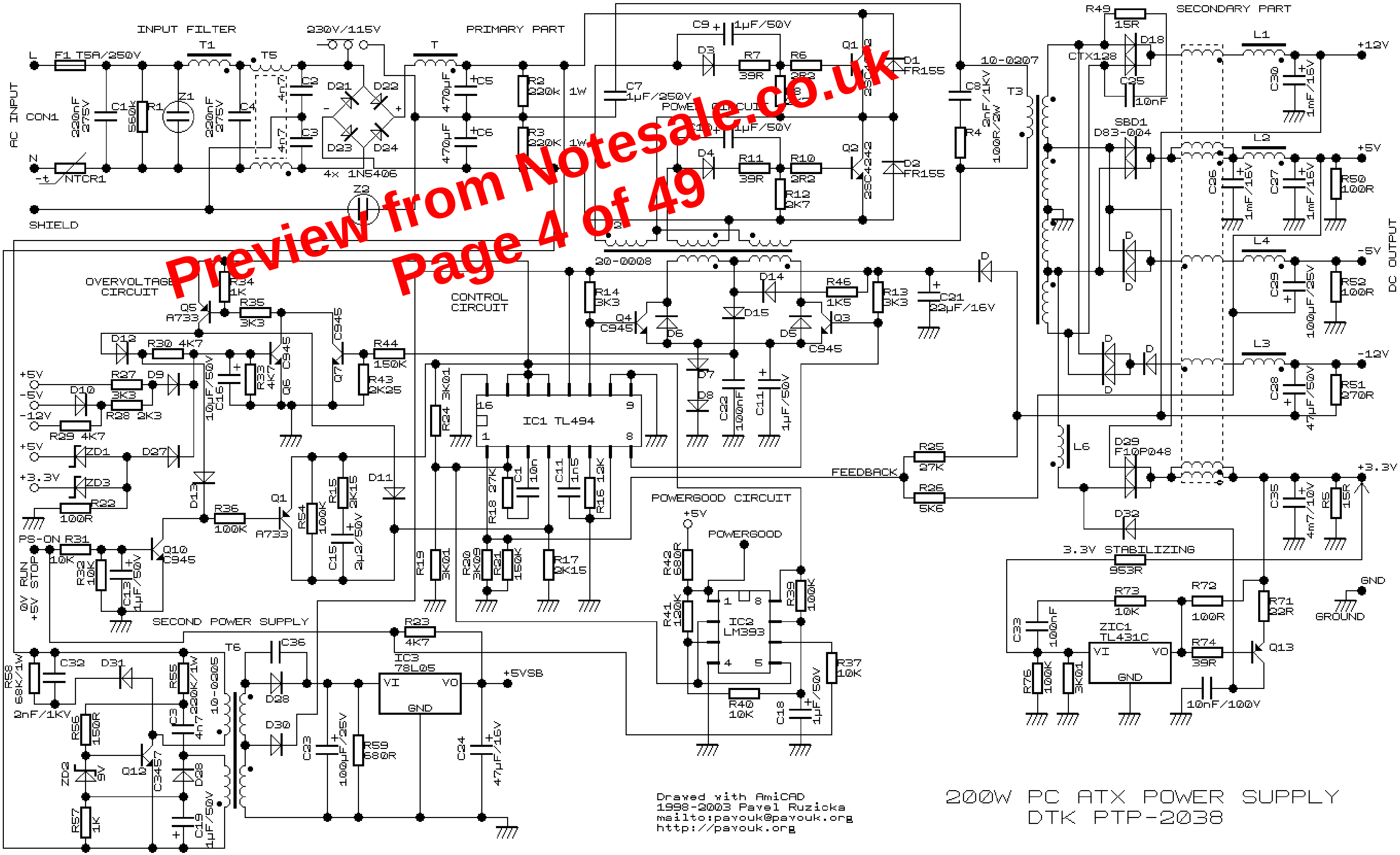
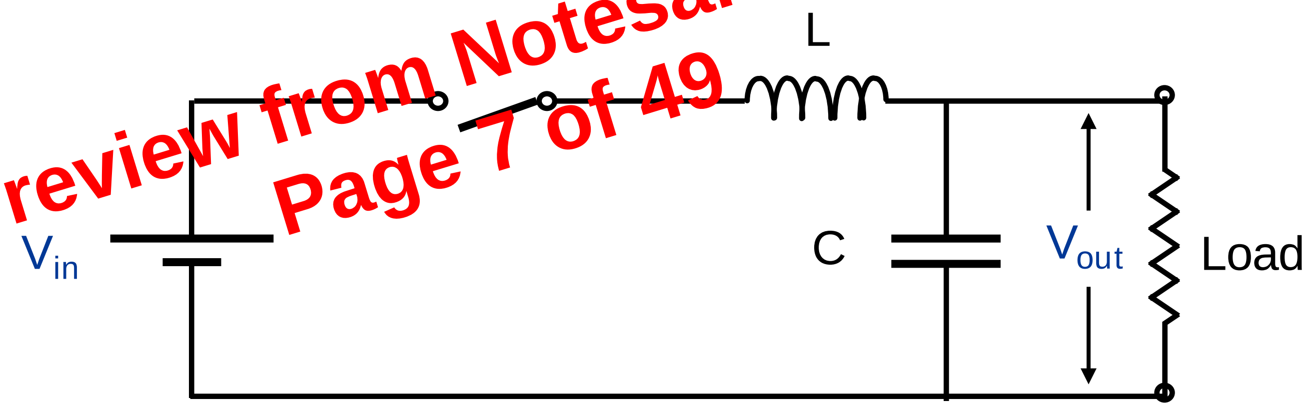

INPUT FILTER
230V/115V
PRIMARY PART
SECONDARY PART
AC INPUT
L
N
CON1
SHIELD
F1 T5A/250V
T1
T5
T
NTCR1
220nF 275V
C1
R1
560k
Z1
C4
C2
C3
4n7
D21
D22
D23
D24
4x 1N5406
Z2
470μF
C5
C6
R2 220k 1W
R3 220k 1W
C7 1μF/250V
POWER CIRCUIT
C9 1μF/50V
C10 1μF/50V
D3
D4
R7 39R
R6 2R2
R11 39R
R10 2R2
R12 2K7
Q1
Q2
2SC4242
D1 FR155
D2 FR155
C8
3nF/1kV
R4
100R/2W
T3
10-0207
20-0008
OVERVOLTAGE CIRCUIT
R34 1K
Q5 A733
R35 3K3
D12
R30 4K7
C16
10μF/50V
R33 4K7
Q6 C945
C945
Q7
R44 150K
R43 2K25
+5V
-5V
-12V
R27 3K3
D9
D10
R28 2K3
R29 4K7
ZD1
D27
+3.3V
ZD3
D13
R22 100R
R36 100K
Q1 A733
R54 100K
R15 2K15
C15 2μ2/50V
D11
PS-ON
R31 10K
Q10 C945
R32 10K
C13 1μF/50V
RUN STOP
0V +5V
SECOND POWER SUPPLY
CONTROL CIRCUIT
R14 3K3
Q4 C945
D6
D14
D15
D5
R46 1K5
Q3 C945
R13 3K3
D
C21 22μF/16V
D7
D8
C22 100nF
C11 1μF/50V
R24 3K01
IC1 TL494
16
9
1
8
R18 27K
C1 10n
C11 1n5
R16 12K
R19 3K01
R20 3K09
R21 150K
R17 2K15
FEEDBACK
R25 27K
R26 5K6
POWERGOOD CIRCUIT
+5V
POWERGOOD
R42 680R
R41 120K
IC2 LM393
R39 100K
R37 10K
R40 10K
C18 1μF/50V
R58 68K/1W
C32 2nF/1KV
D31
R55 220K/1W
R56 150R
C3 4n7
T6
10-0205
C36
D28
D30
R23 4K7
IC3 78L05
VI VO
GND
+5VSB
ZD2 9V
Q12
C3457
D38
R57 1K
C19 1μF/50V
C23 100μF/25V
R59 680R
C24 47μF/16V
R49 15R
CTX128
D18
C25 10nF
SBD1 D83-004
L1
C30 1mF/16V
+12V
L2
C26 1mF/16V
C27 1mF/16V
R50 100R
+5V
L4
C29 100μF/25V
R52 100R
-5V
DC OUTPUT
L3
C28 47μF/50V
R51 270R
-12V
L6
D29 F10P048
C35 4m7/10V
R5 15R
+3.3V
D32
3.3V STABILIZING
953R
R73 10K
R72 100R
R71 22R
C33 100nF
ZIC1 TL431C
R74 39R
Q13
R76 100K
3K01
10nF/100V
GND
GROUND
Drawed with AmiCAD
1998-2003 Pavel Ruzicka
mailto:pavouk@pavouk.org
http://pavouk.org
200W PC ATX POWER SUPPLY
DTK PTP-2038



Try adding an L to prevent the huge current spike. But now, if the L has current when the switch attempts to open, the inductor's current momentum and resulting Ldi/dt burns out the switch.

Calculation for Inductor

The inductance value is not critical, but there are several factors that influence its choice:

- *I_{max} depends on ΔI, so to minimise the switch and diode current ratings L should be large.*
- *The losses in the practical switch and diode increase somewhat as I_{max} increases, so L should be large.*
- *The cutoff frequency of the output 'LC' filter is $\omega = 1/\sqrt{(LC)}$. For a given filtering effect there is a trade-off between L and C.*
- *To minimise the ripple current rating of C, L should be large.*
- *To ensure continuous mode of operation, L should be large.*
- *From size, weight and cost considerations we would like L to be as small as possible.*

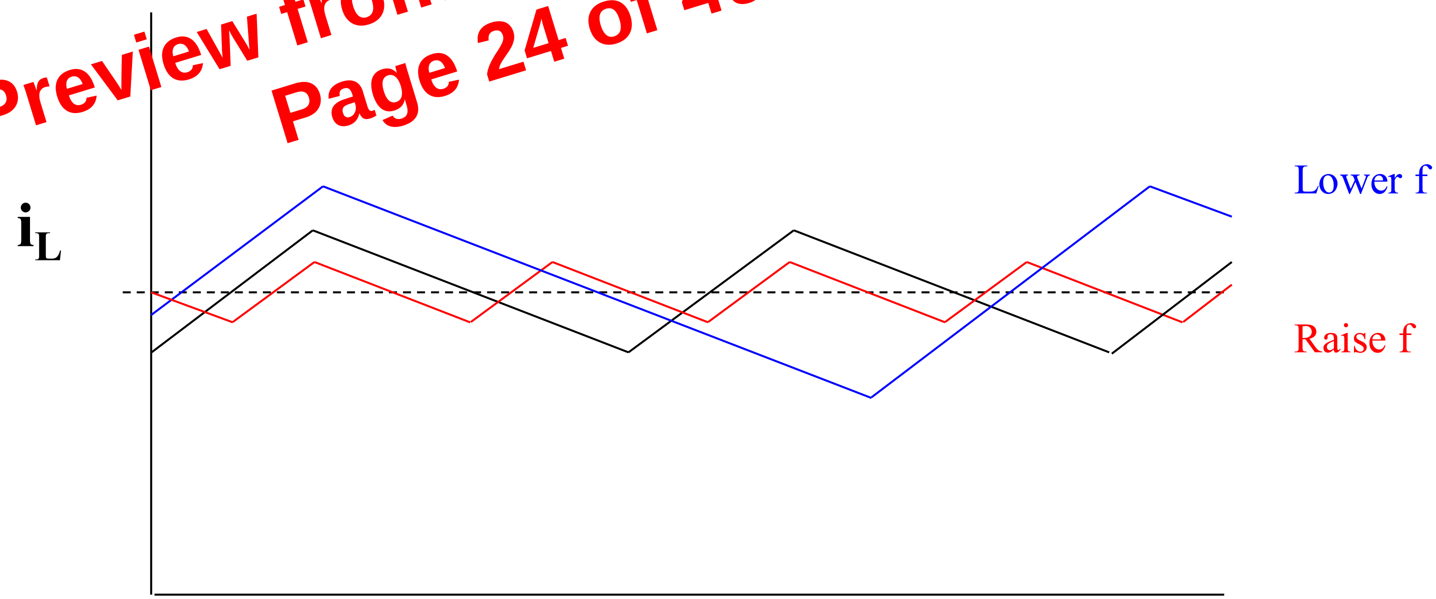
When it operates in the continuous conduction mode, there is always a current in the inductor. The minimum current in the continuous conduction mode can be zero. Consequently, there is a minimum value of the inductor that ensures its continuous conduction mode.

$$(V_{out} / R) - (V_{out} / 2L_{min}) (1 - D)T = 0$$

Hence:

$$L_{min} = (1-D)(RT)/2 = (1-D)R / (2f)$$

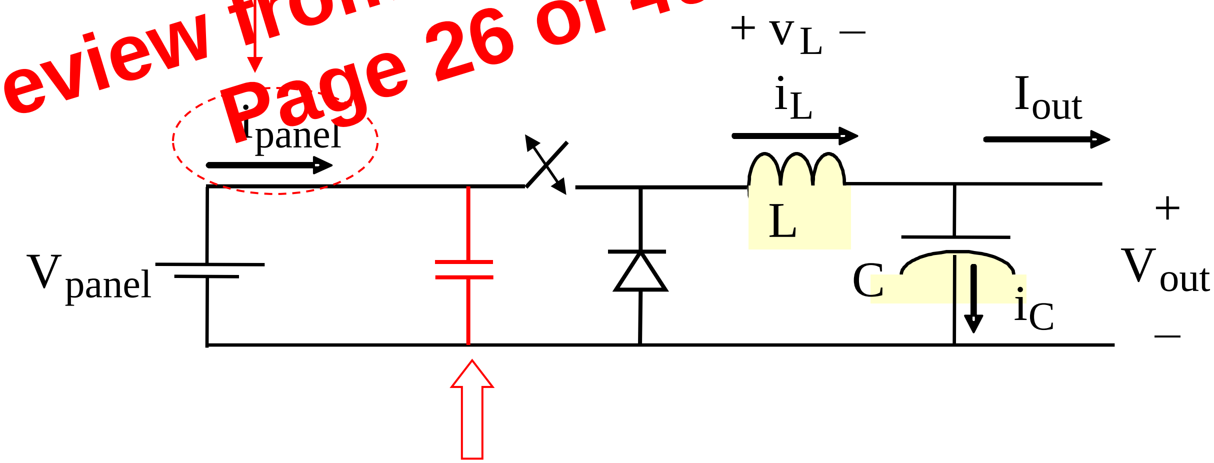
Effect of raising and lowering f while holding V_{in}, V_{out}, I_{out}, and L constant



- Slopes of i_L are unchanged
- Lowering f increases ΔI and moves the circuit toward discontinuous operation

Buck converter for solar applications

The panel needs a ripple-free current to stay on the max power point. Wiring inductance reacts to the current switching with large voltage spikes.



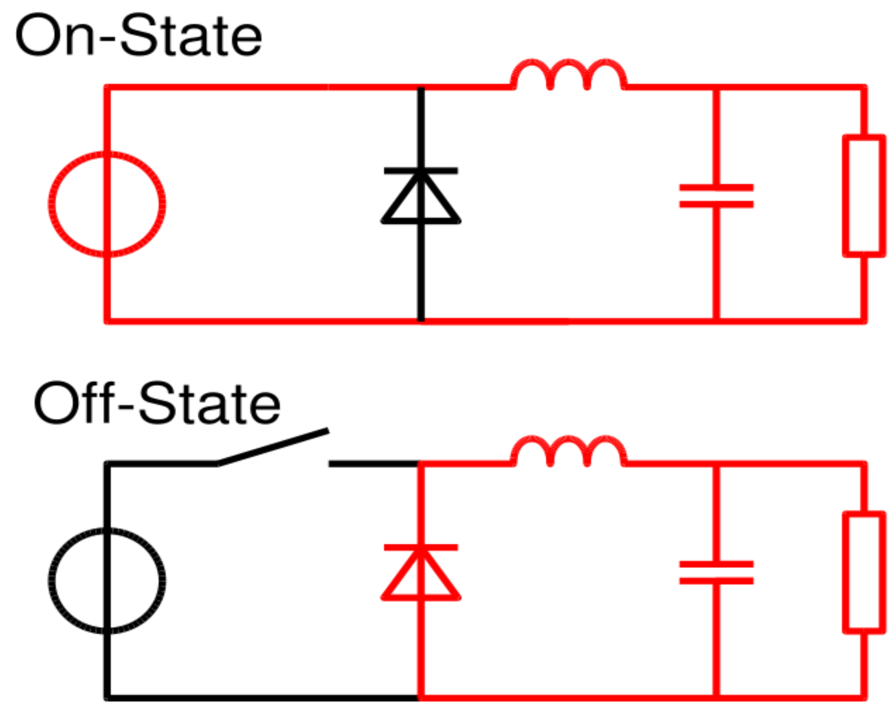
Put a capacitor here to provide the ripple current required by the opening and closing of the MOSFET

In that way, the panel current can be ripple free and the voltage spikes can be controlled

Buck vs. Boost Converters

- A step down DC – DC converter
- Duty cycle dependence
- Up to 95% efficiency when used in integrated circuits
- On State: Storing Power in the inductor
- Off State: Discharging power from the inductor into the load

$$V_{out} = D\,V_{in}$$



The Buck / Boost Converter