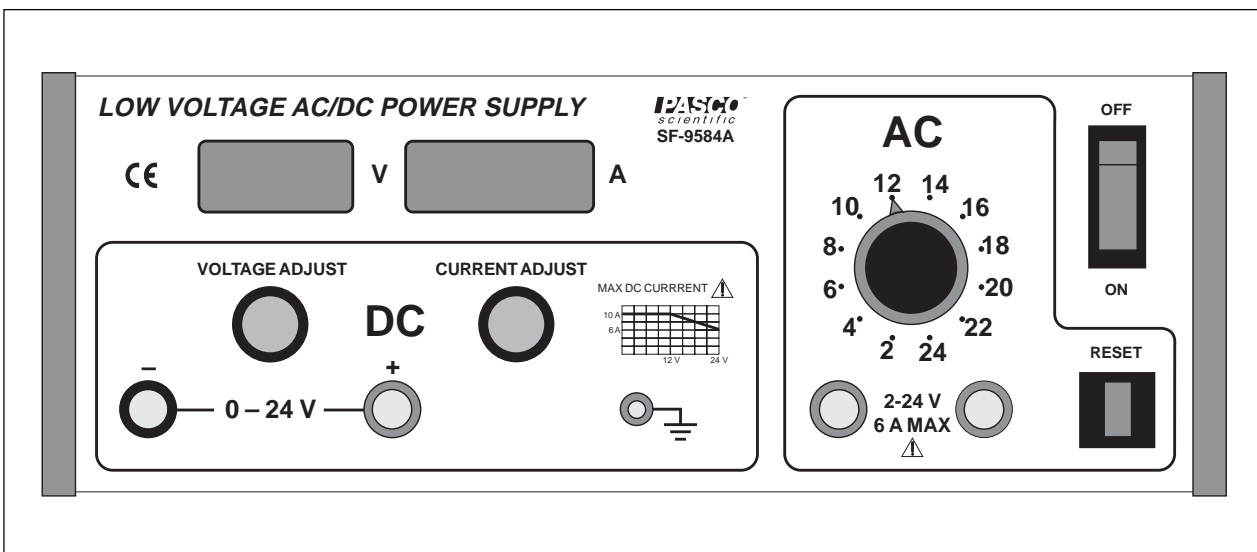


**Instruction Manual  
for the PASCO scientific  
Model SF-9584A**

012-06263A

10/96

# LOW VOLTAGE AC/DC POWER SUPPLY



© 1996 PASCO scientific

\$5.00



**CAUTION**  
RISK OF ELECTRIC SHOCK  
DO NOT OPEN



## **CAUTION**

**TO PREVENT THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER ON UNIT. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.**



The lightning flash with arrowhead, within an equilateral triangle, is intended to alert the user of the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

# ***Table of Contents***

<b>Section</b>	<b>Page</b>
Copyright, Warranty, and Equipment Return .....	ii
Introduction .....	1
Operation .....	1 - 2
Equipment Specifications .....	3
Schematics and Parts Lists .....	5 - 12
Technical Support .....	Back Cover

# **Copyright, Warranty and Equipment Return**

**Please**—Feel free to duplicate this manual subject to the copyright restrictions below.

## **Copyright Notice**

The PASCO scientific 012-06263A manual is copyrighted and all rights reserved. However, permission is granted to non-profit educational institutions for reproduction of any part of the Low Voltage AC/DC Power Supply manual providing the reproductions are used only for their laboratories and are not sold for profit. Reproduction under any other circumstances, without the written consent of PASCO scientific, is prohibited.

## **Limited Warranty**

PASCO scientific warrants the product to be free from defects in materials and workmanship for a period of one year from the date of shipment to the customer. PASCO will repair or replace, at its option, any part of the product which is deemed to be defective in material or workmanship. The warranty does not cover damage to the product caused by abuse or improper use. Determination of whether a product failure is the result of a manufacturing defect or improper use by the customer shall be made solely by PASCO scientific. Responsibility for the return of equipment for warranty repair belongs to the customer. Equipment must be properly packed to prevent damage and shipped postage or freight prepaid. (Damage caused by improper packing of the equipment for return shipment will not be covered by the warranty.) Shipping costs for returning the equipment, after repair, will be paid by PASCO scientific.

## **Credits**

Author: Hans Frederiksen  
Editor: Sunny Bishop

## **Equipment Return**

Should the product have to be returned to PASCO scientific, for whatever reason, notify PASCO scientific by letter or phone BEFORE returning the product. Upon notification, the return authorization and shipping instructions will be promptly issued.

**► NOTE: NO EQUIPMENT WILL BE ACCEPTED FOR RETURN WITHOUT AN AUTHORIZATION.**

When returning equipment for repair, the units must be packed properly. Carriers will not accept responsibility for damage caused by improper packing. To be certain the unit will not be damaged in shipment, observe the following rules:

- ① The carton must be strong enough for the item shipped.
- ② Make certain there is at least two inches of packing material between any point on the apparatus and the inside walls of the carton.
- ③ Make certain that the packing material can not shift in the box, or become compressed, thus letting the instrument come in contact with the edge of the box.

Address: PASCO scientific  
10101 Foothills Blvd.  
P.O. Box 619011  
Roseville, CA 95678-9011

Phone: (916) 786-3800

FAX: (916) 786-8905

email: techsupp@PASCO.com

# Introduction

The PASCO scientific Model SF-9584A Low Voltage AC/DC Power Supply provides two outputs: a regulated DC output and an unregulated AC output. The DC output can be delivered in two modes: constant voltage mode and constant current mode.

The Low Voltage AC/DC Power Supply is intended for supervised classroom use.

# Operation

## DC Output Operation:

- ① Flip the power ON/OFF switch to OFF.
- ② Plug the power cord into a grounded outlet of the appropriate voltage :  
Model SF-9584A, 115 V AC (78–130 V AC), 60 Hz  
or  
Model SF-9584A-230, 230 V AC (200–242 V AC), 50 Hz.
- ③ Connect the 0–24 V DC OUTPUT terminals of the power supply to the circuit. (Connecting wires are not provided with the power supply.)
- ④ Rotate the DC VOLTAGE ADJUST knob and the DC CURRENT ADJUST knob fully counterclockwise.
- ⑤ Flip the power ON/OFF switch to ON. The switch will light to show that the power supply is on.
- ⑥ Constant Voltage Mode: Turn the DC CURRENT ADJUST knob fully clockwise. Then adjust the DC VOLTAGE ADJUST knob to obtain the desired output voltage, as indicated on the meter. The output current is displayed on the current meter.
- ⑦ Constant Current Mode: Turn the DC VOLTAGE ADJUST knob fully clockwise. Adjust the DC CURRENT ADJUST knob to obtain the desired output current, as indicated on the meter. The output voltage is displayed on the voltage meter.



## DC Output, Limitations

The DC output is regulated for both constant-voltage and constant-current operation.

### *Constant Voltage mode:*

The voltage is continuously variable from 0–24 V DC. The maximum load drawn in the range from 0–12 V DC is 10 A. In the 12–24 V range, a load of 10–6 A may be drawn as the maximum load. At 24 V, the maximum is 6 A. (See the illustration printed on the front panel, “Max. DC Current,” or Figure 1.)

### *Constant Current mode:*

The load may be varied from 1–10 A in the 1–12 V DC range. At 12 V, the DC range is variable from 1–10 A. At 24 V, the range decreases to 0–6 A. (See the illustration printed on the front panel, “Max. DC Current,” or Figure 1.) A digital meter allows monitoring of both voltage and current for the DC output.

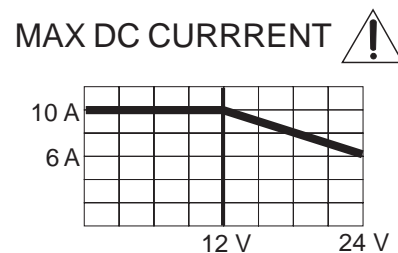


Figure 1. Maximum DC Current

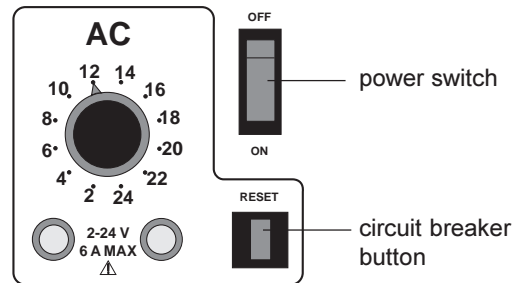
## AC Output Operation:

- ① Flip the power ON/OFF switch to OFF.
- ② Plug the power cord into a grounded outlet of the appropriate voltage :  
Model SF-9584A, 115 V AC (78 - 130 V AC), 60 Hz  
or  
Model SF-9584A-230, 230 V AC (200 - 242 V AC), 50 Hz.
- ③ Connect the 2–24 V AC OUTPUT terminals of the power supply to the circuit. (Connecting wires are not provided with the power supply.)
- ④ Rotate the AC VOLTAGE ADJUST knob to the 2–V position.
- ⑤ Flip the power ON/OFF switch to ON. The switch will light to show that the power supply is on.
- ⑥ Set the AC VOLTAGE ADJUST knob to the desired setting.



## AC Output Limitations

The AC output is unregulated and is adjustable in 2-V increments from 2 to 24 V AC, with a maximum output current of 6 amperes. This output is protected by a 6-amp circuit breaker. If the maximum current output is exceeded, the circuit breaker button below the power switch will pop out. (See Figure 2.)



**Figure 2. Location of Circuit Breaker Button**

The circuit breaker can be reset by simply pushing the button back in. It may be necessary to reduce the AC output voltage or the load connected to the AC output in order to resume operation.

► **NOTE:** If at any time the power supply fails to come on, or if it shuts down during operation due to excessive current, check the following: If the ON/OFF switch does not light when unit is plugged into the appropriate power source and the switch is turned ON, check the fuse on the back of the unit. If it is blown, replace it only with a similarly rated fuse (Model SF-9584A— 8A Slo-Blo fuse, Model SF-9584A-230— 4A Slo-Blo fuse).

# Equipment Specifications

## Specifications:

### Outputs:

**DC:** regulated for both constant-voltage and constant-current operation. Both current and voltage continuously variable over the range 0–24 V DC and 0–10 amperes maximum. Independent floating ground reference.

**AC:** 2 to 24 V (rms) AC, unregulated, selectable in 2-V increments, current up to 6 amperes. Output protected from overload by a 6-amp thermally-activated circuit breaker. Independent floating ground reference.

► **NOTE:** Both DC and AC outputs are available simultaneously on separate floating output terminals. Either one of the DC output terminals can be connected to either one of the AC output terminals to form a composite signal without damage to the unit.

### Line Regulation:

Less than 1% change in DC output voltage or current for full range change in line voltage. AC output not regulated.

### Load Regulations:

Better than 1% no-load to full-load on the DC output voltage or current. AC output not regulated.

### Ripple and Noise:

Less than 25 mV pp on DC output.

### Metering:

DC voltage and DC current  
Accuracy is +1% ± 2 L.S.D.

### Line Voltage Requirement:

78–130 V AC, 60 Hz (model SF-9584A)  
200–242 V AC, 50 Hz (model SF-9584A - 230)

### Power Requirement:

DC and AC: Maximum 350 W  
DC only: Maximum 175 W  
AC only: Maximum 175 W

### Fuse:

8 A Slo-Blo—(model SF-9584A)  
4 A Slo-Blo—(model SF-9584A-230)

### Size:

118 x 298 x 229 mm (H x W x D including controls)

**Notes:**





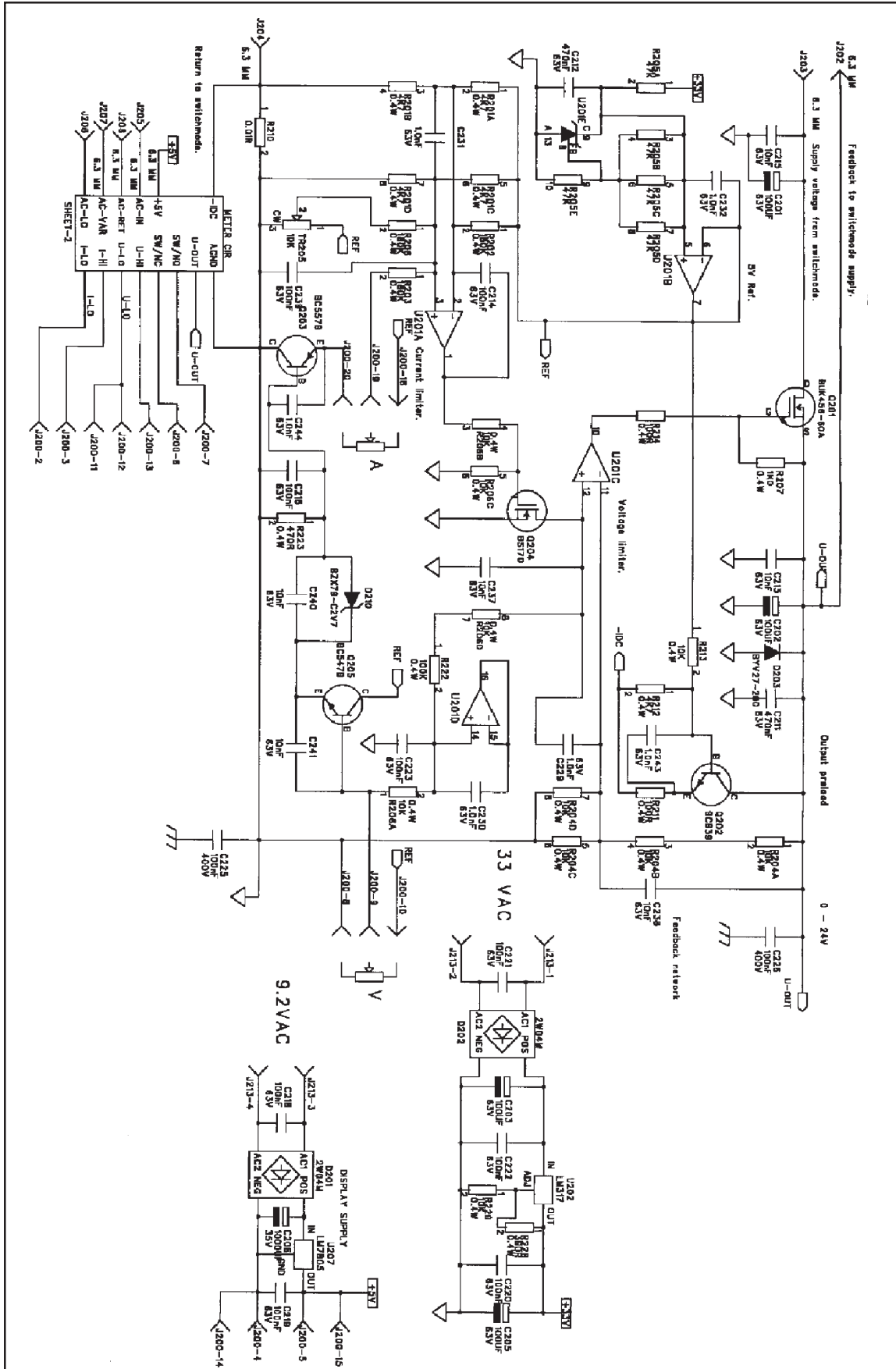


Figure 3. Main Board

## Parts List – Main Board

Item	Reference	Part Name	Value			Qty	Stock No.
1	R201	RESISTOR	4K7	250V	0.4W	1	601074
2	R204R206	RESISTOR	10K	250V	0.4W	2	601082
3	R220-221	RESISTOR	10K	250V	0.4W	2	601083
4	R205	RESISTOR	47K	250V	0.4W	1	601099
5	R216 R219	RESISTOR	100K	250V	0.4W	2	601106
6	R211 R214 R217	RESISTOR	100R	250V	0.4W	3	6030701
7	R227	RESISTOR	150R	250V	0.4W	1	6030801
8	R228	RESISTOR	390R	250V	0.4W	1	6031051
9	R218 R223	RESISTOR	470R	250V	0.4W	2	6031101
10	R226	RESISTOR	680R	250V	0.4W	1	6031201
11	R207 R230	RESISTOR	1K0	250V	0.4W	2	6031301
12	R212	RESISTOR	4K7	250V	0.4W	1	6031701
13	R213 R229	RESISTOR	10K	250V	0.4W	2	6031901
14	R222	RESISTOR	100K	250V	0.4W	1	6032501
15	R202-203 R208	RESISTOR	180K	250V	0.4W	3	6032651
16	R224	RESISTOR	1M0	250V	0.4W	1	6033101
17	R210 R215	RESISTOR	0.01R	20mV	2W	2	604301
18	TR201-202	TRIMPOT HORIZ	220R	250V	0.1W	2	605935
19	TR203-205	TRIMPOT HORIZ	10K	250V	0.1W	3	605960
20	C229-234 C243-244	CERAMIC CAP	1.0nF	63V		8	611890
21	C213 C215 C235 C237-238 C240-241	CERAMIC CAP	10nF	63V		7	612010
22	C224-227	STACK FOIL CAP	100nF	400V		4	613170
23	C214 C216-223 C228 C239	STACK FOIL CAP	100nF	63V		11	613450
24	C211-212	STACK FOIL CAP	470nF	63V		2	613530
25	C207-210 C236	ELECTROLYT CAP	4.7UF	25V		5	615643
26	C201-205	ELECTROLYT CAP	100UF	63V		5	615785
27	C206	ELECTROLYT CAP	1000UF	35V		1	616003
28	D203	DIODE	BYV27-200	200V	2A	1	623267
29	D205-209	DIODE	IN4148	75V	0.2A	5	623300
30	D201-202	DIODE	2W04M	400V	2A	2	623665
31	D210	ZENER-DIODE	BZX79-C2V7	2.7V	0.5W	1	624060
32	Q205	NPN TRANSISTOR	BC547B	50V	0.1A	1	624710
33	Q203	PNP TRANSISTOR	BC557B	50V	0.2A	1	624720
34	Q202	NPN TRANSISTOR	BC639	100V	1.5A	1	624750
35	Q201	Nch MOSFET	BUK456-60A	60V	52A	1	625690
36	Q204	Nch MOSFET	BS170	60V	0.5A	1	626120
37	U204	DualOpAmp	LT1112	30V	10mA	1	630211
38	U201	IC	LM614	36V	0.3mA	1	631214
39	U202	VOLTAGE REGULATOR	LM317	40V	1A	1	632130
40	U205	VOLTAGE REGULATOR	LM78L05	35V	0.1A	1	632430
41	U207	VOLTAGE REGULATOR	LM7805	35V	1.5A	1	632533
42	U206	RAIL SPLITTER	TLE2426CLP	40V	0.08A	1	634941
43	RE201-202	RELAY 5V	M4-5H	125V/30W	1A	2	637428
44	J202-208	CONNECTOR	6.3 MM			7	641245
45	J200	3M-929 20 PIN	20 PIN			1	641321
46	J213	STOCKO MKS4	4 PIN			1	641357

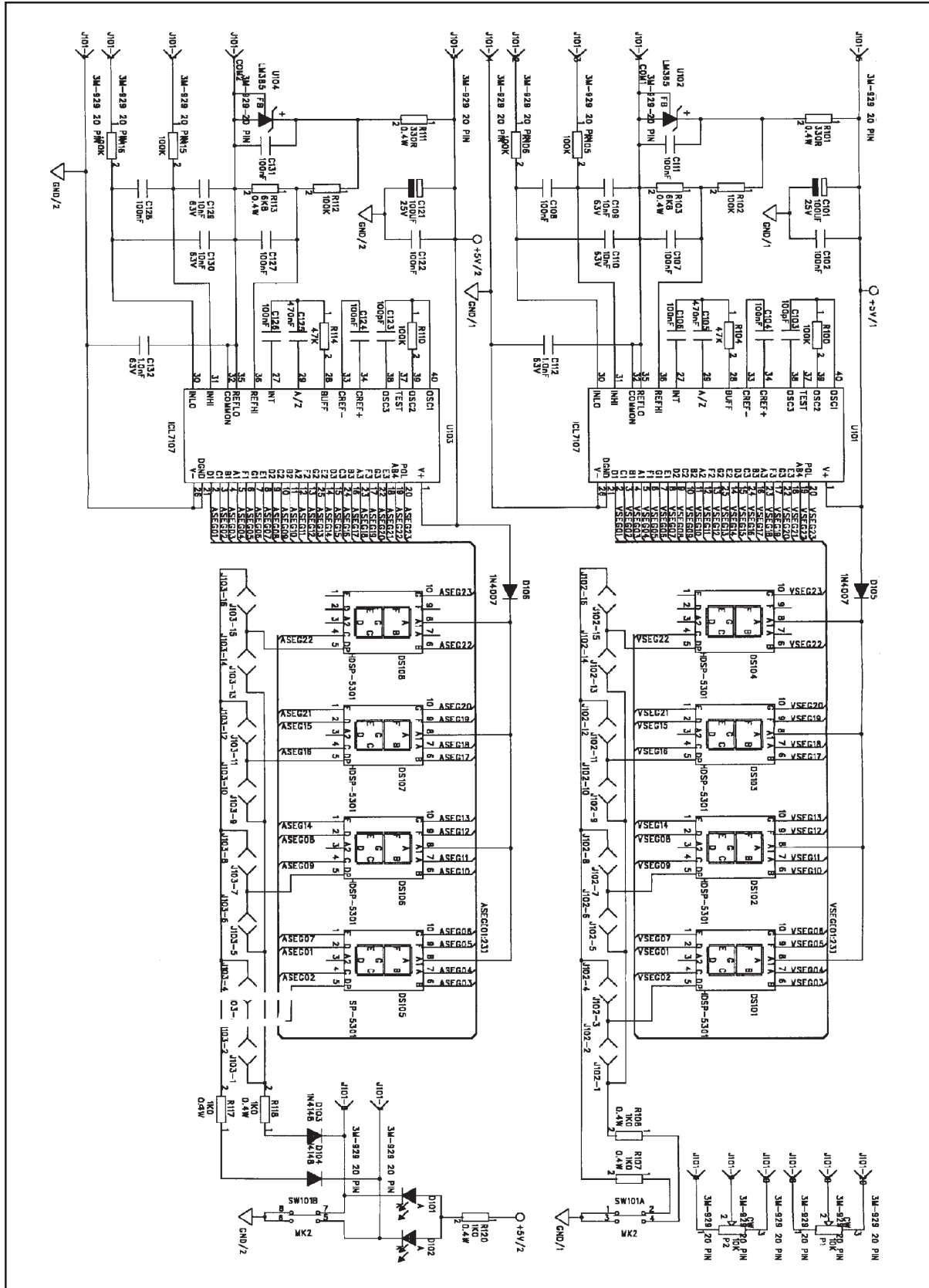


Figure 4. Display Unit

### Parts List – Display Unit

Item	Reference	Part Name	Value			Qty	Stock No.
1	R101 R111	RESISTOR	330R	250V	0.4W	2	6031001
2	R107-108 R117-118 R120	RESISTOR	1K0	250V	0.4W	5	6031301
3	R103 R113	RESISTOR	6K8	250V	0.4W	2	6031801
4	R104 R114	RESISTOR	47K	250V	0.4W	2	6032301
5	R100 R102 R105-106 R110 R112 R115-116	RESISTOR	100K	250V	0.4W	8	6032501
6	P1-2	POTMETER	10K	300V	1.5W	2	608251
7	C103 C123	CERAMIC CAP	100pF	63V		2	611770
8	C112 C132	CERAMIC CAP	1.0nF	63V		2	611890
9	C109-110 C129-130	CERAMIC CAP	10nF	63V		4	612010
10	C102 C104 C106-10 C111 C122 C124 C126-128 C131	STACK FOILCAP	100nF	63V		12	613450
11	C105 C125	STACK FOIL CAP	470nF	63V		2	613530
12	C101 C121	ELECTROLYT CAP	100UF	25V		2	616440
13	D101-102	LED	HLMP-1719	2V	2mA	2	622000
14	DS101-108	DISPLAY	HDSP-5301	2V	20mA	8	622940
15	D103-104	DIODE	1N4148	75V	0.2A	2	623300
16	D105-106	DIODE	1N4007	700V	1A	2	623390
17	U102 U104	VOLTAGE REF.	LM385	20mA		2	631185
18	U101 U103	IC	ICL7107	9V		2	635057
19	SW101	SWITCH LOCKING	MK2	120V	250mA	1	638031
20	J102-103	HEADER	16 PIN	500V	2.5A	2	641029
21	J101	3M-929	20 PIN	20 PIN		1	641321
30	U101 U103	TULIPAN	SOK	40 PIN		2	635539

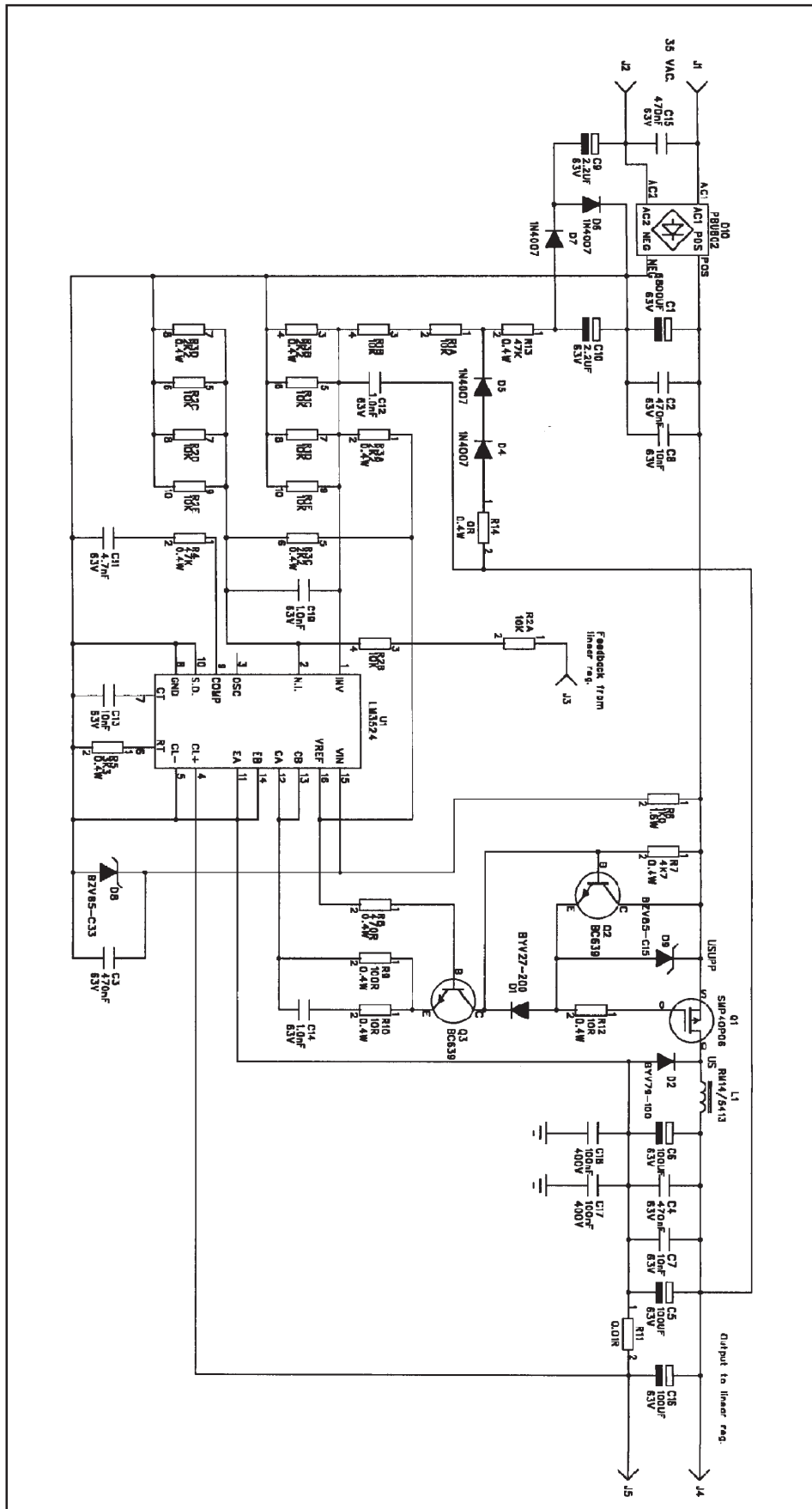


Figure 5. Switch-Mode Regulator

### Parts List – Switch-Mode Regulator

Item	Reference	Part Name	Value			Qty	Stock No.
1	R3	RESISTOR	2K2	250V	0.4W	1	601066
2	R1-2	RESISTOR	10K	250V	0.4W	2	601083
3	R14	RESISTOR	0R	250V	0.4W	1	6020901
4	R10 R12	RESISTOR	10R	250V	0.4W	2	6030101
5	R9	RESISTOR	100R	250V	0.4W	1	6030701
6	R8	RESISTOR	470R	250V	0.4W	1	6031101
7	R5	RESISTOR	3K3	250V	0.4W	1	6031601
8	R7	RESISTOR	4K7	250V	0.4W	1	6031701
9	R4 R13	RESISTOR	47K	250V	0.4W	2	6032301
10	R6	RESISTOR	IK0	500V	1.6W	1	603810
11	R11	RESISTOR	0.01R	20mV	2W	1	604301
12	C12 C14 C19	CERAMIC CAP	1.0nF	63V		3	611890
13	C11	CERAMIC CAP	4.7nF	63V		1	611970
14	C7-8 C13	CERAMIC CAP	10nF	63V		3	612010
15	C17-18	STACK FOIL CAP	100nF	400V		2	613170
16	C2-4 C15	STACK FOIL CAP	470nF	63V		4	613530
17	C9-10	ELECTROLYT CAP	2.2UF	63V		2	615622
18	C5-6 C16	ELECTROLYT CAP	100UF	63V		3	615785
19	C1	ELECTROLYT CAP	6800UF	63V		1	616102
20	D1	DIODE	BYV27-200	200V	2A	1	623267
21	D2	ULTRA FAST DIODE	BYV79-100	100V	14A	1	623268
22	D4-7	DIODE	1N4007	700V	1A	4	623390
23	D10	DIODE BRIDGE	PBU802	100V	8A	1	623685
24	D9	ZENER-DIODE	BZV85-C15	15V	1.0W	1	624515
25	D8	ZENER-DIODE	BZV85-C33	33V	1.0W	1	624533
26	Q2-3	NPN TRANSISTOR	BC639	100V	1.5A	2	624750
27	Q1	Pch MOSFET	SMP40P06	60V	40A	1	626110
28	U1	IC	LM3524	40V		1	632350

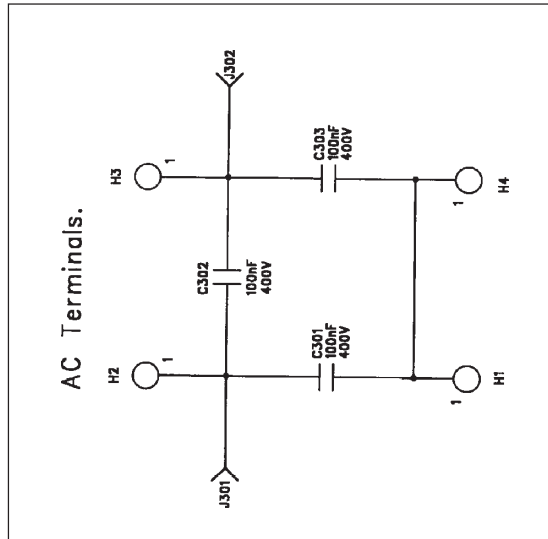


Figure 6. Filter Board

Parts List – Filter Board

Item	Reference	Part Name	Value	Qty	Stock No.
1	H1-4			4	
2	C301-303	STACK FOIL CAP	100NF 400V	3	613170



# Technical Support

## Feedback

If you have any comments about the product or manual, please let us know. If you have any suggestions on alternate experiments or find a problem in the manual, please tell us. PASCO appreciates any customer feedback. Your input helps us evaluate and improve our product.

## To Reach PASCO

For technical support, call us at 1-800-772-8700 (toll-free within the U.S.) or (916) 786-3800.

fax: (916) 786-3292

e-mail: [techsupp@PASCO.com](mailto:techsupp@PASCO.com)

web: [www.pasco.com](http://www.pasco.com)

## Contacting Technical Support

Before you call the PASCO Technical Support staff, it would be helpful to prepare the following information:

- ▶ If your problem is computer/software related, note:
  - Title and revision date of software;
  - Type of computer (make, model, speed);
  - Type of external cables/peripherals.
- ▶ If your problem is with the PASCO apparatus, note:
  - Title and model number (usually listed on the label);
  - Approximate age of apparatus;
  - A detailed description of the problem/sequence of events. (In case you can't call PASCO right away, you won't lose valuable data.);
  - If possible, have the apparatus within reach when calling to facilitate description of individual parts.
- ▶ If your problem relates to the instruction manual, note:
  - Part number and revision (listed by month and year on the front cover);
  - Have the manual at hand to discuss your questions.

