly to another black wire already in the system. Electrical wiring in the US follows the same basic color codes: Connect to the Outlet Usually, the wiring which you are installing will be affixed to the final outlet in the current run of cable. This can be determined by finding the outlet with wires connected only to two of the four terminal screws. Attaching Cable for New Wiring Loosen the screws holding the receptacle in place and remove it in order to add wiring. Take care to make sure you attach the correct size of cable. If gauge is being used, continue with gauge cable; the same applies to gauge. White wire will be attached to the chrome terminal on the receptacle while black wire will be attached to the brass one. The ground wire will be attached to the box itself, but only if it is made of metal. Adding New Wiring From a Junction Box New wiring can also be tied into a junction box, so long as there is excess capacity. To tie in the new wiring, first locate the main supply wire by tracing the white wires, as all of these will be attached to the white wire on the supply line. Take out the unused plug and run the new wiring from the box. Clamp the cable to secure it to the junction box. Make sure the power supply is shut off and then connect the wires according to the color code: Connect the ground wires together and attach them to the metal box and the light. Always Match Connectors to Type of Cable Used Depending upon the type of box you have purchased, it may or may not come with built-in connectors. There are two main types of cable connectors you will have to differentiate between when making a new connection. Armored types have inner rims to hold fiber bushings at the end of the cable, and nonmetallic kinds have a two-screw clamp that will fasten the installation around the cable. You must always leave at least six inches of wiring inside the box so that you have enough slack to make a connection. Make All Connections in Approved Boxes Use only boxes that are approved for your electrical application and never use an open-line splice when adding wiring. Running New Cable Between Multiple Floors Drill a hole wide enough to accommodate the hardware from top to bottom through the floor in a recessed area behind the wall. Then thread a cable through the newly drilled hole using a wire with a hooked end and a string with a weight attached, as is shown in the diagram to the right. This method uses gravity to make the job of adding wiring easier. Start by attaching your cable to the box as previously described. Then, saw a hole at the desired position and install the cable box. Run new cable by adding more holes in places such as the 2x4 board plate and ceiling material. Adding New Wiring on the Same Wall Cable can be run between existing and newly installed outlets by running it through the wall. Find the spot not on a stud for the new outlet and mark an approximate location. Then, using a stud finder, locate and mark the studs in the wall. Start your marks with the wall stud before the existing outlet and finish with the stud on the opposite side of the new outlet location, as shown. Make sure that it is level with the old one before you use a keyhole or drywall saw to cut the opening in the wall. With the same drywall saw, cut a three inch strip of drywall starting at the middle of your first marked stud and ending in the center of the last. Take a hammer and chisel to the wood between the cuts to remove it. Once you have tested the existing outlet to guarantee that the power is off, take off the cover of the existing outlet box. Add a wire through a knockout, threaded end first, and tighten the clamp if there is one. Take the nut off the clamp to feed it through the knockout in the box, then replace the nut and tighten. Attach the wires once the cable is secure and then screw the receptacle back in and put the face plate back on.

Move to the new box and take away one of its knockouts. Self-clamping boxes need only be installed and tightened. Otherwise, use a Madison hanger on each side. Run the wire from the existing outlet behind the wall, using the notches, and up into the new box. Clamp the wire and replace the receptacle into the wall. Finish reassembling all of the hardware before turning the power back on and testing the current to be sure the wiring is working properly. Attach cable protectors over the notches in the wall and put the strip of drywall you cut earlier back into place, repairing the damage with spackling and drywall tape.

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Chapter 2 : Electronic symbol - Wikipedia

Basic Home Wiring Diagrams Summary: Fully Explained Home Electrical Wiring Diagrams with Pictures including an actual set of house plans that I used to wire a new home. Choose from the list below to navigate to various rooms of this home.*

The purpose is the same: Literally, a circuit is the path that allows electricity to flow. This guide will show you a few of the common symbols that you are sure to see in your future electrical engineering career. Outlets in other countries operate at a different voltage, which is why you need a converter when traveling. Current is the flow of electricity, or more specifically, the flow of electrons. It is measured in Amperes Amps , and can only flow when a voltage supply is connected. Materials such as gold or copper, are called conductors, as they easily allow flow of movement low resistance. Plastic, wood, and air are examples of insulators, inhibiting the movement of electrons high resistance. DC is a continuous flow of current in one direction. DC can flow not just through conductors, but semi-conductors, insulators, and even a vacuum. In AC, the flow of current periodically alternates between two directions, often forming a sine wave. The frequency of AC is measured in Hertz Hz , and is typically 60 Hz for electricity in residential and business purposes. Completing an electrical engineering degree and then getting a job in the field means you will see a lot a lot a lot of these schematics. While they can and will get very complex, these are just a few of the common graphics to get your footing on. Starting to make sense? These are the basics and may even seem obvious or intuitive to you, such as the wires and if they are connected. Whenever you determine your specific field of electrical engineering, you may see more complex diagrams and symbols. For example, of the two symbols for resistors above, the first one is used in the U. You will also learn about the various symbols used for switches, other power supplies, inductors, meters, lamps, LEDs, transistors, antennas, and much more. As mentioned earlier, these symbols and schematics will be all over the place. The sooner you familiarize yourself with the verbal and pictorial languages of engineering, the more prepared you will be in your quest for a degree.

Chapter 3 : Help for Understanding Simple Home Electrical Wiring Diagrams

A circuit diagram is a visual display of an electrical circuit using either basic images of parts or industry standard symbols. Symbol usage depends on the audience viewing the diagram. These two different types of circuit diagrams are called pictorial (using basic images) or schematic style (using industry standard symbols).

Combination Circuits Thus far, this unit of The Physics Classroom tutorial has focused on the key ingredients of an electric circuit and upon the concepts of electric potential difference, current and resistance. Conceptual meaning of terms have been introduced and applied to simple circuits. Mathematical relationships between electrical quantities have been discussed and their use in solving problems has been modeled. Lesson 4 will focus on the means by which two or more electrical devices can be connected to form an electric circuit. Our discussion will progress from simple circuits to mildly complex circuits. Former principles of electric potential difference, current and resistance will be applied to these complex circuits and the same mathematical formulas will be used to analyze them. Electric circuits, whether simple or complex, can be described in a variety of ways. An electric circuit is commonly described with mere words. Saying something like "A light bulb is connected to a D-cell" is a sufficient amount of words to describe a simple circuit. On many occasions in Lessons 1 through 3, words have been used to describe simple circuits. Upon hearing or reading the words, a person grows accustomed to quickly picturing the circuit in their mind. But another means of describing a circuit is to simply draw it. Such drawings provide a quicker mental picture of the actual circuit. Circuit drawings like the one below have been used many times in Lessons 1 through 3. Describing Circuits with Words "A circuit contains a light bulb and a 1. Some circuit symbols used in schematic diagrams are shown below. A single cell or other power source is represented by a long and a short parallel line. A collection of cells or battery is represented by a collection of long and short parallel lines. In both cases, the long line is representative of the positive terminal of the energy source and the short line represents the negative terminal. A straight line is used to represent a connecting wire between any two components of the circuit. An electrical device that offers resistance to the flow of charge is generically referred to as a resistor and is represented by a zigzag line. An open switch is generally represented by providing a break in a straight line by lifting a portion of the line upward at a diagonal. These circuit symbols will be frequently used throughout the remainder of Lesson 4 as electric circuits are represented by schematic diagrams. It will be important to either memorize these symbols or to refer to this short listing frequently until you become accustomed to their use. As an illustration of the use of electrical symbols in schematic diagrams, consider the following two examples. Three D-cells are placed in a battery pack to power a circuit containing three light bulbs. Using the verbal description, one can acquire a mental picture of the circuit being described. This verbal description can then be represented by a drawing of three cells and three light bulbs connected by wires. Finally, the circuit symbols presented above can be used to represent the same circuit. Note that three sets of long and short parallel lines have been used to represent the battery pack with its three D-cells. And note that each light bulb is represented by its own individual resistor symbol. Straight lines have been used to connect the two terminals of the battery to the resistors and the resistors to each other. The above circuits presumed that the three light bulbs were connected in such a way that the charge flowing through the circuit would pass through each one of the three light bulbs in consecutive fashion. The path of a positive test charge leaving the positive terminal of the battery and traversing the external circuit would involve a passage through each one of the three connected light bulbs before returning to the negative terminal of the battery. But is this the only way that three light bulbs can be connected? Do they have to be connected in consecutive fashion as shown above? In fact, example 2 below contains the same verbal description with the drawing and the schematic diagrams being drawn differently. But this time, the connections of light bulbs is done in a manner such that there is a point on the circuit where the wires branch off from each other. The branching location is referred to as a node. Each light bulb is placed in its own separate branch. These branch wires eventually connect to each other to form a second node. A single wire is used to connect this second node to the negative terminal of the battery. These two examples illustrate the two common types of connections made in electric circuits. When two or more

resistors are present in a circuit, they can be connected in series or in parallel. The remainder of Lesson 4 will be devoted to a study of these two types of connections and the effect that they have upon electrical quantities such as current, resistance and electric potential. The next part of Lesson 4 will introduce the distinction between series and parallel connections.

Chapter 4 : A Very Simple Circuit | Basic Concepts and Test Equipment | Electronics Textbook

Basic Electrical Definitions. Electricity is the flow of electrical energy through some conductive calendrierdelascience.comonics refers to using changing electrical properties to convey information.

It uses standard symbols for the components in the circuit and does not show the physical arrangements of the components. In this article we discuss 10 simple electrical circuits. From homes to big industries, we all depend on electricity. We know that electric current flows in a closed circuit. An electrical circuit is a closed loop in which continuous electrical current goes from the supply to the load. If you are trying to describe an electrical circuit to your friend or neighbor, it is likely that you have to draw the connection. For example, if you want to explain a lighting circuit, it can take more time to draw the bulb, battery, and wires because different people draw various components of the circuit in different ways and this may take a long time to explain. Therefore, a better way is to learn how to show simple electrical circuits. In this article we give the drawings for some simple electric circuits: AC lighting circuit, battery charging circuit, energy meter, switch circuit, air conditioning circuit, thermocouple circuit, DC lighting circuit, multimeter circuit, current transformer circuit, and single phase motor circuit. These two wires are connected from the lamp to the main supply panel. It is advisable to use different colours for live wires and neutral wires. The universal practice is to use the colour red for live wires and a black colour for the neutral wire. For switching ON and OFF the lamp we need a control called a switch - provided in the live wire between the main supply and lamp. If the switch is ON, the electric circuit is closed and the lamp glows, and if the switch is OFF, it will disconnect the power supply to the lamp. For safe operation this wiring is placed in a box called a switch box. The switch wire and live wire are a single wire; it is just cut in between to connect the switch. The main function of the rectifier is to convert AC alternating current into DC direct current. The rectifier shown in the diagram is the bridge rectifier, which has four diodes connected in the form of a bridge. Resistance is added in the circuit to limit the flow of current. When the supply is given to the rectifier through a step down transformer, it converts the AC supply into DC supply and this flows to the battery, thereby charging it. Usually this circuit is enclosed in a battery charger unit or inverter and only the terminals emerge out of the charger unit to be connected to the battery for charging. Air Conditioning Electric Circuit Air conditioning is a process that heats, cools, cleans, and circulates air together with the control of its moisture content. The electric aspect of AC comprises the power equipment for motors and starters for the compressor and condenser fans. Associated electric equipment includes solenoid valves, high and low pressure switch, and high and low temperature switch, together with the safety cut-outs for over current, under voltage etc. The compressor and condenser fans are driven by a simple fixed speed 3 phase AC induction motor, each with its own starter and supplied from a distribution board. Routine electric maintenance and fault finding on the motor and starters involves cleaning, checking of connections, insulation tests, etc. The function of the switch is to connect or complete the circuit going to the load from the supply. It has moving contacts which are normally open. As shown in the diagram, the power supply to the load is through the switching circuit, and therefore the power supply can be cut by keeping the switch open. This circuit is very simple. The battery has two points, anode and cathode. The anode is positive and cathode is negative. A lamp has two terminals - one is positive and the other is negative. The positive terminal of the lamp is connected to the anode and the negative terminal of the lamp is connected to the cathode of the battery. Once the connection is made the lamp will glow. More simple electrical circuits and simple electrical devices are discussed on the next page. The circuit functioning and uses of these devices are specifically discussed in this part. When the junctions formed from two dissimilar homogenous materials are exposed to the temperature difference, an EMF is generated. This is called the Seebeck effect. The figure shows a thermocouple, which consists of two wires, one iron and the other made of constantan, with a voltmeter. This voltmeter will measure the EMF generated and this can be calibrated to measure the temperature. The temperature difference between the hot and cold junction will produce an EMF proportional to it. If the cold junction temperature is kept constant, then the EMF is proportional to the temperature of the hot junction. The power consumed over a period of time can be measured by a motor meter or energy meter.

Energy meters are used in all power supply lines to every house in order to measure the power consumed in both DC and AC circuits. It is measured in watt-hour or kilowatt hour. For DC circuits, the meter may be an ampere hour or a watt-hour meter. There is an aluminium disc which rotates continuously when power is consumed. The speed of rotation is proportional to the power consumed in watt-hour by the load. Energy meters have a pressure coil and a current coil. When the voltage is applied across the pressure coil, current flows through the coil and produces a flux which exerts torque on the disc. Load current flows through the current coil and produces another flux which exerts an opposite torque on the aluminium disc. The resultant torque acts on the disc and results in a rotation on the disc which is proportional to the energy utilized and which is recorded in the energy meter.

Chapter 5 : Standard Electrical Symbols For Electrical Schematic Diagrams

A final means of describing an electric circuit is by use of conventional circuit symbols to provide a schematic diagram of the circuit and its components. Some circuit symbols used in schematic diagrams are shown below.

Surge protectors protect your electronics from power surges in your electrical system. The wattmeter is an instrument for measuring the electric power in watts of any given circuit. One of the most important parts of a wide range of electrical products like TVs and telephones. AC source Alternating Current, continually change direction. DC source Direct Current, always flow in one direction. The electrical symbols for most major basic electrical components can be found in the above table. However, each electrical component may have numerous possible representations. The electrical symbols can vary from country to country nowadays, but are to a large extent internationally standardized. Some electrical symbols become virtually extinct with the development of new technologies. In cases where there is more than one common electrical symbol, we have tried to give an alternate representation. After you start Edraw, click the icon of Basic Electrical Symbols to open the stencil including this kind of shapes. The stencil panel is opened on the left along with a blank canvas on the right. Drag the shape you need directly onto the canvas. Instead, you can click its icon and then click on the location where you want to place it. After you add shapes on the drawing page, they are selected by default. So you can resize them by dragging the green selection handles. A double sided arrow shows the direction to which you can move the mouse. Move the shape when a four-direction arrow appears. In electrical diagram software , you can use the action button to choose the right electrical symbols with one click. It shows when the shape is selected or when the pointer is over the shape. For example, the Variable Resister can be turned into 6 more kinds of symbols by clicking the button. If many options are available, a dialogue box may be designed. Click the drop down menu to find necessary choice. For instance, an Indicator shape includes 16 options. To know more about basic electrical circuit, please go to basic electrical circuits page for details. Also, check out simple electrical circuits introduction for more information. To learn electrical circuits from four examples here.

Chapter 6 : 10 Simple Electric Circuits with Diagrams

Electrical symbols are used to represent various electrical and electronic devices in a schematic diagram of an electrical or electronic circuit. The following table lists some basic electrical symbols in our electrical drawing software.

The idea sounds great as that gives you the freedom to customize the design for home wiring layout, and also help in saving quite a lot of money. But this is not possible before you are well versed with the basics of electrical wiring and know exactly how to chalk out correct home electrical wiring diagrams. In this article we will get acquainted with the various general electrical components, their symbols and also study the different fundamental electrical wiring configurations normally involved in every domestic the wiring. The power that we receive in our houses from power stations in the form of alternating current and voltage is in fact the electricity. Any electrical wiring is useless without electricity and thus it becomes the life line of all electrical systems. Generally, these are either around or volts depending upon which part of the globe you are in. Similarly its frequency will be approximately 60 and 50 Hertz respectively. Its Main Line is termed as the Phase or Live while the other receiving terminal is called the Neutral. It is the most basic and useful part of any electrical wiring. A switch is a mechanical spring loaded device used to manually make or break the supply or the power Always the Phase to the connected load so that it can be activated or deactivated at will. Click Image to Enlarge The Socket: The power fed into a socket is always via a switch as explained above. External appliances may be plugged into a socket and switched ON to operate, and vice versa. Sockets are available in 2 or 3 pin types. In 3-pin types the third or the top pin is provided for the earth or the ground connection. It may be considered as the entrance or the gateway for electricity and thus has to handle huge loads. It also incorporates an in-built Fuse to safeguard the whole house wiring in case of a short circuit. Any electrical gadget that needs to be operated using electricity constitutes an electrical load. Every piece of electrical equipment from an incandescent bulb to the refrigerator that consumes electric power to remain operative is an electrical load. As can be seen in the diagram the wiring is pretty simple. The Phase is invariably applied to one terminal of the switch, the other terminal moves to one of the connections of the load, and the other point of the load continues to finish at the Neutral of the supply line. In the above example if an additional switch is connected to the existing one in parallel, either of them may be used to switch ON the bulb. And if desired, one switch may be located far away for remote operation of the light. But here, to deactivate the load Bulb , both the switches will need to switch OFF. If two switches are connected in series to the above network see the figure below , both of them will need to be switched ON to energize the load, but, toggling OFF any one of the switches will be enough to extinguish the light. How to wire a Socket with a Switch to an Electrical Supply: The below given diagram shows a simple method of connecting a socket with a switch. Here, the Phase as usual and mandatorily is connected to one terminal of the switch and its other terminal is wired to the RIGHT hand side terminal of the socket. With the help of the figure shown below , one can easily see the simple concept of joining a fan, a fan regulator and a switch to an electrical supply. The idea is simple, just go on connecting each of them in series to one another. The diagram is self explanatory Remember, the Phase always needs to be connected to the switch. The basic home electrical wiring diagrams described above should have provided you with a good understanding. Hopefully this should help you in designing your own home wiring layouts independently. If in any sort of problem, feel free to exchange your thoughts with me comments need moderation, and may take sometime to appear. The author holds no responsibility under any circumstance. You are responsible for complying with all local regulations covering home electrical wiring. Your local zoning board may be a good place to start if you have questions.

Chapter 7 : How to Install Electrical Wiring | calendrierdelascience.com

ElEctrician circuit Drawings anD wiring Diagrams SkillS Exploration 5 activity 1: Drawing circuits 1. Using the basic electrical floor plan and the symbol chart on the following pages, explain.

These symbols help create accurate diagrams and documentation. Electric circuits, whether simple or complex, can be described in a variety of ways. An electric circuit can be described with mere words, however, a simple and visual way to describe an electrical circuit should be diagramming it using basic electrical symbols. Basic Electrical Symbols - Common Basic electrical symbols like earth electrode, cell, battery, source, ideal source, resister, variable resister, pre-set resister, attenuator, capacitor, antenna, diode LED, crystal are included here. Earth electrode is a metal plate, water pipe, or other conductor of electricity partially buried in the earth so as to constitute and provide a reliable conductive path to the ground Cell is a device containing electrodes immersed in an electrolyte, used for generating current or for electrolysis. Battery is a container consisting of one or more cells, in which chemical energy is converted into electricity and used as a source of power. Source is a part of a field-effect transistor from which carriers flow into the inter-electrode channel. Ideal source includes ideal voltage source and ideal current source. An ideal source is a theoretical concept of an electric current or voltage supply such as a battery that has no losses and is a perfect voltage or current supply. Ideal sources are used for analytical purposes only since they cannot occur in nature. Resistor is a device having resistance to the passage of an electric current. Capacitor is a device used to store an electric charge, consisting of one or more pairs of conductors separated by an insulator. Antenna is an electrical device which converts electric power into radio waves, and vice versa. Some most commonly-used basic electrical symbols used in schematic diagrams are shown below: Let we take a look at how to use the basic electrical symbols to provide a schematic diagram of the circuit and its components. Each light bulb is represented by its own individual resistor symbol. Straight lines have been used to connect the two terminals of the battery to the resistors and the resistors to each other. First, choose the electrical symbols you might use in the diagram, in this example is battery, resistor. Then, use the connector tool to connect these symbols. Therefore, the final diagram can be like the following picture. Switch is a device for making and breaking the connection in an electric circuit. Isolator is a mechanical switch which isolates a part of circuit from system as when required. Electrical isolators separate a part of the system from rest for safe maintenance works. As you can see from the above pictures, using electrical symbols to draw electrical circuit diagram is quite easy. To illustrate the method, we will give you another example about using the basic electrical symbols. Three D-cells are placed in a battery pack to power a circuit containing three light bulbs. First things first, quickly figure out what electrical symbols shall be used in the diagram. Then think about the layout of these symbols. Last but not least, use connector tool to connect all the electrical symbols. From the above examples, we can conclude that, simple words can not clearly describe a specific electrical circuit. Using the basic electrical symbols to draw a circuit diagram can show the manners in which the circuit components are placed. Basic Electrical Transmission Path Symbols The picture below shows transmission path symbols like wire, multi-line bus, straight bus, junction, terminal, test point, label, outware flow, inware flow, etc. Wire is used to connect the components in a circuit. Test point is a location within an electronic circuit that is used to either monitor the state of the circuitry or to inject test signals. Outward flow means flowing outwardly, so inward flow means flowing inwardly. Need fresh looking basic electrical symbols for your design? These basic electrical symbols are a cinch to pop in. And their crisp, fine detail will make spectacular, easy-to-understand diagrams and presentations to your customers. You May Also Like:

Chapter 8 : All About Circuits - Electrical Engineering & Electronics Community

An electrical ground is a safety system that provides a safe path for electricity to follow in the event of a short circuit, electrical surge, or other safety or fire hazard. In modern home wiring systems, each circuit has its own ground wire that leads back to the service panel.

Winds What is an electrical circuit? An electrical circuit is a path or line through which an electrical current flows. The path may be closed joined at both ends , making it a loop. A closed circuit makes electrical current flow possible. It may also be an open circuit where the electron flow is cut short because the path is broken. An open circuit does not allow electrical current to flow. Below is a basic set of symbols that you may find on circuit diagrams. It is very important to know the basic parts of a simple circuit and the symbols that relate to them. A simple circuit has conductors, a switch, a load and a power source. Here are the functions of each part: These are usually copper wires with no insulation. They make the path through which the electricity flows. One piece of the wire connects the current from the power source cell to the load. The other piece connects the load back to the power source. The switch is simply a small gap in the conductor where you can close or open the circuit. When the switch is closed, the circuit is closed and electricity flows. The load is a small light bulb or buzzer that lights when the circuit is turned on. The load is also known as a resistor. The power source is a cell. Note that more than one cell put together is known as a battery The diagram below shows how a basic circuit looks like. It is important to draw circuits with clean straight lines, as shown in diagram B. It is important to know that a circuit can have more than the basic components in the diagram. It can have two or more batteries or two or more bulbs. There are two types of circuits namely Series Circuit and Parallel Circuit. Click on each to learn more.

Chapter 9 : Create an electrical engineering diagram - Visio

Short circuits are generally to be avoided, as they result in very high rates of electron flow, causing wires to heat up and battery power sources to deplete. If the power source is substantial enough, a short circuit may cause heat of explosive proportions to manifest, causing equipment damage and hazard to nearby personnel.