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The 12V Battery Auto Cutoff Protection Circuit is designed to protect lead-acid or similar rechargeable batteries from overcharging, ensuring they operate safely and extend their lifespan. When charging a battery, continuous power flow after the battery reaches full capacity can lead to overheating, overcharging, and eventual damage. This circuit automatically disconnects the charging source when the battery is fully charged, preventing further current flow.The core components of the circuit include a TL431 voltage regulator, which acts as a precision voltage sensor, and a MOSFET (IRFZ44N), which serves as a switch to control the connection between the battery and the charging input. The circuit also features LED indicators (green and red) that show the charging status, helping users easily monitor whether the battery is charging or has reached full capacity. Additionally, a diode (1N5408) ensures reverse polarity protection and voltage regulation.This type of circuit is ideal for automotive batteries and other 12V systems where automatic cutoff and voltage monitoring are essential for safe operation.S.NoComponentsValueQty.1.MosfetIRFZ44N12.Shunt RegulatorTL43113.Resistor15K, 2.2K, 1.5K1K, 330 ohm1,1,1,1,14.Diode1N540815.LEDRed, Green1,16.Input Supply14V DC7.Battery12VPin 1 Gate (G):The gate is the control terminal of the MOSFET. A small voltage applied to this pin (relative to the source) switches the MOSFET on, allowing current to flow between the drain and the source.Pin 2 Drain (D):The drain is the terminal through which current flows into the MOSFET when its turned on. This pin is connected to the load in a typical circuit.Pin 3 Source (S):The source is the terminal through which current flows out of the MOSFET. In an N-channel MOSFET, the source is typically connected to the negative side of the circuit (ground).This 12V auto cutoff battery protection circuit is designed to automatically disconnect the battery from the charging source when it reaches full charge, preventing overcharging and extending battery life. At the core of the circuit is the TL431, a programmable shunt voltage regulator that monitors the battery voltage. When the battery is being charged, the IRFZ44N MOSFET (U1) is turned on, allowing current to flow to the battery. A red LED (LED2) lights up during this charging phase, indicating that the battery is being charged. As the battery voltage increases and approaches the preset cutoff threshold, which is determined by the resistor network (R1, R2, R3, R4, and R5), the TL431 adjusts the voltage at its reference pin. Once the battery reaches the full charge level, the TL431 sends a signal to the gate of the MOSFET, turning it off. This stops further current flow into the battery, effectively disconnecting it from the charging source. When this happens, the green LED (LED1) lights up, signaling that the battery is fully charged and the circuit has cut off the input to prevent overcharging.The 1N5408 diode (D1) is placed in the circuit to protect against reverse polarity and ensure proper current flow during charging. Overall, the circuit provides simple and effective battery protection by automatically controlling the charging process based on the batterys voltage.Battery charging systemsUninterruptible Power Supplies (UPS)To plan a 12V battery charging auto cut-off circuit utilizing a LM358 anda 12V 30A Relay, you can follow these steps:Interface the result of the LM358 to the basis of asemiconductor (like a NPN semiconductor) to drive the transfer. Guarantee thatthe semiconductor can deal with the ongoing expected by the transfer loop.How it Works:Potentiometer permits you to set the ideal cut-off voltage for the battery.At the point when the battery voltage surpasses the voltage (not entirelysettled by the potentiometer), the result Changing the of the LM358 goes low,enacting the transfer.The Cut-off, when initiated, detaches the chargingvoltage from the battery, subsequently removing the charging system. The diodeacross the transfer curl forestalls voltage spikes when the Cut-off is switchedoff.Remember:Make sure to pick correct resistor values and parts in viewof the exacting supplies of your battery and charging frame. Moreover,guarantee correct power scattering for the LM358 and the cut-off, mostlyassuming the charging current is high. This 12-battery charger circuit provides an Automatic cut-off facility when the battery gets fully charged. Before using this circuit, you need to adjust the Cut voltage range for the auto cut. This adjustment is done by moving the 10k preset, and for testing the output voltage auto cut range, a multimeter is connected to the output terminals that go to the battery. This voltage range can be set by using any 13v or 14v DC supply that connects the terminals that go to the battery. And moved the preset till the green led ON. Once the auto-cut voltage is set, the circuit is ready to use.One terminal of Input AC power to the Transformer is connected through a 12 V Relay. When the Battery needs charge then the Red LED glow. When the Charge level goes to about 12v or 13v, then the Red LED will turn off, and the Green LED will glow. And the Input Power to the Transformer of the charger is also disconnected by the Relay.12v battery charger with auto cut-off circuit diagramOne 555 timer ic is used for detecting the voltage level, and a Relay is used to disconnect the AC input. 7808 voltage regulator is used for constant supply to the operation of the circuit to cut at a required fixed voltage.This 12v battery charger automatically cuts the circuit after a full charge and provides 6 Ampere high current, and this can use for a big-size Lead-acid Battery up to 100 AH. If you want more higher current, then replace the transformer with 10A and use a 10A10 Diode. You can use a ready-made 12v 10 A Bridge Rectifier, which is available in the market.Schematic diagramcircuit 1ComponentsDiode6A8 or 6A10- 4 pc1N4007 17808 ic 1 pc555 timer ic 1 pcCapacitor1000uf 50v 1pc1000uf 25v 1pc100nf (104) 1 pcResistor10K 15k 1470 2Relay 12v 6 A 1Preset 10k 1 pcLED 1 pc GreenLED 1 pc- REDTransistor BC547 -1 pc 10 amp battery charger circuit diagramCircuit 2Connect positive output wire on NC through Common pin of RelayParts (circuit 2)Transformer 0-14V (10A)-1Diodes MIC10A-41N4007-1Capacitor 1000uf 50v 1Resistors2.2K-1, 150R-1Preset RV1-10K-1Transistor BC547B-1Relay 12v (10A)- 1LED- 2 (Green -1, Red-1)Circuit 3This circuit has a maximum current capacity of 1 A only.Also readDelay Timer To Switch ON / Switch OFFLED Chaser Flasher CircuitAutomatic water level controller230v ac to 12v dc and 5v dc Regulated Power ConverterDimmer/Fan regulator circuitso we want to show you a simple circuit for the charger when the battery is fully charged, the charging automatically stopping,this is a circuit of the auto cut off battery charger, it has only:- - one NPN transistor such as c1815 for controlling the charging, - relay for cutting off this current path through the battery after fully charged, - 10 kilo-ohm variable resistor connected to the base of the transistor, the variable resistor used for restricting the voltage from how many volts you want to stop charging!The set up makes it possible to make an simple 12V battery charger of excellent level of quality through which you are able to recharge batteries of 1 2 Volts for car, and dry batteries employed in the systems of alarms.Its functioning seemingly automatic considering that, whenever it's plugged into a battery, it will eventually only function if the battery is discharged, and it is going to automatically remove when the battery is fully charged.The unit is driven by a transformer whose secondary is usually 14-15 Volts having a current of 3 Amperes minimum.The trimmer TR1 is tweaked to ensure that at the output of the battery charger there exists a voltage of about 14.4 volts without load.The absolute maximum distributable current is 3 Amperes, so DO NOT make an effort to recharge batteries with a capacity higher than 36Ah. Best utilization of this device would be to power a battery charger for alarm system with battery in standby mode.In the course of installation, attention should be taken to hook up the battery with the proper polarity.For the construction of the components, cautiously stick to the configuration of the diagram.Printed circuit, AUTOMATIC BATTERY CHARGER INPUT 14-15 VOLTS at a charging CURRENT of MAX 3 AMPERESParts List for the 12V automatic car battery charger circuit:All resistors areOf 1/4 watt unless otherwise specified.Rl-470 Ohms R2 = 10 K R3 = 270 Ohms TR1 = 10 K trimmer. Cl = 1000uF25V. DZ1 = 5.1 volts lWzener. T1 = 2N2218 T2 = 2N3055-BDW21C 1C1 = UA741 PT1 = KBL04 / 01 1 Socket 8 pins. 1 Heat sink for Tl. 1 Heat sink for T2.If youre looking for an easy and affordable way to make a 12V battery charger Auto-cut-off at home, there are plenty of options available. One popular method is to use a simple transformer and rectifier circuit that converts AC power into DC power. To get started, youll need a transformer with a voltage rating between 12-15 volts, as well as some diodes and capacitors to create the rectifier circuit.In this article I have made a 12V Battery Charger. It can charge batteries up to 60Ah. I have made this charger auto cutoff using very simple component. I hope this article will be helpful to you.Circuit Diagramof 12V Battery Charger Auto-cut-off12V Battery Charger Auto-cut-off Circuit Layout12V Battery Charger Auto-cut-off Circuit DiagramMore Circuit LayoutsLA4440 Amplifier, Tone Control & MP3Bass Tone Control Circuit Diagram2N3055 MJ2955 Class-AB Amplifier Circuit Diagram2N3055 Power Amplifier Circuit DiagramVariable Power Supply 0-30V_10A Circuit DiagramStereo Amplifier TDA7297 Dual-Bridge Circuit Diagram160W 4-Channel TDA7388 Amplifier Circuit Diagram30W TDA2040 Power Amplifier Circuit DiagramProject PCB (Front)12V Battery Charger Auto-cut-off PCB212V Battery Charger Auto-cut-off PCB1Once youve assembled your components, its just a matter of wiring them up and connecting your battery to the output. Keep in mind that safety precautions must be taken when working with electricity always double-check your work before plugging anything in, and wear appropriate protective gear such as gloves or goggles if necessary. With a little bit of effort, anyone can successfully build their own homemade 12V battery charger for all of their charging needs!Components List of 12V Battery Charger Auto-cut-off1- 1 X 555 timer IC2- 1 X BC547 transistors3- 4X 6A10 diodes (6 Amp diodes)4- 2X 100uf 50V capacitors (electrolytic)5- 2X 10K ohm resistors (1/4 watt)6- 2X 470 ohm resistors (1/4 watt)7- 1X 10K variable resistor8- 1X 1N4007 diode9- 2X 100uf 50V capacitors (electrolytic)10- 1X 1000uf 35V capacitors (electrolytic)11- 1X 0.1uf nonpolar capacitors12- 1X 12v relay13- 1X red led14- 1X green led15- 2X 2pin terminal blocks16- 1X 3pin terminal block17- 1X 12v 6A transformer18- Alligator clips19- Dc wire20- vero board21- jumper wires22- power cableGERBER FILEMore projects, You may like:ConclusionIn conclusion, a Battery charger with an auto-cut-off feature is a reliable and convenient tool for charging lead-acid batteries, especially in automotive applications. This feature prevents overcharging and potential damage to the battery, which prolongs its lifespan and ensures a safe charging process. It is essential to choose a charger with the right specifications, such as voltage and amperage, to match the batterys requirements. Additionally, it is crucial to follow the manufacturers instructions and safety guidelines when using and storing the battery charger. Overall, investing in a high-quality, auto-cut-off battery charger is a wise choice for anyone who wants to maintain their lead-acid batterys performance and durability.(Visited 6,896 times, 1 visits today) Please verify your email address so that you can enjoy our more comprehensive services. This article details the construction and working of an Automatic Cut-Off Battery Charger Circuit using common components such as a relay, transistor, potentiometer (pot), LED, diodes, and resistors. Battery chargers with automatic cut-off functionality ensure batteries do not overcharge, enhancing their life span and performance. This circuit charges the battery in its Normally Closed (NC) state and once fully charged it disconnects to Normally Open (NO) state. You can also see a simple battery charger circuit using MOSFET.Components Required for Battery Charger:Relay: 12V, SPDT (Single Pole Double Throw) relay.Transistor: NPN transistor (e.g., BC547).Potentiometer (Pot): 10k for voltage adjustment.LED: Red (charging indicator) and Green (cut-off indicator).Diodes: 1N4007, 6A10 (for protection).Resistors: 15k, and 1k current-limiting resistor for LEDs.Power Supply: 15V DC from transformer or SMPS power supply (nearly 14V).Battery: Lead-acid or lithium-ion battery (12V in this example).Circuit Diagram and Connections:1. Relay Connections:Connect the NC (Normally Closed) terminal of the relay to the Red LED and positive terminal of the battery.The NO (Normally Open) terminal connects to the Green LED that turns on when charging is complete.The Common (COM) and relay coil terminals connects to the positive terminal of the power supply.2. Transistor Stage:The collector of the NPN transistor (BC547) connects to one side of the relay coil.The emitter connects to the ground.A flyback diode (1N4007) is connected across the relay coil to protect the transistor from voltage spikes.3. Voltage Sensing and Control:The base of the transistor is connected to a 10k potentiometer making a voltage divider network.The potentiometer is used to set the cut-off voltage threshold. Also, there is a 15k fixed resistor.The voltage divider taps into the batterys voltage and feeds it to the transistors base for control.4. Indication Circuit:A red LED (charging indicator) is connected to NC terminal to indicate charging.A green LED (cut-off indicator) is connected to the NO terminal to indicate charging completion. A 1k current-limiting resistor is used to limit the current.Auto Cut Off Battery Charger Circuit Working of Automatic Cut Off Battery Charger Circuit:1. Charging Mode:When the circuit is powered, and the battery voltage is below the set threshold:The relay remains in the NC position, allowing current to flow from the power supply to the battery.The red LED lights up, indicating the battery is charging.2. Cut-Off Mode:As the battery reaches the pre-set voltage threshold (adjustable using the potentiometer):The voltage at the transistors base increases, turning it on.This energizes the relay coil, switching it from NC to NO, cutting off the charging current to the battery.The green LED turns on, indicating charging is complete.3. Protection Mechanism:The diode across the relay coil (flyback diode) protects the transistor from back EMF.Additional diodes prevent reverse polarity damage to the circuit.Key Advantages of This Circuit:Automatic Control: Prevents overcharging, improving battery life and safety.Adjustable Cut-Off: The potentiometer allows fine-tuning of the cut-off voltage.Indication: LEDs provide visual feedback on charging status.Calibration and Testing:Set Cut-Off Voltage:Connect the battery and power supply.Adjust the potentiometer while monitoring the battery voltage. Set the potentiometer to trigger the relay at the desired voltage.Observe Indications:Check the LEDs to ensure they switch correctly between charging (red LED) and cut-off (green LED) states.Watch this video for better understanding.Conclusion:This simple yet effective Automatic Cut-Off Battery Charger Circuit provides a reliable way to manage battery charging without manual intervention. The use of a relay, transistor, potentiometer, and LEDs ensure precise control and status indication. With proper calibration, this circuit can be used for various battery types, making it a valuable tool for hobbyists and professionals.12V Auto Cut-Off Battery Charger Circuit Diagram by MOSFET You May Also Like In this tutorial, we are making an easy project of 12V, 9V, and 6V Automatic battery chargers. This circuit can charge batteries of three different voltages. This voltage can be set by two different set ... Read more Read more Lithium-based batteries are a flexible method for storing a high amount of energy. They have one of the most elevated energy density and specific energy(360 900 kJ/kg) as compared to other rechargeable batteries In ... Read more Read more In this circuit, we are making an Adjustable Low Battery Cutoff For All Rechargeable Batteries. Battery charging always has an issue of them getting deep discharged or being fully discharged that completely damages them or ... Read more Read more In this tutorial, we are making an Early Car Battery failure circuit. It will give an early indication of the failure of your car battery by activating a buzzer for a few seconds. In this ... Read more Read more Introduction Batteries are of no use if we dont have a charger with them. Charger circuits play a crucial part in electronic devices and circuits. Thus the charger circuits depend on the battery type. Different ... Read more Read more Are you looking for a cost-effective way to charge your Ni-Cad batteries? Look no further than this solar Ni-Cd charger circuit! Unlike traditional charger circuits that utilize only one Schottky diode and a solar panel, ... Read more Read more As each of our devices needs to be charged separately with its own charger. When you are on your way away from home, you must always keep an eye on your charging device. Because you ... Read more Read more In this tutorial, we are making a project of 6V & 12V Battery Charger With an Auto Battery Detect Function. Usually, charger circuits have a single voltage output which is limited to the battery of ... Read more Read more Battery chargers with automatic cut-off functionality are vital for protecting batteries from overcharging, enhancing their lifespan, and ensuring efficient operation. This guide explains how to build a simple 12V auto cut-off battery charger circuit using commonly available components, including a TL431 voltage reference IC, a MOSFET IRFZ44N, LEDs for status indication, and other basic components. See this battery voltage level indicator circuit for further improving your design.Components Required for Charger Circuit:TL431 (Adjustable Precision Shunt Regulator) 1 unitMOSFET IRFZ44N 1 unit10k Potentiometer 1 unitLEDs (Red & Green) 2 unitsResistors (1k) 3 unitsDiode (6A10 or 1N4007 or similar) 1 unitBattery (12V Lead-Acid)Power Source (e.g., 15V DC supply)12V Battery Charger Circuit Diagram and its Working:The circuit comprises three main sections: voltage reference, switching control, and status indication. Heres an overview of the components and their roles in circuit operation:Voltage Reference (TL431):The TL431 is configured to act as a precision voltage reference. It is connected to the battery and senses the voltage through a voltage divider network.The 10k potentiometer is used to adjust the reference voltage for cut-off. This is set to the fully charged voltage of the 12V battery (e.g., 14.4V).Switching Control (IRFZ44N):The IRFZ44N MOSFET is used as the main switching device. When the battery voltage is below the cut-off threshold, the MOSFET remains on, allowing the charging current to flow to the battery.Once the battery reaches the cut-off voltage, the TL431 triggers the MOSFET to turn off, cutting the charging current.Status Indication (LEDs):Two LEDs (red and green) indicate the charging status.The red LED turns on during charging, while the green LED lights up when the battery is fully charged, signaling cut-off.Protection (Diode):A diode is connected in series with the positive line to prevent reverse current flow from the battery to the power source when the charger is off.12V Auto Cut Off Battery Charger Circuit Wiring Details of 12V Battery Charger Circuit:TL431 Configuration:Connect the reference pin (Ref) of the TL431 to the voltage divider (potentiometer and resistor).The cathode (K) connects to the gate of the IRFZ44N MOSFET. (You may use 1k resistor at gate).The anode (A) is grounded.Voltage Divider:Use a 10k potentiometer and a 1k resistor to form the voltage divider. Connect the potentiometer wiper to the TL431 reference pin.MOSFET Connection:The drain of the IRFZ44N connects to the negative terminal of the battery through charging path.The source is connected to the ground.LED Indicators:The green LED is connected between the gate of the MOSFET and positive supply, with a 1k resistor in series.The red LED is connected between drain of MOSFET and positive supply, with a 1k resistor in series.Power Supply and Diode:Connect a 6A10 or 1N4007 or similar diode in series with the positive terminal of the power supply to prevent reverse polarity.Calibration and Testing:Adjusting Cut-Off Voltage:Turn the potentiometer to set the cut-off voltage. Connect a voltmeter across the output terminals and fine-tune the potentiometer until the charger cuts off at 14.4V.Testing the LEDs:Ensure the red LED lights up during charging. Once the battery reaches the set voltage, the green LED should light up, indicating the charger is off.Load Testing:Test the circuit with a partially discharged 12V battery and monitor its behavior as the voltage approaches the cut-off threshold.Watch this video for better understanding.Advantages of Auto Cut Off Battery Charger:Simple and Cost-Effective: Uses minimal components for efficient operation.Battery Protection: Prevents overcharging, enhancing battery life.Visual Indication: LEDs provide clear feedback on the charging state.Applications of AutomaticBattery Charger:Charging 12V lead-acid batteries for automotive, solar, or backup power systems.Portable charging setups where overcharging protection is crucial.You can make a 3.7V or 9V battery charger my modifying above circuit.By following this guide, you can construct a reliable and efficient 12V auto cut-off battery charging protection circuit. This design is suitable for hobbyists and professionals alike, ensuring your battery charging process is safe and optimized.LM3915 LED Battery Voltage Level Indicator Circuit Diagram This article details the construction and working of an Automatic Cut-Off Battery Charger Circuit using common components such as a relay, transistor, potentiometer (pot), LED, diodes, and resistors. Battery chargers with automatic cut-off functionality ensure batteries do not overcharge, enhancing their life span and performance. This circuit charges the battery in its Normally Closed (NC) state and once fully charged it disconnects to Normally Open (NO) state. 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