*Maintenance Manual*
*LBI-38551*
*Rev. D, May-04*


# MASTR® II/III

## 12/24V Power Supply

19A149979P1 - 120 VOLT/60 Hz
19A149979P2 - 230 VOLT/50 Hz
19A149979P3 – 220VOLT/60 Hz

tyco Electronics

M/A-COM

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The 19A149979P1 power supply is UL recognized and repairs to this unit require only the use of materials listed in the parts list. After a repair, a hi-pot test should be performed to avoid the possibility of a short discharging the input into ground and possibly injure an operator or burn a building. This manual implies that it is possible to open the unit, check the problem, change the components according to the troubleshooting guide, close the unit and power on the system. After a replacement of components a functional and hi-pot test should be performed. This does not refer to replacing a fuse that does not require opening of the unit. **If anyone other than an authorized M/A-COM Service technician attempts to repair this unit, M/A-COM, Inc will assume no responsibility.**

## CREDITS

MASTR is a registered trademark of M/A-COM, Inc.
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## NOTE

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

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### TABLES



### FIGURES

# 1.0 SPECIFICATIONS[1]

| | |
|---|---|
| **OUTPUT VOLTAGE** | |
| Transmit and Receive Simultaneously | 26.0 VDC ±1.0 VDC @ 15 Amps (F801A)<br>13.0VDC ±0.5VDC @ 3Amps (J801) |
| Receive only | Less than 16VDC @ 3 Amps (J801) |
| **INPUT VOLTAGE** | 121 VAC ±20% (60 Hz version)<br>230 VAC ±15% (50 Hz version)<br>220VAC ±15% (60 Hz version) |
| **INPUT FREQUENCY** | 60 Hz ± 2 Hz (60 Hz version)<br>50 Hz ± 2 Hz (50 Hz version) |

**NOTE:** For every + 1.0% change in the input frequency, the output voltage will not vary more than + 1.6% from the output voltage measured at the nominal input line frequency.

| | |
|---|---|
| **INPUT LINE SURGE PROTECTION** | 150 V rated MOV (60 Hz version)<br>275 V rated MOV (50 Hz version) |
| **DUTY CYCLE (For 0-18 Amp Output)** | 100% (Continuous Duty) |
| **OUTPUT VOLTAGE RIPPLE** | Less than 100 mVp-p @ 25°C<br>Less than 200 mVp-p @ -30°C |
| **OUTPUT TRANSIENT RESPONSE** | |
| Overshoot | Not to exceed 30 Volts (F801A) |
| Undershoot | Not less than 22 Volts (F801A) |
| **EFFICIENCY** | 70% @ rated TX/RX load current and nominal line<br>voltage |
| **FUSE CAPABILITY** | |
| Input | 10 Amp (60 Hz version)<br>(2) 5 Amp (50 Hz version) |
| Output | 5 Amp (Low Current Port)<br>20 Amp High Current Port) |
| **DIMENSIONS (HxWxD)** | 5.25" x 19" x 10.35" |
| **WEIGHT** | 45 lbs. |
| **OPERATING ENVIRONMENT** | -30°C To + 60°C |

[1] These specifications are intended primarily for the use of the service personnel.

# 2.0 IMPORTANT SAFETY INFORMATION

The following conventions are used throughout this manual to alert the user to general safety precautions that must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions for with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. M/A-COM Inc. assumes no liability for the customer's failure to comply with these standards


The **WARNING** symbol calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING symbol until the conditions identified are fully understood or met.


The **CAUTION** symbol calls attention to an operating procedure, practice, or the like, which, if not performed correctly or adhered to, could result in damage to the equipment or severely degrade the equipment performance.


The **NOTE** symbol calls attention to supplemental information, which may improve system performance or clarify a process or procedure.

The **ESD** symbol calls attention to procedures, practices, or the like, which could expose equipment to the effects of **E**lectro-**S**tatic **D**ischarge. Proper precautions must be taken to prevent ESD when handling circuit modules.

1. SAVE THIS MANUAL - It contains important safety and operating instructions.
2. Before using the product, please follow and adhere to all warnings, safety and operating instructions located on the product and in the manual.
3. DO NOT expose product to rain, snow or other type of moisture.
4. Care should be taken so objects do not fall or liquids do not spill into the product.
5. DO NOT expose product to extreme temperatures.
6. DO NOT use auxiliary equipment not recommended or sold by the manufacturer. To do so may result in a risk of fire, electric shock or injury to persons.
7. To reduce risk of damage to electrical cord, pull by plug rather than cord when disconnecting unit.
8. Make sure the cord is located so it will not be stepped on, tripped over or otherwise

subjected to damage or stress.

9. An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:
    a. That pins on the plug of the extension cord are the same number, size and shape as those of the plug on the power supply.
    b. That the extension cord is properly wired in good condition.
    c. That the wire size is large enough for AC ampere rating of unit.
10. DO NOT operate unit with a damaged cord or plug. Replace the damaged cord immediately.
11. DO NOT operate this product in an explosive atmosphere unless it has been specifically certified for such operation.
12. To reduce risk of electric shock, unplug unit from outlet before attempting any maintenance or cleaning.
13. DO NOT operate this product with covers or panels removed.This unit does not contain any user serviceable components.
14. Use only fuses of the correct type, voltage rating and current rating as specified in the parts list. Failure to do so can result in fire hazard.
15. **GROUNDING AND AC POWER CORD CONNECTION** - To reduce risk of electrical shock use only a properly grounded outlet. The unit is equipped with an electric cord having an equipment - grounding conductor and a grounding plug. Be sure the outlet is properly installed and grounded in accordance with all local codes and ordinances.
16. **DANGER** - Never alter the AC cord or plug. Plug into an outlet properly wired by a qualified electrician. Improper connection or loss of ground connection can result in risk of an electrical shock.
17. The Model 19A149978P2 is for use on a circuit having a nominal rating of 230 VAC and is factory equipped with a specific electric cord to permit connection to an acceptable electric circuit. A plug meeting local electrical codes must be supplied by the customer. Make sure the unit is connected to an outlet having the same configuration as the plug. No adapter should be used with this unit.

**NOTE**

A ferroresonant power supply is designed to work specifically at a given frequency. The 60 and 50 Hz supplies should be used at their nominal frequency ±2 Hz.


The 19A149979P1 power supply is UL recognized and repairs to this unit require only the use of materials listed in the parts list. After a repair, a hi-pot test should be performed to avoid the possibility of a short discharging the input into ground and possibly injure an operator or burn a building. This manual implies that it is possible to open the unit, check the problem, change the components according to the troubleshooting guide, close the unit and power on the system. After a replacement of components a functional and hi-pot test should be performed. This does not refer to replacing a fuse that does not require opening of the unit. **If anyone other than an authorized M/A-COM Service technician attempts to repair this unit, M/A-COM, Inc will assume no responsibility.**

# 3.0 DESCRIPTION

The M/A-COM MASTR® II/III Base Station 12/24 Volt Power Supply provides up to 429 watts to power a MASTR II/III 800 or 900 MHz base station receiver, system circuitry, and transmitter. The nominal 12 volt output is actually 13.0 VDC and provides a maximum of 3 amperes to power the receiver and system circuitry. The nominal 24 volt output is actually 26.0 VDC and provides a maximum of 15 amperes to power the transmitter power amplifier.

The 60 Hz Model (19A149979P1) operates from a nominal 121 VAC, 60 Hz source. If a 208/220/240VAC, 60 Hz source is used, an external step-down transformer (similar to 19C307148P1) must be used with the '979P1 supply. The 50 Hz model (19A149979P2) provides the same output as the '979P1 supply, but operates from a nominal 230 VAC, 50 Hz source. The output voltage will change a maximum of +1.6% for each +1.0% change in the input line frequency. The 60 Hz model (19A149979P3) provides the same output as the 979P1&P2 supplies, but operates from a nominal 220 VAC, 60 Hz source.

**NOTE**

A ferroresonant power supply is designed to work specifically at a given frequency. The 60 Hz and 50 Hz supplies should be used at their nominal frequency ± 2 Hz.

The power supply step-down ferroresonant transformer provides excellent line voltage regulation. For the rated input line voltage range ( ±20% for P1, ± 15% for P2), the output voltage will not vary more than 2%. A ferroresonant power supply provides inherently excellent line voltage surge protection, and fewer parts for high reliability. No active semiconductor devices are used, which could reduce reliability.

The output voltages will vary depending on the load currents that the supply is being asked to source. As the load current rises, the output voltage will drop. Typical output voltages for various load currents are shown in Table 3-1.

**Table 3-1: Typical Output Voltages**

| LOAD CURRENT CONDITIONS | | 12 V OUTPUT | 24 V OUTPUT |
|---|---|---|---|
| TX AND RX SIMULTANEOUSLY | (15 + 3 AMPS) | ~13.0 VDC | ~26.0 VDC |
| RX ONLY | (0 + 3 AMPS) | <15.8 VDC | <29.0 VDC |
| NO LOAD | (0 + 0 AMPS) | <16.3 VDC | <30.0 VDC |

The operation and servicing of the power supply are completely accessible from the front. The ON/OFF switch and all fuses are located on the front panel. The low profile slot type fuse holders contain the primary fuse(s) F1 (F1 and F4 for P2), the high current output fuse F2, and the low current output fuse F3. The primary fuse(s) protect the input wiring to the ferroresonant transformer (one 10 amp fuse for P1, two 5 amp fuses for P2). The output fuses F2 (20 amps) and F3 (5 amps) provide external overload protection.

The 60 Hz supply provides a courtesy dual AC receptacle. The primary line current fuse (F1) also provides overcurrent protection for the dual receptacle. The 60 Hz supply draws 5 amps under nominal conditions and 7 amps under all conditions. Thus, the dual courtesy receptacles are rated for 3 amps.

# 4.0 CIRCUIT ANALYSIS

In the 60 Hz power supply (19A149979P1), the ON/OFF switch (S1) provides line voltage to the power supply through the primary line fuse F1. Line current flows through F1 to the courtesy receptacle prior to S1. This allows line voltage to always be available at the receptacles. Current then flows through the primary of stepdown transformer (T1) via the 200°C thermal fuse. The thermal fuse would only open in the unlikely event that an internal short would develop in the transformer. The varistor (VR1- 150 V rating) provides addition input line voltage suppression.

In the 50 Hz power supply (19A149979P2) and the 60 Hz power supply (19A149979P3), the ON/OFF switch (S1) is a DPST type switching both primary AC lines. In addition, both input lines have 5 amp fuses (F1 and F4). The varistor (VR1-275 V rating) provides additional input line voltage suppression. When power is applied, current flows through the primary of step-down transformer (T1) via the 200°C thermal fuse. As in the 60 Hz, 19A149979P1 model, the thermal fuse would only open if the transformer develops an internal short.

The step-down transformer (T1) is a ferroresonant type, which has inherently good input line voltage regulation. This eliminates the need for additional high current regulators. Capacitor C9 serves as a resonating capacitor across the secondary taps of the transformer.

The transformer steps the input voltage down to approximately 28 VAC across two secondary windings. Each winding drives two separate full wave bridge rectifiers consisting of D1A, D1B through D4A and D4B. The rectifiers are dual diode packages and are mounted on heat sink HS 1. During the first half of the period diodes D1B, D2A, D3B, and D4A are conducting and delivering current, which is summed at the input to the high current filter. During the second half of the period diodes D1A, D2B, D3A, and D4B are conducting and also delivering current, which is summed at the input to the high current filter. The high current filter consists of capacitors C1-C4, and C7, inductor L1, and resistor R1. It is designed to reduce the output ripple to less than 100 mV p-p for any current load up to 15 amps. It also keeps transient responses greater than 22 volts and less than 30 volts. Resistor R1 is a 30-ohm, 50 watt resistor that serves two functions. One, it acts as a bleeder resistor to discharge the capacitors when the supply is turned off. Two, it provides a minimum current load to prevent the output voltage from ever rising above 30 volts under any load condition. The high current filter sources up to 15 amps through the 20 amp fuse F2 to the high current output port F801A on the rear wall of the chassis. F801A-1 and F801A-2 are A + and A-, respectively, and connect to the transmitter power amplifier. The two secondary windings are also center tapped to produce a step-down voltage of around 14 VAC, which is also fed to the two full wave bridge rectifiers. During the first half of the period, diodes D2A and D4A provide a conduction path for current going to both the high current filter and the low current filter. During the second half of the period, diodes D1A and D3A provide the conduction path for current going to the high current filter and the low current filter. The low current filter consists of C5, C6, L2, and R2. It is designed to reduce the output ripple to less than 100 mV p-p for any current load up to 3 amps. It also keeps transient responses greater than 11 volts and less than 18 volts. Resistor R2 is a 100-ohm, 10 watt resistor that serves two functions. One, it acts as a bleeder resistor to discharge the capacitors when the supply is turned off. Two, it provides a minimum current load to prevent the output voltage from ever rising above 18 volts under any load condition. The low current filter sources up to 3 amps through the 5 amp fuse F3 to the low current output port J801 on the rear wall of the chassis. J801-1, 2,

3 and J801-4,5,6 are A+ and A-, respectively, and connect to the receiver and system circuitry.

The power supply is rated for a nominal 26.0 VDC for a 15 amp load out of F801A and for a nominal 13.0 VDC for a 3 amp load out of J801 (receiving and transmitting simultaneously). When receiving only (a 3 amp load out of J801) the output voltage is less than 15.8 VDC at J801 and less than 29.0 VDC at F801A.


**Figure 4-1: 60 Hz Power Supply (19A149979P1)**


**Figure 4-2: 50 Hz Power Supply (19A149979P2)**

**Figure 4-3: 60 Hz Power Supply (19A149979P3)**

# 5.0 MAINTENANCE

For disassembly, remove 8 screws and lift off top cover. Disassembly is required before working on the power supply. When replacing any component be certain to use an identical component. Thermal joint compound is required between diodes D1, D2, D3, and D4 and the heat sink.


To avoid electrical shock, disconnect power supply from the AC input power source before removing or replacing any component or assembly.

## 5.1 TROUBLE-SHOOTING

The troubleshooting procedure in Table 1 may be helpful in isolating a defective component or assembly in a malfunctioning power supply. When a component or assembly is identified as defective, replace the defective component with an identical component. Be sure to check associated circuitry for any other damaged components before applying power to the unit.

## 5.2 ADJUSTMENTS

This power supply has no adjustments or controls other than the ON/OFF switch.

## 5.3 INSTALLATION

The power supply is normally installed in an EIA 19-inch wide rack of a MII/III base station cabinet. It can also be installed in a 19-inch wide stand alone open rack.


Insure that ventilation holes in the unit are not obstructed when the unit is mounted or in operation.

## 5.4 FUSE REPLACEMENT

To replace a defective fuse, perform the following procedure:

1. Place ON/OFF switch to the OFF position.
2. For fuses F1 (F1 & F4 on 19A149979P2), F2, or F3; remove cap from fuse holder and replace fuse with a fuse of the same type and rating.


1. To avoid possible electric shock, DO NOT operate this power supply with the fuse cover removed.
2. No one should be permitted to handle any portion of the equipment that is supplied with high voltage, or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS.

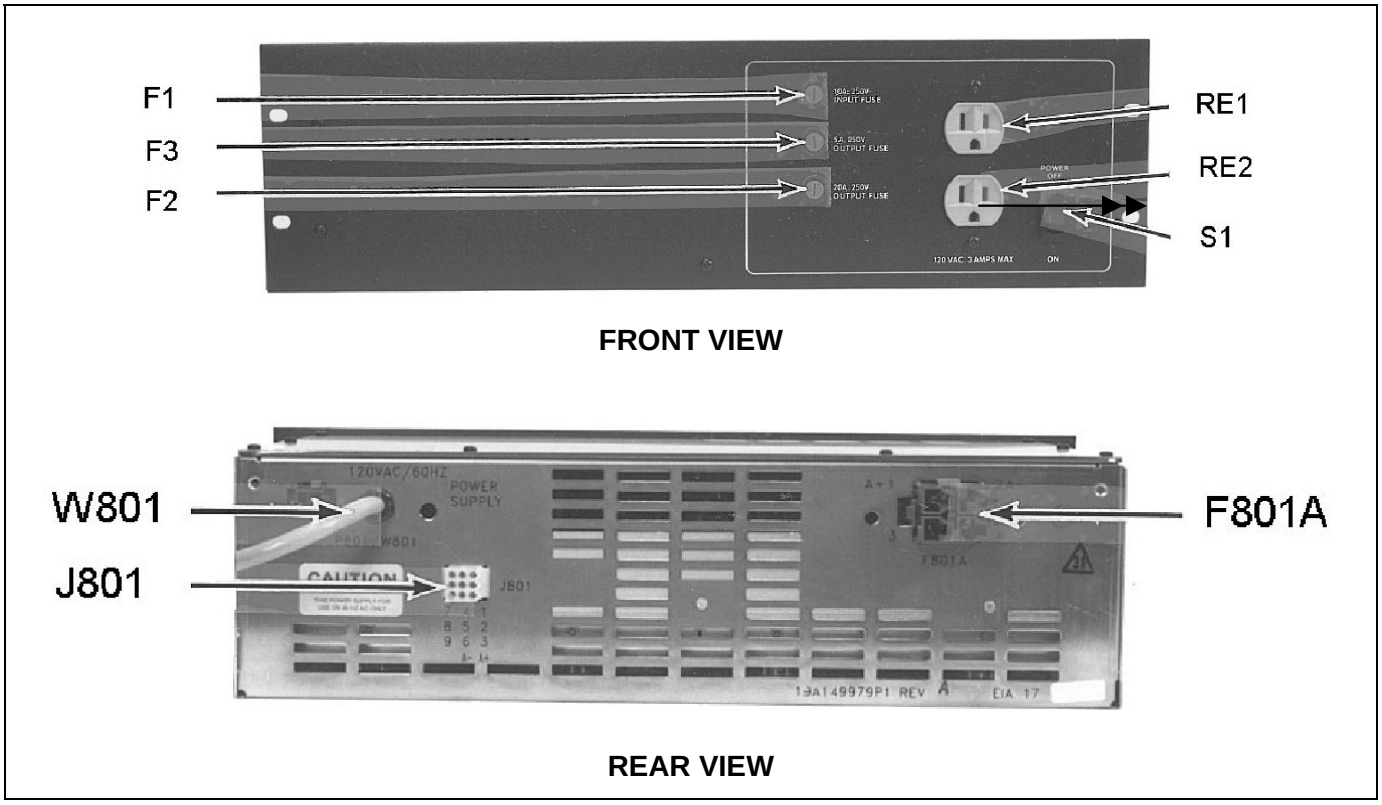



**Figure 5-1: Front and Rear View 60 Hz Power Supply (19A149979P1)**

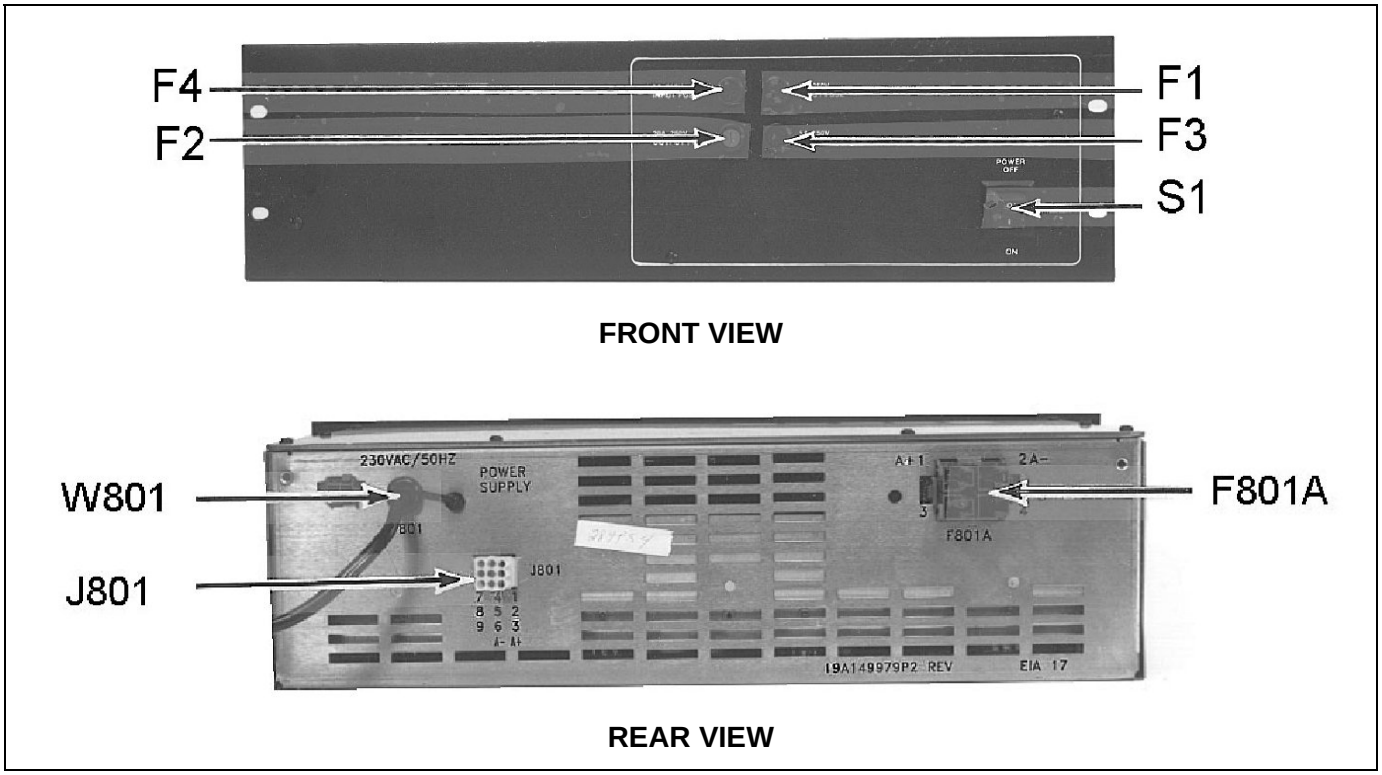



**Figure 5-2: Front and Rear View of 50 Hz Power Supply (19A149979P2)**

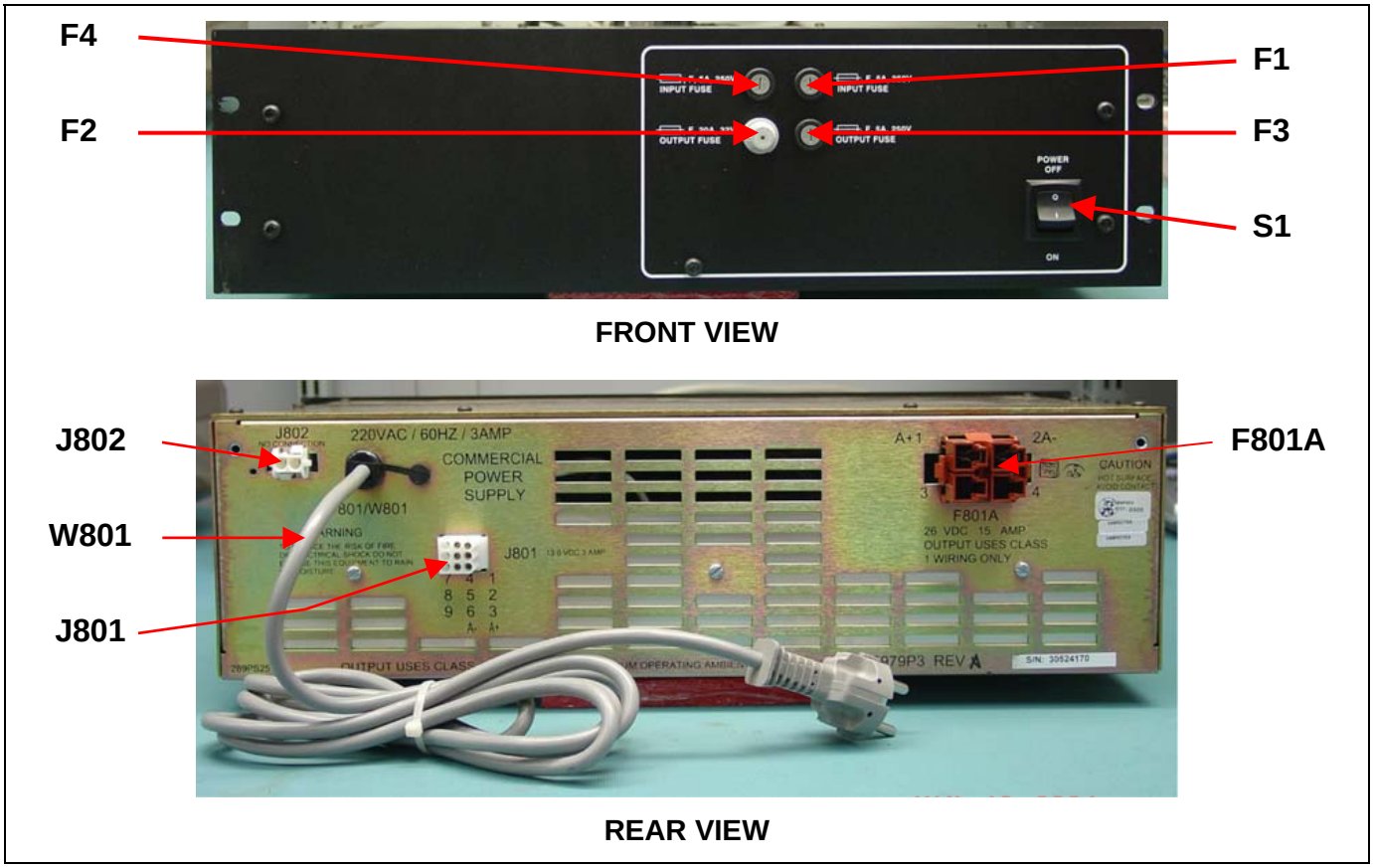



**Figure 5-3: Front and Rear View of 60 Hz Power Supply (19A149979P3)**

## 5.5 TROUBLESHOOTING PROCEDURES

**Table 5-1: Symptoms and Procedures for 60 Hz Power Supply 19A149979P1**

| SYMPTOM | PROCEDURE |
|---|---|
| No output voltage at J801 | Check the following:<br>1. Open F1, F3 or S1.<br>2. AC voltage on W801.<br>3. Open D1, D2, D3, or D4. |
| No output voltage at F801A | Check the following:<br>4. Open F1, F2 or S1.<br>5. AC voltage on W801.<br>6. Open D1, D2, D3, or D4. |
| Low output voltage on F801A.<br>0 < Vo < 25.0 VDC | Check the following:<br>7. If one of the dual diodes on D1, D2, D3, or D4 is shorted.<br>**NOTE**: All four diode packages contain two diodes each.<br>8. Line frequency < 60 Hz.<br>9. Load current greater than 15.0 amps. |
| Low output voltage on J801.<br>0 < Vo < 12.5 VDC | Check the following:<br>10. If one of the dual diodes on D1, D2, D3, or D4 is shorted.<br>**NOTE**: All four diode packages contain two diodes each.<br>11. Line frequency < 60 Hz.<br>12. Load current greater than 3.0 amps. |
| High output voltage on F801A<br>(>30.0 VDC) or J801 (>16.3 VDC). | Check the following:<br>13. R1 not connected between pos. 1 and 2 on F801A.<br>14. R2 not connected between pos. 1 and 4 on J801.<br>15. Line frequency >60 Hz. |

**Table 5-2: Symptoms and Procedures for 50 Hz Power Supply 19A149979P2**

| SYMPTOM | PROCEDURE |
|---|---|
| No output voltage at J801 | Check the following:<br>1. Open F1, F3, F4 or S1.<br>2. AC voltage on W801.<br>3. Open D1, D2, D3, or D4<br>**NOTE:** Diodes also referred to as CR1-CR4. |
| No output voltage at F801A | Check the following:<br>1. Open F1, F2 or S1.<br>2. AC voltage on W801.<br>3. Open diode D1, D2, D3, or D4. |
| Low output voltage on F801A.<br>0 < Vo < 25.0 VDC | Check the following:<br>1. If one of the dual diodes on D1, D2, D3, or D4 is shorted.<br>**NOTE**: All four diode packages contain two diodes each.<br>2. Line frequency < 60 Hz.<br>3. Load current greater than 15.0 amps. |
| Low output voltage on J801.<br>0 < Vo < 12.5 VDC | Check the following:<br>1. If one of the dual diodes on D1, D2, D3, or D4 is shorted.<br>**NOTE**: All four diode packages contain two diodes each.<br>2. Line frequency < 60 Hz.<br>3. Load current greater than 3.0 amps. |
| High output voltage on F801A<br>(>30.0 VDC) or J801 (>16.3 VDC). | Check the following:<br>1. R1 not connected between pos. 1 and 2 on F801A.<br>2. R2 not connected between pos. 1 and 4 on J801.<br>3. Line frequency >60 Hz. |
| No output voltage at F801A | Check the following:<br>1. Open F1, F2, F4 or S1.<br>2. AC voltage on W801.<br>3. Open D1, D2, D3, or D4. |
| Low output voltage on F801A.<br>0 < Vo < 25.0 VDC | Check the following:<br>1. If one of the dual diodes on D1, D2, D3, or D4 is shorted.<br>**NOTE**: All four diode packages contain two diodes each.<br>2. Line frequency < 50 Hz.<br>3. Load current greater than 15.0 amps. |

| SYMPTOM | PROCEDURE |
|---|---|
| Low output voltage on J801.<br>0 < Vo < 12.5 VDC | Check the following:<br>1. If one of the dual diodes on D1, D2, D3, or D4 is shorted.<br>**NOTE**: All four diode packages contain two diodes each.<br>2. Line frequency < 50 Hz.<br>3. Load current greater than 3.0 amps. |
| High output voltage on F801A<br>(>30.0 VDC) or J801 (>16.3 VDC). | Check the following:<br>1. R1 not connected between pos. 1 and 2 on F801A.<br>2. R2 not connected between pos. 1 and 4 on J801.<br>3. Line frequency >50 Hz. |

**Table 5-3: Symptoms and Procedures for 60 Hz Power Supply 19A149979P3**

| SYMPTOM | PROCEDURE |
|---|---|
| No output voltage at J801 | Check the following:<br>1. Open F1, F3 or S1.<br>2. AC voltage on W801.<br>3. Open CR1, CR2, CR3, or CR4. |
| No output voltage at F801A | Check the following:<br>1. Open F1, F2 or S1.<br>2. AC voltage on W801.<br>3. Open CR1, CR2, CR3, or CR4. |
| Low output voltage on F801A.<br>0 < Vo < 25.0 VDC | Check the following:<br>1. If one of the dual diodes on CR1, CR2, CR3, or CR4 is shorted.<br>**NOTE**: All four diode packages contain two diodes each.<br>2. Line frequency < 60 Hz.<br>3. Load current greater than 15.0 amps. |
| Low output voltage on J801.<br>0 < Vo < 12.5 VDC | Check the following:<br>1. If one of the dual diodes on CR1, CR2, CR3, or CR4 is shorted.<br>**NOTE**: All four diode packages contain two diodes each.<br>2. Line frequency < 60 Hz.<br>3. Load current greater than 3.0 amps. |
| High output voltage on F801A<br>(>30.0 VDC) or J801 (>16.3 VDC). | Check the following:<br>1. R1 not connected between pos. 1 and 2 on F801A.<br>2. R2 not connected between pos. 1 and 4 on J801.<br>3. Line frequency >60 Hz. |

# 6.0 PARTS LIST[2]

## 6.1 12/24 VDC, 121VAC, 60 Hz POWER SUPPLY 19A149979P1

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | - - - - CAPACITOR - - - - |
| C9 (Item #8) | M29/17032400 | Polypropylene: 8 µF, 660VAC, similar to Ronken P61A24805H05. |
| | | - - - - CONNECTOR - - - - |
| J801 | M29/40027400 | Connector: 9 position; sim to Molex 03-09-1091. |
| | | - - - - RESISTOR - - - - |
| R1 (Item #5) | M29/16012302 | Wirewound Resistor: 30 ohms, 50 w; similar to IRC PW-50E-30OHMS-5% (with bracket). |
| | | - - - - TRANSFORMER - - - - |
| T1 (Item #4) | M29/289CV3 | Ferro-Resonant Transformer. |
| | | - - - - WIRE HARNESS - - - - |
| W1 | | From E1 on PCB to rear terminal of fuse holder F1. |
| W2 | | Ground lead on J1 to chassis ground stud. |
| W3 | | White lead on J1 to TB7 on PCB. |
| W4 and W5 | | Part of front panel 9H910463001. |
| W6 | | From E3 on PCB to piggy back terminal of W5 on bottom of switch S1. |
| W7 | 250074313 | From top terminal on switch S1 to terminal 4 of transformer T1. |
| W8 | | From E4 on PCB to terminal 1 of transformer T1. |
| W9 | 250074315 | From terminal 2 of transformer T1 to terminal 3 of T1. |
| W10 | | From E5 to E6 on PCB. |
| W11 | | From E9 on PCB to inside terminal of resistor R1. |
| W12 | | From E10 on PCB to outside terminal of R1. |
| W13 | | From E12 on PCB to end terminal of fuse holder F3. |

[2] COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| W14 | | From terminal 1 of connector F801A to side terminal of fuse holder F2. |
| W15 | | From terminal 2 of F801A to TB8 on PCB. |
| W16 | | Red lead from J801 to side terminal of fuse holder F3. |
| W17 | | Black Lead from J801 to E13 on PCB. |
| W18 | | From E8 on PCB to end terminal of fuse holder F2. |
| W801 | M29/11022301 | Power Cord. |
| | | - - - - MISCELLANEOUS - - - - |
| Item #3 | 070698702 | Case |
| Item #7 | M29/05065600 | Bracket for capacitor C9. |
| Item #9 | M29/22043200 | Nylon Standoff: Quantity 7; Used to separate PCB from case. |
| Item #10 | M29/11022000 | Strain relief, black similar to Heyco 1200. To secure W801 to case. |
| Item #11 | 11022301 | Power Cord. |
| Item #12 | 72067900 | Terminal boot. |
| Item #13 | 31024000 | Insulator (Not shown – goes on C1 thru C4 and C6 and C7. |
| Item #14 | M29/07062201 | Top Cover. |
| Item #15 | M29/22041501 | Hex nut: No. 6-32 x .250, quantity 10; used to secure PCB. |
| Item #16 | 11024500 | Ty-Wraps |
| Item #17 | 22046400 | Screw: 3.5 mm. |
| | M29/22043800 | Machine screw, TORX head: 3.5m x 1/2; Quantity 8; similar to Camcar/Textron Inc. Secures cover. |
| Item #18 | M29/22041503 | Nut: No. 10-32, quantity 4; used to secure terminal lugs to PCB. |
| Item #19 | M29/22041502 | Hex nut: No. 8-32, quantity 4; secures C9, R1, and ground wire to case. |
| Item #20 | 22008207 | Nut: #8-32. |
| Item #21 | M29/22041504 | Nut: 1/4-20 x 7/16, quantity 4; secures T1 to case. |
| Item #23 | M29/22044600 | Machine screw, hex head; No. 8-32 x 5/8" secures C9 to case. |
| Item #24 | 40028400 | Plug: Housing (Blank). |
| Item #25 | 35002900 | Pad: 3” x 6” x 3/16”. |
| Item #26 | 43019000 | High temperature RTV. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| Item #27 | 220496205 | Washer: #10 |
| Item #28 | 22049500 | Screw: #10-32 x 3/8", Tork. |
| Item #29 | 22010305 | Washer: #6 internal tooth LW. |
| Item #30 | 22009003 | Screw: #6-32 x 0.312. |
| Item #31 | 43017000 | Cement RTV 6700 |
| Item #32 | 51092475-000 | Label |
| Item #2 | M29/07063000 (Old Number) | **FRONT PANEL 9H910463001** Assembly includes the following: |
| | 83070684000 | Front Panel (Blank). |
| | 821090172PE (M29/09014200) | Fuse Holder, screwdriver slot design: similar to Bussman "HTB-96I". (Used with F1 and F2). |
| | 821090215PE (M29/09014200) | Fuse Holder. (Used with F3). |
| F1 | 821157200PE (M29/09013901) | Fuse: 10 Amp: sim to AGC10, 6.3x32 F. (Old number M29/09013901). |
| F2 | 821090214PE (M29/09013903) | Normal Blow Fuse: 20 amps, 32V; similar to Bussman AGC-20. |
| F3 | 821097100PE (M29/09016300) | Slow Blow Fuse: 5 amps, 250V; similar to Bussman MDL-5. |
| J1 | 81525013000 | AC Receptacle. power, 3 wire grounding, 15 amps at 125V. (Previously RE1 and RE2 M29/40027800). |
| | 81622043800 | Screw: 3.5 x 10mm PHTXTT. |
| | 81622010305 | Washer. Split lock washer #6, zinc. Secures J1 |
| | 81622044500 | Nut: to M3.5 6MMAF HEX ZN. Secures J1. |
| W4 | 81525007430 | Black wire from AC receptacle piggy backed with black wire W5 at side terminal of fuse holder F1. |
| W5 | 81525007430 | Black wire from switch S1 to side terminal of fuse holder F1.. |
| F801A (Item #6) | 81525013100 | Connector: 4 position; sim to AMP 641685-2 (Old number M29/40028600) |
| S1 | 82191100000 (M29/20003300) | Switch: SPST, 16 amps, 125V switch; similar to Carling RA911VB-B-0-V. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| Item #1 | | **HEAT SINK / PCB ASSEMBLY M29/91034501**<br>Assembly includes the following: |
| | | - - - - CAPACITORS - - - - |
| C1 thru C4 | M29/17034301 | Aluminum electrolytic: 27000 µF, 40V. |
| C5 | M29/17034300 | Aluminum electrolytic: 33000 µF, 25V; sim to UCC KME25VB333M35X50LL. |
| C6 | M29/17031500 | Aluminum electrolytic: 27000 µF, 25V; sim to UCC KME25VB273M35X50LL. |
| C7 | M29/17034301 | Aluminum electrolytic: 27000 µF, 40V. (Rev. B & later). |
| | | - - - - RECTIFIERS - - - - |
| D1 thru D4 | M29/18030500 | Dual Schottky Rectifier: 30 amps, 150V; similar to GI FED30CP. |
| | | - - - - CHOKES - - - - |
| L1 | M29/289C5 | Output Choke: 0.7mH, 15 amps. |
| L2 | M29/289FC4 | Output Choke: 0.4mH, 3 amps. |
| | | - - - - VARISTOR - - - - |
| MOV1 | M29/18008013 | Varistor: 150V, 80j metal oxide. |
| | | - - - - RESISTOR - - - - |
| R2 | M29/116013800 | Resistor: 100 ohm 10%, 10 watt. |
| | | - - - - TERMINALS - - - - |
| TB1 thru TB11 | M29/13048100 | FASTON tabs; similar to Amp 62650-1. |
| | | - - - - MISCELLANEOUS - - - - |
| | M29/22045500 | Pem stud: #10-32. Quantity 4, secures PCB. |
| | M29/22041503 | Keeper Nut: #10-32, 1/8" thick. Quantity 4, secures PCB. |
| | M29/22046700 | Rivet: Quantity 2, secures L1. |
| | M29/22025001 | Flat washer: #10. Quantity 2, secures L1. |
| | M29/11024400 | Heatsink. |
| | M29/31016703 | Heat Transfer Pad: To insure good thermal conductivity between D1-D4 and heat sink. |
| | M29/22027710 | Hex head screw: No. 4-40 x .5; quantity 4, used to secure D1-D4 to heat sink. |

## 6.2 12/24 VDC, 230 VAC, 50 Hz POWER SUPPLY 19A149979P2

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | - - - - CAPACITORS - - - - |
| C9 | M29/17032400 | Polypropylene: 8 µF, 660VAC, similar to Ronken P61A24805H05. |
| | | - - - - FUSES - - - - |
| F1 | M29/09016000 | Normal Blow Fuse: 5 amps, 250V; similar to Bussman GDA-5. |
| F2 | M29/09013903 | Normal Blow Fuse: 20 amps, 32V; similar to Bussman AGC-20. |
| F3 and F4 | M29/09016300 | Normal Blow Fuse: 5 amps, 250V; similar to Bussman GDA-5. |
| | | - - - - FUSE HOLDER & BLOCKS - - - - |
| | M29/09016100 | Fuse Holder, screwdriver slot design: similar to Bussman "HTB-96M". (Used with F1, F3, and F4). |
| | M29/09014200 | Fuse Holder, screwdriver slot design: similar to Bussman "HTB-96I". (Used with F2). |
| | | - - - - CONNECTORS - - - - |
| F801A | M29/40028600 | Connector: 4 position; sim to AMP 641685-2. |
| J801 | M29/40027400 | Connector: 9 position; sim to Molex 03-09-1091. |
| | | - - - - RESISTORS - - - - |
| R1 | M29/16012302 | Wirewound Resistor: 30 ohms, 50 w; similar to IRC PW-50E-30OHMS-5% (with bracket). |
| | | - - - - TRANSFORMER - - - - |
| T1 | M29/289CV4 | Ferro-Resonant Transformer. |
| | | - - - - WIRE HARNESS - - - - |
| W1 thru W30 | M29/289LW4 | Wiring Harness. |
| W801 | M29/11023800 | Power Cord. |
| | | - - - - MISCELLANEOUS - - - - |
| | M29/07062200 | Top Cover. |
| | | - - - - FRONT PANEL- - - - |
| | 83070685000 | Front panel. |
| | 8152500743F | Lead and terminal assembly. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | - - - - SWITCH - - - - |
| S1 | 82120003900 (M29/20003900) | DPST: sim to RGSCC-711-R-B-B-E.. |
| | | - - - - FUSE - - - - |
| | 821090170PE | Holder: sim to HTB-36M. |
| F1 thru F4 | 821097100PE | 5 Amp: sim to |
| | 821090215PE | Holder: sim to 342024. |
| F2 | 821090214PE | 20 Amp. |
| F801A | 81525013100 | Connector Assembly. |
| | M29/22043800 | Machine screw, TORX head: 3.5M x 1/2; Quantity 8; Secures cover. |
| | M29/22044600 | Machine screw, hex head; No. 8-32 x 5/8" secures C9 to case. |
| | M29/22041502 | Hex nut: No. 8-32, quantity 4; secures C9, R1, and ground wire to case. |
| | M29/05065600 | Bracket for C9 |
| | M29/22041501 | Hex nut: No. 6-32 x .250, quantity 10; used to secure PCB. |
| | M29/22043201 | Nylon Standoff: Quantity 7; Used to separate PCB from case. |
| | M29/11023900 | Strain relief, black similar to Heyco 3772. To secure W801 to case. |
| | M29/22041504 | Nut: 1/4-20 x 7/16, quantity 4; secures T1 to Case. |
| | M29/22041503 | Nut: No. 10-32, quantity 4; used to secure terminal lugs to PCB. |
| | | **HEAT SINK / PCB ASSEMBLY M29/11024300** Assembly includes the following: |
| | | - - - - CAPACITORS - - - - |
| C1 thru C4 | M29/17034301 | Aluminum electrolytic: 27000 µF, 40V. |
| C5 | M29/17034300 | Aluminum electrolytic: 33000 µF, 25V; sim to UCC KME25VB333M35X50LL. |
| C6 and C7 | M29/17034301 | Aluminum electrolytic: 27000 µF, 40V. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | - - - - RECTIFIERS - - - - |
| D1 thru D4 | M29/18030500 | Dual Schottky Rectifier: 30 amps, 150V; similar to GI FED30CP. (Also referred to as CR1-CR4) |
| | | - - - - CHOKES - - - - |
| L1 | M29/289C5 | Output Choke: 0.7mH, 15 amps. |
| L2 | M29/289FC4 | Output Choke: 0.4mH, 3 amps. |
| | | - - - - RESISTORS - - - - |
| R2 | M29/116013800 | 100 Ohm 10%, 10 watt. |
| | | - - - - VARISTOR - - - - |
| MOV1 | M29/18008011 | 275V, 55j metal oxide. |
| | | - - - - - TERMINALS - - - - |
| TB1 thru TB11 | M29/13048100 | FASTON tabs; similar to Amp 62650-1. |
| | | - - - - MISCELLANEOUS - - - - |
| | M29/22045500 | Pem Stud: #10-32. Quantity 4, secures PCB. |
| | M29/22041503 | Keeper Nut: # 10-32, 1/8" thick. Quantity 4, secures PCB. |
| | M29/22046700 | Rivet: Quantity 2, secures L1. |
| | M29/22025001 | Flat washer: #10. Quantity 2, secures L1. |
| | M29/11024400 | Heatsink. |
| | M29/31016703 | Heat Transfer Pad: To insure good thermal conductivity between D1-D4 and heat sink. |
| | M29/22027710 | Hex head screw: No. 4-40 x .5, quantity 4, used to secure D1-D4 to heat sink. |

## 6.3 12/24 VDC, 220 VAC, 60Hz POWER SUPPLY 19A149979P3

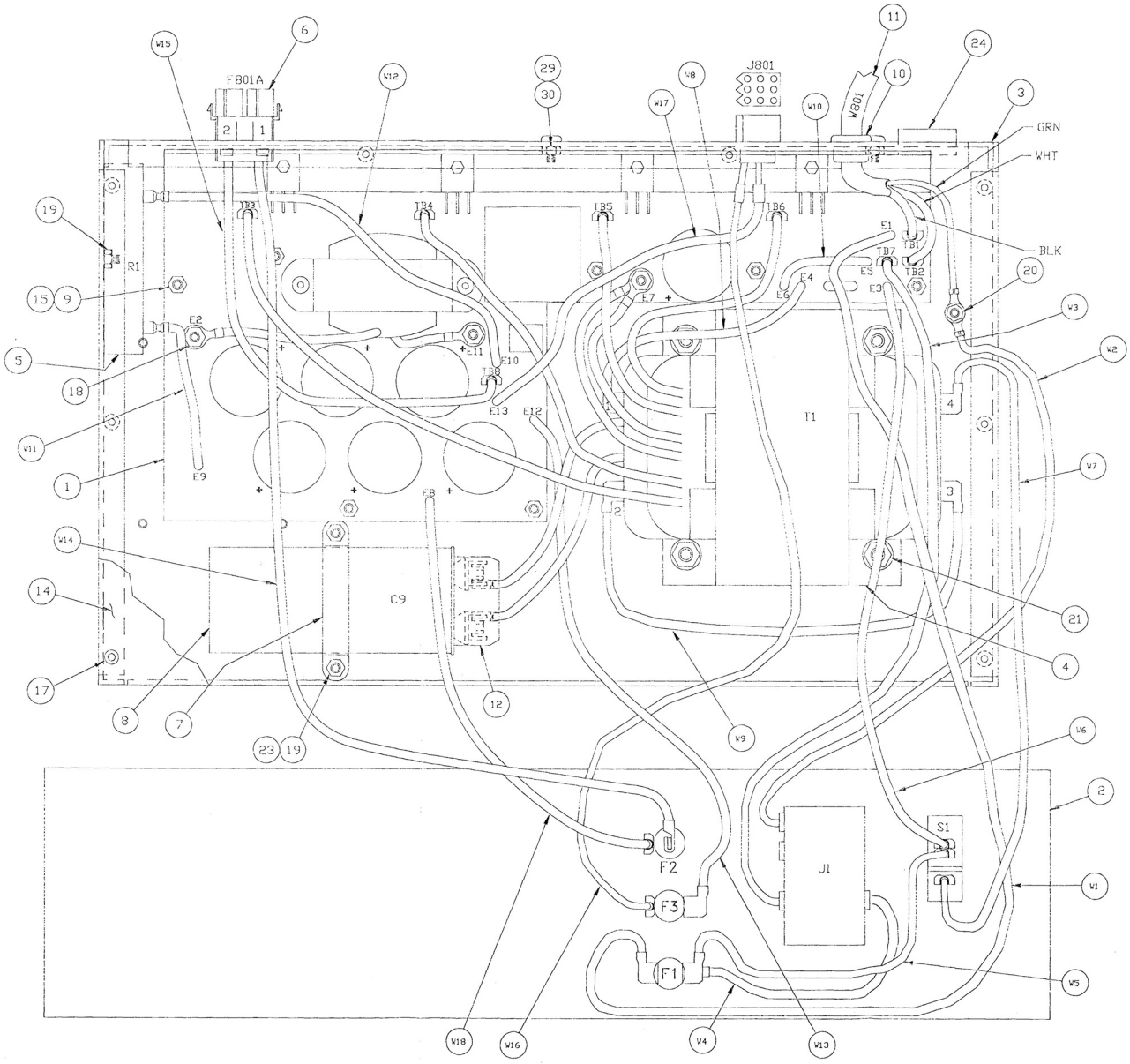
| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | - - - - CAPACITORS - - - - |
| C9 | 801000276PE | Polypropylene: 8 µF, 660VAC, similar to Ronken P61A24805H05. |
| | | - - - - RESISTORS - - - - |
| R1 | 8113000550P | Wirewound Resistor: 30 ohms, 50 W; similar to IRC PW-50E-30OHMS-5% (with bracket). |
| | | - - - - TRANSFORMER - - - - |
| T1 | 83289CV9001 | Ferro-Resonant Transformer (50 Hz). |
| | | - - - - WIRE HARNESS - - - - |
| W7 | 81525074324 | Lead Wire Assembly |
| W9 | 81525074315 | Lead Wire Assembly |
| | | - - - - FRONT PANEL - - - - (9H910464001) |
| | 83070685000 | Front panel. |
| | 8152500743F | Wire: Black. |
| | | - - - - SWITCH - - - - |
| S1 | 82120003900 | DPST: sim to RGSCC-711-R-B-B-E.. |
| | | - - - - FUSE - - - - |
| | 821090170PE | Holder: sim to HTB-36M. |
| F1 | 821097100PE | 5 Amp, 250V, Normal Blow: sim to Bussman GDA-5. |
| F2 | 821090214PE | 20 Amp, 32V, Normal Blow: sim to Bussman AGC-20. |
| F3 and F4 | 821097100PE | 5 Amp, 250V, Normal Blow: sim to Bussman GDA-5. |
| | 821090215PE | Fuse Holder: sim to 342024. |
| F801A | 81525013100 | Connector Assembly. |
| | | - - - - MISCELLANEOUS - - - - |
| | 81622049500 | Screws (Qty. 5). |
| | 83110245000 | Tywraps (Qty. 5). |
| | 81535002900 | Pad. |
| | 83310240000 | Insulator. |
| | 83070622010 | Cover. |
| | 81622046400 | Screws (Qty. 8). |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | PCB ASSEMBLY |
| | 833303680 | Printed Circuit Board. |
| | | - - - - CAPACITORS - - - - |
| C1 thru C4 | 801000281PE | Aluminum electrolytic: 27000 µF, 40V. |
| C5 and C6 | 801000280PE | Aluminum electrolytic: 33000 µF, 25V; sim to UCC KME25VB333M35X50LL. |
| C7 | 801000281PE | Aluminum electrolytic: 27000 µF, 40V. |
| | | - - - - RECTIFIERS - - - - |
| CR1 thru CR4 | M29/18030500 | Dual Schottky Rectifier: 30 amps, 150V; similar to GI FED30CP. |
| | | - - - - CHOKE - - - - |
| L1 | 83289C50000 | Choke |
| L2 | 83289FC4000 | Output Choke: 0.4mH, 3 amps. |
| | | - - - - RESISTORS - - - - |
| R2 | 8111010510P | 10 Ohm, 10%, 10 watt. |
| | | - - - - VARISTOR - - - - |
| VR1 | 814023240PE | 150V: sim to V275LA20A. |
| | | - - - - - LEAD ASSEMBLIES - - - - |
| E1 | 8152500743E | W12. |
| E3 | 8152500743D | W5. |
| E4 | 815250074314 | W8. |
| E5 | 815250074312 | W2. |
| E6 | 8152500743E | W12. |
| E8 | 8152500743C | W8. |
| E9 | 81525007439 | W11. |
| E10 | 8152500743E | W12. |
| E12 | 81525007439 | W12. |
| E13 | 81525013300 | W17. |
| W7 | 81525074324 | Lead Wire Assembly. |
| W9 | 81525074315 | Lead Wire Assembly. |
| | | - - - - MISCELLANEOUS - - - - |
| | 83070697030 | Chassis. |
| | 83070622010 | Cover. |
| | 83110239000 | Strain Relief. |
| | 83110271000 | Power Cord Assembly. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | 83310240000 | Insulator. |
| | 81622046700 | Rivet (Qty. 2). |
| E2, E7 and E11 | 83322045500 | Perm Stud; (Qty. 3). |
| TB1 thru TB8 | 820130618 | Faston Tabs (Qty. 8). |
| | 81622041501 | Nut: Printed Wire Board (Qty. 7). |
| | 81622041502 | Nut: Bottom cover, Ground Stud and Capacitor U9 Bracket and Resistor R1 bracket (Qty. 4). |
| | 81622041503 | Nut: #10-32; goes on, E2, E7 and E11 (Qty. 3). |
| | 81622041504 | Nut (Transformer T1) |
| | 81505065600 | Bracket (Capacitor C9). |
| | 81622044600 | Screws: Bracket for C9 (Qty. 2). |
| | 81622009003 | Screws: Rear of chassis (Qty. 3). |
| | 81622046400 | Screw: Fastens top cover (Qty. 8). |
| | 81622049500 | Screw: Fastens front panel (Qty.5). |
| | 81622010305 | Washer: Goes with screws in rear of chassis (Qty. 3). |
| | 81622043200 | Standoffs, Printed Wire Board (Qty. 7) |
| | 81572067900 | Terminal Boot (Goes over end of C9). |

# 7.0 ASSEMBLY DIAGRAMS

## 7.1 12/24 VDC, 121VAC, 60 Hz POWER SUPPLY 19A149979P1



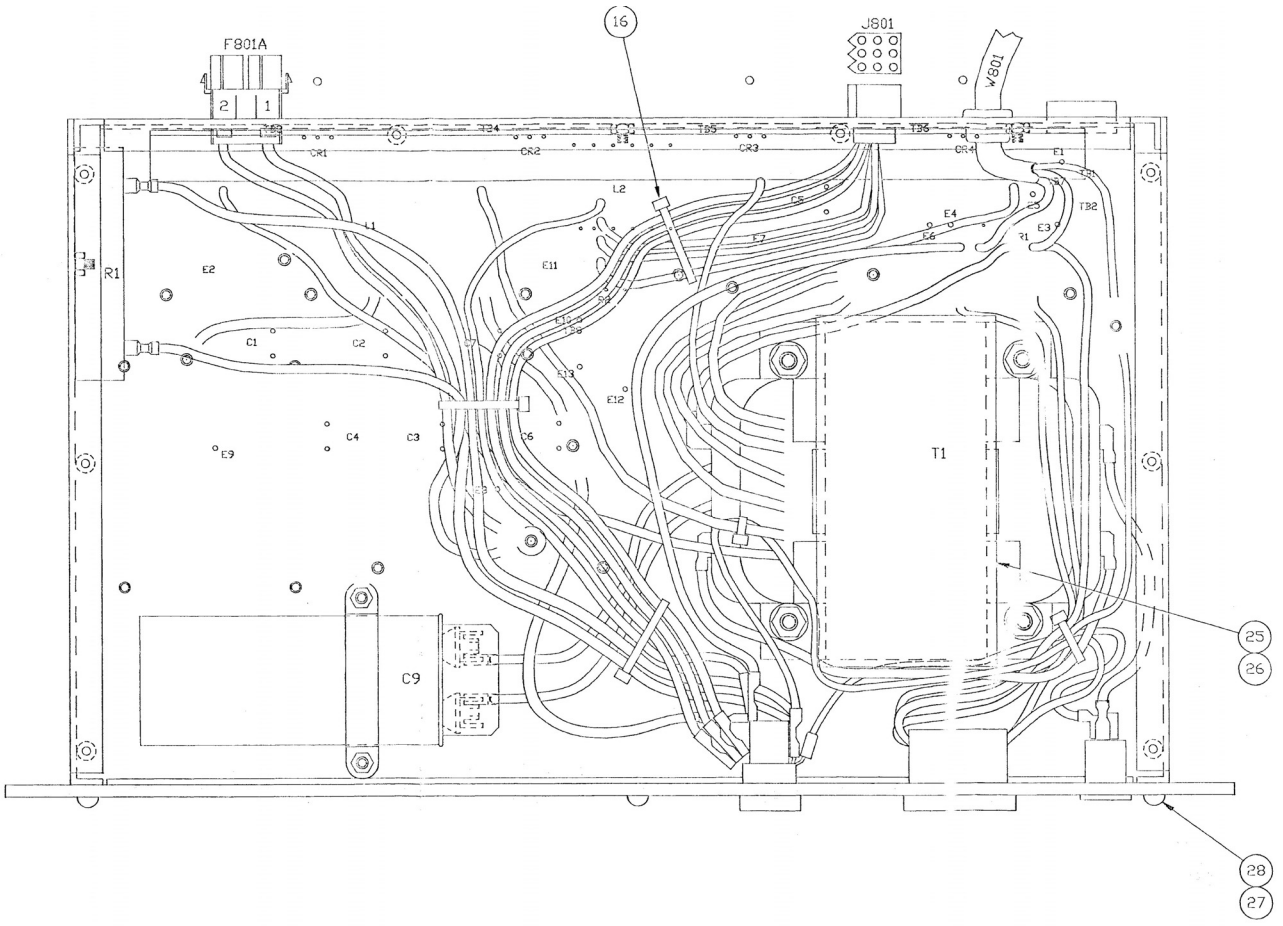

NOTES:

[1] STAMP MOST RECENT REVISION CODE FROM 'MAGNETEK POWER SUPPLY AND CHARGER REVISION CHANGES' IN THIS AREA USING AERO BRAND INK #1250, BLACK (STOCK #7400)

[2] STAMP DATE CODE (XXYY) IN THIS AREA USING AERO BRAND INK #1250, BLACK (STOCK #7400)
XX = YEAR
YY = WEEK OF THE YEAR

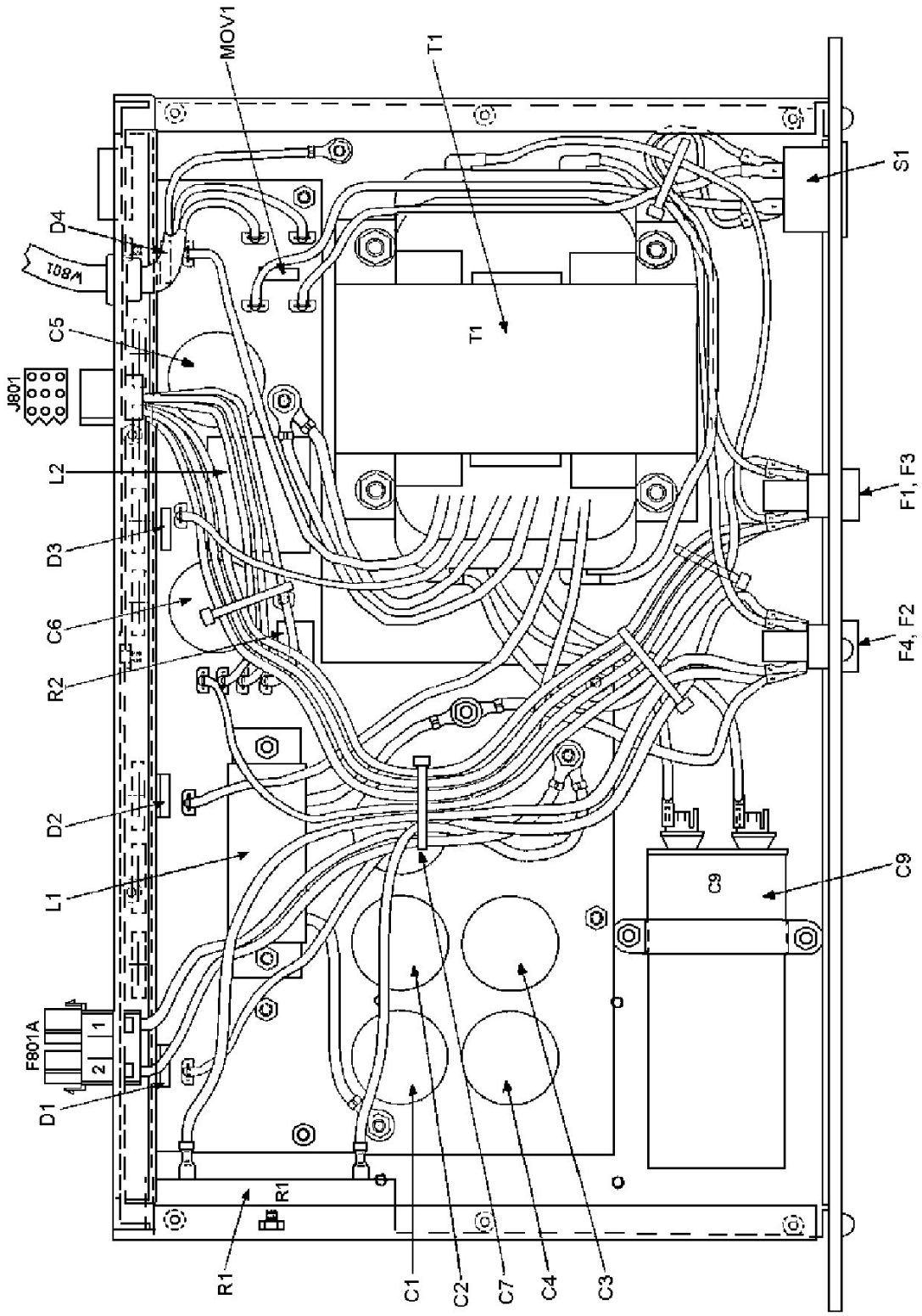
| ITEM # | DESCRIPTION | TORQUE IN/LB |
|---|---|---|
| 17, 30 | 3.5M SCREW | 6-8 |
| 18 | 10-32 NUT | 18-20 |
| 15 | 6-32 NUT | 6-8 |
| 21 | 1/4-20 NUT | 28-32 |
| 20 | 8-32 NUT | 14-16 |
| 19, 23 | 8-32 NUT KEEPER | 14-16 |
| 28 | 10-32 SCREW | 18-20 |

*(289PS15, Sh. 1, Rev. T)*



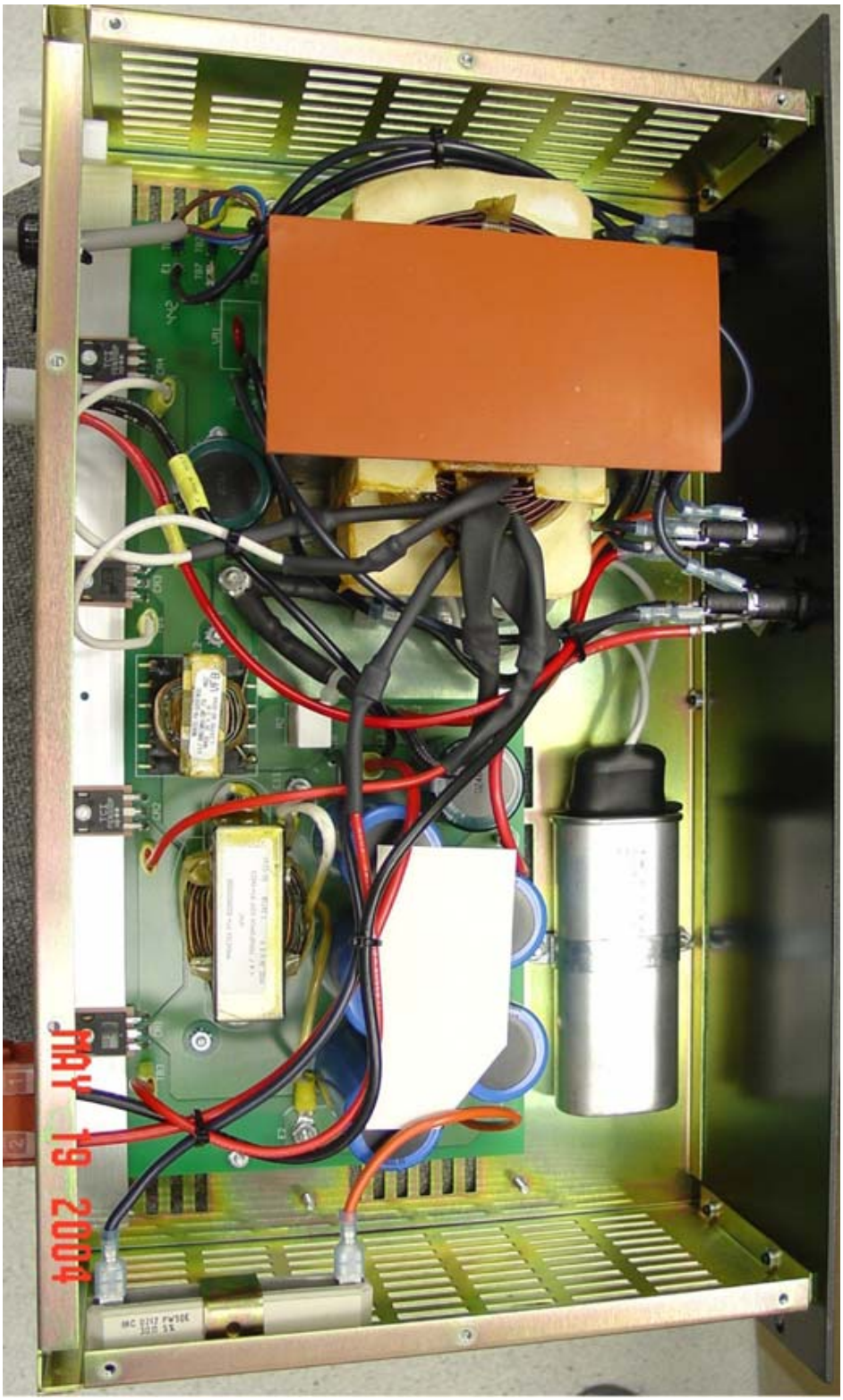

*(289PS15, Sh. 2, Rev. T)*

## 7.2 12/24 VDC, 230VAC, 50 Hz POWER SUPPLY 19A149979P2



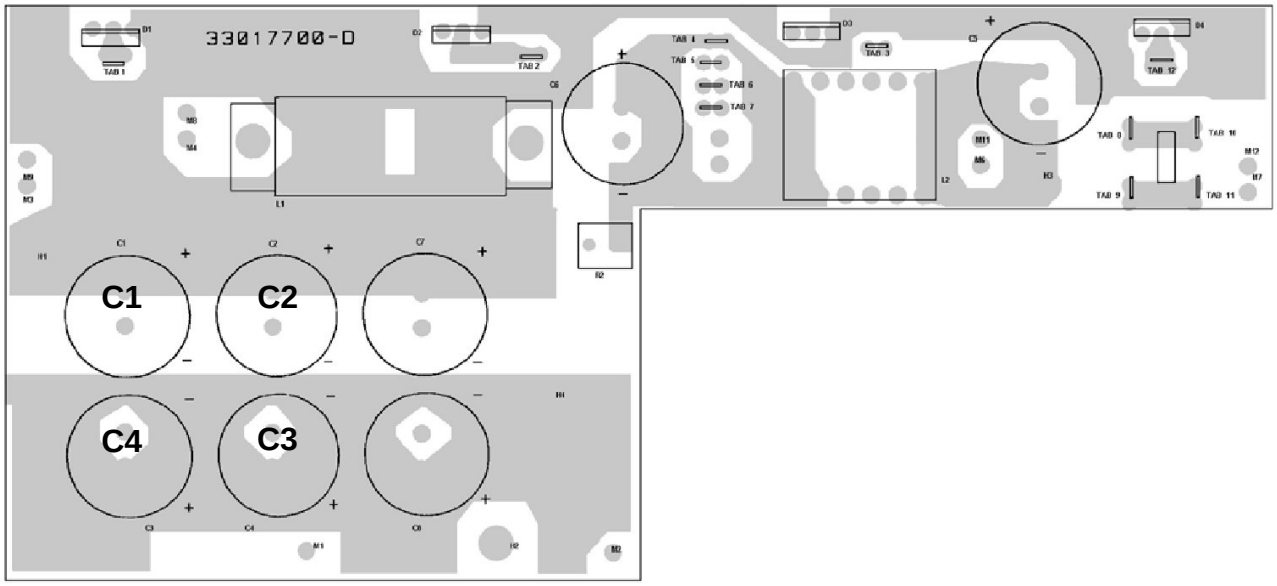

*(289PS16, Sh. 1, Rev. T)*

## 7.3 12/24 VDC, 220VAC, 60 Hz POWER SUPPLY 19A149979P3



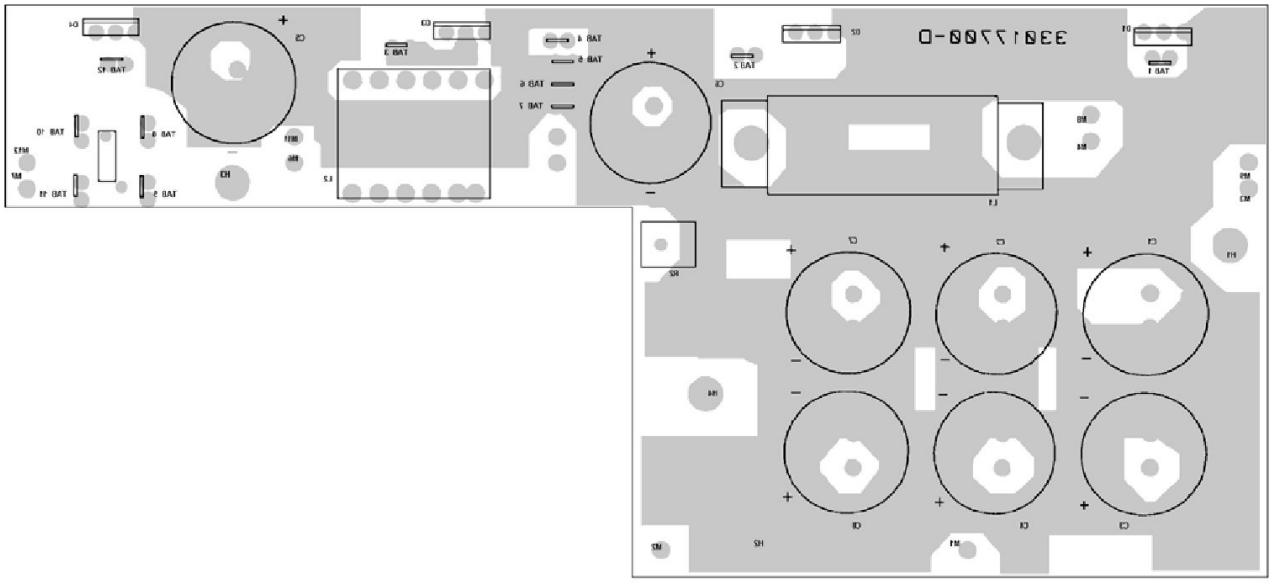
# 8.0 OUTLINE DIAGRAM

## 8.1 PRINTED CIRCUIT BOARD 50 Hz AND 60 Hz MODELS (19A149979P1 & P2)




(*33017704, Sh. 1)*
*(33017700, Sh. 1)*

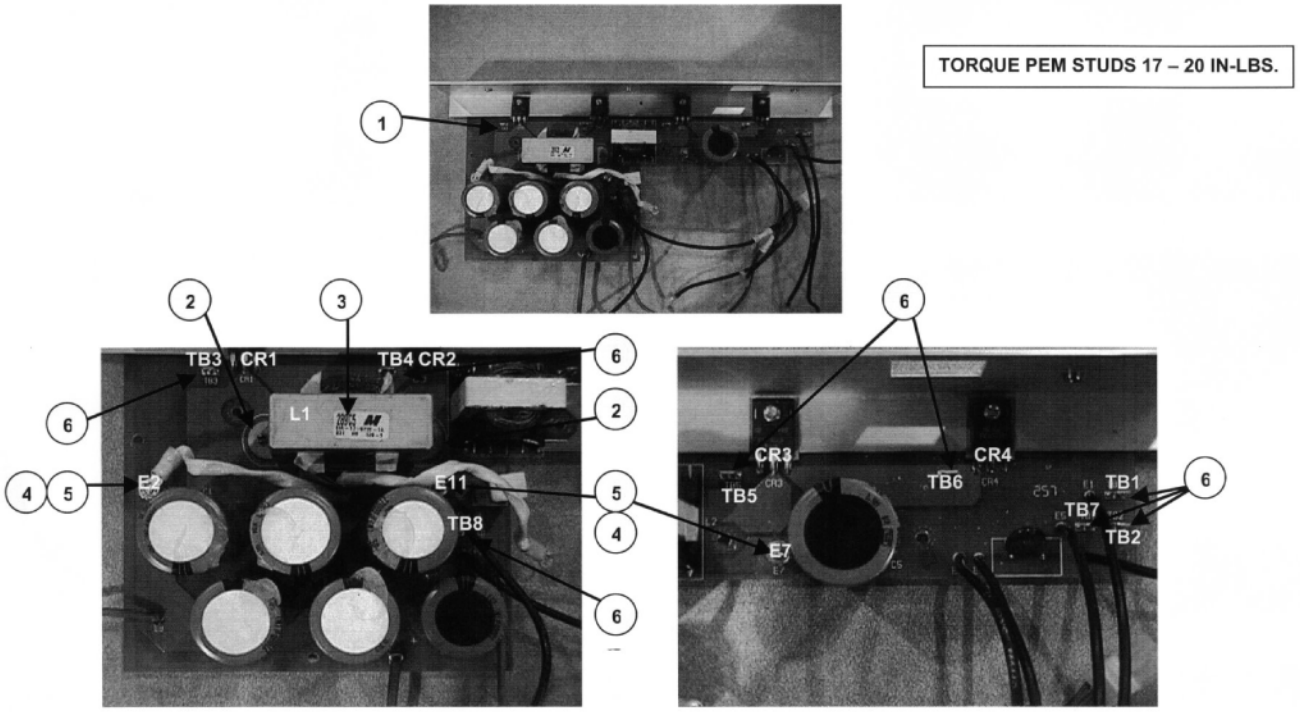
**COMPONENT SIDE**



(*33017704, Sh. 1)*
*(33017700, Sh. 1)*

**SOLDER SIDE**

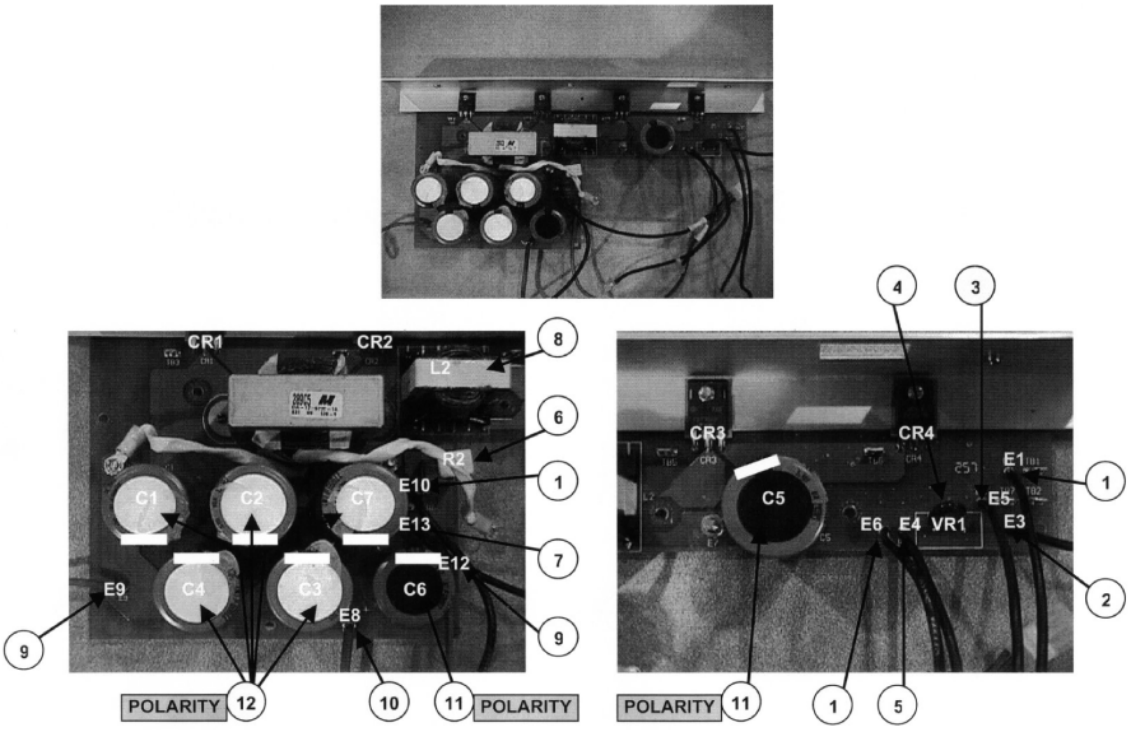
## 8.2 PRINTED CIRCUIT BOARD 60 Hz MODELS (19A149979P2)




| FIND# | REF.# | PART # | DESCRIPTION | QTY | FIND# | REF.# | PART # | DESCRIPTION | QTY |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 833303680PE | P.C. BOARD | 1 | 4 | E2,7,11 | 81622041503 | NUT # 10-32 KEPS | 3 |
| 2 | | 81622046700 | RIVET | 2 | 5 | E2,7,11 | 83322045500 | PEM STUD | 3 |
| 3 | L1 | 83289C50000 | CHOKE | 1 | 6 | TB1-8 | 820130618PE | FASTON TABS | 8 |

*(289PS16)*

## 8.3 12/24 VDC, 220VAC, 60 Hz POWER SUPPLY 19A149979P3

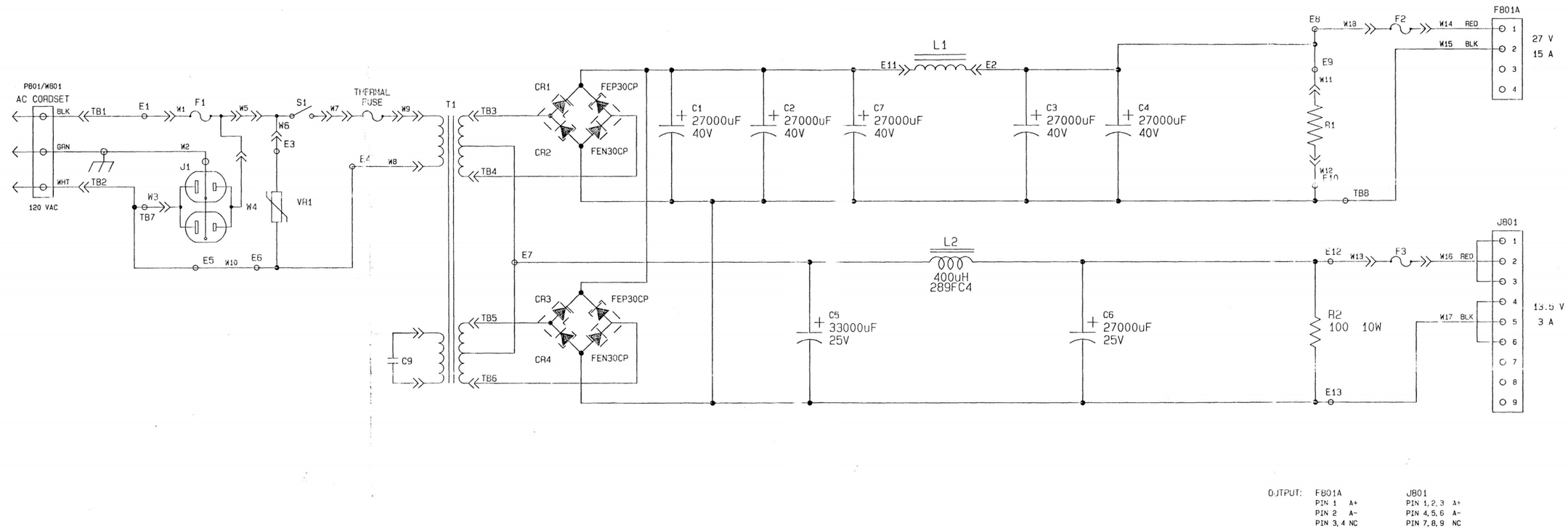



| FIND# | REF.# | FORM # | PART # | DESCRIPTION | QTY | FIND# | REF.# | FORM # | PART # | DESCRIPTION | QTY |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | E1,6,10 | | 8152500743E | LEAD ASSY W12 | 3 | 7 | E13 | | 81525013300 | CONNECTOR W17 | 1 |
| 2 | E3 | | 8152500743D | LEAD ASSY W5 | 1 | 8 | L2 | | 83289FC4000 | CHOKE | 1 |
| 3 | E5 | | 81525074312 | LEAD ASSY W2 | 1 | 9 | E9,12 | | 81525007439 | LEAD ASSY W11, W12 | 2 |
| 4 | VR1 | 92001300 | 814023240PE | VARISTOR 150V V275LA20A | 1 | 10 | E8 | | 8152500743C | LEAD ASSY W8 | 1 |
| 5 | E4 | | 81525074314 | LEAD ASSY W8 | 1 | 11 | C5,6 | | 801000280PE | CAP 33000MF 25V | 2 |
| 6 | R2 | | 8111010510P | RES 10OHM 10W | 1 | 12 | C1-4,7 | | 801000281PE | CAP 27000MF, 40V | 5 |

*(289PS25)*

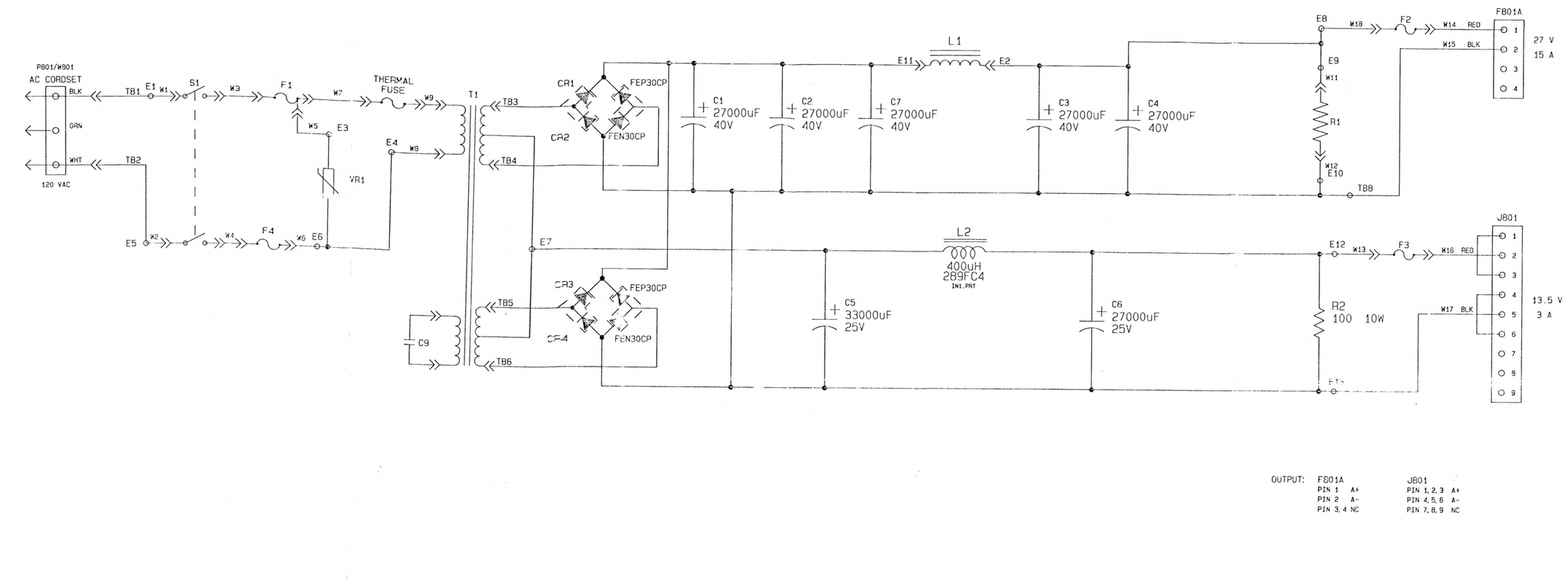
# 9.0 SCHEMATIC DIAGRAMS

## 9.1 POWER SUPPLY 19A149979P1 (Model 289PS15)




*(289PS15, Rev. A)*

## 9.2 POWER SUPPLY 19A149979P2 (Model 289PS16)




*(289PS16, Rev. A)*

## 9.3 POWER SUPPLY 19A149979P3 (Model 289PS25)

(Schematic Diagram Not Available)

***M/A-COM, Inc.***
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