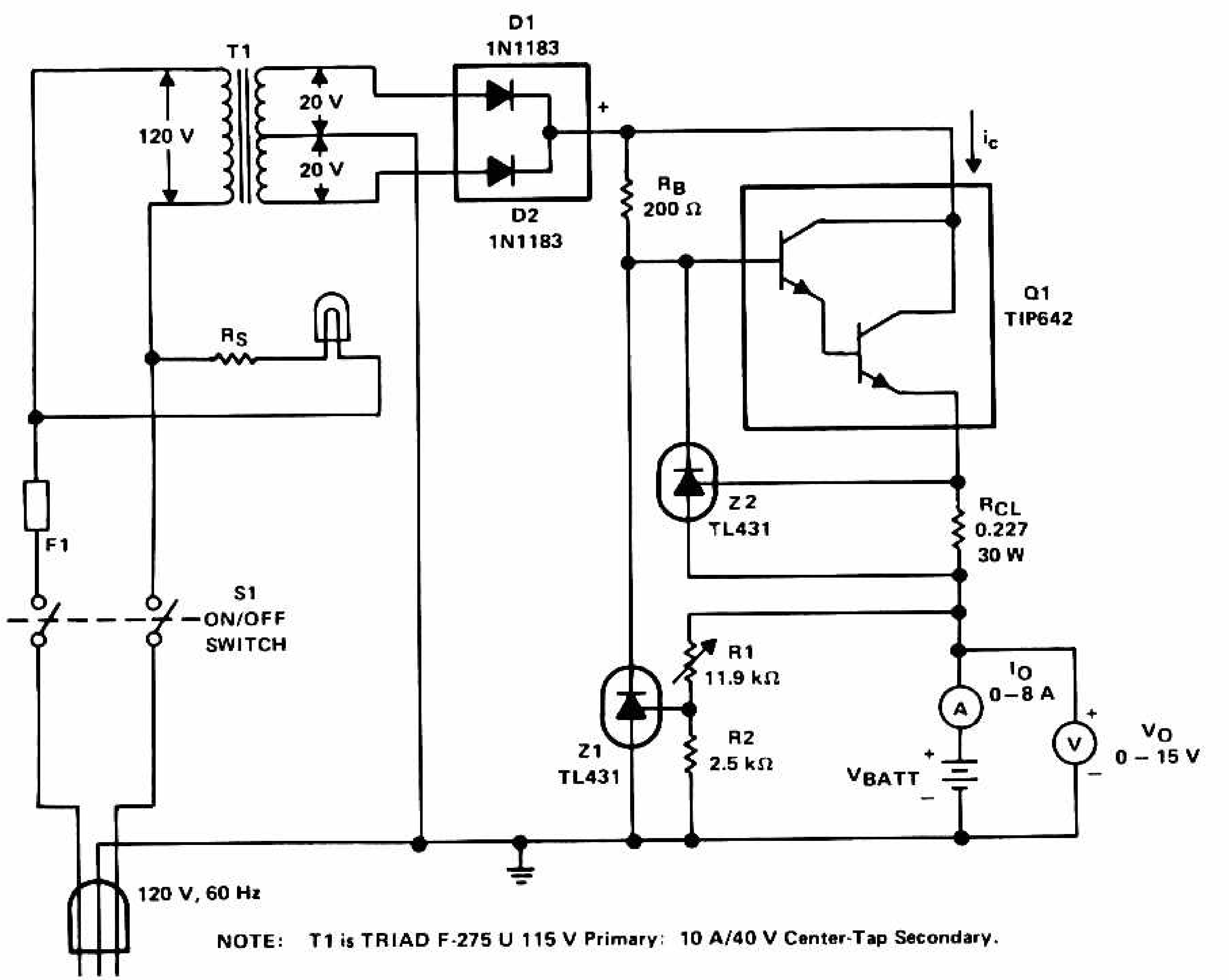
BATTERY CHARGER

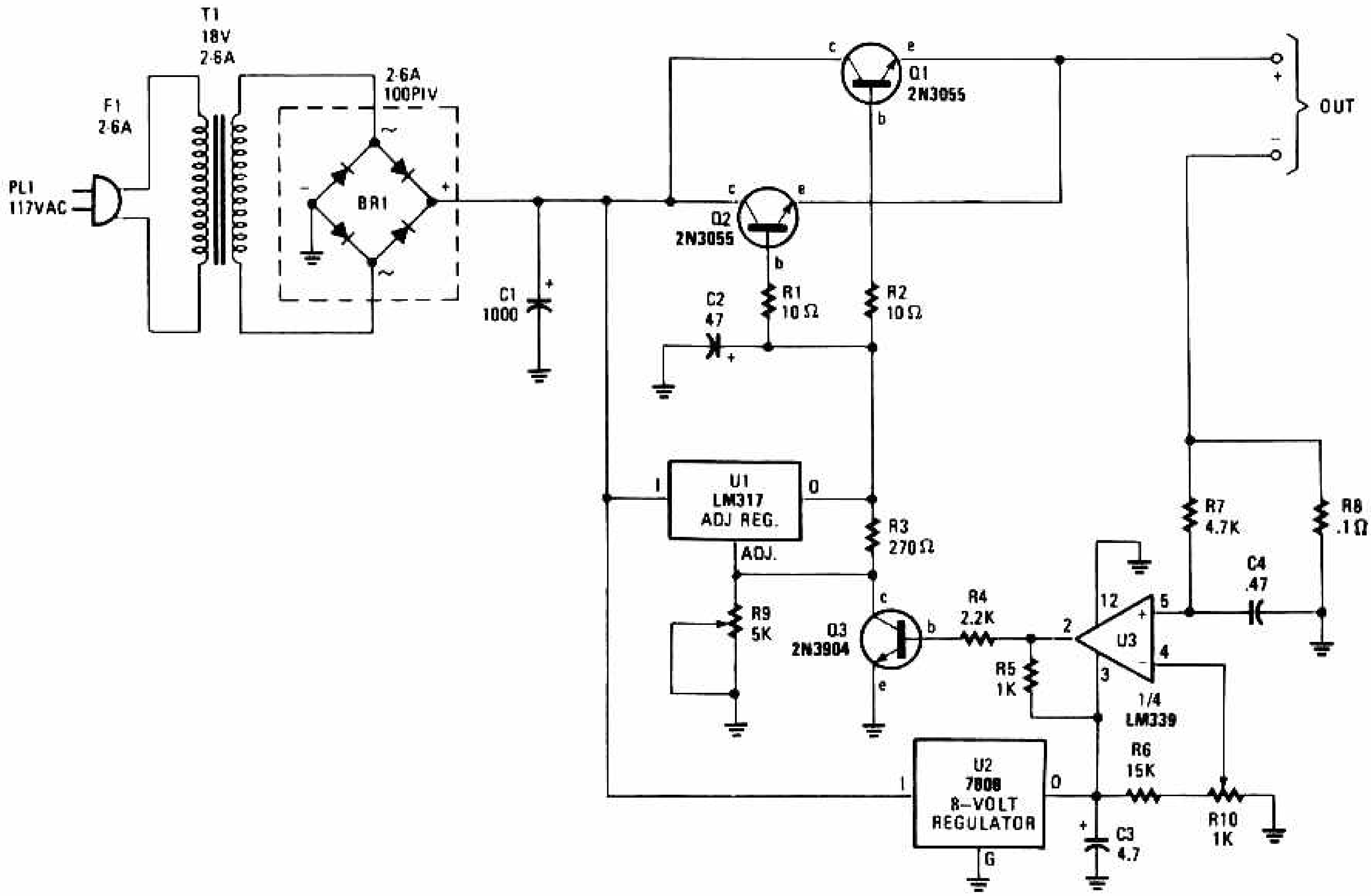


TEXAS INSTRUMENTS

Fig. 1-14

The charger is based on a charging voltage of 2.4 V per cell, in accordance with most manufacturers' recommendations. The circuit pulses the battery under charge with 14.4 V (6 cells × 2.4 V per cell) at a rate of 120 Hz. The design provides current limiting to protect the charger's internal components while limiting the charging rate to prevent damaging severely discharged lead-acid batteries. The maximum recommended charging current is normally about one-fourth the ampere-hour rating of the battery. For example, the maximum charging current for an average 44 ampere-hour battery is 11 A. If the impedance of the load requires a charging current greater than the 11 A current limit, the circuit will go into current limiting. The amplitude of the charging pulses is controlled to maintain a maximum peak charging current of 11 A (8 A average).

UNIVERSAL BATTERY CHARGER



POPULAR ELECTRONICS

Fig. 1-15

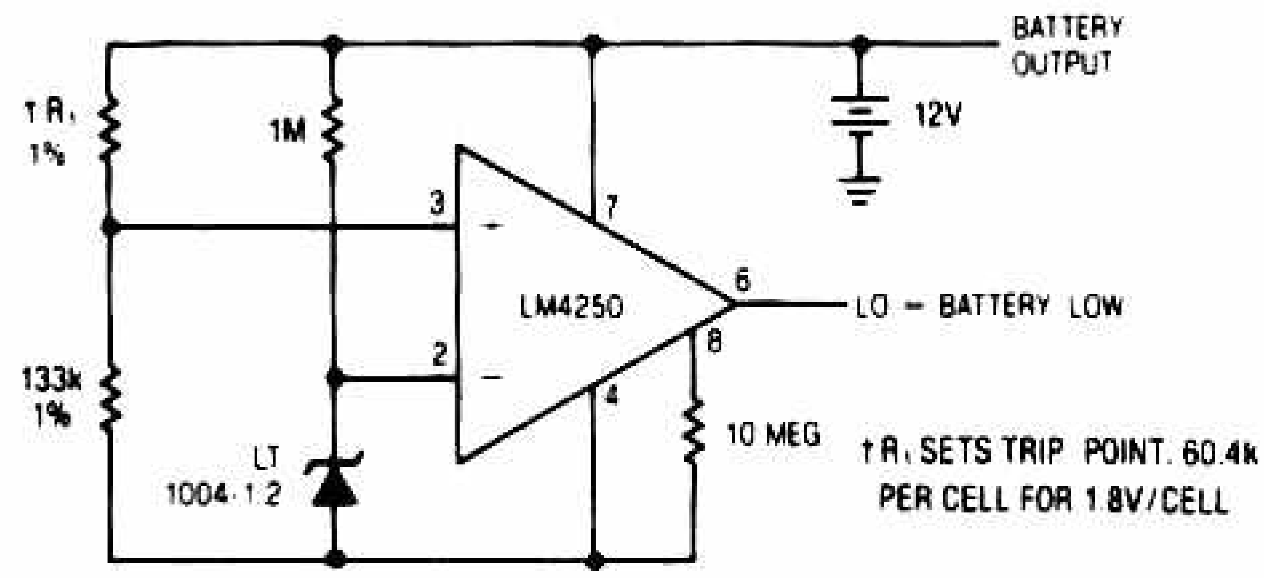
The charger's output voltage is adjustable and regulated, and has an adjustable constant-current charging circuit that makes it easy to use with most NiCad batteries. The charger can charge a single cell or a number of series-connected cells up to a maximum of 18 V.

Power transistors Q1 and Q2 are connected as series regulators to control the battery charger's output voltage and charge-current rate. An LM317 adjustable voltage regulator supplies the drive signal to the bases of power transistors Q1 and Q2. Potentiometer R9 sets the output-voltage level. A current-sampling resistor, R8 (a 0.1-Ω, 5-W unit), is connected between the negative output lead and circuit ground. For each amp of charging current that flows through R8, a 100 mV output is developed across it. The voltage developed across R8 is fed to one input of comparator U3. The other input of the comparator is connected to variable resistor R10.

As the charging voltage across the battery begins to drop, the current through R8 decreases. Then the voltage feeding pin 5 of U3 decreases, and the comparator output follows, turning Q3 back off, which completes the signal's circular path to regulate the battery's charging current.

The charging current can be set by adjusting R10 for the desired current. The circuit's output voltage is set by R9.

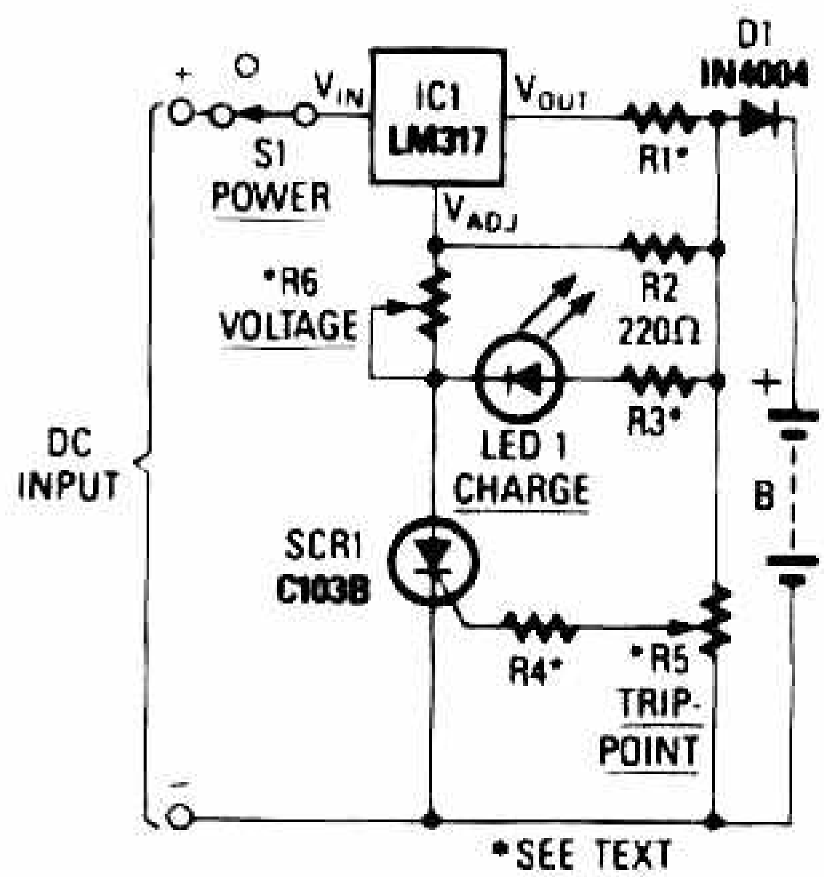
LEAD-ACID LOW-BATTERY DETECTOR



LINEAR TECHNOLOGY

Fig. 1-16

UNIVERSAL BATTERY CHARGER

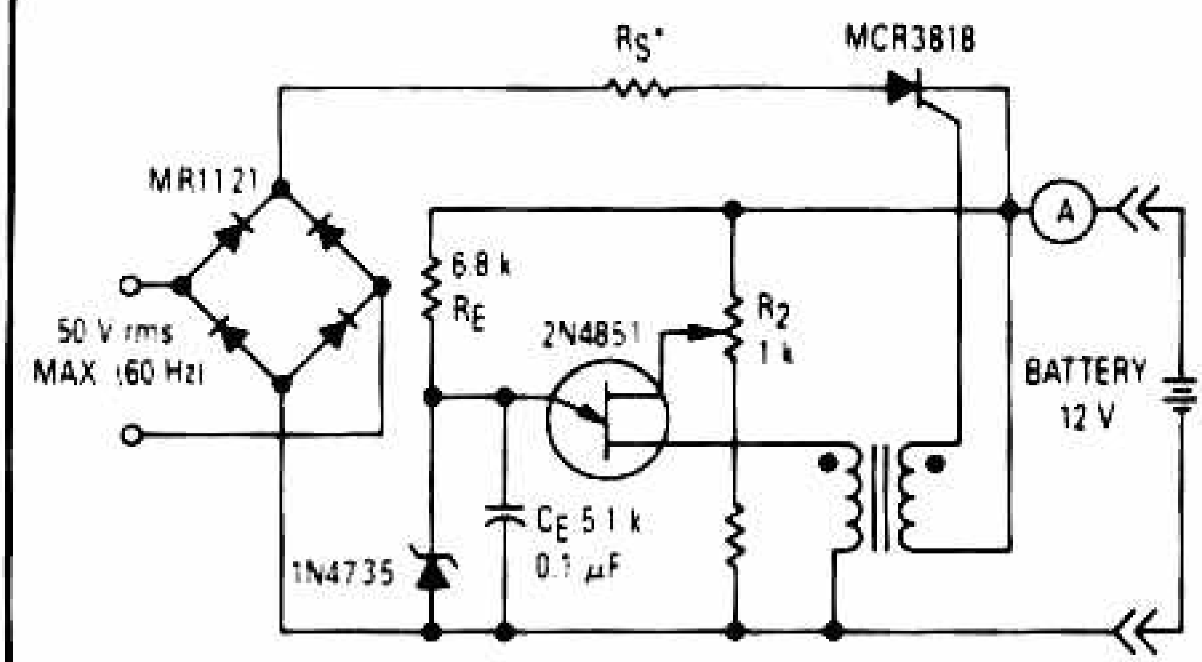


RADIO-ELECTRONICS

Fig. 1-17

When power is applied to the circuit, SCR1 is off, so there is no bias-current path to ground; thus, LM317 acts as a current regulator. The LM317 is connected to the battery through steering diode D1, limiting resistor R1, and bias resistor R2. The steering diode prevents the battery from discharging through the LED and the SCR when power is removed from the circuit. As the battery charges, the voltage across trip-point potentiometer R5 rises, and at some point, turns on the SCR. Then, current from the regulator can flow to ground, so the regulator now functions in the voltage mode. When the SCR turns on, it also provides LED1 with a path to ground through R3. So, when LED1 is on, the circuit is in the voltage-regulating mode; when LED1 is off, the circuit is in the current-regulating mode.

UJT BATTERY CHARGER



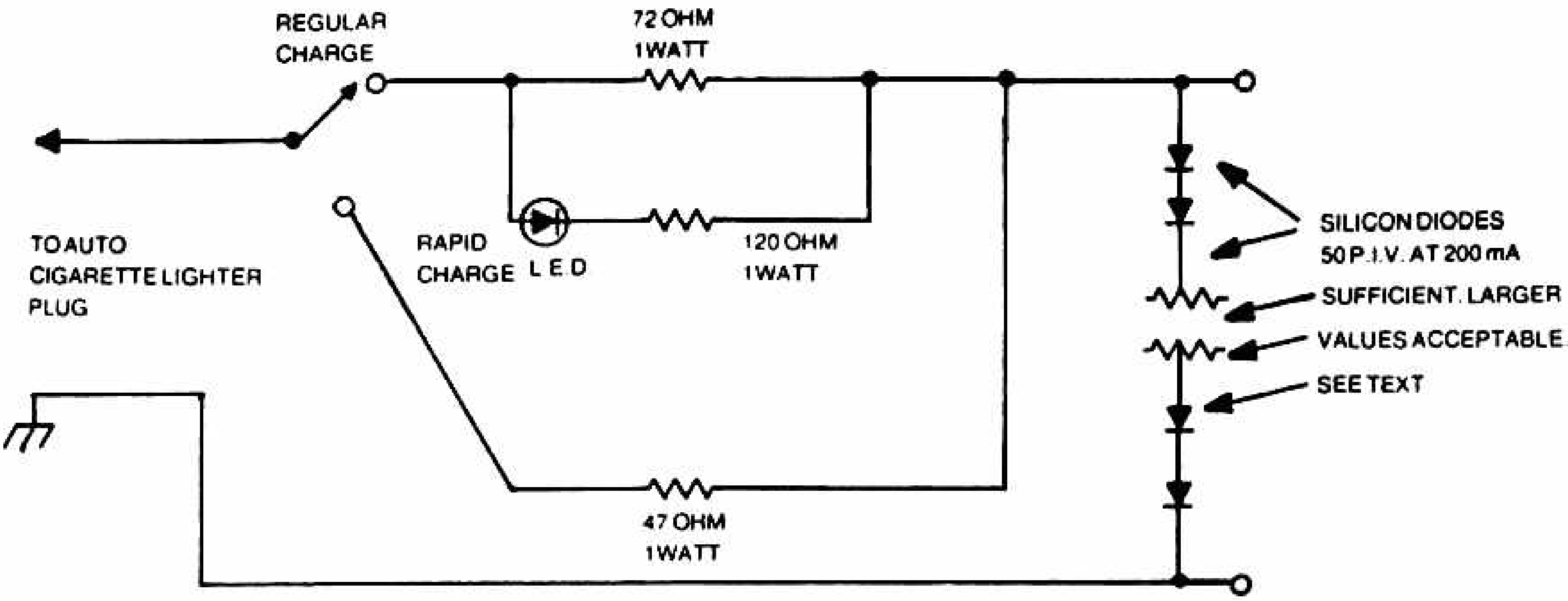
T1 — PRIMARY = 30 TURNS #22
SECONDARY = 45 TURNS #22
CORE = FERROXCUBE 203 F 181-3C3
* RS — SERIES RESISTANCE TO LIMIT CURRENT THROUGH SCR
MCR 2818-3 IS RATED AT 20 AMPS rms

MOTOROLA

Fig. 1-18

This circuit will not work unless the battery to be charged is connected with proper polarity. The battery voltage controls the charger and when the battery is fully charged, the charger will not supply current to the battery. The battery charging current is obtained through the SCR when it is triggered into the conducting state by the UJT relaxation oscillator. The oscillator is only activated when the battery voltage is low. $V_{B_2B_1}$ of the UJT is derived from the voltage of the battery to be charged, and since $V_P = V_D = V_{B_2B_1}$; the higher $V_{B_2B_1}$, the higher V_P. When V_P exceeds the breakdown voltage of the zener diode Z1, the UJT will cease to fire and the SCR will not conduct. This indicates that the battery has attained its desired charge as set by R2.

AUTOMOTIVE CHARGER FOR NICAD BATTERY PACKS



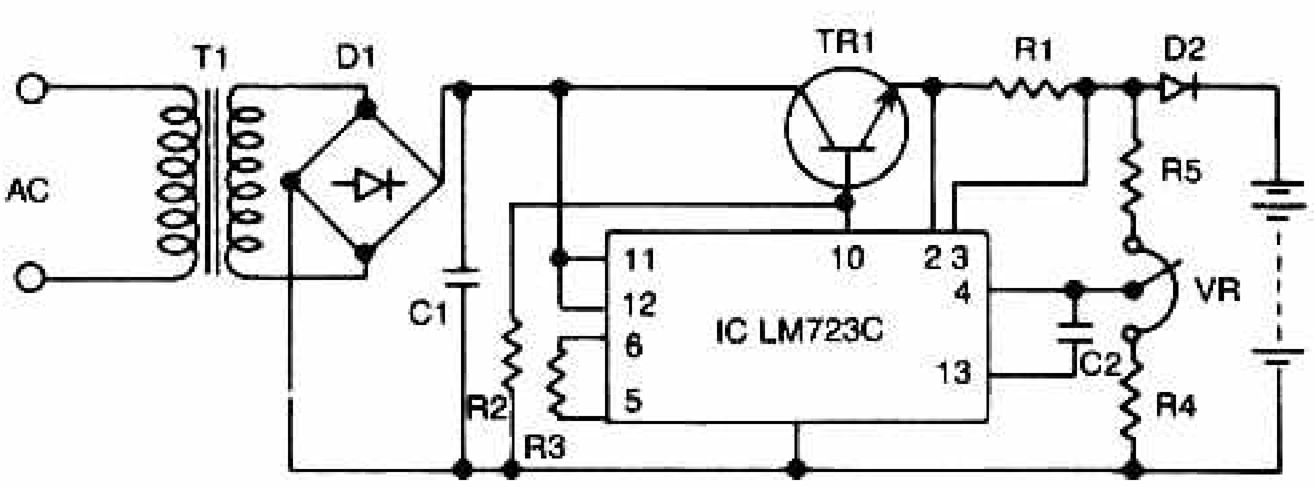
TAB BOOKS

Fig. 1-19

The number of silicon diodes across the output is determined by the voltage of the battery pack. Figure each diode at 0.7 V. For example, a 10.9-V pack would require 10.9/0.7 = 15.57, or 16 diodes.

CONSTANT-VOLTAGE CURRENT-LIMITED CHARGER

IC LM723C VOLTAGE REGULATOR (FOR 12V dc OUTPUT 0.42A MAX.)



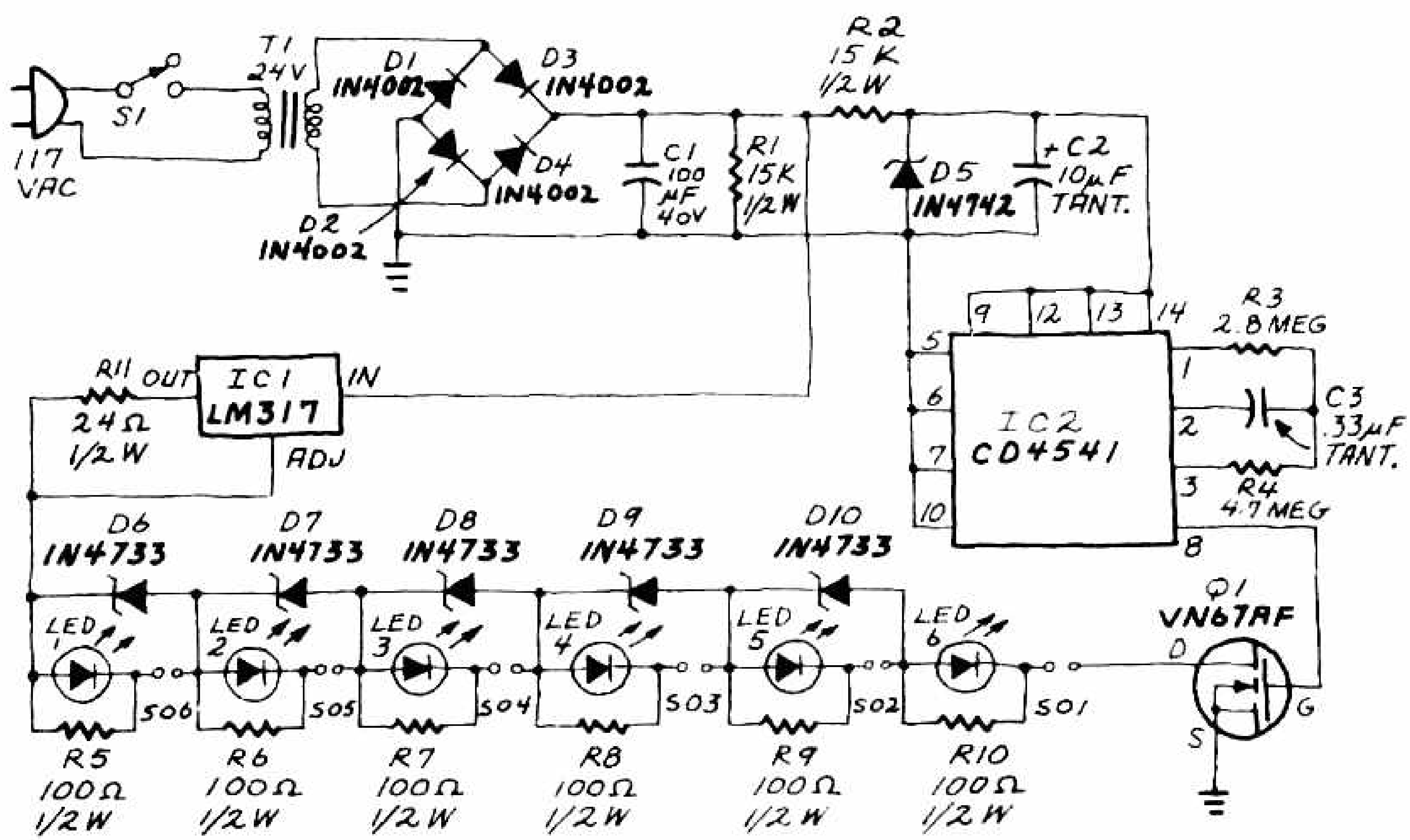
For 12-V sealed lead-acid batteries.

T1	Transformer, dc 13V (rms), 1-3A (rms)
D1,D2	100V 1A Diode
C1	50V, 470μF Electrolytic Condenser
TRI	MJ2840 10A 60V 150W (Motorola)
IC	LM723C (National Semiconductor)
R1	4.7 Ohm 1/2W 3P
R2	5.1K Ohm 1/4W
R3	3.9K Ohm 1/4W
R4	7.5K Ohm 1/4W
R5	8.2K Ohm 1/4W
VR	2K Ohm
C2	50V 1000pF

YUASA BATTERY

Fig. 1-20

VERSATILE BATTERY CHARGER



RADIO-ELECTRONICS

Fig. 1-21

An LM317 voltage regulator is configured as a constant-current source. It is used to supply the 50-mA charging current to S01-S06, an array of AA-cell battery holders. Each of the battery holders is wired in series with an LED and its associated shunt resistor. When the battery holder contains a battery, the LED glows during charging. Each battery holder/LED combination is paralleled by a 5.1-V zener diode. If the battery holder is empty, the zener conducts the current around the holder.

A timing circuit prevents overcharging. When power is applied to the circuit, timing is initiated by IC2, a CD4541 oscillator/programmable timer. The output of IC2 is fed to Q1. When that output is high, the transistor is on, and the charging circuit is completed. When the output is low, the transistor is off, and the path to ground is interrupted.