John Hornby Skewes
Service

ZED series SMPS repair

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ZED PSU repair procedure.

When the power supply is removed; firstly, check that C6 and 7 are fully discharged.

Unfortunately; when switchmode power supplies fail they tend to destroy quite a few components.

For repairing switchmode psu`s, it is recommended you have a 1:1 isolation transformer around 750VA and a variac so that you can wind the voltage up after repair. This should help in case you have missed a failed component and may prevent the PSU failing again as you get nearer to normal mains voltage e.g. 240V, 220V, 120V or 100V.

You will definitely need an accurate multimeter and an oscilloscope. With your multimeter set to diode measurement and with +15 -15 and +48V disconnected;

1. check all the diodes in the primary and then the secondary rectification diodes. None should read s/c.

2. remove U1. With your multimeter set to measure resistance, measure across pin 5 and pin 7 on the legs of the IC. If they are s/c then the IC has failed.

3. measure Q1 MOSFET (STP5NB100FB); any s/c reading means the MOSFET has failed. If the MOSFET has failed then R11/12 (0.5R 1W) resistor will more than likely have failed. Also check R7.

4. replace any resistor that looks damaged (i.e. burnt).

It is rare for the bridge rectifier BR1 and NTC or any EMI filter components to fail (but they can), often the mains fuse will rupture F1.

When powering the PSU up after repair, connect it via the variac, powered from the isolation transformer.

Set the variac to 120V.

Connect the PSU to a load i.e. console.

With your oscilloscope, place the probe next to the heatsink of MOSFET Q1. Neither the probe or ground clip need to be clipped onto a component or PCB. There is such a strong field from the switching MOSFET that just placing the oscilloscope probe next to the heatsink and setting the scope to read something like 5V/div you will see a signal. This will give you a good indication as to whether the PSU is operating correctly. Power up the PSU and look at the oscilloscope waveshape. Refer to figures 1 & 2 to give you an indication of good waveshapes at 120V & 240V.

Measure the DC output voltages.

They should be +48V ± 0.5V.

+15V ± 0.5V

-15V ± 0.5V

After the unit has been on for 2 minutes switch off the PSU and check that none of the components are getting too hot to touch. If they are something is still faulty - watch your fingers on C6 and 7.

If everything is okay; power up the PSU again check the DC voltages and begin increasing the variac voltage. As the ac input voltage increases listen for any odd noises and look at the waveshape change on the oscilloscope screen.

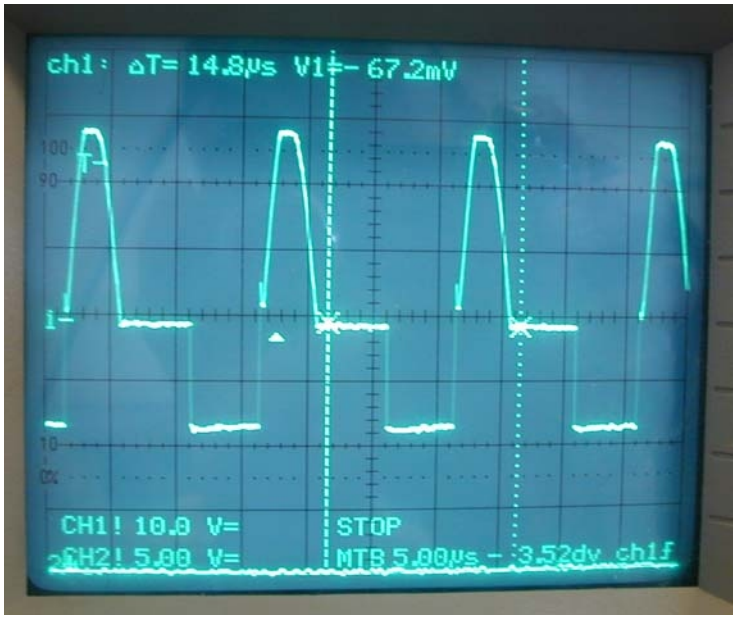


Fig 1: Q2 MOSFET waveshape at 120V mains input voltage

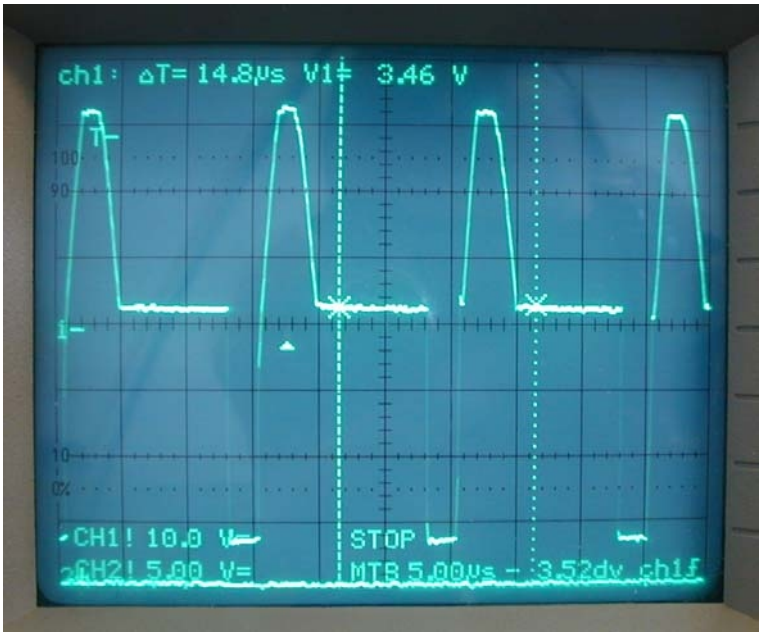
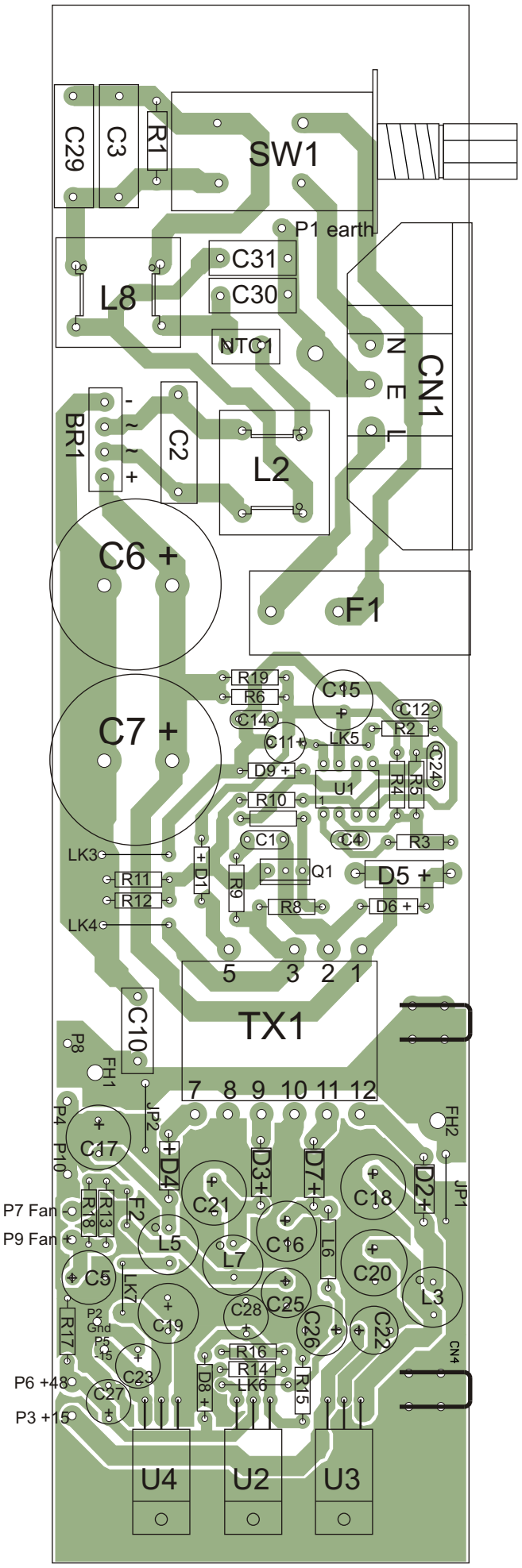
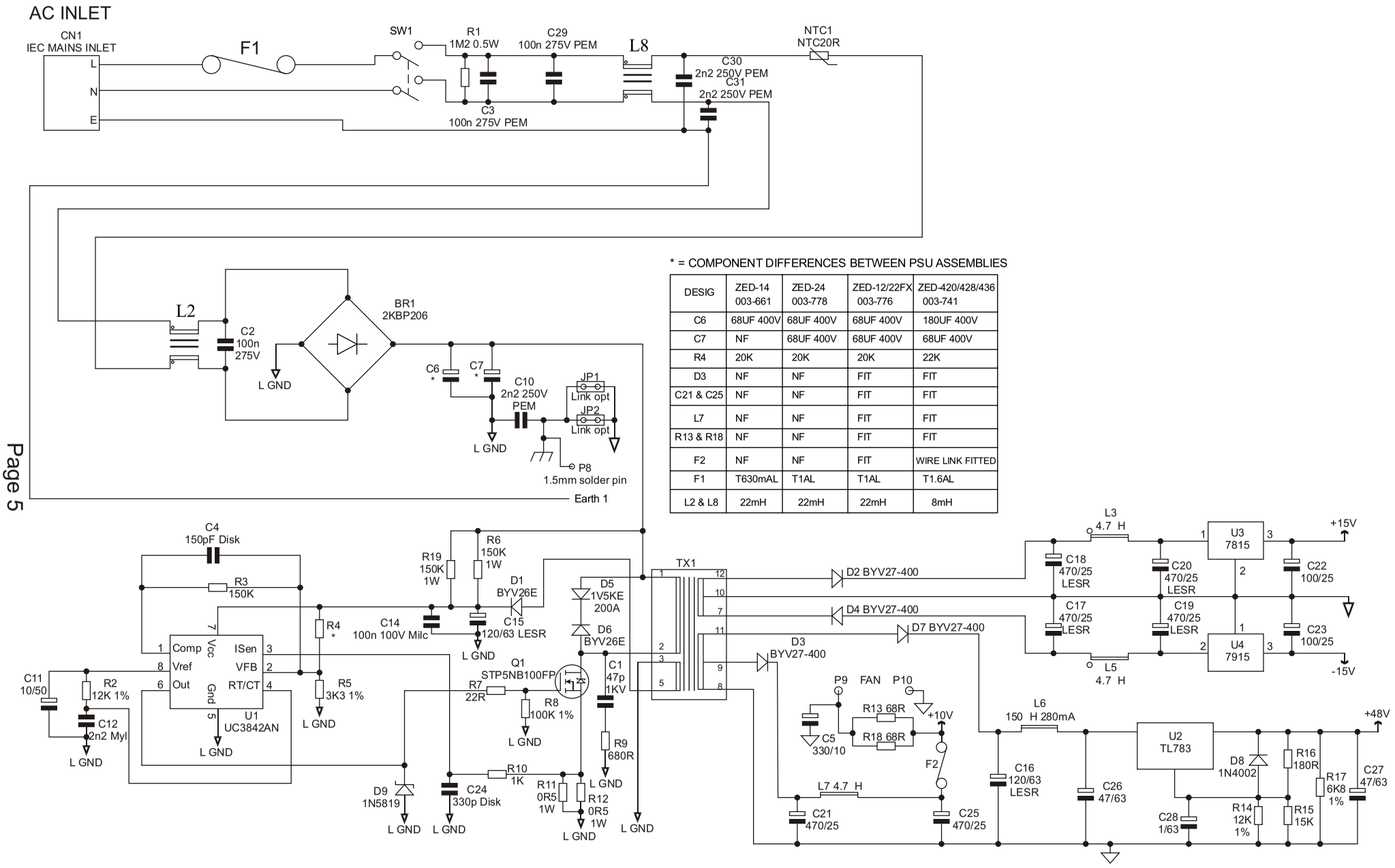


Fig 2: Q2 MOSFET waveshape at 240V mains input voltage

When you get to 240V; again switch off and check for any components getting too hot to touch.

Finally, power up the PSU on raw mains, and everything should be okay.


C29
C3
R1
SW1
P1 earth
C31
C30
L8
NTC1
N
E
L
CN1
BR1
C2
L2
C6 +
F1
C7 +
R19
R6
C14
C15
C12
R2
C11
LK5
C24
D9 +
U1
R4
R5
R10
C1
C4
R3
LK3
D11
Q1
D5 +
R11
R9
R12
R8
D6 +
LK4
5 3 2 1
TX1
C10
P8
FH1
7 8 9 10 11 12
JP2
FH2
P4
P10
C17
D4+
D3+
D7+
D2+
JP1
P7 Fan
P9 Fan
R18
R13
F2
C21
C18
L5
C16
L6
L7
C20
C5
LK7
C28
C25
C26
C22
L3
P2
Gnd
P5
+15
R17
C19
CN4
R16
R14
C23
LK6
R15
P6 +48
C27
D8 +
P3 +15
U4
U2
U3



* = COMPONENT DIFFERENCES BETWEEN PSU ASSEMBLIES

DESIG	ZED-14 003-661	ZED-24 003-778	ZED-12/22FX 003-776	ZED-420/428/436 003-741
C6	68UF 400V	68UF 400V	68UF 400V	180UF 400V
C7	NF	68UF 400V	68UF 400V	68UF 400V
R4	20K	20K	20K	22K
D3	NF	NF	FIT	FIT
C21 & C25	NF	NF	FIT	FIT
L7	NF	NF	FIT	FIT
R13 & R18	NF	NF	FIT	FIT
F2	NF	NF	FIT	WIRE LINK FITTED
F1	T630mAL	T1AL	T1AL	T1.6AL
L2 & L8	22mH	22mH	22mH	8mH

A FAN IS USED TO COOL THE REGULATOR HEATSINK ON THE ZED-428 AND 436 MODELS
A GOSS SHIELD IS FITTED AROUND L8 FOR MAGNETIC SHIELDING

BR1 2KBP206	AE3477
C1 47PF 1KV/MLC	AF3075
C2 100N 275V	
C3 100N 275V/PEM	AF3073
C4 150P/DISK	
C5 330/10	
C6 68uF 400V	AF5616
C6 180uF 400V	
C7	
C10 2N2 250V/PEM	
C11 10/50	
C12 2N2/MYL	
C14 100N 100V/MLC	
C15 120/63 LESR	AF3464
C16 120/63 LESR	
C17 470/25 LESR	
C18 470/25 LESR	AF3462
C19 470/25 LESR	
C20 470/25 LESR	
C21 470/25	
C22 100/25	
C23 100/25	
C24 330P/DISK	
C25 470/25	
C26 47/63	
C27 47/63	
C28 1/63	
C29 100N 275V/PEM	
C30 2N2 250V/PEM	AF3548
C31 2N2 250V/PEM	
CN1 IEC MAINS INLET	AL3179
D1 BYV26E	AE3470
D2 BYV27-400	AE3469
D3 BYV27-400	AE3469
D4 BYV27-400	AE3469
D5 1V5KE200A	AE5960
D6 BYV26E	AE3470
D7 BYV27-4000	AE3469
D8 1N4002	
D9 1N5819	AE3914
F1 FUSE HOLDER	AL3178
F2 1.3A 60V 1.3A 60V	
PTC RESETTABLE SCHURTER	AL5598
FAN	
HS1 HEATSINK W3-PSU	AA5675
HEATSINK ZED4-PSU	AA6987
HC1 HEATSINK CLIP DL1	AB3445
L2 CHOKE 8MH	AM3560
L3 4.7uH	AM3567
L5 4.7uH	AM3567
L6 CHOKE 150UH 280MA	AM2970
L7 CHOKE 4.7UH	AM3567
L8 CHOKE 8MH	AM3560
L8 22mH Choke	AM3466
NTC1 INRUSH SUPP NTC20R SIEMENS B57236S200M	AE3478
Q1 STP5NB100FP	AE5994
R1 1M2 1/2W	
R2 12K 1%	
R3 150K	
R4	
R5 3K3 1%	
R6 150K 1W*	
R7 22R	
R8 100K 1%	
R9 680R	
R10 1K0	
R11 0R5 1W	AC5757
R12 0R5 1W	AC5757
R13 68R	
R14 12K 1%	
R15 15K	
R16 180R	
R17 6K8 1%	
R18 68R	
R19 150K 1W	
SW1	AL3338
TX1 XFRMR E/30/15/7A (UNI)	AM5547
U1 UC3842AN	AE3473
U2 TL783	AE0214
U3 7815	AE0047
U4 7915	AE0048