

**MANSON ENGINEERING INDUSTRIAL LTD.**

**SERVICE MANUAL  
FOR  
SPS-9400**

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## 1. PRODUCTION SPECIFICATION

MODEL: SPS-9400-000	REV. 1.0	DATE: 24-8-2000
DESCRIPTION: 3-15V 40A SWITCHING MODE POWER SUPPLY		
INPUT VOLTAGE: 207-245 VAC	FREQUENCY: 50 Hz	
ENVIRONMENT TEMPERATURE: 25 °C		

	MIN.	TYP.	MAX.	UNIT
Rated Output Voltage Range	3		15	V
Max. Output Voltage	15.1		16.1	V
Min. Output Voltage			3	V
Fixed Output Voltage	13.5	13.8	14.3	V
Output Current (continue)		40		A
Protection Current (start point)	43	43.5	44.5	A
Over Voltage Protection	16	16.5	17	V
Voltage Regulation:				
Load (0~100% load)			200	mV
Line (207~254Vac Variation)			50	mV
Ripple & Noise (r.m.s)		2	5	mV
Ripple & Noise (peak to peak)		30	50	mV
No Load Input Current			380	mA
Full Load Input Current			3.5	A
Power consumption at 15V			770	W
Insulation Resistance (500Vdc)	100			MΩ
Withstanding Test (10mA 60s)	2.1			KV
Power factor	97			%
Efficiency:				
Loading 13.8V 40A	78	80		%
Loading 15V 40A	79	82		%
Meter Accuracy:				
Voltmeter			±1% 1+1	Dight
Ammeter			±1% 1+1	Dight
Fuse		5		A

### REMARKS:

1. Rated load is 15V 40A.
2. Insulation resistance is measured as INPUT vs. HOUSING.
3. High frequency interference test (sample 3%).  
 Test frequency : 1. 437 MHz (5W) 2. 144 MHz (5W)  
 Result : No function have been affected. Output Voltage 0.5V Variation.

## **2. ALIGNMENT PROCEDURE**

<b>Equipment</b>	<b>Quantity</b>
CRO	1
Digital Multimeter	1
High Frequency Micrometer	1
Electronic Load	1
Adjustable AC Transformer	1
Power Analyzer	1
DC Regulated Power Supply (Max. V>17)	1

### **Procedures:**

#### **1. No Load Input Current Measurement**

Switch ON the SPS-9400, the Power Indicator Should light up in green, the fan rotates in a low speed. The SPS-9400 Ammeter should display 00.0, the Voltmeter should not display 00.0, the Power Analyzer should display a current of less than 380mA.

#### **2. Voltmeter Adjustment**

Switch SW2 located at the bottom side of the unit to position "FIXED", connect a Digital Multimeter to the output terminal of SPS-9400, adjust RV4 such that the Digital Multimeter display a voltage of 13.81 ~ 13.84V. Turning the control knob on the front panel will make no change to the output voltage. Switch SW2 to another position, turn the control knob on the front panel to fully-clockwise position, adjust RV2 such that the Digital Multimeter display 15.4 ~ 15.6V, then turn the control knob to fully-counterclockwise position, the Digital Multimeter should display a voltage of less than 3V.

#### **3. Protection Current Adjustment**

Adjust the output voltage of SPS-9400 to 15V by turning the control knob, turn RV3 to fully-clockwise position, connect the Electronic Load, slowly adjust the loading current to 44.5A. Then, slowly turn RV3 in counter-clockwise until the overload red LED indicator lights up and the output voltage falls suddenly. Afterward, decreases the loading current to 0A, the red light should OFF and the output voltage returns to normal condition. Then, slowly increases the loading current, when the loading current is 43 ~ 44.5A, the overload red LED indicator will light up and the output voltage will fall.

#### **4. Power Consumption Test**

Adjust the output voltage of SPS-9400 to 15V and connect the electronic load with 40A loading current, the Power Analyzer should display an input current of less than 3.5A, power factor of more than 0.97 and input power of less than 770W.

#### **5. Voltmeter Calibration**

Adjust the output voltage of SPS-9400 to 15.0V, connect the Digital Multimeter to the output terminal of SPS-9400, adjust the variable resistor on the Voltmeter such that the voltage display on the Digital Multimeter is equal to the voltage display on Voltmeter. Then, check that the voltage on the Voltmeter increases as the control knob is turned in clockwise direction. Similarly, check that the voltage decreases as the control knob is turned in counterclockwise direction. Also, the difference between the voltage on Voltmeter and the Digital Multimeter should be less than 0.2V. And check that the LED Voltmeter does not have missing segment.

#### **6. Ammeter Calibration**

Connect the Electronic Load with 40A loading current, adjust the variable resistor of Ammeter such that the Ammeter displays 39.9. Then, check that the current on Ammeter increases as the loading current on the Electronic Load increases. Similarly, check that the current on Ammeter decreases as the loading current on the Electronic Load decreases. Also, the difference between the current on Ammeter and the Digital Multimeter should be less than 0.4A. And check that the LED Ammeter does not have missing segment.

#### **7. Over-Voltage Protection Test**

Adjust the output voltage of the DC Regulated Power Supply to 15.9V and connect to the output terminal of SPS-9400, then disconnect it and the SPS-9400 is in working condition. Adjust the output voltage of the DC Regulated Power Supply to 16.9V and connect to the output terminal SPS-9400, then disconnect it. The overload red LED indicator of SPS-9400 will light up and the output voltage will fall.

#### **8. Load Regulation Measurement**

Adjust the output voltage of SPS-9400 to 15V and connect to the Electronic Load with 40A loading current, measure the output voltage by the Digital Multimeter and record the voltage. Then, disconnect from the load and measure the output voltage again. The difference between 2 voltages should be less than 200mV.

### **9. Ripple and Noise Measurement**

Adjust the output voltage of SPS-9400 to 15V and connect to the Electronic Load with 40A loading current. Measure the output terminal by the High Frequency Micrometer and the value should less than 5mV. Connect the output terminal to CRO and the Peak to Peak measured wave form should less than 50mVp-p.

### **10. Line Regulation Measurement**

Adjust the output voltage of SPS-9400 to 15V and connect to the Electronic Load with 40A loading current. Adjust the input voltage to 190V and 254V, record the output voltage at these 2 input voltages, the difference between these 2 output voltages should less than 50mV.

### **11. Loading Test**

Adjust the output voltage of SPS-9400 to 15V and connect to the Electronic Load with 40A loading current, turn OFF the SPS-9400. Then, make sure the Electronic Load has a 40A loading current, turn ON SPS-9400 again and check that the SPS-9400 is ON and the Overload Indicator is OFF.

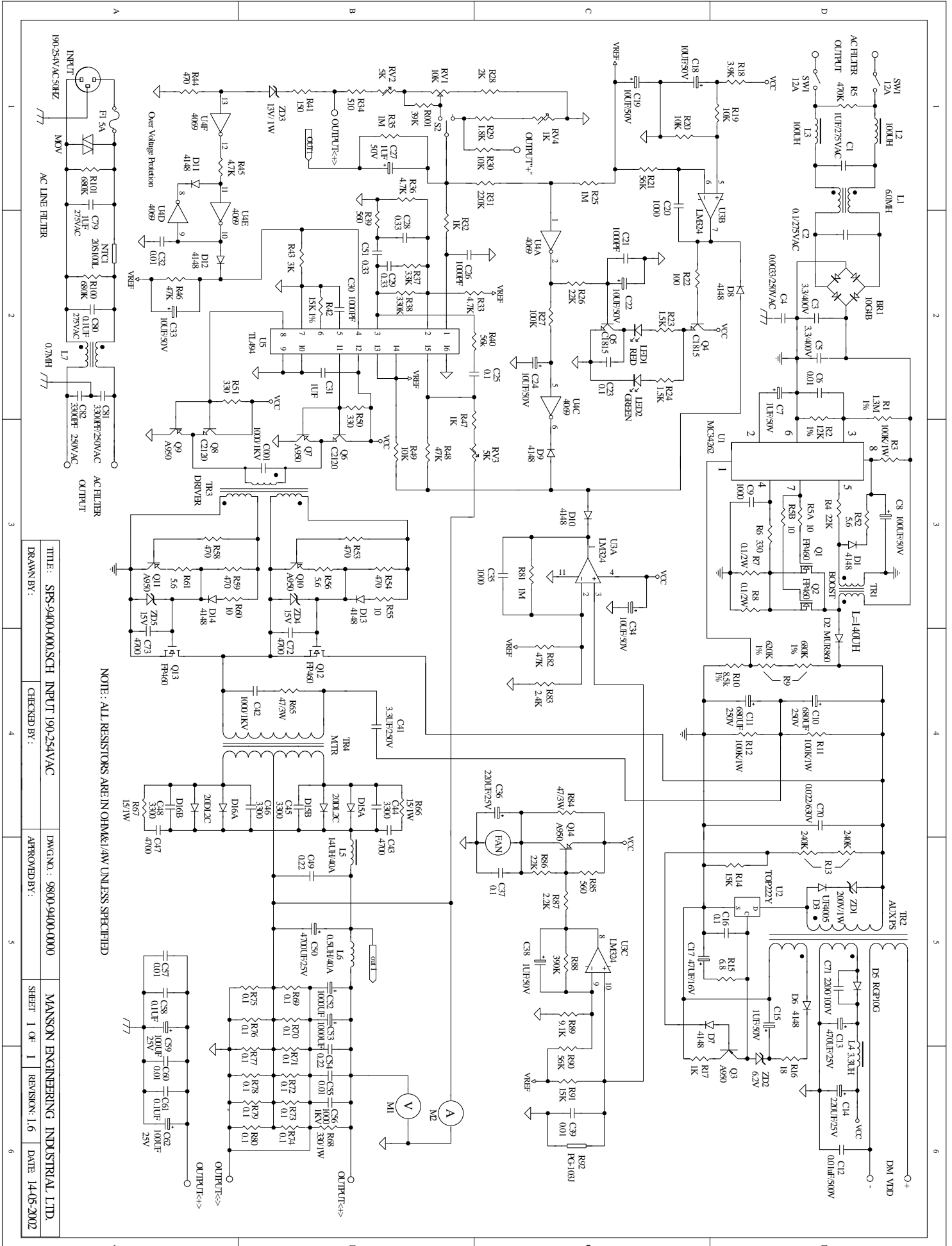
### **Remarks:**

1. The above procedures should be carried out in normal condition, if the SPS-9400 has abnormal condition (e.g. Unpleasant noise, smell , smoke, etc...), turns OFF the AC source at once.

### ***3. Trouble Shooting***

1. The Power Supply do not turn ON.
  - a. Switch off the unit.
  - b. Check the fuse if it is blown, replace with the same type of the fuse.
  - c. Check the AC Power Cord is firmly plugged into the AC socket of the Power Supply.
  - d. Switch on the unit again if problem persists.
2. Overload LED Indicator light up once the unit is turned ON.
  - a. Check if the loading current is not more than 40A, adjust the loading current of not more than 40A
  - b. Check if the output voltage is not more than 16.5V. The Over Voltage Protection is at 16.5V.
  - c. Check if the output is short circuit.
  - d. Switch off the unit, wait 30 minutes and switch it ON again to see if problem persists.

# 4.1 SCHEMATICS



NOTE: ALL RESISTORS ARE IN OHM&/K/4M UNLESS SPECIFIED

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET 1 OF 1	REVISION: 1.6	DATE: 14-05-2002
TITLE: SFS-9400-000SCH INPUT 190-254VAC			MANSION ENGINEERING INDUSTRIAL LTD.		
DWG NO.: 9800-9400-0000			DATE: 14-05-2002		



