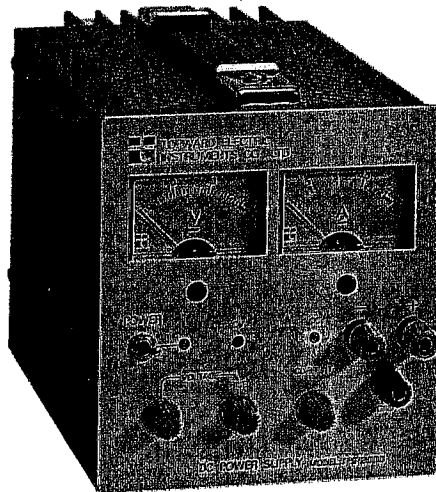


For Reference Only

INSTRUCTION MANUAL

DC POWER SUPPLY

TPS-2000 Series



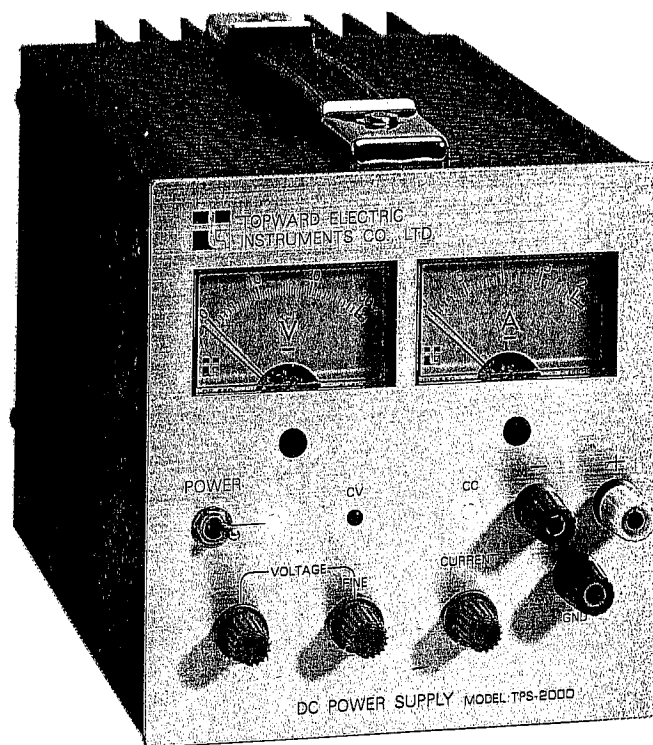
 **Topward**

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HauMan, Inc.
2031 RINGWOOD AVENUE
SAN JOSE, CA 95131
(408) 434-0888

PICTURE of MODEL TPS-2000



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INTRODUCTION

The Topward Model TPS-2000 is a bench top single output power supply. The power supply has two meters for monitoring output voltage and current.

The TPS-2000 will find wide application in schools, laboratories, and commercial engineering and testing departments, as well as with the advanced hobbyist.

BEFORE WE BEGIN

The Topward Model TPS-2000 is packed in styrofoam to protect it during shipment from the factory. You should keep this material, as well as the shipping box, in case your unit must be moved or shipped again.

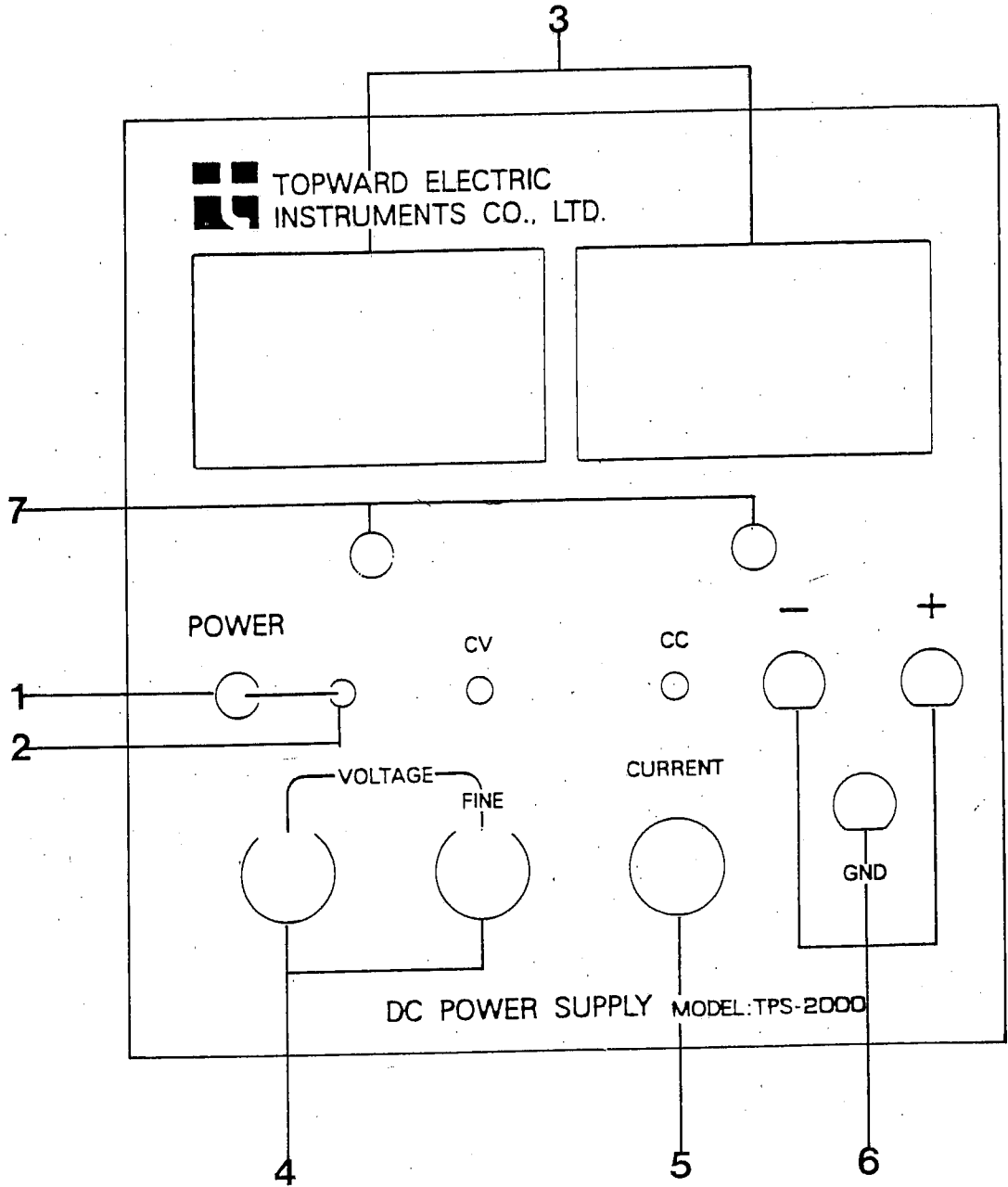
The box should include the following items:

- Model TPS-2000 Series power supply
- Removeable AC line cord
- Banana plug to Alligator clip cables
- Instruction manual

Please check to see that all of the above items are included.

FRONT PANEL of MODEL TPS-2000 Series

Figure - 1

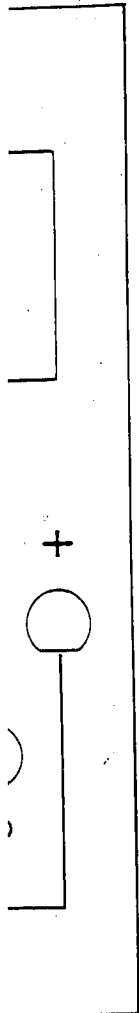


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FRONT PANEL DESCRIPTION

The following is the explanation of the function of each of the front panel controls and connectors. You should refer to Figure 1 for the location of each control/connector.

1. POWER ON - This is the main power switch.
2. POWER ON LED - This LED indicates that the power is on.
3. VOLTAGE/CURRENT METERS - These two meters indicate the output voltage and current as measured at the output terminals.
4. VOLTAGE ADJUST - These two controls (main & fine - Models 2203, 2302, 2303, 2601 only) adjust the output voltage of the supply.
5. CURRENT ADJUST - This control adjusts the output current that the supply will put out.
6. OUTPUT TERMINALS - There are three terminals. They represent positive, negative and ground.
7. METER ZERO - Each meter has a mechanical screw adjustment for setting the zero point.



OPERATING INSTRUCTIONS

WARNING - Before applying power to your TPS-2000 Series power supply, make sure that the AC input voltage setting SW03 and SW04 on rear panel is correctly set for your available power.

1. Connect the instrument to an AC power source using the line cord provided and turn the POWER ON switch (1) on. For maximum stability, allow the instrument to warm up for at least 20 minutes.
2. Set the voltage and current adjustment knobs as you desire.

OPERATING CAUTIONS

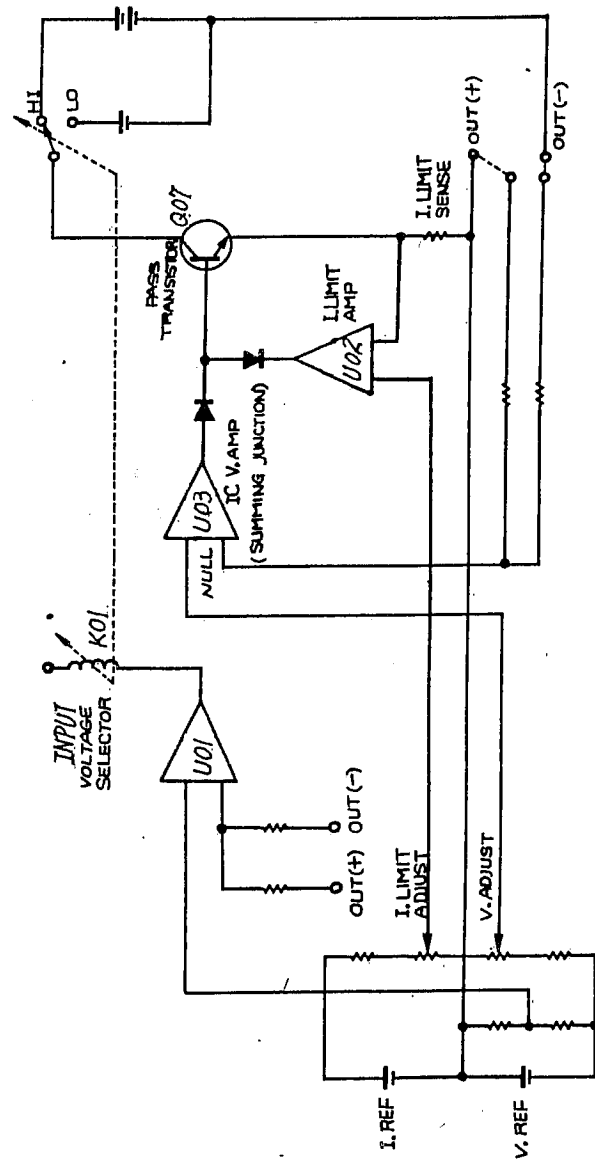
Please follow the following cautions when using your Model TPS-2000 Series power supply to prevent damage to the unit.


1. Verify that the AC voltage setting is the same as your available power BEFORE you apply power the instrument.
2. Do not connect a voltage that is greater than the current output voltage to the terminals of the instrument.
3. Do not parallel the output of TPS-2000 series.

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Model TPS
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REVISION	DATE



DO NOT SCALE THIS DRAWING	2000 SERIES BLOCK DIAGRAM	
	DRAWING NO:	
TOLERANCE UNLESS SPECIFIED ARE ANGLES ± DECIMALS ±		DESIGNER Simon Wang
 TOPWARD ELECTRIC INSTRUMENTS CO., LTD.		APPROVED Simon Wang

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MAINTENANCE & CALIBRATION

ROUBL

To keep your TPS-2000 Series power supply in top working condition, you should periodically calibrate it. As you follow the adjustment procedure below, refer to the component layout diagrams for the location of the adjustment components.

1. Mechanical zero adjustment - Using a small screwdriver, turn off the power and adjust the four screws under the meters to read zero.
2. Turn on the unit and connect a digital multimeter (Topward Model TDM-104 or equivalent) set to the 200 volt range to the output terminals. Turn the Voltage Adjustment knob (4) fully clockwise. Adjust R33 until the output is within the range 21V -23V (Model 2203), 31V - 33V (Models 2302, 2303, 2306, 23010) or 62V-65V (Models 2601, 2603).
3. Turn the Voltage Adjustment knob (4) until the output voltage is exactly 20 volts (Model 2203), 30 volts (Models 2302, 2303, 2306 and 23010) or 60 volts (Models 2601 and 2603). Adjust R34 until the meter reads 20 volts, 30 volts or 60 volts depending on the model.
4. Set the multimeter to measure DC amperes and the range to 20A. Turn the Voltage Adjustment knob to approximately 25% of full scale and the Current Adjustment knob to maximum. Adjust R32 in order to have a minimum output current: 1.1A (Model 2601), 2.1A (Model 2302), 3.1A (Models 2203, 2303, 2603), 6.1A (Model 2306) or 10.1A (Model 23010).
5. Turn the Current adjustment knob (5) until the output current is exactly 1 amps (Model 2601), 2 amps (Model 2302), 3 amps (Models 2203, 2303, or 2603), 6 amps (Model 2306), 10 amps (Model 23010) Adjust R35 until the meter indicates the above values.

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TROUBLESHOOTING

Control Section for Power Supply and Correct Reference Voltage

- A. Check to be sure that voltage select switch on bottom rear panel is switched to correct line voltage.
- B. With power on, check CC, CV, and power LED. If there is indication of functional error, turn off power. Then check transformer and fuse on rear panel.
- C. Turn on power again and consult circuit diagram. There are two diode bridge circuits. The upper one from D01 to D04 is for the main power source. The lower one from D05 to D08 is for the control circuit and the reference voltage generator.
- D. Check to be sure that the Q05 emitter is set at a positive reading of $9.6V \pm 10\%$ and that the Q06 emitter is set at a negative reading of $11.5V \pm 10\%$. The DMM GND (negative) clip must be clipped to the main output (positive) terminal.
- E. Check CR03 to be sure that CR03 shows a positive reading of $3.3V \pm 10\%$ and that CR04 shows a negative reading of $8.2V \pm 10\%$.

Voltage Control Circuit

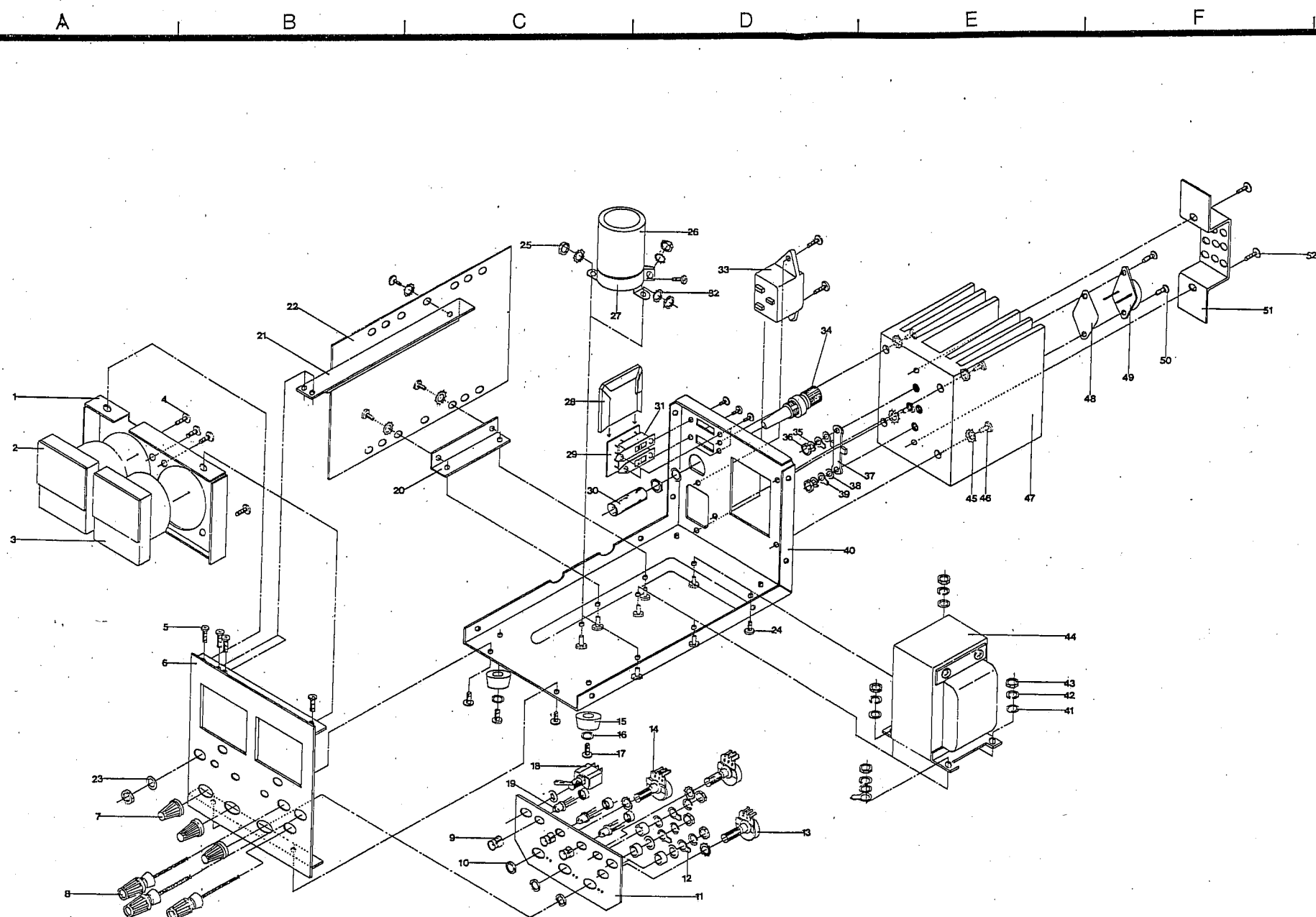
- A. Turn the voltage verniers (main and fine) to minimum and the current vernier to maximum. Check to be certain that the U03 pin 6 shows a reading of from $-5V$ to $-12V$.
- B. Then turn the voltage vernier to maximum and check to see that U03 pin 6 shows a reading of $+2V \pm 20\%$.
- C. Please note that the positive voltage control current passes through Q01, Q02, and Q07.
- D. The voltage meter is controlled by the voltage verniers.

3. Current Control Circuit

- A. Turn the current vernier to minimum. Check to be sure that the U02 output shows a reading of from -5V to -9V.
- B. Turn both voltage verniers to maximum.
- C. Connect the positive output terminal and the negative output terminal with a 5 Ohm 50W resistor or similar component.
- D. The current meter is controlled by the current vernier.

4. Relay Circuit and the CC and CV LED

- A. The U01 relay control IC is controlled by the output voltage. At approximately half of maximum output the relay will change state. Please note that with specially ordered power supplies there may be a four state relay change.
- B. The CC LED is controlled by the constant current mode. Otherwise it will be controlled by the constant voltage mode.



REVISION	DATE

ITEM	DESCRIPTION	QTY
1	METER BRACKET	1
2	VOLTAGE METER	1
3	CURRENT METER	1
4	SCREW CFS M3*6 BLACK	13
5	SCREW CFS M3*6 BLACK	18
6	FRONT PANEL	1
7	KNOB(A)	3
8	M1-14	3
9	LED SOCKET	3
10	FE-ROUND NUT M8*8.75	3
11	OR BRACKET	1
12	SOLDER PLATE 4D	3
13	18K UR	1
14	1K UR	2
15	RUBBER FOOT	4
16	4D WASHER	4
17	SCREW CFS M3*18 BLACK	4
18	TOGGLE SW.	1
19	5D LED(RED)	1
20	PCB HOLDER BRACKET(B)	1
21	PCB HOLDER BRACKET(A)	1
22	PCB	1
23	WASHER	1
24	SCREW CFS M4*18 BLACK	4
25	M3 NUT	3
26	ELECTROLYTIC CAPACITOR	1
27	ACCESSORY	1
28	M/C ISOLATION COVER	1
29	PCB	1
30	ACCESSORY	1
31	SLIDE-SW	1
32	M3 NUT	3
33	AC SOCKET	1
34	FUSE SOCKET	1
35	3D SPRING WASHER	2
36	M3 NUT	7
37	TRANSISTOR SOCKET(TO3)	1
38	3D WASHER	2
39	3D SOLDER PLATE	2
40	LOWER COVER	1
41	4D WASHER	4
42	4D SPRING WASHER	4
43	M4 NUT	4
44	TRANSFORMER	1
45	3D TOOTH WASHER	4
46	SCREW CFS M3*18 BLACK	4
47	HEAT SINK	1
48	MICA PLATE	1
49	TRANSISTOR	1
50	SCREW CRS M3*14 BLACK	1
51	TRANSISTOR COVER	1
52	SCREW CFS M4*6 BLACK	2

DO NOT SCALE THIS DRAWING



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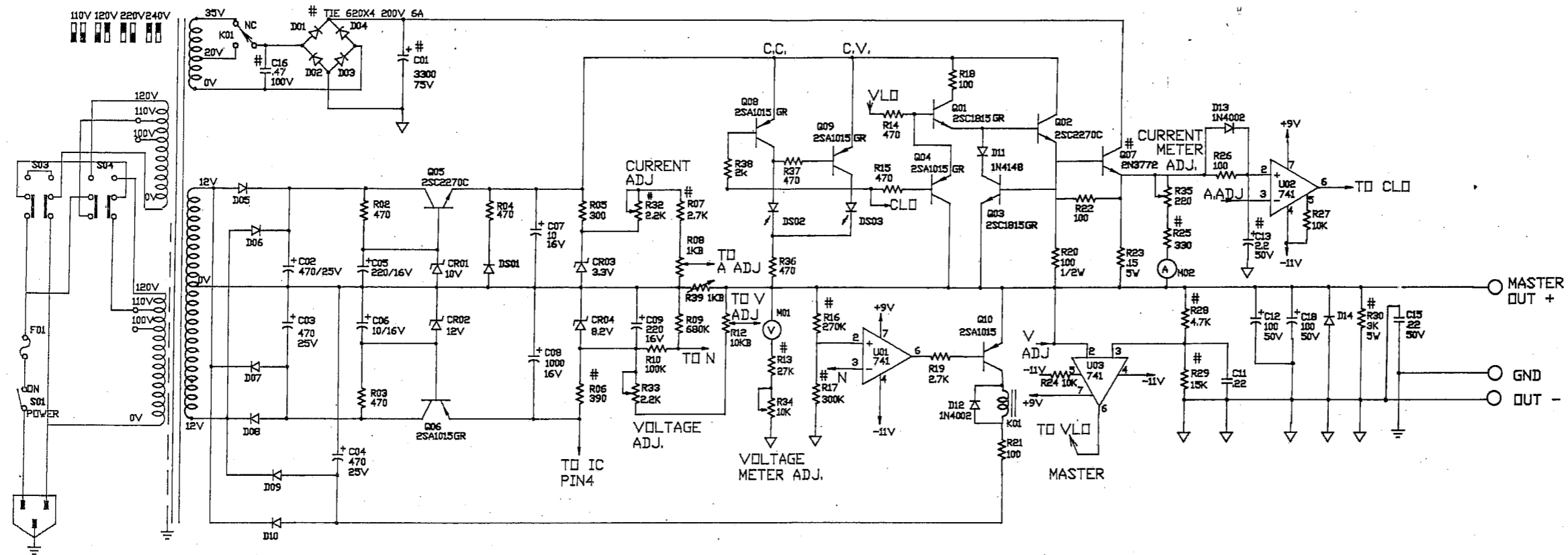
TOLERANCE
UNLESS SPECIFIER ARE
ANGLES ±
DECIMALS ±

DRAFTER 李榮明

POWER SUPPLY LOW POWER SERIES
ASSEMBLY DRAWING
DRAWING NO: 82500000

DESIGNER

APPROVED *[Signature]*



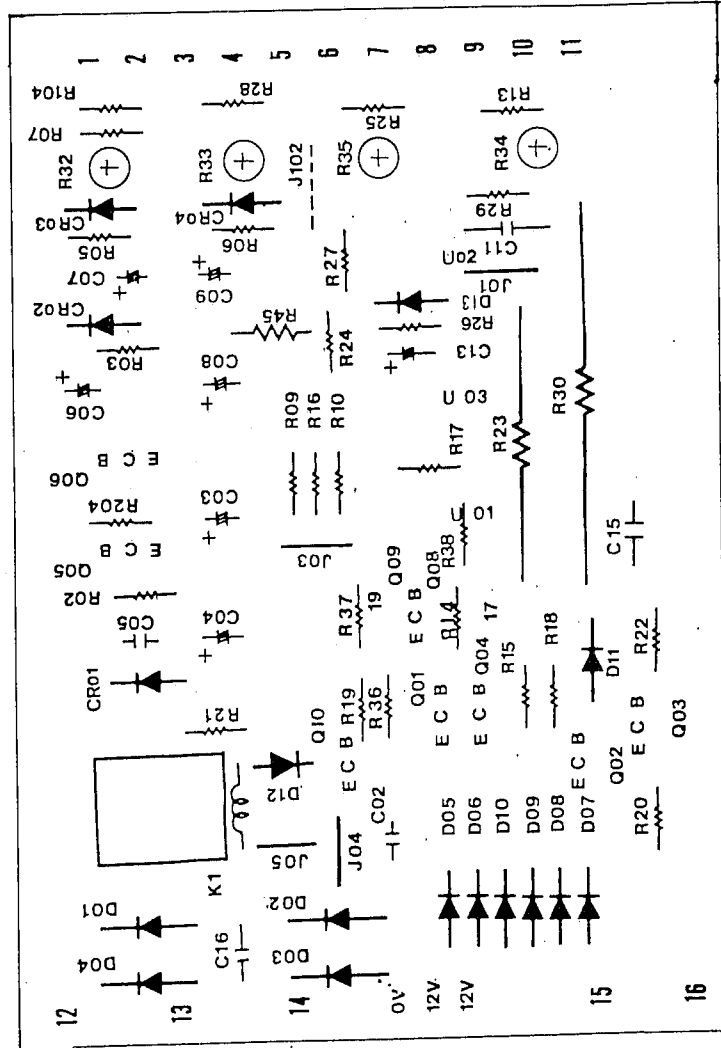
NOTES

1. ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN MICROFARADAYS.
3. # DENOTE VALUES OF 2000 SERIES WHICH ARE DIFFERENT.
4. † DENOTE CHASSIS CONNECTION.
5. ‡ DENOTE OUTPUT- CONNECTION.
6. THE FOLLOWING TABLE SPECIFIES THE DIFFERENCE BETWEEN 2000 SERIES.

PART	C01	C13	C16	D01-04	Q07	R06	R07	R13	R16	R17	R25	R28	R29	R30	R32
2203	3300	2.2/50V	.47/100V	TIE620	2N3772	390	2.7K	18K	270K	120K	330	6.8K	15K	3K/5W	3.3KB
2302	2200	2.2/50V	.47/100V	1N5402	2N3055	390	5.1K	27K	270K	300K	270	4.7K	15K	3K/5W	2.2KB
2303	3300	2.2/50V	.47/100V	TIE620	2N3772	390	2.7K	27K	270K	300K	330	4.7K	15K	3K/5W	2.2KB
2601	2200	2.2/100V	.47/250V	1N5402	2SD873	150	13K	60.4K	150K	470K	47	4.7K	33K	5.6K/5W	10KB

DWG No.	82000000-A		
DESCRIPTION	POWER SUPPLY LOW POWER SERIES CIRCUIT DIAGRAM		
DRAFTED BY	ANITA YUEN	3/21/1988	FIRST USED
DESIGNED BY			2303
APPROVED BY			SHEET SIZE
			1 OF 1 A3

REVISION	DATE



CURRENT ADJ.


VOLTAGE ADJ.

CURRENT METER ADJ.

VOLTAGE METER ADJ.

TOLERANCE UNLESS SPECIFIER ARE	POWER SUPPLY LOW POWER SERIES
ANGLES ±	COMPONENT LAYOUT
DECIMALS ±	DRAWING NO: 824-00001
DRAFTER	DESIGNER
	APPROVED

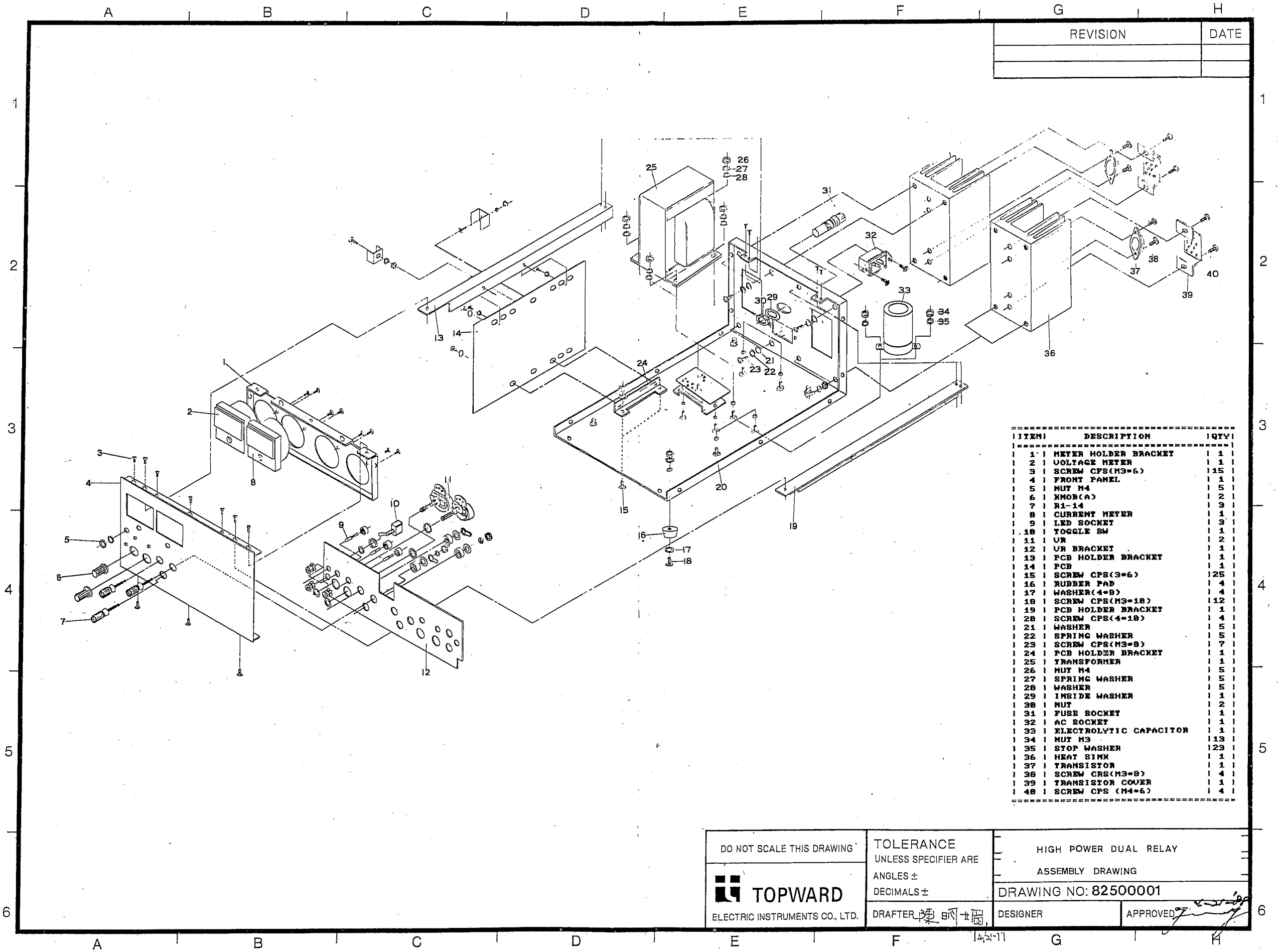
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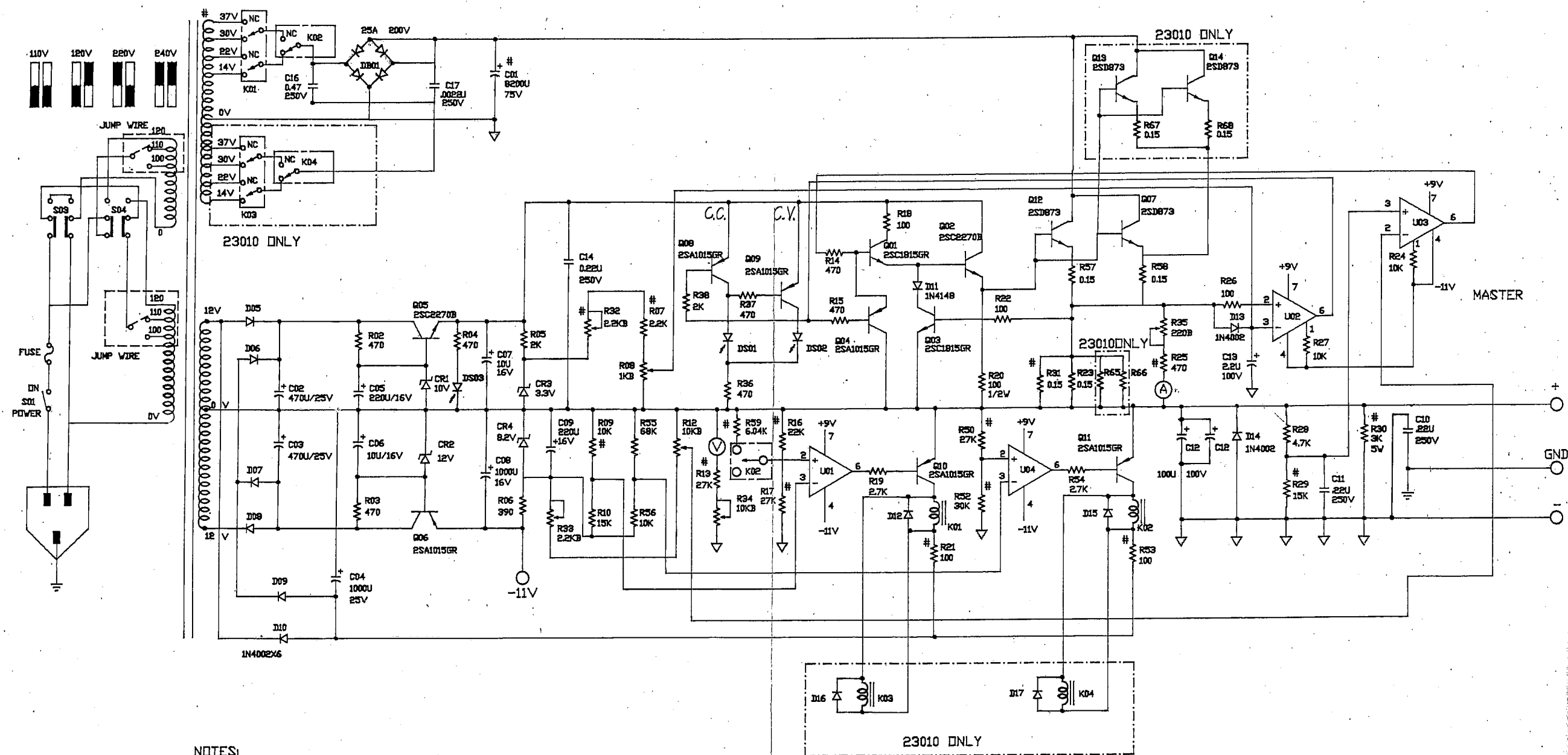
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REVISION	DATE

ITEM	DESCRIPTION	QTY
1	METER HOLDER BRACKET	1
2	VOLTAJE METER	1
3	SCREW CFS(M3=6)	15
4	FRONT PANEL	1
5	NUT M4	5
6	KNOB(A)	2
7	R1-14	3
8	CURRENT METER	1
9	LED SOCKET	3
10	TOGGLE SW	1
11	UR	2
12	UR BRACKET	1
13	PCB HOLDER BRACKET	1
14	PCB	1
15	SCREW CFS(3=6)	25
16	RUBBER PAD	4
17	WASHER(4=8)	4
18	SCREW CFS(M3=18)	12
19	PCB HOLDER BRACKET	1
20	SCREW CFS(4=18)	4
21	WASHER	5
22	SPRING WASHER	5
23	SCREW CFS(M3=8)	7
24	PCB HOLDER BRACKET	1
25	TRANSFORMER	1
26	NUT M4	5
27	SPRING WASHER	5
28	WASHER	5
29	INSIDE WASHER	1
30	NUT	2
31	FUSE SOCKET	1
32	AC SOCKET	1
33	ELECTROLYTIC CAPACITOR	1
34	NUT M3	13
35	STOP WASHER	123
36	HEAT SINK	1
37	TRANSISTOR	1
38	SCREW CRS(M3=8)	4
39	TRANSISTOR COVER	1
40	SCREW CFS (M4=6)	4

DO NOT SCALE THIS DRAWING	TOLERANCE UNLESS SPECIFIER ARE	HIGH POWER DUAL RELAY	
	ANGLES ± DECIMALS ±	ASSEMBLY DRAWING	
 ELECTRIC INSTRUMENTS CO., LTD.	DRAFTER 李國士	DRAWING NO: 82500001	
	DESIGNER	DESIGNER	APPROVED



NOTES:

1. ALL RESISTORS VALUES ARE IN OHM UNLESS OTHERWISE SPECIFIED. (K-KILOHM, M-MEGAOHM)
2. ALL CAPACITORS VALUES ARE IN MICROFARADAY UNLESS OTHERWISE SPECIFIED.
3. ALL PARTS OF 2000S ARE THE SAME, EXCEPT THOSE MARKED WITH '#'. PLEASE SEE PARTS LIST FOR DETAILS.
4. ↓ DENOTE OUTPUT-

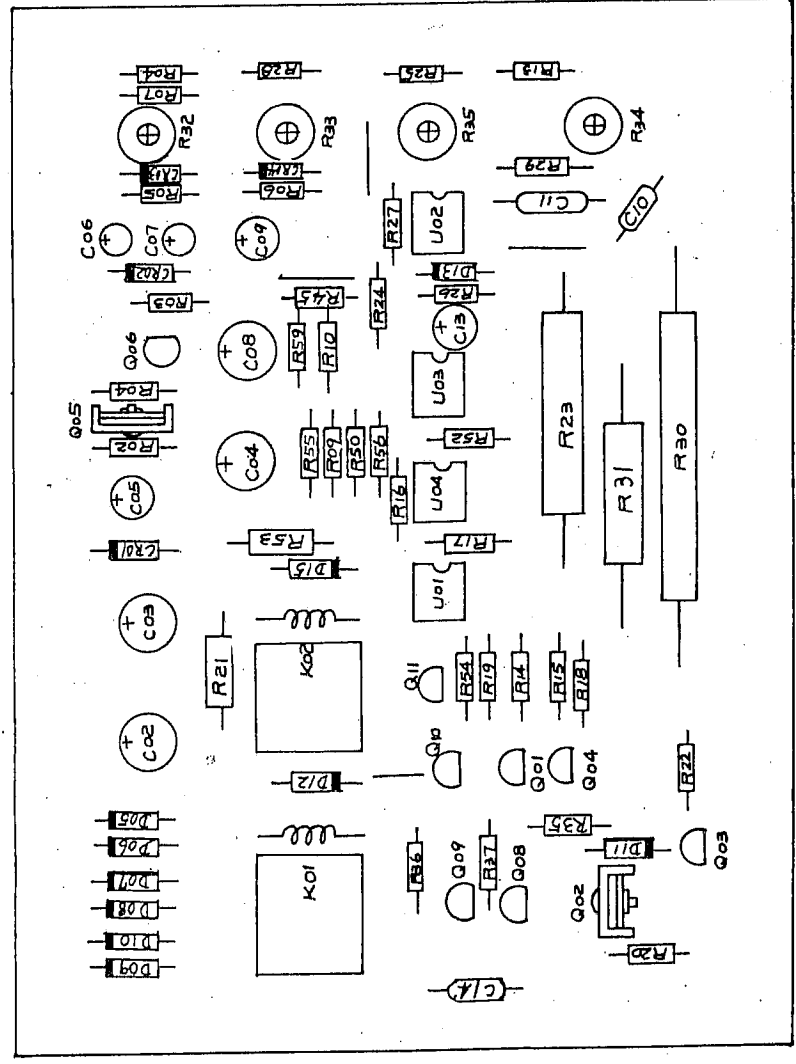
DWG No.	82000003-A		
DESCRIPTION	HIGH POWER DUAL RELAY CIRCUIT DIAGRAM		
DRAFTED BY	ANITA YUEN	4/13/1988	FIRST USED TPS-2306
DESIGNED BY			SHEET _OF_ A3
APPROVED BY			

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REVISION	DATE




CURRENT ADJ.

VOLTAGE ADJ.

CURRENT METER ADJ.

VOLTAGE METER ADJ.

DO NOT SCALE THIS DRAWING	TOLERANCE UNLESS SPECIFIER ARE ANGLES ± DECIMALS ±	HIGH POWER DUAL RELAY COMPONENT LAYOUT
 TOPWARD ELECTRIC INSTRUMENTS CO., LTD.		DRAWING NO: 82400002-A
		DESIGNER

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SPECIFICATIONS

Mode	2203	2303	2302	2306	2603	2601	23010
Output DC Voltage DC Current	0-20V 0-3A	0-30V 0-3A	0-30V 0-2A	0-30V 0-6A	0-60V 0-3A	0-60V 0-1A	0-30V 0-10A
Loading Effect (Load Regulation)	0.02% + 5mV 0.02% + 5mA						
Source Effect (Line Regulation)	0.02% + 2mV 0.02% + 0.25mA						
PARD (Ripple & Noise) At Any Line Voltage	0.5mV(rms), 4mV(p-p) 0.5mA(rms), 4mA(p-p)						
Input 110V/120V/220V/240V + 10%	1A 115W 60Hz	1.5A 120W 60Hz	1.1A 120W 60Hz	2.2A 260W 60Hz	3.1A 340W 60Hz	1.2A 135W 60Hz	5.1A 560W 60Hz
Dimensions: (Width, Height, Depth in mm)	125*140*303 125*140*303 125*140*303 250*140*363 250*140*363 125*140*303 250*140*363						
Weight : (in Kg)	4.9 5 4.5 9.2 8.6 4.5 13.2						
Accessory : ACS-002 (Banana-Clip)	1 1 1 1 1 1 1						
Operating Temperature Range	0 C to 40 C in Operation -20 C to 55 C in Storage						

Notes: CV=Constant Voltage, CC=Constant Current
Input voltage can be factory-modified to meet different country.