ZT-3203

REGULATED DC POWER SUPPLY
0 - 32VDC, 0 - 3A DUAL
&
5VDC/3A

INSTRUCTION MANUAL

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SECTION - 1
GENERAL INFORMATION

1.0 DESCRIPTION :

1.1 The ZT3203 Power Supply is a high perfomance triple output DC power supply particularly suitable for industrial, laboratory use, experimental set-up and circuit development applications. Performance with economy have successfully been combined to provide a compact, fully solid state instrument.

1.2 The two main outputs are continuously variable from 0 to 32V and each can supply 3A max. The variable output sections can be operated in constant voltage or constant current modes. The front panel VOLTAGE and CURRENT control can be used to set the output Voltage and Current respectively. The unit will automatically cross over from constant voltage(CV) to constant current(CC) mode and vice-versa. The operating mode is indicated by a seperate CV or CC indicator(LED). Separate 3 digit front panel meters are provided for each variable section to monitor output voltage or load current through Meter selection(V/A) switch. In addition, a separate 5V output is provided with a maximum current of 3A & overload indication(OL).

1.3 The load terminals are provided on the front panel. All the outputs are floating i.e. neither the output positive terminal nor the negative terminal (nor any point within the circuitry) is connected to ground.

1.4 The power supply is designed to operate in ambient temperature of upto 40°C and full output may be drawn continuously provided free air circulation is allowed. The unit works from mains supply of 115VAC or 230VAC, 47-63 Hz. (With internal tap selector).

SECTION - 2
SPECIFICATIONS

Detailed specifications of the ZT3203 power supply are as given below :

Dual 0 to 32 V Section(Two Identical Sections)

Output Voltage	:0-32V DC continuously variable by VOLTAGE control.
Output Current	:0-3 Amp max, continuously variable by CURRENT control.

Constant Voltage Mode Operation(CV):

Line Regulation	:± 0.01% + 2mV for ±10% line change.
Load Regulation	:± 0.01% + 2mV for load change from zero to full load
Ripple & Noise	:1mV rms max.

Constant Current Mode Operation(CC):

Line Regulation	:± 0.1% +250µA for ±10% line change.
Load Regulation	:± 0.1% +250µA for change in output voltage from 0 to maximum.
Ripple & Noise	:1mA rms max.

Metering:

METER V/A	:Two separate 3 digit DPMs are provided to monitor Voltage or Current of each Variable Section through Meter Selection(V/A) Switch.
Meter Accuracy	:±3 Counts

Overload Protection	:	Automatic overload and short circuit protection.
5V Section :		
Output Voltage	:	5V DC.
Output Current	:	3A max with overload indication.
Line Regulation	:	Less than 10mV.
Load Regulation	:	Less than 10mV.
Ripple & Noise	:	2 mV rms max.
General :		
Operating Temperature	:	0 to 40°C.
Input Voltage	:	115VAC or 230 VAC, 47 to 63 Hz. (with internal tap selection)
Dimensions (W x D x H)	:	230mm x 285mm x 133mm
Weight	:	13Kg. (Approx)

SECTION - 3
INSTALLATION

3.1 INITIAL INSPECTION :

As soon as the power supply unit is unpacked, inspect for any damage that may have occured during transit. Save all packing material until inspection is completed. If any damage is found, notify the carriers immediately. Our authorised representative should also be notified.

3.2 PHYSICAL CHECK :

This check should confirm that there are no broken knobs or connectors, that the cabinet and panel surfaces are free of dents and scratches and the meters are not scratched and cracked.

3.3 ELECTRICAL CHECK :

The power supply unit should be checked against electrical specifications. An in-cabinet performance check will verify proper operation.

3.4 INSTALLATION DATA :

The power supply unit is shipped ready for bench operation. It is necessary only to connect the unit to a rated source of power and it is ready for operation.

3.5 LOCATION :

The power supply unit is naturally cooled. Sufficient space should be kept around the unit while in operation, so that heat sinks do not remain in confined space or close to another heating source. The ambient temperature of the area around the unit should be less than 40°C.

3.6 INPUT POWER REQUIREMENTS :

The power supply unit may be operated continuously from input voltage of 115VAC or 230VAC, 47-63Hz power source with an internal tap selector. The instrument, as shipped from factory is wired for 230VAC operation.

3.7 REPACKAGING FOR SHIPMENT :

To ensure safe shipment of the power supply unit, it is recommended that the package designed for the unit be used. The original packaging material is reusable. Be sure to attach a tag to the unit specifying the owner, and the fault observed with a brief description.

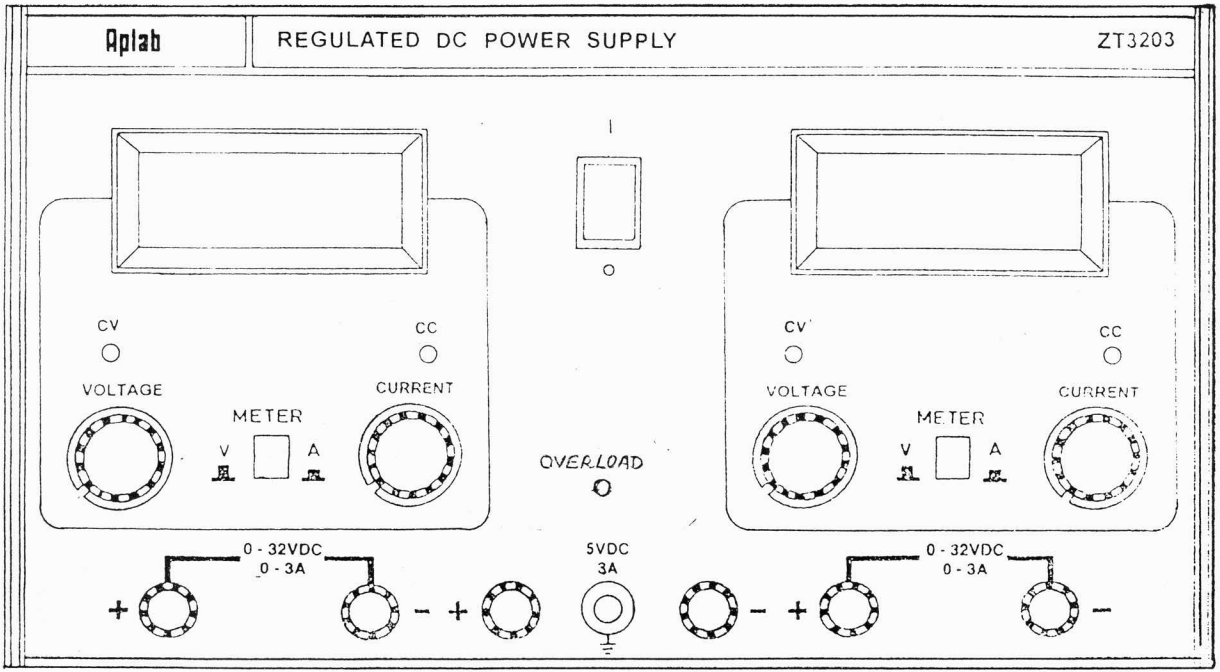
3.8 REMOVING COVER :

The top cover is retained in place by 6 self tapping screws & two handle mounting screws.To remove cover, proceed as follows:

a) Remove the handle mounting screws.

b) Remove the self tapping screws on sides.

c) Lift the cover from rear side, slide backwards & pull.



ZT3203: FRONT PANEL LAYOUT

SECTION - 4
OPERATING INSTRUCTIONS

4.1 VARIABLE OUTPUT SECTIONS :

4.1.1 CONSTANT VOLTAGE MODE :

a) Ensure that the AC power switch is in the OFF position.
b) Connect the unit to a rated power source.
c) Turn the VOLTAGE and CURRENT controls fully counter-clockwise. Keep the Meter selection switch in 'V' position(released).
d) Connect the digital voltmeter (DVM) to the output terminals, observing correct polarity. The DVM must be rated for better than 0.5% accuracy.
e) Turn the power switch ON.
The front panel DPMs will light up and displays will read zero.
f) Turn the current control a 1/2 turn clockwise. Slowly turn the Voltage control clockwise and observe both the front panel voltmeters and DVM.
g) Compare the DVM reading with the front panel voltmeter reading. The minimum control range will be from 0 to 32V. The green Constant Voltage mode LED will be illuminated to indicate CV mode of operation.

4.1.2 CONSTANT CURRENT MODE :

a) Ensure that the AC power switch is in the OFF position.
b) Connect the unit to a rated power source.
c) Turn the VOLTAGE and CURRENT controls fully counter-clockwise. Keep the Meter selection switch in 'A' position(pressed).
d) Connect a DC ammeter or a shunt-digital voltmeter (DVM) combination across the output terminals using appropriately gauged wire and hardware. The recommended current ratings for the ammeter or the shunt and the wire must be atleast 3A.The ammeter or shunt-DVM combination must be rated for better than 0.5% accuracy.

e) Turn the power switch ON. The front panel DPMs will light up and displays will read zero.
f) Turn the voltage control knob clockwise.
g)Turn the current control slowly clockwise.
h) Compare the ammeter reading with the front panel ammeter reading. Calculate the output current I using the formula I=V/R where V is the DVM reading and R is the resistance of the external shunt.

The control range will be from 0 to 2A.The red current mode LED will be illuminated to indicate CC mode of operation.

4.2 5V SECTION :

4.2.1 VOLTAGE CHECK :

a) Ensure that the AC power switch is in the OFF position.
b) Connect the unit to a rated power source.
c) Connect a voltmeter across the 5V output terminals, observing correct polarity.
d) Turn the AC power switch ON.
e) Check the voltage reading.

4.2.2 CURRENT CHECK :

a) Ensure that the AC power switch is in the OFF position.
b) Connect the unit to a rated power source.
c) Connect an ammeter and a variable load to the 5V output terminals,observing correct polarity.
d) Turn the AC power switch ON.
e)Vary the load and check that the current can be varied in the rage of 0-3A.
f) Check that, in case of overload or short-circuit, the overload LED(OL) lights up and the output voltage reduces.

4.3 LOAD CONNECTIONS :

The load should be connected to the power supply output terminals using separate pairs of connecting wires.This will minimize mutual coupling effects between loads and will retain full advantage of the low output impedance of the power supply.Each pair of connecting wires should

be as short as possible and twisted or shielded to reduce noise pick up. (If a shielded pair is used, connect one end of the shield to ground at power supply and leave the other end unconnected).

4.4 POLARITY :

Positive or negative voltage can be obtained from this supply by grounding either one of the output terminals or one end of the load. Always use two leads to connect load to the supply, regardless of whether the setup is grounded. This will eliminate any possibility of the output current return paths through the power source ground which would damage the line cord plug. This supply can also be operated upto ±300V DC above ground, if neither output terminal is grounded.

4.6 REVERSE VOLTAGE LOADING :

A diode is connected across the output terminals. Under normal operation, the diode is reverse biased(anode connected to the negative terminal). If a reverse voltage is applied to the output terminals(positive voltage applied to the negative terminal), the diode will conduct, shunting current across the output terminals to the forward voltage drop of the diode. This diode protects the series transistor and the output electrolytic capacitors.

4.7 REVERSE CURRENT LOADING :

Active loads connected to the power supply may actually deliver a reverse current to the power supply during a portion of its operating cycle.

An external source cannot be allowed to pump current into the supply without loss of regulation and possible damage to the output capacitor. To avoid these effects, it is necessary to preload the supply with a dummy load resistor so that the power supply delivers current through the entire operation cycle of the load device.

SECTION - 5
PART LIST & SCHEMATICS

PCB Components	2 X ZSDT-CT/05 PCB
Ref Designator	**Value**
RESISTORS	
R1	270E, 2W, 5%, MOR
R2	47E, MFR, 1/4W, 5%
R3	10K, MFR, 1/4W
R4*	1K, MFR, 1/4W, 5%
R5	10E, MFR, 1/4W, 5%
R6	3.9K, MFR, 1/4W
R7	3.3K, 2W, 5%, MOR
R8	10K, MFR, 1/4W
R9	8.2K, MFR, 1/4W
R10	100K, MFR, 1/4W
R11	4.7E, MFR, 1/4W.
R12	1.5K, MFR, 1/4W.
R13	180K, MFR, 1/4W.
R14	390E, MFR, 1/4W.
R15	6.8K, MFR, 1/4W, 5%
R16	12K, MFR, 1/4W, 5%
R17	3.9K, MFR, 1/4W, 5%
R18	10K, MFR, 1/4W
R19	10K, MFR, 1/4W
R20	10K, MFR, 1/4W
R21	3.3K, 2W, 5%, MOR
R22	270E, 2W, 5%, MOR
R23#	82K, MFR, 1/4W, 5%
R24	4.7K, MFR, 1/4W, 5%
R25	24E, MFR, 1/4W, 5%
R26	820E, MFR, 1/4W, 5%
R27#	330K, MFR, 1/4W, 5%
R28#	39K, MFR, 1/4W, 5%
R29#	180K, MFR, 1/4W, 5%
R30	1K, MFR, 1/4W, 5%
R31	15E, MFR, 1/4W, 5%
R32	6.8K, MFR, 1/4W, 5%
R33	15K, MFR, 1/4W, 5%
R34	6.8K, MFR, 1/4W, 5%
R35	15K, MFR, 1/4W, 5%
R36	1K, MFR, 1/4W, 5%

Ref Designator	Value
R37	2K, MFR, 1/4W, 5%
R38	1K, MFR, 1/4W, 5%
R39	1K, MFR, 1/4W, 5%
R40	4.7K, MFR, 1/4W, 5%
R41	330K, MFR, 1/4W, 5%
R42	100E, MFR, 1/4W, 5% (I CAL)
R43*	3.9K, MFR, 1/4W, 5% (I CAL)
R44	1K, MFR, 1/4W, 5%
R45	1K, MFR, 1/4W, 5%
R46*	10K, MFR, 1/4W, 5% (V CAL)
R47*	100E, MFR, 1/4W, 5% (V CAL)
R48	2K, MFR, 1/4W, 5%
R49	Shorting Link
R50	Shorting Link
R51	10E, MFR, 1/4W, 5%
R59	10E, MOR, 2W
PRESETS	
PR101	5K, PRE, LIN, (V)(DEV. DROP)
PR102	500E, PRE, LIN, (V)(V CAL)
PR103	500E, PRE, LIN, (V)(I CAL)
CAPACITORS	
C1	0.1µF/100V, MP
C2	0.1µF/250VAC MKP
C3	10,000µF/50V ELE
C4	0.1µF/50V, MP 10%
C5	33µF/50V, ELE
C6	100µF/50V, ELE
C7	100µF/50V, ELE
C8	1µF/50V, ELE
C9	4.7µF/50V, ELE
C10	10µF/50V, ELE
C11	100µF/50V, ELE
C12	47µF/50V, ELE
C13	1kpF/50V, CD
C14	1kpF/50V,.CD
C15	0.1µF/50V, CD
C16	10µF/50V, ELE
C17	10µF/50V, ELE
C18	0.1µF/50V, CD
C19	220µF/50V, ELE

Ref Designator	Value
C20	220µF/50V, ELE
C21	47µF/50V, ELE
C22	10µF/50V, ELE
C23	0.1µF/50V, CD
C24	10µF/50V, ELE
C25	10µF/50V, ELE
C26	0.1µF/50V, CD
C27	470µF/50V, ELE
C29	1000µF/35V,ELE
DIODES	
CR1	Not Used
CR2	1N4007, 1KV/1A
CR3	1N4007, 1KV/1A
CR4	1N4007, 1KV/1A
CR5	1N4007, 1KV/1A
CR6	1N4007, 1KV/1A
CR7	1N4007, 1KV/1A
CR8	1N4007, 1KV/1A
CR9	1N4007, 1KV/1A
C10	1N4007, 1KV/1A
CR11	1N4007, 1KV/1A
CR12	1N4007,1KV/1A.
CR13	1N4007,1KV/1A.
CR14	1N4007,1KV/1A
CR15	1N4007,1KV/1A
CR16	1N4007, 1KV/1A
CR17	1N4007, 1KV/1A
CR18	1N4007, 1KV/1A
CR19	1N4007, 1KV/1A
CR20	1N4007, 1KV/1A
CR21	1N4007, 1KV/1A
CR22	1N4007, 1KV/1A
CR23	1N4007, 1KV/1A
CR24	1N4007, 1KV/1A
CR25	1N4148, 100V/10mA
CR26	1N4148, 100V/10mA
CR27	1N4148, 100V/10mA
CR28	1N4148, 100V/10mA
CR29	1N4007, 1KV/1A
CR30	1N4007, 1KV/1A

PCB Components	2 X ZSDT-CT/05 PCB
Ref Designator	**Value**
ZENERS	
Z1	1N758, 10V, 0.4W
Z2	1N758, 10V, 0.4W
Z3	1N750, 4.7V, 0.4W
BRIDGE	
BR1	10A/600V PC MTG BRIDGE
BR2	CSB-1, 100V/1A BRIDGE.
ICs	
IC1	4N25 OPTO
IC2	7812
IC3	TL431
IC4	LM324
IC5	7812
IC6	TL431
IC7	79L05
IC8	7805
TRANSISTORS/FET/SCR	
Q1	BC109
Q2	MPSA12
Q3	BC557
Q4	BC557
Q5	BC547
FET1	IRFP150
SCR1	2N6396
FET2	IRFP150
CONNECTORS	
CON2	2.54mm PITCH, 12PIN M
CON3	2.54mm PITCH, 12PIN M L TYPE
CON4	2.54mm PITCH, 8PIN M
MISCELLANEOUS	
TP1	RIM PIN MALE
TP2	RIM PIN MALE
TP3	RIM PIN MALE
TP4	RIM PIN MALE
TP5	RIM PIN MALE
TP6	RIM PIN MALE
SPADE CON	12H750

PCB Components	2 X Z-DPM/01 PCB
Ref Designator	**Value**
RESISTORS	
R1	39K,0.25,5%,MFR
R2	470K,0.25W,5%,MFR
R3	1M,0.25W,5%,MFR
R4*	SEL(INPUT)
R5	10K,0.25W,5%,MFR
R6	2K4,0.25W,5%,MFR
R7	330E,0.25W,5%,MFR
R8	330E,0.25W,5%,MFR
R9	6K8, 0.25W,5%,MFR
RESETS	
PR1	2.5K,LIN,VER(REF ADJ)
CAPACITORS	
C1	220pF,50V,CD
C2	0.1µF,100V,MP
C3	0.01µF,50V,CD
C4	0.47µF,100V,MP
C5	0.1µF,100V,MP
C6	0.1µF,100V,MP
C7	10µF,50V,EL
C8	0.1µF,50V,CD
C9	10µF,50V,EL
C10	0.1µF,50V,CD
IC's	
IC1	7107 DECODER DRIVER
VR1	TLO-431
FND's	
DS1	TSD566 GREEN
DS2	TSD566 GREEN
DS3	TSD566 GREEN
LED's	
LED1*	2 X 3MM GREEN(V), FOR 'CV' MODE
LED2*	2 X 3MM GREEN(A), FOR 'CC' MODE

PCB Components	2 X Z-DPM/01 PCB
Ref Designator	**Value**
MISCILLANEOUS	
J1	2.54PITCH,5PIN M
J2	2.54PITCH,3PIN M
J3	2.54PITCH,4PIN M

PCB Components	2 X Z-TR/01 PCB
Ref Designator	**Value**
RESISTORS	
R1	1K,2W,5%,MOR
R2	0.1E,2.5W,5%,WW
R129*	33K,0.25W,5%,MFR
CAPACITORS	
C1	0.1µF,50V,CD
C2	100µF,50V,EL
C3	10µF,50V,EL
DIODE	
CR1	1N5402

PCB Components	ZT-5V5AVP/06.PCB
Ref Designator	**Value**
RESISTORS	
R1	150E,0.25W,5%,MFR
R2	1K2,0.25W,5%,MFR
R3	SEL
R4	1K2,0.25W,5%,MFR
R5	1K,2W,5%,WW
PRESET	
PR1	500E,LIN,VER(I-LIM ADJ)
CAPACITOR	
C1	3K3pF,50V,CD
C2	1KpF,50V,CD
C3	0.1µF,50V,CD

PCB Components	ZT-5V5AVP/01 PCB
Ref Designator	**Value**
C4	10µF,50V,EL
C5	10000µF,50V,EL
C6	470 µF, 16 VEL
TRANSISTORS	
Q1	2N6122
IC's	
IC1	LM723
BRIDGE	
BR1	6A/600VDC PC MTG BRIDGE

PCB Components	1210-CHG(A)/01 PCB
Ref Designator	**Value**
RESISTORS	
R1	1E,4W,5%,WW
R2	1E,4W,5%,WW
TRANSISTORS	
Q1	TIP122 / TIP41C
Q2	TIP122 / TIP41C

PCB Components	TER-MGLAB/01 PCB
Ref Designator	**Value**
RESISTOR	
R1	0.1E,2.5W,5%,WW
R2	2K,0.25W,5%,MFR
R3	2K,0.25W,5%,MFR
R4	5K1,0.25W,5%,MFR
CAPACITORS	
C1	470µF,50V,EL
C2	0.1µF,50V,CD
DIODES	
CR1	1N5402

PCB Components **TER-MGLAB/01 PCB**

Ref Designator	Value
TRANSISTOR	
Q1	BC547
POT	
VR5	4K7,LIN
LED's	
LED1	3MM,RED(OL)

PCB Components **2 X ZDT-VA/01 PCB**

Ref Designator	Value
RESISTORS	
R1	470K,0.25W,5%MFR
R2	4.7K,0.25W,5%MFR
R3	Not used
R4	1E,0.25W,5%,MFR
PRESET	
PR1	1K,LIN,HOR
PR2	1K,LIN,HOR
SWITCHES	
SW1	2 X 4P/2W PUSH SWITCH, WITH BRACKET

GENERAL (CHASSIS & FRONT PANEL)

Ref Designator	Value
CV CONTROL	WW POT 10K X 2
CC CONTROL	WW POT 1K X 2
INPUT FILTER	6A/250V YUMPEN
VARISTOR	275V GMEL
ON/OFF SW	DPST 6A/250V, CHILY
OUTPUT TERMINAL	ST15 4mm, RED/BLACK
INPUT FUSE	3Amp type T(for 230V) 6Amp Type T(for 115V)

SAFETY

INSULATION CLASS I, POLLUTION DEGREE 2 : IEC 1010 -1

This instrument has been built & tested as per IEC publications prepared by Technical Committee No. 66(Ref. No. CEI/IEC 1010-1:1990) : Safety requirements for electrical equipment for measurement, control & laboratory use.This instructions manual provides information and warning data which must be taken into consideration by the user for safety of operator and instrument.

SAFETY PRECAUTIONS TO BE TAKEN BEFORE SETTING THE INSTRUMENT INTO SERVICE :

Warning : Any interruption of the safety lead inside or outside the unit or disconnection of the protection ground terminal may render the instrument dangerous. An intentional disconnection is prohibited.

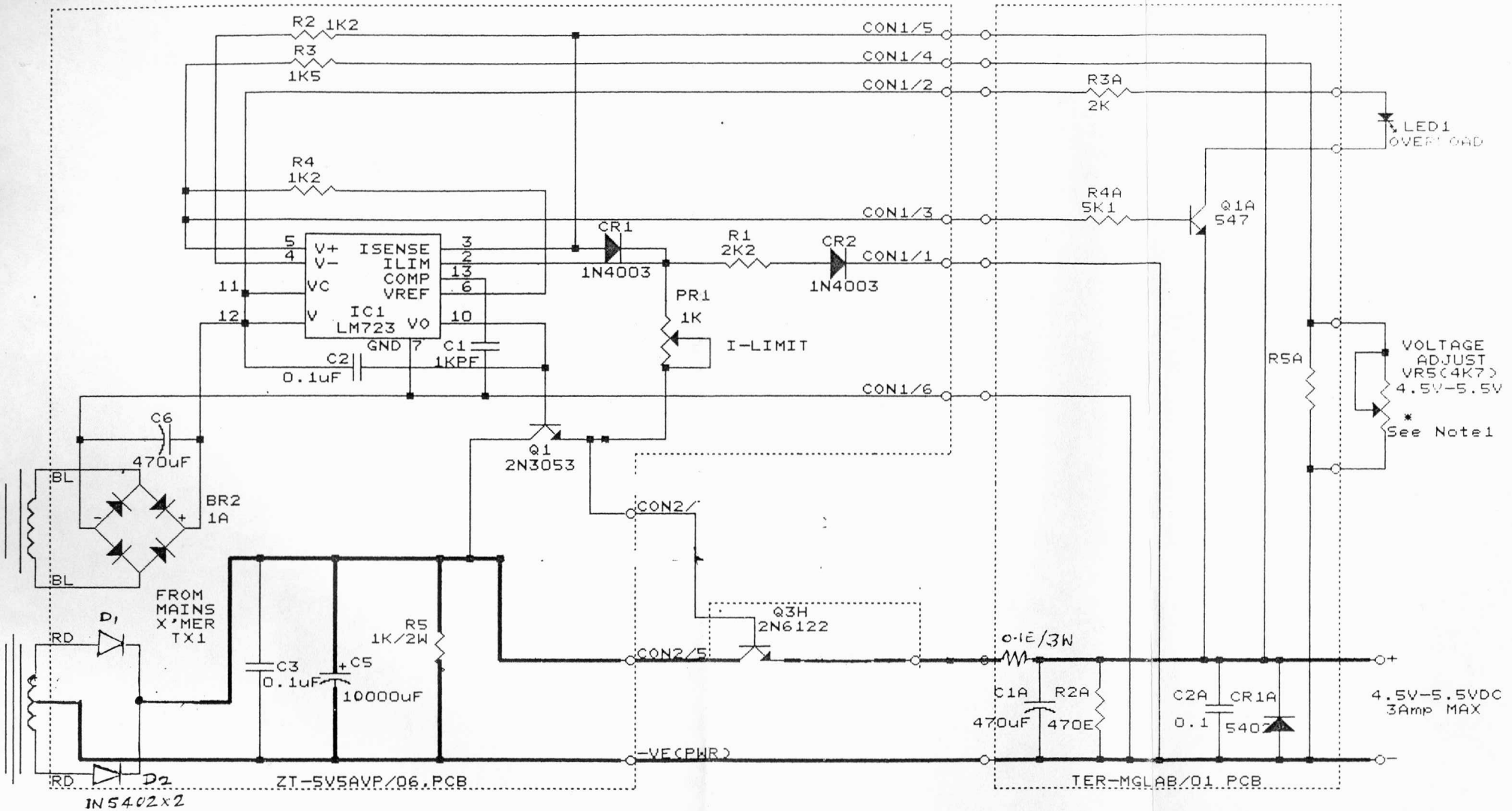
When the instrument is to be supplied via an auto-transformer, in order to reduce the supply voltage available, make sure the common terminal is connected to the neutral point (grounded) of the supply circuit. The jack should only be into a plug fitted with a grounding piece. The safety connection should never be interrupted by the use of an extension cord without a protection (ground) lead. The power supply cord must be connected to the mains network (with good value), before connecting the control of the measuring circuits.

SYMBOLS (as marked on equipment or in this manual) :

DANGER High Voltage.

Protective ground (earth) terminal.

ATTENTION - Refer to manual. This symbol involves a mandatory reference to the operating manual. The User is required to refer and follow the relevant instructions.



NOTE 1: Potentiometer is used for 4.5 to 5.5VDC variation. shorted for fixed 5VDC output.

Title: ZT3202/ZT3203: 4.5V-5.5V/3A SECTION		
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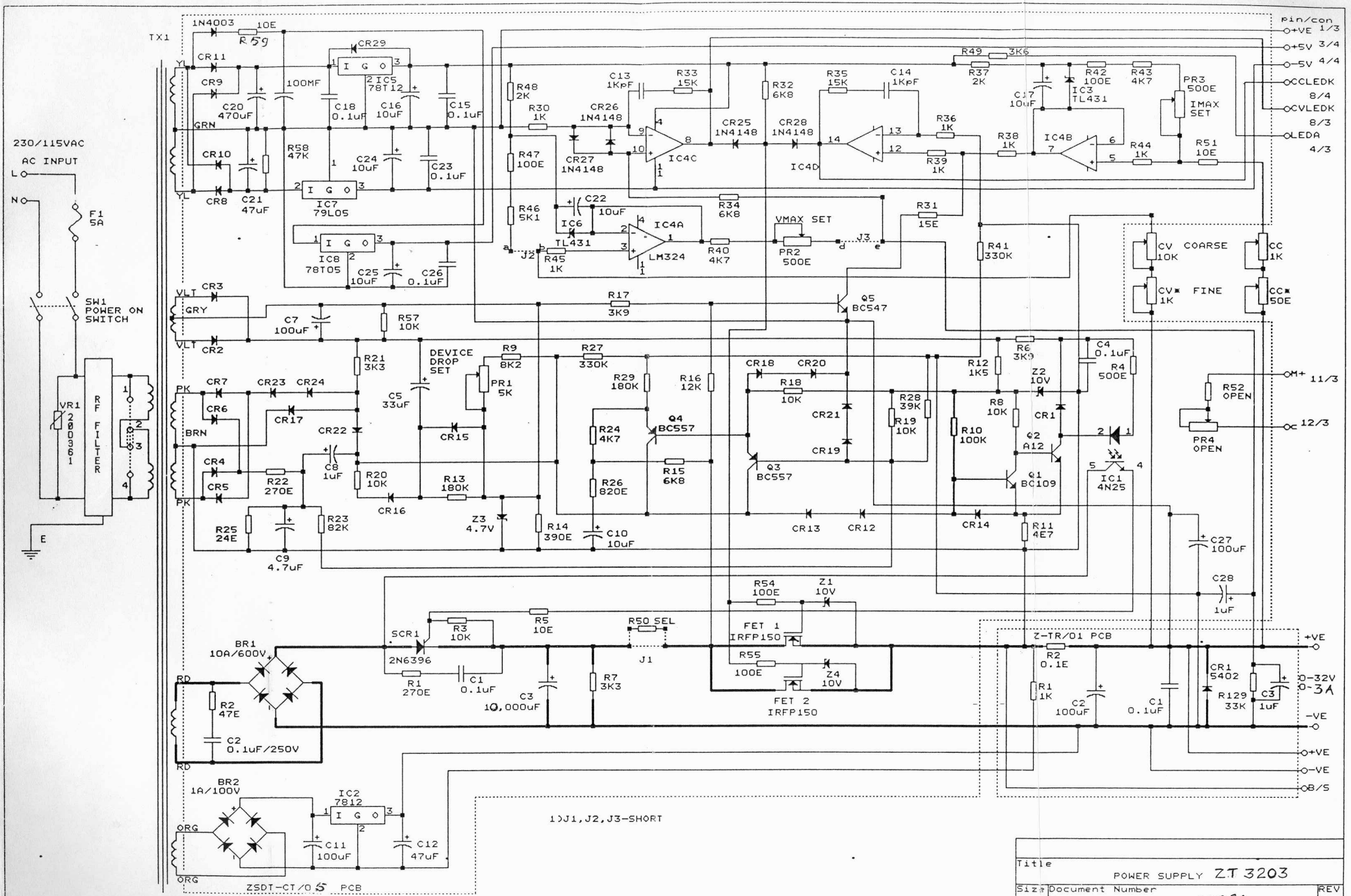
Date: February 23, 2000	Sheet 1 of 1	


230/115VAC
AC INPUT
L
N
F1
5A
SW1
POWER ON
SWITCH
E
VR1
200361
RF
FILTER
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10E
R59
CR11
CR9
CR10
CR8
CR29
IC5
78T12
IC7
79L05
IC8
78T05
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C21
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C18
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C16
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C15
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C24
10uF
C23
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C25
10uF
C26
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YL
GRN
VLT
GRY
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CR2
C7
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PK
BRN
CR7
CR23
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CR6
CR17
CR22
CR4
CR5
C8
1uF
R22
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R21
3K3
R20
10K
CR16
R25
24E
C9
4.7uF
R23
82K
DEVICE
DROP
SET
C5
33uF
CR15
R13
180K
Z3
4.7V
R9
8K2
PR1
5K
R27
330K
R29
180K
R24
4K7
R26
820E
R14
390E
C10
10uF
R16
12K
R15
6K8
Q4
BC557
R17
3K9
Q5
BC547
R48
2K
R30
1K
R47
100E
R46
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PR3
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R44
1K
R51
10E
CV COARSE
10K
CV
1K
FINE
CC
1K
CC
50E
R6
3K9
R12
1K5
R18
10K
CR18
CR20
CR21
CR19
Q3
BC557
R28
39K
R19
10K
R10
100K
Z2
10V
CR1
Q2
A12
Q1
BC109
C4
0.1uF
R4
500E
IC1
4N25
R52
OPEN
PR4
OPEN
CR14
CR13
CR12
R11
4E7
C27
100uF
C28
1uF
R54
100E
Z1
10V
FET 1
IRFP150
R55
100E
Z4
10V
FET 2
IRFP150
SCR1
2N6396
R3
10K
R1
270E
C1
0.1uF
R5
10E
C3
10,000uF
R50 SEL
J1
R7
3K3
BR1
10A/600V
R2
47E
C2
0.1uF/250V
RD
BR2
1A/100V
ORG
IC2
7812
C11
100uF
C12
47uF
ZSDT-CT/05 PCB
1)J1,J2,J3-SHORT
Z-TR/01 PCB
R2
0.1E
R1
1K
C2
100uF
C1
0.1uF
CR1
5402
R129
33K
C3
1uF
+VE
0-32V
0-3A
-VE
+VE
-VE
B/S
Pin/con
+VE 1/3
+5V 3/4
-5V 4/4
CCLEDK
8/4
CVLEDK
8/3
LEDA
4/3
M+ 11/3
12/3
Title
POWER SUPPLY ZT 3203
Size A3
Document Number C- 00220
REV 1
Date: January 11, 2001
Sheet 1 of 1