

Circuit description of ACCEL 7350

Operations

This is a self-oscillating, RCC type switching power supply circuit. The output voltage is controlled by the switching frequency. The rated input is 120V, 60Hz for U.S.A. and 100V for JAPAN setting (adding to the Jumper at CN2) and 230V, 50Hz for European setting (Removing the Jumper at CN2). The output voltages are +40V, and +5V. To stabilize the output voltages, the switching frequency of the HIC (P1) in the primary circuitry is controlled by the signal feed back from the +40V output voltage detection circuitry through the photo-coupler (PC2).

The step of the operations:

- (1) Power switch is turned on.
- (2) The DC voltage V_{in} is converted through the rectifying circuitry(DB1, L2, C7, C8) and is supplied to the HIC(P1) through initial one-time flow resistor(R5). The P1 starts oscillating when the 4 pin of P1 reaches 16V.
- (3) Initiated by the oscillation of P1, the Power MOSFET (in P1) is turned ON, then the current starts flowing through C7(+) → TR1 (5→2)→ P1 (4→2) → R2 → C8(-).
- (4) The drain current at P1 increases in proportion to the ON time interval of P1 due to the transformer (TR1) inductance.
- (5) When P1 is ON and the current flows in the primary coil(5-2) of the transformer (TR1), the voltage is generated on the control coil(6-7) of the TR1. The voltage is rectified through D2 and C11 and is supplied to the Vcc of the P1 at approximately 20V to sustain the oscillation in P1. At that time, the voltages for 40V is also generated in the secondary coil(12,13-15,16) of the TR1.
- (6) The voltage in the secondary coil(12,13) is rectified through the diode D7 and smoothed by C16 and C17.
- (7) When the voltage exceeds +40V in the output and reaches over the rated value of the zener diode(ZD5) at the voltage level divided down by the ratio of R19 and R20, the transistor(Q1) is turned on. Simultaneously, the photo-coupler(PC2) is turned on. Consequently it increases the voltage on OCP/FB(1 pin) of P1 and the switching frequency of P1, and it decreases the output voltages. When the output voltages decrease below 40V the PC2 is turned off. It in turns, increases the output voltages.
- (8) By the repetition of the process at step 7 above, +40V output voltage is stabilized. Because the current flow in the PC2 responds linearly and inversely proportional to the load, the switching frequency of the P1 is controlled to stabilize at the +40V output.
- (9) +5V output voltage is also leveled to a constant value by the chopper operation in the regulator IC(P2) and smoothing circuit. +40V output voltage flows into P2 and generates a square waveform with a different duty ratio by the switching on and off operation(chopper operation). These squarewaves are flattened and smoothed out to be in 5V voltage level in the rectifying circuitry.
- (10) The main MCU will operate under 5V, and the printer and motor will be driver under 40V with the control of the MCU.