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Agilent 42841A Bias Current Source Service Manual

SERIAL NUMBERS

This manual applies directly to instruments whose serial number prefix is 2915J-.
For additional important information about serial numbers,
read SECTION 1, SERIAL NUMBER of this Service Manual.



Agilent Technologies

Agilent Part No. 42841-90032
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Manual Printing History

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Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific **WARNINGS** elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

The Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

Ground The Instrument

To avoid electric shock hazard, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.

DO NOT Operate In An Explosive Atmosphere

Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Keep Away From Live Circuits

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT Service Or Adjust Alone

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT Substitute Parts Or Modify Instrument

Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

Dangerous Procedure Warnings

Warnings , such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

Warning



Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting this instrument.

Certification

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

Warranty

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period of one year from the date of shipment, except that in the case of certain components listed in *General Information* of this manual, the warranty shall be for the specified period. During the warranty period, Agilent Technologies will, at its option, either repair or replace products that 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 instruction 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.

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 the environmental specifications for the product, or improper site preparation or maintenance.

No other warranty is expressed or implied. Agilent Technologies specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

Exclusive Remedies

The remedies provided herein are buyer's sole and exclusive remedies. Agilent Technologies shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products.

For any assistance, contact your nearest Agilent Technologies Sales and Service Office. Addresses are provided at the back of this manual.

SAFETY SYMBOLS

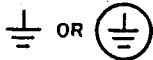
General Definitions of Safety Symbols Used On Equipment or In Manuals.



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.



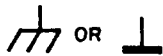
Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with wiring terminals to indicate the terminal which must be connected to ground before operating equipment.



Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of fault. A terminal marked with this symbol must be connected to ground in the manner described in the installation (Operating) manual, and before operating the equipment.



Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.



Alternating current (power line).



Direct current (power line).



Alternating or direct current (power line).



A **WARNING** denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.



A **CAUTION** sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result damage to or destruction of part or all of the product.

NOTE

A **NOTE** denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.

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SECTION 1

GENERAL INFORMATION

1-1. INTRODUCTION

This manual contains technical information concerning the performance test adjustment and servicing of the HP 42841A BIAS CURRENT SOURCE.

1-2. MANUAL ORGANIZATION

This manual contains five sections, and a summary of each section follows.

SECTION 1. GENERAL INFORMATION

This section describes this service manual and lists the recommended test equipment for performance testing, adjusting, and servicing the HP 42841A. The HP 42841A service program is described in this section.

SECTION 2. PERFORMANCE TEST

This section provides the performance test for the HP 42841A, used to verify that the instrument meets its specifications.

SECTION 3. ADJUSTMENT

This section provides the necessary adjustments required to ensure that the HP 42841A is within its published specifications after it has been repaired.

SECTION 4. ASSEMBLY REPLACEMENT INFORMATION

This section provides information on replacing the HP 42841A's assemblies. The information includes the parts list, and the disassembly procedures.

SECTION 5. ASSEMBLY LEVEL TROUBLESHOOTING

This section provides information on troubleshooting the HP 42841A at assembly level. The information includes theory of operation and how to isolate a faulty board.

1-3. INSTRUMENTS COVERED BY THIS MANUAL

Hewlett-Packard uses a two-part, nine character serial number which is stamped on the serial number plate (see Figure 1-1) attached to the instrument's rear panel. The first four digits and the letter are the serial prefix and the last five digits are the suffix. The letter placed between the two sections identifies the country where the instrument was manufactured. The prefix is the same for all identical instruments, it changes only when a change is made to the instrument. The suffix, however, is assigned sequentially and is unique to each instrument. The contents of this manual apply to instruments with the serial number prefixes listed under Serial Numbers on the title page.



Figure 1-1. Serial Number Plate

An instrument manufactured after the printing date 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 this manual. The manual for a new instrument may be accompanied by a yellow Manual Changes supplement or have a different manual part number. The Manual Changes supplement contains "change information" that explains how to adapt the manual to newer instruments.

In addition to change information, the supplement may contain manual error (Errata) correction information. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is identified by this manual's printing data and its part number, both of which appear on the manual's title page. Complimentary copies of the supplement are available from Hewlett-Packard. If the serial prefix or number of an instrument is lower than that on the title page of this manual, see APPENDIX A, MANUAL CHANGES.

For information concerning serial number prefixes not listed on the title page or in the Manual Change supplement, contact the nearest Hewlett-Packard office.

1-4. RECOMMENDED TEST EQUIPMENT

Table 1-1 lists the equipment required for adjustment, performance testing, and troubleshooting the HP 42841A. Other equipment may be substituted if it meets or exceeds the critical specifications given in Table 1-1.

Table 1-1. Test Equipment List

Equipment	Requirements	Recommended Model	Qty Used
Resistance Meter	Range: up to 1 Ω Accuracy: $\leq \pm 0.5\%$ at 50 m Ω $\leq \pm 0.2\%$ at 200 m Ω $\leq \pm 0.05\%$ at 1 Ω	HP 3458A	1 P,A,T
DC Voltmeter	Range: up to 1 V Accuracy: $\leq \pm 0.05\%$	HP 3458A	1 P,A,T
Oscilloscope	Band Width: >10 MHz Range: 5 V/div min.	HP 54111D	1 T
Computer	HP Technical Computer With HP BASIC rev. 5.0	HP 9000 Series 200 Model 226	1 P,A,T
GPIO Interface	No Substitute	HP 98622A	1 P,A,T
50 m Ω Resistor ¹	No Substitute	HP PN 042841-65100	1 P,A,T
200 m Ω Resistor ¹	No Substitute	HP PN 042841-65101	1 P,T
1 Ω Resistor ¹	No Substitute	HP PN 042841-65102	1 P,A,T
Test Lead	Banana to banana 2 Alligator Clips to Dual Banana Plug	HP 11058A HP 11002A	2 P,A,T 1 A,T
HP-IB Cable	HP-IB Cable, 1 m	HP 10833A	1 P,A
Bias IF Cable	No Substitute	HP PN 42841-61640	1 P,A,T
Service Program ²	No Substitute	HP PN 42841-65003	1 P,A,T

P: Performance Test

A: Adjustment

T: Troubleshooting

1: 50 m Ω , 200 m Ω and 1 Ω resistors can be purchased by ordering 42841-65002 (Resistor Box Set).

2: 42841-65003 is the 5.25 inch floppy disk service program. That of 3.5 inch disk is 42841-65004.

1-5. SERVICE PROGRAM

The HP 42841A Service Program is used when performing the HP 42841A's performance test, adjustment, and troubleshooting.

1-5-1. GENERAL INFORMATION

The HP 42841A Service Program consists of the Performance Test Program, the Adjustment Program, the Resistor Box Calibration Program, and the Troubleshooting program. Figure 1-2 shows the structure of the service program. Table 1-2 lists the service program specifications.

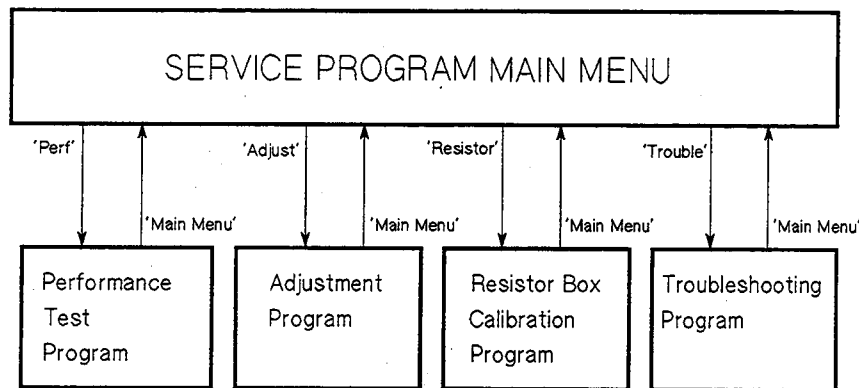


Figure 1-2. Service Program Structure

Table 1-2. Service Program Specification

HP Part Number:	42841-65003 (5.25 inch floppy disk) 42841-65004 (3.5 inch floppy disk)
Language:	HP BASIC (rev. 5.0 and above)
Binary Requirement:	HPIB, CLOCK, IO, KBD (for HP BASIC rev. 5.0)
Computer Requirement:	HP 9000 Series 200 or Series 300 computer equipped with the GPIO interface (HP 98622A).
Write Protection:	Service program is not write protected. Using a backup copy for service program is recommended. Do not copy the program for purposes other than backup.

1-5-2. INITIAL OPERATING PROCEDURE

This paragraph gives the procedure for displaying the Service Program Main Menu.

EQUIPMENT:

Service Program Disc (5 inch)
Computer
GPIO interface

PN 42841-65003
HP 9000 Series 200 Model 226
HP 98622A

PROCEDURE:

1. Set the GPIO interface switches as shown in Figure 1-3.

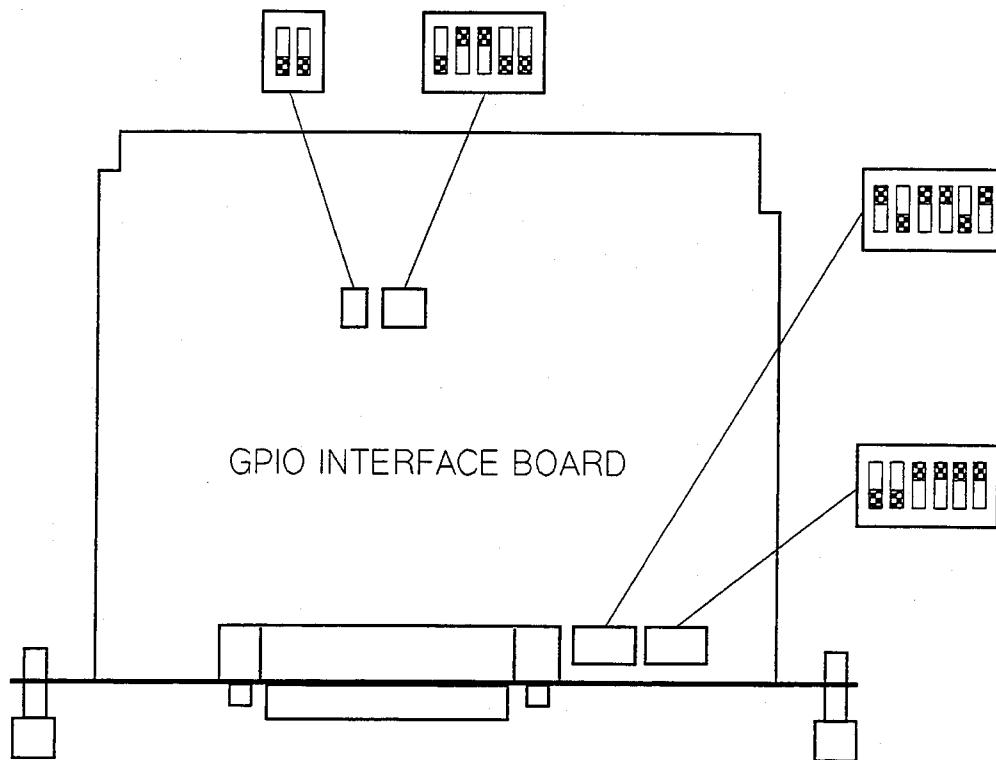


Figure 1-3. GPIO Interface Setting

2. Install the GPIO interface in the Computer.
3. Connect the HP 42841A's rear panel input A connector to the GPIO interface.
4. Turn the Computer ON.

5. Boot up BASIC and load the necessary binary files into the computer. The necessary **BASIC BIN**aries for Revision 5.0 are as follows.

HPIB, CLOCK, IO, KBD

6. Load the service program into the computer, the file name is "**SVC42841A**".

NOTE

Do not remove the Service Program Disk from the computer while the service program is running.

7. Press the computer's **RUN** key. The Main Menu shown in the following figure will appear, after the copyright appears. In the main menu, you can select the necessary programs using the softkeys.

```
HP 42841A SERVICE PROGRAM
MAIN MENU
f1: Performance Test Program
f2: Resistor Box Calibration Program
f3: Adjustment Program
f4: Troubleshooting Program
f8: Exit from the program

Select using softkeys.

|         |PerfTest|Resistor|Adjust |Trouble |
|         |         |         |Exit  |         |
```

Figure 1-4. Service Program Main Menu

1-6. PERFORMANCE TEST PROGRAM

The HP 42841A Performance Test Program is a part of the Service Program, as described in Paragraph 1-5. The program is necessary to performance test the HP 42841A automatically using a computer. The program controls the HP 42841A and HP 3458A to perform the test. Figure 1-5 shows the performance test program flow.

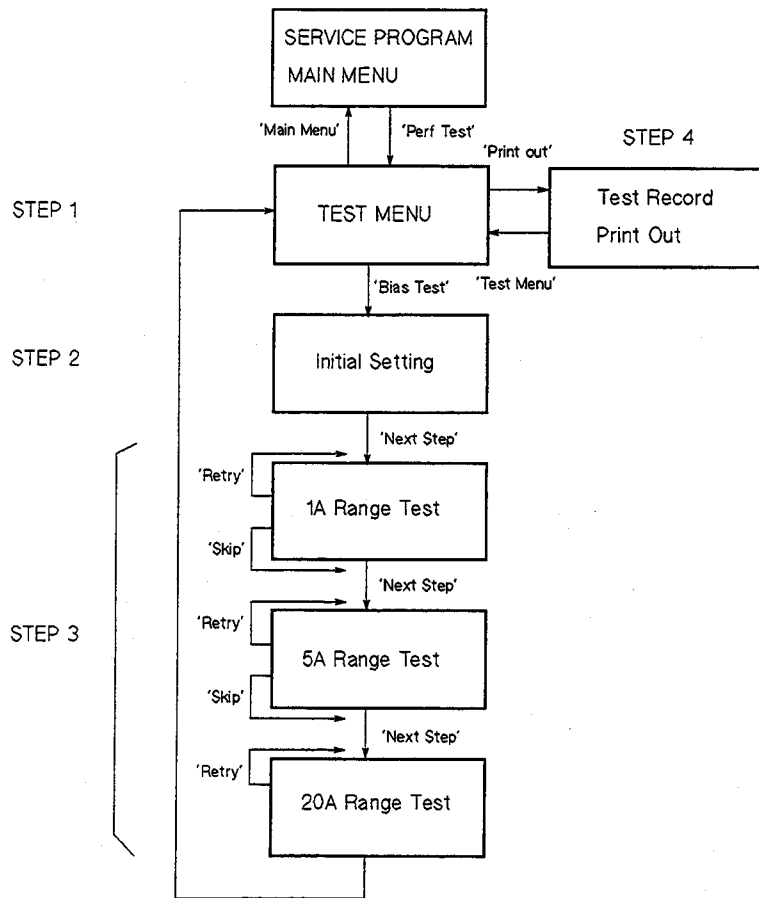


Figure 1-5. Performance Test Program Flow

The following describes each step in the performance test.

1. Test Menu

You can proceed to the performance test, the performance test record print out, and the service program main menu, using the softkeys.

2. Initial Setting

You are required to connect the HP 3458A to a computer with an HP-IB cable. Then you are required to register the HP 3458A's HP-IB address on the program, if the actual HP 3458A address is different from the registered address.

3. 1 A Range Test

Instructions for the test setup appear. Then the test is performed automatically, and the test result appears on the computer display. If a printer is not available, you should record the test results in the performance test record.

4. 5 A, 20 A Range Test

The same as the 1 A range test.

5. Test Record Print Out

The print out display, shown in Figure 1-6, appears after the printer connection instruction. You can enter the test record's header and start the print out as described in Figure 1-6.

HP 42841A PERFORMANCE TEST PROGRAM
Performance Test Record Printout

Test Date : XXXXXXXXXXXXX
Serial No. : XXXXJXXXXX
Comment 1: -----
Comment 2: -----
Comment 3: -----

f1: Test Date Entry
f2: HP 42841A's Serial Number Entry
f3: Record Header Comment Entry (1st Line)
f4: Record Header Comment Entry (2nd Line)
f5: Record Header Comment Entry (3rd Line)
f8: Start Print

Press the 'Ready' softkey to start printing.

Comment3	Date	Serial TestMenu	Comment1 Ready	Comment2
----------	------	--------------------	-------------------	----------

How To Use The Softkeys

'Date': Press the **'Date'** softkey, then enter the test date using the alphabetic, numeric, and **ENTER** keys.

'Serial': Press the **'Serial'** softkey, then enter the test instrument's serial number using the alphabetic, numeric, and **ENTER** keys.

'Comment X': Press the **'Comment X'** softkey, then enter a comment using the alphabetic, numeric, and **ENTER** keys.

'Ready': Press the **'Ready'** softkey to start the print out.

Figure 1-6. Performance Test Record Print Out

1-7. ADJUSTMENT PROGRAM

The HP 42841A Adjustment Program is a part of the Service Program described in Paragraph 1-5. The program is necessary to do the adjustments. The program controls the HP 42841A and HP 3458A. Figure 1-7 shows the adjustment program flow.

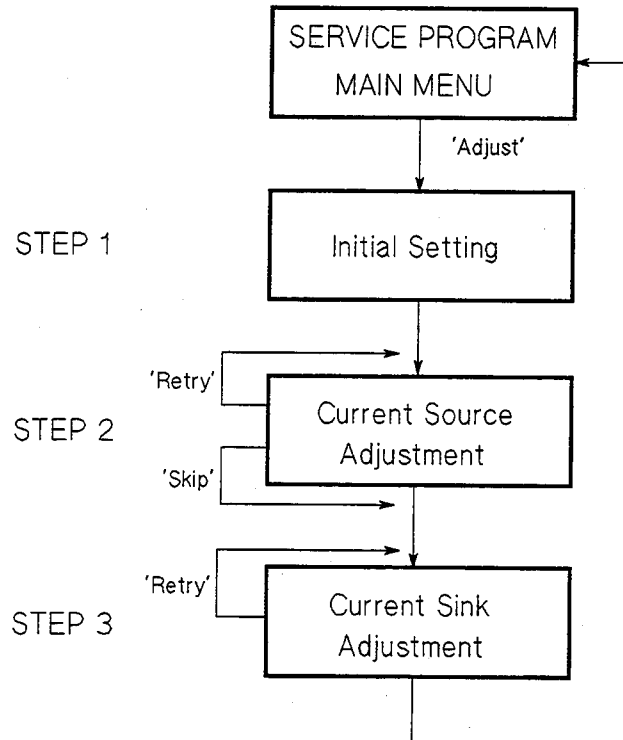


Figure 1-7. Adjustment Program Flow

The following describes each step in the program flow.

1. Initial Setting

You are required to connect the HP 3458A to a computer with an HP-IB cable. Then you are required to register the HP 3458A's HP-IB address on the program, if the actual HP 3458A address is different from the registered address.

2. Current Source Adjustment

The instructions for performing the bias current source adjustment are displayed. You cannot proceed to the next step, until you complete this adjustment.

3. Current Sink Adjustment

The instructions for performing the bias current sink adjustment are displayed. You cannot proceed to the next step, until you complete this adjustment.

1-8. RESISTOR BOX CALIBRATION PROGRAM

The HP 42841A Resistor Box Calibration Program is a part of the Service Program, as described in Paragraph 1-5 Service Program. This program is used to calibrate the resistor box. The program controls the HP 3458A, and calibrates the Resistor Box automatically. The Resistor Box's calibration value is registered in the program disk, and is used in the performance test program and the adjustment program. The calibration value remains until the next calibration. Figure 1-8 shows the Resistor Box Calibration Program flow.

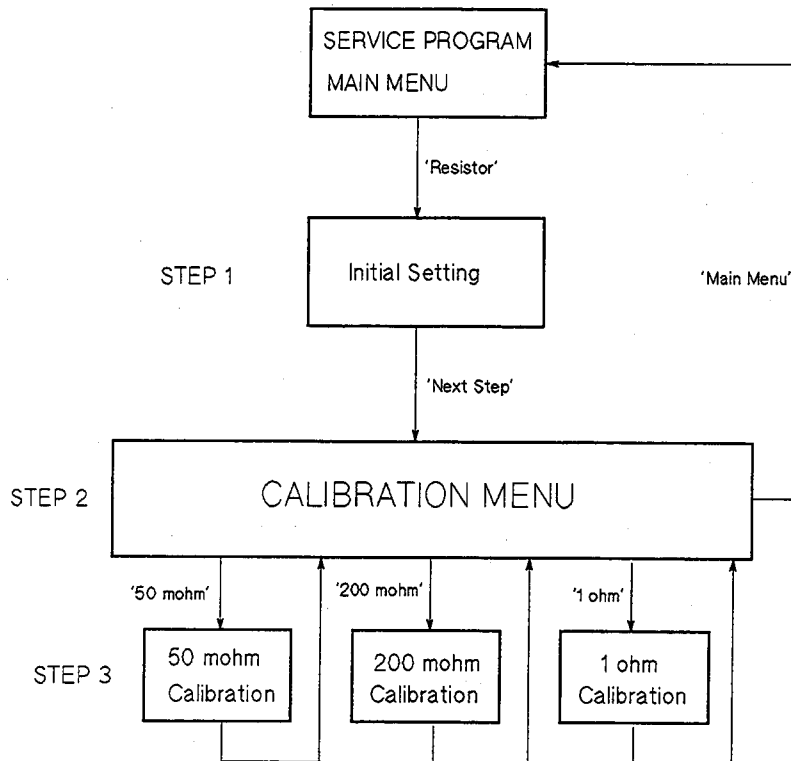


Figure 1-8. Resistor Box Calibration Program Flow

The following describes each step in the program flow.

1. Initial Setting

You are required to connect the HP 3458A to a computer with an HP-IB cable. Then you are required to register the HP 3458A's HP-IB address on the program, if the actual HP 3458A address is different from the registered address.

2. Calibration Menu

You can select the Resistor Box to be calibrated, using the softkeys. You can see the registered calibration values for the resistor boxes.

3. 50 mohm Calibration

The instructions for performing the calibration appear. If the measured value is incorrect, the value is not registered on the program. The calibration value remains until the next calibration.

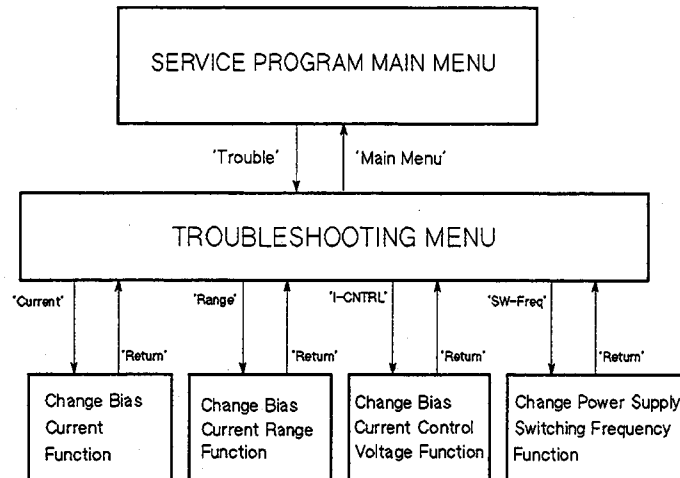
4. 200 mohm, 1 ohm Calibration

The same as the 50 mohm Calibration.

1-9. TROUBLESHOOTING PROGRAM

1-9-1. INTRODUCTION

The HP 42841A Troubleshooting Program is a part of the Service Program, as described in Paragraph 1-5. The program is designed to enable a computer to control the HP 42841A. The troubleshooting program has four functions as shown in the Figure 1-9. This program can be used only for service purposes, because it may be dangerous to use this program for measurement applications.



"Change Bias Current" Function

You can set the HP 42841A's bias current to 0.00 to 1.00 A, in 0.01 A steps and 1.1 to 20.0 A, in 0.1 A steps, by entering the current value (A) using the numeric keys and the enter key. The current range and the current control voltage are set the same as when the HP 4284A controls the HP 42841A.

"Change Bias Current Range" Function

You can set the HP 42841A's bias current range to 1 A, 5 A, 20 A and OFF range, by pressing the '1 A', '5 A', '20 A', or 'OFF' softkeys. In this function the bias current control voltage is always set to 0 V.

"Change Bias Current Control Voltage" Function

In this function you can set the HP 42841A's bias current control voltage 0.000 V to 1.000 V in 0.005 V steps, by entering the voltage value (V) using the numeric keys and enter key. In this function the bias current range is always set to OFF.

"Change Power Supply Switching Frequency" Function

You can set the power supply switching frequency to 54.6875 kHz and 62.5 kHz, by pressing the '54.7 kHz' and '62.5 kHz' softkeys. In this function the bias current range is always set to OFF, and the bias current control voltage is always set to 0 V.

Figure 1-9. Troubleshooting Program Structure

1-9-2. INITIAL OPERATING PROCEDURE

This Paragraph gives how to start the troubleshooting program.

PROCEDURE

1. Start the HP 42841A Service Program refer to Paragraph 1-5 Service Program.
2. Connect the 50 mΩ Resistor Box to the HP 42841A.
3. Turn the HP 42841A ON.
4. Press the 'Trouble' softkey of the Main Menu to display the Troubleshooting Program Menu. Figure 1-10 shows the Menu.

```
HP 42841A TROUBLESHOOTING PROGRAM

Bias Current      : 0.000 [A]
Current Control   : 0.000 [V]
Current Range     : OFF
Switching Frequency: 62.5000 [kHz]

f1: Change Bias Current
f2: Change Bias Current Range
f3: Change Bias Current Control Voltage
f4: Change Power Supply Switching Frequency
f8: Exit from the program

Select using softkeys.

|          | Current | Range | I-CNTRL | SW-Freq |
|          |        |      | Exit    |         |
```

Figure 1-10. Troubleshooting Program Menu

5. Select the function using the softkeys and control the HP 42841A, refer to Figure 1-9.

SECTION 2

PERFORMANCE TEST

2-1. INTRODUCTION

This section provides the test procedures to verify that the HP 42841A meets the specifications listed in the HP 42841A Operation Manual. All tests can be performed without accessing the interior of the instrument.

Performance tests are used to perform incoming inspection and to verify that the HP 42841A is within its performance specifications after troubleshooting or adjustments have been performed on it.

If the performance tests indicate that the HP 42841A is not within specifications, check your test setup, then proceed to Adjustments or Troubleshooting as required.

NOTE

To ensure proper results and correct instrument operation, Hewlett-Packard suggests a 5-minute warm-up and stabilization period before performing any of the following adjustments.

NOTE

The performance tests are valid only when performed in an ambient temperature of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

2-1-1. PERFORMANCE TEST IN THE OPERATION MANUAL

The HP 42841A performance test described here is automatic performance test using the Service Program and a computer. When the Service Program and a computer are not available, perform the test manually, refer to the performance test section of the HP 42841A Operation Manual. This manual performance test requires an HP 4284A with Option 002. Both performance tests give the same result.

2-2. TEST EQUIPMENT

The Test Equipment required for the automatic performance test are listed in Table 1-1. Use only calibrated test instruments when performance testing the HP 42841A.

If any of the recommended test equipment is not available, equipment with specifications equal to or surpassing those of the recommended equipment may be used.

2-3. PERFORMANCE TEST RECORD

Record the performance test results in the Performance Test Record, located at the end of this section. Keep a record of past performance test results for comparison purposes to help indicate any possible areas of impending trouble.

NOTE

The HP 42841A Service Program can print out the performance test record on an HP printer.

NOTE

The test limits indicated in each performance test do not take into account the measurement errors induced by the test equipment used. Be sure to take into consideration these test equipment induced errors when determining whether or not the HP 42841A meets its indicated specifications.

2-4. CALIBRATION CYCLE

The HP 42841A requires periodic performance verification. How often you verify the HP 42841A's performance depends on the operating and environmental conditions. Check the HP 42841A using the performance test at least twice a year, to ensure optimum operation.

2-5. DC BIAS CURRENT ACCURACY TEST

This test verifies that the HP 42841A's DC Bias Current meets the following specification. The accuracy is specified for an ambient temperature range of $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

Current Range	Accuracy
0.00 A to 1.00 A	$\pm(1\% + 5\text{ mA})$
1.1 A to 5.0 A	$\pm 2\%$
5.1 A to 20.0 A	$\pm 3\%$

EQUIPMENT

DC Voltmeter	HP 3458A
Computer	HP 9826A
GPIO Interface	HP 98622A
Service Program (5.25 inch)	HP PN 42841-65003
50 m Ω Resistor Box	HP PN 42841-65100
200 m Ω Resistor Box	HP PN 42841-65101
1 Ω Resistor Box	HP PN 42841-65102
Banana to Banana Test Lead	HP 11058A (2 ea.)
HP-IB Cable	HP 10833A
Bias Interface Cable	HP PN 42841-61640

NOTE

When bias current is applied to the Resistor Box, the temperature of the resistor box increases and the value of its resistors changes. The Resistor Boxes are designed to perform the DC Bias Current Accuracy Test, taking into account the resistance value change caused by applying bias current. The resistance value changes for the 50 m Ω , 200 m Ω and 1 Ω Resistor Boxes are as follows:

50 m Ω Resistor Box:	Resistance Change=0.2% (Typical Value at 20 A DC bias)
200 m Ω Resistor Box:	Resistance Change=0.15% (Typical Value at 5 A DC bias)
1 Ω Resistor Box:	Resistance Change=0.05% (Typical Value at 1 A DC bias)

PROCEDURE

1. Start the HP 42841A Service Program, refer to Paragraph 1-5.
2. Press the 'Resistor' softkey of the Main Menu to display the Calibration Menu.
3. Calibrate the 50 m Ω , 200 m Ω and 1 Ω Resistor Box according to the program instruction. Figure 2-1 shows the instrument setup for the Resistor Box calibration. The Resistor Box Calibration Program is described in Paragraph 1-8.

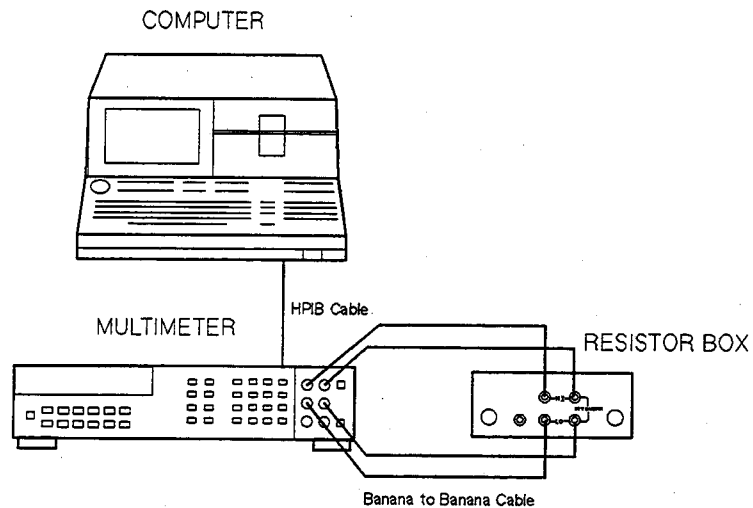


Figure 2-1. Resistor Box Calibration Setup

4. Press the 'Main Menu' softkey to display the Service Program Main Menu.
5. Press the 'Perf Test' softkey of the Main Menu to display the Test Menu.
6. Press the 'Bias Test' softkey to start the DC Bias Current Accuracy Test.
7. Perform the test according to the program's instructions. Figure 2-2 shows the instrument setup for the test. Table 2-1 lists the test points and the test limits. The performance test program is described in Paragraph 1-6.

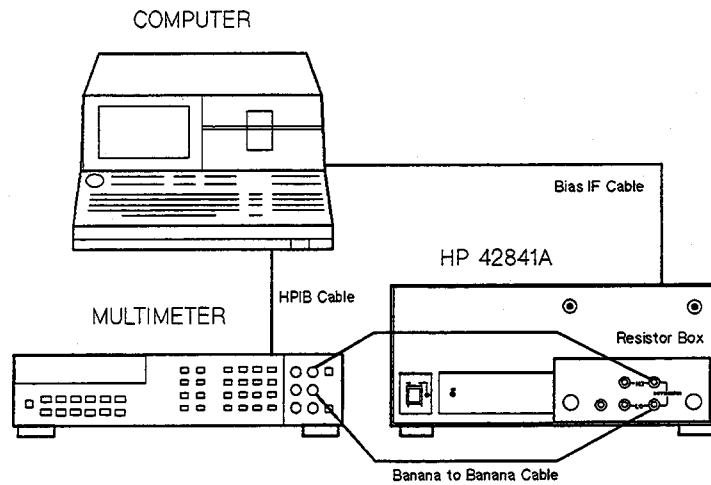


Figure 2-2. DC Bias Current Accuracy Test Setup

Table 2-1. Bias Current Accuracy Test Limits

Bias Current Setting	Minimum Limit	Maximum Limit
0 A	-5.0 mA	5.0 mA
10 mA	4.9 mA	15.1 mA
100 mA	94.0 mA	106.0 mA
200 mA	193.0 mA	207.0 mA
300 mA	292.0 mA	308.0 mA
500 mA	490.0 mA	510.0 mA
700 mA	688.0 mA	712.0 mA
900 mA	886.0 mA	914.0 mA
1 A	0.985 A	1.015 A
1.1 A	1.078 A	1.122 A
2 A	1.960 A	2.040 A
3 A	2.940 A	3.060 A
4 A	3.920 A	4.080 A
5 A	4.900 A	5.100 A
5.1 A	4.947 A	5.253 A
8 A	7.760 A	8.240 A
10 A	9.70 A	10.30 A
15 A	14.55 A	15.45 A
17 A	16.49 A	17.51 A
20 A	19.40 A	20.60 A

NOTES

PERFORMANCE TEST RECORD

Hewlett-Packard HP 42841A

Tested by _____

DC Bias Current Source

Date _____

Serial No. _____

DC BIAS CURRENT ACCURACY TEST

Bias Current

Setting	Minimum Limit	Test Result	Maximum Limit
0 mA	-5.0 mA	_____ [mA]	5.0 mA
10 mA	4.9 mA	_____ [mA]	15.1 mA
100 mA	94.0 mA	_____ [mA]	106.0 mA
200 mA	193.0 mA	_____ [mA]	207 mA
300 mA	292.0 mA	_____ [mA]	308.0 mA
500 mA	490.0 mA	_____ [mA]	510.0 mA
700 mA	688.0 mA	_____ [mA]	712.0 mA
900 mA	886.0 mA	_____ [mA]	914.0 mA
1.00 A	0.985 A	_____ [A]	1.015 A
1.1 A	1.078 A	_____ [A]	1.122 A
2.0 A	1.960 A	_____ [A]	2.040 A
3.0 A	2.940 A	_____ [A]	3.060 A
4.0 A	3.920 A	_____ [A]	4.080 A
5.0 A	4.900 A	_____ [A]	5.100 A
5.1 A	4.947 A	_____ [A]	5.253 A
8.0 A	7.760 A	_____ [A]	8.240 A
10.0 A	9.70 A	_____ [A]	10.30 A
15.0 A	14.55 A	_____ [A]	15.45 A
17.0 A	16.49 A	_____ [A]	17.51 A
20.0 A	19.40 A	_____ [A]	20.60 A

SECTION 3

ADJUSTMENTS

3-1. INTRODUCTION

This section describes the adjustments required to ensure that the HP 42841A Bias Current Source is within its published specifications after it has been repaired. These adjustments should be performed along with periodic maintenance to keep the HP 42841A in optimum operating condition. If proper performance cannot be achieved after adjustment, proceed to Section 5 Assembly Level Troubleshooting.

NOTE

To ensure proper results and correct instrument operation, Hewlett-Packard suggests a 5-minute warm-up and stabilization period before performing any of the following adjustments.

3-2. SAFETY CONSIDERATIONS

This manual contains **NOTES**, **CAUTIONS**, and **WARNINGS** which must be followed to ensure the safety of the operator and to keep the instrument in a safe and serviceable condition. The adjustments covered in this section must be performed by qualified service personnel.

WARNING

ANY INTERRUPTION OF THE PROTECTIVE GROUND CONDUCTOR (INSIDE OR OUTSIDE THE INSTRUMENT) OR DISCONNECTION OF THE PROTECTIVE GROUND TERMINAL CAN MAKE THE INSTRUMENT DANGEROUS. INTENTIONAL INTERRUPTION OF THE PROTECTIVE GROUND SYSTEM FOR ANY REASON IS PROHIBITED.

The removal or opening of covers for adjustment, or removal of parts other than those which are accessible by hand will expose circuits containing dangerous voltage levels.

Remember that even though you have turned the HP 42841A off and unplugged it, the capacitors in the HP 42841A can remain charged for several minutes.

WARNING

THE ADJUSTMENTS DESCRIBED IN THIS SECTION ARE PERFORMED WITH POWER APPLIED AND THE PROTECTIVE COVERS REMOVED. DANGEROUS VOLTAGE LEVELS EXIST AT MANY POINTS AND CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH IF YOU COME INTO CONTACT WITH THEM.

3-3. TEST EQUIPMENT

Table 1-1 lists the test equipment required to perform the adjustments described in this section. Use only calibrated test equipment when adjusting the HP 42841A. If the recommended test equipment is not available, equipment whose specifications are equal to, or surpass those of the recommended test equipment may be used.

3-4. ADJUSTABLE COMPONENTS

Table 3-1 lists the HP 42841A's adjustable components, the name of the adjustment related to each component, and gives a brief description of each adjustment.

Table 3-1. Adjustable Components

Adjustable Component	Adjustment Name	Description
A1R79	V-ADJ	Power Supply Output Voltage Adjustment
A2R25	SINK-ADJ	Bias Current Sink Adjustment
A3R65	SOURCE-ADJ	Bias Current Source Adjustment

3-5. ADJUSTMENT INTERACTION

Some of the HP 42841A adjustments are interactive. If you repair or replace an HP 42841A's assembly, be sure to perform the related adjustment(s) in the sequence given. Table 3-2 lists the adjustments required for each assembly that is repaired or replaced. Ignoring or changing the adjustment sequence will make it impossible to obtain optimum performance.

Table 3-2. Required Adjustments

Assembly Replaced or Repaired	Adjustments Required (Paragraph Number)
A1 Power Supply A2 Current Sink A3 Current Source A4 Digital Control/Power Supply	2-8. Power Supply Voltage Adjustment 2-9. Bias Current Adjustment 2-9. Bias Current Adjustment None

3-6. INITIAL OPERATING PROCEDURES

Before starting the adjustments, perform the OPERATIONAL VERIFICATION and the DISASSEMBLY procedures given in the following paragraphs to prepare the HP 42841A for adjustment.

OPERATIONAL VERIFICATION

Check that the line voltage selector switch on the rear panel of the HP 42841A is properly set. Connect the 50 m Ω Resistor Box (HP PN 42841-65100) to the HP 42841A's output and turn the HP 42841A ON and let it warm-up and stabilize for at least 5 minutes.

NOTE

The HP 42841A is shut down, if nothing is connected to its output.

DISASSEMBLY

To gain access to the adjustment points, perform the following procedure.

1. Remove the four plastic instrument-feet located at the corners of the rear panel.
2. Fully loosen the top cover retaining screw located at the back of the top cover.
3. Slide the top cover towards the rear and lift it off.
4. Fully loosen the bottom cover retaining screw located at the back of the top cover.
5. Slide the bottom cover towards the rear and lift it off.

WARNING

TO PROTECT AGAINST POSSIBLE ELECTRICAL SHOCK, USE INSULATED TOOLS TO MAKE ALL ADJUSTMENTS.

3-7. POWER SUPPLY VOLTAGE ADJUSTMENT

This procedure adjusts the output voltage of the power supply.

EQUIPMENT:

Multimeter		HP 3458A
2 Alligator Clips to 1 Dual Banana Plug	Test Lead	HP 11002A
1 Ω Resistor Box		HP PN 42841-65100

PROCEDURE:

1. Make sure the HP 42841A is turned OFF.
2. Remove the top side shield to enable access to the A1 board assembly.
3. Connect the 1 Ω Resistor Box to the HP 42841A.
4. Set the Multimeter to the DC voltage measurement function. The Multimeter must be electrically floated.
5. Connect multimeter's Lo input to A1TP35 (COM), and connect the Hi input to A1TP33 (13 V). Figure 3-2 shows the location of A1TP33 and A1TP35.

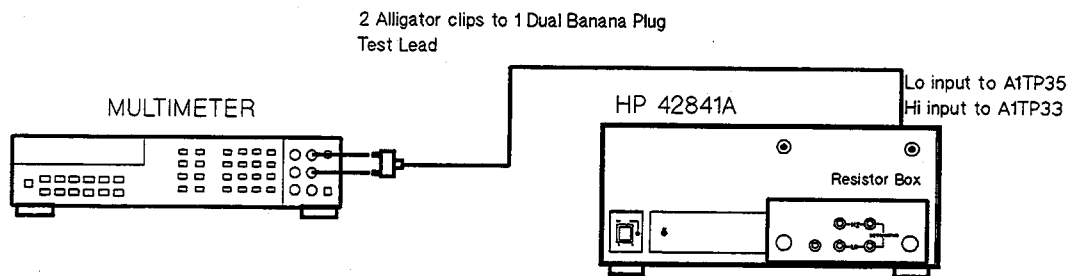


Figure 3-1. Power Supply Voltage Adjustment Setup

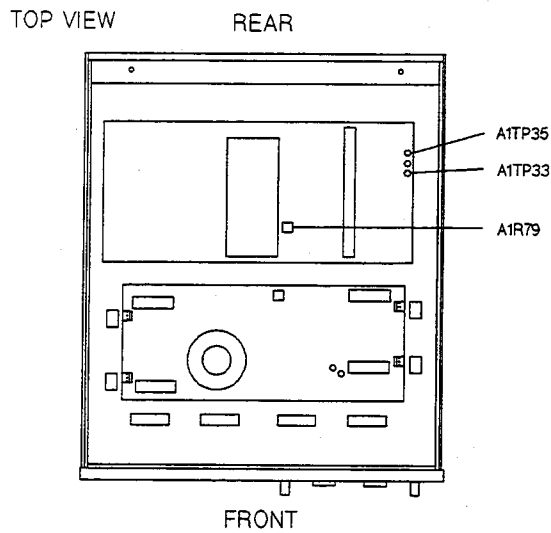


Figure 3-2. Power Supply Voltage Adjustment Location

6. Turn A1R79 (**V-ADJ**) fully **CCW** (Counter Clock-Wise). Figure 3-2 shows A1R79's location.
7. Turn the HP 42841A ON.
8. Adjust A1R79 until the multimeter reads $13\text{ V} \pm 0.1\text{ V}$.

NOTE

The HP 42841A is shut down, when the DC voltage between TP33 and TP35 is higher than 13.6 V. If the HP 42841A is shut down, turn A1R79 fully CCW then cycle the power OFF and ON to turn it on.

3-8. DC BIAS CURRENT ADJUSTMENT

This adjustment sets the HP 42841A's DC Bias Current.

EQUIPMENT

DC Voltmeter	HP 3458A
Computer	HP 9826A
GPIO Interface	HP 98622A
Service Program (5.25 inch)	HP PN 42841-65003
50 m Ω Resistor Box	HP PN 42841-65100
1 Ω Resistor Box	HP PN 42841-65102
2 Alligator Clips to 1 Dual Banana Plug Test Lead	HP 11002A
Banana-Banana Test Lead	HP 11058A (2 ea.)
HP-IB cable	HP 10833A
Bias Interface Cable	HP PN 42841-61640

PROCEDURE

1. Start the HP 42841A Service Program, refer to Paragraph 1-5 in the Service Program.
2. Press the 'Resistor' softkey of the Main Menu to display the Calibration Menu.
3. Calibrate the 1 Ω Resistor Box according to the program instruction. Figure 3-3 shows the instrument setup for the Resistor Box calibration. The Resistor Box Calibration Program is described in Paragraph 1-8.

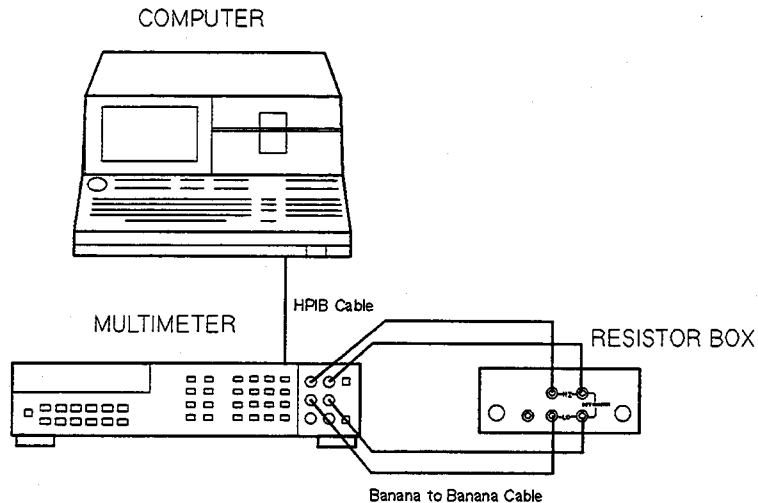


Figure 3-3. Resistor Box Calibration Setup

4. Press the 'Main Menu' softkey to display the Service Program Main Menu.
5. Press the 'Adjust' softkey of the Main Menu to start the adjustment program.
6. Perform the Bias Current Source Adjustment according to the program's instructions. Figure 3-4 shows the adjustment setup. Figure 3-5 shows A3R65's (SOURCE ADJ) location.

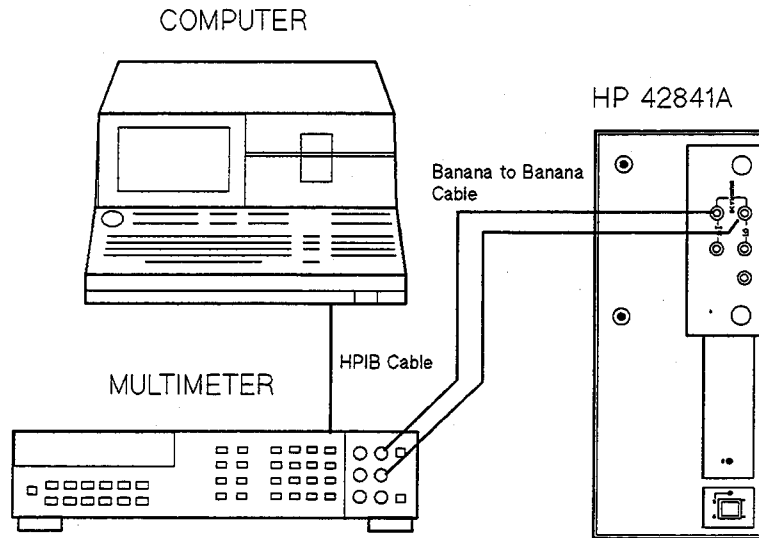


Figure 3-4. Bias Current Source Adjustment Setup

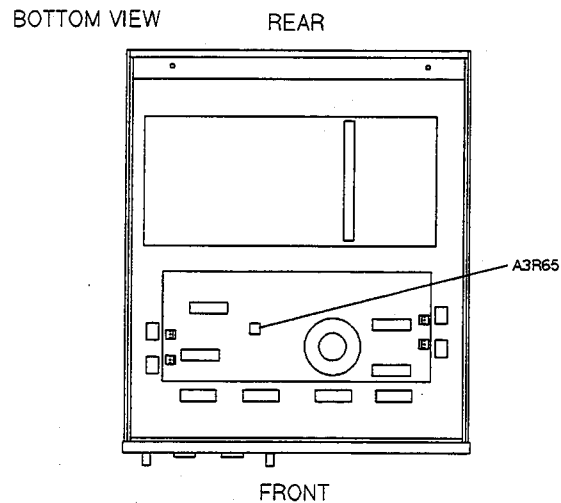


Figure 3-5. Bias Current Source Adjustment Location

7. Perform the Bias Current Sink Adjustment according to the program's instruction. Figure 3-6 shows the adjustment setup. Figure 3-7 shows A2R25's (**SINK ADJ**), A2TP2 and A2TP3 (**COM**) locations.

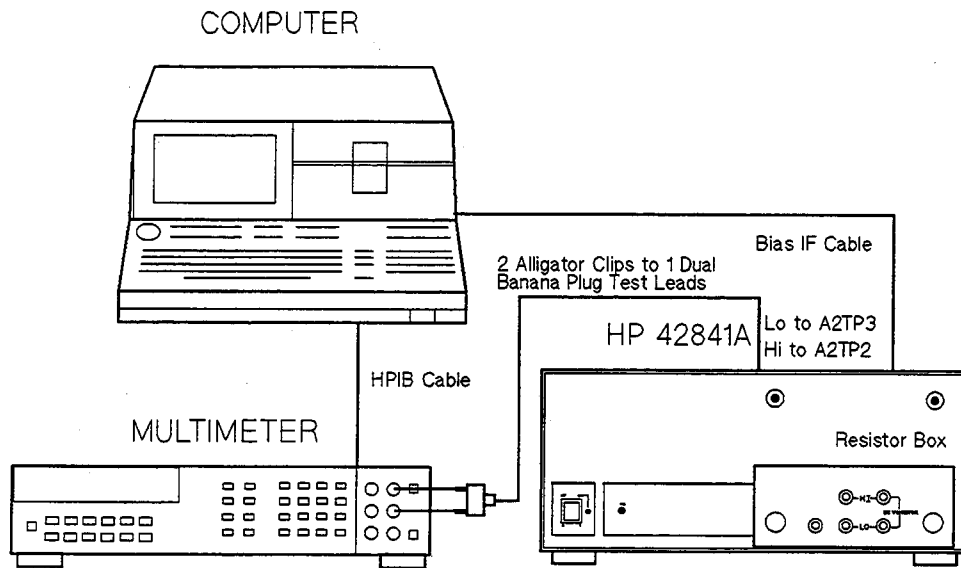


Figure 3-6. Bias Current Sink Adjustment Setup

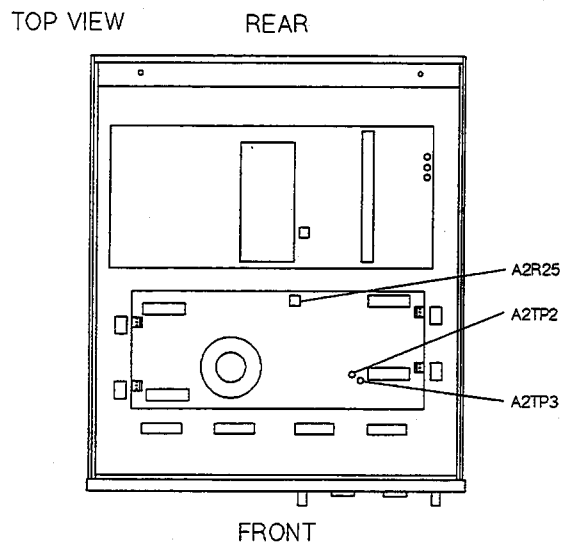


Figure 3-7. Bias Current Sink Adjustment Location

SECTION 4

ASSEMBLY REPLACEMENT INFORMATION

4-1. INTRODUCTION

This section provides replaceable assemblies list, replaceable mechanical parts list and assembly disassembly information for the HP 42841A BIAS CURRENT SOURCE. When rewiring the HP 42841A, cable assemblies list (table 4-6 and table 4-7) may be useful.

4-2. REPLACEABLE ASSEMBLY LIST

The HP 42841A replaceable electrical assemblies are listed in Table 4-1. When ordering a replacement part listed in the table, specify the Hewlett-Packard Part Number and the quantity required, and send the order to the nearest Hewlett-Packard office.

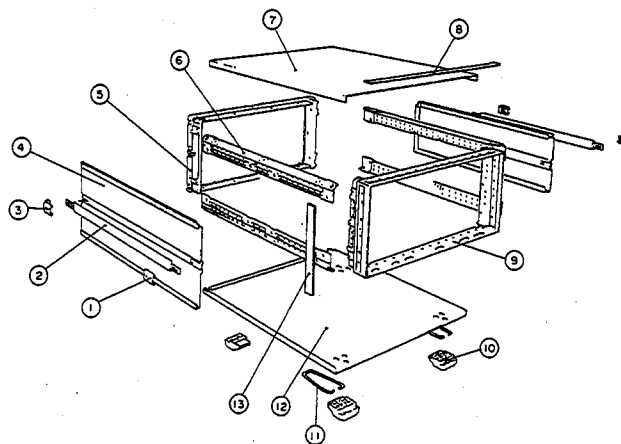
Table 4-1. Replaceable Assemblies

Reference Designator	HP Part Number	Qty	Description
A1	42841-66501	1	Power Supply
	42841-69501	1	Power Supply (Re-Built)
A2	42841-66502	1	Bias Current Sink
	42841-69502	1	Bias Current Sink (Re-Built)
A3	42841-66503	1	Bias Current Source
	42841-69503	1	Bias Current Source (Re-Built)
A4	42841-66504	1	Digital Control
	42841-69504	1	Digital Control (Re-Built)
A5	42841-66505	1	LED Indicator
Q1 to Q4	42841-61633	4	FET Assembly (N-channel)
	0340-1126	4	Insulator
	3050-0891	4	Washer
	0515-1550	4	Screw M3
Q5 to Q8	42841-61634	4	FET Assembly (P-channel)
	0340-1126	4	Insulator
	3050-0891	4	Washer
	0515-1550	4	Screw M3
R1 to R4	0811-3804	4	Resistor 0.2 Ω , 1%, 10 W
	0515-1550	8	Screw M3
R5 to R8	42841-88101	4	Resistor 0.2 Ω , 1%, 10 W
	0515-1550	8	Screw M3
SW1	3103-0135	1	Switch Thermal
	3050-0891	2	Washer
	0515-1550	2	Screw

4-3. REPLACEABLE MECHANICAL PARTS LIST

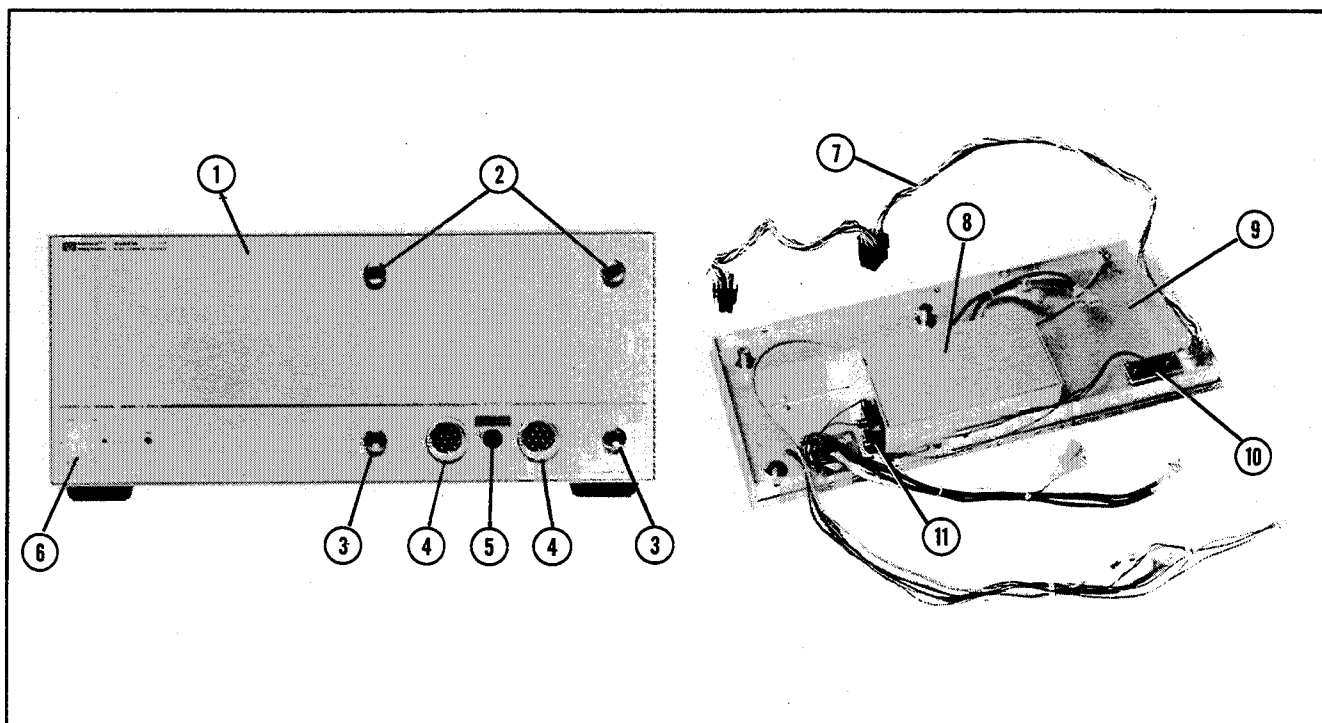
The HP 42841A replaceable mechanical parts are listed in Tables 4-2 to 4-7. When ordering a replacement part listed in the tables, specify the Hewlett-Packard Part Number and the quantity required, and send the order to the nearest Hewlett-Packard office.

Table 4-2. Major Mechanical Parts



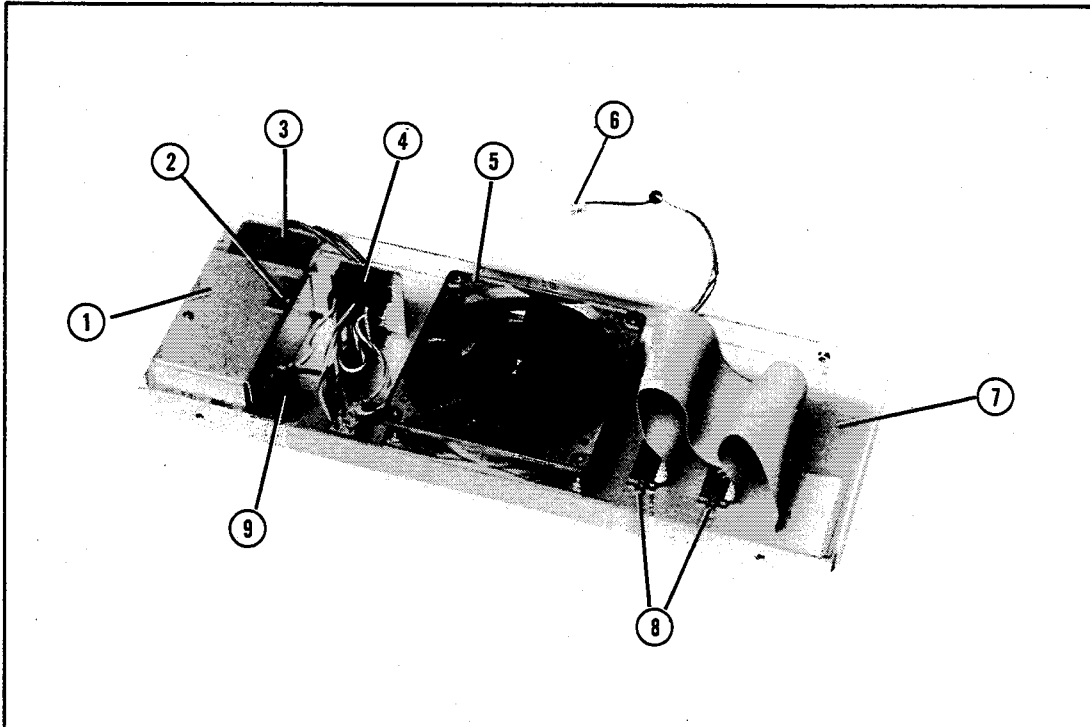
Reference Designator	Part Number	Qty	Description
1	5081-8819	2	Front Cap
2	5062-3704	2	Strap Handle
3	5041-8820	2	Rear Cap
4	5062-3842	2	Side Cover
	8160-0461		Gasket
5	5021-5806	1	Rear Frame
6	5021-5837	4	Corner Strut
7	5062-3735	1	Top Cover
8	5041-8802	1	Top Trim
9	5021-8405	1	Front Frame
10	5041-8801	4	Foot
11	1460-1345	2	Tilt Stand
12	5062-3747	1	Bottom Cover
13	5001-0540	2	Side Trim

Table 4-3. Front Panel Components



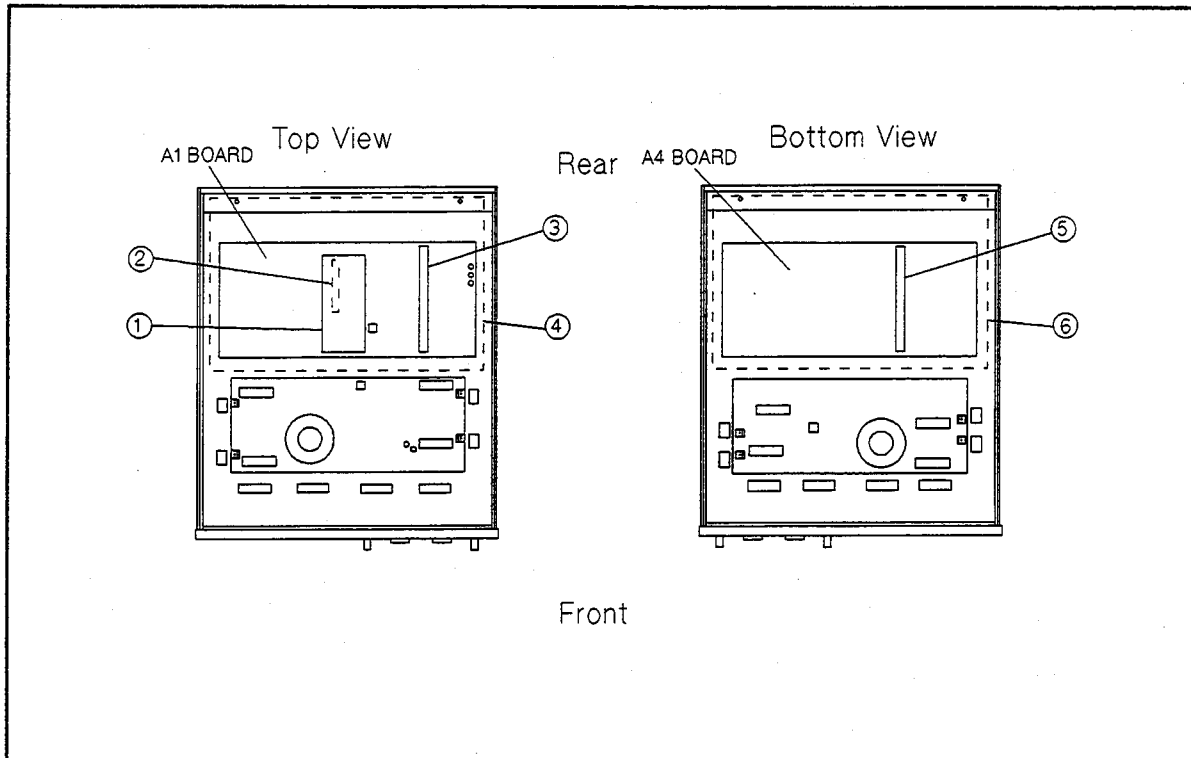
Reference Designator	Part Number	Qty	Description
1	42841-00201	1	Panel Front Dress
2	42841-21002	2	Guide
	2109-0054	2	Washer
	2950-0054	2	Nut
3	42841-21001	2	Guide
	2109-0054	2	Washer
	2950-0054	2	Nut
4	1252-3227	2	Connector 12 pin Male
	0535-0043	8	Nut
5	0430-0321	1	Bushing
6	3101-2862	1	Switch Power
7	42841-61624	1	Power Cable Assembly
8	42841-00603	1	Case Shield
9	42841-00202	1	Panel Sub Front
10	42841-66505	1	A5 LED Indicator Board
	0515-1550	2	Screw
11	3101-3011	1	Switch
	3050-0893	2	Washer Flat
	2190-0586	2	Washer Spring
	0515-0982	2	Screw

Table 4-4. Rear Panel Components



Reference Designator	Part Number	Qty	Description
1	04278-00634	1	Shield
	1400-1048	1	Saddle Edge
	0515-1550	3	Screw
2	1400-1334	1	Clamp Cable
3	42841-61001	1	Line Filter Assembly
	2190-0586	2	Washer
	0515-0910	2	Screw
4	04278-61619	1	Cable Assembly
5	04279-61001	1	Fan Assembly
	3160-0092	1	Cover Fan
	3050-0893	4	Washer
	0515-0071	4	Screw
	0535-0043	4	Nut
	5080-3271	1	Label "J2"
7	42841-00203	1	Panel Rear
8	42841-61623	2	Cable Assembly
	0515-1551	4	Screw
	0535-0031	4	Nut
9	2100-0566	1	Holder Fuse
	2100-0383	1	Fuse (8 A)
	2110-0030	1	Fuse (5 A)
	2100-0565	1	Cap Fuse
	2110-0569	1	Nut

Table 4-5. Shield and Heatsink

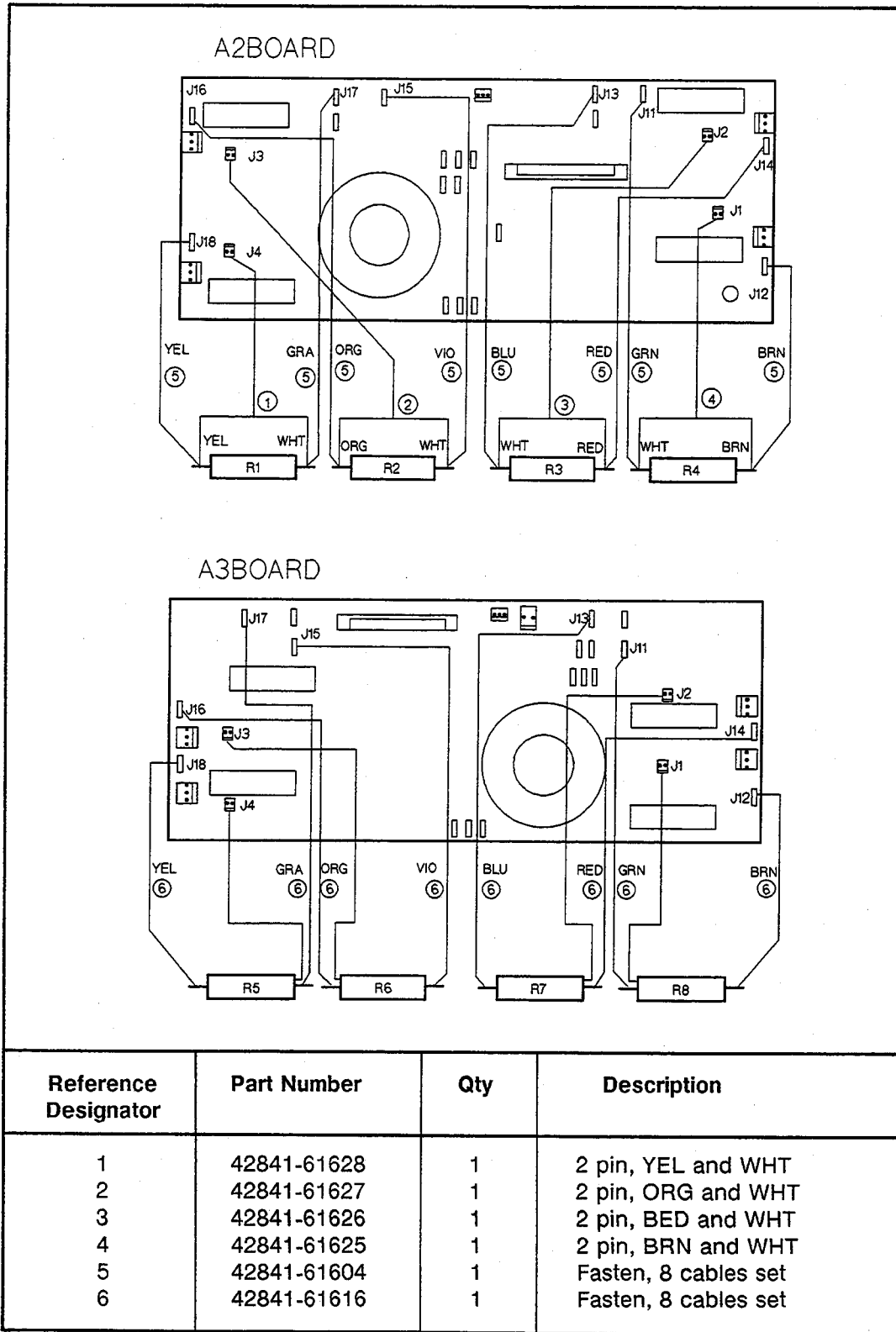


Reference Designator	Part Number	Qty	Description
1 ¹	42841-00604	1	Case Shield Component Side
	0515-1550	4	Screw
2 ¹	42841-00605	1	Case Shield Circuit Side
	0515-1007	4	Screw
3 ¹	42841-01203	1	Heat Sink
	0340-1140	1	Sheet Thermal
4	42841-01202	1	Heat Sink
	0340-1140	1	Sheet Thermal
5 ²	0515-1551	2	Screw
	42841-61625	1	Shield above A1 Board
6	2190-0586	2	Washer
	0515-0910	2	Screw
5 ²	0515-1550	9	Screw
	42841-61604	1	Heat Sink
6	0340-1140	1	Sheet Thermal
	0515-1551	2	Screw
6	42841-61616	1	Shield above A4 Board
	2190-0586	2	Washer
6	0515-0910	2	Screw
	0515-1550	9	Screw

1: Included in A1 Board (42841-66501), except for the Case Shield Component Side.

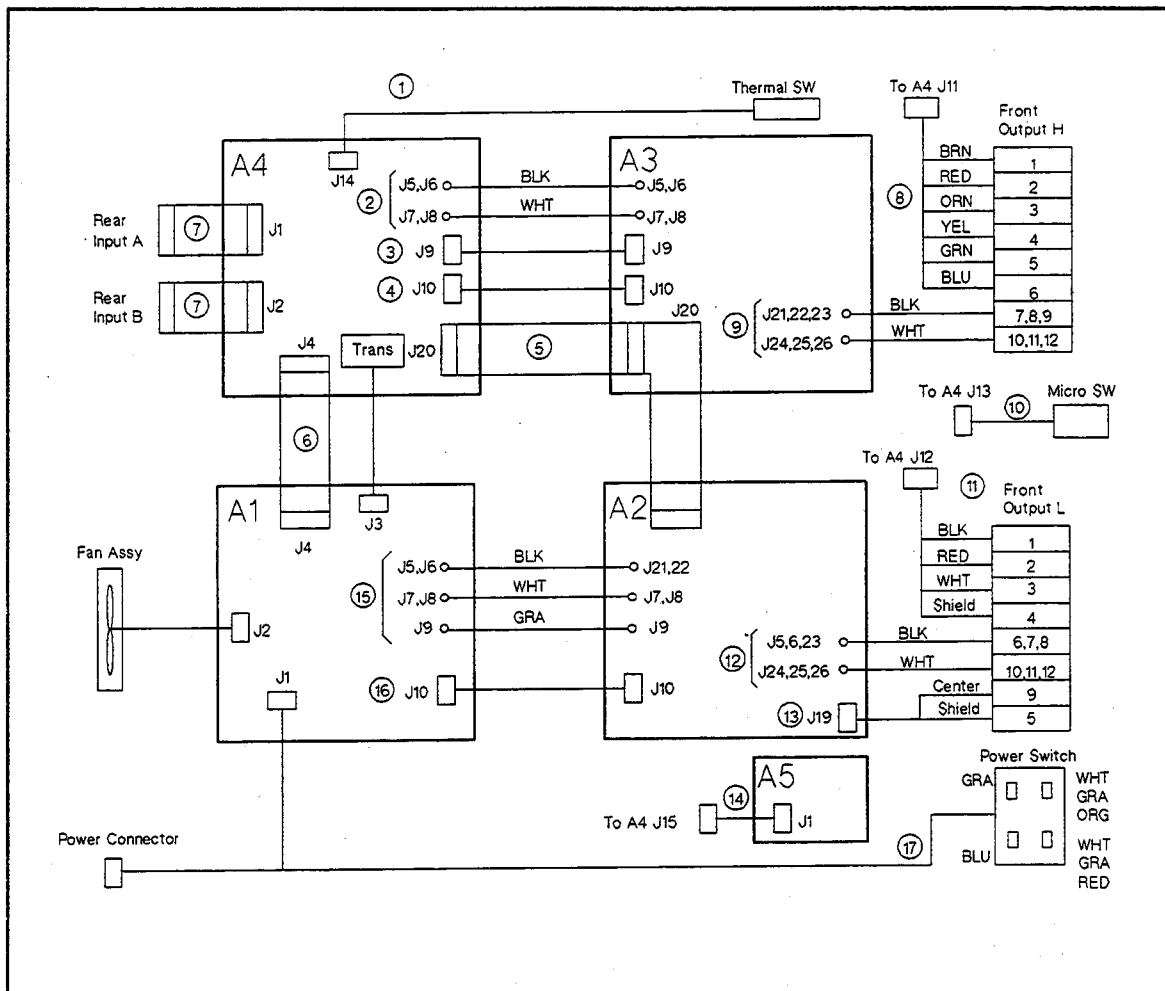
2: Included in A2 Board (42841-66502)

Table 4-6. Cables Connected to R1 to R8



Reference Designator	Part Number	Qty	Description
1	42841-61628	1	2 pin, YEL and WHT
2	42841-61627	1	2 pin, ORG and WHT
3	42841-61626	1	2 pin, RED and WHT
4	42841-61625	1	2 pin, BRN and WHT
5	42841-61604	1	Fasten, 8 cables set
6	42841-61616	1	Fasten, 8 cables set

Table 4-7. Cable Assemblies



Reference Designator	Part Number	Qty	Description
1	42841-61619	1	2 pin, "J14"
2	42841-61615	1	Fasten, 4 cables set
3	42841-61614	1	2 pin, "J9"
4	42841-61617	1	3 pin, "J10"
5	42841-61618	1	40 pin, flat cable
6	42841-61621	1	18 pin, flat cable
7	42841-61623	2	50 pin, flat cable
8	42841-61610	1	6 pin, "J11"
9	42841-61608	1	Fasten, 6 cables set
10	42841-61611	1	2 pin, "J13"
11	42841-61613	1	4 pin, "J12"
12	42841-61601	1	Fasten, 6 cables set
13	42841-61603	1	Coaxial
14	42841-61612	1	3 pin, "J15"
15	42841-61605	1	Fasten, 5 cables set
16	42841-61606	1	3 pin, "J10"
17	42841-61624	1	Power cable

4-4. TOOLS AND FASTENERS

The HP 42841A's mechanical components are secured using metric threaded fasteners. Many fasteners in the HP 42841A may appear to be Phillips type, but they are in fact, Pozidrive type. To avoid damaging them, use only Pozidrive screwdrivers to remove or tighten Pozidrive type fasteners.

4-5. DISASSEMBLY

Following paragraphs give disassembly procedures. How to remove the Fasten Connector is given first, and then the following paragraphs tell you how to remove each assembly from the instrument.

4-5-1 FASTEN CONNECTOR REMOVAL

When you remove the Fasten Connector, pull the connector up while holding the center of the connector housing with a pair of pliers, as shown in Figure 4-1.

CAUTION

If you remove the fasten connector by force, the connector may be damaged.

Figure 4-1 shows the fasten connector mechanism. When a tub is inserted to a receptacle, the receptacle's hook catches the tub's lock hole and the connection becomes tight. When the center of the connector housing is held, the release lever is pushed which release the hook from the lock hole, and the connector can be removed easily.

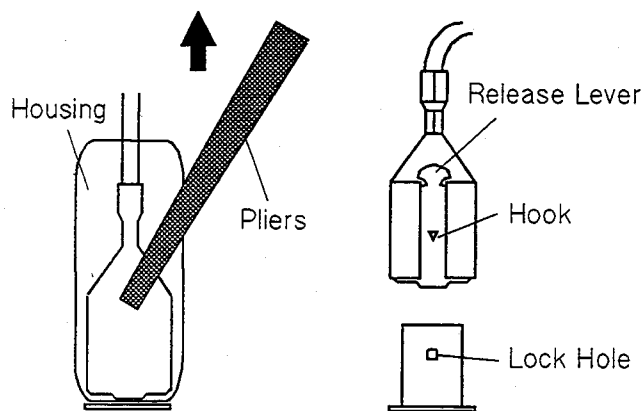


Figure 4-1. Fasten Connector

4-5-2. TOP COVER REMOVAL

The following procedures are common for gaining access to any of the assemblies.

1. Remove the two plastic instrument-feet located in the upper corners of the rear panel.
2. Fully loosen the top cover retaining screw located at the rear of the top cover.
3. Slide the top cover towards the rear and lift it off.

4-5-3. BOTTOM COVER REMOVAL

The following procedures are common for gaining access to any of the assemblies.

1. Remove the two plastic instrument-feet located in the lower corners of the rear panel.
2. Fully loosen the bottom cover retaining screw located at the rear of the top cover.
3. Slide the bottom cover towards the rear and lift it off.

4-5-4. FRONT PANEL ASSEMBLY REMOVAL

1. Remove the top cover and the bottom cover.
2. Remove the bottom side shield to enable to gain access the A4 board.
3. Pull out all the cables, connected to the front panel assembly, from the A2, A3 and A4 board assemblies. The cable connection is shown in Table 3-7 Cable Assemblies.
4. Remove the three screws from the bottom of the front frame. Then remove the three screws from the top of the front frame.
5. Carefully remove the HP 42841A's front panel assembly.

4-5-5. REAR PANEL ASSEMBLY REMOVAL

1. Remove the top cover and the bottom cover.
2. Remove the bottom side shield to enable to gain access the A4 board.
3. Remove the two screws retaining the one handle strap. Then remove the strap and the side cover. The other side cover need not to be removed.
4. Remove the two large screws on the bottom side shield retaining the rear panel assembly. Then remove the two large screws on the top side shield retaining the rear panel assembly.
5. Carefully make space between the rear panel assembly and the rear frame to enable to remove the cables connect the rear panel to the board assemblies.
6. Remove the power cable from the rear panel assembly. Then remove the cables, connected to the rear panel assembly, from the A1 and A4 assemblies. The cable connection is shown in the Table 4-7 Cable Assemblies.
7. Carefully remove the rear panel assembly.

4-5-6. A1 BOARD ASSEMBLY REMOVAL

1. Remove the top cover.
2. Remove the top side shield plate.
3. Remove all the cable assemblies from the A1 board.
4. Remove the eight screws retaining the A1 board.
5. Remove the A1 board assembly.

4-5-7. A2 BOARD ASSEMBLY REMOVAL

1. Remove the top cover.
2. Remove all the cable assemblies from the A2 board.
4. Remove the nine screws retaining the A1 board.
5. Remove the A2 board assembly.

4-5-8. A3 BOARD ASSEMBLY REMOVAL

1. Remove the bottom cover.
2. Remove all the cable assemblies from the A3 board.
4. Remove the nine screws retaining the A3 board.
5. Remove the A3 board assembly.

4-5-9. A4 BOARD ASSEMBLY REMOVAL

1. Remove the bottom cover.
2. Remove the bottom side shield plate.
3. Remove all the cable assemblies from the A4 board.
4. Remove the eight screws retaining the A4 board.
5. Remove the A4 board assembly.

4-5-10. A5 BOARD ASSEMBLY REMOVAL

1. Remove the front panel assembly referring to Paragraph 4-8-3.
2. Remove the cable from the A5 board.
3. Remove the two screws from the A5 board.
4. Remove the A5 board assembly.

SECTION 5

ASSEMBLY LEVEL TROUBLESHOOTING

5-1. INTRODUCTION

This section provides assembly level troubleshooting information for the HP 42841A BIAS CURRENT SOURCE.

5-2. SAFETY CONSIDERATIONS

This section contains **WARNINGS** and **CAUTIONS** that must be followed for your protection and to avoid damaging the equipment.

WARNING

THE MAINTENANCE PROCEDURES DESCRIBED HEREIN ARE PERFORMED WHEN POWER IS SUPPLIED TO THE INSTRUMENT AND ITS PROTECTIVE COVERS ARE REMOVED. THIS TYPE OF MAINTENANCE MUST BE PERFORMED ONLY BY SERVICE-TRAINED PERSONNEL WHO ARE AWARE OF THE HAZARDS INVOLVED (FOR EXAMPLE, FIRE AND ELECTRICAL SHOCK). WHEN MAINTENANCE CAN BE PERFORMED WITHOUT POWER APPLIED TO THE INSTRUMENT, REMOVE POWER FROM THE INSTRUMENT. BEFORE ANY REPAIR IS COMPLETED, ENSURE THAT ALL SAFETY FEATURES ARE INTACT AND FUNCTIONING, AND THAT ALL NECESSARY PARTS ARE PROPERLY CONNECTED TO THE PROTECTIVE GROUNDING SYSTEM.

5-3. RECOMMENDED TEST EQUIPMENT

Table 1-1 lists the instruments required, their critical specifications, and their model numbers. If the recommended models are not available, equipment which meets or exceeds all of the critical specifications may be substituted.

5-4. AFTER SERVICE PRODUCT SAFETY CHECKS

WARNING

WHENEVER IT APPEARS LIKELY THAT PROTECTIVE SAFETY PROVISIONS HAVE BEEN IMPAIRED, THE APPARATUS SHALL BE MARKED AS INOPERATIVE AND SHOULD BE SECURED AGAINST ANY UNINTENDED OPERATION. THE PROTECTION PROVISIONS WILL HAVE LIKELY BEEN COMPROMISED IF, FOR EXAMPLE:

- **INSTRUMENT SHOWS VISIBLE DAMAGE.**
- **THE INSTRUMENT FAILS TO PERFORM THE INTENDED MEASUREMENT.**
- **THE UNIT HAS UNDERGONE PROLONGED STORAGE UNDER UNFAVORABLE CONDITIONS.**
- **THE INSTRUMENT WAS SEVERELY STRESSED IN TRANSPORT.**

Perform the following four safety checks to verify the safety condition of the HP 42841A (these checks may also be used for safety checks after troubleshooting and repair).

1. Visually inspect the interior of the instrument for any signs of abnormal internally generated heat, such as discolored printed circuit boards and components, damaged insulation, or evidence of arcing. Determine the cause, and then repair.
2. Use an ohmmeter which can accurately measure 0.5Ω to check the resistance from the instrument enclosure to the power cord's ground pin. The resistance must be less than 0.5Ω . Flex the power cord while making this measurement to determine if any intermittent discontinuities exist.
3. Unplug the 42841A's power plug from the power source. Set the power switch to **ON**. Tie the line and neutral pins of the power connector together and check the resistance between them and the instrument's enclosure. The minimum acceptable resistance is $2 \text{ M}\Omega$. Find and replace any component which causes the instrument to fail this test.
4. Verify that the correct fuse is installed.

NOTES

5-5. THEORY OF OPERATION

Figure 5-1 shows a block diagram of the HP 42841A. The HP 42841A consists mainly of the A1 Power Supply, the A2 Bias Current Sink, the A3 Bias Current Source, and the A4 Digital Control and Power Supply.

The Bias Current Source section supplies the bias current, almost all of which is sunk by the Bias Current Sink. An active inductor on the A2 board, compensates for the bias current difference between the bias source current and the bias sink current.

The Digital Control section sets the bias current level by controlling the current range switches and the DA converters.

HP 42841A BIAS CURRENT SOURCE

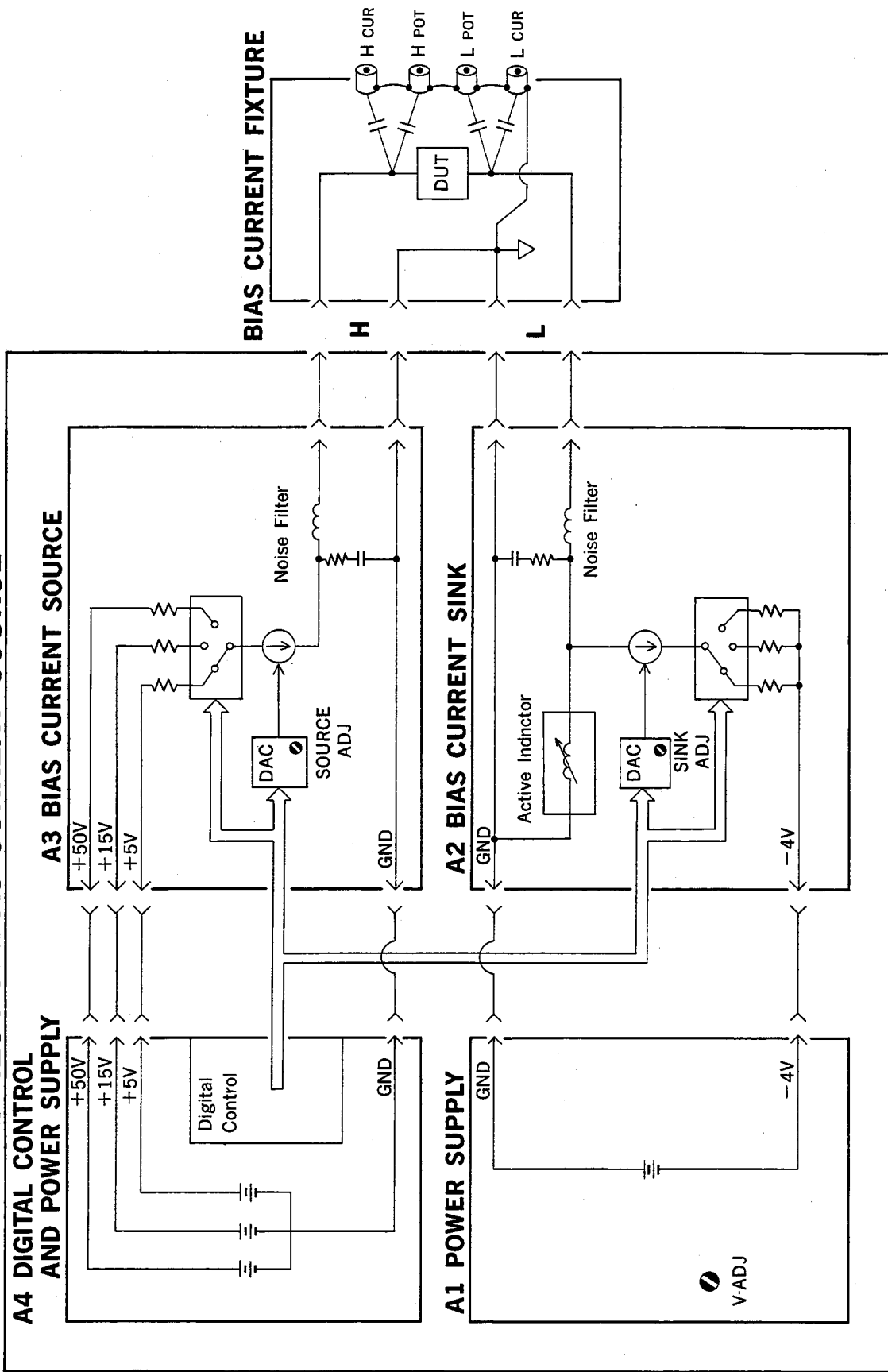


Figure 5-1. Block Diagram

5-6. FAULTY BOARD ISOLATION HINTS

5-6-1. INTRODUCTION

This Paragraph provides hints for isolating faulty a HP 42841A board. Troubleshoot the HP 42841A by first determining what the failure is. Then functionally check-out the HP 42841A according to the hints given in the following paragraphs.

NOTE

It is important to isolate the failure to either the HP 42841A, the Bias Current Test Fixture, or the LCR meter. Fault isolation between the HP 42841A, the Bias Current Fixture and the LCR meter is performed as follows:

1. If the trouble disappears after replacing the test fixture with a Resistor Box, the test fixture may be defective.
2. If the trouble disappears when the Service Program is used as the HP 42841A controller instead of the LCR meter, the LCR meter may be defective

The HP 42841A failures are separated into the following major categories:

1. **HP 42841A cannot be turned on.** (Paragraph 5-6-2)
2. **Bias current setting is incorrect.** (Paragraph 5-6-3)
3. **Fixture condition errors always appears.** (Paragraph 5-6-4)
4. **Impedance measurement is incorrect.** (Paragraph 5-6-5)

The following paragraphs provide faulty board isolation hints for each type of failure.

5-6-2. HP 42841A CANNOT BE TURNED ON

Turn on failures are separated into the following categories:

1. **Nothing happens when the line switch is turned on.**
2. **When turned on, shuts down immediately.**
3. **When turned on, shuts down after a few seconds.**

Perform the following faulty board isolation procedures according to your instrument's failure symptoms.

NOTE

The HP 42841A's Operation Indicator, the yellow LED on the front panel, lights while the HP 42841A is ON.

1. Nothing happens when the line switch is turned on

If nothing happens when the HP 42841A's line switch is turned on, check, and if necessary, correct the **Line Voltage Selector** setting or replace the **Line Fuse, Power Cable, A1F1** (HP PN 2110-0051, 10 A 250 V) or **A1FT1** (HP PN 2110-0663, Temp Fuse). (Refer to Figure 5-4 for the locations of A1F1 and A1FT1.) If still inoperative, replace the **A1 board**.

2. When turned on, shuts down immediately

If the HP 42841A shuts down immediately after being turned on, perform the following steps in sequence until the problem is solved. (The shut down function is described in Paragraphs 5-7 and 5-10.)

NOTE

If nothing is connected to the HP 42841A's front panel input, the HP 42841A will be shut down by the safety circuit immediately after being turned on. Connect the Resistor Box, to determine the shut down error.

1. Check that the thermal switch on the bottom side (SW1) is closed, and replace it if it is open, refer to Table 4-1, Replaceable Assemblies.
2. Turn A1R79 (V-ADJ) fully counter clock wise (CCW), and turn the line switch ON, refer to Figure 5-4. If the HP 42841A turns on, perform the adjustments given in Paragraph 3-7, Power Supply Voltage Adjustment.
3. Replace the A1 board.
4. Replace the A4 board.

3. When turned on, shuts down after a few seconds

If the HP 42841A shuts down a few seconds after being turned on, perform the following steps in sequence until the problem is solved.

1. If the cooling fan turns while the HP 42841A is ON, replace the A1 board.
2. Check the cooling fan supply voltage (E10 and E11 in Figure 5-2), according to Paragraph 5-7-2 Power Supply Voltage Check.
3. If the fan does not turn and the supply voltage is correct, replace the fan assembly.

5-6-3. BIAS CURRENT SETTING IS INCORRECT

This type of failure can be separated into the following categories:

1. An overload occurs at all settings.
2. An overload occurs at a specific current range.
3. An overload occurs when the bias current exceeds a threshold level.
4. The bias current value is incorrect. (Overload does not occur.)

Perform the following faulty board isolation procedures according to your instrument's failure symptoms.

1. Overload appears at all settings

If an overload occurs at all settings, perform the following steps in sequence until the problem is solved.

1. Perform the FET Controller check-out given in Paragraph 5-8-3.
2. Perform the FET Controller check-out given in Paragraph 5-9-3.
3. Perform the Current Control signal (I-CTRL1) check-out given in Paragraph 5-8-4.
4. Perform the Current Control signal (I-CTRL2) check-out given in Paragraph 5-9-4.
5. Perform the Power Supply Voltage check-out given in Paragraph 5-7-2.
6. Replace the A4 board.

2. Overload occurs at a specific current range

If an overload occurs at a specific current range, perform the following steps in sequence until the problem is solved. The HP 42841A has following three bias current ranges:

1 A Range:	0.00	A to	1.00 A
5 A Range:	1.1	A to	5.0 A
20 A Range:	5.1	A to	20.0 A

1. Check the power supply voltages on the A4 board (E1 to E5 in Figure 5-2), according to the voltage check-out procedures given in Paragraph 5-7-2.
2. Perform the range changing check-out procedure given in Paragraph 5-8-2.
3. Perform the range changing check-out procedure given in Paragraph 5-9-2.

3. Overload occurs when the bias current exceeds a threshold level

If an overload occurs when the bias current exceeds a threshold level, perform the following steps in sequence until the problem is solved.

1. Perform the current check given in paragraph 5-8-5.
2. Perform the current check given in paragraph 5-9-5.
3. Perform the DC bias current adjustment procedure given in paragraph 3-8.

4. Bias current value is incorrect (Overload does not occur)

If the bias current value is incorrect and an overload does not occur, perform the following steps in sequence until the problem is solved.

1. Perform the DC bias current adjustment procedure given in paragraph 3-8.
2. Perform the current control signal (I-CTRL2) check-out given in paragraph 5-9-4.
3. Replace the A3 board.

5-6-4. FIXTURE CONDITION ERRORS ALWAYS APPEARS

If the following fixture condition errors always appear, replace the **A4 board**. (The following errors should not occur when the Resistor Box is connected to the HP 42841A.)

- * Fixture circuit defective
- * Fixture over temperature
- * Fixture OPEN det. defective
- * Fixture cover open

5-6-5. IMPEDANCE MEASUREMENT IS INCORRECT

When an impedance measurement is incorrect, the LCR meter's performance must be examined first.

If the LCR meter is correct, use the performance test procedure to make sure that the HP 42841A is applying the correct bias current. If the bias current value is incorrect, go to Paragraph 5-6-3, Bias Current Setting.

If the bias current value is correct and the impedance measurement is incorrect, perform the power supply switching frequency check-out procedure given in paragraph 5-7-3. If still inoperative, replace the A2, A3, A1, and A4 boards in order.

5-7. POWER SUPPLY TROUBLESHOOTING INFORMATION

5-7-1. CIRCUIT DESCRIPTION

Figure 5-4 shows a block diagram of the power supply. The A1 board (power supply) includes all the primary circuit and the secondary circuit for the A2 board and the A4 board. The A4 board (digital control and power supply) includes the secondary circuit for the A3 board. The following describes the main functions of the power supply.

Shut down Circuit:

The shut down circuit turns the HP 42841A OFF under the following conditions:

1. An over current flows through the primary circuit.
2. The voltage between A1TP33 and A1TP35 is greater than 13.6 Vdc.
3. The power supply switching frequency is incorrect.
4. The rear panel cooling Fan stops.*
5. A shut down command is sent from the A4 digital control board.

*: The shut down circuit operates a few seconds after the fan stops.

Switching Frequency Control:

The power supply switching frequency is set to 54.6875 kHz and 62.5 kHz by a digital control signal. This function affects impedance measurement accuracy.

V-ADJ:

V-ADJ (A1R79) affects all the supply voltages.

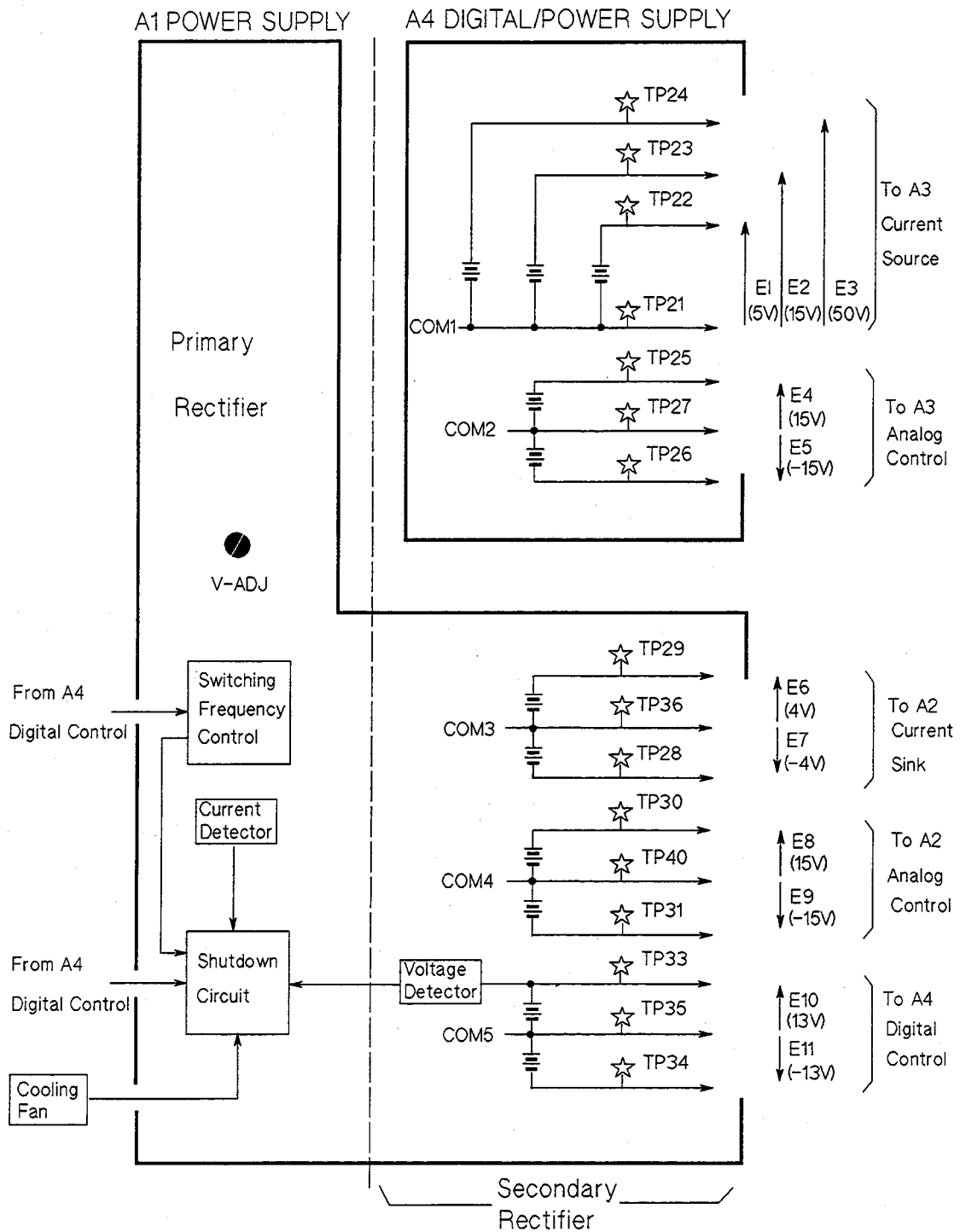


Figure 5-2. Power Supply Block Diagram

5-7-2. POWER SUPPLY VOLTAGE CHECK

The power Supply Voltage can be checked out as follows:

1. Cycle the HP 42841A's power switch OFF and ON to initialize it.
2. Use a DVM to make sure that voltages E1 through E11, shown in Figure 5-4, are within the limits listed in Table 5-1. The test point locations are shown on in Figures 5-4 and 5-5.

Table 5-1. Power Supply Voltages

Reference Number	Voltage Limit (Vdc)		Concerned Fuse	
	Minimum	Maximum	Designator	HP Part Number
E1	7.6	10.5	F14, F15	2110-0697
E2	22.0	27.0	F2, F3	2110-0741
E3	45.0	49.0	F4, F5	2110-0741
E4	15.0	17.5	F6	2110-0741
E5	-17.5	-15.0	F7	2110-0741
E6	3.7	4.5	F16, F17	2110-0697
E7	-7.0	-5.2	F8, F9	2110-0741
E8	14.2	15.2	F10	2110-0741
E9	-15.2	-14.2	F11	2110-0741
E10	12.2	13.4	F12	2110-0743
E11	-13.4	-12.2	F13	2110-0741

Troubleshooting:

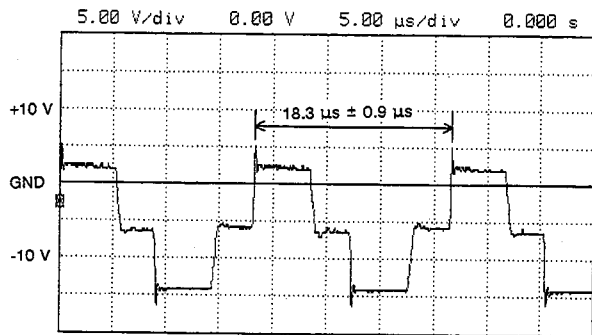
If a voltage value is out of limits, check the appropriate fuse and replace it if it is defective, refer to Table 5-1.

If still inoperative and voltages E6 to E11 are correct, replace the A4 board. Otherwise, replace the A1 board first. If the A1 board replacement does not solve the problem, replace the A4 board.

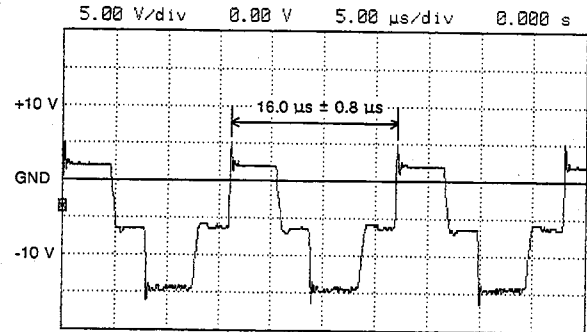
5-7-3. POWER SUPPLY SWITCHING FREQUENCY CHECK

The power supply switching frequency can be checked out as follows:

1. Run the HP 42841A Troubleshooting Program, refer to Paragraph 1-9.
2. Press the 'PW-Freq' softkey to start the "change power supply switching frequency" function.
3. Set the oscilloscope to observe the wave forms shown in Figure 5-3.
4. Connect the oscilloscope probe's ground lead to the HP 42841A's chassis and connect the probe's tip to A1TP32.
5. Make sure that the switching period for the 54.6875 kHz setting is $18.3 \mu\text{s} \pm 0.9 \mu\text{s}$ and that for the 62.5 kHz setting is $16.0 \mu\text{s} \pm 0.8 \mu\text{s}$.



54.6875 kHz



62.5 kHz

Figure 5-3. Power Supply Switching Frequency Check Wave Form

Troubleshooting:

If the wave forms are incorrect, replace the A1 board.

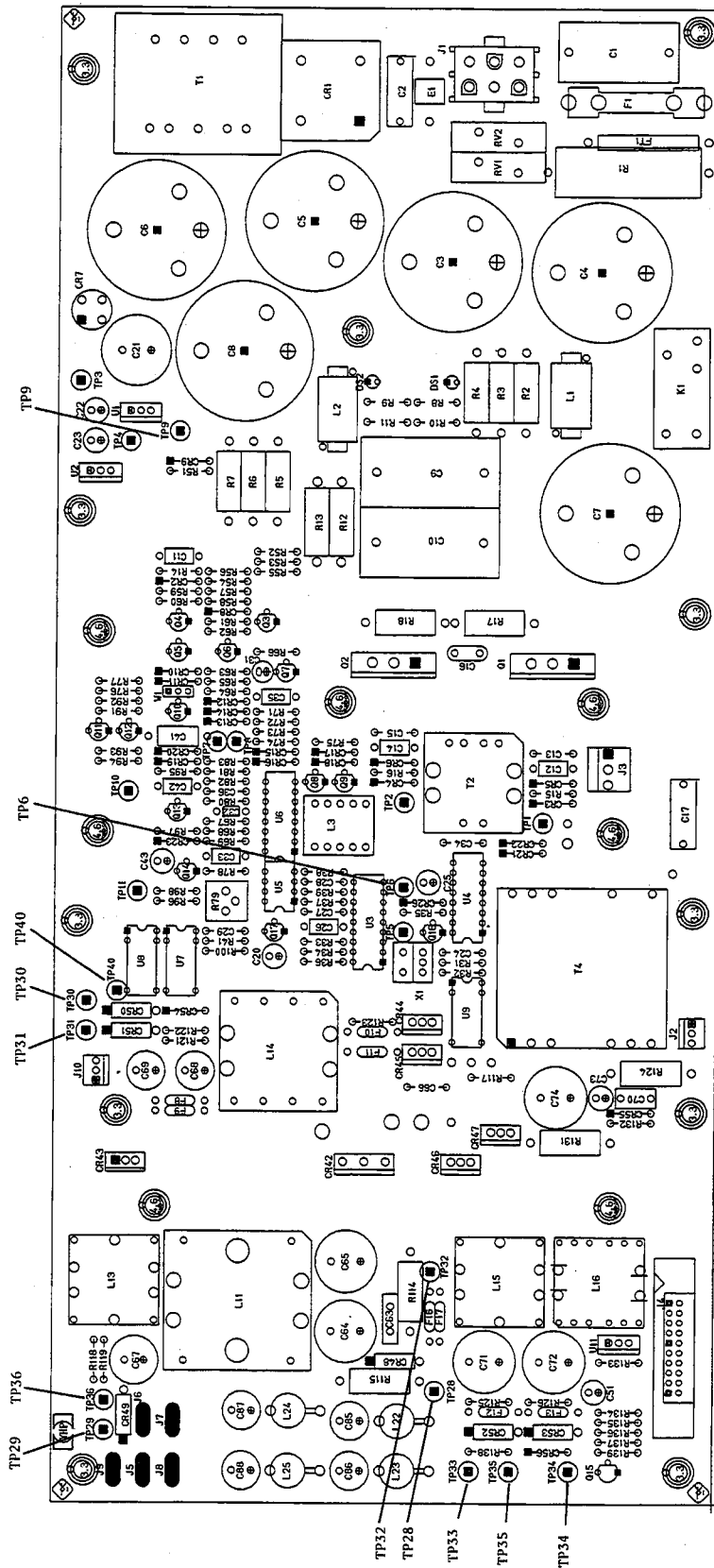


Figure 5-4. A1 Power Supply Component Locations

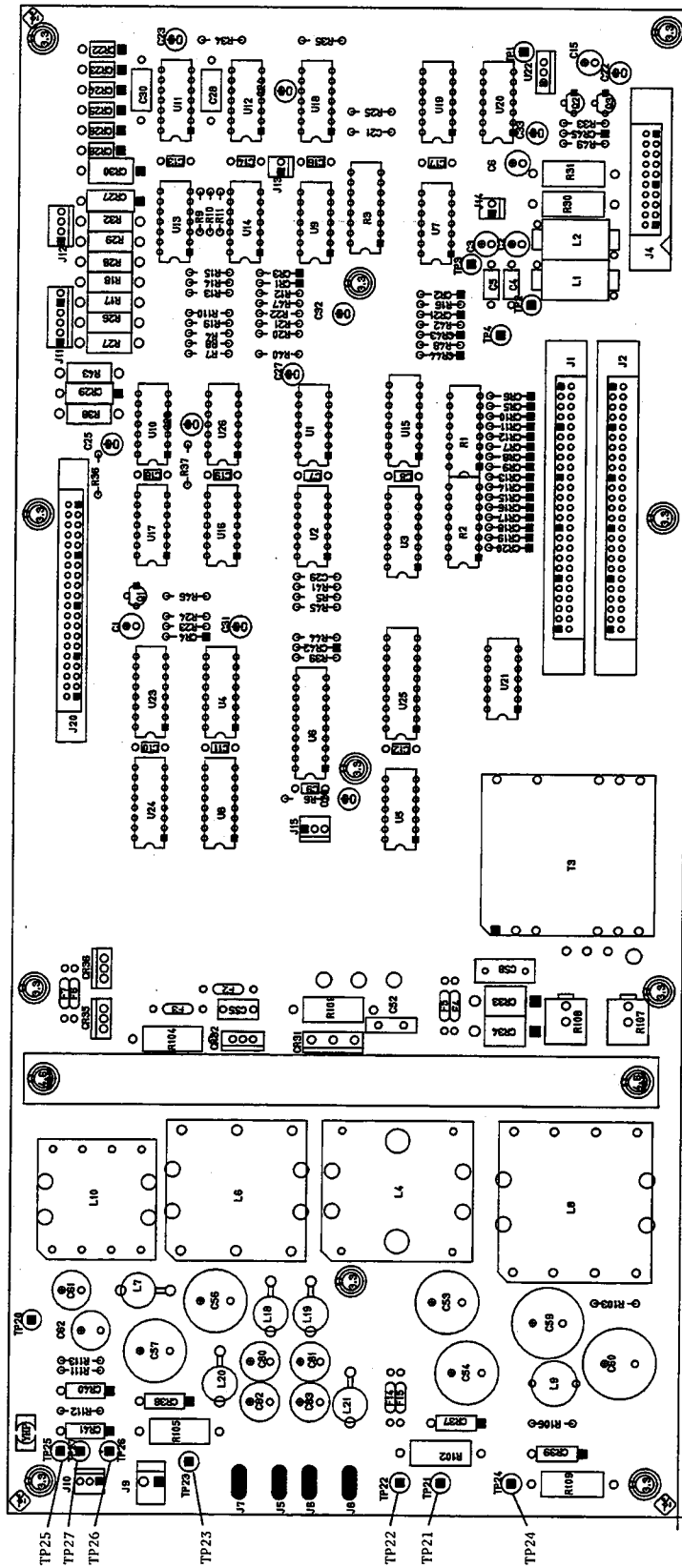


Figure 5-5. A4 Digital Control And Power Supply Component Locations

5-8. BIAS CURRENT SINK TROUBLESHOOTING INFORMATION

5-8-1. CIRCUIT DESCRIPTION

Figure 5-6 shows the Bias Current Sink Block Diagram. All of these circuits are included on the A2 board. (Q1 to Q4, and R1 to R4 are placed on the chassis.)

The bias current sink consists primarily of four identical current sink circuits. The bias Current is determined by analog control signal (I-CTRL1), and digital control signal (RANGE). The following describes the bias current sink's main functions.

Current Sink Circuit:

The current sink circuit consists of FETs (Q1 to Q4) and the FET control circuit. The current sink current is controlled so that the voltage dropped across the current sense resistor is the same as voltage "I-CTRL1", referenced to TP7 (COM L). In other words the current is proportional to voltage "I-CTRL1" and inversely proportional to the value of the sense resistor.

Active Inductor:

The active inductor is a current source, which senses the voltage across the test fixture's low terminal to ground and controls the current so that the voltage is held at zero. The active inductor affects the impedance measurement accuracy.

Overload Detector:

When the difference between the source current and the sink current exceeds a threshold level, the overload detector sends a signal to the A4 Digital Control board which then issues a command to terminate output of the bias current.

SINK ADJ:

SINK ADJ (A2R25) affects voltage I-CTRL1.

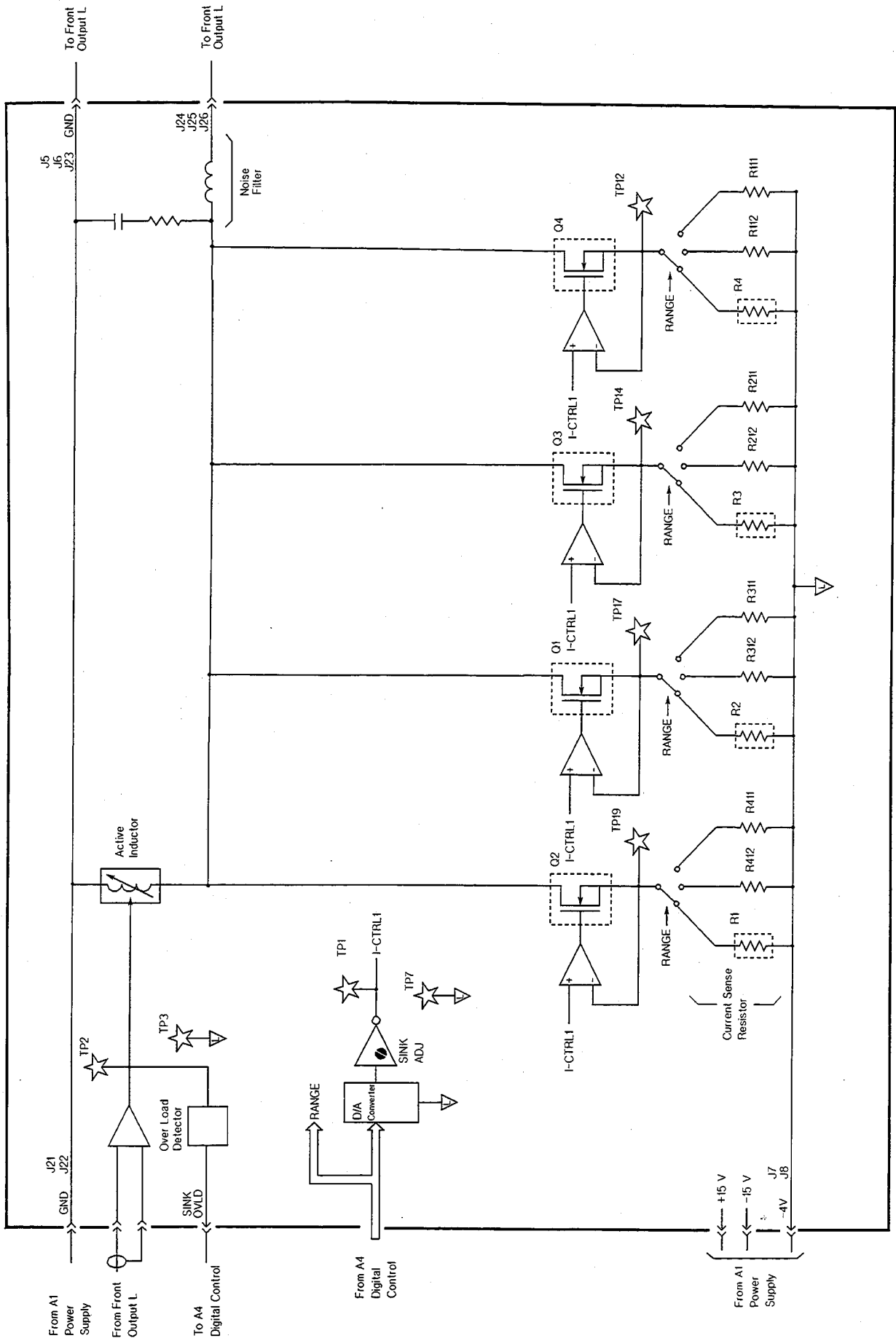


Figure 5-6. Bias Current Sink Block Diagram

5-8-2. RANGE CHANGING CHECK-OUT

The range changing function can be checked out as follows:

1. Run the HP 42841A Troubleshooting Program, refer to Paragraph 1-9.
2. Press the 'Range' softkey to start the "change bias current range" function.
3. Set the DVM to the DC voltage measurement function.
4. Connect the DVM's Lo input to the HP 42841A's chassis.
5. Use a DVM to make sure that voltage at A2TP12, A2TP14, A2TP17, and A2TP19 from the chassis are within the following limits for the 1 A, 5 A, 20 A, and OFF ranges.

Range	TP12, TP14, TP17, and TP19 Voltage (Vdc)	
	Minimum	Maximum
1 A	-7.0	-5.2
5 A	-7.0	-5.2
20 A	-7.0	-5.2
OFF	Floating	Floating

Troubleshooting:

If any, but not all of the test point voltages are incorrect, replace the A2 board.

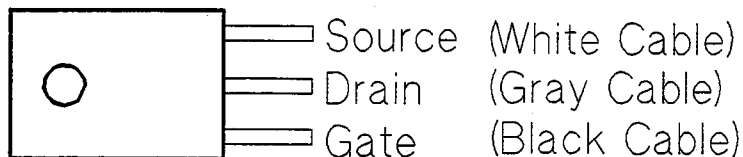
If all of the Test Point are incorrect, check supply voltages E6, E7, E8, and E9, shown in Figure 5-2, according to Paragraph 5-7-2, Power Supply Voltage Check. If still inoperative, replace the A4 board.

5-8-3. FET CONTROLLER CHECK

The Bias Current Source FET CONTROLLER can be checked out as follows:

1. Cycle the HP 42841A's power switch OFF and ON to initialize it.
2. Set the DVM to the DC voltage measurement function.

3. Measure the Gate-Source voltage by connecting the DVM's Lo input to Q1's Source, and connect the Hi input to Q1's Gate. The FET's pin assignments are as follows:



4. Make sure that the Gate-Source voltages of Q1 to Q4 are negative.

Troubleshooting:

If the FET's Gate-Source voltage is positive, replace the A2 board.

5-8-4. CURRENT CONTROL SIGNAL CHECK-OUT (I-CTRL1)

The Current Control Signal can be checked out as follows:

1. Run the HP 42841A Troubleshooting Program, refer to Paragraph 1-9.
2. Press the 'I-CNTRL' softkey to start the "change bias current control voltage" function.
3. Set the DVM to the DC voltage measurement function.
4. Connect the DVM's Lo input to A2TP7, and its Hi input to A2TP1.
5. Make sure that voltage "I-CTRL1" is within the following limits:

Setting Voltage (Vdc)	0	0.005	0.01	0.02	0.04	0.08	0.16	0.32	0.64
Minimum (Vdc)	-0.010	-0.015	-0.020	-0.031	-0.051	-0.093	-0.176	-0.341	-0.672
Maximum (Vdc)	-0.004	-0.005	0.000	-0.009	-0.029	-0.067	-0.144	-0.299	-0.608

Troubleshooting:

If voltage "I-CTRL1" is incorrect, check voltage "I-CTRL2", refer to Paragraph 5-9-4, Current Control Signal Check. If both "I-CTRL1" and "I-CTRL2" are incorrect, replace the A4 board. If only "I-CTRL1" is incorrect, replace the A2 board.

5-8-5. BIAS CURRENT CHECK

The bias currents across the four current sink circuits are checked out individually as follows:

1. Run the HP 42841A Troubleshooting Program, refer to Paragraph 1-9.
2. Press the 'Current' softkey to start the "change bias current" function.
3. Set the DVM to the DC voltage measurement function.
4. Set the HP 42841A bias current as follows. If an overload occurs when the bias current exceeds a threshold level, set the bias current equal to the threshold level.

1 A Range Check:	1.00 A
5 A Range Check:	5.0 A
20 A Range Check:	20.0 A

5. Use a DVM to make sure that the voltage drop across the sense resistor (V_{sense}) is within the range given by the following equation. (V_{sense} should be between 0.9 V and 1.1 V, when the bias current is set to 1.00 A, 5.0 A, or 20.0 A.) The following table lists the range select sense resistors according to the bias current range selected. The sense resistor locations are shown in Figure 5-7.

$$V_{sense} (V_{dc}) = \{I_{bias} (A_{dc}) \div 4 \times R_{sense} (\Omega)\} \pm 10\%$$

V_{sense} : Voltage drop across the sense resistor
 I_{bias} : Bias Current Setting
 R_{sense} : Sense Resistor Resistance

Bias Current (A)	Sense Resistor	
	Reference Designator	Resistance (Ω)
0.0 A to 1.00 A	R111, R211, R311, R411	4.0 Ω
1.1 A to 5.0 A	R112, R212, R312, R412	0.8 Ω
5.1 A to 20.0 A	R1, R2, R3, R4	0.2 Ω

Troubleshooting:

If some, but not all, of the V_{sense} values are incorrect, replace the FET concerned (Q1, Q2, Q3, or Q4). If still inoperative, replace the A2 board.

If all of the V_{sense} values are incorrect, check Current Control Signal (I-CNTRL1), refer to Paragraph 5-8-4. If still inoperative replace the A2 board.

5-8-6. ACTIVE INDUCTOR CHECK

The Active Inductor can be checked out as follows. If the active inductor is inoperative, impedance measurement will be affected.

1. Run the HP 42841A Troubleshooting Program, refer to Paragraph 1-9.
2. Press the **'Current'** softkey to start the "change bias current" function.
3. Set the DVM to the DC voltage measurement function.
4. Connect the DVM's Lo input to the Resistor Box Guard terminal, and connect its Hi input to the Resistor Box Lo terminal.
5. Make sure that the DVM reads less than 10 mV dc on the 0.00 A, 1.00 A, 1.1 A, 5.0 A, 5.1 A, and 20 A bias current settings.

Troubleshooting:

If the voltage across the Resistor Box guard and Lo terminals is greater than 10 mVdc, replace the A2 board.

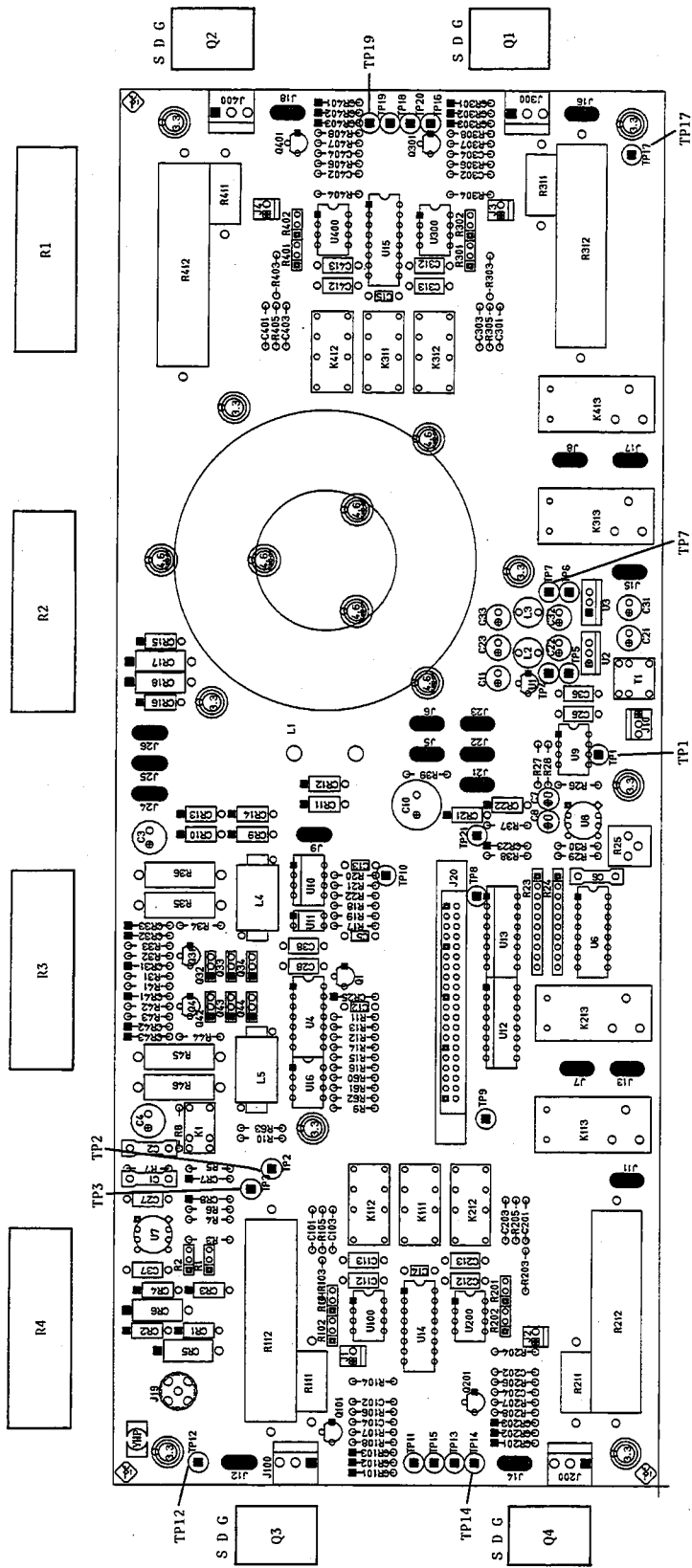


Figure 5-7. A2 Bias Current Sink Component Locations

NOTES

5-9. BIAS CURRENT SOURCE TROUBLESHOOTING INFORMATION

5-9-1. CIRCUIT DESCRIPTION

Figure 5-8 shows a block diagram of the Bias Current Source. All of the circuits in the block diagram are included on the A3 board. (Q5 to Q8 and R5 to R8 are placed on the chassis.)

The Bias current source consists mainly of four identical current source circuits. The bias current source operates using 5 Vdc, 15 Vdc, and 50 Vdc. 5 Vdc is used for the 20 A range. 15 Vdc is used for the 5 A range. 50 Vdc is used for the 1 A range. The bias current is determined by analog control signal (I-CTRL2) and digital control signal (RANGE). The following describes the main functions of the bias current source.

Current Source Circuit:

The current source circuit consists of FETs Q5 to Q8, and the FET control circuit. The current source circuit controls the output current so that the voltage drop across the current sense resistor is the same as voltage "I-CTRL2" referenced to TP2 (COM H). In other words the current is proportional to voltage "I-CTRL2" and inversely proportional to the sense resistor's resistance.

Overload Detector:

When the Drain-Source voltage of Q6 is lower than a threshold level, the overload detector signals the A4 Digital Control board to issue a command to terminate the bias current.

SOURCE ADJ:

SOURCE ADJ (A3R65) affects voltage I-CTRL2.

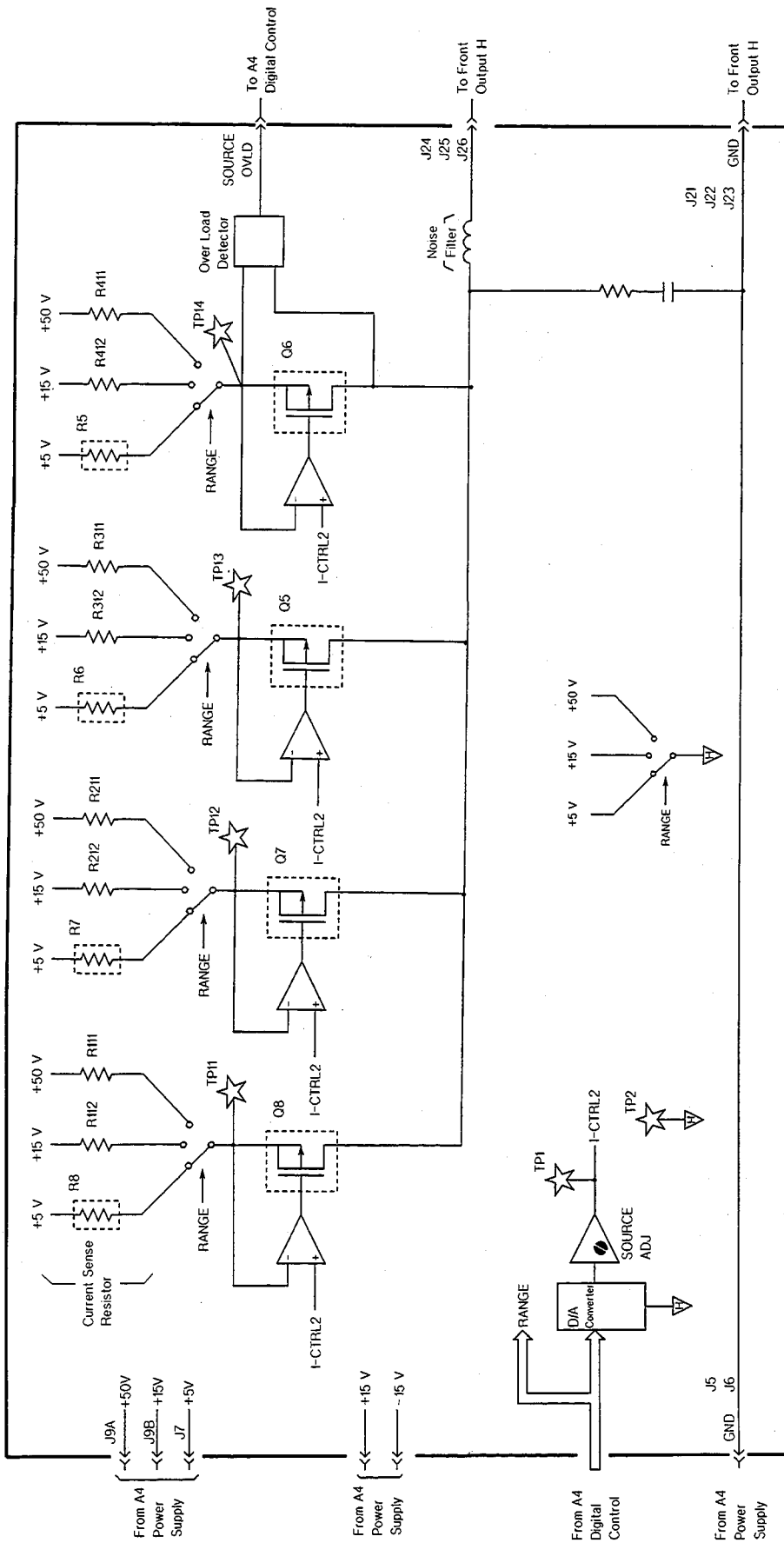


Figure 5-8. Bias Current Source Block Diagram

5-9-2. RANGE CHANGING CHECK

The range changing function is checked out as follows:

1. Run the HP 42841A Troubleshooting Program, refer to Paragraph 1-9.
2. Press the 'Range' softkey to start the "change bias current range" function.
3. Set the DVM to the DC voltage measurement function.
4. Connect the DVM's Lo input to the HP 42841A's chassis.
5. Use a DVM to make sure that the voltages at A3TP11, A3TP12, A3TP13, and A3TP14 are within the following limits for the 1 A, 5 A, 20 A, and OFF ranges.

Range	TP11, TP12, TP13, and TP14 Voltage (Vdc)	
	Minimum	Maximum
1 A	45.0	49.0
5 A	22.0	27.0
20 A	7.6	10.5
OFF	Floating	Floating

Troubleshooting:

If some but not all of the voltages at the Test Points are incorrect, replace the A3 board.

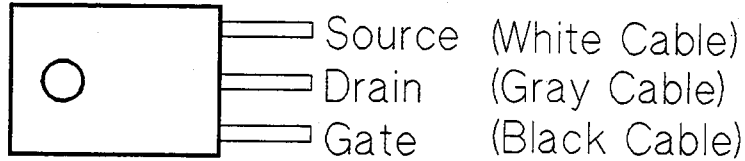
If all the voltages at the Test Points are incorrect, check supply voltages E1, E2, E3, E4, and E5 of Figure 5-2, according to the Power Supply Check-Out procedure given in Paragraph 5-7-2. If still inoperative, replace the A4 board.

5-8-3. FET CONTROLLER CHECK

The Bias Current Source FET CONTROLLER is checked out as follows:

1. Cycle the HP 42841A's power switch OFF and ON to initialize it.
2. Set the DVM to the DC voltage measurement function.

3. Measure Q5's Gate to Source voltage by connecting the DVM's Lo input to Q5's Source and connecting the Hi input to Q5's Gate. The FET's pin assignments are as follows:



4. Make sure that the Gate-Source voltage of Q5 to Q8 is positive.

Troubleshooting:

If the FET's Gate-Source voltage is negative, replace the A3 board.

5-9-4. CURRENT CONTROL SIGNAL CHECK (I-CTRL2)

The Current Control Signal is checked out as follows:

1. Start the HP 42841A Troubleshooting Program, refer to Paragraph 1-9.
2. Press the 'I-CNTRL' softkey to start the "change bias current control voltage" function.
3. Set the DVM to the DC voltage measurement function.
4. Connect the DVM's Lo input to A3TP2, and its Hi input to A3TP1.
5. Use a DVM to check that voltage "I-CTRL2" is within the following limits:

Setting Voltage (Vdc)	0	0.005	0.01	0.02	0.04	0.08	0.16	0.32	0.64
Minimum (Vdc)	0.000	0.004	0.009	0.018	0.038	0.077	0.155	0.311	0.623
Maximum (Vdc)	0.001	0.006	0.011	0.022	0.042	0.083	0.165	0.329	0.657

Troubleshooting:

If voltage "I-CTRL2" voltage is incorrect, check voltage "I-CTRL1", refer to Paragraph 5-8-4, Current Control Signal Check.

If both "I-CTRL2" and "I-CTRL1" are incorrect, replace the A4 board. If only "I-CTRL2" is incorrect, replace the A3 board.

5-9-5. BIAS CURRENT CHECK

The Bias Current across the four current source circuits, is checked individually as follows:

1. Run the HP 42841A Troubleshooting Program referring to Paragraph 1-9, Troubleshooting Program.
2. Press the 'Current' softkey to start the "change bias current" function.
3. Set the DVM to the DC voltage measurement function.
4. Set the HP 42841A bias current as follows. If an overload occurs when the bias current exceeds a threshold level, set the bias current equal to the threshold level.

1 A Range Check: 1.00 A
 5 A Range Check: 5.0 A
 20 A Range Check: 20.0 A

5. Use a DVM to check that the voltage drop across the sense resistor (V_{sense}) is within the range given by the following equation. (V_{sense} should be in between 0.9 V and 1.1 V, when the bias current is set to 1.00 A, 5.0 A, or 20.0 A.) The sense resistors which are selected according to the bias current range, are listed in the following table. The sense resistor locations are shown in Figure 5-9.

$$V_{sense} (V_{dc}) = \{I_{bias} (A_{dc}) \div 4 \times R_{sense} (\Omega)\} \pm 10\%$$

V_{sense} : Voltage drop across the sense resistor
 I_{bias} : Bias Current Setting
 R_{sense} : Sense Resistor Resistance

Table 5- . Sense Resistors vs Bias Current

Bias Current (A)	Sense Resistor	
	Reference Designator	Resistance (Ω)
0 A to 1.00 A	R111, R211, R311, R411	4.0 Ω
1.1 A to 5.0 A	R112, R212, R312, R412	0.8 Ω
5.1 A to 20.0 A	R1, R2, R3, R4	0.2 Ω

Troubleshooting:

If some, but not all of the V_{sense} values are incorrect, replace the FETs (Q5, Q6, Q7, or Q8) concerned. If still inoperative, replace the A3 board.

If all of the V_{sense} values are incorrect, check Current Control Signal (I-CNTRL2), refer to Paragraph 5-9-4. If still inoperative replace the A3 board.

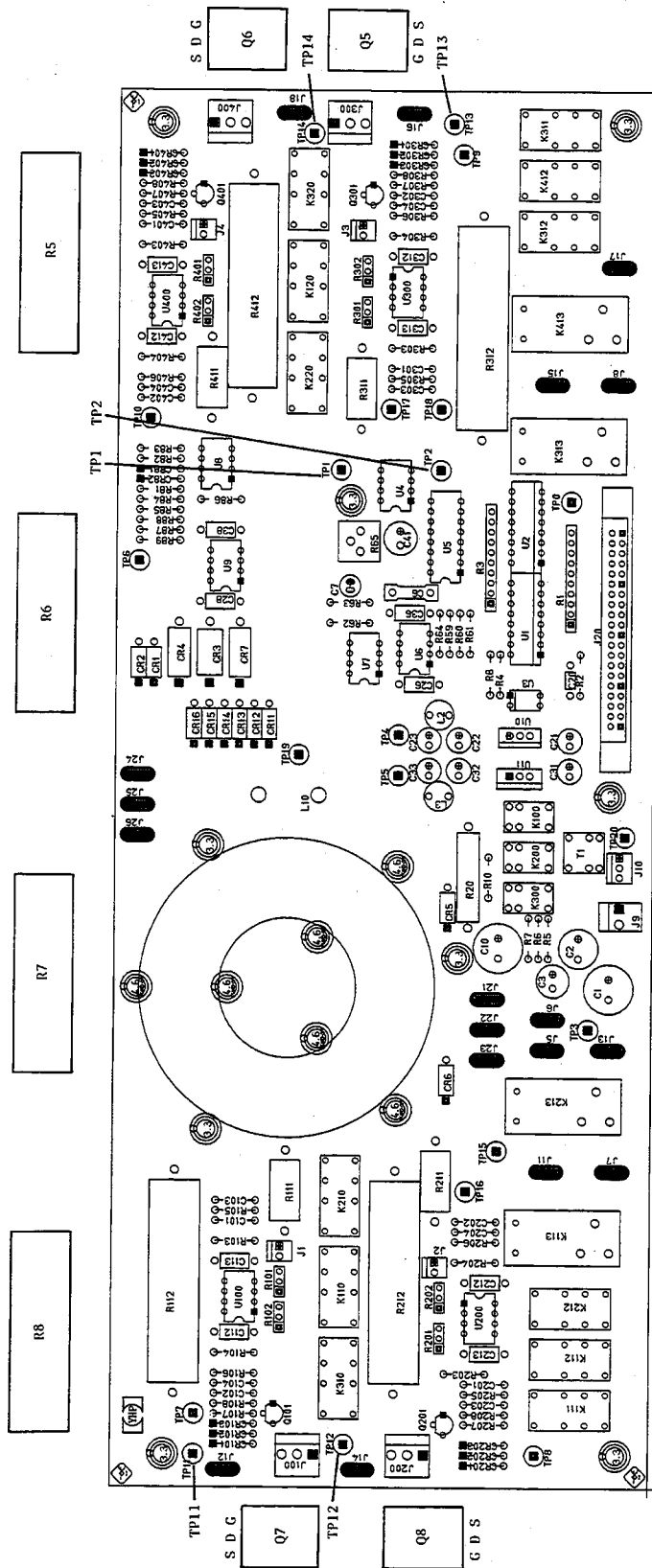


Figure 5-9. Bias Current Source Component Locations

5-10. DIGITAL SECTION TROUBLESHOOTING INFORMATION

Figure 5-10 shows a block diagram of the Digital Section. The HP 42841A's digital section consists of the Bias Current Control, Bias Off, and Shut Down functions.

Bias Current Control Function:

The A4 Digital Control Board controls the range switching relays, and the D/A converters which used to set the bias current level according to control signals from the LCR meter. The A4 board controls the A2 and the A3 board using the same control signals.

Bias Off Function:

For safety, the HP 42841A's bias current is **turned OFF** under the following conditions:

1. Bias Current Sink is overloaded.
2. Bias Current Source is overloaded.
3. Test Fixture cover is open.
4. Test Fixture is overheated.
5. Test Fixture protection circuit is defective.

Shut Down Function:

For safety the HP 42841A is shut down under the following conditions.

1. Nothing is connected to the front panel output.
2. HP 42841A is overheated.
3. A Power Supply Error occurs. (Refer to paragraph 5-8-1.)

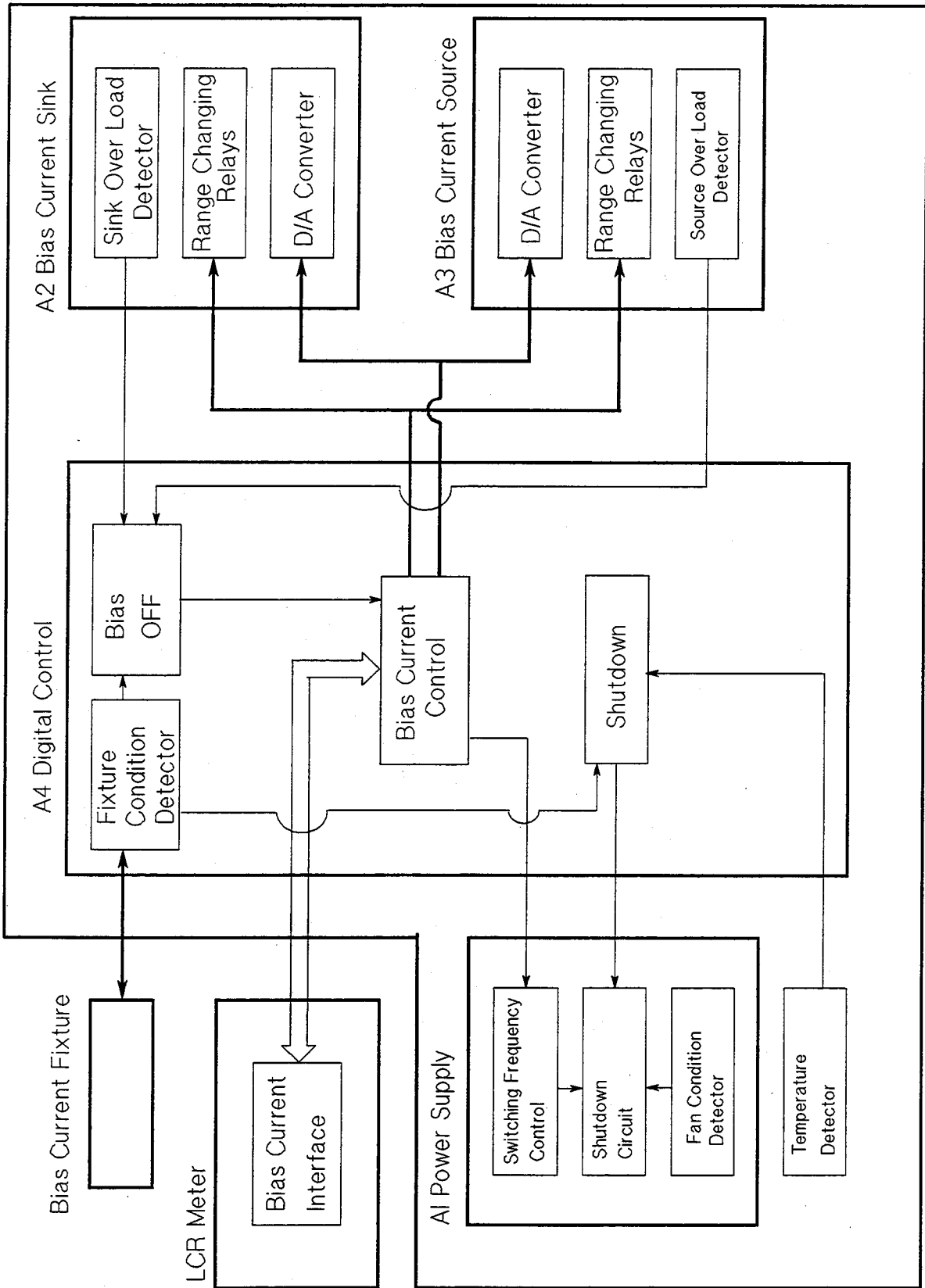


Figure 5-10. Digital Section Block Diagram

5-11. LED INDICATOR BOARD (A5) TROUBLESHOOTING INFORMATION

The A5 LED Indicator Board's schematic diagram is shown in Figure 5-11, the component locations are shown in Figure 5-12, and the replaceable parts are listed in Table 5-2.

The Yellow and Red LED are mounted on the Indicator Board. The yellow LED, Operation Indicator, lights when the HP 42841A is ON. The red LED, DC Bias Indicator, lights when the HP 42841A is applying a bias current.

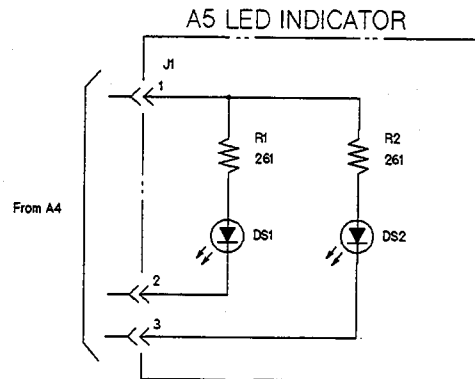


Figure 5-11. A5 LED Indicator Schematic Diagram

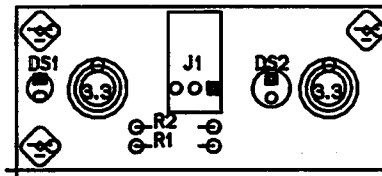


Figure 5-12. A5 LED Indicator Component Locations

Table 5-2. Replaceable Parts List

Reference Designator	Part Number	Qty	Description
DS1	1990-0487	1	LED-VSBL YEL
	5040-3328	1	INSULATOR
DS1	1990-0517	1	LED-VSBL RED
	5040-3322	1	INSULATOR
J1	1251-5427	1	CONNECTOR 3 PIN MALE
R1	0698-3132	2	RESISTOR 261 1% .125 W
R2	0698-3132		RESISTOR 261 1% .125 W

APPENDIX A

MANUAL CHANGES

A-1. INTRODUCTION

This appendix contains the information required to adapt this manual to earlier versions or configurations of the HP 42841A than the current printing date of this manual. The information in this manual applies directly to the HP 42841A Bias Current Source whose serial number prefix is listed on the title page of this manual.

A-2. MANUAL CHANGES

To adapt this manual to your HP 42841A, refer to Table A, and make all of the manual changes listed opposite your instrument's serial number.

Instruments manufactured after the printing of this manual may be different than those documented in this manual. Later instrument versions will be documented in a manual changes supplement that will accompany the manual shipped with that instrument. If your instrument serial number is not listed on the title page of this manual or in Table A, it may be documented in a **yellow MANUAL CHANGES** supplement.

For additional information on serial number coverage, refer to **SECTION 1**.

Table A. Manual Changes by Serial Number

**Serial Prefix
or Number**

Make Manual Changes

There are no earlier configurations than the printing date of this manual.

NOTES

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