INVERTER

DESCRIPTION

The inverter produces 115vac from two 12 volt lead-acid batteries when commercial 115vac is lost. There is a 2 minute delay in Inverter turn-on when commercial 115vac is lost and a 5 minute delay in Inverter turn-off when commercial 115vac is restored. The batteries are connected in parallel for increased current capabilities.

The Inverter is based on a 500 watt Tripp Lite design. It is a two transformer driven Inverter, neither transformer is of the saturable core type. The drive circuitry has been redesigned to provide an improved frequency stable symmetrical output waveform from the Inverter. The output has been beefed up with the addition of a 4th output transistor on each side of the output transformer.

The Inverter is anticipated to operate a 382 watt load which consists of a living room lamp, the living room TV, a living room fan, the video distribution board in the basement and a 40 watt lamp mounted on top of the power backup system in the basement. With a 382 watt load, battery current draw should be between 30 and 40 amps, output load current should be approximately 3 amps.

DETAILED THEORY OF OPERATION

Circuit Description

The circuit consists of two major sections. The driver and the output. The driver circuitry is built on a printed circuit board. The output circuitry is all chassis mounted.

The driver circuitry is built around the NTE1720 PWM IC. R4 and C2 form the time constant components to set the operating frequency. R4 is adjusted for a 60Hz output frequency. R3 and C1 are Op Amp compensation components. R1 and R2 form a voltage divider off the +5 VREF output from the IC. C3 is a decoupling capacitor. R5 and R6 are collector load resistors for the chip internal drive transistors. Q1 and Q2 are the output drive transistors. T1 is the output drive transformer. D1 and D2 are 43 volt zeners. 1Q1 through 1Q8 are the output transistors. 1C8 and 1C9 are filter capacitors. 1T2 is the output transformer. 1D7 and 1D8 dampen inductive kickback from the output transformer primary.

Circuit Operation

IC1 generates a symmetrical square wave output waveform on pins 11 and 14. The signals on pin 11 and 14 are 180 degrees out of phase thus suitable to drive a balanced push pull stage. The frequency of the output wave form is set by time constant components R4 and C2. R4 is adjusted for a pulse width of 8.33 milliseconds (60Hz) at the output.

Transistors Q1 and Q2 drive transformer T1 in a push pull configuration. D1 and D2 clamp Q1 and Q2 collector spikes to 43 volts. T1 is a drive transformer, it steps up current drive to the outputs and provides impedance matching to the output transistors.

1Q1 through 1Q8 are paralleled to increase current handling capability and are configured in a push pull configuration. The output transistors drive the output transformer 1T2. 1C8/1C9 and 1D7/1D8 form a snubber network to remove transients and spikes from the output transistor collectors. The output of 1T2 secondary outputs a 150 volt P-P square wave.

INVERTER LINE FREQUENCY ADJUST

The Inverter should be on and operating into a load to make the following adjustment.

1). Connect and O'Scope and/or a frequency counter to