

# Operation and Service Manual

## Agilent Technologies 85901A AC Power Source

**This manual applies directly to  
Agilent 85901A AC Power Sources with  
serial numbers prefixed 2838K and below.**



**Agilent Technologies**

**Manual Part Number: 85901-90001**

Supersedes September 1988

**Microfiche Part Number: 85901-90004**

**Printed in USA**

**April 2000**

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The following safety symbols are used throughout this manual. Familiarize yourself with the symbols and their meaning before operating this instrument.

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WARNING

***Warning* denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

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CAUTION

*Caution* denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

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NOTE

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facility of other International Standards Organization members.

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WARNING

**Before the charger of the 85901A is switched on, make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with the protective earth contact. Any interruption of the protective (grounding) conductor inside or outside the instrument, or disconnection of the protective earth terminal, can result in personal injury.**

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WARNING

**There are voltages at many points in the instrument which can, if contacted, cause personal injury. Be extremely careful. Any adjustments or service procedures that require operation of the instrument with the protected covers removed should be performed only by trained service personnel.**

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**WARNING**

**ALWAYS assume that high voltage is present at the inverter output and on the power cord adapters. NEVER rely on the position of the inverter switch or charger switch or on the front-panel LED indicators to determine if high voltage is present. Never use a damaged power cord adapter. The inverter output should be treated as cautiously as you would treat a line voltage source.**

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**WARNING**

**When the high voltage output of the inverter is exposed, for example when the 85901A is used in servicing some other instrument, take extreme safety precautions as you would for any high voltage exposure. ALWAYS disconnect all inverter power cords before servicing the load unit. NEVER rely on the position of the inverter switch or charger switch or on the front-panel LED indicators to determine if high voltage is present.**

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**CAUTION**

Before an instrument is connected to the 85901A, verify that the line voltage selector of the instrument to be connected is set to the same voltage as the 85901A inverter output voltage. Failure to set the ac power input to the correct voltage could cause damage to the instrument.

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## Regulatory Notices

### Herstellerbescheinigung

Hiermit wird bescheinigt, daß das Gerät/System 85901A in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/Systems angezeigt und die Berechtigung Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

### Zusatzinformation für Meß- und Testgeräte

Werden Meß- und Testgeräte mit ungeschirmten Kabeln und/oder in offenen Meßaufbauten verwendet, so ist vom Betreiber sicherzustellen, daß die Funk-Entstörbestimmungen unter Betriebsbedingungen an seiner Grundstücksgrenze eingehalten werden.

### **Manufacturer's Declaration**

This is to certify that the equipment 85901A is in accordance with the Radio Interference Requirements of Directive FTZ 1046/84. The German Bundespost was notified that this equipment was put into circulation, the right to check the series for compliance with the requirements was granted.

### **Additional Information for Test- and Measurement Equipment**

If Test- and Measurement Equipment is operated with unscreened cables and/or used for measurements on open set-ups, the user has to assure that under operating conditions the Radio Interference Limits are still met at the border of his premises.

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## **Warranty**

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Agilent Technologies will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Agilent Technologies. Buyer shall prepay shipping charges to Agilent Technologies and Agilent Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Agilent Technologies from another country.

Agilent Technologies warrants that its software and firmware designated by Agilent Technologies for use with an instrument will execute its programming instructions when properly installed on that instrument. Agilent Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error-free.

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## **LIMITATION OF WARRANTY**

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

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# **1** **General Information**

## Introduction

This manual contains information required to operate and service the Agilent Technologies Model 85901A AC Power Source. The 85901A is shown in Figure 1-1 with all of its externally supplied accessories.

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## Description

The 85901A is a portable ac power source. It can be operated on the bench or as a portable power supply for field service. Other uses are for measurements requiring power line isolation or for measurements performed during power failure. The instrument has a carrying handle that can also be used as an adjustable tilt-stand. The handle can be moved by pushing the sides of the handle in and then turning the handle to a suitable position.

The 85901A consists of battery, inverter, charger, and control circuits. It provides up to 200W maximum continuous power with the internal battery, at either 115 Vrms or 230 Vrms.

The 85901A weighs 14.2 kg (31.3 lbs) with the battery installed, and 8.0 kg (17.6 lbs) without the battery. The rear panel has terminals for connecting an external battery or other 12 Vdc source. The dimensions of the package are 337 mm wide by 125 mm high by 461 mm deep.

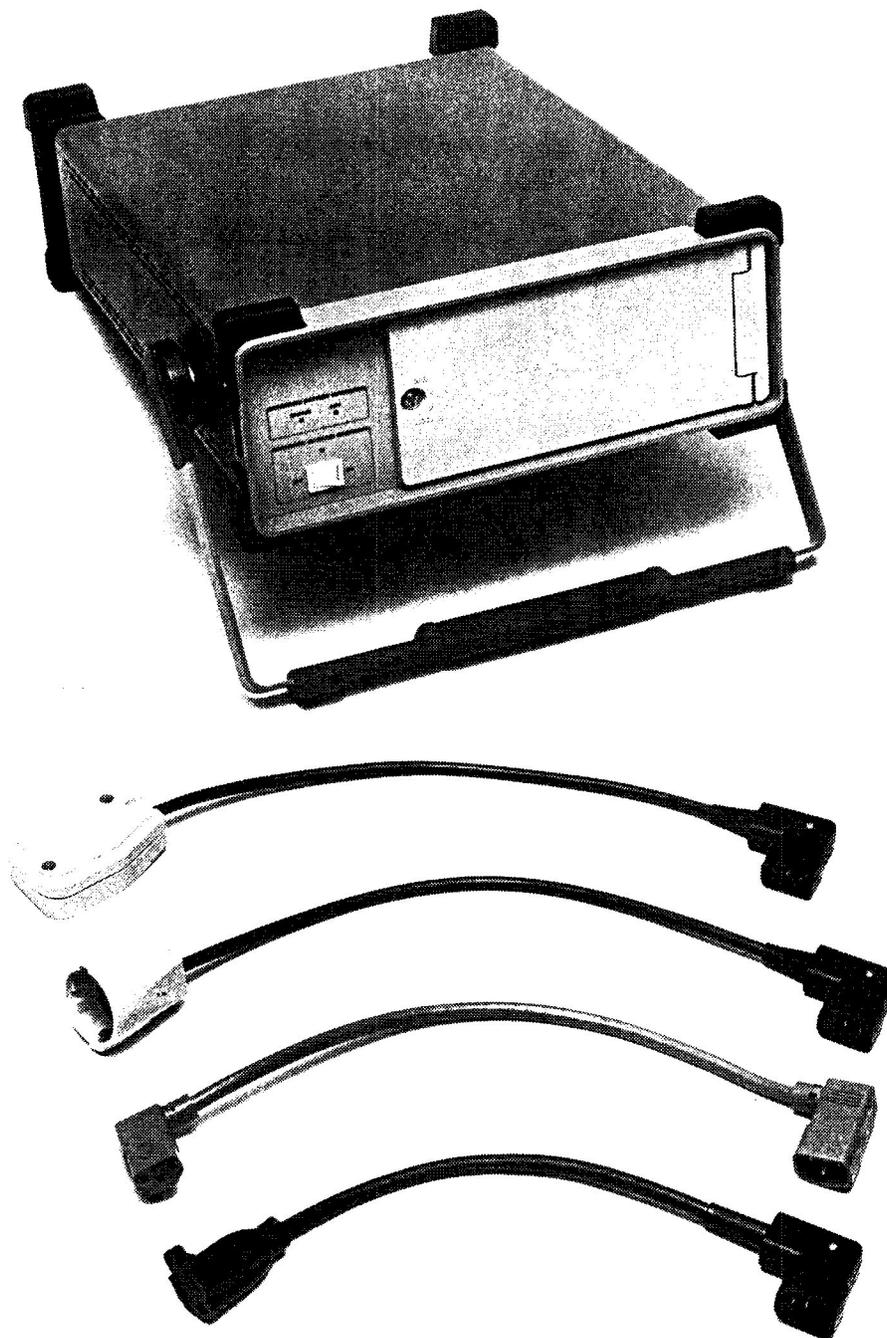
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## Specifications

Instrument specifications are listed in Table 1-1. These specifications are the performance standards or limits against which the instrument may be tested.

Performance characteristics are listed in Table 1-2. Characteristics provide useful information by describing typical, non-warranted instrument performance.

**Figure 1-1**      **85901A w/Complete Set of General Purpose Power-Cord  
Adapters**



## Safety Considerations

The 85901A AC Power Source has been designed to conform to the safety requirements of an IEC (International Electromechanical Committee) Safety Class I instrument, and is shipped from the factory in a safe condition. This *Agilent Technologies 85901A A C Power Source Operation and Service Manual*, and all related documentation, must be reviewed for familiarization with safety markings and instructions before operation. This unit is to be used in a controlled environment.

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WARNING

**This unit contains more than one live circuit. See the schematic diagrams.**

This operation and service manual contains safety information, cautions, and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

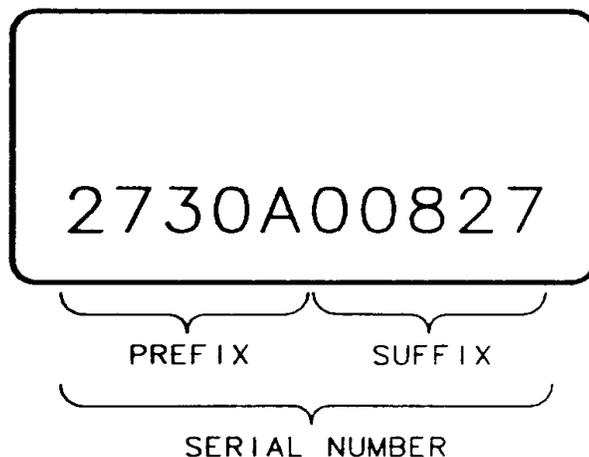
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## Instruments Covered by This Manual

This instrument has a two-part serial number in the form of 00000K00000 (see Figure 1-2). The number is stamped on the serial plate attached to the rear panel of the instrument. The first five digits and the letter constitute the serial prefix; the last five digits form the digits. The prefix is the same for all identical instruments, and it changes only when a change is made to the instrument. The suffix, however, is assigned sequentially and is different for each instrument.

The contents of this manual apply directly to instruments having the same serial number prefix(es) listed under "Serial Numbers" on the title page. The letter placed between the two sets of digits identifies the country where the instrument was manufactured.

**Figure 1-2** Typical Serial Number Label



An instrument manufactured after the printing of this manual may have a serial number prefix that is not listed on the title page. This unlisted serial number prefix indicates that the instrument is different from those described in the manual.

The manual for a newer instrument is accompanied by a Manual Updating Supplement, which contains the change information that explains how to adapt the manual to the newer instrument.

In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Agilent recommends that you periodically request Manual Updating Supplement. The supplements are identified with the manual print date and part number, both of which appear on the manual title page. For information concerning a serial number prefix that is not listed on the title page or in the Manual Updating Supplement, contact your nearest Agilent office.

**Table 1-1 85901A Specifications**

Specifications describe warranted performance over the temperature range of 0°C to 55°C after one hour continuous operation, unless otherwise noted.	
<b>INPUTS</b>	
Inverter <sup>1</sup>	
Voltage	10.8 Vdc to 14.5 Vdc
Charger <sup>2</sup>	
Voltage	90 to 250 Vac, auto-selected
Frequency	44 to 66 Hz
Power consumption	122 VA, maximum
<b>OUTPUTS</b>	
Inverter	
Voltage	135 or 270 V peak 5% Rectangular waveform with 25% dead zone (115 or 230 Vrms 5%)
Frequency	60 Hz 0.1%, crystal reference
Maximum power	200W, continuous

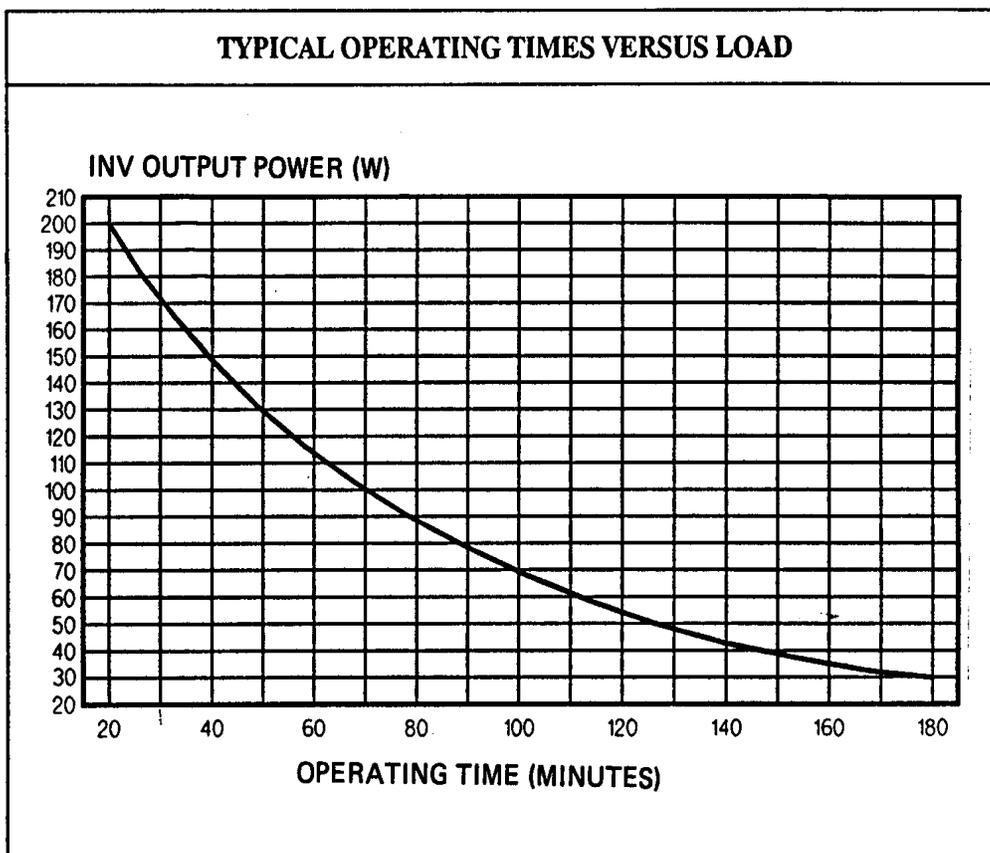
1. The inverter input must not have any transients higher than 14.5 V. Otherwise, the overvoltage protection circuit will automatically turn the inverter off.
2. Turning the charger on automatically turns the inverter off.

**Table 1-2 85901A Characteristics (1 of 2)**

<b>ENVIRONMENTAL</b>	
<b>Temperature<sup>1</sup></b>	
Operating	0°C to +55°C
Storage: with battery	-20°C to +40°C
without battery	-40°C to +70°C
<b>EMI</b>	
Conducted emission	FTZ 1046
Radiated emission	FTZ 1046
<b>Battery<sup>23</sup></b>	
Type	Sealed lead acid
Voltage	12Vdc
Capacity	17 ampere-hours
<b>MECHANICAL</b>	
Dimensions: width	337mm (13.3 in)
height	125 mm (4.9 in)
depth	461 mm 18.1 in)
Weight: with battery	14.2 kg (31.3 lb)
without battery	8.0 kg (17.7 lb)
Shipping weight	16.3 kg (36.0 lb)
<b>BATTERY SHELF LIFE</b>	
<b>Storage Temperature</b>	<b>Recharge Interval</b>
<20°C	18 months
20°C to 30°C	12 months
0°C to 40°C	6 months
<b>CERTIFICATION</b>	
The 85901A is certified for use with the following Agilent test and measurement equipment:	
HP/Agilent 8562A/B, Agilent 8590A, and Agilent 8592A, and their options.	

1. Shelf life of battery decreases with either extended operation or storage at higher than 40C
2. Battery cyclic life (charge-discharge) is nominally rated at more than 200 cycles.
3. Battery is a Matsushita Electric LCR12V17P sealed lead acid. Battery is available from Agilent Technologies as HP/Agilent p/n 1420-0373.

**Figure 1-3 85901A Characteristics (2 of 2)**



**Table 1-3 Recommended Test Equipment**

Instrument	Critical Specifications	Recommended Model	Where Used		
			Perf. Tests	Adj.	Service
Power Supply	Output voltage: 9 to 20 Vdc	HP/Agilent 6032A	√		√
Digital Multimeter	4.5 digits display	HP/Agilent 3487A	√	√	√
Electronic Load	Input voltage: 20 Vdc Input current: 10A minimum	Fujitsu EUL-300D	√		√

---

## **2** **Installation**

## Introduction

This chapter provides the information needed to install the 85901A AC Power Source. Topics covered include: initial inspection, line voltage and fuse selection, operating environment, battery charging, battery replacement, storage, and shipment.

---

## Initial Inspection

The 85901A AC Power Source, as shipped from the factory, meets all the specifications listed in Table 1-1.

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, notify the carrier as well as the Agilent office and be sure to keep the shipping materials for the carrier's inspection until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically.

Complete shipment contents are shown in Figure 2-1. A test procedure for checking general electrical operation may be found under "Basic Operation Check" in Chapter 3. Performance tests to check the 85901A against its specifications are given in Chapter 4. If the instrument does not pass the performance tests, notify the nearest Agilent office (or, to obtain the address of the Agilent office nearest you, contact an office listed on the inside rear cover of this manual). The office will arrange for repair or replacement without waiting for a claim settlement.

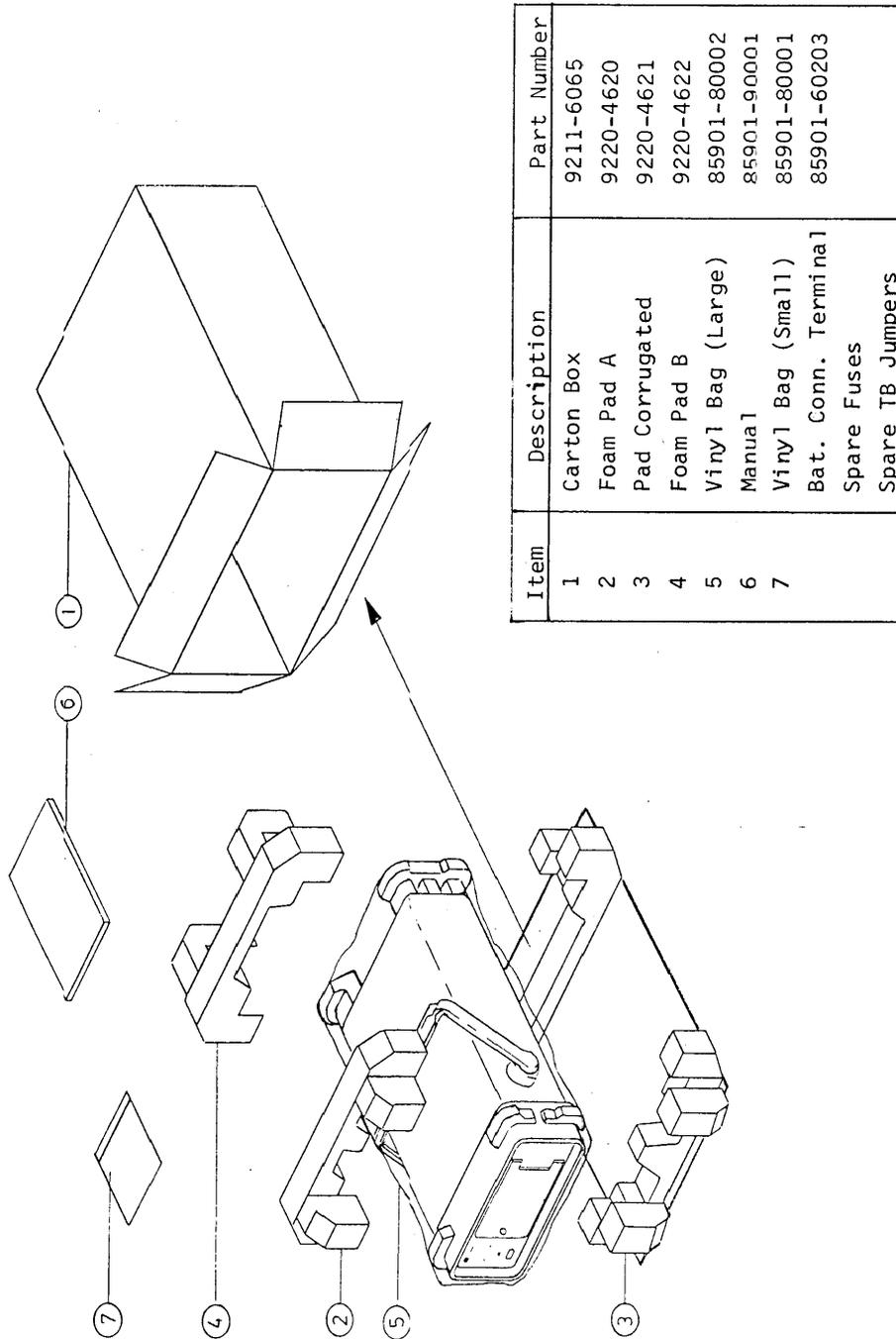
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**CAUTION**

Before using the 85901A for the first time, the internal battery should be charged. Follow the procedure for charging the battery in Chapter 3.

If the shipping materials are in good condition, retain them for possible future use. You may wish to ship the instrument to another location or return it to Agilent for service.

**Figure 2-1 85901A Shipping Container and Contents**



## Preparation for Use

### Power Requirements

The inverter of the 85901A requires a power source of 10.8 Vdc to 14.5 Vdc. Power consumption is approximately 330W when the 85901A provides its maximum continuous output capacity of 200W.

---

**WARNING**

**If the instrument is to be energized via an external autotransformer for voltage reduction, make sure the common terminal is connected to the neutral pole of the charger input.**

---

**CAUTION**

Before turning the 85901A charger switch on, verify that the line voltage is within the charger input's voltage range.

The charger circuit of the 85901A requires a power source of 90 to 250 Vac, 47 to 66 Hz, single-phase. You do not need to select the correct input voltage; the charger circuit automatically does so. Maximum power consumption in the charging mode is approximately 122 VA.

---

## Inverter Line Voltage and Fuse Selection

---

**CAUTION**

Before turning the 85901A inverter switch on, verify that the connected instrument's line voltage selection is set to the same voltage as the 85901A inverter output voltage.

The 85901A voltage selection switch selects the output voltage of the inverter (115V or 230V).

The appropriate fuses are factory-installed for the instrument's destination. Figure 2-2 illustrates replacement fuses, and Table 2-1 lists their ratings and part numbers.

---

**CAUTION**

Before using the 85901A, check that the proper fuse for your line voltage and selected inverter-output voltage is installed.



## Connecting Internal Battery

The internal battery for the 85901A is not installed when the instrument is shipped from the factory. When unpacking the 85901A, you will find a package containing two battery connectors in the main container. You will also find two screws and two washers in the battery container. These connectors and screws are used to install the internal battery. You will need two screwdrivers, both slotted and Phillips.

---

**WARNING**

**This instrument is independent of the power mains. HIGH VOLTAGE is present whenever the internal battery has been installed and the inverter switch is on.**

**Connecting the battery may cause electrical arcing at the terminal. Do not connect the battery in an explosive atmosphere or near inflammable materials.**

---

**CAUTION**

The voltage ratings of the battery should be the same as the input voltage range of the inverter. Verify that you are installing a battery of the correct voltage rating.

Connect the internal battery's positive and negative terminals to the 85901A front-panel positive (red wire) and negative (black wire) internal battery terminals, respectively.

---

1. Install the two separate battery connectors on the battery.
2. Open the battery door in the right-hand side of the front panel.
3. Place the battery in the 85901A battery cage with its terminals toward the top. Correct battery position and connection polarity are shown in Figure 2-3
4. Insert the two internal battery cable terminals into the positive and negative battery connectors, respectively. Fasten them using the two screws.
5. Refasten the battery cage door.

Confirm the correct placement of the wide four-terminal shorting strap at the rear-panel terminal block. Refer to Figure 2-4 for correct terminal block configurations with either internal or external batteries.

---

## Connecting External Battery

The 85901A AC Power Source can use an external battery by connecting the external battery to the rear-panel terminal block. Car and truck 12V batteries can be used for the external battery. Figure 2-4 shows the correct connections from the 85901A terminal block to the external battery.

---

WARNING

**This instrument is independent of the power mains. HIGH VOLTAGE is present whenever a 12 Vdc source has been connected and the inverter switch is on.**

**Connecting the battery may cause electrical arcing at the terminal. Do not connect the battery in an explosive atmosphere or near inflammable materials.**

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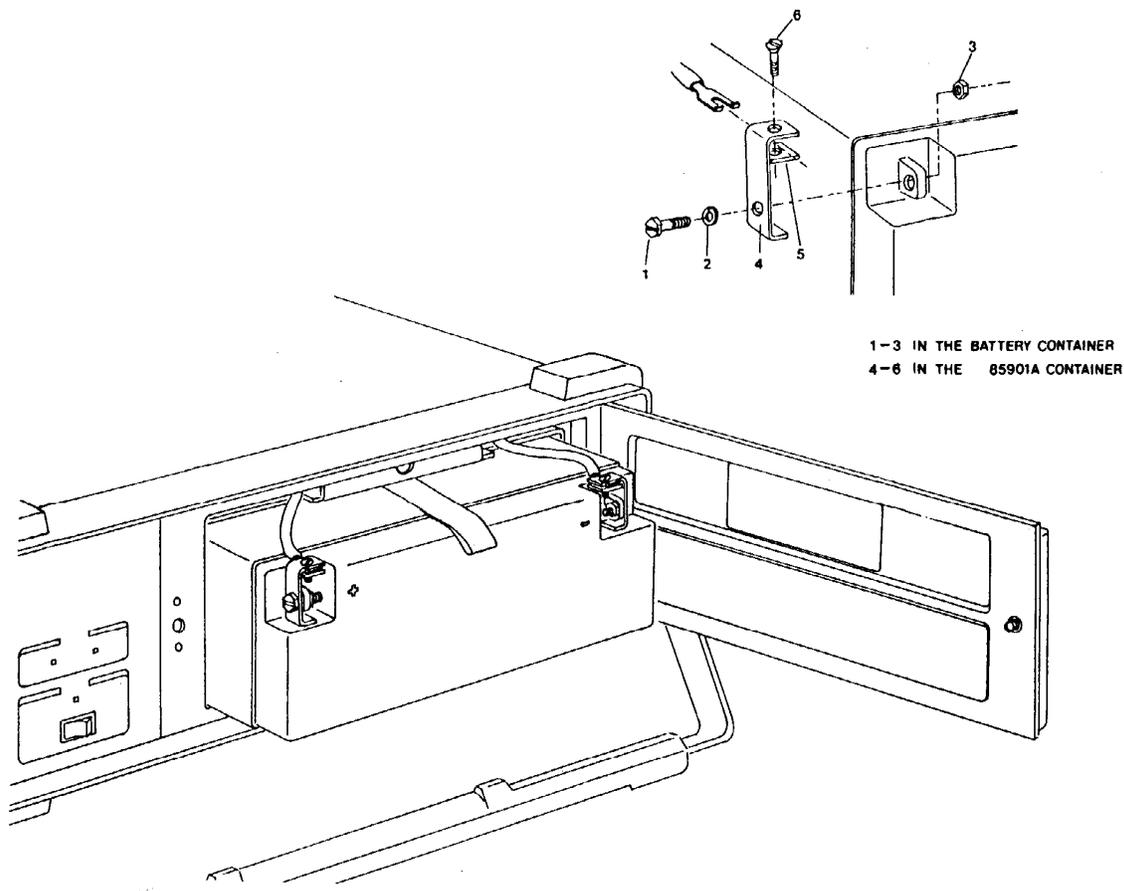
NOTE

When an external DC voltage source is used, voltage transients must not exceed 14.5V or the Over Voltage Protection circuitry will shut the inverter off.

Likewise, if an external charger is connected to an external battery, voltage transients above 14.5V may turn the 85901A off. This may happen, for example, when a car battery is used while the car's alternator is operating.

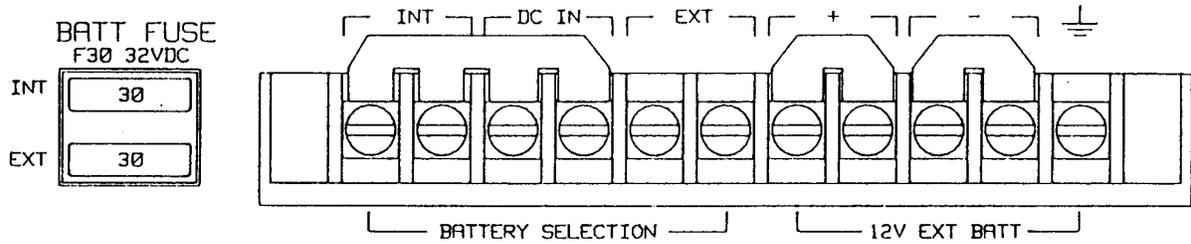
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**Figure 2-3**      **Battery Position and Connector Polarity**

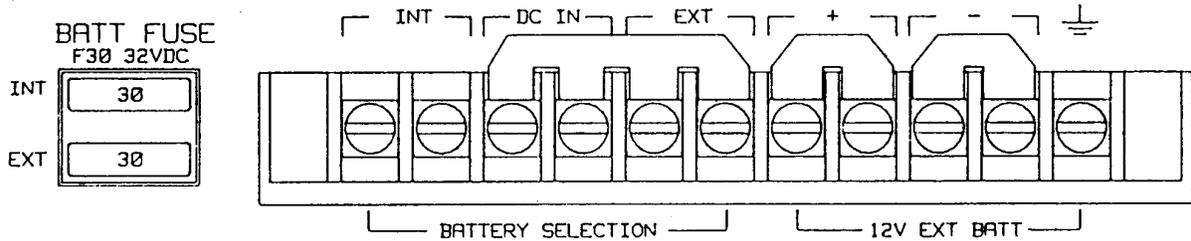


**Figure 2-4**      **Battery Terminal Block**

FOR INTERNAL BATTERY



FOR EXTERNAL BATTERY



**CAUTION**

The voltage ratings of the battery should be the same as the input voltage range of the inverter. Verify that you are installing a battery of the correct voltage rating

Connect the external battery's positive and negative terminals to the 85901A rear-panel positive and negative external-battery terminals, respectively.

Do not remove the wide two-terminal shorting bar on rear-panel positive and negative external- battery terminals.

---

## Power Cable for Charger Input

The 85901A is equipped with a three-connector power cable. When connected to an appropriate ac power receptacle, this cable grounds the instrument cabinet.

---

### WARNING

**The mains plug may only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection. Various power cables are available to connect the instrument to the types of ac power outlets unique to specific geographic areas. The cable appropriate for the area to which the analyzer is originally shipped is included with the unit.**

---

### NOTE

While the inverter output is used, the 85901A will meet its EMI specification with the charger input power cable removed.

---

## Power Cable for Inverter Output

The 85901A standard connector is two CEE22-V connectors in place of the USA standard NEMA-15P connector. The interconnection cable, Part Number 8120-5220, CEE22-V male to NEMA-15P female, is provided. This cable is used to connect external instruments to the inverter output.

Other general-purpose power-cord adapters are available. The adapters listed below allow country-specific line cords to be plugged into the 85901A AC Power Source.

Europe	HP/Agilent Part Number 8120-5210
U.S.A.	HP/Agilent Part Number 8120-5211
United Kingdom	HP/Agilent Part Number 8120-5212

## **Operating Environment**

### **Temperature**

The 85901A may be operated over temperatures from 0°C to +55°C. Temperatures above +40°C may reduce the life of the battery.

### **Humidity**

The 85901A may be operated in environments with relative humidities up to 95% and to +40°C. However, the 85901A should be protected from temperature extremes, which cause condensation within the instrument.

---

## **Installation**

The 85901A can be operated on the bench or as a portable power supply for field use. The instrument has a carrying handle that can also be used as an adjustable tilt-stand. The handle can be moved by pushing its sides in and then turning the handle to the desired position.

The battery must be installed before the 85901A can be operated. See the battery-installation instructions, above. Before turning on the 85901A inverter switch, verify that the same line voltage is selected for both the 85901A inverter output and the equipment connected to the inverter output.

## Storage and Shipment

### Environmental

The 85901A with battery may be stored and shipped in environments within the following limits:

Temperature	-20°C to +40°C
Humidity	<95%
Altitude	<50,000 ft

The 85901A should be protected from temperature extremes, which cause condensation inside the equipment.

### Packaging

Original packaging is shown in Figure 2-1. Containers and materials identical to those used in factory packaging are available through Agilent offices. If the instrument is being returned to Agilent for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. Mark the container *FRAGILE* to assure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

Other packaging may be used if these general instructions for repackaging with commercially-available materials are followed:

- a. Wrap instrument in heavy paper or plastic. If it is being shipped to an Agilent office or service center, attach tag indicating the type of service required, return address, model number, and full serial number.
- b. Use a strong shipping container. A double-walled carton made of 350-pound test material is adequate.
- c. Use enough shock-absorbing material (3- to 4-inch layer) around all sides of instrument to provide firm cushioning and prevent movement inside the container.
- d. Seal shipping container securely.
- e. Mark shipping container *FRAGILE* to ensure careful handling.

---

# **3** **Operation**

## Introduction

This chapter provides operating instructions for the 85901A AC Power Source. It also provides a brief description of the front- and rear-panel features.

Upon receipt of the 85901A AC Power Source, perform the procedure described under "Basic Operation Check" in this chapter. This check should also be performed after the instrument has been repaired. LED indicators, which represent the status of the battery, inverter, and charger circuits, are located on the left-hand side of the front panel. See Figure 3-1.

---

## Front-Panel Features

LED indicators, which represent the status of the battery, inverter, and charger circuits, are located on the left-hand side of the front panel. See Figure 3-1.

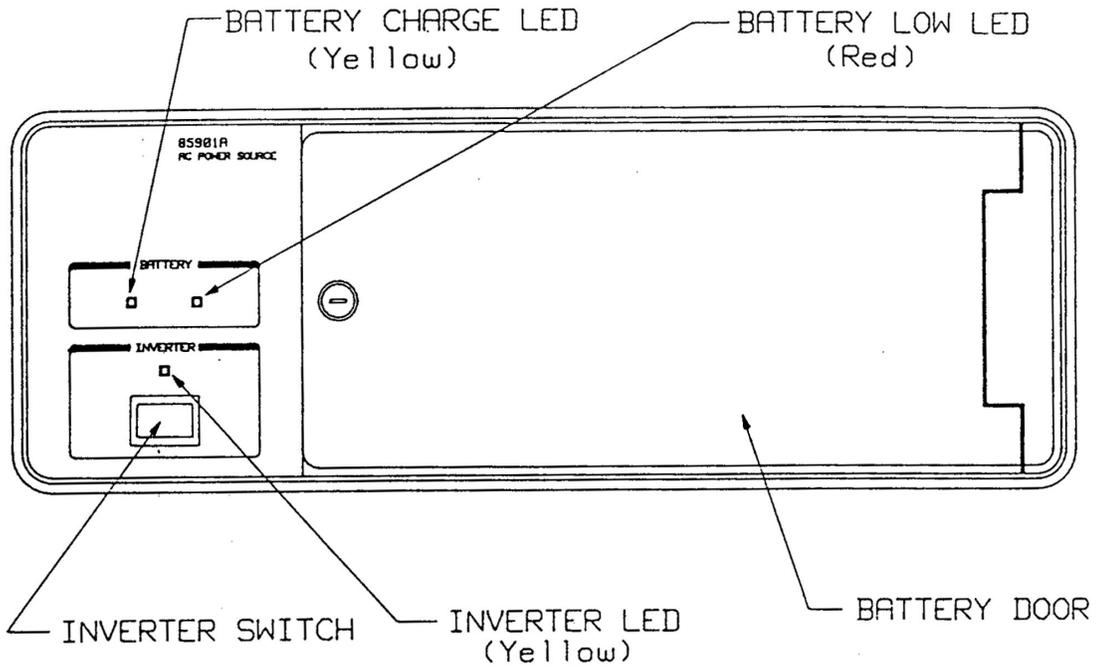
The battery function area has two LEDs: the yellow LED indicates whether the charger is on or off, and the red LED indicates the state of the battery charger circuit. When the charger is operating, the red LED will be on if the battery-charging current is greater than 0.45 A 0.15 A, and it will be off if the battery-charging current is less than 0.45 A 0.15 A.

The inverter function area includes a yellow LED and the inverter on/off switch. The LED should be on when the inverter switch is on and the inverter is operating, and it should be off when the inverter is not operating. The inverter will not operate while the battery charger is operating.

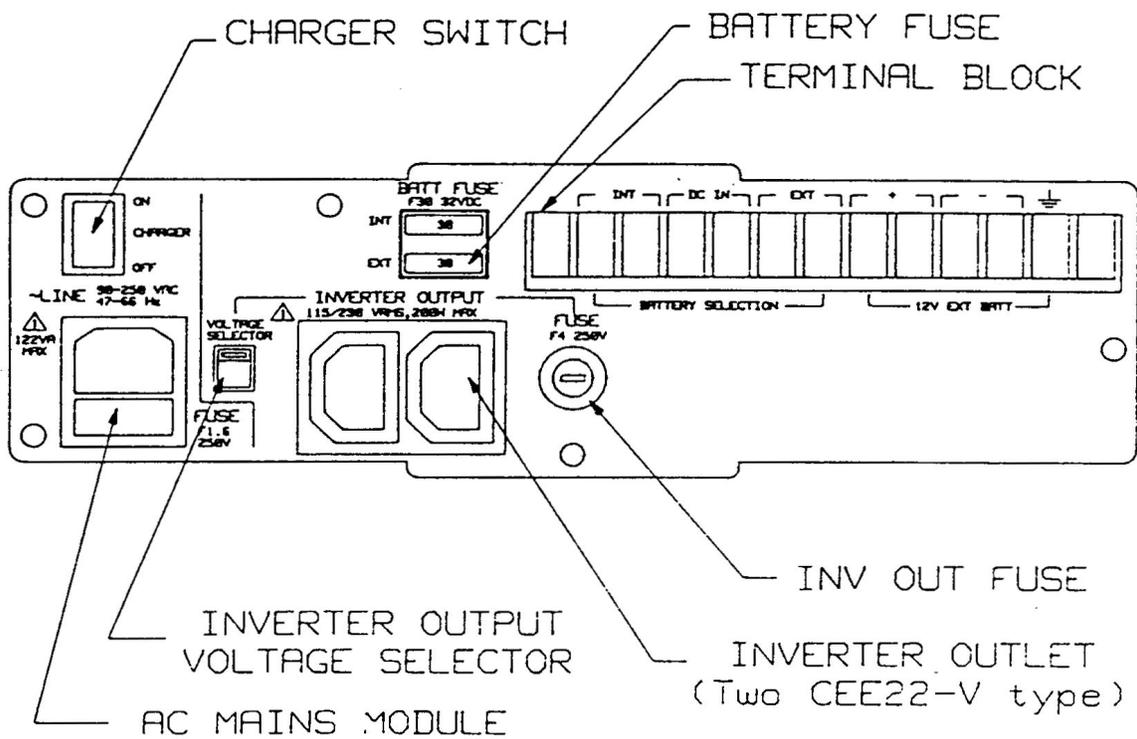
During inverter operation, the red LED in the battery function area also is used to indicate the state of the battery output voltage. When the inverter is operating, the red LED will be off when battery voltage is greater than 10.8 V typical, and it will blink (accompanied by a buzzer) when battery voltage is less than 10.8 V typical.

The battery door occupies the remaining part of the front panel. This door provides access for battery service.

**Figure 3-1 Front-Panel Features**



**Figure 3-2 Rear-Panel Features**



## Rear-Panel Description

The charger on/off switch is located in the upper left-hand corner of the rear panel (see Figure 3-2). A yellow LED in the front-panel battery function area indicates whether the charger is on or off. The charger input line module is mounted directly below the charger switch. The line module contains the I-6A 250V charger input fuse.

The inverter voltage selection switch, two CEE-22V receptacles, and 4A 250V inverter output fuse are grouped together by the INV OUTPUT bracket. The voltage selection switch sets the inverter output to 115V or 230V.

The internal battery fuse and external battery fuse (both 30A 32 Vdc) are located above the inverter output receptacles.

The battery selection terminal block occupies the upper right-hand half of the rear panel. Select the internal battery or an external battery by changing the position of the shorting bar on the terminal block. The external battery's positive and negative leads are connected to the terminals marked **plus** and **minus**, respectively.

---

## Charging the Battery

Before the 85901A is used for the first time, the internal battery should be charged for up to six hours. This will ensure that the battery has its maximum charge.

1. After the internal battery has been installed, connect the power cable to the rear-panel charger line receptacle (directly under the charger switch).
2. Check the rear-panel battery terminal block to ensure that the battery selection jumper is connected for INT battery selection.
3. Check to make sure that no other equipment is connected to the inverter output receptacles at this time.
4. Turn on the charger switch. Verify that the yellow LED in the front-panel battery function area has turned on.
5. Let the charger continue to operate until the red LED turns off. This indicates that the battery has been fully charged.
6. Turn off the charger switch. The 85901A is now ready for normal use.

---

### CAUTION

The charger circuit is designed for use with the internal battery. Do not use it to charge an external battery.

---

## Basic Operation Check

The following steps will verify basic operation of the 85901A. These short procedures will not verify that the 85901A meets all its specifications; they are intended simply as a quick method to verify that all major functions of the 85901A operate correctly. To verify that the instrument meets its specifications, or in case of a problem, refer to Chapter 4 for the appropriate inverter or charger performance test.

### Charger Operation

Refer to “Charging the Battery” in this chapter to verify that the charger is functioning correctly.

### Inverter Operation

This procedure verifies that the inverter is functioning correctly.

1. Ensure that the charger and inverter switches are turned off.
2. Connect an external instrument to one of the INV OUTPUT receptacles using the appropriate power cable and/or adapter cable.
3. Turn on the front-panel inverter switch. The yellow LED in the inverter function area just above the inverter switch should be on. Turn on the equipment connected to the inverter output.
4. The red LED in the battery function area should not be lit if the battery voltage is greater than 10.8 Vdc typical; if the battery voltage is less than 10.8 Vdc typical, the red LED should blink and a buzzer should sound. The inverter will not operate when the battery output voltage is greater than 14.5 Vdc typical or less than 10.0 Vdc typical.
5. Turn on the rear-panel charger switch. The inverter LED and the ac inverter output should turn off. The yellow battery-function LED should turn on, indicating that the charger is operating and has shut off the inverter. The red battery-function LED indicates the state of the battery-charging current: it will be lit if the battery-charging current is greater than 0.45 A 0.15 A; it will not be lit if the battery-charging current is less than 0.45 A 0.15 A.
6. Turn off the charger and inverter switches. Wait five seconds, then turn on the inverter switch. The inverter ac output should again be present and operate the external equipment.

Operation  
Basic Operation Check

---

# **4 Performance Tests**

---

## Introduction

The procedures in this section test the instrument's electrical performance using the specifications of Table 1-1 as performance standards. These tests can be performed without access to the interior of the instrument.

---

---

## Equipment Required

Equipment required for the performance tests is listed in Table 1-3. Any equipment that satisfies the critical specifications given in the table may be substituted for the recommended model(s).

---

**CAUTION**

To prevent short-circuits, use suitable wire terminals for wire leads connected to the rear-panel terminal block.

---

---

## Performance Test Record

Results of the performance tests may be tabulated at the end of this chapter in Table 4-1. The table lists all the tested specifications and their acceptable limits. Test results recorded at incoming inspection can be used for comparison in periodic maintenance, troubleshooting, and after repairs or adjustments.

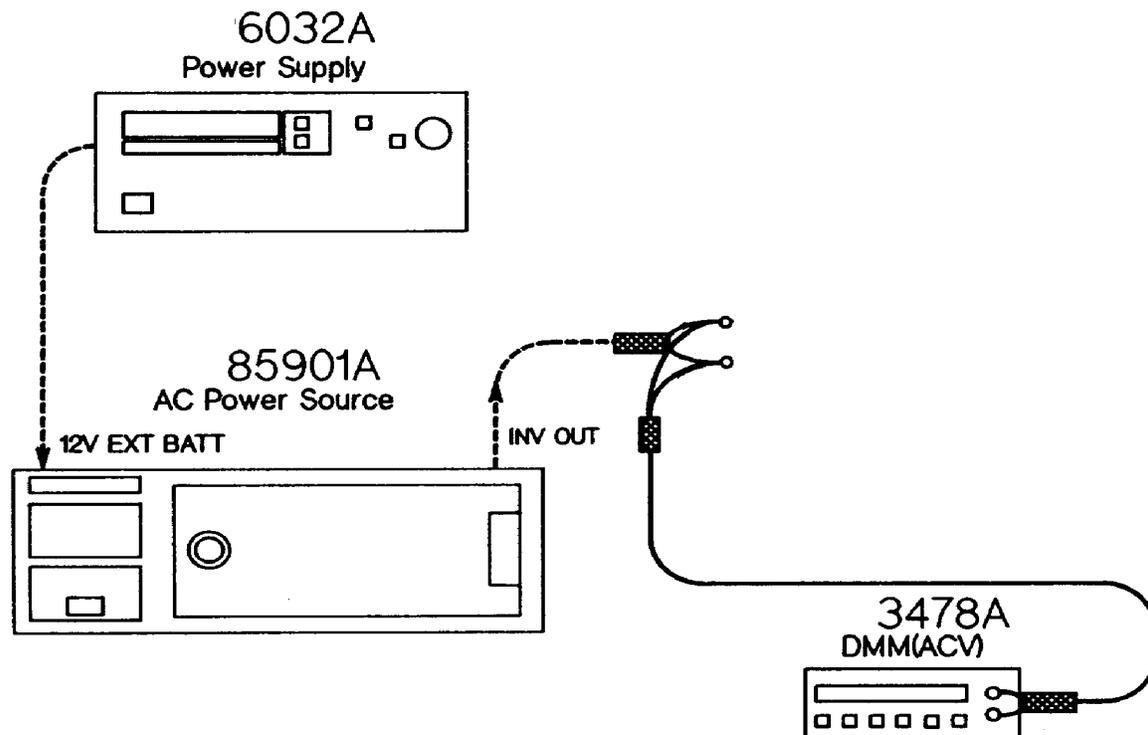
## 1. Inverter Output Voltage and LED Annunciators

This test measures the output voltage of the inverter, and verifies operation of the front-panel LED annunciators.

<b>Specification</b>	Inverter output voltage <sup>1</sup>	115 Vrms 7% or 230 Vrms 7%
	Output frequency	60 Hz, Crystal Reference
	LED Annunciators	
	Battery charge (yellow LED)	OFF
	Battery charge low (red LED)	OFF
	Inverter (yellow LED)	ON

1. The inverter output voltage is a modified square wave of 135V or 270V, with a 25% dead zone at the zero voltage level. The output voltage waveform, with period timing and peak voltage levels, is shown in the illustration. (Note: 135V or 270V peak 5% is equivalent to 115 Vrms or 230 Vrms 5%.)

**Figure 4-1 Inverter Performance Test Setup**



### Equipment

Power Supply.....HP/Agilent 6032A  
Digital Multimeter .....HP/Agilent 3478A

---

WARNING

**This instrument is independent of power mains. High voltage will be present at the inverter output, and at the resistive load(s), whenever the internal battery or an external 12 Vdc source is installed and the inverter switch is on.**

---

### Procedure

1. Connect the equipment as shown in Figure 4-1.
2. Turn off the rear-panel charger switch. Set the INV OUTPUT voltage selector switch to 115 Vrms.
3. Connect the four-wide shorting strap in rear-panel terminal block to the EXT DC IN position.
4. Adjust the power supply for a dc input voltage of 12.0 Vdc 0.1 Vdc.
5. Turn on the inverter switch.
6. Read the inverter output voltage on the digital multimeter and confirm that the LED annunciators operate correctly.
7. Turn off the inverter switch and set the INV OUTPUT voltage selector switch to 230 Vrms.
8. Repeat steps 4 through 6 for 230 Vrms.
9. Record the results of steps 6 and 8 in Table 4-1.

---

## 2. Inverter DC Input Voltage Range

This test verifies inverter operation over the specified input voltage range, and the LED annunciator.

<b>Specification</b>	Inverter input voltage range	10.8 Vdc to 14.5 Vdc
	LED Annunciators	
	Battery charge (yellow LED)	OFF
	Battery charge low (red LED)	See procedure
	Inverter (yellow LED)	ON

### Equipment

Power Supply.....HP/Agilent 6032A  
Digital Multimeter.....HP/Agilent 3478A

---

### WARNING

**This instrument is independent of power mains. High voltage will be present at the inverter output, and at the resistive load(s), whenever the internal battery or an external 12 Vdc source is installed and the inverter switch is on.**

---

### Procedure

1. Connect the equipment as shown in Figure 4-1.
2. Turn off the rear-panel charger switch. Set the INV OUTPUT voltage selector switch to 115 Vrms.
3. Connect the four-wide shorting strap in rear-panel terminal block to the EXT DC IN position.
4. Adjust the power supply for a dc input voltage of 12.0 Vdc 0.1 Vdc.
5. Turn on the inverter switch. Decrease the inverter dc input voltage until the battery LED blinks and the buzzer beeps. The voltmeter of the power supply should indicate 11.0 Vdc or lower.
6. Turn off the inverter switch. Adjust the power supply for a inverter dc input voltage of 12.0 Vdc 0.1 Vdc.
7. Turn on the inverter switch. Decrease the inverter dc input voltage until the inverter is shut off. The voltmeter of the power supply should indicate 10.5 Vdc or lower.
8. Turn off the inverter switch. Increase the inverter dc input voltage to 12.0 Vdc 0.1 Vdc.

2. Inverter DC Input Voltage Range

9. Turn on the inverter switch. Increase the inverter dc input voltage until the inverter shuts off. The voltmeter of the power supply should indicate 14.5 Vdc or higher.

---

**NOTE**

When an external DC voltage source is used, voltage transients must not exceed 14.5V or the Over Voltage Protection circuitry will shut the inverter off.

---

10. Record the results of steps 6, 8, and 9 in Table 4-1.

---

### 3. Inverter Internal DC Input Operation

This test measures the 115V and 230V outputs of the inverter operating with the internal battery as the dc input voltage source.

---

**CAUTION** Before performing this test, ensure that the internal battery is not completely discharged.

---

<b>Specification</b>	Inverter output voltage	115 Vrms 7% or 230 Vrms 7%
	Output frequency	60 Hz, Crystal Reference

#### Equipment

Power Supply.....6032A  
Digital Multimeter.....3478A

---

**WARNING** **This instrument is independent of power mains. High voltage will be present at the inverter output, and at the resistive load(s), whenever the internal battery or an external 12 Vdc source is installed and the inverter switch is on.**

---

#### Procedure

1. Connect the equipment as shown in Figure 4-1, without the power supply.
2. Turn off the rear-panel charger switch. Set the INV OUTPUT voltage selector switch to 115 Vrms.
3. Connect the four-wide shorting strap in rear-panel terminal block to the INT DC IN position. This uses the internal battery as the input voltage source.
4. Open the front-panel battery door and ensure that the internal battery terminals are connected to the correct positions.
5. Turn on the inverter switch and record the digital multimeter reading.
6. Turn off the inverter switch and set the INV OUTPUT voltage selector switch to 230 Vrms.
7. Repeat step 5 for 230 Vrms.
8. Record the results in Table 4-1.

---

## 4. Inverter Shutoff with Charger On

This test verifies that the inverter will automatically turn off if, while it is on, the charger is turned on.

### Specification

Inverter output voltage is automatically turned off when the charger is turned on.

### Equipment

Power Supply . . . . .HP/Agilent 6032A  
Digital Multimeter . . . . .HP/Agilent 3478A

---

**WARNING**

**This instrument is independent of power mains. High voltage will be present at the inverter output, and at the resistive load(s), whenever the internal battery or an external 12 Vdc source is installed and the inverter switch is on.**

---

### Procedure

1. Connect the equipment as shown in Figure 4-1, without the power supply.
2. Turn off the rear-panel charger switch. Set the INV OUTPUT voltage selector switch to 115 Vrms.
3. Connect the four-wide shorting strap in rear-panel terminal block to the INT DC IN position.
4. Turn on the inverter and verify that the digital multimeter indicates 115 Vrms.
5. Connect the charger to the ac mains. Turn on the charger.
6. Verify that the digital multimeter indicates that the inverter has turned off.
7. Turn off the inverter switch and the charger switch. Record this operation in Table 4-1.

**Table 4-1 Performance Test Record**

Test No.	Test Item	Results		
		Min.	Actual	Max.
1.	Inverter Output Voltage and LED Annunciators			
	6. LED status:			
	BATT CHRG (yellow): OFF		ON      OFF	
	BATT LOW (red): OFF		ON      OFF	
	INV (yellow): ON		ON      OFF	
	Inverter output (Vrms)	106.95	_____	123.05
	9. Inverter output (Vrms)	213.90	_____	246.10
2.	InverterDC Input Voltage Range			
	6. Battery low indication (blinking LED) DC input voltage (Vdc)		_____	11.0
	8. Lower limit DC input voltage (Vdc)		_____	10.5
	9. Upper limit DC input voltage (Vdc)	14.5	_____	
3.	Inverter Internal DC Input Operation			
	Inverter output (Vrms)	106.95	_____	123.05
		213.90	_____	246.10
4.	Inverter Shutoff with Charger On			
	Inverter operation: automatic shutoff		YES      NO	

4. Inverter Shutoff with Charger On

---

# **5 Adjustments**

## Introduction

This chapter describes adjustments required to return the 85901A AC Power Source to peak operating condition after repairs are required. Test setups and adjustment procedures are included in this chapter.

Data taken during adjustments should be recorded in the spaces provided. Comparison of initial data with data taken during periodic adjustments assists in preventive maintenance and troubleshooting.

Test points and adjustment locations are supplied in Chapter 7 and are placed just before the schematic for the assembly.

---

## Equipment Required

Table 1-3 in Chapter 1 contains a list of test equipment and test accessories required in the adjustment procedures. In addition, the table contains the required minimum specifications and a suggested manufacturer's model number.

---

## Pre-Adjustment Set-up

This short procedure warms up the A2 Control and A3 Charger board assemblies to remove any component value shift that might affect the adjustments.

1. Turn off the charger switch and the inverter switch.
2. Remove the 85901A cover with a 4 mm hex wrench.

---

### WARNING

**This instrument is independent of power mains. HIGH VOLTAGE is present whenever the internal battery has been installed and the inverter switch is on.**

3. Disconnect the wide four-terminal shorting strap in rear-panel terminal block. Connect the (+) terminal of electronic load to DC IN terminal of rear-panel terminal block and the (-) terminal of electronic load to 12V EXT BATT (-) terminal of rear-panel terminal block.

**CAUTION**

Be sure to connect the electronic load with the correct polarity. Do not let the cables short to the chassis.

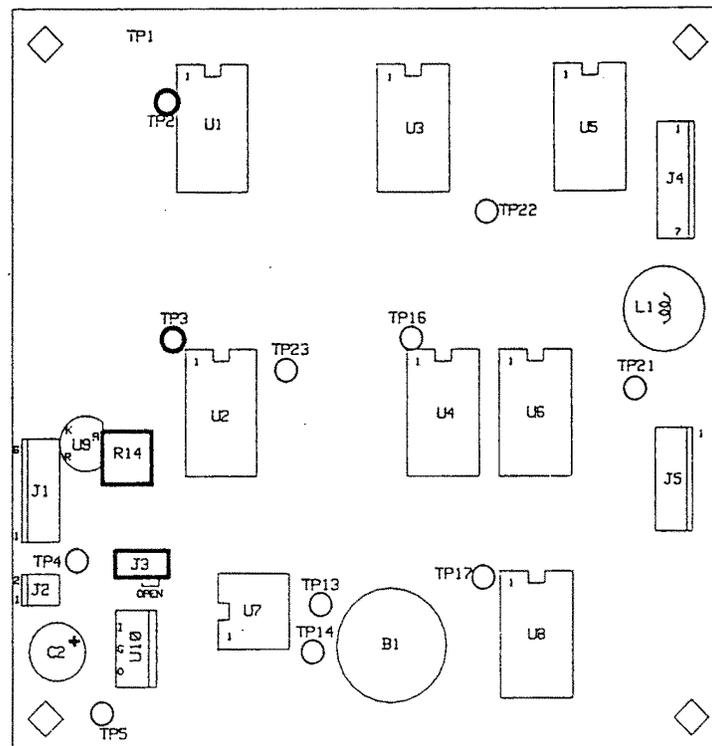
4. Set the electronic load for 100Ω load.
5. Turn the charger switch ON

## Reference Voltage Adjustment: A2R14

This procedure sets the 3.0V reference voltage, by A2R14, used throughout the A2 Control assembly circuits.

1. Connect the negative (-) Digital Voltmeter probe to A2TP3, and the positive (+) probe to test point A2TP2. Refer to Figure 5-1.
2. Set the digital voltmeter to DC Volts and Autorange.
3. Adjust A2R14 for 3.000 0.001 Vdc. Refer to Figure 5-1.
4. Disconnect the probes from A2TP2 and A2TP3. Refer to Figure 5-1.
5. Turn the charger switch off.

**Figure 5-1** A2R14 Reference Voltage Adjustment Location



## Charger Output Voltage Adjustment

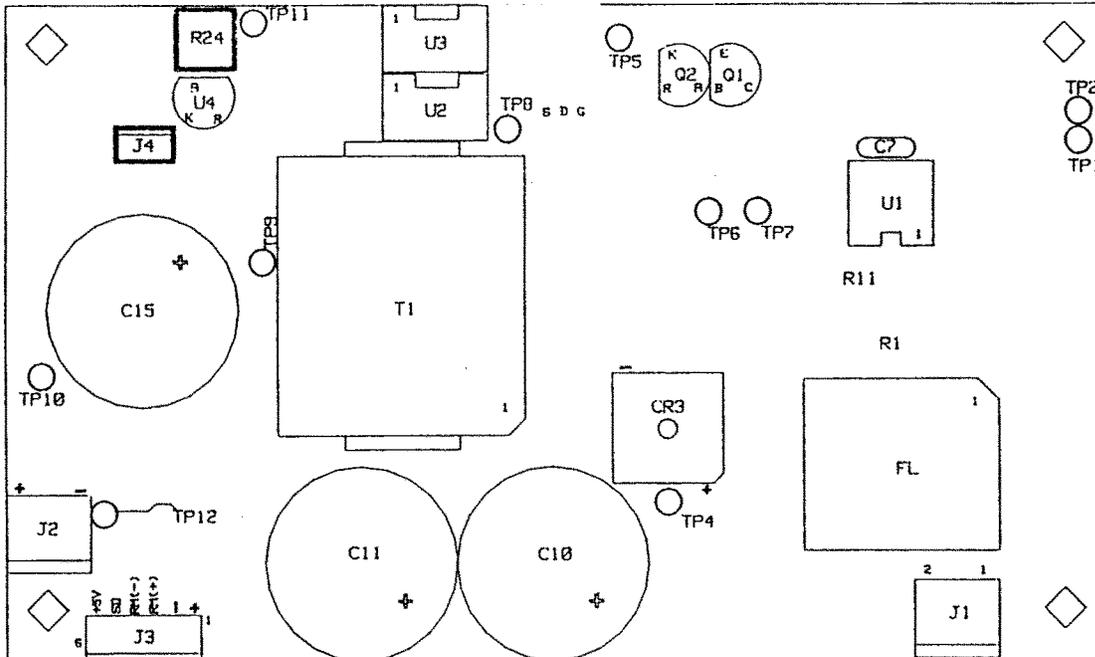
This procedure sets the charger output voltage by setting A3R24 in one leg of the constant-voltage feedback-amplifier bridge. The feedback voltage picked up from the output of the charger sets the input voltage of the bridge.

**CAUTION**

Be sure to connect the internal battery cable terminals with the correct polarity. Do not let the cables short to the chassis.

1. Move the charger board jumper A3J4 from across pins 1-2 to pins 2-3. Refer to Figure 5-2.
2. Turn the charger switch on.
3. Adjust A3R24 for 14.5 Vdc 0.1 Vdc across the electronic load. Refer to Figure 5-2.
4. Turn the charger switch off.
5. Move jumper A3J4 from across pins 2-3 to its original position across pins 1-2. Refer to Figure 5-2.

**Figure 5-2 A3R24 Charger Output Voltage Adjustment Location**



## **After Completing All Adjustments**

1. Disconnect the electronic load from the rear-panel terminal block.
2. Connect the wide four-terminal shorting strap to the desired position. Refer to “Connecting Internal Battery” or “Connecting External Battery” in Chapter 2.
3. Reinstall the 85901A metal cover with a 4 mm hex wrench.

Adjustments  
After Completing All Adjustments

---

## **6** **Replaceable Parts**

## **Introduction**

This chapter contains information for ordering parts. The tables list all replaceable parts in order by reference designator. Overall, top, and bottom views of assembly locations are illustrated in Figures 6-1 and 6-2.

To order a part listed in the replaceable parts tables, quote the Agilent Technologies part number, indicate quantity required, and address the order to the nearest Agilent Technologies office. To obtain the address of the office nearest you, inquire of one of the Agilent Technologies Sales and Service Offices listed in Chapter 7.

**Table 6-1 AI Inverter Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A1	85901-60001	1	1	INVERTER BOARD ASSEMBLY	28480	85901-60001
A1C2	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A1C	0160-7059	3	1	CAPACITOR-FXD 1UF 250VDC MPE 10%	28480	0160-7059
A1C4	0180-4107	8	1	CAPACITOR-FXD 2800UF 25VDC AL	28480	0180-4107
A1C5	0180-4107	8	1	CAPACITOR-FXD 2800UF 25VDC AL	28480	0180-4107
A1C6	0160-0263	7	1	CAPACITOR-FXD 0.22UF 50VDC CER 20%	28480	0160-0263
A1C7	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A1C9	0180-3737	8	1	CAPACITOR-FXD IUF 50VDC AL	28480	0180-3737
A1C10	0160-7081	1	1	CAPACITOR-FXD 470PF 50VDC CER 20%	28480	0160-7081
A1C11	0160-7084	4	1	CAPACITOR-FXD 2200PF 50VDC PP 2%	28480	0160-7084
A1C12	0180-2984	5	1	CAPACITOR-FXD 47UF 50VDC AL	28480	0180-2984
A1C13	0160-3831	1	1	CAPACITOR-FXD 0.01UF 50VDC CER 20%	28480	0160-3831
A1C14	0160-0263	7	1	CAPACITOR-FXD 0.22UF 50VDC CER 20%	28480	0160-0263
A1C15	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A1C17	0160-7080	0	1	CAPACITOR-FXD 220PF 50VDC CER 5%	28480	0160-7080
A1C18	0160-7080	0	1	CAPACITOR-FXD 220PF 50VDC CER 5%	28480	0160-7080
A1C19	0160-7078	6	1	CAPACITOR-FXD 0.1UF 200VDC PP 10%	28480	0160-7078
A1C20	0160-7078	6	1	CAPACITOR-FXD 0.1UF 200VDC PP 10%	28480	0160-7078
A1C21	0160-7078	6	1	CAPACITOR-FXD 0.1UF 200VDC PP 10%	28480	0160-7078
A1C22	0180-2984	5	1	CAPACITOR-FXD 47UF 50VDC AL	28480	0180-2984
A1C23	0160-7078	6	1	CAPACITOR-FXD 0.1UF 200VDC PP 10%	28480	0160-7078
A1C24	0160-7083	3	1	CAPACITOR-FXD 820PF 50VDC CER 4%	28480	0160-7083
A1C25	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A1C26	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A1C27	0160-7086	6	1	CAPACITOR-FXD 270PF 1000VDC CER 20%	28480	0160-7086
A1C28	0160-7086	6	1	CAPACITOR-FXD 270PF 1000VDC CER 20%	28480	0160-7086
A1C29	0160-0263	7	1	CAPACITOR-FXD 0.22UF 50VDC CER 20%	28480	0160-0263
A1C30	0160-7082	2	1	CAPACITOR-FXD 120PF 50VDC CER 5%	28480	0160-7082
A1C31	0160-0263	7	1	CAPACITOR-FXD 0.22UF 50VDC CER 20%	28480	0160-0263
A1C32	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A1C33	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A1C34	0180-3215	7	1	CAPACITOR-FXD 100UF 16VDC AL	28480	0180-3215
A1C35	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A1C36	0160-7076	4	1	CAPACITOR-FXD 0.033UF 630V MPE 10%	28480	0160-7076
A1C37	0180-0224	2	1	CAPACITOR-FXD 10UF 16VDC AL	28480	0180-0224
A1C38	0180-0224	2	1	CAPACITOR-FXD 10UF 16VDC AL	28480	0180-0224
A1C39	0160-4535	4	1	CAPACITOR-FXD 1UF 50VDC CER 10%	28480	0160-4535
A1C40	0160-7076	4	1	CAPACITOR-FXD 0.033UF 630V MPE 10%	28480	0160-7076
A1C41	0160-7077	5	1	CAPACITOR-FXD 0.1UF 630V MPE 10%	28480	0160-7077
A1C42	0160-7076	4	1	CAPACITOR-FXD 0.033UF 630V MPE 10%	28480	0160-7076
A1C43	0160-7074	2	1	CAPACITOR-FXD 0.033UF 100V MPE 10%	28480	0160-7074
A1C44	0160-7074	2	1	CAPACITOR-FXD 0.033UF 100V MPE 10%	28480	0160-7074
A1C45	0180-4109	0	1	CAPACITOR-FXD 330UF 200VDC AL	28480	0180-4109
A1C46	0180-4109	0	1	CAPACITOR-FXD 330UF 200VDC AL	28480	0180-4109
A1C47	0160-7076	4	1	CAPACITOR-FXD 0.033UF 630V MPE 10%	28480	0160-7076

**Table 6-1 AI Inverter Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A1C48	0160-7074	2	1	CAPACITOR-FXD 0.033UF 100V MPE 10%	28480	0160-7074
A1C49	0160-7074	2	1	CAPACITOR-FXD 0.033UF 100V MPE 10%	28480	0160-7074
A1C50	0160-4535	4	1	CAPACITOR-FXD 1UF 50VDC CER 10%	28480	0160-4535
A1C51	0160-7079	7	1	CAPACITOR-FXD 39PF 50VDC CER 10%	28480	0160-7079
A1C52	0160-7079	7	1	CAPACITOR-FXD 39PF 50VDC CER 10%	28480	0160-7079
A1C54	0180-3215	7	1	CAPACITOR-FXD 100UF 16VDC AL	28480	0180-3215
A1CR1	1901-0978	4	1	DIODE-GEN PRP	28480	1901-0978
A1CR2	1901-0978	4	1	DIODE-GEN PRP	28480	1901-0978
A1CR3	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR4	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR5	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR6	1901-0646	3	1	DIODE-PWR RECT 200V 1A 150NS	28480	1901-0646
A1CR7	1901-1165	3	1	DIODE-SCHOTTKY	28480	1901-1165
A1CR8	1901-1165	3	1	DIODE-SCHOTTKY	28480	1901-1165
A1CR9	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR10	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR11	1901-1273	4	1	DIODE-GEN PRP 100V 6A 35NS	28480	1901-1273
A1CR12	1901-0646	3	1	DIODE-PWR RECT 200V 1A 150NS	28480	1901-0646
A1CR13	1901-0646	3	1	DIODE-PWR RECT 200V 1A 150NS	28480	1901-0646
A1CR14	1901-1273	4	1	DIODE-GEN PRP 100V 6A 35NS	28480	1901-1273
A1CR15	1901-1273	4	1	DIODE-GEN PRP 100V 6A 35NS	28480	1901-1273
A1CR16	1901-1273	4	1	DIODE-GEN PRP 100V 6A 35NS	28480	1901-1273
A1CR17	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR18	1901-1233	6	1	DIODE-GEN PRP 1000V 4A 75NS	28480	1901-1233
A1CR19	1901-1233	6	1	DIODE-GEN PRP 1000V 4A 75NS	28480	1901-1233
A1CR20	1901-1233	6	1	DIODE-GEN PRP 1000V 4A 75NS	28480	1901-1233
A1CR21	1901-1233	6	1	DIODE-GEN PRP 1000V 4A 75NS	28480	1901-1233
A1CR26	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR27	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR28	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR29	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR30	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1CR31	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A1R88	2110-0665	0	1	TPN00326 0 1 RESISTOR-FUSIBLE 1 5% 0.5W	28480	2110-0665
A1F2	2110-0665	0	1	FUSE 1A 125V	28480	2110-0665
A1J1	1251-4381	2	1	CONNECTOR-POST-TP-HDR 7P	28480	1251-4381
A1J2	1252-2787	0	1	CONNECTOR-POST-TP-HDR 3P	28480	1252-2787
A1J3	1252-2786	9	1	CONNECTOR-POST-TP-HDR 2P	28480	1252-2786
A1L3	9140-1346	6	1	INDUCTOR-FXD 2MH 0.4A	28480	9140-1346
A1L4	9140-1347	7	1	INDUCTOR-FXD 600UH	28480	9140-1347
A1L5	9140-1347	7	1	INDUCTOR-FXD 600UH	28480	9140-1347
A1Q1	1884-0332	6	1	THYR-SCR TO-220AB VRRM=200	28480	1884-0332
A1Q2	1854-0215	1	1	TRANSISTOR NPN SI TO-92	28480	1854-0215
A1Q3	1854-0215	1	1	TRANSISTOR NPN SI TO-92	28480	1854-0215
A1Q4	1855-0694	2	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0694

**Table 6-1 AI Inverter Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A1Q5	1855-0694	2	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0694
A1Q6	1855-0694	2	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0694
A1Q7	1855-0694	2	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0694
A1Q8	1855-0631	7	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0631
A1Q9	1855-0631	7	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0631
A1Q10	1855-0631	7	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0631
A1Q11	1855-0631	7	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0631
A1Q12	1855-0518	9	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0518
A1Q13	1855-0518	9	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0518
A1Q14	1855-0518	9	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0518
A1Q15	1855-0518	9	1	TRANSISTOR MOSFET N-CHAN	28480	1855-0518
A1R1	0699-1301	7	1	RESISTOR 4.7M 5% .25W CF	28480	0699-1301
A1R3	0757-0338	2	1	RESISTOR 1K 5% .25W CF	28480	0757-0338
A1R4	0757-0338	2	1	RESISTOR 1K 5% .25W CF	28480	0757-0338
A1R5	0698-5523	1	1	RESISTOR 1.50K 1% .25W F	28480	0698-5523
A1R6	0698-4623	0	1	RESISTOR 1.37K 1% .25W F	28480	0698-4623
A1R7	0757-0757	9	1	RESISTOR 15K 1% .25W F	28480	0757-0757
A1R8	0757-0757	9	1	RESISTOR 15K 1% .25W F	28480	0757-0757
A1R9	0683-6825	7	1	RESISTOR 6.8K 5% .25W CF	28480	0683-6825
A1R10	0757-0342	8	1	RESISTOR 100K 1% .25W F	28480	0757-0342
A1R11	0757-0298	3	1	RESISTOR 22K 1% .25W CF	28480	0757-0298
A1R13	0698-4703	7	1	RESISTOR 8.66K 1% .25W F	28480	0698-4703
A1R14	0698-3231	4	1	RESISTOR 28K 1% .25W F	28480	0698-3231
A1R15	0757-0757	9	1	RESISTOR 15K 5% .25W CF	28480	0757-0757
A1R16	0683-0338	5	1	RESISTOR 1K 5% .25W CF	28480	0683-0338
A1R17	0699-2522	6	1	RESISTOR 3.0 1% .25W F	28480	0699-2522
A1R18	0683-2215	1	1	RESISTOR 220 5% .25W CF	28480	0683-2215
A1R19	0757-0340	6	1	RESISTOR 10K 5% .25W CF	28480	0757-0340
A1R20	0757-0340	6	1	RESISTOR 10K 5% .25W CF	28480	0757-0340
A1R23	0757-0340	6	1	RESISTOR 10K 5% .25W CF	28480	0757-0340
A1R24	0757-0739	7	1	RESISTOR 2K 1% .25W F	28480	0757-0739
A1R26	0757-0497	4	1	RESISTOR 22 5% .25W CF	28480	0757-0497
A1R27	0757-0497	4	1	RESISTOR 22 5% .25W CF	28480	0757-0497
A1R28	0757-0497	4	1	RESISTOR 22 5% .25W CF	28480	0757-0497
A1R30	0757-0739	7	1	RESISTOR 2K 5% .25W CF	28480	0757-0739
A1R31	0757-0739	7	1	RESISTOR 2K 5% .25W CF	28480	0757-0739
A1R32	0698-7433	6	1	RESISTOR 3K 5% .25W CF	28480	0683-3025
A1R33	0811-3814	1	1	RESISTOR 220 10% 10W PW	28480	0811-3814
A1R34	0811-3816	3	1	RESISTOR 47 10% 10W PW	28480	0811-3816
A1R35	0757-0497	4	1	RESISTOR 22 5% .25W CF	28480	0757-0497
A1R36	0757-0739	7	1	RESISTOR 2K 5% .25W CF	28480	0757-0739
A1R37	0811-3816	3	1	RESISTOR 47 10% 10W PW	28480	0811-3816
A1R38	0811-3814	1	1	RESISTOR 220 10% 10W PW	28480	0811-3814
A1R39	0757-0739	7	1	RESISTOR 2K 5% .25W CF	28480	0757-0739
A1R40	0757-0776	2	1	RESISTOR 110K 5% .25W CF	28480	0757-0776

**Table 6-1 AI Inverter Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A1R41	0683-4725	2	1	RESISTOR 4.7K 5% .25W CF	28480	0683-4725
A1R42	0811-3817	4	1	RESISTOR 20K 10% 5W PW	28480	0811-3817
A1R43	0811-3817	4	1	RESISTOR 20K 10% 5W PW	28480	0811-3817
A1R44	0811-3817	4	1	RESISTOR 20K 10% 5W PW	28480	0811-3817
A1R45	0757-0340	6	1	RESISTOR 10K 1% .25W F	28480	0757-0340
A1R46	0698-3757	9	1	RESISTOR 1.2K 1% .25W F	28480	0698-3757
A1R47	0699-1797	5	1	RESISTOR 10M 5% .25W F	28480	0699-1797
A1R49	0683-4705	8	1	RESISTOR 47 5% .25W CF	28480	0683-4705
A1R50	0757-0772	8	1	RESISTOR 68.1K 1% .25W F	28480	0757-0772
A1R51	0757-0772	8	1	RESISTOR 68.1K 1% .25WF	28480	0757-0772
A1R52	0698-4627	4	1	RESISTOR 1.54K 1% .25W F	28480	0698-4627
A1R53	0757-0092	5	1	RESISTOR 33K 1% .25W F	28480	0757-0092
A1R54	0698-3506	6	1	RESISTOR 470 1% .25W CF	28480	0698-3506
A1R55	0757-0342	8	1	RESISTOR 100K 1% .25W CF	28480	0757-0342
A1R56	0683-3315	4	1	RESISTOR 330 5% .25W CF	28480	0683-3315
A1R57	0683-4735	4	1	RESISTOR 47K 5% .25W CF	28480	0683-4735
A1R58	0757-0342	8	1	RESISTOR 100K 1% .25W CF	28480	0757-0342
A1R59	0699-2518	0	1	RESISTOR 267K 1% .25W CF	28480	0699-2518
A1R60	0683-4705	8	1	RESISTOR 47 5% .25W F	28480	0683-4705
A1R61	0683-4705	8	1	RESISTOR 47 5% .25W F	28480	0683-4705
A1R62	0811-3817	4	1	RESISTOR 20K 10% 5W PW	28480	0811-3817
A1R63	0683-3315	4	1	RESISTOR 330 5% .25W CF	28480	0683-3315
A1R64	0683-6825	7	1	RESISTOR 6.8K 5% .25W F	28480	0683-6825
A1R65	0683-6825	7	1	RESISTOR 6.8K 5% .25W F	28480	0683-6825
A1R66	0757-0715	9	1	RESISTOR 150 1% .25W CF	28480	0757-0715
A1R67	0683-3315	4	1	RESISTOR 330 5% .25W CF	28480	0683-3315
A1R68	0683-3315	4	1	RESISTOR 330 5% .25W CF	28480	0683-3315
A1R69	0683-6825	7	1	RESISTOR 6.8K 5% .25W CF	28480	0683-6825
A1R70	0683-6825	7	1	RESISTOR 6.8K 5% .25W CF	28480	0683-6825
A1R71	0757-0715	9	1	RESISTOR 150 1% .25W CF	28480	0757-0715
A1R72	0757-0715	9	1	RESISTOR 150 1% .25W CF	28480	0757-0715
A1R73	0683-4725	2	1	RESISTOR 4.7K 5% .25W CF	28480	0683-4725
A1R74	0757-0715	9	1	RESISTOR 150 1% .25W CF	8480	20757-0715
A175	0757-0760	4	1	RESISTOR 20K 1% .25W CF	28480	0757-0760
A1R76	0757-0497	4	1	RESISTOR 22K 1% .25W CF	28480	0757-0497
A1R77	0757-0497	4	1	RESISTOR 22K 1% .25W CF	28480	0757-0497
A1R78	0757-0497	4	1	RESISTOR 22K 1% .25W CF	2840	0757-0497
A1R79	0757-0497	4	1	RESISTOR 22K 1% .25W CF	28480	0757-0497
A1T1	9100-4744	0	1	CURRENT XFMR	28480	9100-4744
A1T2	9100-4747	3	1	MAIN XFMR	28480	9100-4747
A1T3	9100-4745	1	1	FEEDBACK XFMR	28480	9100-4745
A1T4	9140-1348	8	1	IDCTR-FXD 1.3MH 2.5A	28480	9140-1348
A1T5	9100-4746	2	1	DRVR XFMR	28480	9100-4746
A1T6	9100-4746	2	1	DRVR XFMR	28480	9100-4746
A1TP1	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359

**Table 6-1 AI Inverter Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A1TP2	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP3	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP4	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP5	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP6	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP7	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP8	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP9	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP10	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP11	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP12	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP13	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP14	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP15	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP16	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP17	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP18	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP19	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP20	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP21	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP22	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1TP23	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A1U1	1826-1576	0	1	IC V RGLTR-SWG 16-DIP PKG	28480	1826-1576
A1U2	1820-6080	9	1	IC UC3707 PWR DRIVER	28480	1820-6080
A1U3	1826-1524	8	1	IC MISC 8-DIP-P PKG	28480	1826-1524
A1U4	1820-2922	0	1	IC GATE CMOS NAND QUAD	28480	1820-2922
A1U5	1820-3081	4	1	IC DUAL D FLIP FLOP CMOS NAND	28480	1820-3081
A1U6	1820-3200	9	1	IC CNTR CMOS BIN ASYNCHRO	28480	1820-3200
A1U7	1820-3377	1	1	IC DRVR CMOS PRPHR HI-CUR	28480	1820-3377
A1U8	1826-1411	2	1	IC COMPARATOR PRCN DUAL 8-DIP-P	28480	1826-1411
A1U9	1990-1276	4	1	IC CNY17GFI OPTO ISOLATOR	28480	1990-1276
A1U10	1826-0147	9	1	IC V RGLTR FXD 11.5/12.5 TO-220	28480	1826-0147
A1VR1	1902-0557	7	1	DIODE-ZNR 20V PO=1W 5%	28480	1902-0557
A1VR2	1902-1304	4	1	DIODE-ZNR 15V PO=.4W 5%	28480	1902-1304
A1VR3	1902-1304	4	1	DIODE-ZNR 15V PO=.4W 5%	28480	1902-1304
A1VR4	1902-1304	4	1	DIODE-ZNR 15V PO=.4W 5%	28480	1902-1304
A1VR5	1902-1304	4	1	DIODE-ZNR 15V PO=.4W 5%	28480	1902-1304
A1VR6	1902-1304	4	1	DIODE-ZNR 15V PO=.4W 5%	28480	1902-1304
A1VR7	1902-1304	4	1	DIODE-ZNR 15V PO=.4W 5%	28480	1902-1304
A1YI	0410-2105	1	1	CLK-OSC-XTAL 1.96608MHZ	28480	0410-2105
				AI INVERTER MISCELLANEOUS PARTS		
	0360-2362	5	1	TERMINAL BLOCK 4-TERMINAL	28480	0360-2362
	85901-00015	1	2	TB JUMPER J6-2	28480	85901-00015
	85901-80043	3	24	TERMINAL-STUD SGL-TUR	28480	85901-80043

**Table 6-1 AI Inverter Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
	85901-20010	8	8	COOL SHEET	28480	85901-20010
	85901-00010	6	1	INV. BASE	28480	85901-00010
	1990-1130	9	1	LED-LAMP LUM-INT=560UCD	28480	1990-1130
	85901-40008	6	8	HOLDER FET	28480	85901-40008
	0515-0912	6	6	SCREW-MACH M3X0.5 8MM-LG PH	28480	0515-0912
	2190-0584	0	14	WASHER-LK HLCL 3.0MM	28480	2190-0584
	3050-0891	7	14	WASHER-FL MTLC 3.0MM	28480	3050-0891
	0535-0025	4	8	NUT-HEX DBL-CHAM M3X0.5 2.4MM-TH	28480	0535-0025
	85901-80044	4	6	EYELET	28480	85901-80044

**Table 6-2. A2 Control Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A2	85901-60002	2	1	CONTROL BOARD ASSEMBLY	28480	85901-60002
A2B1	9164-0325	9	1	PIEZOELECTRIC SOUNDER	28480	9164-0325
A2C1	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C2	0180-3469	3	1	CAPACITOR-FXD 100UF 25VDC AL 105C	28480	0180-3469
A2C3	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C4	0160-3237	1	1	CAPACITOR-FIXED 0.1UF 50VDC CER 20%	28480	0160-3237
A2C5	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C6	0180-0224	2	1	CAPACITOR-FXD 10UF 16VDC AL 105C	28480	0180-0224
A2C7	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C8	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C9	0180-4110	3	1	CAPACITOR-FXD 2.2UF 50VDC AL 85C	28480	0180-4110
A2C10	0180-3315	2	1	CAPACITOR-FXD 4.7UF 25VDC AL 85C	28480	0180-3315
A2C11	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C12	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C13	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C14	0160-3237	1	1	CAPICATOR -FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C15	0160-3237	1	1	CAPICATOR- FXD 0.1UF 50VDC CER 20%	2840	0160-3237
A2C16	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C17	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C18	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A2C19	0160-0263	7	1	CAPACITOR-FXD 0.22UF 50VDC CER 20%	28480	0160-0263
A2CR1	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A2CR2	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A2CR3	1901-0894	3	1	DIODE-SWITCHING 70V 200MA	28480	1901-0894
A2CR4	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A2CR5	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A2CR6	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A2CR7	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A2CR8	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A2CR9	1901-0704	3	1	DIODE-GEN PRP 100V 1A 1N4002GP	28480	1901-0704
A2J1	1251-6527	2	1	CONNECTOR-POST-TP-HDR 6P	28480	1251-6527
A2J2	1251-5066	2	1	CONNECTOR-POST-TP-HDR 2P	28480	1251-5066
A2J3	1251-4938	5	1	CONNECTOR-POST-TP-HDR 2P	28480	1251-4938
A2J4	1251-4381	2	1	CONNECTOR-POST-TP-HDR 7P	28480	1251-4381
A2J5	1251-6527	2	1	CONNECTOR-POST-TP-HDR 6P	28480	1251-6527
A2JP1	1252-2794	9	1	CONNECTOR-JUMPER 2P	28480	1252-2794
A2W1	8151-0013	6	1	WIRE-JUMPER 22AWG 1X22	28480	8151-0013
A2R1	0698-4631	0	1	RESISTOR 1.91K 1% .25W F	28480	0698-4631
A2R2	0698-4703	7	1	RESISTOR 8.66K 1% .25W F	28480	0698-4703
A2R3	0698-4036	9	1	RESISTOR 16.9K 1% .25W F	28480	0698-4036
A2R4	0757-0344	0	1	RESISTOR 1M 1% .25W F	28480	0757-0344
A2R5	0698-4706	0	1	RESISTOR 10.2K 1% .25W F	28480	1215-6527
A2R6	0757-0744	4	1	RESISTOR 3.92K 1% .25W F	28480	0757-0744
A2R7	0757-0740	0	1	RESISTOR 2.21K 1% .25W F	28480	0757-0740
A2R8	0757-0745	5	1	RESISTOR 4.32K 1% .25W F	28480	0757-0745

**Table 6-2. A2 Control Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A2R9	0757-0740	0	1	RESISTOR 2.21K 1% .25W F	28480	0757-0740
A2R10	0683-4735	4	1	RESISTOR 47K 5% .25W F	28480	0683-4735
A2R11	0698-3506	6	1	RESISTOR 470 1% .25W F	28480	0698-3506
A2R12	0757-0743	3	1	RESISTOR 3.32 1% .25W F	28480	0757-0743
A2R13	0757-0885	4	1	RESISTOR 15.4K 1% .25W F	28480	0757-0885
A2R14	2100-2497	9	1	RESISTOR-TRMR 2K 10%	28480	2100-2497
A2R16	0757-0340	6	1	RESISTOR 10K 1% .25W CF	28480	0757-0340
A2R17	0699-2519	1	1	RESISTOR 470K 5% .25W CF	28480	0699-2519
A2R18	0698-4646	7	1	RESISTOR 4.42K 1% .25W F	28480	0698-4646
A2R19	0698-4646	7	1	RESISTOR 4.42K 1% .25W F	28480	0698-4646
A2R20	0757-0344	0	1	RESISTOR 1M 1% .25W F	28480	0757-0344
A2R22	0757-0340	6	1	RESISTOR 10K 1% .25W F	28480	0757-0340
A2R23	0757-0338	2	1	RESISTOR 1K 1% .25W F	28480	0757-0338
A2R24	0698-0746	0	1	RESISTOR 4.75K 1% .25W F	28480	0698-0746
A2R25	0699-1301	7	1	RESISTOR 4.7M 5% .25W F	28480	0699-1301
A2R26	0698-4725	3	1	RESISTOR 19.6K 1% .25W F	28480	0698-4725
A2R28	0698-4739	9	1	RESISTOR 3.83K 1% .25W F	28480	0698-4739
A2R29	0757-0715	9	1	RESISTOR 150 1% .25W CF	28480	0757-0715
A2R30	0757-0757	9	1	RESISTOR 15K 1% .25W CF	28480	0757-0757
A2R31	0698-4708	2	1	RESISTOR 10.7K 1% .25W F	28480	0698-4708
A2R32	0757-0739	7	1	RESISTOR 2K 1% .25W F	28480	0757-0739
A2R33	0757-0344	0	1	RESISTOR 1M 1% .25W F	28480	0757-0344
A2R34	0757-0338	2	1	RESISTOR 1K 1% .25W CF	28480	0757-0338
A2R35	0757-0340	6	1	RESISTOR 10K 1% .25W F	28480	0757-0340
A2R36	0699-2521	5	1	RESISTOR 2.2M 1% .25W F	28480	0699-2521
A2R37	0698-4714	0	1	RESISTOR 13.7K 1% .25W F	28480	0698-4714
A2R38	0698-4646	7	1	RESISTOR 4.42K 1% .25W F	28480	0698-4646
A2R39	0757-0748	8	1	RESISTOR 5.62K 1% .25W F	28480	0757-0748
A2R40	0758-0030	3	1	RESISTOR 510 5% .25W F	28480	0758-0030
A2R41	0758-0030	3	1	RESISTOR 510 5% .25W F	28480	0758-0030
A2R42	0757-0338	2	1	RESISTOR 1K 1% .25W CF	28480	0757-0338
A2R43	0757-0760	4	1	RESISTOR 20K 1% .25W F	28480	0757-0760
A2R45	0757-0340	6	1	RESISTOR 10K 1% .25W CF	28480	0757-0340
A2RT1	0837-0388	2	1	THERMISTOR TUB 5K-OHM	28480	0837-0388
A2TP1	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP2	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP3	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP4	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP5	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP6	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP7	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP8	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP9	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP10	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP11	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359

**Table 6-2. A2 Control Board Assembly, Replaceable Parts**

Reference Designation	Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A2TP12	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP13	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP14	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP15	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP16	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP17	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP18	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP19	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP20	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP21	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2TP22	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A2U1	1826-0161	7	1	IC OP AMP GP QUAD 14-DIP	28480	1826-0161
A2U2	1820-2922	0	1	IC GATE CMOS NAND QUAD	28480	1820-2922
A2U3	1826-0161	7	1	IC OP AMP GP QUAD 14-DIP	28480	1826-0161
A2U41	1820-2924	2	1	IC GATE CMOS NOR QUAD	28480	820-2924
A2U5	1820-2923	1	1	IC GATE CMOS NAND TPL	28480	1820-2923
A2U6	1820-2922	0	1	IC GATE CMOS NAND QUAD	28480	1820-2922
A2U7	1826-1624	9	1	IC OP AMP GP DUAL 8-DIP-P PKG	28480	1826-1624
A2U8	1826-0161	7	1	IC OP AMP GP QUAD 14-DIP	28480	1826-0161
A2U9	1826-1115	3	1	IC V RGLTR-V-REF-ADJ TO-92	28480	1826-1115
A2U10	1826-01446	6	1	IC V RGLTR-FXT-POS 4.8/5.2V	28480	1826-0144

**Table 6-3. A3, AS, and A23 Board Assemblies, Replaceable Parts**

Reference Designation	Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3	85901-60003	3	1	CHARGER BOARD ASSEMBLY	28480	85901-60003
A3C1	0160-7049	1	1	CAPACITOR-FXD 4700PF 250VAC Y	28480	0160-7049
A3C2	0160-7049	1	1	CAPACITOR-FXD 4700PF 250VAC Y	28480	0160-7049
A3C3	0160-4259	9	1	CAPACITOR-FXD 0.22UF 250VAC X	28480	0160-4259
A3C4	0160-7075	3	1	CAPACITOR-FXD 4700PF 50VDC PP 2%	28480	0160-7075
A3C5	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER	28480	0160-3237
A3C6	0180-3737	8	1	CAPACITOR-FXD 1UF 50VDC AL 85C	28480	0180-3737
A3C7	0160-0263	7	1	CAPACITOR-FXD 0.22UF 50VDC CER 20%	28480	0160-0263
A3C8	0180-3705	0	1	CAPACITOR-FXD 47UF 50VDC AL 105C	28480	0180-3705
A3C9	0160-3752	5	1	CAPACITOR-FXD 1000PF 50VDC CER 10%	28480	0160-3752
A3C10	0180-4106	7	1	CAPACITOR-FXD 390UF 250VDC AL 105C	28480	0180-4106
A3C11	0180-4106	7	1	CAPACITOR-FXD 390UF 250VDC AL 105C	28480	0180-4106
A3C12	0160-7076	4	1	CAPACITOR-FXD 0.033UF 630VDC MPE	28480	0160-7076
A3C13	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A3C14	0160-7049	1	1	CAPACITOR-FXD 4700PF 250VAC Y	28480	0160-7049
A3C15	0180-4107	8	1	CAPACITOR-FXD 2800UF 25VDC AL 105C	28480	0180-4107
A3C16	0180-4108	9	1	CAPACITOR-FXD 220UF 25VDC AL 105C	28480	0180-4108
A3C17	0160-3237	1	1	CAPACITOR-FXD 0.1UF 50VDC CER 20%	28480	0160-3237
A3C18	0160-4259	9	1	CAPACITOR-FXD 0.22UF 250VAC X	28480	0160-4259
A3C19	0160-7049	1	1	CAPACITOR-FXD 4700PF 250VAC Y	28480	0160-7049
A3C20	0160-7085	5	1	CAPACITOR-FXD 470PF 50VDC CER 20%	28480	0160-7085
A3C21	0160-0263	7	1	CAPACITOR-FXD 0.22UF 50VDC CER 20%	28480	0160-0263
A3C22	0160-7086	6	1	CAPACITOR-FXD 270PF 1000VDC CER 20%	28480	0160-7086
A3C23	0160-3831	1	1	CAPACITOR-FXO 0.01UF 50VDC CER 20%	28480	0160-3831
A3CR1	1901-0646	3	1	DIODE-PWR RECT 200V 1A 150NS	28480	1901-0646
A3CR2	1901-0646	3	1	DIODE-PWR RECT 200V 1A 150NS	28480	1901-0646
A3CR3	1906-0356	2	1	DIODE-FW BRDG 800V 3A	28480	1906-0356
A3CR4	1901-1274	5	1	DIODE-GEN PRF	28480	1901-1274
A3CR5	1906-0321	1	1	DIODE-CT-RECT 200V 16A	28480	1906-0321
A3CR6	1906-0357	3	1	DIODE-CT-RECT 100V 16A	28480	1906-0357
A3FL1	9135-0364	5	1	LINE FILTER 40MH	28480	9135-0364
A3J1	1252-2786	9	1	CONNECTOR-POST-TP-HDR 2P	28480	1252-2786
A3J2	1252-2786	9	1	COMMECTOR-POST-TP-HDR 2P	28480	1252-2786
A3J3	1251-6527	2	1	CONNECTOR-POST-TP-HDR 6P	28480	1251-6527
A3J4	1251-4938	5	1	CONNECTOR-POST--HDR 3P	28480	1251-4938
A3L1	9140-1349	9	1	CHOKE COIL 30UH 4A	28480	9140-1349
A3Q1	1854-0210	6	1	TR NPN SI TO-18	28480	1854-0210
A3Q2	1884-0336	0	1	THYR-2N5064 SCR	28480	1884-0336
A3Q3	1855-0766	6	9	1TR MOSFET N-CHAN E-MODE TO-220	28480	1855-0766
A3R1	0811-3813	0	1	RESISTOR 22K 5% 10W PW	28480	0811-3813
A3R2	0683-8245	9	1	RESISTOR 820K 5% .25W CF	28480	0683-8245
A3R3	0689-1845	3	1	RESISTOR 180K 5% .25W CF	28480	0689-1845
A3R4	0698-4712	8	1	RESISTOR 12.4K 1% .25W CF	28480	0698-4712
A3R5	0683-2215	1	1	RESISTOR 220 5% .25W CF	28480	0683-2215
A3R6	0683-3925	2	1	RESISTOR 3.9K 5% .25W CF	28480	0683-3925

**Table 6-3. A3, AS, and A23 Board Assemblies, Replaceable Parts**

Reference Designation	Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3R7	0757-0340	6	1	REGISTOR 10K 1% .25W CF	28480	0757-0340
A3R8	0757-0340	6	1	RESISTOR 10K 1% .25W CF	28480	0757-0340
A3R9	0811-3812	9	1	RESISTOR 100 5% 3W	28480	0811-3812
A3R10	0683-4725	2	1	RESISTOR 4.7K 5% .25W CF	28480	0683-4725
A3R11	0811-3815	2	1	RESISTOR 6.8K 5% 10W PW	28480	0811-3815
A3R12	0698-3506	6	1	RESISTOR 470 1% .25W CF	28480	0698-3506
A3R13	0757-0338	2	1	RESISTOR 1K 1% .25W CF	28480	0757-0338
A3R14	0757-0340	6	1	RESISTOR 10K 1% .25W CF	28480	0757-0340
A3R15	0699-2519	1	1	RESISTOR 470K 5% .5W CF	28480	0699-2519
A3R16	0699-2519	1	1	RESISTOR 470K 5% .5W CF	28480	0699-2519
A3R17	0699-2534	0	1	RESISTOR 0.03 5% .5W	28480	0699-2534
A3R18	0698-3506	6	1	RESISTOR 470 1% .25W CF	28480	10698-3506
A3R19	0698-3506	6	1	RESISTOR 470 1% .25W CF	28480	0698-3506
A3R20	0757-1027	8	1	RESISTOR 680 1% .25W CF	28480	0757-1027
A3R21	0757-0743	3	1	RESISTOR 3.32K 1% .25W CF	28480	0757-0743
A3R22	0699-2520	4	1	RESISTOR 462 1% .25W CF	28480	0699-2520
A3R23	0698-7810	3	1	RESISTOR 2.05K 1% .25W CF	28480	0698-7810
A3R24	2100-2497	9	1	RESISTOR-TRMR 2K 10%	28480	2100-2497
A3R25	0757-0354	2	1	RESISTOR 3.65K 1% .25W F	28480	0757-0354
A3R26	0757-0340	6	1	RESISTOR 10K 1% .25W CF	28480	0757-0340
A3R27	0757-0354	2	1	RESISTOR 3.65K 1% .25W TF	28480	0757-0354
A3RT1	0837-0389	3	1	THERMISTOR S1100	28480	0837-0389
A3RT2	0837-0388	2	1	THERMISTOR TUB 5K-OHM	28480	0837-0388
A3T1	9100-4748	4	4	XFMR POWER	28480	9100-4748
A3TP1	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP2	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP3	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP4	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP5	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP6	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP7	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP8	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP9	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP10	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP11	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3TP12	0360-2359	0	1	CONNECTOR-SGL CONT	28480	0360-2359
A3U1	1826-1908	2	1	IC V RGLTR-SWG	28480	1826-1908
A3U2	1990-1276	4	1	IC OPTO-ISOLATOR	28480	1990-1276
A3U3	1990-1276	4	1	IC OPTO-ISOLATOR	28480	1990-1276
A3U4	1826-1115	3	1	IC V RGLTR-V-REF-ADJ TO-92	28480	1826-1115
				A3 MISCELLANEOUS PARTS		
	85901-40008	6	3	HOLDER-FET	28480	85901-40008
	0535-0025	4	3	NUT-HEX OBL-CHAM M3-0.5	28480	0535-0025
	85901-00014	0	1	CHRGR-BASE	28480	85901-00014

**Table 6-3. A3, AS, and A23 Board Assemblies, Replaceable Parts**

Reference Designation	Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
	0515-0912	6	4	SCREW-MACH M3X0.5 8MM-LG PAN-HD	28480	0515-0912
	2190-0584	0	7	WASHER-LK HLCL 3.0MM	28480	2190-0584
	3050-0891	7	7	WASHER-LK MTLC 3.0MM	28480	3050-0891
	1252-2794	9	1	CONN-JUMPER 2P	28480	1252-2794
A5	85901-60005	5	1	TERMINAL BLOCK BOARD ASSEMBLY	28480	85901-60005
A5C1	0160-7050	4	1	CAPACITOR-FXD 4700PF 100V	28480	0160-7050
A5C2	0160-7048	0	1	CAPACITOR-FXD 2200PF 100V	28480	0160-7048
A5C3	0160-7050	4	1	CAPACITOR-FXD 4700PF 100V	28480	0160-7050
A5C4	0160-7048	0	1	CAPACITOR-FXD 2200PF 100V	28480	0160-7048
A5C5	0160-7050	4	1	CAPACITOR-FXD 4700PF 100V	28480	0160-7050
A5C6	0160-7048	0	1	CAPACITOR-FXD 2200PF 100V	28480	0160-7048
A23	85901-60006	6	1	DC FILTER BOARD ASSEMBLY	28480	85901-60006
A23C1	0160-7048	0	1	CAPACITOR-FXD 2200PF 100V	28480	0160-7048
A23C2	0160-7050	4	1	CAPACITOR-FXD 4700PF 100V	28480	0160-7050
A23C3	0160-7048	0	1	CAPACITOR-FXD 2200PF 100V	28480	0160-7048
A23C4	0160-7050	4	1	CAPACITOR-FXD 4700PF 100V	28480	0160-7050
A23C5	0160-7050	4	1	CAPACITOR-FXD 4700PF 100V	28480	0160-7050
A23C6	0160-7048	0	1	CAPACITOR-FXD 2200PF 100V	28480	0160-7048

**Table 6-4. 85901A Miscellaneous Replaceable Parts**

Reference Designation	Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
				INSTRUMENT COVER ASSEMBLY		
	5041-7288	3	2	FOOT REAR	28480	5041-7288
	85901-80005	7	2	SPACER FOOT	28480	85901-80005
	5021-6332	4	2	PLATE HANDLE	28480	5021-6332
	5021-8728	6	2	PLATE BACK-UP	28480	5021-8728
	85901-80053	5	1	HANDLE	28480	85901-80053
	5021-6344	8	2	SOCKET GEAR	28480	5021-6344
	5021-6343	7	2	GEAR RING	28480	5021-6343
	1460-2164	8	2	SPRING HANDLE	28480	1460-2164
	5041-3991	7	2	CAP TRIM HANDLE	28480	5041-3991
	0515-0926	2	6	SCREW-MACH M4X0.7 10MM-LG PAN-HD	28480	0515-0926
	0515-0913	7	6	SCREW-MACH M4X0.7 10MM-LG FLH-HD	28480	0515-0913
	0515-1021	0	2	SCREW-MACH M5X0.8 16MM-LG FLH-HD	28480	0515-1021
	2190-0586	2	2	WSHR-LK HLCL 4.0MM	28480	2190-0586
				BATTERY TERMINAL ASSEMBLY		
	85901-80039	7	2	TERMINAL BATTERY	28480	85901-80039
	85901-80042	2	2	PLATE NUT	28480	85901-80042
	0515-1012	9	2	SCREW-MACH M4X0.7 8MM LG FLH	28480	0515-1012
	85901-90001	4	1	MANUAL	28480	85901-90001
	2110-0665	0	1	FUSE 1A 125V	28480	2110-0665
	2110-0773	1	1	FUSE 1.6A 250V TO IEC	28480	2110-0773
	2110-0734	4	1	FUSE 4A 250V TO IEC	28480	2110-0734
	2110-0809	4	2	FUSE 30A 32V	28480	2110-0809
	0360-2365	8	1	TB JUMPER J8-2	28480	0360-2365
	0360-2364	7	1	TB JUMPER J8-4	28480	0360-2364
	85901-60100	1	1	CHARGER-CONTROL HARNESS ASSEMBLY	28480	85901-60100
	85901-60101	2	1	INDICATOR HARNESS ASSEMBLY	28480	85901-60101
	85901-60103	4	1	INVERTER-CONTROL HARNESS ASSEMBLY	28480	85901-60103
	85901-60104	5	1	CHARGER OUTPUT HARNESS ASSEMBLY	28480	85901-60104
	85901-60108	9	1	INVERTER DC INPUT HARNESS ASSEMBLY "A"	28480	85901-60108
	85901-60109	0	1	INVERTER OC INPUT HARNESS ASSEMBLY "B"	28480	85901-60109
	3101-3000	5	1	SW-RKR DPST 4A 250V (WHT)	28480	3101-3000
	1390-0088	2	1	RETAINER FASTENER	28480	1390-0088
	1390-0818	6	1	STUD FASTENER	28480	1390-0818
	1390-0071	3	1	WSHR WEAR FASTENER	28480	1390-0071
				FRONT FRAME ASSEMBLY		
	1390-0293	1	1	EJECTOR SPRING	28480	1390-0293
	85901-40002	0	1	DOOR	28480	85901-40002
	85901-40003	1	1	FRONT FRAME	28480	85901-40003
	85901-80007	9	1	PANEL DRESS	28480	85901-80007

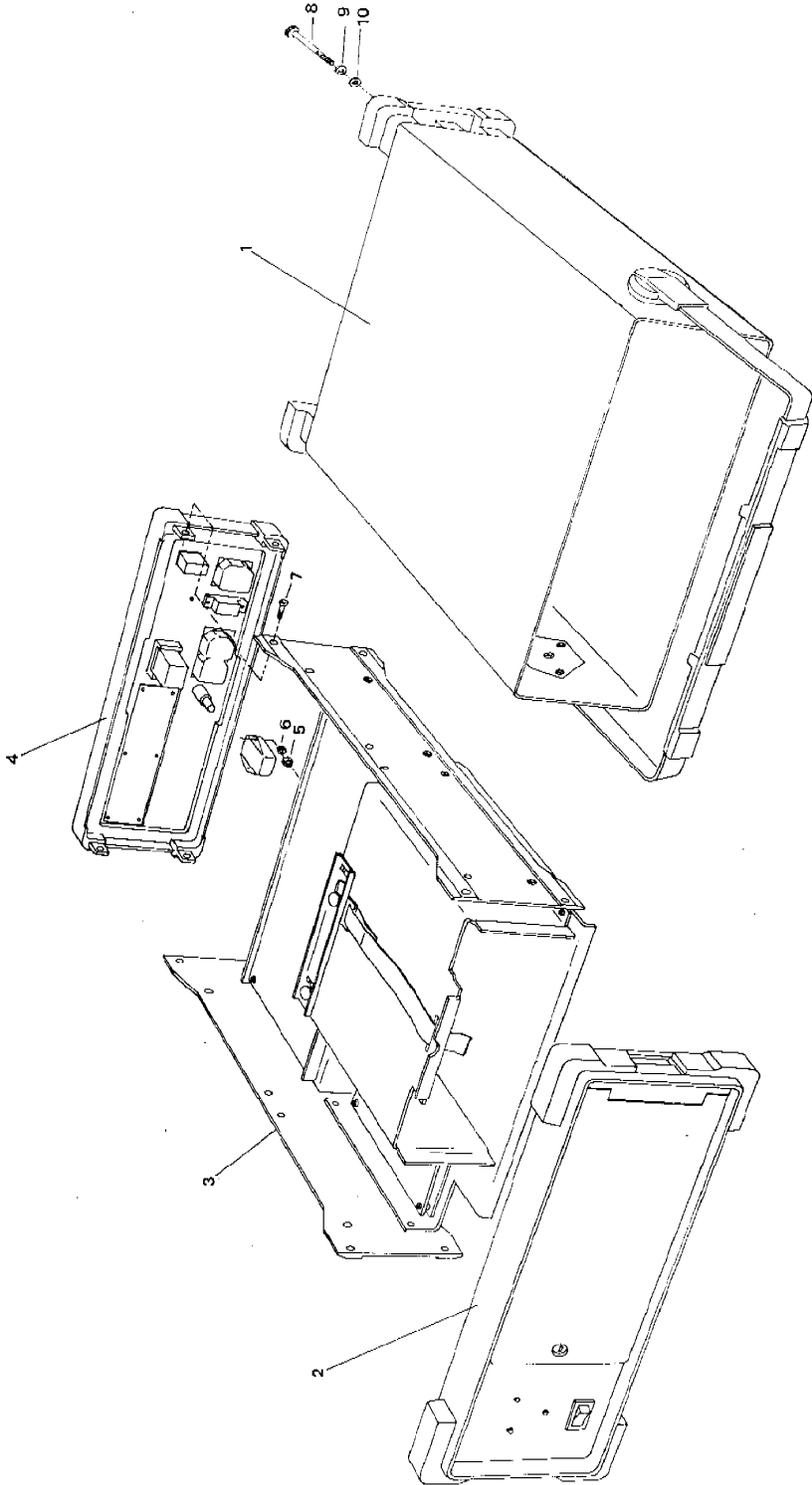
**Table 6-4. 85901A Miscellaneous Replaceable Parts**

Reference Designation	Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
	5041-7289	4	4	BUMPER	28480	5041-7289
	85901-40007	5	1	PLATE HINGE	28480	85901-40007
	85901-80018	2	2	PIVOT PIN	28480	85901-80018
	85901-80041	1	1	PAD DOOR	28480	85901-80041
	0515-0924	0	8	SCREW-MACH M3X0.5 6MM-LG PAN-HD	28480	0515-0924
	0515-0910	4	2	SCREW-MACH M4X0.7 8MM-LG PAN-HD	28480	0515-0910
	0515-0912	6	23	SCREW-MACH M3X0.5 8MM-LG PAN-HD	28480	0515-0912
	3050-1313	0	2	NYLON WASHER ID5.2XOD9.5MM 0.8TH	28480	3050-1313
	2190-0586	2	2	WASHER-LK HLCL 4.0MM	28480	2190-0586
	3050-0891	7	3	WSHR-FL MTLC 3.0MM	28480	3050-0891
	2190-0584	0	11	WSHR-LK HLCL 3.0MM	28480	2190-0584
				PCB INDICATOR BOARD ASSEMBLY		
DS2	1252-0040	4	1	CONNECTOR-POST-TP-HDR 4P	28480	1252-0040
DS1	1990-1129	6	1	LED-LAMP LUM-INT=900UCD	28480	1990-1129
DS3	1990-1130	9	1	LED-LAMP LUM-INT=560UCD	28480	1990-1130
	1990-1130	9	1	LED-LAMP LUM-INT=560UCD	28480	1990-1130
	85901-60112	5	1	SELECTOR SW HARNESS ASSEMBLY	28480	85901-60112
	85901-60121	6	1	INVERTER OUTPUT HARNESS ASSEMBLY	28480	85901-60121
	85901-60106	7	1	INTER IN HARNESS ASSEMBLY	28480	85901-60106
	85901-60105	6	1	BATT (-) HARNESS ASSEMBLY	28480	85901-60105
	85901-60102	3	1	CHARGER IN HARNESS ASSEMBLY	28480	85901-60102
	85901-60118	1	1	EXT IN HARNESS ASSEMBLY	28480	85901-60118
	85901-40005	3	1	REAR FRAME	28480	85901-40005
	85901-00002	6	1	REAR PANEL	28480	85901-00002
	9135-0367	8	1	CONNECTOR-AC PWR INLET MALE REC	28480	9135-0367
	0590-1661	2	4	THREAD-IN M5X0.8 7.5MM-LG	28480	0590-1661
	3101-2999	9	1	SW RKR DPST 4A 250V(BLK)	28480	3101-2999
	1252-2772	3	1	CONNECTOR-AC PWR OUTLET CEE-22	28480	1252-2772
	9135-0365	6	1	NOISE FILTER	28480	9135-0365
	85901-00003	7	1	MAIN DECK	28480	85901-00003
	85901-40006	4	2	SIDE FRAME	28480	85901-40006
	2190-0584	0	22	WASHER-LK HLCL 3.0MM	28480	2190-0584
	0515-1012	9	8	SCREW-MACH M4X0.7 8MM-LG FLH-HD	28480	0515-1011
	0400-0325	2	0.3	GRO-CHANNEL NOTCHED	28480	0400-0325
	0515-0926	2	4	SCREW-MACH M4X0.7 10MM-LG PAN-HD	28480	0515-0926
	2190-0586	2	4	WSHR-LK HLCL 4.0MM	28480	2190-0586
	3050-0891	7	10	WSHR-FL MTLC 3.0MM	28480	3050-0891
	0535-0025	4	2	NUT-HEX DBL-CHAM M3X0.5	28480	0535-0025
	85901-80045	5	1	PLATE CHOKE	28480	85901-80045
	85901-80046	6	2	SPACER	28480	85901-80046
	0460-2198	7	0.5	TAPE INSULATION	28480	0460-2198

**Table 6-4. 85901A Miscellaneous Replaceable Parts**

Reference Designation	Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
	1400-1501	9	11	MOUNTING BLOCK CABLE	28480	1400-1501
	85901-60107	8	1	THERMISTOR HARNESS ASSEMBLY	28480	85901-60107
				BATTERY CAGE ASSEMBLY		
	85901-00005	9	1	CAGE BATTERY	28480	85901-00005
	85901-00006	0	1	BRACKET, WIRE	28480	85901-00006
	85901-20007	3	1	SHAFT ROLLER	28480	85901-20007
	85901-20011	9	1	SHAFT HINGE	28480	85901-20011
	85901-80006	8	1	EXTRACTOR, STRAP	28480	85901-80006
	85901-00008	2	1	BRACKET BATTERY	28480	85901-00008
	85901-80011	5	1	PAD BRACKET	28480	85901-80011
	0510-1322	4	2	E-RETAINER 4MM	28480	0510-1322
	0510-1321	3	2	E-RETAINER 8MM	28480	0510-1321
	0515-0912	6	6	SCREW-MACH M3X0.5 8MM-LG PAN-HD	28480	0515-0912
	2190-0584	0	6	WSHR-LK HLCL 3.0MM	28480	2190-0584
	85901-20008	4	1	ROLLER EXTRACTING	28480	85901-20008
	3050-1313	0	3	WASHER-NYLON ID5.2X0D10MM	28480	3050-1313
	85901-00007	1	1	BRACKET THERMISTOR	28480	85901-00007
	0510-1323	5	1	E-RETAINER 6MM	28480	0510-1323
	2110-0811	8	1	FUSE HLDR 4A 250V	28480	2110-0811
	0535-0023	2	8	NUT-HEX DBL-CHAM M4X0.7	28480	0535-0023
	2190-0586	2	6	WSHR-LK HLCL 4.0MM	28480	2190-0586
	3050-0893	9	1	WSHR-FL MTLC 4.0MM	28480	3050-0893
	0515-1005	0	7	SCREW-MACH M3X0.5 10MM-LG FLH	28480	10515-1005
	0535-0025	4	7	NUT-HEX DBL-CHAM M3X0.5	28480	0535-0025
	3050-0891	7	7	WSHR-FL MTLC 3.0MM	28480	3050-0891
	2190-0584	0	7	WASHER-LK HLCL 3.0MM	28480	2190-0584
	0890-0312	4	0.24	TUBING-HS .25-IN-D/.125-IN-RCVD	28480	0890-0312
	0515-0913	7	1	SCREW-MACH M4X0.7 10MM LG FLH	28480	0515-0913
	3101-3001	6	11	SW-SL DPDT 5A 250V	28480	3101-3001
	85901-80013	7	1	LABEL WARNING	28480	85901-80013
	85901-80049	9	2	LABEL WARNING HIGH VOLTAGE	28480	85901-80049
	0515-1218	7	4	SCR-SKD-HD-CAP M5X0.8 40MM-GL	28480	0515-1218
	0900-0024	8	4	O-RING	28480	0900-0024
	2190-0587	3	4	WSHR-LK HLCL 5.0MM 5.1-MM-ID	28480	2190-0587
	1420-0373	3	1	BATTERY, MATSUSHITA ELECTRIC LCR 12V17P	28480	1420-0373

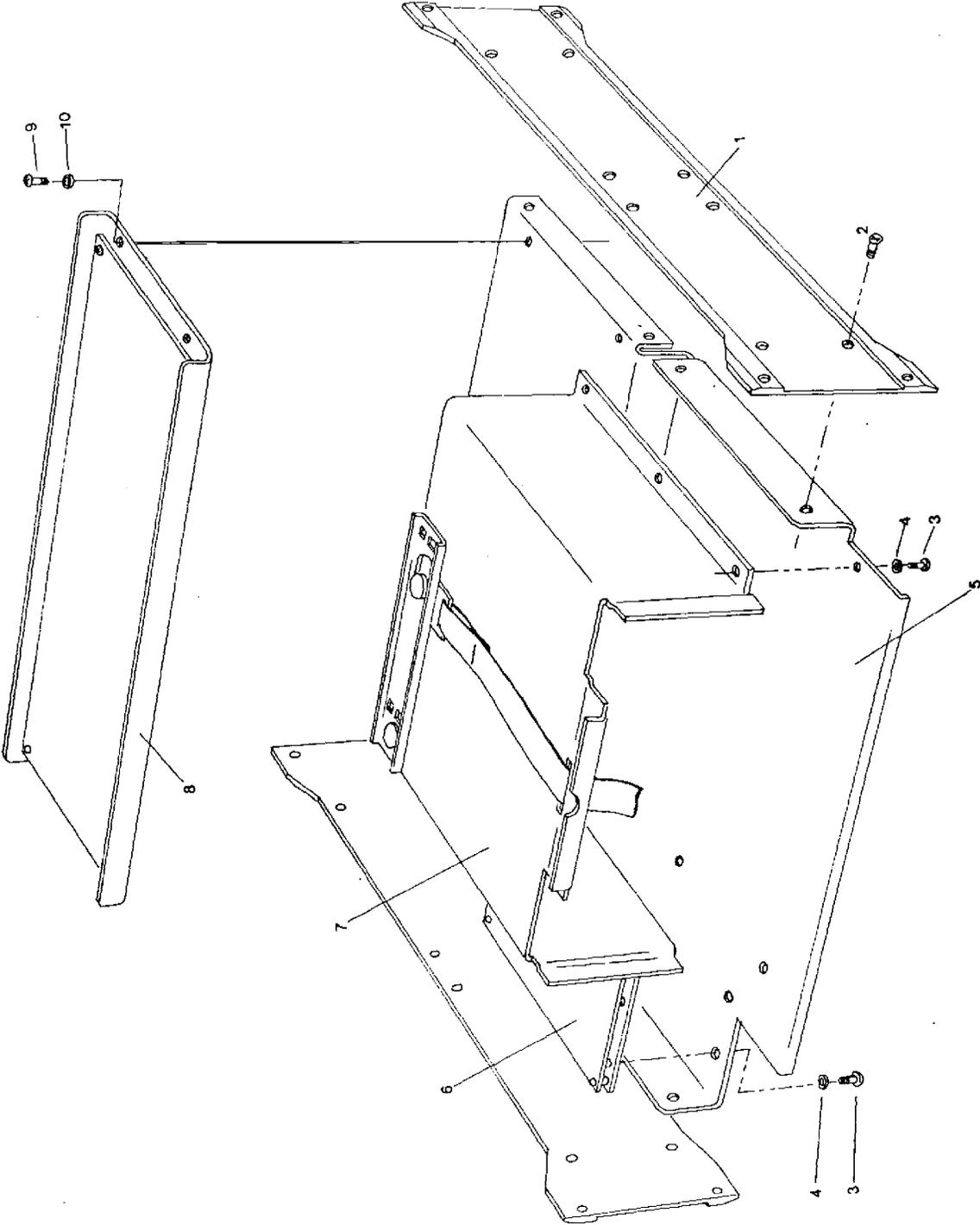
**Figure 6-1 85901A Overall Subassembly Locations (1 of 2)**



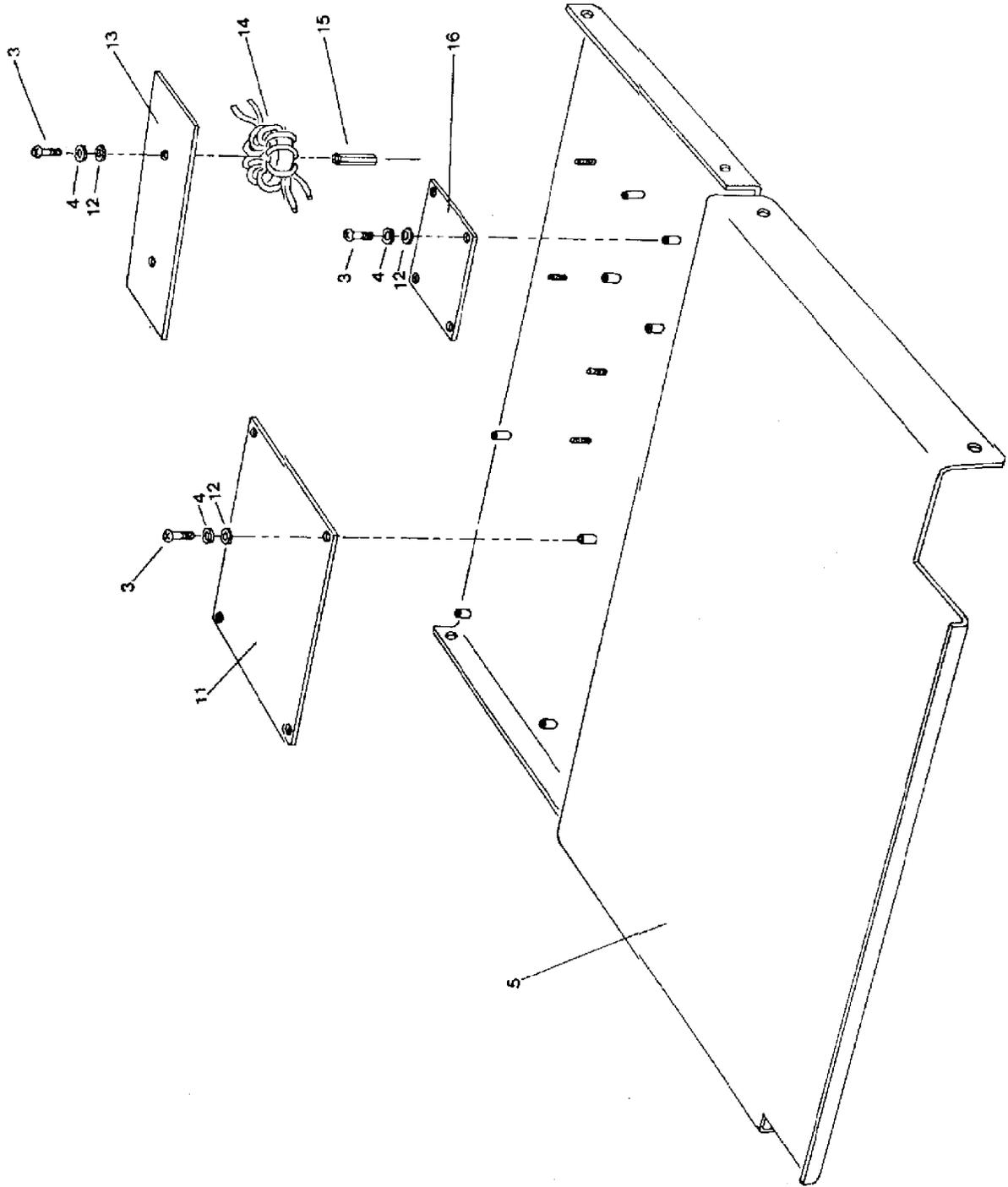
<b>Item</b>	<b>Part Number</b>	<b>Qty</b>	<b>Description</b>
1	85901-60207	1	ASS'Y-COVER
2	85901-60208	1	ASS'Y-FRONT FRAME
3	85901-60210	1	ASS'Y-MAIN DECK
4	85901-60209	1	ASS'Y-REAR FRAME
5	0535-0025	2	NUT-HEX DBL-CHAM M3X0.5
6	2190-0584	2	WSHR-LK HLCL 3.0MM
7	0515-0913	8	SCR-MACH M4X0.7 10MM FH
8	0515-1218	4	SCR-SKD-HD-CAP M5X0.8 40MM
9	2190-0587	4	WSHR-LK HLCC 5.0MM
10	0900-0024	4	O-RING

Figure 6-1. 85901A Overall Subassembly Locations (2 of 2)

**Figure 6-2 85901A Subassembly Locations, Top and Bottom Views (1 of 3)**



**Figure 6-3 85901A Subassembly Locations, Top and Bottom Views (2 of 3)**



<b>Item</b>	<b>Part Number</b>	<b>Qty</b>	<b>Description</b>
1	85901-40006	2	FRAME-SIDE
2	0515-1012	8	SCR-MACH M4XO.7 8MM FH
3	0515-0912	30	SCR-MACH M3XO.5 8MM PH
4	2190-0584	30	WSHR-LK HLCL 3.0MM
5	85901-00003	1	DECK-MAIN
6	85901-60003	1	ASS'Y-CHARGER BOARD
7	85901-60212	1	ASS'Y-BATTERY CAGE
8	85901-60001	1	ASS'Y-INVERTER BOARD
9	0515-0926	4	SCR-MACH M4XO.7 10MM PH
10	2190-0586	4	WSHR-LK HLCL 4.0MM
11	85901-60002	1	ASS'Y-CONTROL BOARD
12	3590-0891	20	WSHR-FL MTLC 3.0MM
13	85901-80045	1	PLATE-CHOKE
14	85901-60108	1	ASS'Y-"A" INV. DC INPUT
15	85901-80046	2	SPACER
16	85901-60006	1	ASS'Y-DC FILTER BOARD

Figure 6-2. 85901A Subassembly Locations, Top and Bottom Views  
(3 of 3)

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**7**

**Service**

## Introduction

This chapter provides circuit descriptions, component location drawings, and schematics for the 85901A AC Power Source.

Test equipment and accessories required to maintain the 85901A are listed in Table 1-3. If the equipment listed is not available, equipment that meets the minimum specifications shown may be substituted.

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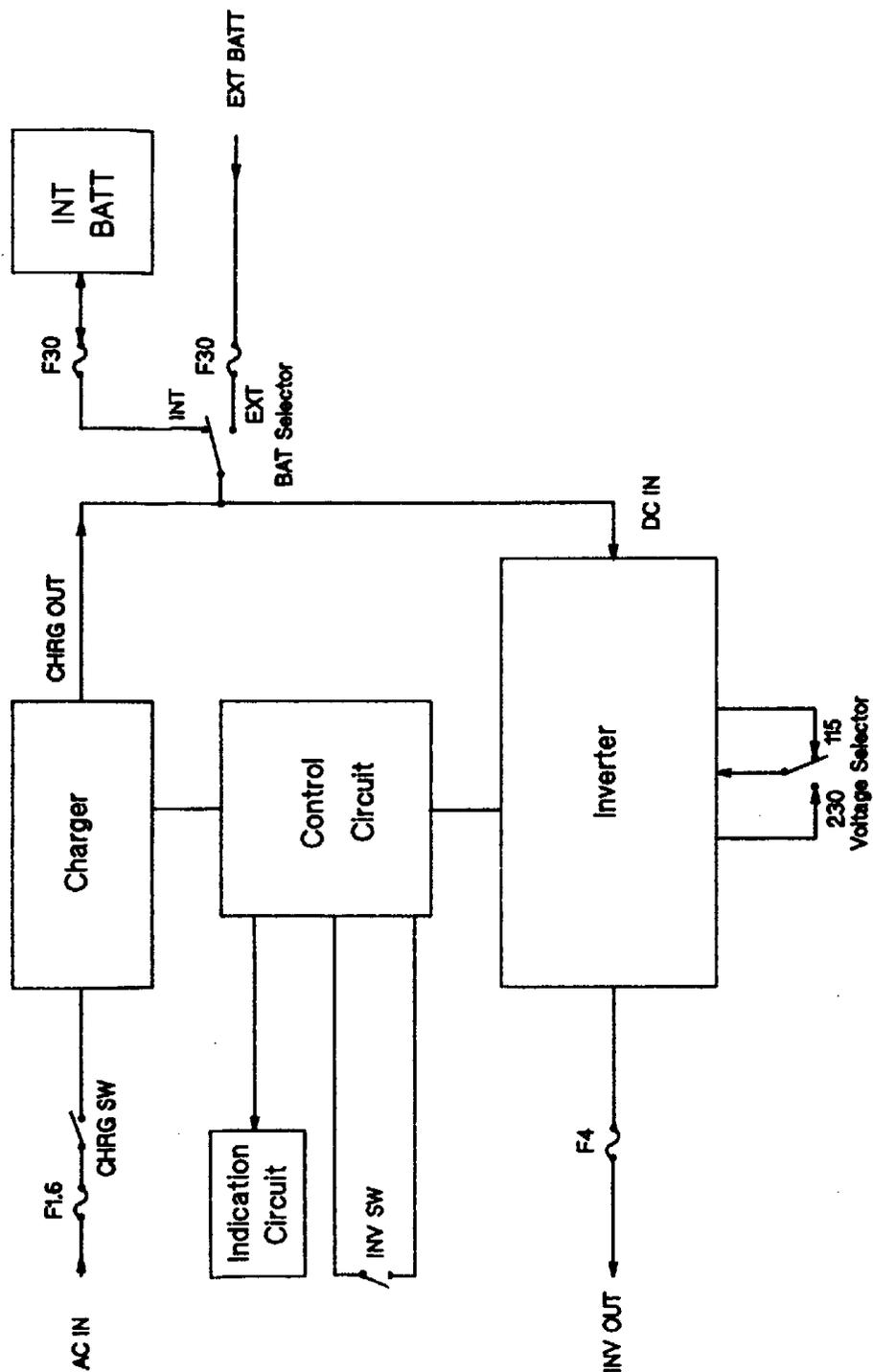
## Overall Description

The 85901A is a portable ac power source. It can be operated on the bench or as a portable power supply for field service. It may also be used for measurements requiring power-line isolation or for measurements performed during power failure. The instrument has a carrying handle that can also be used as an adjustable tilt-stand. The handle can be moved by pushing the sides of the handle in and then turning the handle to a suitable position.

The 85901A consists of battery, inverter, charger, and control circuits. It provides up to 200W maximum continuous power with the internal battery, at either 115 Vrms or 230 Vrms. For an overview of major circuits and their functions, refer to the overall block diagram in Figure 7-1.

The 85901A weighs 14.2 kg (31.3 lb) with the battery installed, and 8.0 kg (17.6 lb) without the battery. The rear panel has terminals for connecting an external battery or other 12 Vdc source. The dimensions of the package are 337 mm wide by 125 mm high by 461 mm deep.

Figure 7-1 85901A AC Power Source, Overall Block Diagram



## Front-Panel Description

LED indicators, which represent the status of battery, inverter, and charger circuits, are located on the left-hand side of the front panel.

The battery function area has two LEDs: the yellow LED indicates whether the charger is on or off, and the red LED indicates the state of the battery charger circuit. When the charger is operating, the red LED will be on if the battery- charging current is greater than 0.45 0.15 A, and it will be off if the battery-charging current is less than 0.45 0.15 A.

The inverter function area includes a yellow LED and the inverter on/off switch. The LED should be on when the inverter switch is on and the inverter is operating, and it will be off when the inverter is not operating. The inverter will not operate while the battery charger is operating.

During inverter operation, the red LED in the battery function area also is used to indicate the state of the battery output voltage. When the inverter is operating, the red LED will be off when battery voltage is greater than 10.8V typical, and it will blink (accompanied by a buzzer) when battery voltage is less than 10.8V typical.

The battery door occupies the remaining part of the front panel. This door provides battery access for service.

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## Rear-Panel Description

The charger on/off switch is in the upper left-hand corner of the rear panel. A yellow LED that indicates whether the charger is on or off is located in the front-panel battery function area. The charger-input line module is mounted directly below the charger switch. The line module contains the 1.6A 250V charger input fuse.

The inverter voltage selection switch, two CEE-22V receptacles, and 4A 250V inverter output fuse are grouped together by the INV OUTPUT bracket. The voltage selection switch sets the inverter output to 115V or 230V.

The internal battery fuse and external battery fuse, both 30A 32 Vdc, are located above the inverter output receptacles.

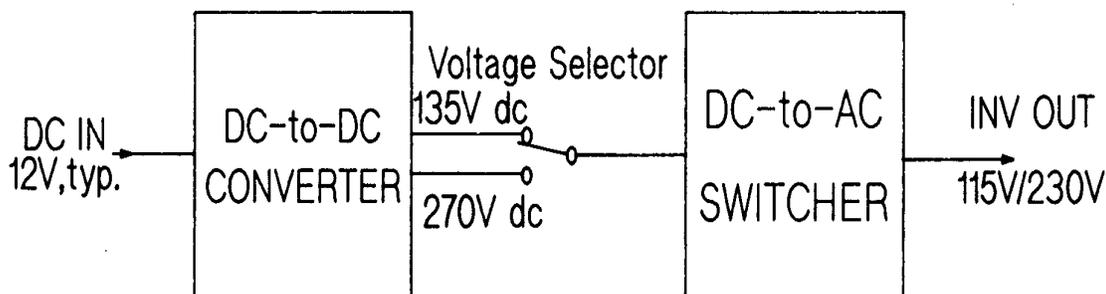
The battery-selection terminal block occupies the upper right-hand half of the rear panel. Select the internal or an external battery by changing the position of the shorting bars on the terminal block. The external battery positive and negative leads are connected to the terminals marked **plus** and **minus**, respectively.

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## Inverter

The inverter has two major functional blocks, a dc-to-dc converter and a dc-to-ac switcher, which are illustrated in Figure 7-2. The inverter also includes control and protection circuits. The dc-to-dc converter produces 135 Vdc and 270 Vdc from 12 Vdc input. Either output, 135 Vdc or 270 Vdc, is selected by the rear-panel INV OUTPUT voltage selector switch.

**Figure 7-2** A1 Inverter Board Assembly, Simplified Block Diagram

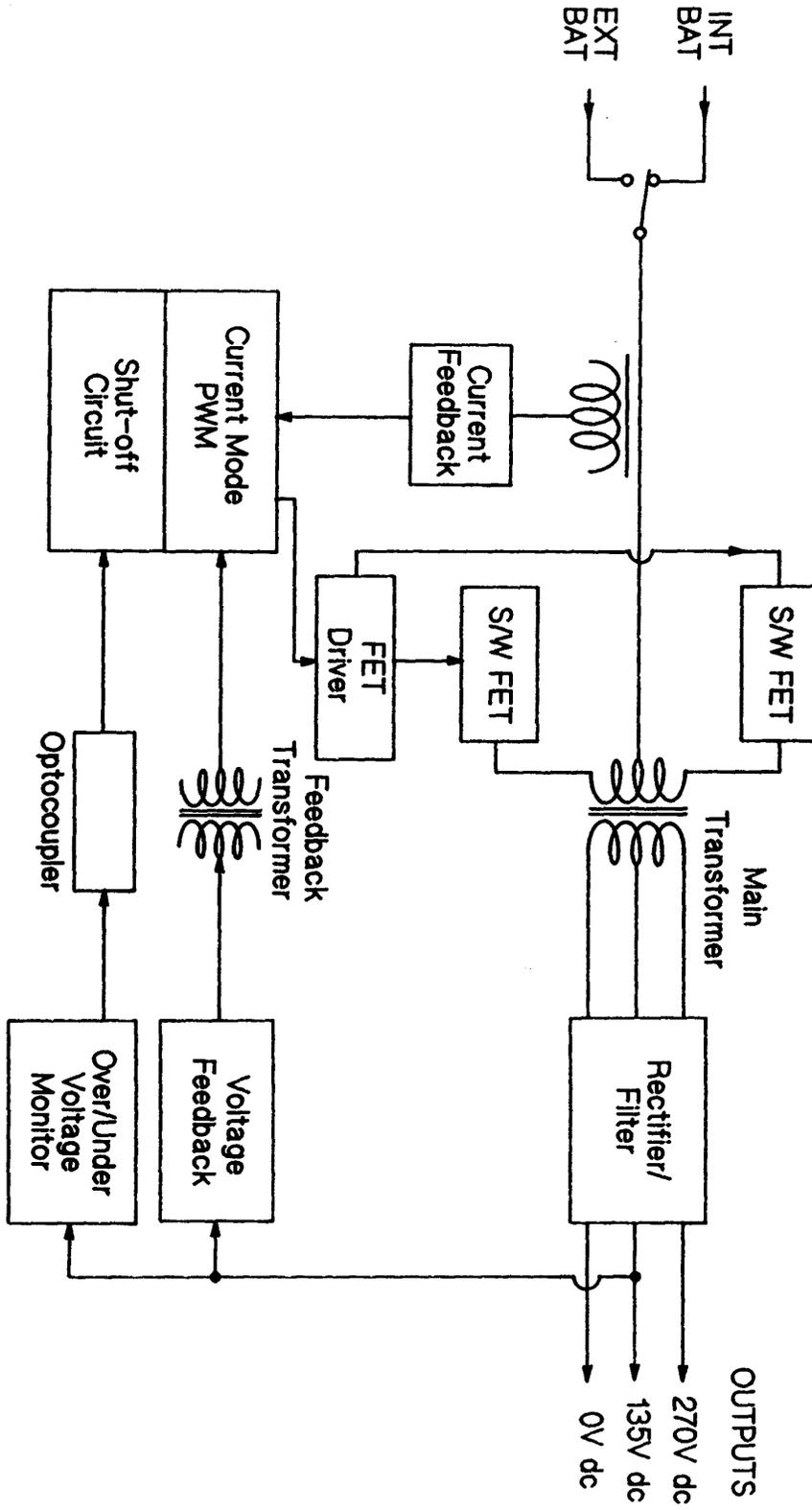


### DC-to-DC Converter

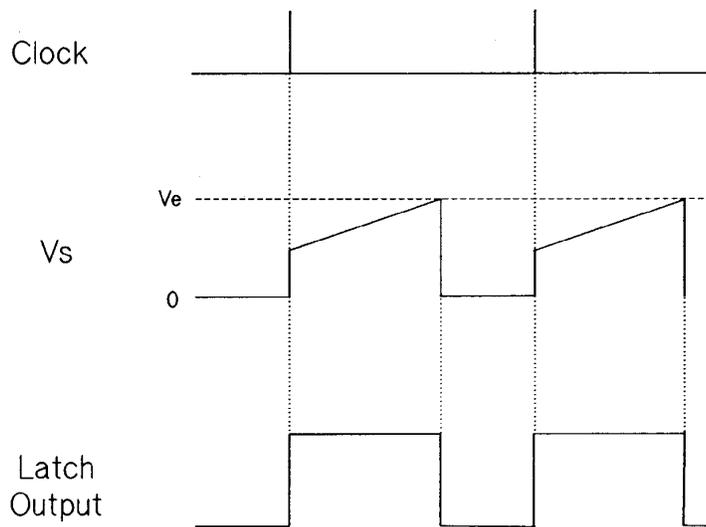
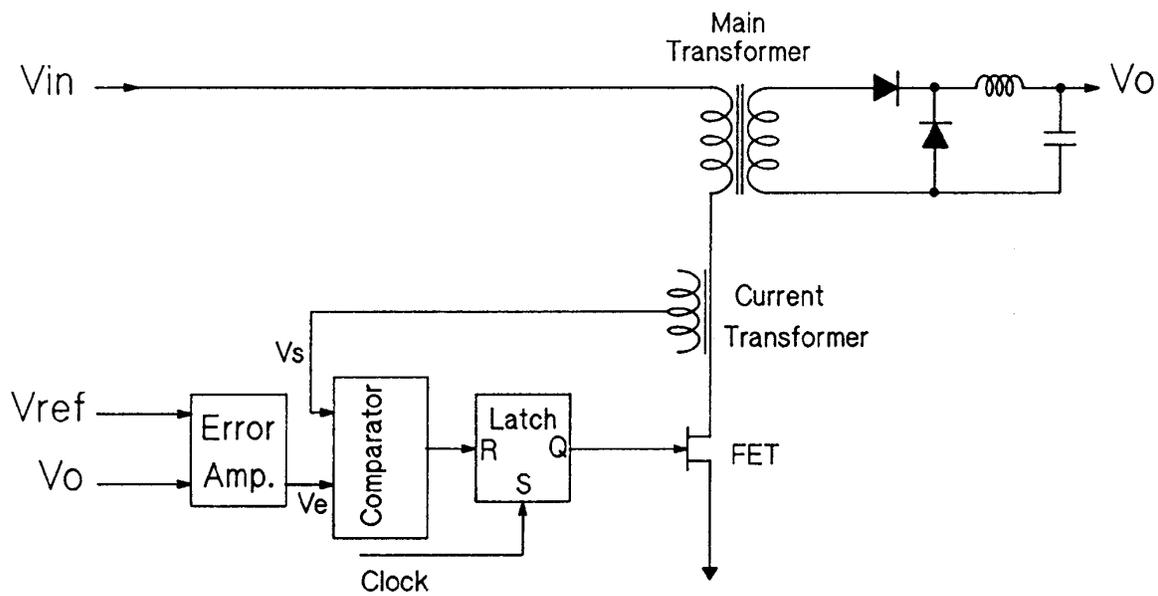
The dc-to-dc converter uses four IGFETs in push-pull current mode driving transformer T2, transforming 12 Vdc input to 135 Vdc or 270 Vdc output. Figure 7-3 shows the circuit in greater detail.

Current-mode control using two control loops is illustrated in Figure 7-4. For simplicity, only half of the push-pull configuration is shown. When the switching transistor is on, current through the primary winding of T2 is proportional to the upward-ramping filter-inductor current. When the ramp voltage  $V_s$ , also proportional to the filter inductor current, reaches the level of  $V_e$ , the switching transistor turns off.  $V_e$  is the amplified output-error voltage. Thus the outer voltage control loop defines the level at which the inner loop regulates peak current through the switching IGFET and the filter inductor.

Figure 7-3 DC-to-DC Converter Board Assembly, Block Diagram



**Figure 7-4** Current Control of Switching Power Supply



## **Inverter Circuit Operation**

The dc input is selected from either the internal or external battery by the position of the wide (four-terminal) jumper located on the rear-panel terminal block. This dc input (12V) is fed through T1 (C.T., the current transformer) to the main transformer T2 and the switching IGFETs. The dc input is switched on and off at a 100 kHz rate by the FET Switching circuitry, producing the 135V/270V output at the secondary of T2. This high voltage is then rectified and filtered to produce the 135/270 Vdc outputs of the inverter.

The 135V dc output is sampled and fed to the voltage feedback circuit. The voltage feedback circuit generates an amplitude-modulated carrier signal of approximately 1 MHz. This feedback signal is transmitted to the primary side of T2 by the feedback transformer T3, where it is peak-detected and applied to the pulse-width modulator (PWM) circuit as a voltage feedback signal. The PWM circuit compares the feedback signal with the reference signal, which is the current ramp sampled from the primary switching current through T1. When the level of the current feedback signal reaches the level of the voltage feedback signal, the turn-on pulse to the IGFET switching circuit is terminated, which completes one IGFET switching cycle.

When the output voltage goes below the preset level, due to an output overload or short circuit, the output voltage monitor circuit sends a shut-down signal through opto-coupler U9.

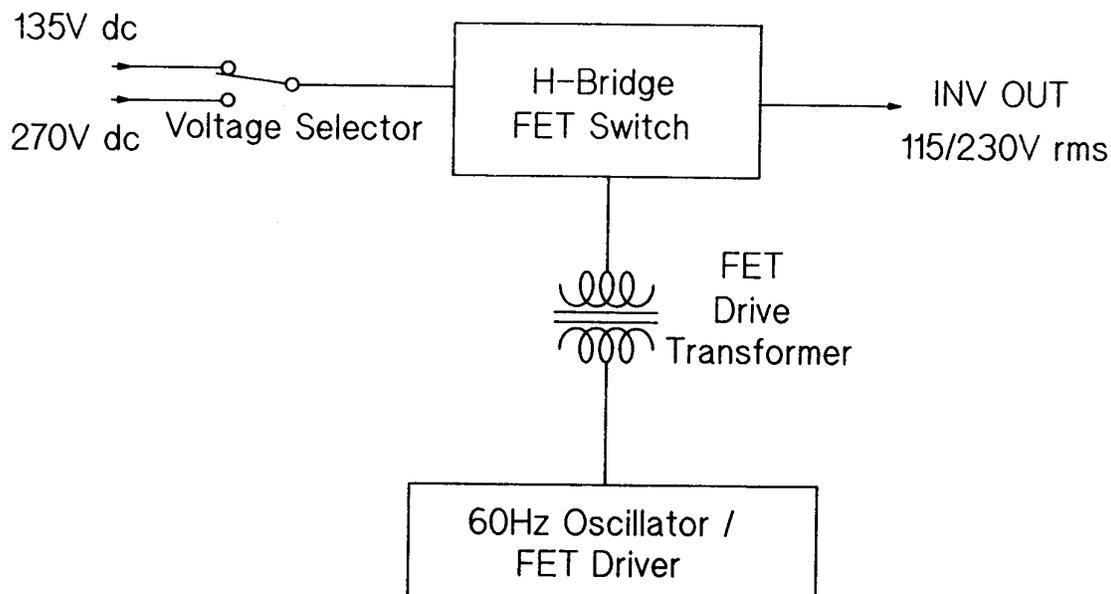
When the dc input voltage is higher than 15V, FET Driver A1U2 is disabled. This is done by R14, R15 divider, and the internal comparator of U2. The comparator includes an internal offset of 0.3V. U2 pins 9 and 10 are differential inputs of this comparator.

When the input dc voltage is higher than 20V, SCR A1Q1 is triggered and blows the 30A input fuse. When the input dc voltage polarity is reversed, diodes A1CR1 and A1CR2 cause the fuse to blow.

## **DC-to-AC Switcher**

As shown in Figure 7-5, the dc-to-ac switcher is composed of two functional blocks: a full-wave bridge circuit with FET switches, and a 60 Hz quartz oscillator FET driver circuit.

**Figure 7-5 DC-toAC Switcher Board Assembly, Block Diagram**



In the 60 Hz oscillator circuit, a 1.96608 MHz quartz crystal is divided down to 60 Hz. This 60 Hz frequency switches each FET in the full-wave bridge circuit on and off to produce the ac output. The ac output waveform is a stepped square-wave with dead time, as illustrated in Figure 7-6.

**Figure 7-6 A1 Inverter Output Waveform**



## Charger Introduction

The charger restores the internal battery (energy) charge level. The charger also powers the control circuits and prevents the inverter from operating during battery charging.

### Charger Block Diagram Overview

Charger-circuit function blocks and interconnections are shown in Figure 7-7.

Power flows from the ac mains at the left through the circuit functions to the output terminals at the right. Control circuits (not shown) can disable the charger through the shut-off signal  $\overline{\text{CHRG-SO}}$  when abnormal conditions are sensed on either the charger circuit or the internal battery.

The ac mains input voltage, 90 to 250 Vac, is passed through the line filter to full-wave bridge rectifier package CR3. The rectified dc is filtered by C10 and C11, then passed to the primary of T1 and FET switch Q3. FET switch Q3 is turned on and off by U1, thus controlling current flow in T1. Flyback control circuit U1 samples the output of T1 auxiliary winding, then varies the on and off time of FET switch Q3 to regulate battery charging voltage and/or current.

The power transformer stores energy in its magnetic field while current flows in its primary. When Q3 is turned off, the current of T1 reverses trying to maintain the field. However, since Q3 is turned off the current must flow through catch diode CR4. The primary energy in T1 is transferred to the secondary by the switching primary current.

The CV (constant voltage) feedback amplifier block, below the output rectifier block, shows how the output voltage is regulated during CV mode of operation. The output voltage, monitored before output protection diode CR6, is compared with reference voltage from U4, CV feedback amplifier. This produces the error-feedback signal. The CV error signal is fed to flyback control circuit U1 pin 1 through opto-coupler U3 and R6.

The charger shut-off signal,  $\overline{\text{CHRG-SO}}$ , comes from A2U2 pin 11 on the control board. This signal is routed through opto-coupler U2, SCR Q2, and transistor Q1 to U1 pin 3. When U1 pin 3 is held below 1V, U1 turns off the charger until either the  $\overline{\text{CHRG-SO}}$  signal goes away or the power switch is turned off and on.

The third or auxiliary winding of power transformer T1 provides power for the primary flyback-control circuitry of U1. It also provides a zero transit signal for U1 to detect whether the secondary current of T1 is turned on or off.



## Flyback Control Circuit

The heart of the flyback control circuit is A3U1 (TDA4605), an integrated circuit for controlling free-running flyback converters. It has four different modes of operation: no load, normal, overload, and burst.

- In no-load operation mode, U1 oscillates at its resonant frequency, typically 100 to 200 kHz. The resonant frequency of U1 is determined by the inductance of the primary winding of T1 and the drain to source capacitance of Q3. The output voltage may be slightly above normal in this mode.
- In normal operation mode, the switching frequency decreases as the load increases and the mains voltage drops.
- When subjected to an overload in overload operation mode (power-limited operation), the energy transferred from the primary to secondary of T1 per operation cycle of U1 is limited by external components.
- U1 operates in burst mode if the output is short-circuited or subjected to a very heavy load. U1 moves into burst mode when the dc input voltage at A3TP2, divided across A3R2 and A3R4, is lower than 1.0 Vdc. This activates the undervoltage protection circuit in U1, driving it into burst mode.

When the charger is turned on, U1 starts switching. To start U1, A3C8 charges through A3R1. When the voltage across A3C8 reaches 12 Vdc, U1 will start switching. During start-up, the energy stored in A3C8 is used as the supply voltage for U1. Once a steady state has been reached, U1 receives its power from the auxiliary winding of T1 and rectifier A3CR1.

## Normal Operation

When the battery voltage is near full-charge voltage, the charger operates in normal operation mode.

In normal operation, A3U1 turns A3Q3 on and off to regulate the output voltage. If the output load is increased, the output voltage goes down and the voltage at A3TP11 rises, causing less current through the cathode of A3U4. This reduces current through opto-coupler A3U2, the parallel-connected A3U2 and A3R7, and decreases the voltage at A3U1 pin 1. Finally, the regulation amplifier in A3U1 widens the on-pulse to A3Q3 to transfer more power to the secondary circuit. Current flows longer in the secondary of T1, increasing the period of current conduction in the secondary winding of T1. Thus the switching frequency goes down.

When A3Q3 is turned off, the energy stored in the emf reverses the current in the primary winding of T1. This energy is absorbed by snubber circuit A3R11 and A3C12 and catch diode A3CR4, which prevents arcing across FET switch A3Q3.

A3Q3 is turned on when A3U1 senses the voltage of A3TP6 has gone to zero (i.e., there is no current in the secondary winding of transformer T1). Because of the time delay between the moment A3U1 detects zero transit of the secondary and the moment A3Q3 is turned on, there is a small time interval when no current flows in either the primary or secondary of T1. This zero transit guarantees that the current in T1's primary winding starts at zero, which helps prevent saturating the power transformer T1.

### **Power-Limited Operation**

When the battery voltage is approximately 10% less than full-charge voltage, the charger operates in power-limited mode (i.e., overload operation).

During the off-time of A3Q3, primary current amplifier of A3U1 holds the voltage across A3C4 at 1.0 Vdc, but allows this voltage to change when A3Q3 turns on. After A3Q3 turns on, the primary current of T1 rises. This current increase is dependent on primary inductance and input dc voltage. The voltage across A3C4 also rises (depending on the time constant of A3C4, A3R3 and the input dc voltage), and is proportional to the primary current of T1. As the load is further increased and the voltage across A3C4 reaches 3.0 Vdc, the overload amplifier in A3U1 narrows the pulse width to limit power transferred through T1, thus reducing the output voltage.

### **Shut-Off Circuit**

If the control circuit detects an abnormal status on the charger, such as overheating of the internal battery, it holds the CHRG-SO line low. Then opto-coupler A3U3 conducts and provides a trigger signal for A3Q2. The current through A3R13, A3R12, and A3Q2 keeps A3Q1 turned on, holding the voltage of A3RP2 low (less than 1.0 Vdc) which disables A3U1. Therefore no switching occurs and the 85901A is disabled. A3Q2 continues to conduct until the CHRG-SO signal is removed, decreasing the current through A3Q2 to less than the minimum hold current (1 mA typical).

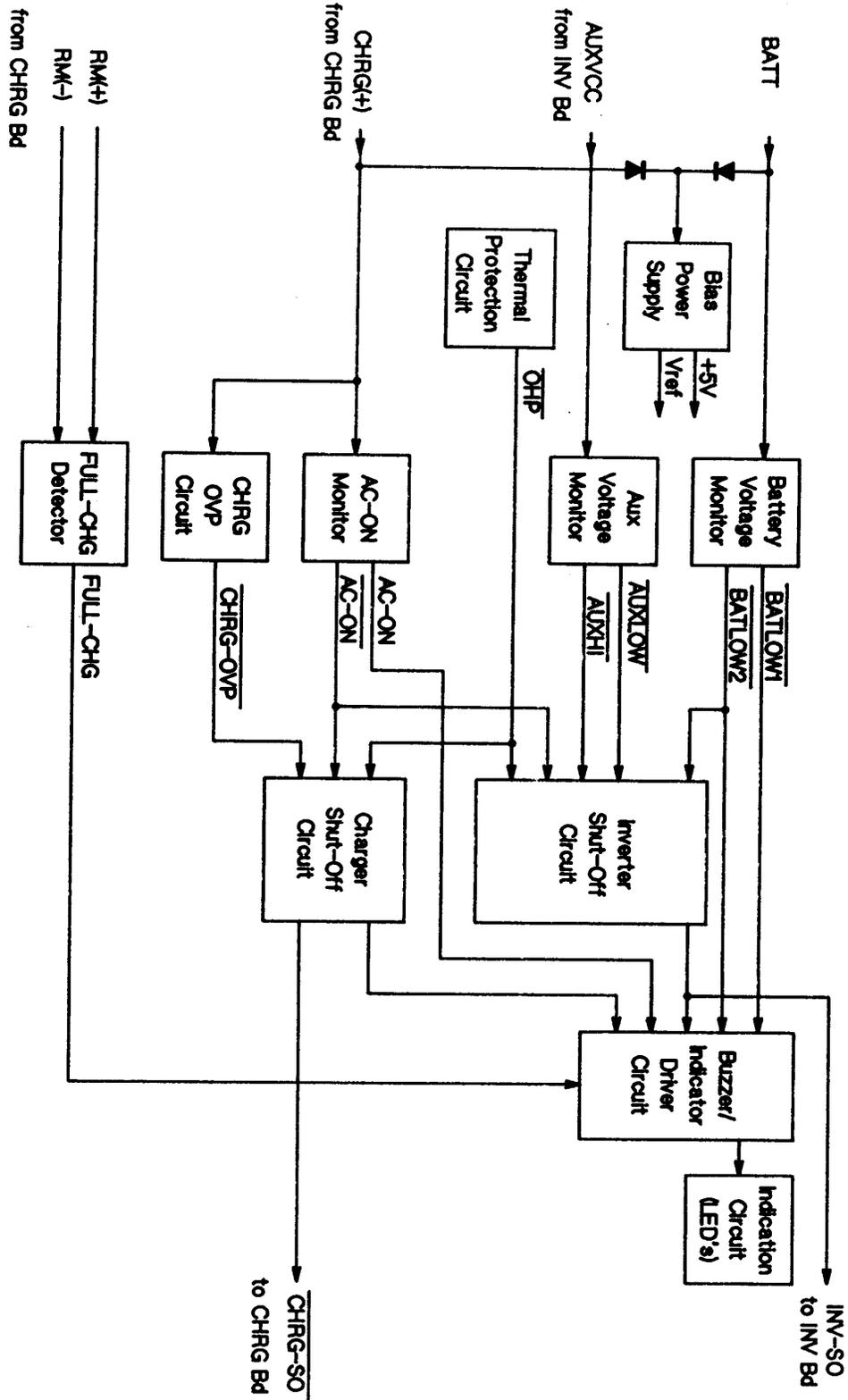
## **Control Circuit Introduction**

Control Circuit Assembly A2 monitors the status of the charger circuit, inverter circuit, and internal or external battery. It also inhibits each circuit if a problem occurs on one of them and/or the battery, and provides a user interface through a buzzer and LED annunciators on the front panel.

## **Control Circuit Block Diagram**

This section contains descriptions of the operation of the A2 assembly, circuit interconnections, and signal mnemonics. Refer to the block diagram, Figure 7-8, for a graphic representation of this information.

Figure 7-8 A2 Control Board Assembly, Block Diagram



The unit is composed of three major parts: status-sensing circuits, shut-off circuits, and user-interface circuits. Status-sensing circuits include thermal protection, battery voltage monitor, auxiliary voltage monitor, AC-ON monitor, charger over-voltage protection circuit, and full-charge detector. Shut-off circuits include the inverter shut-off and charger shut-off circuits. The user-interface circuits comprise the buzzer and indicator driver for updates of equipment status.

## Status-Sensing Circuits

The thermal protection circuit is composed of resistive bridge A2R7, R8, and R9, in addition to A2U1-U4, which monitors the internal-battery temperature using thermistor sensor RT1. This circuit generates signal  $\overline{\text{OHP}}$  for the shut-off circuit if the internal battery temperature rises to 71°C. R16 connected to pin 5 of A2U1 detects the open-circuit status of the connection between A2J2 and the thermistor.

The battery voltage monitor detects two voltage levels of the internal or external battery. It compares the actual battery voltage with a 3V reference, and provides alarm signal  $\overline{\text{BATLOW1}}$  if the battery is near full discharge (typically 10.5V). It also provides inverter shut-off signal  $\overline{\text{BATLOW2}}$  to prevent over-discharging when the battery voltage is lower than 10.0V (typical).

The auxiliary voltage monitor compares AUXVCC, auxiliary voltage from the inverter, with a 3V reference and generates two inverter shut-off signals,  $\overline{\text{AUXLOW}}$  and  $\overline{\text{AUXHI}}$ . If the inverter should stop operation by itself, AUXVCC drops to zero; the auxiliary voltage monitor then activates the  $\overline{\text{AUXLOW}}$  signal to trigger the inverter shut-off circuit. If an inverter feedback loop failure occurs, AUXVCC rises to over 19V (typical) and  $\overline{\text{AUXHI}}$  is activated to shut off the inverter.

The AC-ON monitor compares the charger output voltage CHRG (+) and a 3V reference and sets AC-ON high and AC-ON low to indicate the presence of the ac line (i.e., charger is on).

The charger over-voltage protection circuit compares the charger output and 3V reference to set the  $\overline{\text{CHRG-OVP}}$  signal low when the charger output voltage is too high. Its purpose is to prevent internal battery damage.

The full-charge detector amplifies the charging-current signal RM (+) and RM (-) from the charger and compares it with a 3V reference. If the charging current is reduced to 0.45A (typical), pin 7 of U7, FULL-CHG, is set high to indicate that the internal battery is fully charged.

## Shut-Off Circuits

The inverter shut-off circuit is composed of diode OR gate A2CR5-CR9 and R-S flip-flop A2U2. All status signals concerning the inverter— $\overline{\text{OHP}}$ ,  $\overline{\text{AC-ON}}$ ,  $\overline{\text{BATLOW1}}$ ,  $\overline{\text{BATLOW2}}$ ,  $\overline{\text{AUXHI}}$ , and  $\overline{\text{AUXLOW}}$ —are ORed and then connected to the set input of the R-S flip-flop. If one or more of the status signals goes low, A2U2 is set and its output, A2TP2, goes low.

If AC-ON is low and A2TP2 is low, INV-SO A2TP21 is set high and is routed to A1U2 pin 7, which disables the inverter. Thus the charger circuit always has priority over the inverter. A2R27-R28 and A2C10 provide a reset signal when the inverter switch, INV SW, is turned on. A2CR4 provides a discharge path (about three to five seconds) for A2C10 when INV SW is turned off to ensure that the reset network works properly when INV SW is again turned on.

The charger shut-off circuit consists of an OR-gate, A2U5, and NAND A2U2. If either or both  $\overline{\text{OHP}}$  and  $\overline{\text{CHRG-OVP}}$  signals are set low, the output of A2U2, TP7, is set high, disabling the charger. The output of A2U2 does not stay high due to the latched shut-off circuitry, A2R17 and A2C6. This RC network forms a reset circuit to eliminate power-on transients.

## Buzzer and Indicator Driver

In normal operation, when the charger switch is off and the inverter switch is on, the INVERTER LED annunciator is turned on and BATT LOW LED annunciator is turned off. If an inverter shut-off occurs, the INVERTER LED is turned off.

If  $\overline{\text{BATLOW1}}$  is held low with the inverter operating, A2U4 pin 4 goes high. It is then ANDed with the 1 Hz square wave generated by the circuitry of A2U8: resistors A2R35, A2R36, A2R37, and A2R43, and capacitor A2C19. This 1 Hz signal then switches the 1 kHz square wave from A1U6 pin 15, the inverter 60 Hz oscillator. The modulated 1 kHz square wave at A2U4 pin 10 causes the buzzer A2B1 to beep and also blinks the BATT LOW LED on the front panel.

If  $\overline{\text{BATLOW2}}$  is held low when the inverter is turned on, the inverter is disabled, the buzzer is prevented from beeping, and the BATT LOW LED is prevented from blinking.  $\overline{\text{BATLOW2}}$  low turns on BATT LOW LED through U4 pin 13, U6 pin 6, and U5 pin 12. But, since the inverter is shut off, power is removed and all LEDs are turned off.

If the charger is turned on, the BATT CHG LED is turned on and the BATT LOW and INVERTER status LEDs discussed above are disabled by AC-ON and  $\overline{\text{AC-ON}}$ . FULL-CHG signal at pin 1 of A2U6 determines whether the BATT LED is to be turned on or off. If the internal battery is fully charged, BATT LOW LED will be turned off. The BATT CHG LED is turned off when the charger is off or disabled.

## **Bias Power Supply**

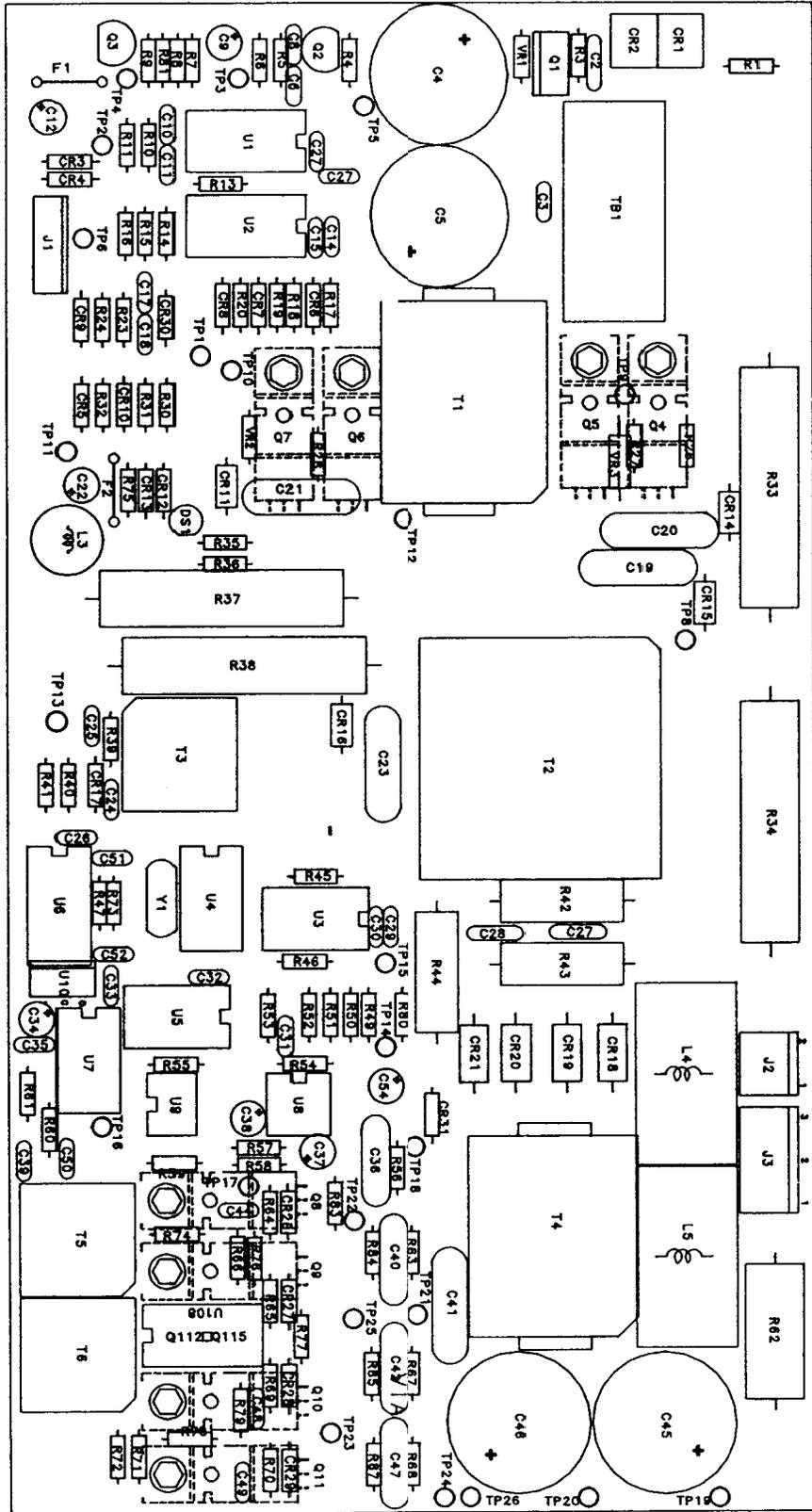
The bias power-supply circuit is a three-terminal voltage regulator. It receives +10V to +16V, from either the charger or battery, and regulates it to provide +5 Vdc and a +3 Vdc reference voltage, Vref for the control circuits.

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**NOTE**

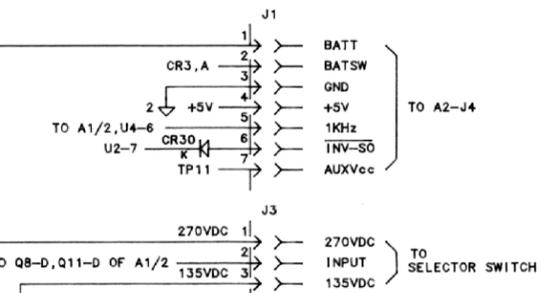
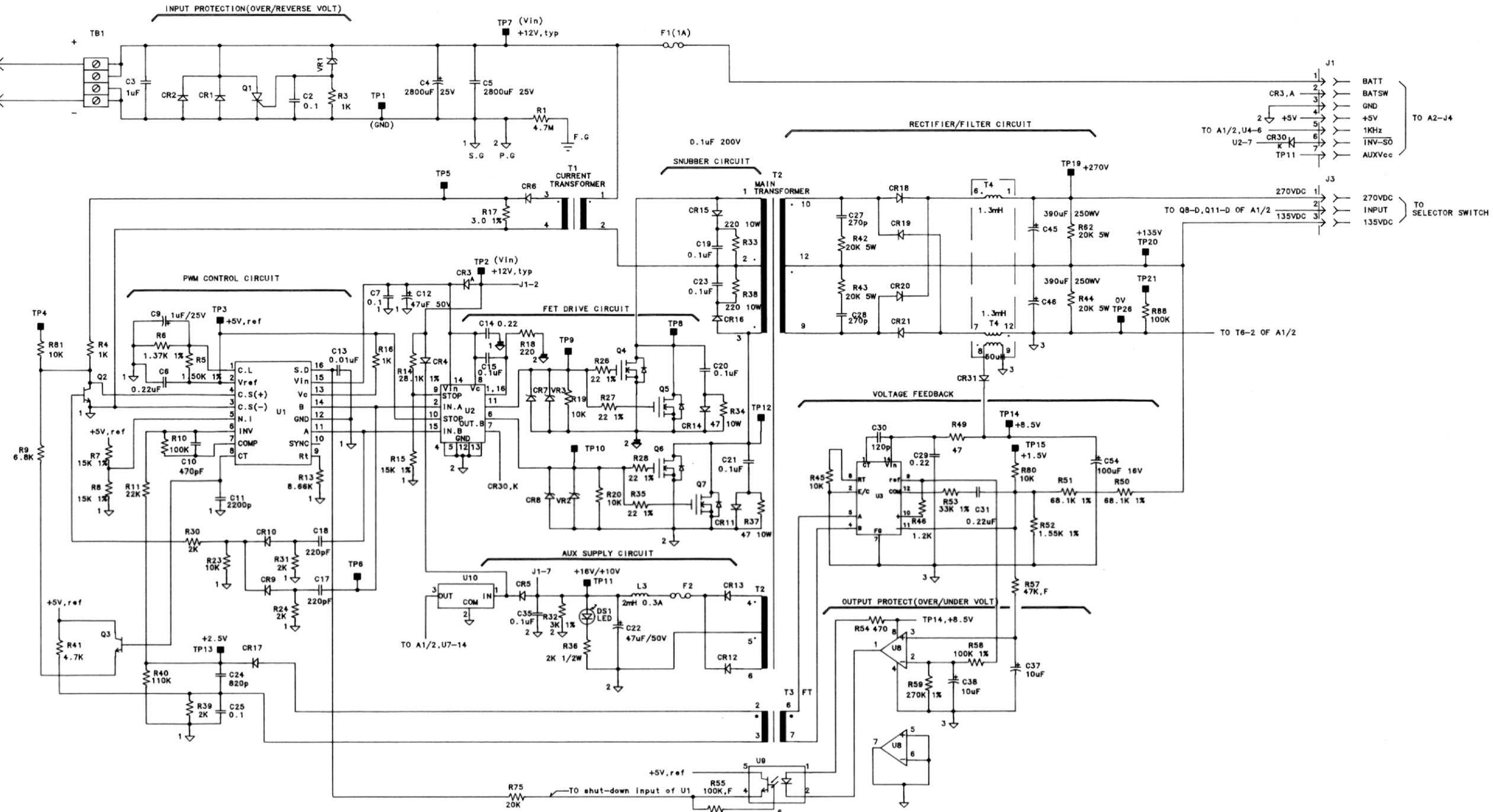
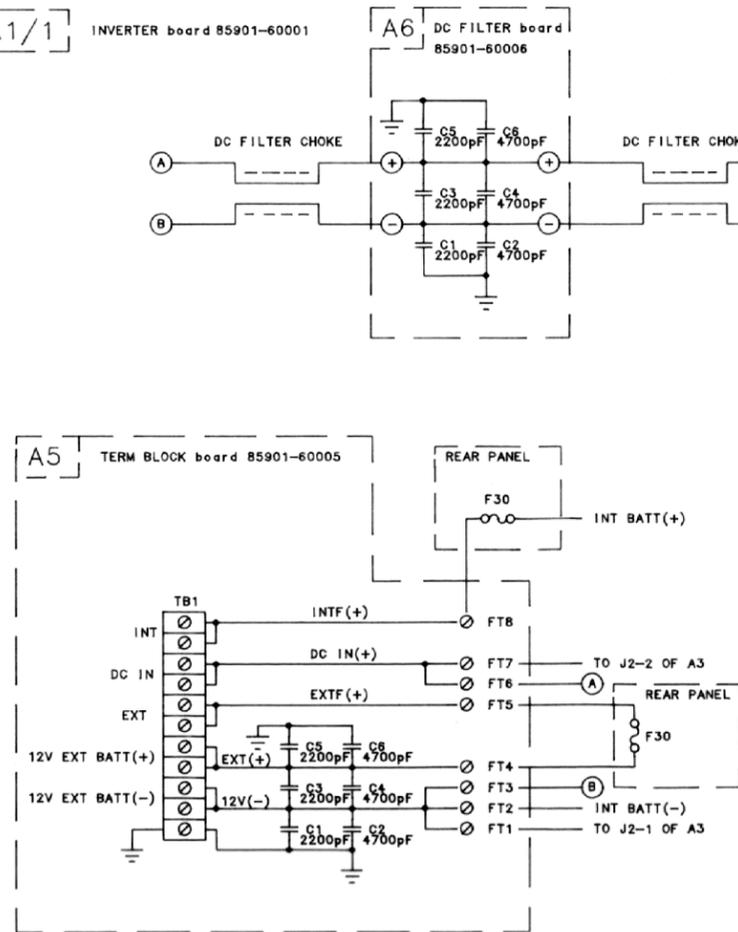
In Firgure 7-9 please change “F1” to R88.”

Figure 7-9 A1 Inverter Board Assembly, Component Locations



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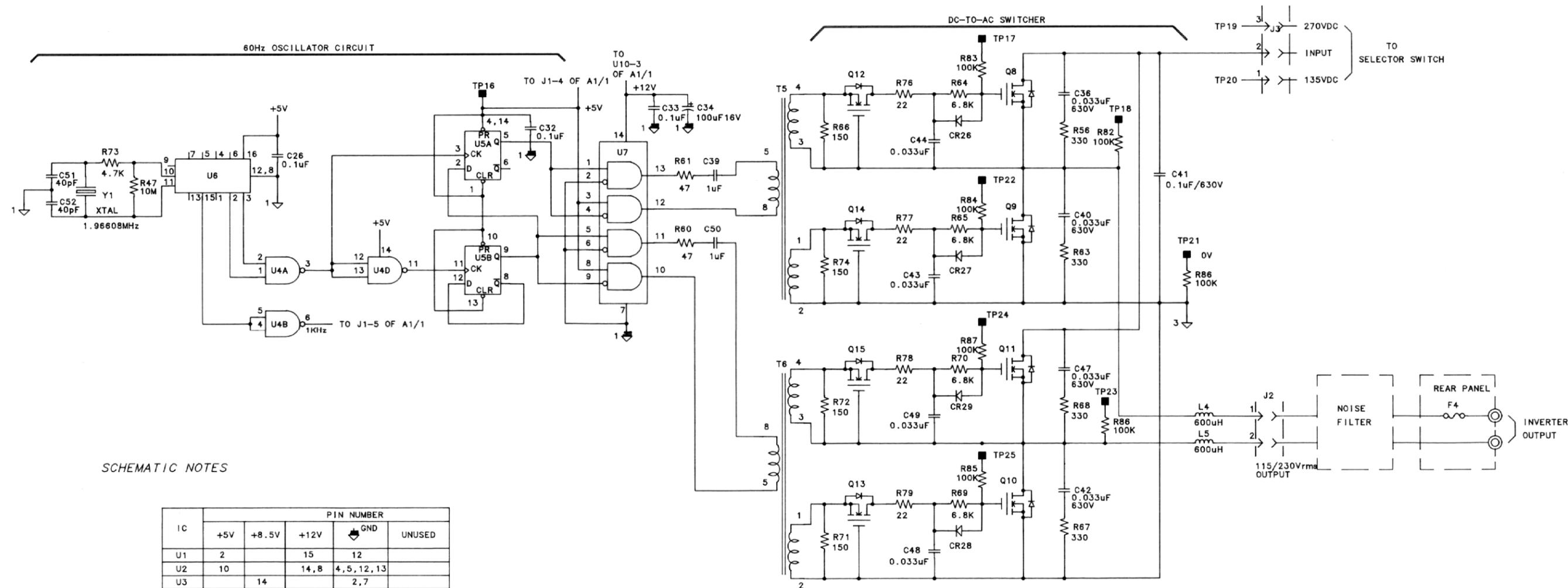
**NOTE** In Figure 7-10 please change “F1(1A)” to “R88 1.”



- NOTES:
1. ALL RESISTORS ARE IN OHMS, 1/4W,+5%, UNLESS OTHERWISE NOTED.
  2. ALL CAPACITORS ARE IN MICROFARADS, UNLESS OTHERWISE NOTED.

Figure 7-10. A1 Inverter Board Assembly, Schematic Diagram (1 of 2)

Service  
Control Circuit Introduction



SCHEMATIC NOTES

IC	PIN NUMBER				
	+5V	+8.5V	+12V	GND	UNUSED
U1	2		15	12	
U2	10		14, 8	4, 5, 12, 13	
U3		14		2, 7	
U4	14			7, 9, 10	8
U5	10, 14			7	
U6	16			12, 8	
U7	3, 8		14	2, 6, 7	
U8		8		4	
U9					
U10			3	2	

NOTES 1:

- ALL RESISTORS ARE IN OHMS, 1/4W +5%, UNLESS OTHERWISE NOTED.
- ALL CAPACITORS ARE IN MICROFARADS, UNLESS OTHERWISE NOTED.

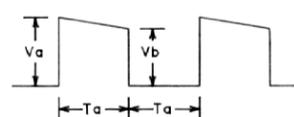
NOTES 2:

1. TEST POINT VOLTAGE.

- TP1 PRIMARY GND (BATTERY NEGATIVE POLE)
- TP2 +12V, Typ
- TP3 +5.1V, Typ
- TP7 +12V, Typ
- TP11 +10V • NO LOAD, +16V • NORMAL LOAD.
- TP13 +2.5V, Typ
- TP14(/TP21) +8.0V(TP14 VOLTAGE WITH REFERENCE TO TP21)
- TP15(/TP21) +1.5V
- TP16 +5V
- TP19(/TP21) +270V
- TP19(/TP21) +135V
- TP21 +0V(SECONDARY DC GND)

2. TEST POINT WAVEFORM.

- 2-1. TP17(/TP21)\*
- TP24(/TP23)
- TP22(/TP21)
- TP25(/TP21)



Va: 7V min, 10V Typ. Vb: 6V min, 7V Typ.  
Ta: 8.3 ms

\* note 1: TP17 WITH REFERENCE TO TP18

2-2.

AS THE DC-to-AC SWITCHER OPERATES IN 60Hz, DC-to-DC CONVERTER IS CONNECTED TO THE LOAD FOR 6.25 ms(A DURATION) AND DISCONNECTED FROM THE LOAD FOR 2.08 ms(B DURATION) IN EVERY HALF CYCLE OF OUTPUT AC 60Hz. SO FOLLOWING TEST POINT WAVEFORMS OF DC-to-DC CONVERTER NEEDS TO BE DESCRIBED SEPERATELY AS BELOW. (WHEN NO LOAD IS CONNECTED TO AC OUTPUT, THE WAVEFORM IN A DURATION BECAMES SIMILAR WITH THAT OF B DURATION)

AC output Voltage waveform

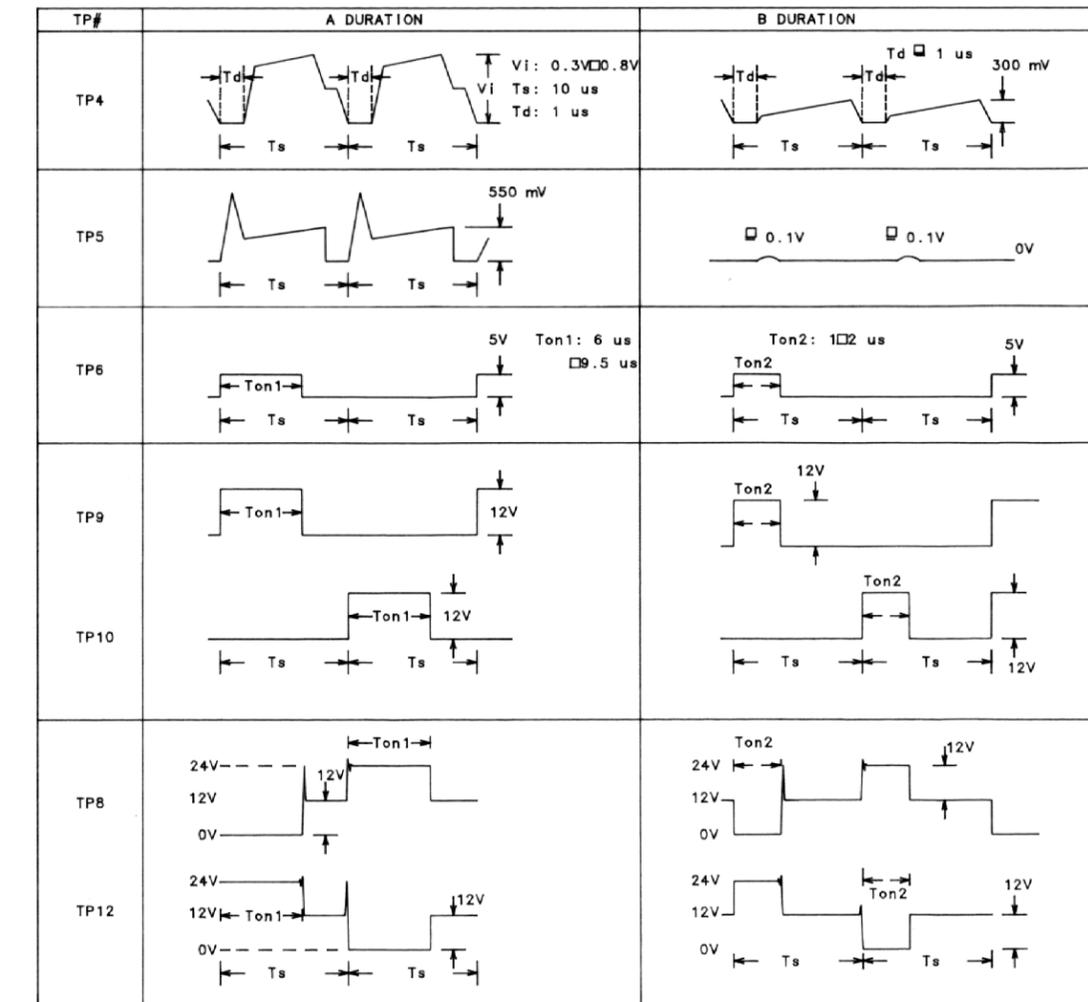
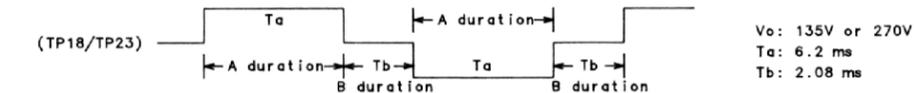
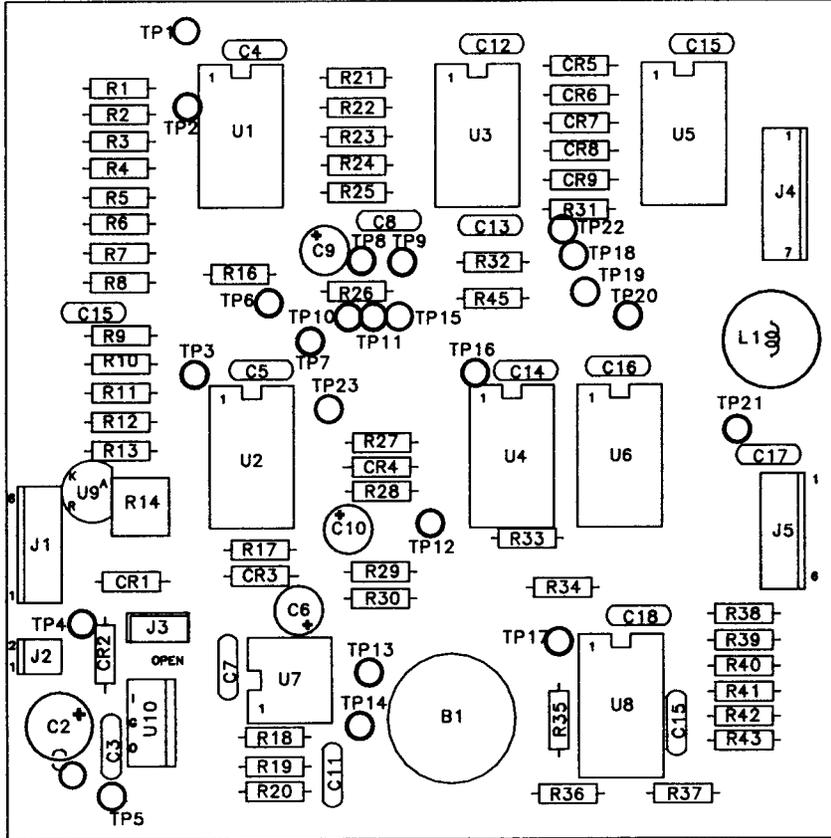


Figure 7-10. A1 Inverter Board Assembly, Schematic Diagram (2 of 2)



NOTE In Figure 7-11 please change "L1" to "W1."

**Figure 7-11 A2 Control Board Assembly, Component Locations**



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**NOTE**

In Figure 7-12 please note the following changes:

- “L1 10mH” to “W1”
  - “R17 47K” to “R17 470K”
  - “C6 4.7uF 16V” to C6 10uF 16V”
-

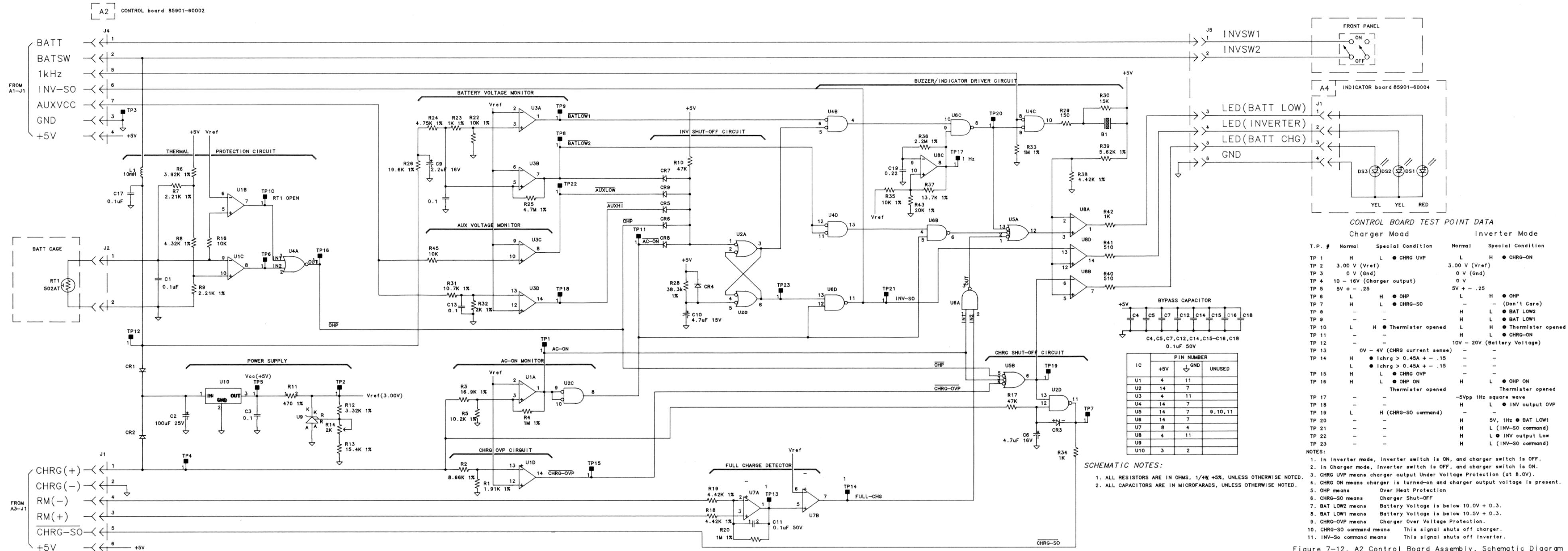
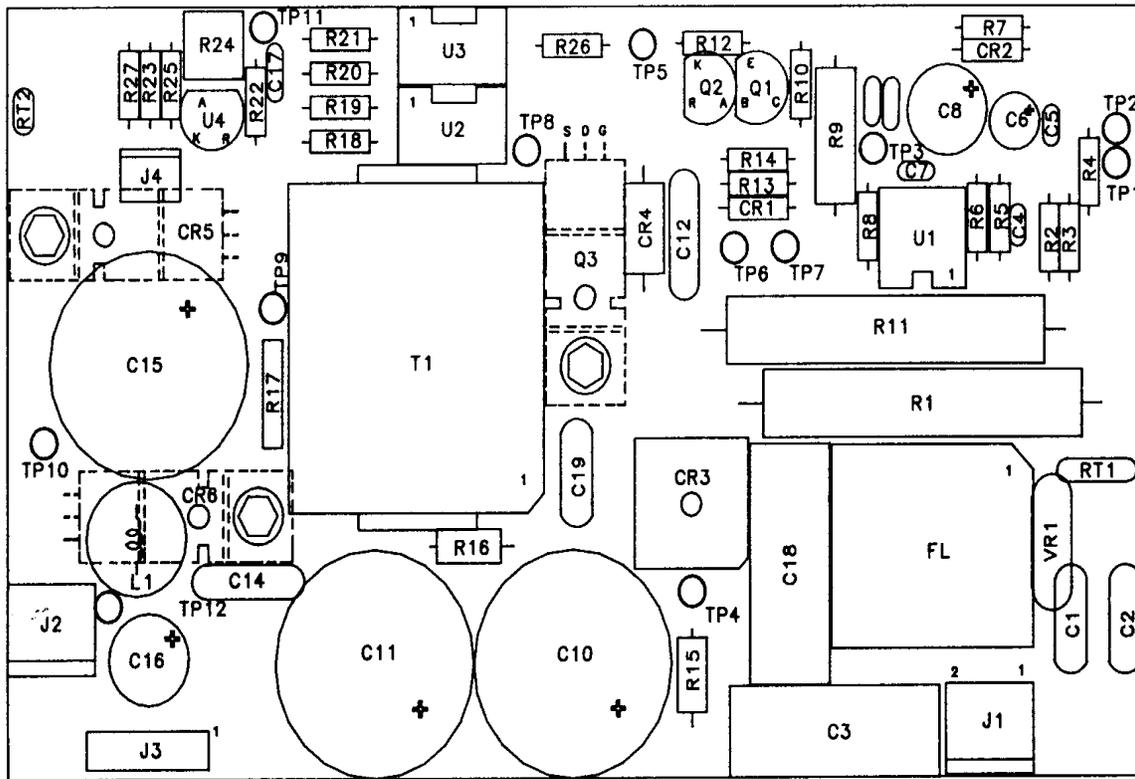


Figure 7-12. A2 Control Board Assembly, Schematic Diagram



**Figure 7-13 A3 Charger Board Assembly, Component Locations**





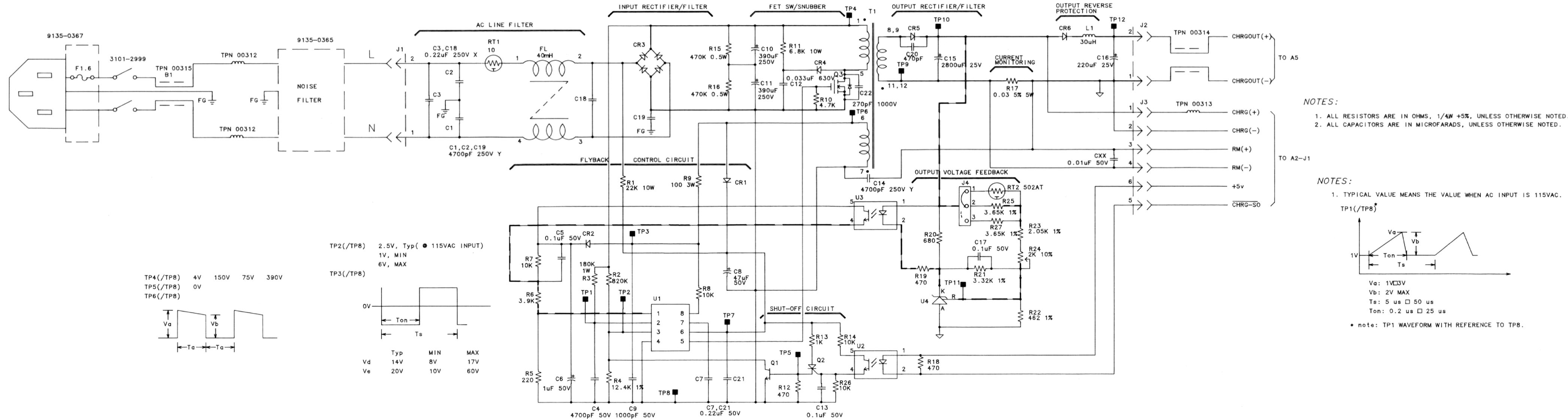
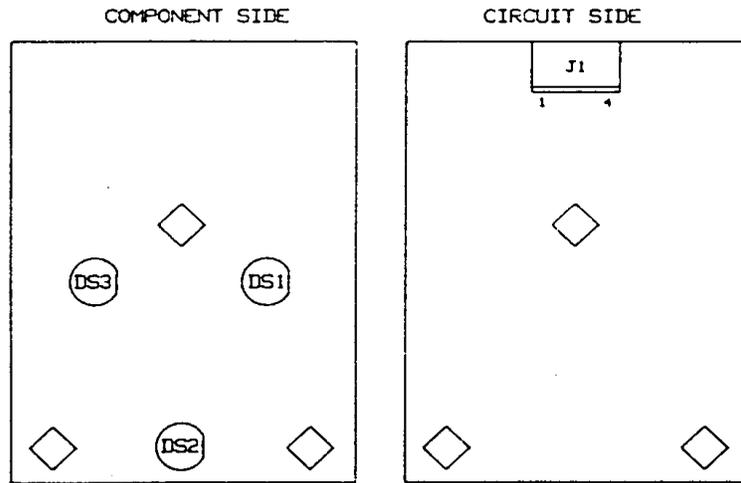


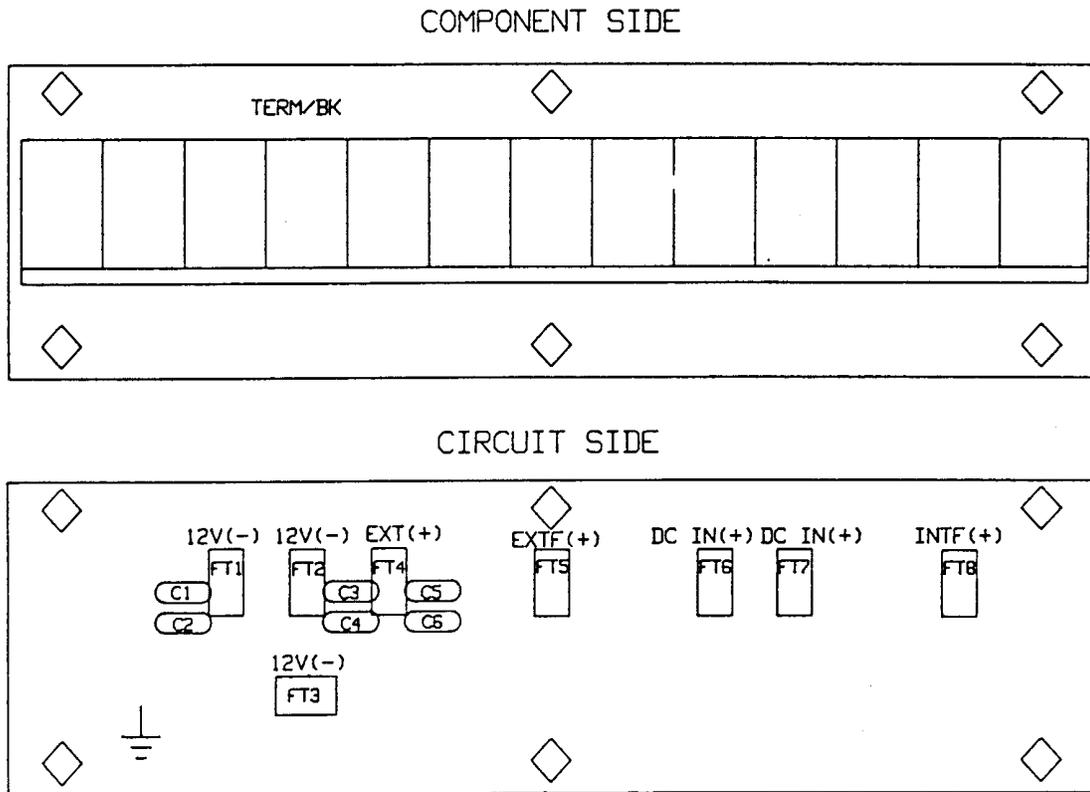
Figure 7-14. A3 Charger Board Assembly, Schematic Diagram



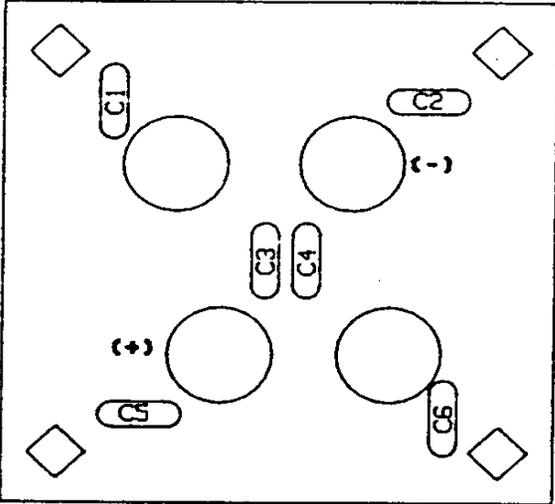
**Figure 7-15 Indicator Board Assembly, Component Locations**



**Figure 7-16 Terminal Block Board Assembly, Component Locations**



**Figure 7-17 DC Filter Board Assembly, Component Locations**



**Table 7-1 Agilent Technologies Sales and Service Offices**

<b>UNITED STATES</b>		
Instrument Support Center Agilent Technologies (800) 403-0801		
<b>EUROPEAN FIELD OPERATIONS</b>		
Headquarters Agilent Technologies S.A. 150, Route du Nant-d'Avril 1217 Meyrin 2/ Geneva Switzerland (41 22) 780.8111	France Agilent Technologies, Inc. 1 Avenue Du Canada Zone D'Activite De Courtaboeuf F-91947 Les Ulis Cedex France (33 1) 69 82 60 60	Germany Agilent Technologies, Inc. GmbH Agilent Technologies, Inc. Strasse 61352 Bad Homburg v.d.H Germany (49 6172) 16-0
Great Britain Agilent Technologies, Inc. Eskdale Road, Winnersh Triangle Wokingham, Berkshire RG41 5DZ England (44 118) 9696622		
<b>INTERCON FIELD OPERATIONS</b>		
Headquarters Agilent Technologies, Inc. 3495 Deer Creek Rd. Palo Alto, CA 94304-1316 USA (415) 857-5027	Australia Agilent Technologies, Inc. Ltd. 31-41 Joseph Street Blackburn, Victoria 3130 (61 3) 895-2895	Canada Agilent Technologies, Inc. 17500 South Service Road Trans-Canada Highway Kirkland, Quebec H9J 2X8 Canada (514) 697-4232
Japan Agilent Technologies, Inc. Measurement Assistance Center 9-1, Takakura-Cho, Hachioji-Shi, Tokyo 192-8510, Japan TEL (81) -426-56-7832 FAX (81) -426-56-7840	Singapore Agilent Technologies, Inc. (Pte.) Ltd. 150 Beach Road #29-00 Gateway West Singapore 0718 (65) 291-9088	Taiwan Agilent Technologies, Inc. 8th Floor, H-P Building 337 Fu Hsing North Road Taipei, Taiwan (886 2) 712-0404
China Agilent Technologies, Inc. 38 Bei San Huan X1 Road Shuang Yu Shu Hai Dian District Beijing, China (86 1) 256-6888		