









Components

	SRA-12VDC-CL Songle	Х	1	
	NE555 Texas Instruments	Х	1	
	1N5408-E3/73 Vishay General Semiconductor	Х	1	
	1N4007 DIODES	х	1	
	BC557-B	Х	1	
Can	45F1K0E Ohmite	Х	1	
March	FM0207FTE52-2K2 YAGEO	х	1	
	1N4148WSH RRG	Х	1	

Description

DIY Automatic Cut Off 12V Tricl Charger | Lead Acid Battery AutoC Charger

Learn how to build a DIY 12V trickle charge automatic cutoff for lead-acid batteries. Pr overcharging and extend battery life wit

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Standard PCB

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Topic

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Do you often charge your 12V lead-acid battery manually and worry about overcharging? With this DIY Automatic Cut Off 12V Trickle Charger, you can safely charge your battery without supervision. This smart charger automatically disconnects when the battery is full—protecting your battery and extending its life.

In this post, you'll get the full circuit diagram, parts list, working principle, and step-by-step guide to make your own lead-acid battery auto cut-off charger at home!

What is a Trickle Charger?

A trickle charger is a low-current battery charger designed to charge batteries slowly and maintain them at full capacity. It's especially useful for lead-acid batteries that are not used regularly, like those in cars, bikes, solar systems, or inverters.

However, trickle charging without cutoff can overcharge the battery, leading to reduced life or even damage. That's why adding auto cut-off protection is essential.

Features of This DIY Charger

12V lead-acid battery compatible

Automatic cut-off when fully charged

Auto resume if voltage drops

Safe, simple, and low-cost design

Built with commonly available components

■ Circuit Diagram Explanation

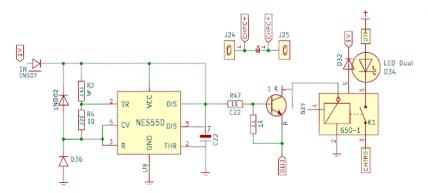


Figure: Auto Cut-Off 12V Battery Charger Circuit using 555 Timer

This is a smart automatic battery cut-off charger circuit built using the NE555 timer IC, a relay, and a few passive components. Here's how the circuit works in simple terms:

Key Components Breakdown

1. Power Input and Protection

D37 (1N4007): Protects the circuit from reverse polarity.

R48 (2.2K) and RV5 (50K potentiometer): Voltage divider network to control the trigger level.

Zener D36 (5.1V): Sets a reference voltage input to pin 2 of the NE555.

2. 555 Timer Configuration (U9 - NE555D)

Mode: The NE555 is configured as a comparator.

Pin 2 (TR) monitors the voltage through the adjustable divider.

When the battery voltage is below the threshold, pin 3 (Output) goes high, turning on the transistor.

When the battery is fully charged, pin 3 goes low, deactivating the relay.

3. Transistor Switch and Relay Control

Q3 (BC557 PNP): Works as a switch to drive the relay.

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R47 (1K): Limits base current to the transistor.

C22 (220µF): Provides a delay/smoothing to avoid relay flickering.

D35 (1N4007): Flyback diode across relay coil to suppress back EMF.

K1 (Relay G5Q-1): Connects or disconnects the charging supply to the battery.

4. Dual Color LED Indicator (D34)

Connected across the relay contacts:

RED LED turns ON during charging.

GREEN LED lights up when the battery is fully charged (relay off).

This provides a simple visual indication of charging status.

How the Auto Cut-Off Works

Battery voltage is monitored by the voltage divider and fed into pin 2 of NE555.

When battery voltage is below threshold (e.g., <14.2V), the NE555 output goes HIGH:

Turns ON transistor \rightarrow Relay energizes \rightarrow Charging starts.

When battery voltage reaches the set threshold, the NE555 output goes LOW:

Transistor turns $OFF \rightarrow Relay$ disconnects the charger.

The LED indicator switches from RED to GREEN to show full charge.

This cycle can repeat automatically, making it ideal for safe trickle charging.

Calibration Tips

RV5 (50K Potentiometer) is used to set the cutoff voltage precisely.

Use a multimeter to monitor and adjust RV5 while observing relay action.

Target voltage:

For 12V lead-acid batteries: 14.2V - 14.4V cutoff

For SLA (sealed): 13.8V - 14.0V max

Advantages of This Circuit

Prevents battery overcharging

Automatically restarts charging when voltage drops

Low-cost and DIY-friendly

Uses standard electronic components

Suitable for car, bike, inverter, and solar battery charging

√ Video Reference



Conclusion

This DIY Auto Cut Off 12V Trickle Charger is a must-have project for anyone using lead-acid batteries regularly. It's budget-friendly, easy to build, and adds safety and intelligence to your charging routine.