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Battery Chargers and Zappers

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Battery-Charging Regulator
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Battery Charger
Universal Battery Charger
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Universal Battery Charger
UJT Battery Charger
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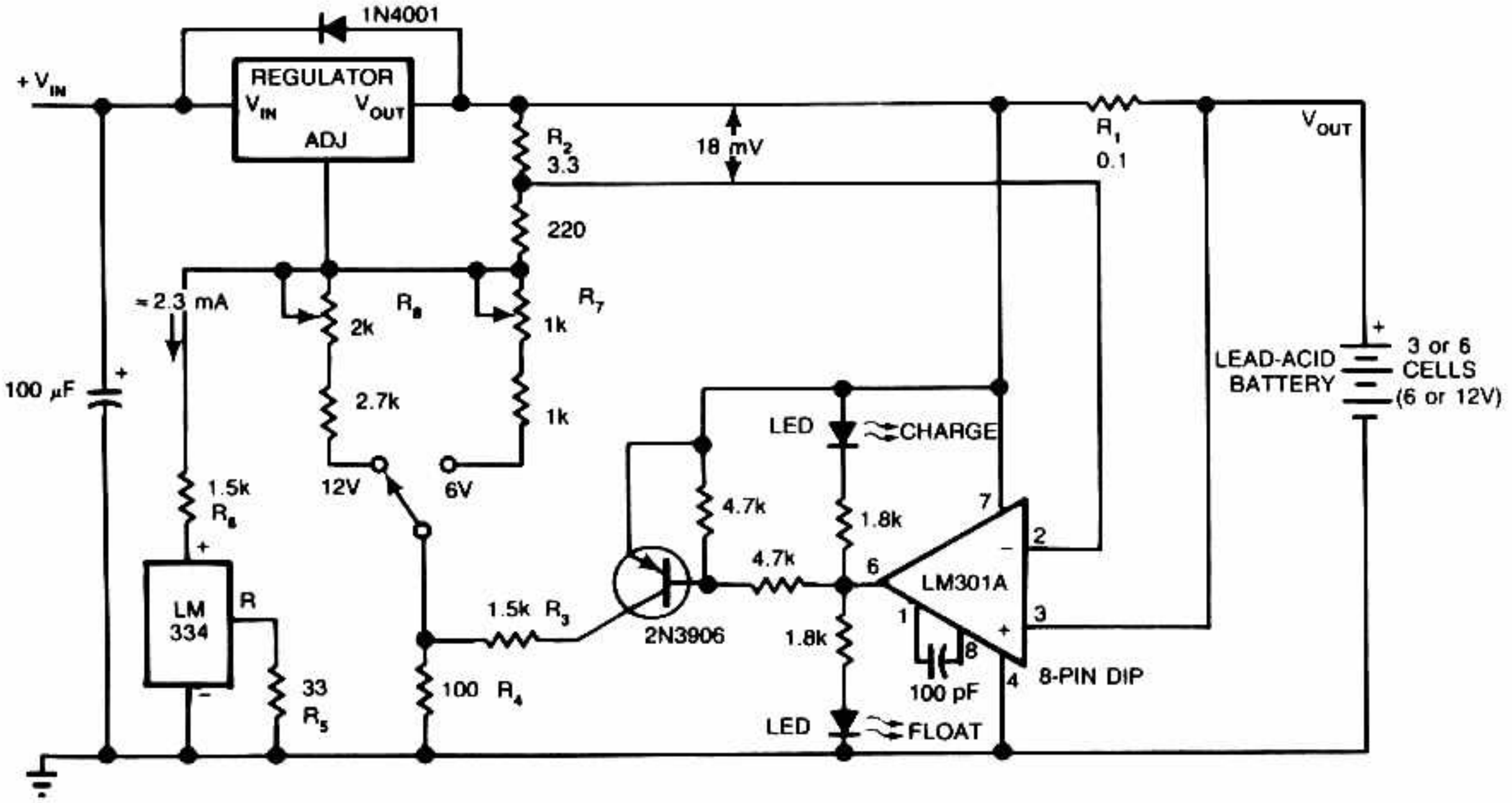
Lithium Battery Charger
Rapid Battery Charger for Icom IC-2A
Battery Charger Operates on Single Solar Cell
Wind-Powered Battery Charger

LEAD-ACID BATTERY CHARGER



EDN

Fig. 1-1

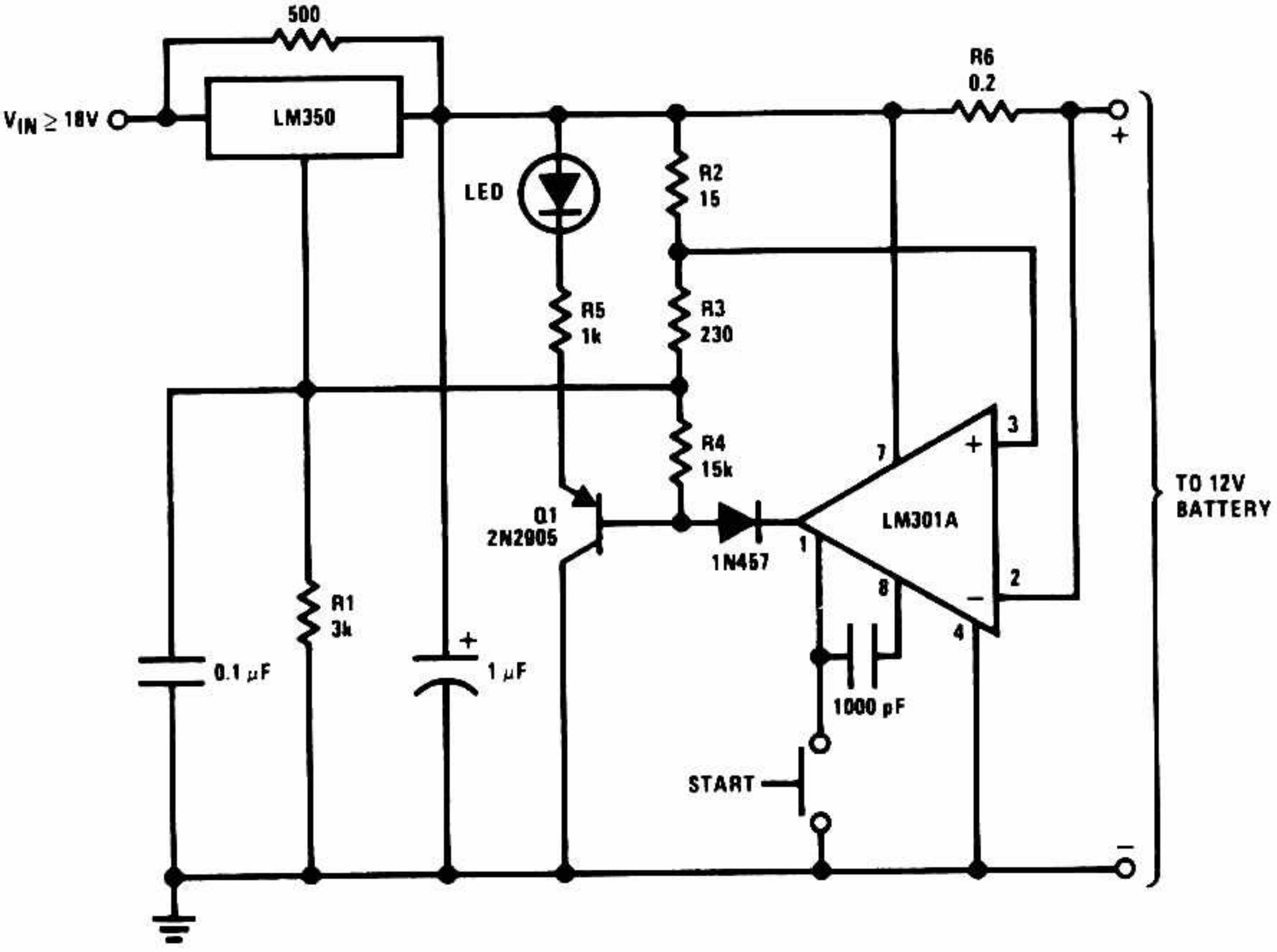
This circuit furnishes an initial voltage of 2.5 V per cell at 25°C to rapidly charge a battery. The charging current decreases as the battery charges, and when the current drops to 180 mA, the charging circuit reduces the output voltage to 2.35 V per cell, leaving the battery in a fully charged state. This lower voltage prevents the battery from overcharging, which would shorten its life.

The LM301A compares the voltage drop across R1 with an 18 mV reference set by R2. The comparator's output controls the voltage regulator, forcing it to produce the lower float voltage when the battery-charging current, passing through R1, drops below 180 mA. The 150 mV difference between the charge and float voltages is set by the ratio of R3 to R4. The LEDs show the state of the circuit.

Temperature compensation helps prevent overcharging, particularly when a battery undergoes wide temperature changes while being charged. The LM334 temperature sensor should be placed near or on the battery to decrease the charging voltage by 4 mV/°C for each cell. Because batteries need more temperature compensation at lower temperatures, change R5 to 30 Ω for a tc of −5 mV/°C per cell if application will see temperatures below −20°C.

The charger's input voltage must be filtered dc that is at least 3 V higher than the maximum required output voltage: approximately 2.5 V per cell. Choose a regulator for the maximum current needed: LM371 for 2 A, LM350 for 4 A, or LM338 for 8 A. At 25°C and with no output load, adjust R7 for a V_{OUT} of 7.05 V, and adjust R8 for a V_{OUT} of 14.1 V.

12-V BATTERY CHARGER

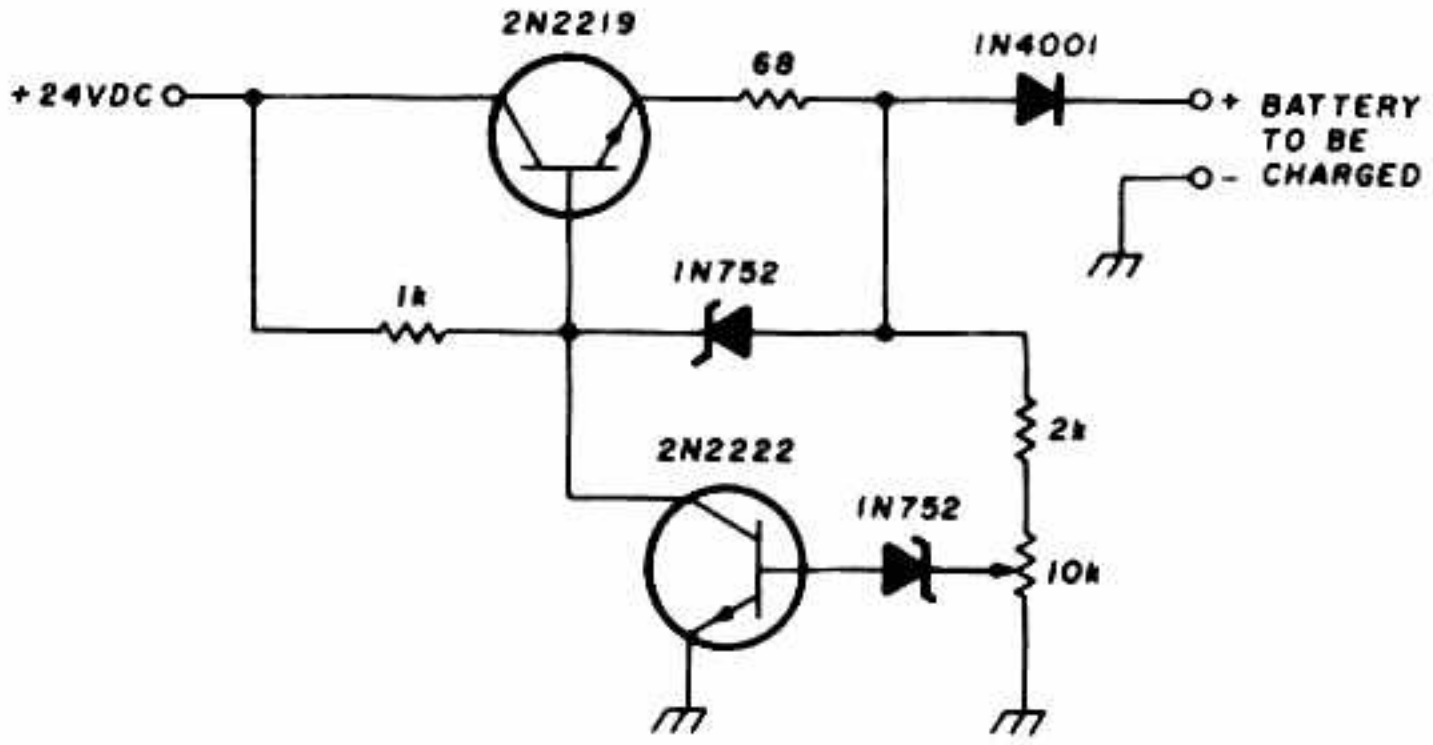


NATIONAL SEMICONDUCTOR

Fig. 1-2

This circuit is a high-performance charger for gelled-electrolyte lead-acid batteries. This charger quickly recharges the battery and shuts off at full charge. Initially, charging current is limited to 2 A. As the battery voltage rises, current to the battery decreases, and when the current has decreased to 150 mA, the charger switches to a lower float voltage, which prevents overcharge. When the start switch is pushed, the output of the charger goes to 14.5 V. As the battery approaches full charge, the charging current decreases and the output voltage is reduced from 14.5 V to about 12.5 V, terminating the charging. Transistor Q1 then lights the LED as a visual indication of full charge.

200-mA/HOUR, 12-V NICAD BATTERY CHARGER

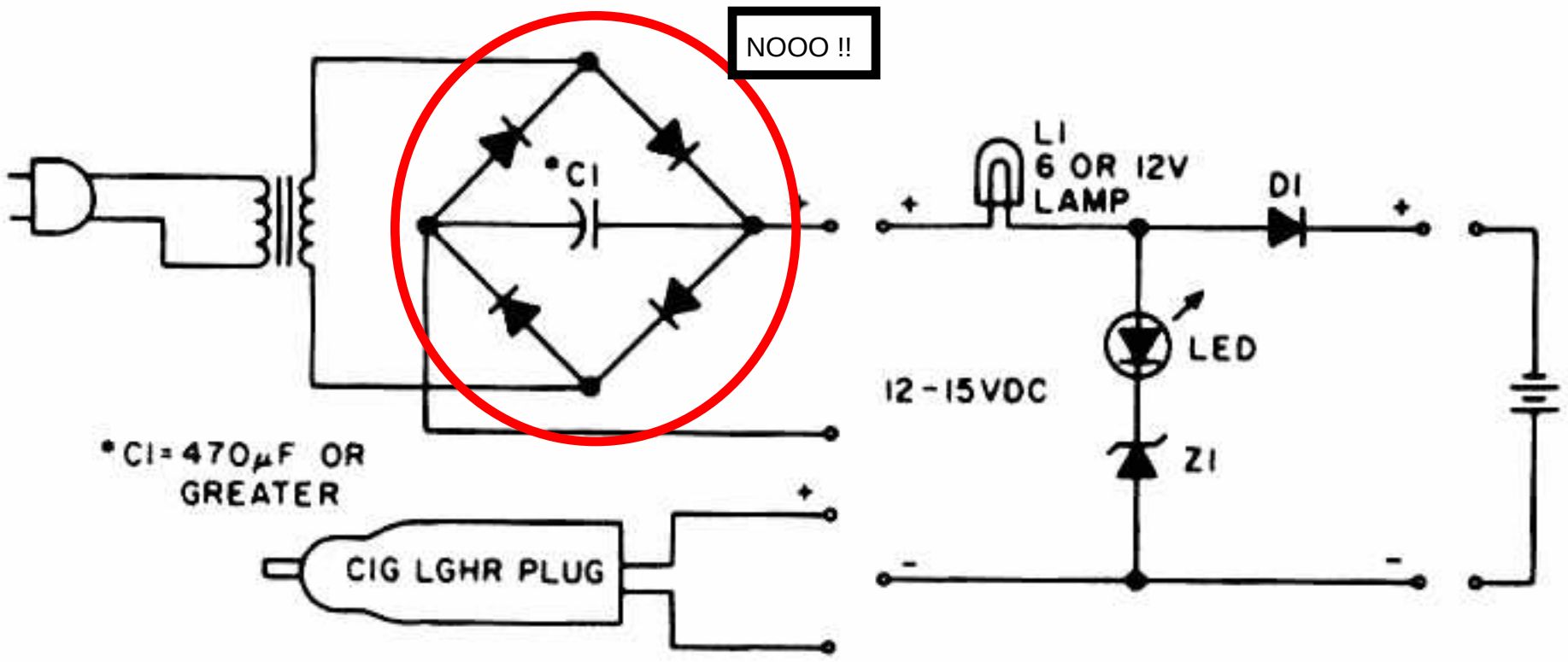


HAM RADIO

Fig. 1-3

This circuit charges the battery at 75 mA until the battery is charged, then it reduces the current to a trickle rate. It will completely recharge a dead battery in four hours and the battery can be left in the charger indefinitely. To set the shut-off point, connect a 270-Ω, 2-W resistor across the charge terminals and adjust the pot for 15.5 V across the resistor.

NICAD CHARGER WITH CURRENT AND VOLTAGE LIMITING

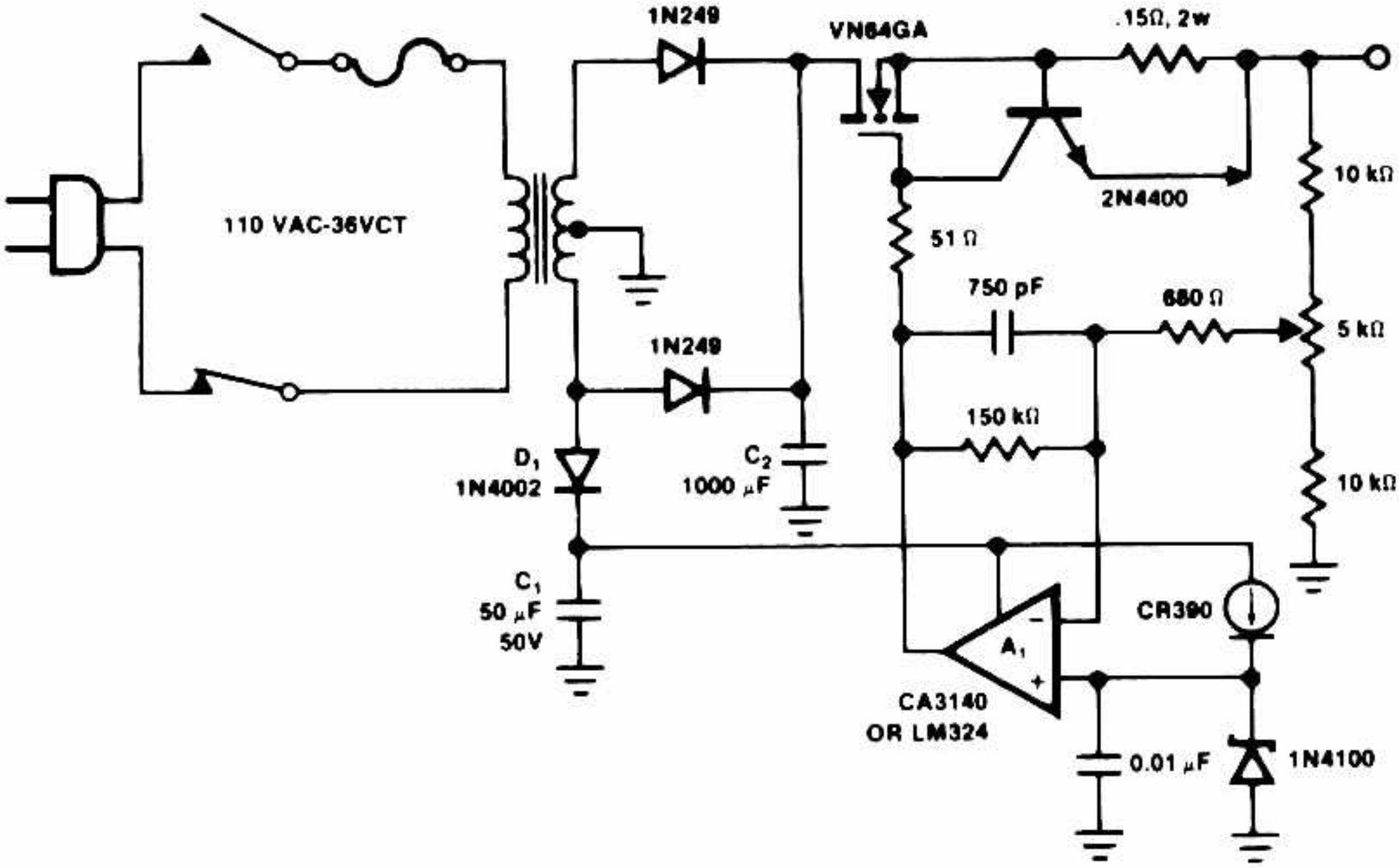


73 AMATEUR RADIO

Fig. 1-4

Lamp L1 will glow brightly and the LED will be out when the battery is low and being charged, but the LED will be bright and the light dim when the battery is almost ready. L1 should be a bulb that is rated for the current you want (usually the battery capacity divided by 10). Diode D1 should be at least 1 A, and Z1 is a 1-W zener diode with a voltage determined by the full-charge battery voltage minus 1.5 V. After the battery is fully charged, the circuit will float it at about battery capacity divided by 100 mA.

14-V 4-A BATTERY CHARGER/POWER SUPPLY

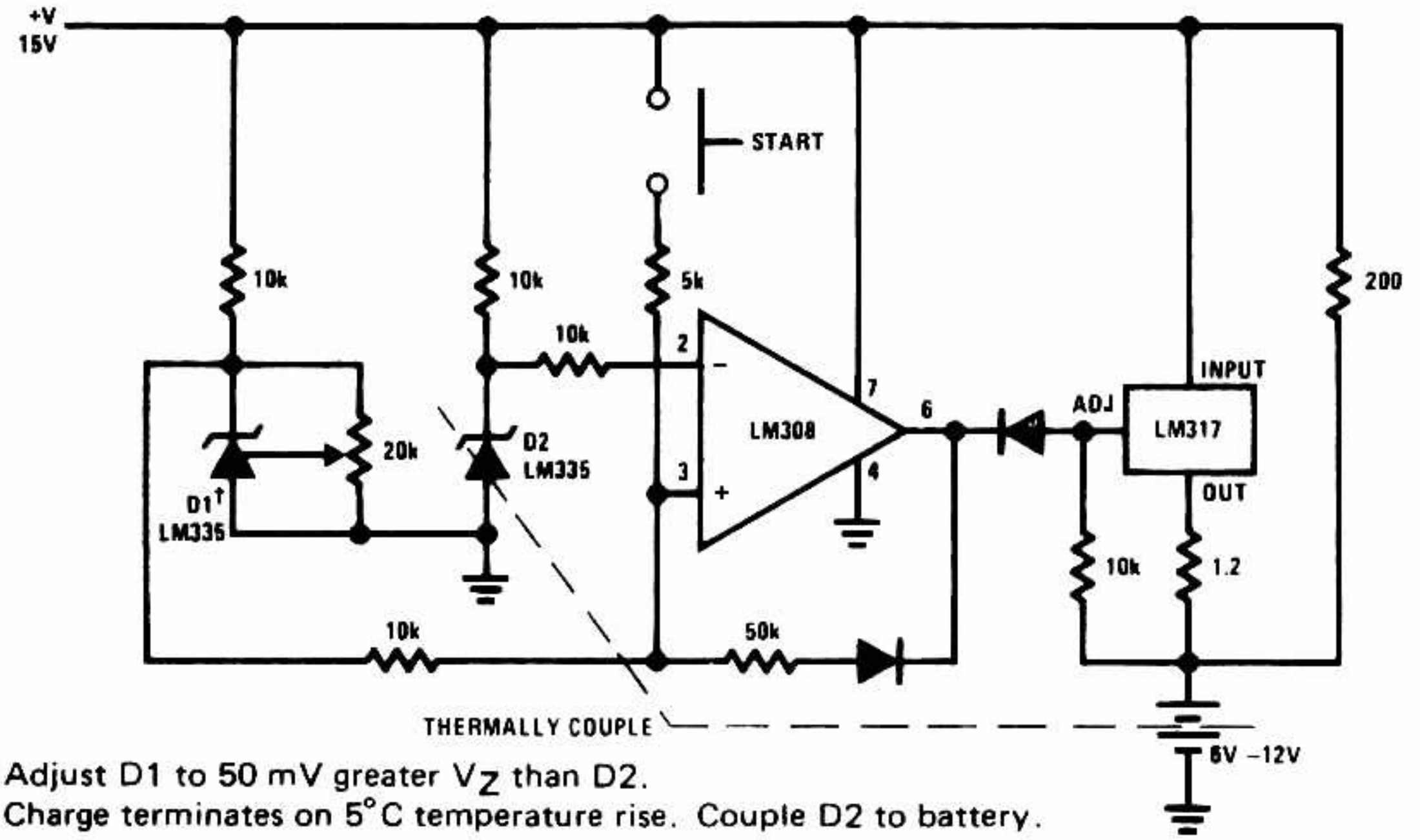


SILICONIX

Fig. 1-5

Operational amplifier A1 directly drives the VN64GA with the error signal to control the output voltage. Peak rectifier D1, C1 supplies error amplifier A1 and the reference zener. This extra drive voltage must exceed its source voltage by several volts for the VN64GA to pass full load current. The output voltage is pulsating dc, which is quite satisfactory for battery charging. To convert the system to a regulated dc supply, capacitor C2 is increased and another electrolytic capacitor is added across the load. The response time is very fast, determined by the op amp. The 2N4400 current-limiter circuit prevents the output current from exceeding 4.5 A. However, maintaining a shorted condition for more than one second will cause the VN64GA to exceed its temperature ratings. A generous heatsink, on the order of 1°C/W, must be used.

FAST CHARGER FOR NICAD BATTERIES

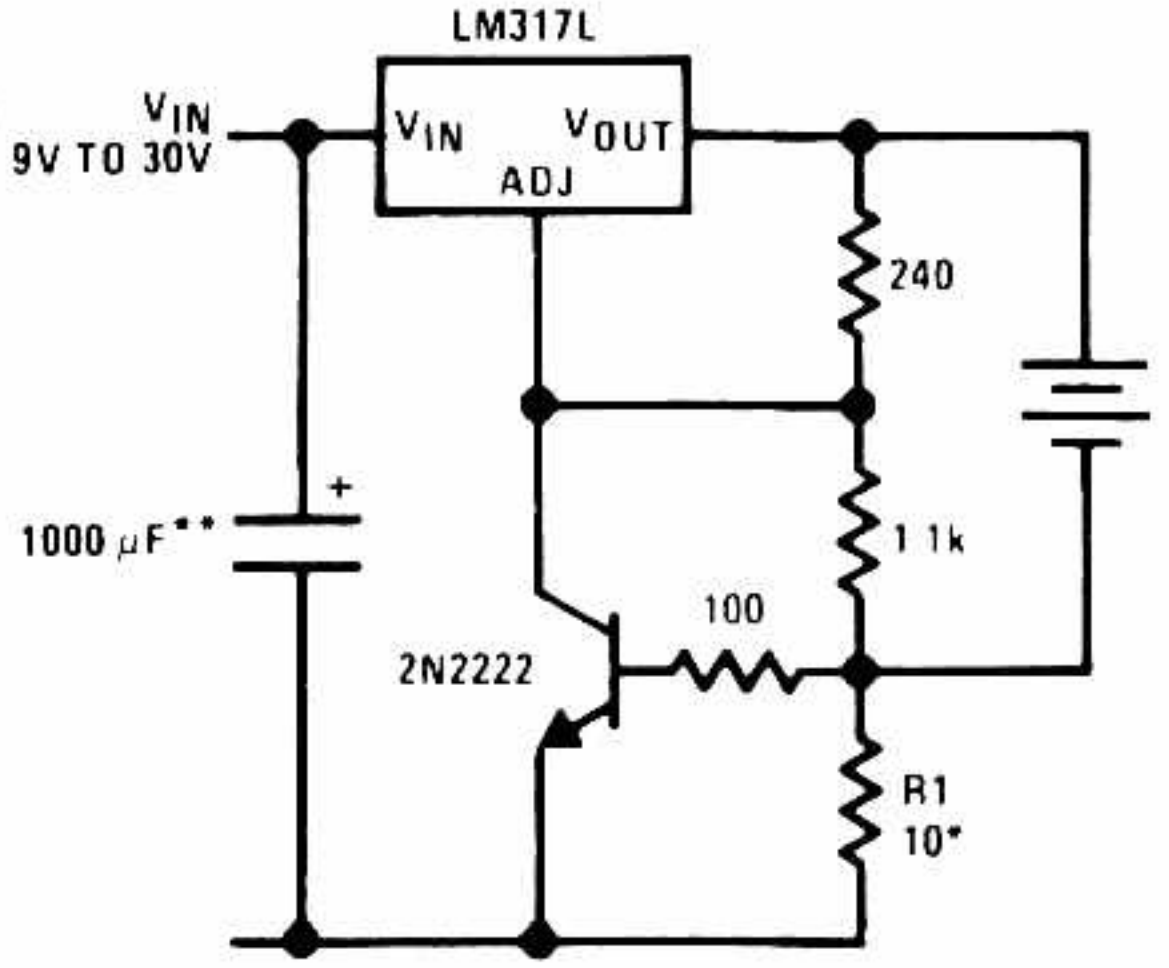


Adjust D1 to 50 mV greater V_Z than D2.
Charge terminates on 5°C temperature rise. Couple D2 to battery.

NATIONAL SEMICONDUCTOR

Fig. 1-6

CURRENT-LIMITED 6-V CHARGER



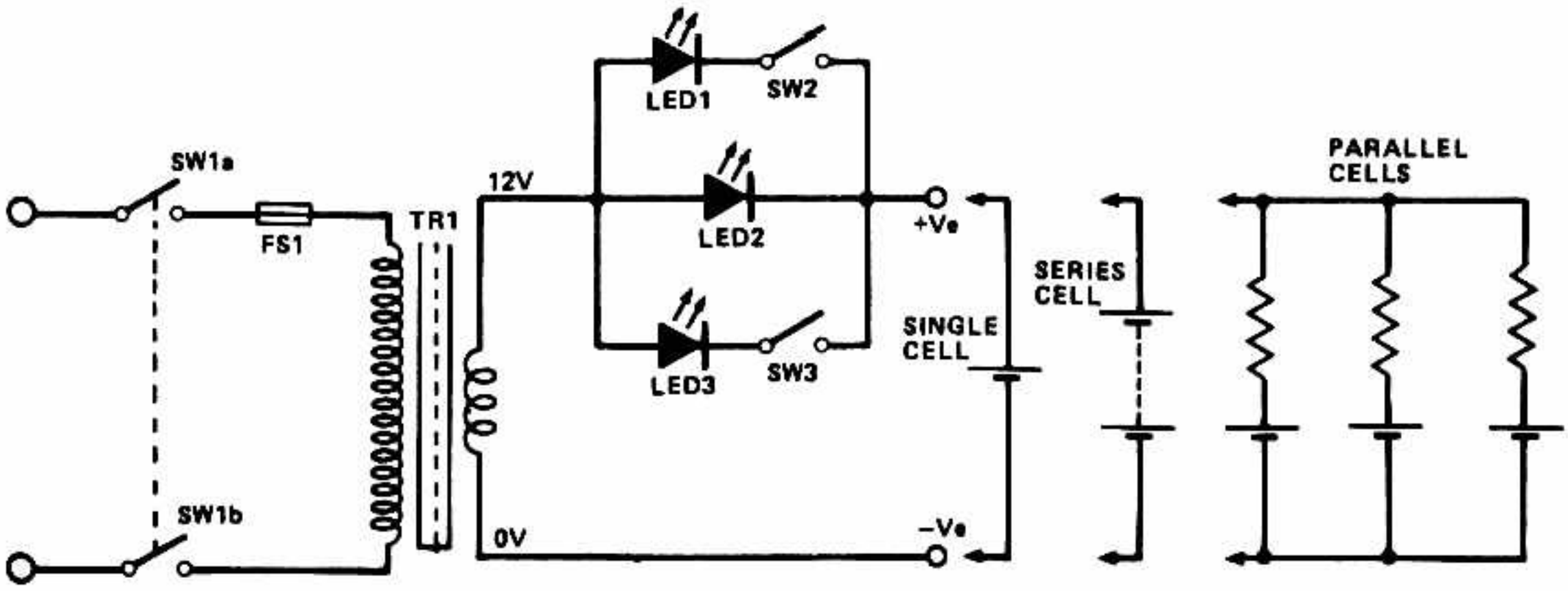
* Sets peak current, $I_{PEAK} = 0.6V/R1$

** 1000 μF is recommended to filter out any input transients

NATIONAL SEMICONDUCTOR

Fig. 1-7

NICAD CHARGER

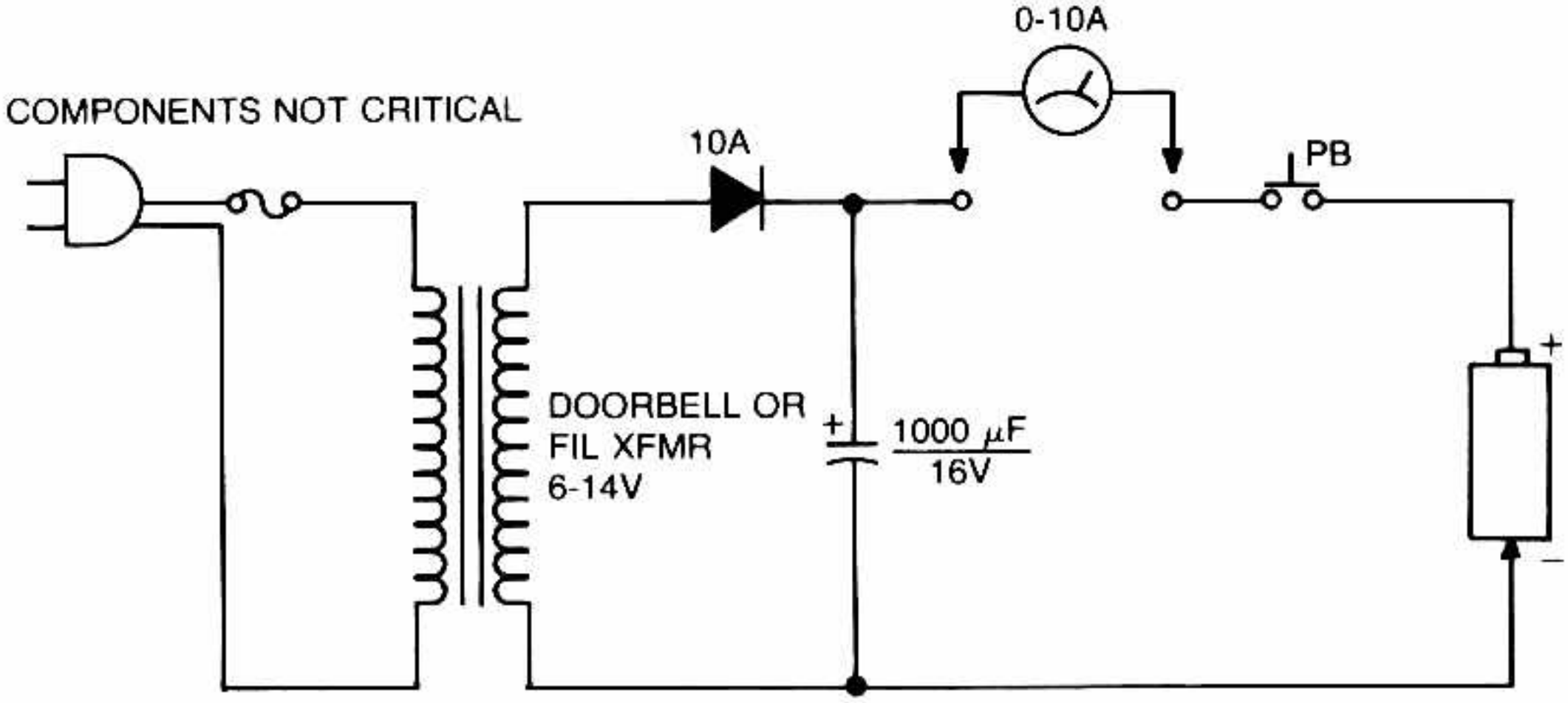


ELECTRONICS TODAY INTERNATIONAL

Fig. 1-8

This circuit uses constant current LEDs to adjust charging current. It uses LEDs that pass a constant current of about 15 mA for an applied voltage range of 2 to 18 V. They can be paralleled to give any multiple of 15 mA and they light up when current is flowing. The circuit will charge a single cell at 15, 30, or 45 mA, or cells in series up to the rated supply voltage limit (about 14 V).

SIMPLE NICAD BATTERY ZAPPER

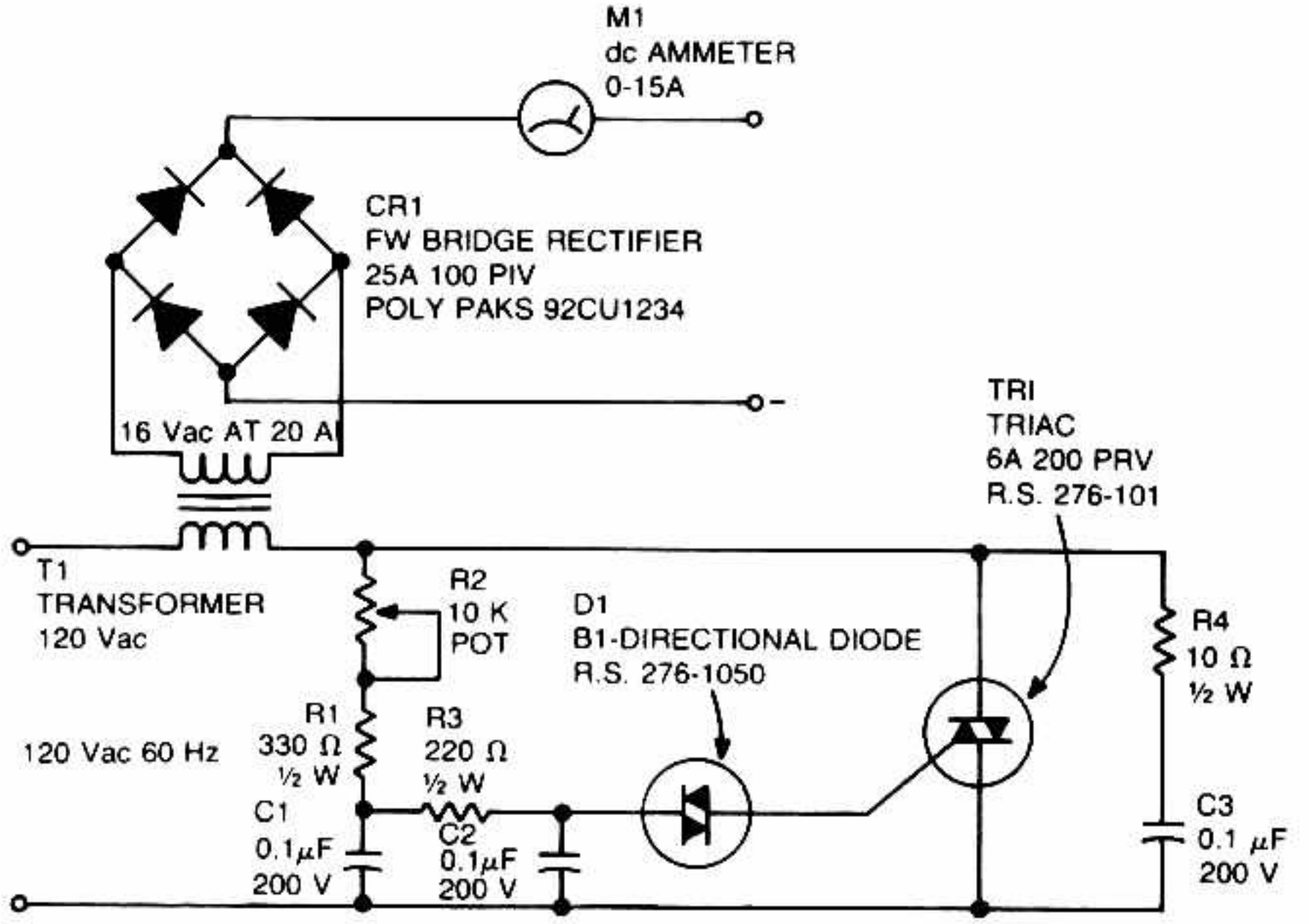


73 AMATEUR RADIO

Fig. 1-9

This circuit is used to clear internal shorts in nickel-cadmium batteries. To operate, connect a NiCad battery to the output and press the pushbutton for three seconds.

BATTERY CHARGER

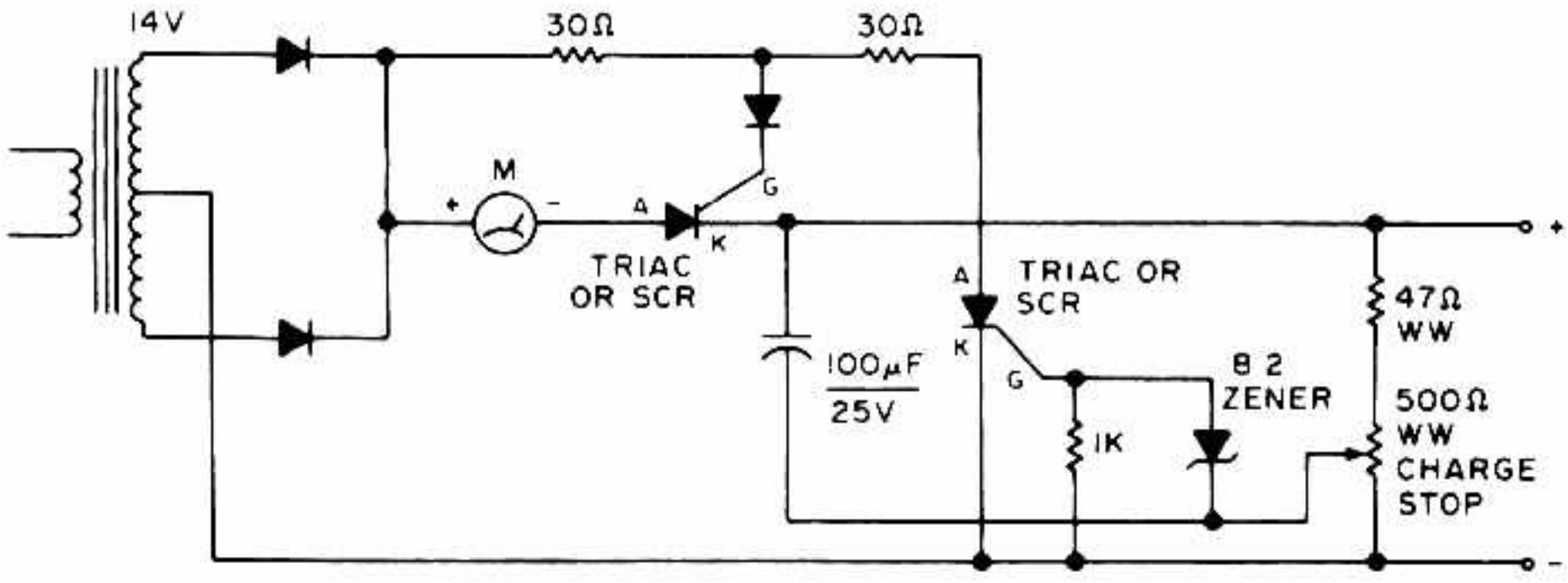


73 AMATEUR RADIO

Fig. 1-10

A diac is used in the gate circuit to provide a threshold level for firing the triac. C3 and R4 provide a transient suppression network. R1, R2, R3, C1, and C2 provide a phase-shift network for the signal being applied to the gate. R1 is selected to limit the maximum charging current at full rotation of R2.

AUTOMATIC SHUTOFF BATTERY CHARGER

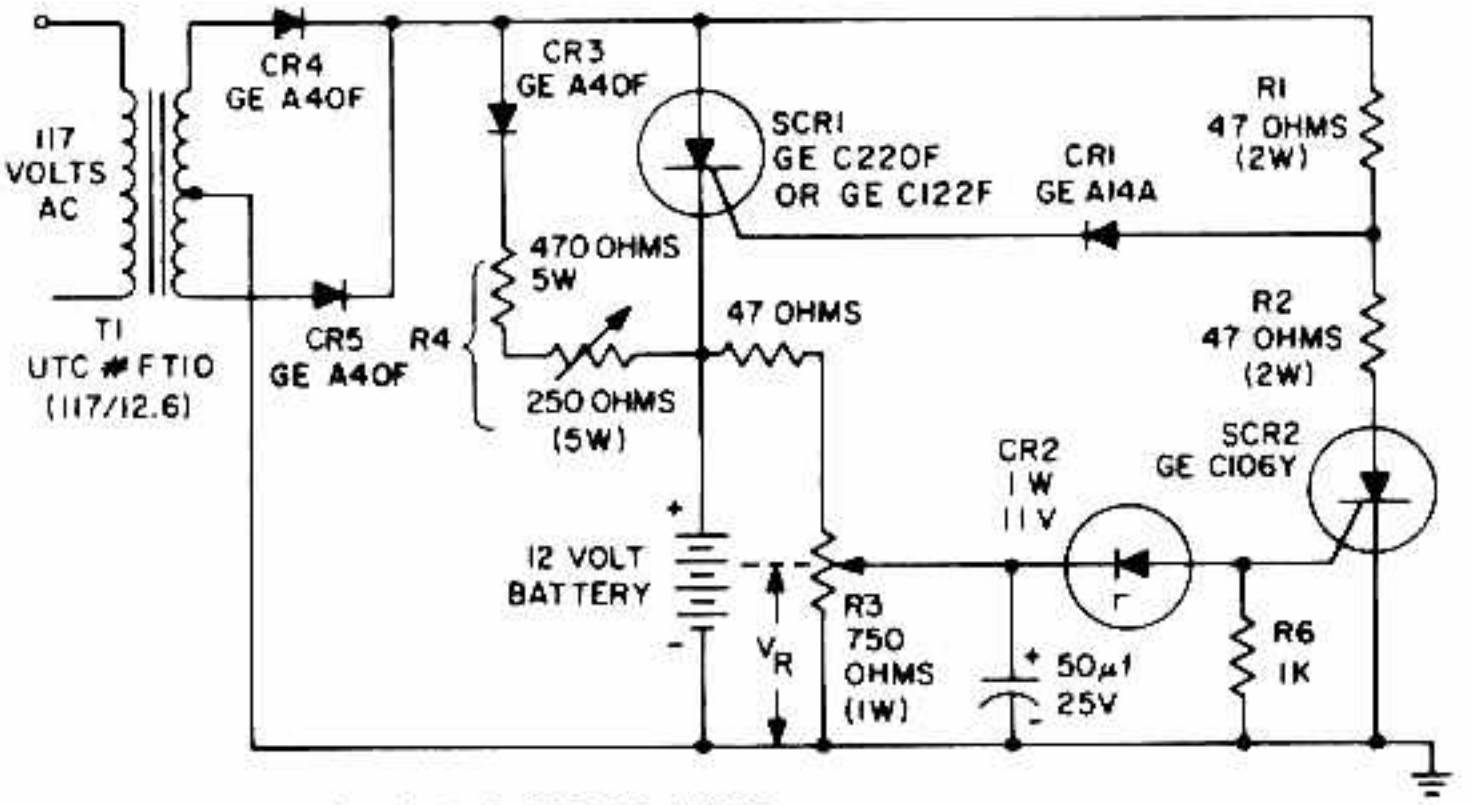


73 AMATEUR RADIO

Fig. 1-11

Adjust this circuit by setting the 500-Ω resistor while it is attached to a fully charged battery.

BATTERY-CHARGING REGULATOR



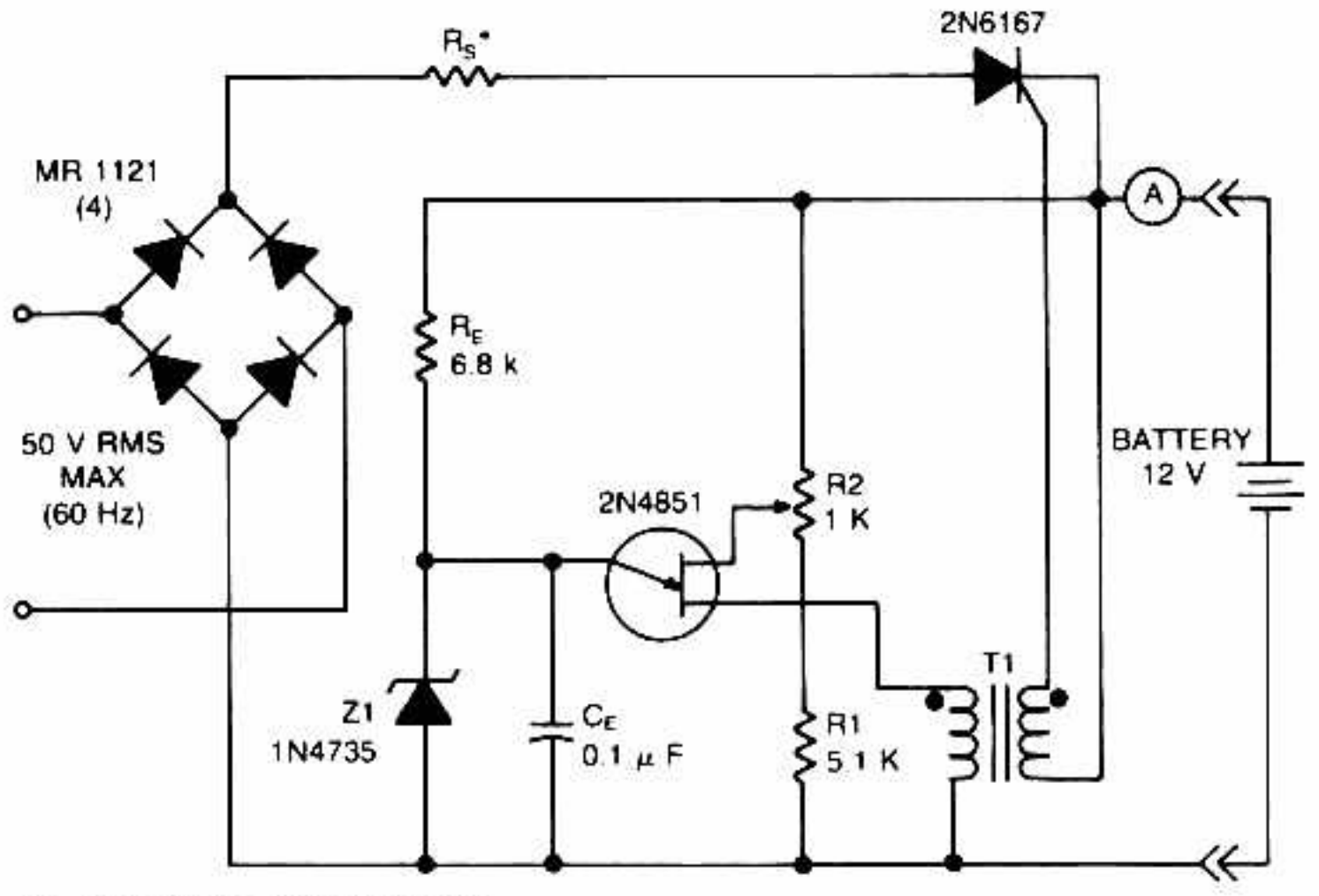
ALL RESISTORS 1/2 WATT EXCEPT AS NOTED

GE

Fig. 1-12

The circuit is capable of charging a 12-V battery at up to a six ampere rate. Other voltages and currents, from 6 to 600 V and up to 300 A, can be accommodated by suitable component selection. When the battery voltage reaches its fully charged level, the charging SCR shuts off, and a trickle charge, as determined by the value of R4, continues to flow.

12-V BATTERY-CHARGER CONTROL (20 A rms MAX.)



T1 - PRIMARY = 30 TURNS #22
SECONDARY = 45 TURNS #22
CORE = FERROXCUBE 203 F 181-3C3

R_S - SERIES RESISTANCE TO LIMIT CURRENT THROUGH SCR
2N6167 IS RATED AT 20 AMPS RMS

MOTOROLA

Fig. 1-13