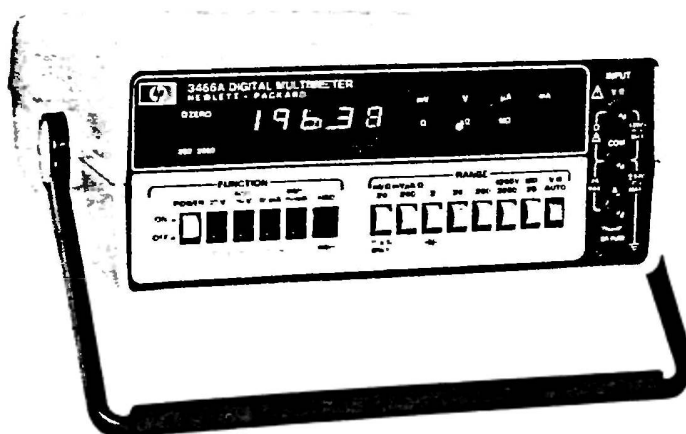


# OPERATING AND SERVICE MANUAL

## DIGITAL MULTIMETER 3466A



 **HEWLETT  
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# OPERATING AND SERVICE MANUAL 3466A DIGITAL MULTIMETER

Serial Numbers 1716A18811 and Above

## IMPORTANT

If the serial number of your instrument is lower than shown on this Title Page, the manual contains information that do not apply to your instrument. Refer to Section VII of this manual for backdating information to adapt this manual to earlier instruments.

## WARNING

*To help minimize the possibility of electrical fire or shock hazards,  
do not expose this instrument to rain or excess moisture.*

Manual Part No. 03466-90003

Microfiche Part No. 03466-90053

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# SECTION I

## GENERAL INFORMATION

### 1-1. INTRODUCTION

1-2. This section contains general information concerning the -hp- Model 3466A Multimeter. Included is an instrument description, specifications, information about instrument and manual identification, option and accessory information, and safety considerations.

### 1-3. DESCRIPTION

1-4. The -hp- Model 3466A is a 4½ digit, seven function, autoranging multimeter. The functions are AC or DC Voltage, AC or DC Current, AC + DC Voltage, AC + DC Current and Ohms. All seven functions have manually selectable ranges. AC Voltage, DC Voltage, AC + DC Voltage and Ohms functions may also be automatically ranged by pressing the AUTO pushbutton. Throughout the remainder of this manual, the -hp- Model 3466A Multimeter will be referred to as Multimeter.

### 1-5. SPECIFICATIONS

1-6. Specifications for the Multimeter are listed in Table 1-1. These specifications are the performance standards or limits to which the Multimeter can be tested. Any changes in these specifications due to manufacturing changes, design or traceability to the National Bureau of Standards will be covered by an errata or change sheet. These specifications supersede any prior published specifications. Supplemental information in Table 1-2 is provided to describe general operating characteristics.

### 1-7. INSTRUMENT AND MANUAL IDENTIFICATION

1-8. Hewlett-Packard uses a two-section serial number. The first section (prefix) identifies a series of instruments. The last section (suffix) identifies a particular instrument within the series. A letter between the prefix and the suffix identifies the country in which the instrument was manufactured. The manual is kept up-to-date at all times by means of a change sheet which is supplied with the manual. If the serial number of your instrument differs from the one on the title page of this manual, refer to

the change sheet supplied with the manual. All correspondence with Hewlett-Packard should include the complete serial number.

### 1-9. OPTIONS

1-10. Table 1-3 lists the option available for the Multimeter.

1-11. The option label affixed to the rear of the Multimeter identifies the line voltage for which the instrument is wired. This operating voltage can be changed by following the procedure outlined in Section V (Power Requirement Modification Instructions). If the line voltage option is changed, the option label should also be corrected to reflect the new configuration.

#### NOTE

*Option 001 Multimeters can be converted to standard instruments by adding the battery and charger circuitry. The Battery/Charger kit to convert the instruments can be ordered under Part Number 03438-80001.*

### 1-12. ACCESSORIES

1-13. The accessories available for use with the Multimeter are listed in Table 1-4.

### 1-14. SAFETY CONSIDERATIONS



1-15. This Operating and Service Manual contains cautions and warnings alerting the user to hazardous operating and maintenance conditions. This information is flagged by a caution or warning heading and/or the symbol . The  symbol appears on the front panel and is an international symbol meaning "refer to the Operating and Service Manual". This symbol flags important operating instruction located in Section III. To ensure the safety of the operating and maintenance personnel and retain the operating condition of the instrument, these instructions must be followed.

Table 1-1. Specifications

**DC VOLTMETER**

Accuracy: (for 1 year at 23°C ± 5°C):

Range	Max. Display	Accuracy
20mV	± 19.999mV	± (.05% of reading + 3 digits)
200mV	± 199.99mV	± (.04% of reading + 2 digits)
2V	± 1.9999V	± (.03% of reading + 1 digit)
20V	± 19.999V	± (.03% of reading + 1 digit)
200V	± 199.99V	± (.03% of reading + 1 digit)
1200V	± 1199.9V	< 700V, ± (.035% of reading + 1 digit)
1200V	± 1199.9V	> 700V, ± (.055% of reading + 1 digit)

Maximum Input: ± 1200V (dc + peak ac).

Ranging: Automatic or Manual.

Input Type: Floating (500V max. from COM to earth ground).

Input Resistance: 10MΩ ± 0.5% (all ranges).

Sensitivity: 1μV on the 20mV range.

Polarity: Automatically sensed and displayed.

Response Time: &lt; 0.7 seconds to within 1 digit of final value on one range. Add 0.8 seconds for each range change.

Temperature Coefficient: ± (.003% of reading + 0.15 Digits)/°C (0°C to 18°C and 28°C to 55°C).

Normal Mode Rejection: &gt; 54dB at 50/60Hz ± 0.1%.

Effective Common-Mode Rejection: ≥ 140dB at dc; 120dB at 50/60Hz ± .1% (1kΩ imbalance).

**AC VOLTMETER (TRUE RMS)**

AC Converter: True RMS

Range	Max. Display
200mV	199.99mV
2V	1.999V
20V	19.999V
200V	199.99V
1200V	1199.9V

Accuracy: (for 1 year at 23°C ± 5°C and at &gt; 1900 digits):

Frequency	Accuracy (all ranges)
20 Hz — 30 Hz	± (2% of reading + 50 digits)
30 Hz — 50 Hz	± (1% of reading + 30 digits)
50 Hz — 20kHz	± (0.3% of reading + 20 digits)
20kHz — 50kHz	± 1% of reading + 40 digits)
50kHz — 100kHz	± (2% of reading + 150 digits)

Maximum Input: 600Vdc or 1700 (dc + peak ac), 10<sup>7</sup>V Hz.

Ranging: Automatic or Manual.

Input Type: Floating (500V max. from COM to earth ground).

Input Impedance: Resistance: 2M ohms ± 1.5%  
Shunt Capacitance: < 75pF

Sensitivity: 10μV on the 200mV range.

Response time: &lt; 4.5 seconds to within 4 digits of final value on one range. Add 1.2 seconds for each range change.

Temperature Coefficient: (0°C to 18°C and 28°C to 55°C):

Frequency	Temperature Coefficient (all ranges)
20Hz to 30Hz and 50kHz to 100kHz	± (.05% of reading + 15 digits)/°C
30Hz to 50Hz and 20kHz to 50kHz	± (.05% of reading + 2 digits)/°C
50Hz to 20kHz	± (.03% of reading + .5 digits)/°C

Maximum Crest Factor: 4 to 1

**DC + AC VOLTMETER (TRUE RMS)**

Range	Max. Display
200mV	199.99mV
2V	1.9999V
20V	19.999V
200V	199.99V
1200V	1199.9V

Accuracy: (for 1 year at 23°C ± 5°C and at &gt; 1900 digits):

DC + 20 Hz to 50kHz	± (1% of reading + 80 digits)
DC + 50kHz to 100kHz	± (2% of reading + 200 digits)

Maximum Input: 1200Vdc or 1700V (dc + peak ac), 10<sup>7</sup>VHz

Ranging: Automatic or Manual.

Input Type: Floating (500V max. from COM to earth ground).

Input Impedance: Resistance: 2M ohms ± 1.5%  
Shunt Capacitance: < 75pF

Sensitivity: 10μV on the 200mV range.

Response Time: &lt; 4.5 seconds to within 4 digits of final value on one range. Add 1.2 seconds for each range change.

Temperature Coefficient: (0°C to 18°C and 28°C to 55°C):

Frequency	Temperature Coefficient *For all ranges except 200mV
DC + (50Hz to 20kHz)	± (.03% of reading + 6 digits)/°C
DC + (30Hz to 50Hz and 20kHz to 50kHz)	± (.05% of reading + 6 digits)/°C
DC + (20Hz to 30Hz and 50kHz to 100kHz)	± (.05% of reading + 10 digits)/°C

\*Add 5 digits/°C for the 200mV range.



Table 1-1. Specifications (Cont'd)

**DC AMMETER**

Accuracy: (for 1 year at 23°C ± 5°C):

Range	Max. Display	Shunt Resistance	Accuracy
200μA	199.99μA	1000Ω	± (.07% of reading + 2 digits)
2mA	1.9999mA	100Ω	± (.07% of reading + 2 digits)
20mA	19.999mA	10Ω	± (.07% of reading + 2 digits)
200mA	199.99mA	1Ω	± (.15% of reading + 2 digits)
2000mA	1999.9mA	0.1Ω	± (.5% of reading + 2 digits)

Maximum Input: ± 2 Amps from ≤250V Source.

Ranging: Manual only.

Input Type: Floating (500V max. from COM to earth ground).

Sensitivity: 10nA on the 200μA range.

Polarity: Automatically sensed and displayed.

Temperature Coefficient: (0°C to 18°C and 28°C to 55°C):

Range	Temperature Coefficient
200μA thru 20mA	± (.004% of reading + .15 digits)/°C
200mA thru 2000mA	± (.01% of reading + .15 digits)/°C

Voltage Burden:

Range	Max. Burden at Full Scale
200μA thru 20mA	<220mV
200mA	<240mV
2000mA	<600mV

**AC AMMETER (TRUE RMS)**

Range	Max. Display
200μA	199.99μA
2mA	1.9999mA
20mA	19.999mA
200mA	199.99mA
2000mA	1999.9mA

Sinewave Accuracy: (for 1 year at 23°C ± 5°C and at &gt; 1900 digits):

Range	Frequency	Accuracy
200μA thru 200mA	20Hz to 30 Hz	± (2% of reading + 50 digits)
	30Hz to 10kHz	± (1.9% of reading + 35 digits)
2000mA	20Hz to 30 Hz	± (2% of reading + 50 digits)
	30Hz to 10kHz	± (1.2% of reading + 20 digits)

Minimum Display: 1900 digits.

Maximum Input: 2 Amps rms from ≤250V rms source.

Ranging: Manual only.

Input Type: Floating (500V max. from COM to earth ground).

Input Protection: 2A, 250V Fuse.

Sensitivity: 10nA on the 200μA range.

Temperature Coefficient: (0°C to 18°C and 28°C to 55°C):

Range	Temperature Coefficient
200μA thru 200mA	± (.03% of reading + .5 digits)/°C
2000mA	± (.04% of reading + .5 digits)/°C

Maximum Crest Factor: 4 to 1

Voltage Burden:

Range	Max. Burden at Full Scale
200μA thru 20mA	<220mV rms
200mA	<240mV rms
2000mA	<600mV rms

**DC + AC AMMETER (TRUE RMS)**

Range	Max. Display
200μA	199.99μA
2mA	1.9999mA
20mA	19.999mA
200mA	199.99mA
2000mA	1999.9mA

Accuracy: (for 1 year at 23°C ± 5°C)

Range	Frequency	Accuracy
200μA thru 2000mA	DC + 20Hz to 10kHz	± (1.5% of reading + 80 digits)

Minimum Display: 1900 digits.

Maximum Input: 2 Amps rms from ≤250V rms source.

Ranging: Manual only.

Input Type: Floating (500V max. from COM to earth ground).

Input Protection: 2A, 250V Fuse.

Sensitivity: 10nA on the 200μA range.

Response Time: &lt;4.5 seconds to within 4 digits of final value.

Temperature Coefficient: ± .03% of reading + 20 digits/°C (0°C to 18°C and 28°C to 55°C):

Maximum Crest Factor: 4 to 1

Table 1-1. Specifications (Cont'd)

## Voltage Burden:

Range	Max. Burden at Full Scale
200 $\mu$ A thru 20mA	<220mV rms
200mA	<240mV rms
2000mA	<600mV rms

Sensitivity: 1m $\Omega$  on the 20 $\Omega$  range.

Output Voltage: <5 volts dc.

Overload Protection: 350V (dc + peak ac).

Temperature Coefficient: (0°C to 18°C and 28°C to 55°C):

Range	Temperature Coefficient
20 $\Omega$ thru 2M $\Omega$	$\pm (.002\%$ of reading + .05 digits)/°C
20M $\Omega$	$\pm (.01\%$ of reading + .1 digits)/°C


## OHMMETER


Accuracy: (for 1 year at 23°C  $\pm$  5°C):

Range	Max. Display	Voltage at 10000 Digits	Output Current	Accuracy
20 $\Omega$	19.999 $\Omega$	5mV	5mA	$\pm 1.08\%$ of reading + 2 digits)
200 $\Omega$	199.99 $\Omega$	500mV	5mA	$\pm 1.08\%$ of reading + 2 digits)
2k $\Omega$	1.9999 $\Omega$	1V	1mA	$\pm 1.03\%$ of reading + 1 digit)
20k $\Omega$	19.999k $\Omega$	1V	100 $\mu$ A	$\pm 1.03\%$ of reading + 1 digit)
200k $\Omega$	199.99k $\Omega$	1V	10 $\mu$ A	$\pm 1.03\%$ of reading + 1 digit)
2M $\Omega$	1999.9k $\Omega$	1V	1 $\mu$ A	$\pm 1.04\%$ of reading + 1 digit)
20M $\Omega$	19.999M $\Omega$	1V	100nA	$\pm 1.15\%$ of reading + 1 digit)

Response Time: <1.1 seconds to within 1 digit of final value on one range. Add 0.8 seconds for each range change.

## DIODE TEST

Function:  (k $\Omega$ ).

Range:  (2k $\Omega$ ).

Test Current: 1mA  $\pm$  1.5%.

Maximum Measureable Voltage Drop: 1.9999 volts.

Overload Protection: 350V (dc 2 peak ac).

Ranging: Automatic or Manual.

Input Configuration: 2 wire with lead zero (700m $\Omega$  adjustment range on the 20 $\Omega$  and 200 ranges only).

Table 1-2. General Information

<b>GENERAL</b>		<b>Power:</b> AC line; 48 – 440Hz	86 – 106V Opt. 100
			104 – 127V Opt. 115
			190 – 233V Opt. 210
			208 – 250V Opt. 230
<b>Display:</b> 7 segment RED 0.3 inch high LED's. Function and range annunciation.		<b>Battery:</b> 5 hours minimum continuous operation. Recharge Time: 16 hours operating 12 hours non-operating. 1.5 hour recharge provides 3 hours of continuous use.	
<b>Reading Rate:</b> 2.4 - 4.7/sec. depending on input level.		<b>Maximum Power Dissipation:</b> 9 watts — with battery charger. 4 watts — AC only.	
<b>A-D conversion:</b> Dual slope.		<b>Configuration:</b> 3466A Std, Streamlined portable case with handle, ac line power. Rechargeable batteries, and recharger included.	
<b>Integration Time:</b> 100 msec.		3466A Option 001, Streamlined portable case, as ac line power only.	
<b>Ranging:</b> Automatic or manual in acV, dcV, acV + dcV and Ohms. Manual only in acI, dcI and acI + dcI.		<b>Dimensions:</b> 3466A: 23.81 cm (9 3/8") wide x 9.84 cm (3 7/8") high x 27.62 cm (10 7/8") long.	
<b>Storage Temperature:</b> (–55 to +75)°C; (–55 to 65)°C with batteries.		<b>Weight:</b> 3466A: 2.77 kg (6 lbs 2 oz.) 3466A Option 001: 1.98 kg (4 lbs 6 oz.)	
<b>Operating Temperature:</b> (0 to 55)°C.			
<b>Humidity:</b> 0–95% RH at 40°C.			

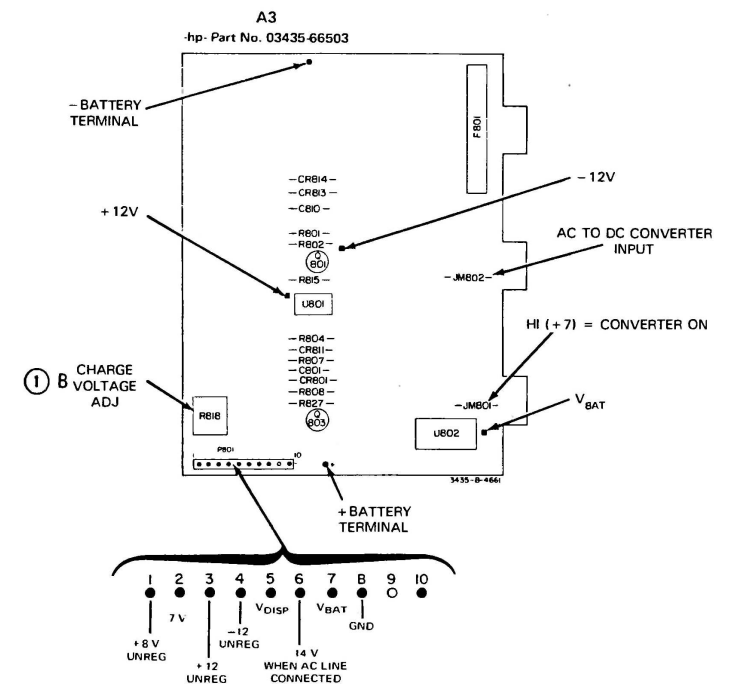
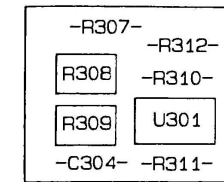
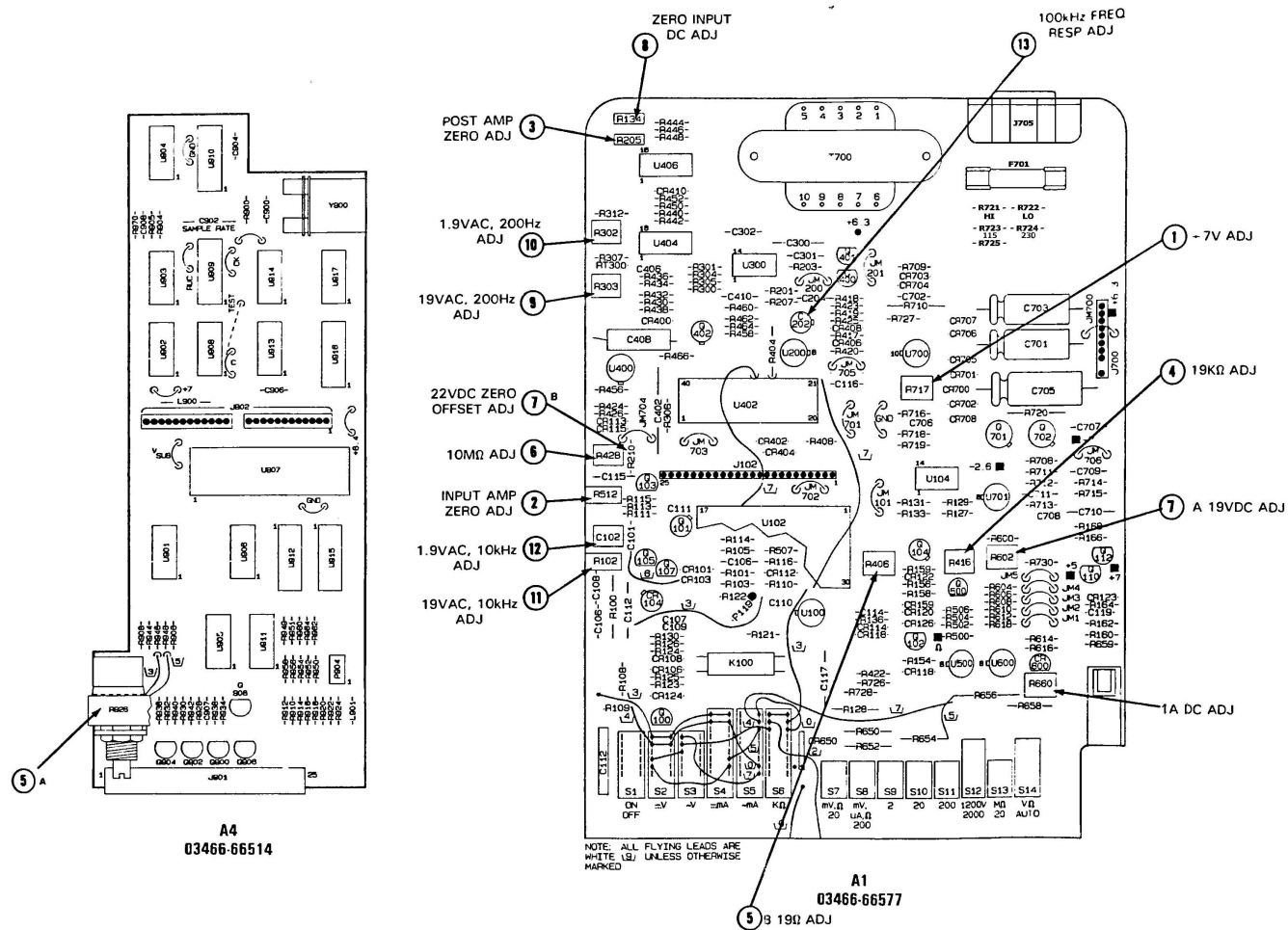


Figure 5-2. Adjustment Locator  
5-7/5-8

# SECTION VII BACKDATING

## 7-1. INTRODUCTION.

7-2. This section of the manual has backdating information which adapts this manual to instruments with serial numbers and serial number prefixes lower than the ones shown on the title page. If the component values and part numbers in the instrument are different than shown on the schematics and Table 6-3 (Replaceable Parts) and are NOT listed in this section, replace with the component value as presently shown on the schematics and listed in the table.

## 7-3. MANUAL CHANGES

7-4. Refer to Table 7-1 to adapt this manual to instruments with serial numbers and serial prefixes lower than shown on the title page. Make all the appropriate manual changes listed opposite your instrument's serial number. Perform these in the sequence shown in the table.

7-5. If your instrument serial number or prefix is not listed on this manual's title page or in Table 7-1, it may be documented in a yellow MANUAL CHANGES supplement.

**Table 7-1. Manual Changes**

Serial Prefix/Number	Make Manual Changes
1716A00450 and Below	17 thru 13,11,9 thru 6,4,2,1
1716A00525 and Below	17 thru 13,11,9 thru 2
1716A01582 thru 1716A00451	17 thru 13,11 thru 3
1716A01638 thru 1716A00451	17 thru 13,11 thru 4
1716A01830 and Below	17 thru 13,11 thru 5
1716A02330 and Below	17 thru 6
1716A02780 and Below	17 thru 7
1716A02980 and Below	17 thru 8
1716A03380 and Below	17 thru 9
1716A04380 thru 1716A01331	17 thru 10
1716A05530 and Below	17 thru 11
1716A11460 thru 1716A01831	17 thru 12
1716A12147 and Below	17 thru 13
1716A13915 and Below	17 thru 14
1716A14170 and Below	17 thru 15
1716A17005 and Below	17,16
1716A18810 and Below	17

## 7-6. Change #1 (Serial Numbers 1716A00450 and Below)

7-7. Table 6-3 (Replaceable Parts) and Table 6-4 (Miscellaneous Parts) Changes. Change the following in the tables.

Ref. Des.	-hp- Part Number	C D	Description
A4	03466-66504 03466-00601	1 1	PC Board Assembly: Logic PC Shield (Top)

The 03466-00603 shield must be used with the 03466-66504 board; the shield presently listed in Tables 6-3 and 6-4 will not fit.

## 7-8. Change #2 (Serial Numbers 1716A00525 and Below)

7-9. Table 6-3 (Replaceable Parts) Changes. Do the changes shown in Table 7-2.

**Table 7-2. Changes in Table 6-3 (Change #2)**

Ref. Des.	-hp- Part Number	C D	Description
A1C115	0180-0374	3	Change to 10 $\mu$ F 20V Capacitor
A1CR113	1901-0040	1	Delete Diode
A1CR115	1901-0040	1	Delete Diode
A1Q105	1855-0270	0	Delete JFET
A1Q107	1855-0270	0	Delete JFET
A1Q106	1855-0308	5	Add Dual JFET DN 324
A1R111	0698-3136	8	Change to 17.8k 1% Resistor
A1R113	0757-0472	5	Change to 200k 1% Resistor
A1R118*	0698-0077	0	Delete 93.1k 1% Resistor
A1R120*	0698-0077	0	Delete 93.1k 1% Resistor
A1R159	0698-8768	2	Delete 100 ohm 1/2W Resistor
A1R207	0757-0288	1	Delete 9.09k 1% Resistor
A1R305	0757-0471	4	Change to 182k 1% Resistor
A1R307	0698-3226	7	Delete 6.94k 1% Resistor
A1RT300	0839-0026	9	Delete Thermistor

7-10. Schematic 1 Changes. Delete R159 from the collector of Q104 and connect the collector to CR122, as shown in Figure 7-1.

7-11. Schematic 2 Changes. Do the following changes on the schematic.

- Change Q105 and Q107 to a dual FET Q106.
- Delete R118\* and R120\*.
- Change the current source (Q103) circuitry in the input amplifier as shown in Figure 7-1.

7-12. Schematic 3 Changes. Do the following changes on the schematic.

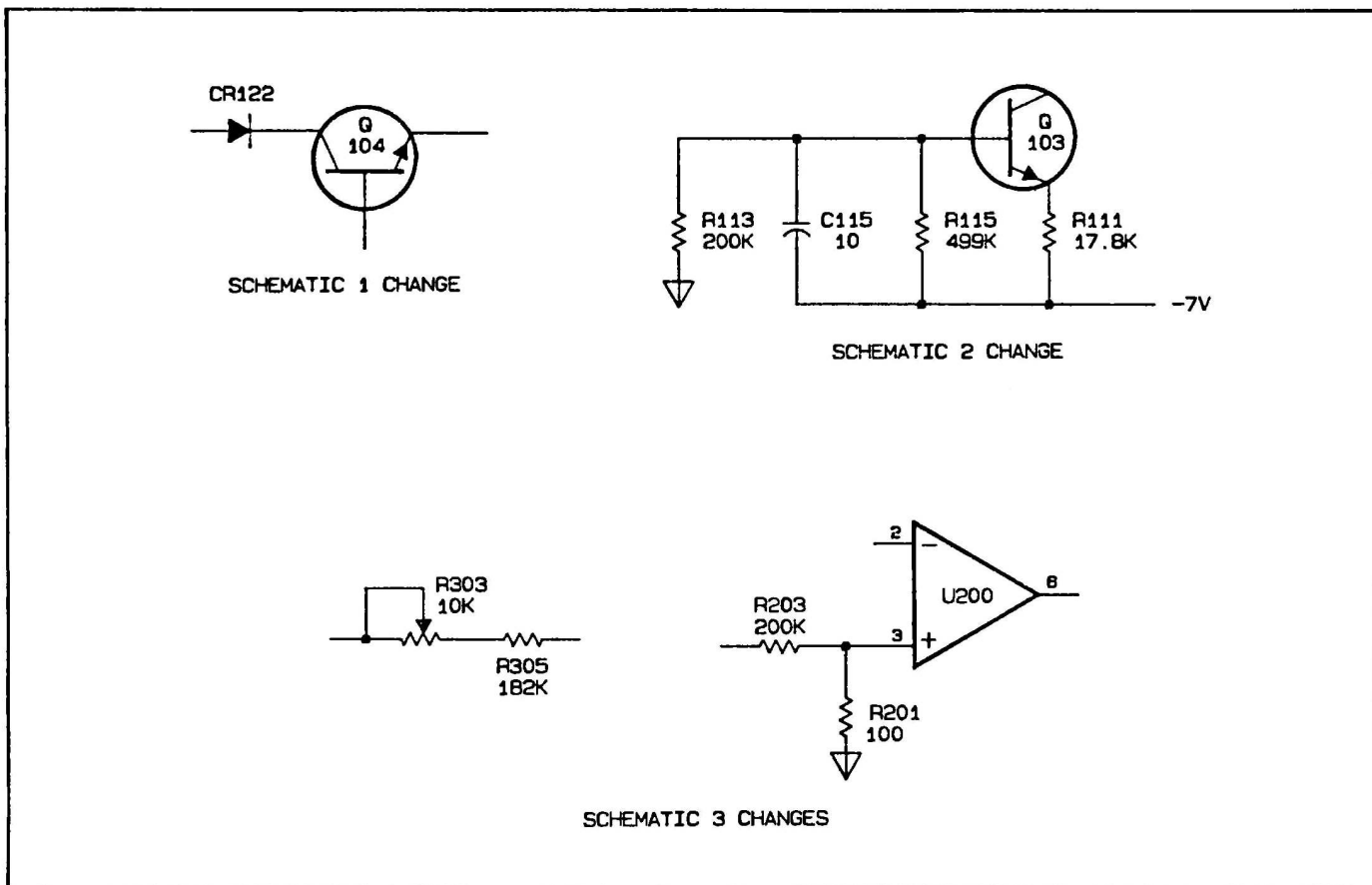


Figure 7-1. Schematics 1, 2, and 3 Changes (Change #2)

a. Delete RT300 and R307, connected to potentiometer R303, and connect R303 to R305 (see Figure 7-1). Also change the value of R305 to 182k.

b. Delete R207 from the + input of U200, as shown in Figure 7-1.

**7-13. Component Locator.** Use component locator shown in Figure 7-2.

**7-14. Change #3 (Serial Numbers 1716A01580 to 1716A00451)**

**7-15. Table 6-3 (Replaceable Parts) Changes.** Delete A4C908 and A4R970 from the table.

**7-16. Schematic 4 Changes.** Do the following changes:

#### NOTE

*Change #3 may not be necessary in some instruments since they have been changed to the circuitry presently shown on the schematic.*

a. Change the supply voltage on R944, R946, and R948 from +7V to  $V_{DISP}$ .

b. Change the U904 circuitry on the schematic as shown in Figure 7-3.

**7-17. Change #4 (Serial Numbers 1716A01638 to 1716A00451)**

**7-18. Table 6-3 (Replaceable Parts) and Table 6-4 (Miscellaneous Parts) Changes.** Change the part number of the shield on the A1 Assembly to 03466-00603 (CD is 3).

**7-19. Change #5 (Serial Numbers 1716A01830 and Below)**

**7-20. Table 6-3 (Replaceable Parts) and Table 6-4 (Miscellaneous Parts) Changes.** Change the following in the tables.

Ref. Des.	-hp- Part Number	C D	Description
A1	03466-66501	8	PC Assembly: Mother
A2	03466-66502	9	PC Assembly: Display

**7-21. Change #6 (Serial Numbers 1716A02330 and Below)**

**7-22. Table 6-3 (Replaceable Parts) and Table 6-4 (Miscellaneous Parts) Changes.** Change the part number of the bottom shield (that sits on the bottom shell) to 03466-00602 (CD is 2). If the bottom shell is replaced, use the shield presently listed in Tables 6-3 and 6-4.

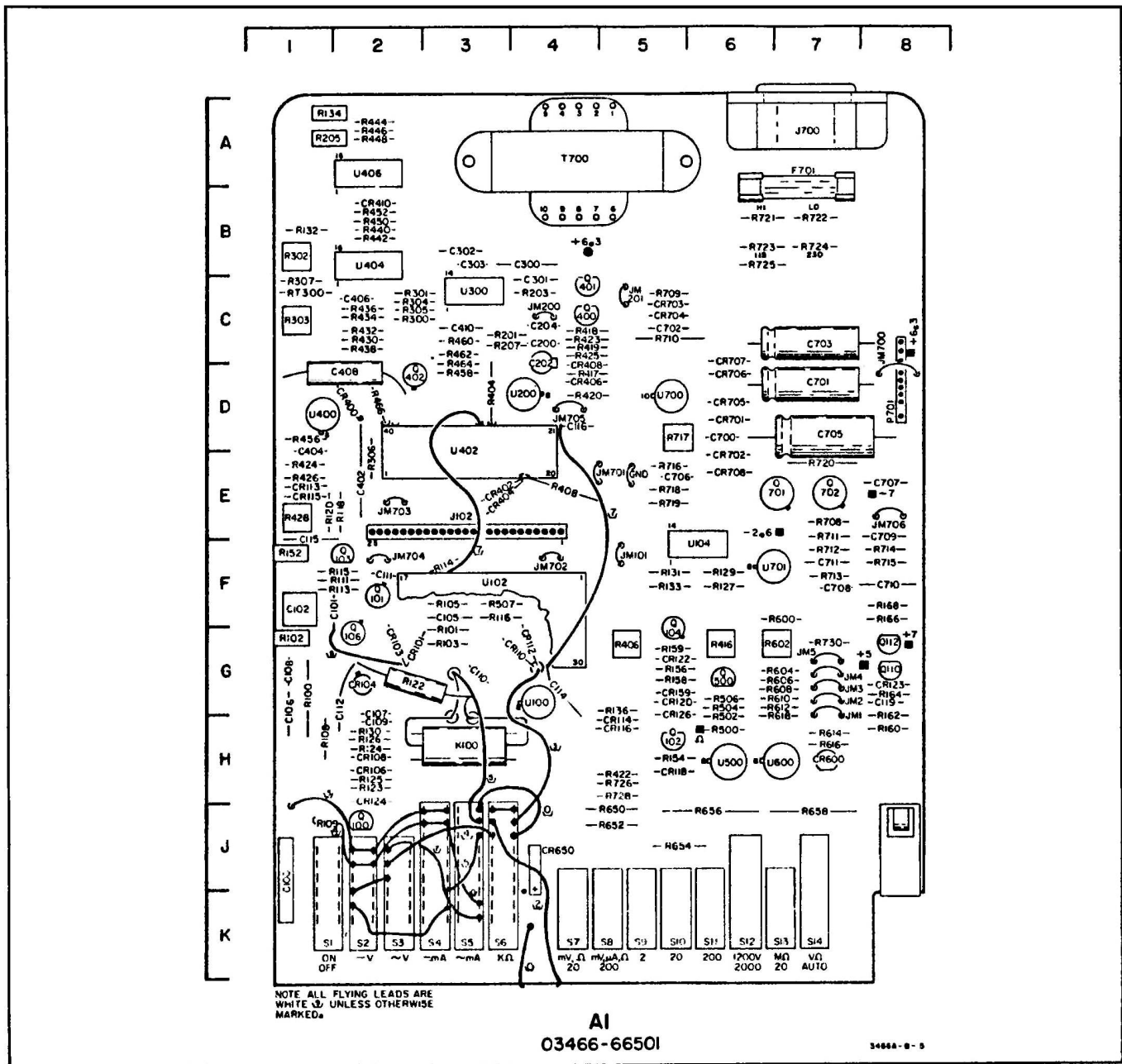


Figure 7-2. Component Locator for Changes #2, 7, and 16

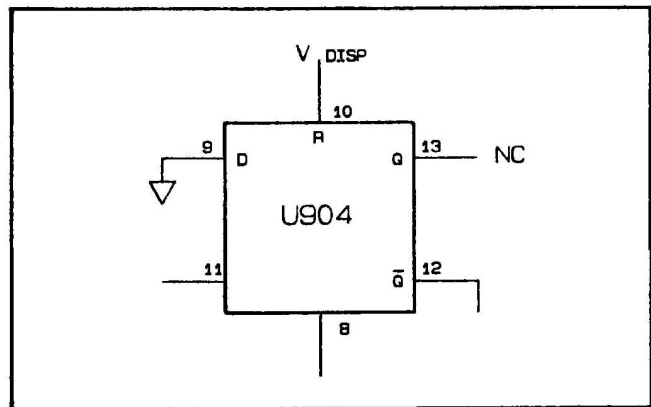


Figure 7-3. Schematic 4 Changes (Change #3)

7-23. Change #7 (Serial Numbers 1716A02780 and Below)

7-24. Table 6-3 (Replaceable Parts) Changes. Change the following in the table.

Ref. Des.	-hp- Part Number	C D	Description
A1U400	1826-0478	9	Change to 115KLM308H Op Amp
A1C404	0160-2199	2	Add 30pF 600V Capacitor

A1U400 can be replaced with the op amp part number presently listed in Table 6-3 (1826-0561). If the part number in the table is used, remove C404 from the U400 circuitry.

**7-25. Schematic 3 Changes.** Add a 30pF capacitor between pins 1 and 8 of U400.

**7-26. Component Locator.** Use component locator shown in Figure 7-2. Capacitor C404 is located near U400.

**7-27. Change #8 (Serial Numbers 1716A02980 and Below)**

**7-28. Table 6-3 (Replaceable Parts) Changes.** Delete R119\* (1.5k ohms; 0757-0427) from the table.

**7-29. Schematic 2 Changes.** Delete R119\* as shown in Figure 7-4.

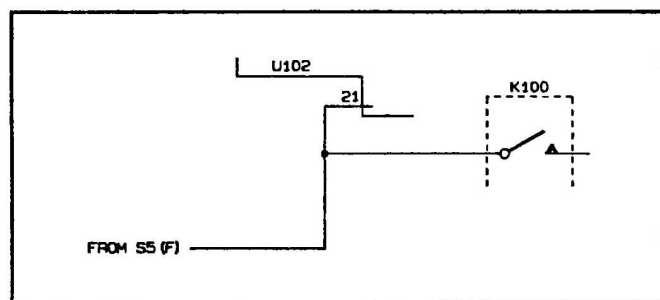


Figure 7-4. Schematic 2 Changes (Change #8)

**7-30. Change #9 (Serial Numbers 1716A03380 and Below)**

**7-31. Table 6-3 (Replaceable Parts) Changes.** Change the following in the table.

Ref. Des.	-hp- Part Number	C D	Description
A1C101	0160-4560	5	Change to 62pF Capacitor
A1C102	0121-0128	1	Change to 1.4-9.2pF Var. Capacitor

**7-32. Schematic 2 Changes.** Change C101 to 62pF and C102 to 1.4-9.2pF.

**7-33. Change #10 (Serial Numbers 1716A04380 to 1716A01331)**

**7-34. Table 6-3 (Replaceable Parts) Changes.** Add sockets X901, X905, X906, and X911, part number 1200-0474, to the table. The part number of the sockets is 1200-0474 (CD is 9). These sockets are used for U901, U905, U906 and U911.

**7-35. Change #11 (Serial Numbers 1716A05530 and Below)**

**7-36. Table 6-3 (Replaceable Parts) and Schematic 2 Changes.** Change the part number of A1K100 to 0490-1136, and delete A1C117 and R121. A1K100 can be replaced with the relay part number presently listed in Table 6-3 (0490-1247). If the part number in the table is used, add C117 and R121 as shown on Schematic 2 (use component locator presently in the manual to locate C117 and R121).

**7-37. Change #12 (Serial Number 1716A11460 to 1716A01831)**

**7-38. Table 6-3 (Replaceable Parts) and Table 6-4 (Miscellaneous Parts) Changes.** Change the following in the tables.

Ref. Des.	-hp- Part Number	C D	Description
A1	03466-66516	5	Change PC Assembly: Mother
A2	03466-66517	6	Change PC Assembly: Display

**7-39. Change #13 (Serial Numbers 1716A12147 and Below)**

**7-40. Table 6-3 (Replaceable Parts) Changes.** Change the following in the table.

Ref. Des.	-hp- Part Number	C D	Description
A1Q101	1855-0222	2	Change to FET Dual DN1402
A1R101	0698-3158	4	Change to 23.7k .01 Resistor
A1R103	0698-3158	4	Change to 23.7k .01 Resistor
A1R111	0698-4479	4	Change to 14k .01 Resistor
A1R152	2100-3502	9	Change to 200 Var. Resistor

If A1Q101 is replaced, use the part number (1855-0449) presently listed in Table 6-3. If the part number in the table is used, change R101, R103, R111, and R152 to the part numbers and values presently listed in the table and Schematic 2 (37.4k for R101, R103, and R111, and 500 for R152).

**7-41. Schematic #2 Changes.** Do the following changes.

Ref. Des.	Value Change
R101	23.7k
R103	23.7k
R111	14k
R152	200

**7-42. Change #14 (Serial Numbers 1716A13915 and Below)**

**7-43. Table 6-3 (Replaceable Parts) and Schematic 4 Changes.** Delete connector P904 from the table and Schematic 4. Use component locator in Figure 7-5.

**7-44. Change #15 (Serial Numbers 1716A14170 and Below)**

**7-45. Table 6-3 (Replaceable Parts) Changes.** Change the following in the table.

Ref. Des.	-hp- Part Number	C D	Description
A1U300	1826-0421		Change to IC RMS AD536
A1R108	0698-4470		Change to 6.98k .01 Resistor

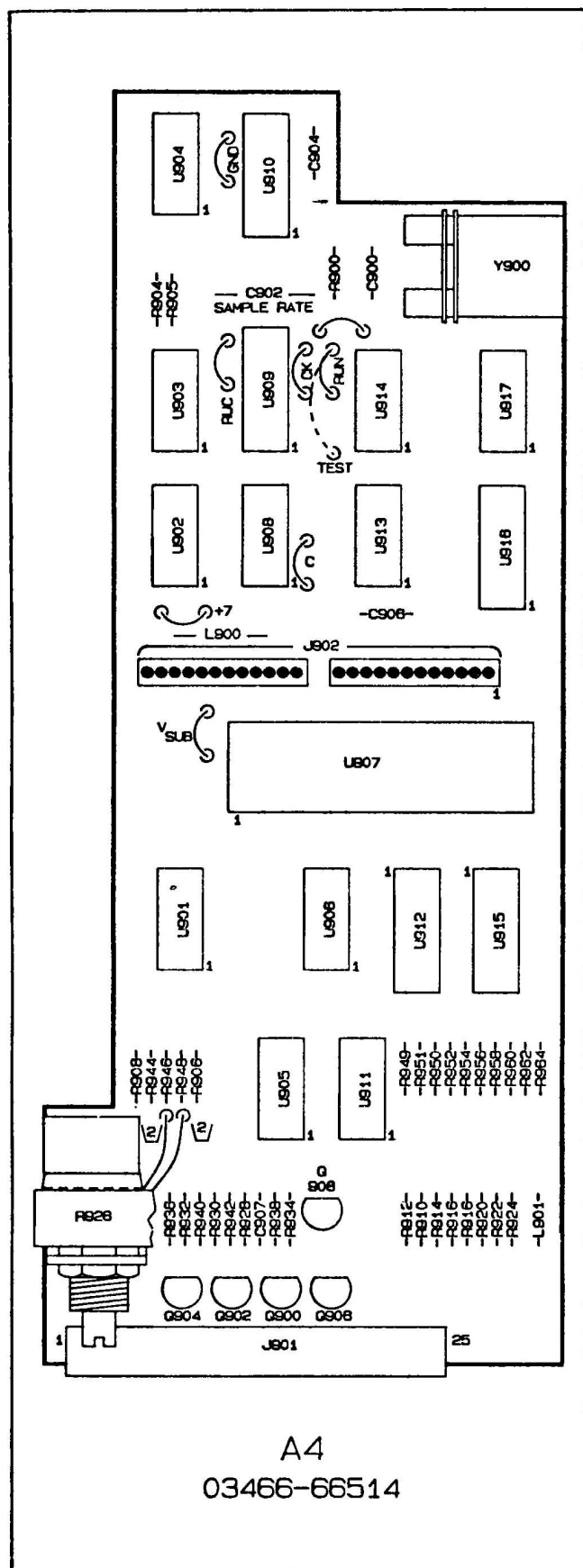


Figure 7-5. Component Locator for Change #14

A1U300 can be replaced with the RMS converter part number presently listed in Table 6-3 (1826-0935). If the part number in the table is used, change R108 to the part number and value presently listed in the table and Schematic 3 (4.99k).

**7-46. Schematic 3 Changes.** Change the value of R108 to 6.98k.

**7-47. Change #16 (Serial Numbers 1716A17005 and Below)**

**7-48. Table 6-3 (Replaceable Parts) Changes.** Delete AIR727 and R128 from the table.

**7-49. Schematic 2 Changes.** Delete R128 resistor connected to pin 9 of switch S5 and connect the pin to U102 pin 21.

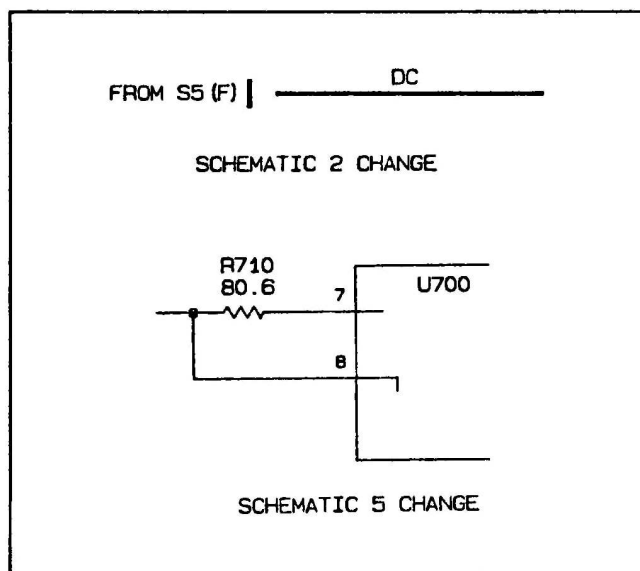


Figure 7-6. Schematics 2 and 5 Changes (Change #16)

**7-50. Schematic 5 Changes.** Delete R727 between pin 8 of U700 and R710 and connect pin 8 to R710, as shown in Figure 7-6.

**7-51. Component Locator.** Use component locator in Figure 7-2.

**7-52. Change #17 (Serial Numbers 1716A18810 and Below)**

**7-53. Table 6-3 (Replaceable Parts) Changes.** Do the following changes in the table.

Ref. Des.	-hp- Part Number	C D	Description
A1C200	0160-2265	3	Add 22pF 500V Capacitor
A1C204	0160-2257	3	Change to 10pf 500V Capacitor
A1C210	0160-2236	8	Add 1pF Capacitor
A1R659	0757-0346	2	Delete 10 .01 1/8W Resistor
A1R660	2100-3383	4	Delete 50 .10 1/2W Var. Resistor
A1R305	0696-3243	8	Change to 178k .01 1/6W Resistor



c. Add C200 (22pF) capacitor between pins 1 and 2 of U200.

d. Change C204 to 10pF.

- 7-56. Component Locator.** Use component locator in Figure 7-7.



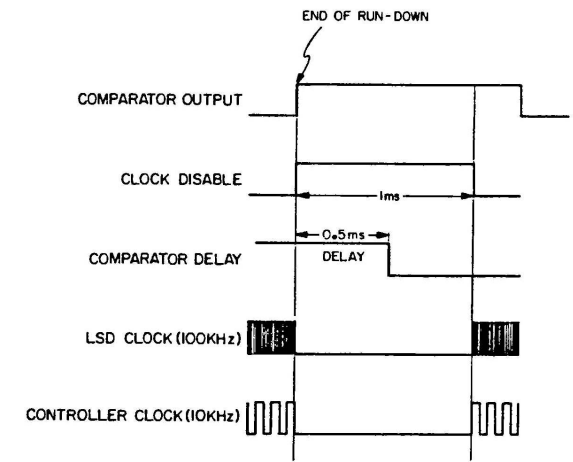
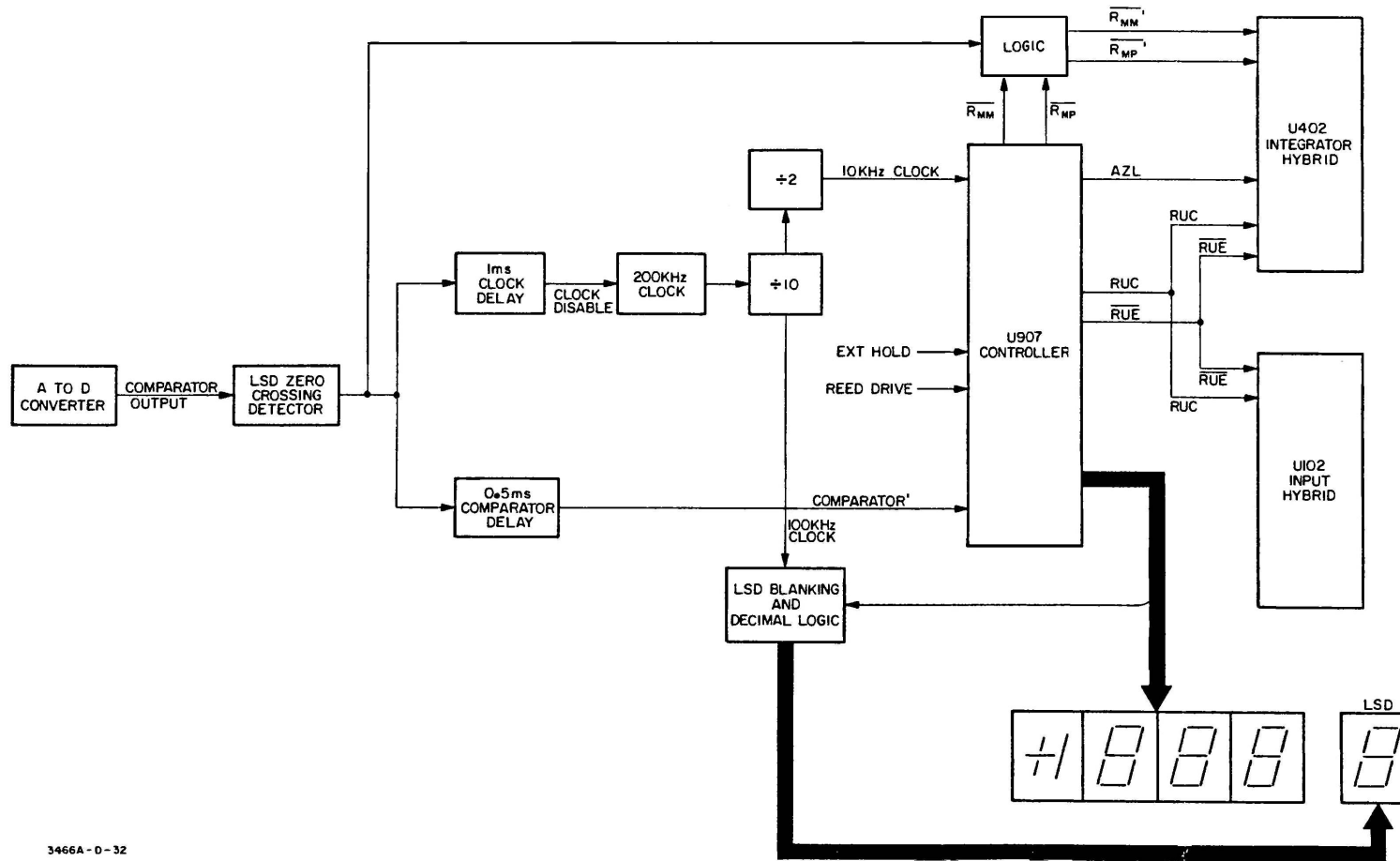
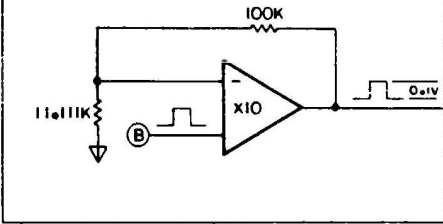
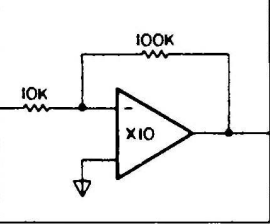

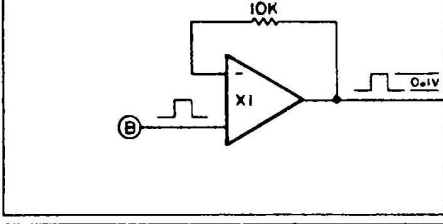
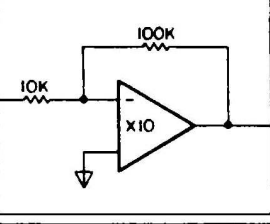

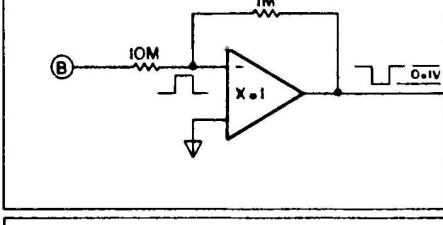
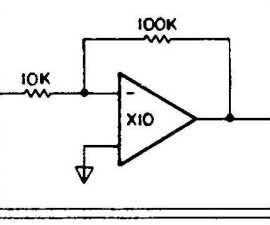

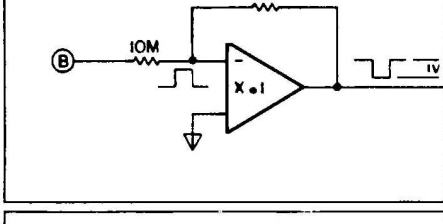
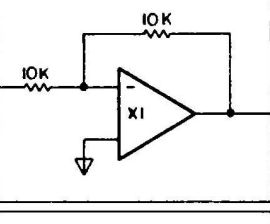
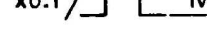
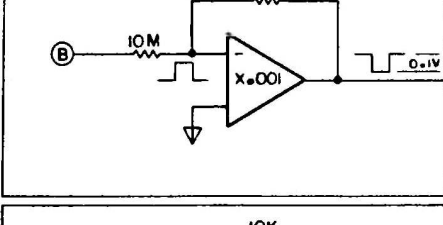
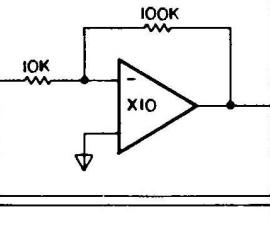
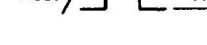
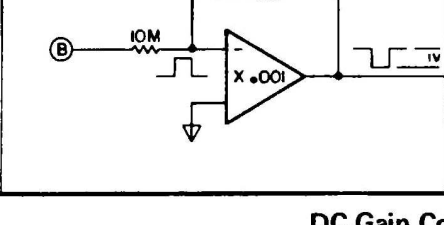
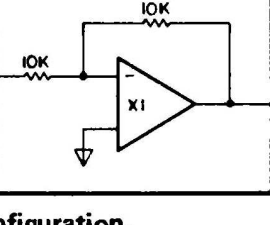

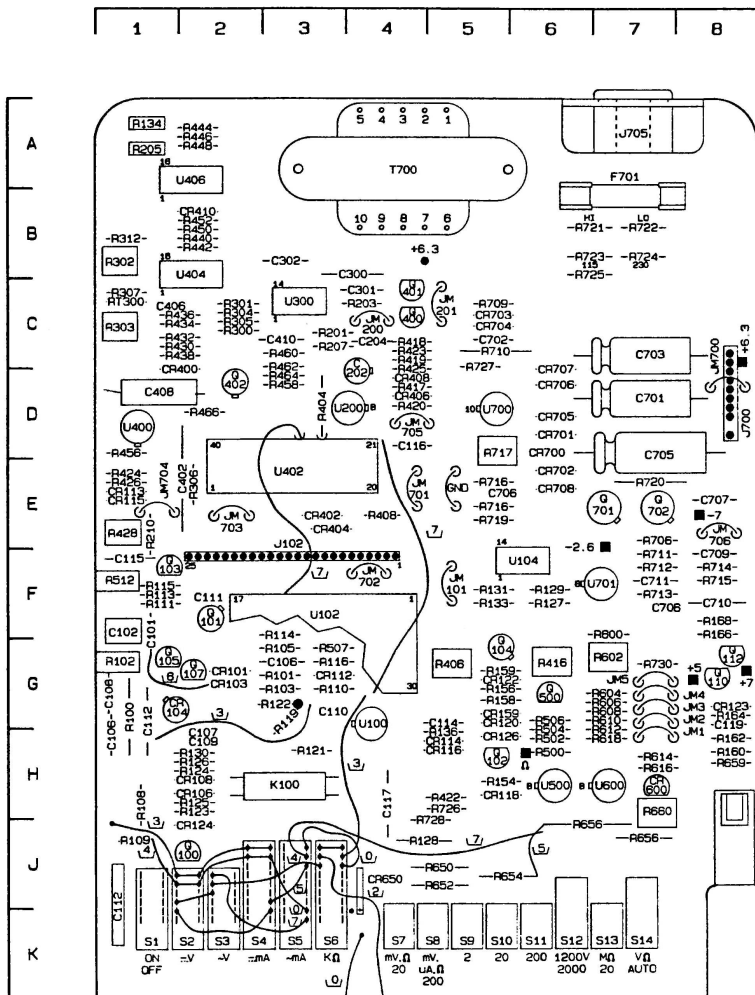


Figure 8-16. Logic Interface Block Diagram  
8-25

RANGE/INPUT	INPUT AMP	POST AMP	OVERALL GAIN/ OUTPUT VOLTAGE
20mV/10mV			x100 / 
200mV/100mV			x10 / 
2V/1V			x1 / 
20V/10V			x0.1 / 
200V/100V			x0.01 / 
200V/100V			x0.001 / 

3466A-B-27

DC Gain Configuration.

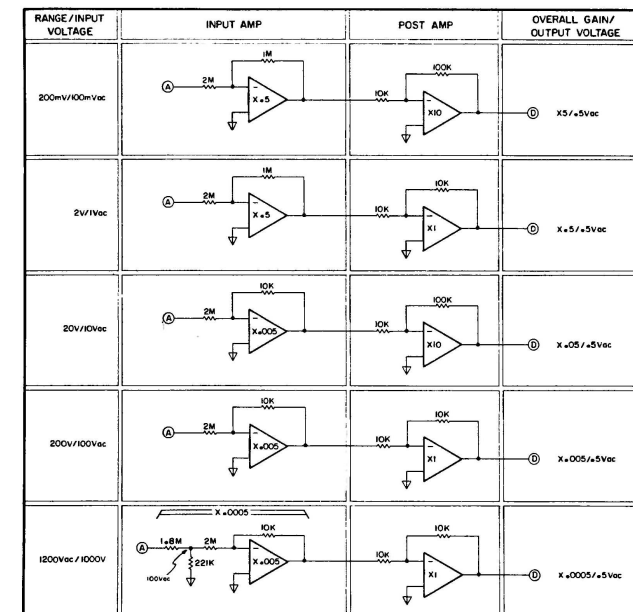


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03466-66501

## COMPONENT LOCATOR FOR SCHEMATIC 1

Component	Location	Component	Location
C100	J,K1	R154	H5
C119	G8	R156	G5
		R158	G5
CR118	H5	R159	G5
CR120	G5	R160	H8
CR122	G5	R162	H8
CR123	G8	R164	G8
CR126	H5	R166	F8
CR159	G5	R168	F8
CR650	J4	R650	J5
		R652	J5
Q102	H5	R654	J5,6
Q104	G5	R656	I6
Q110	G8	R658	I7
Q112	G8	R659	H8
		R660	H7
		R730	G7



AC Gain Configurations.

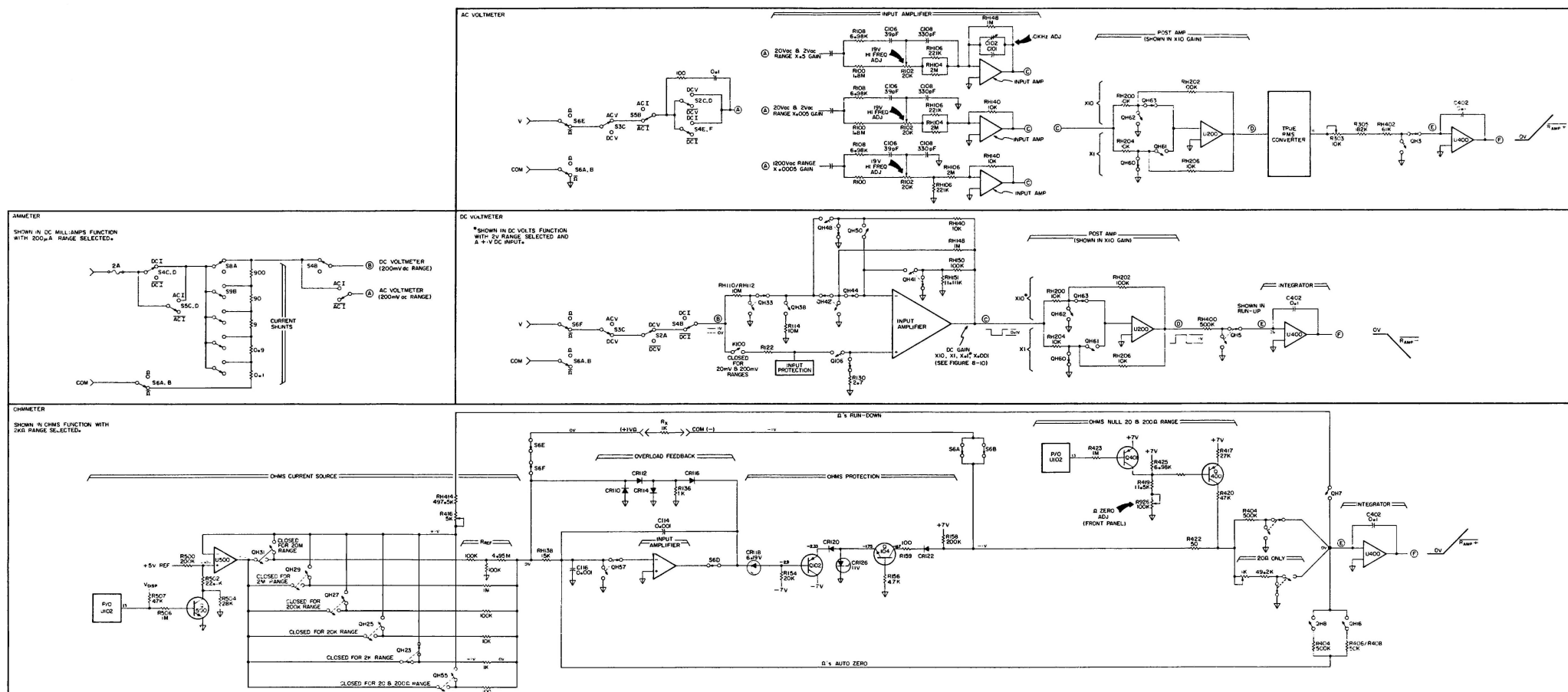


Figure 8-17. Simplified Analog Schematic  
8-27





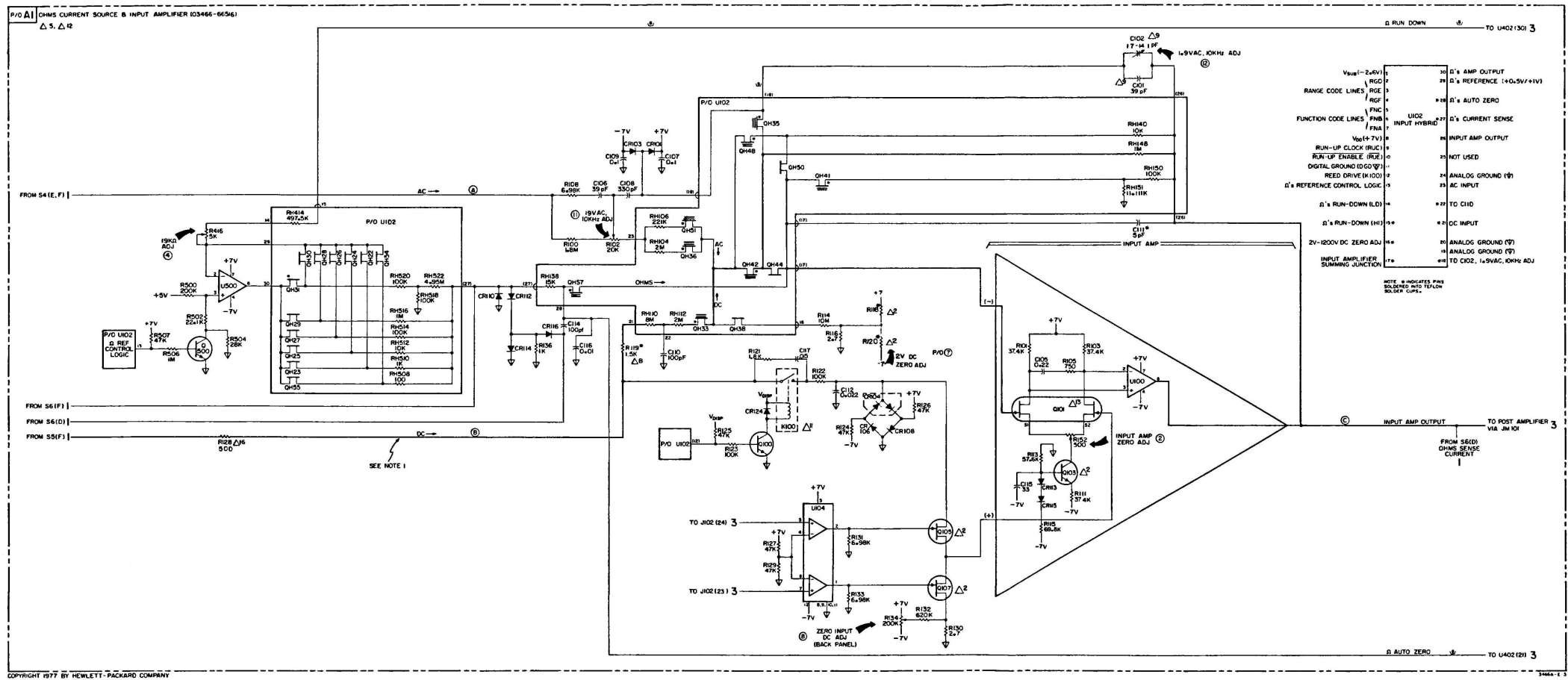


Figure 8-19. Ohms Current Source and Input Amplifier Schematic  
 8-31



# NOTE 1

THE SCHEMATIC IS SHOWN WITH DCV (FUNCTION) AND 2V (RANGE) SELECTED. PROMINANT SCHEMATIC LINES SHOW THE SIGNAL PATH FOR THIS SWITCH SETTING.

# NOTE 2

U102 AND U402 ARE HYBRID INTEGRATED CIRCUITS. FINE LINE RESISTORS AND MOST FET SWITCHES WHICH ARE PART OF THE HYBRIDS ARE SHOWN ON THE SCHEMATIC FOR OPERATIONAL CLARIFICATION ONLY. THESE COMPONENTS ARE NOT INDIVIDUALLY SERVICEABLE.

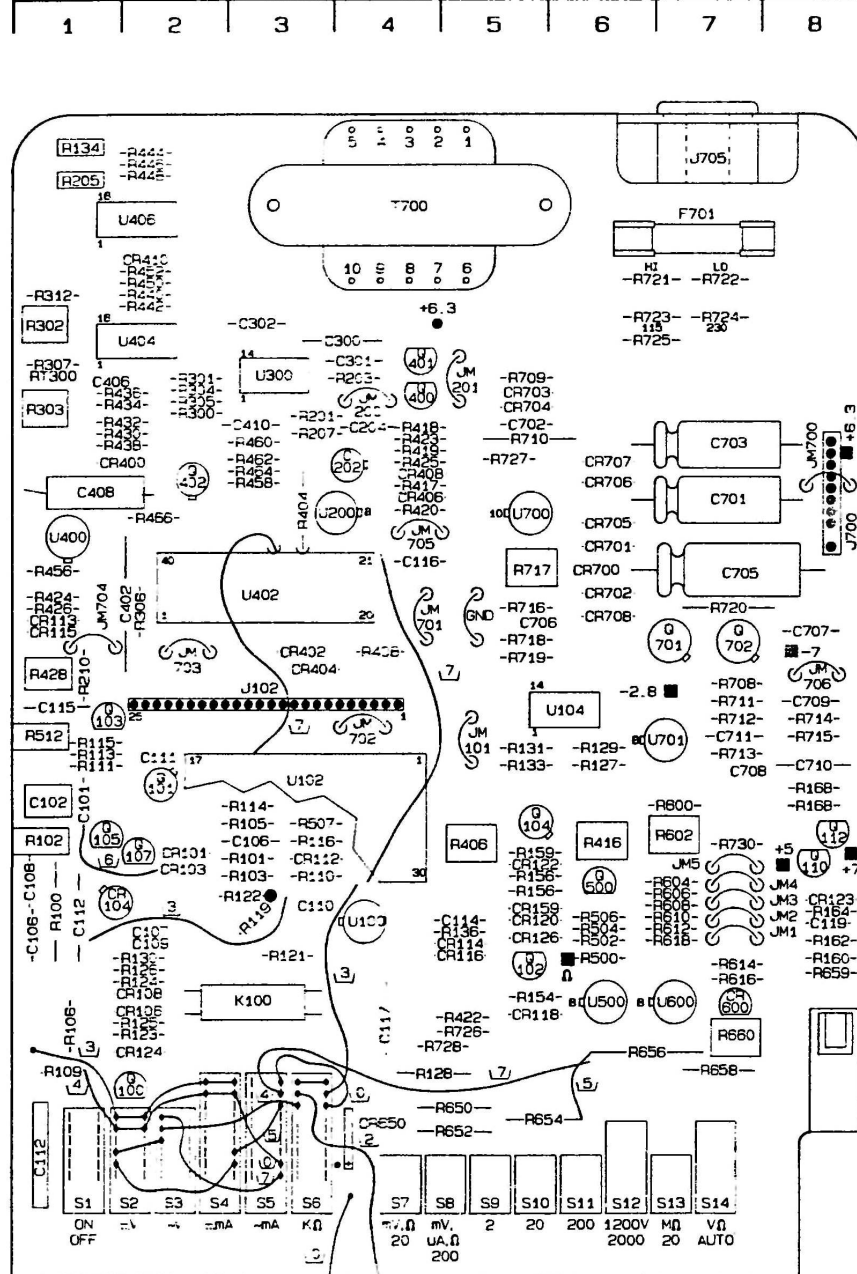
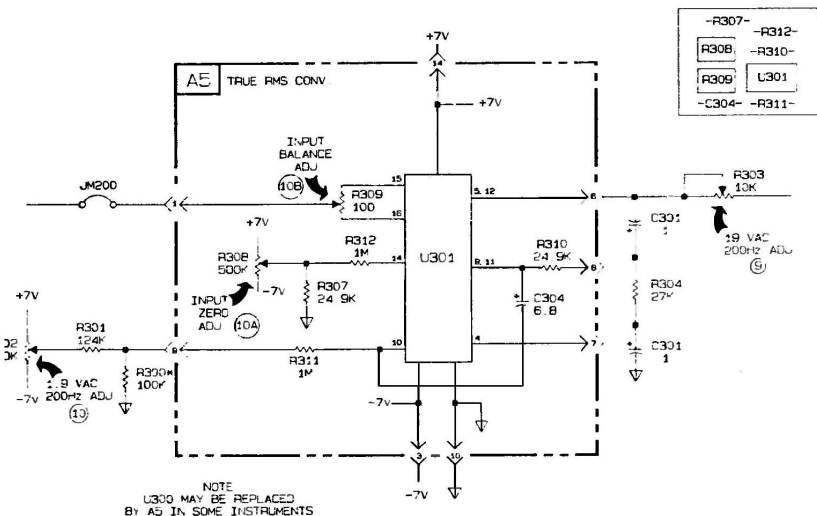
# NOTE 3

SIMPLIFIED SCHEMATIC REPRESENTATIONS OF MOS FET SWITCHES ARE USED FOR SCHEMATIC CLARITY. COMPARISONS OF THE SIMPLIFIED, ACTUAL AND FUNCTIONAL SCHEMATIC REPRESENTATIONS ARE AS FOLLOWS:

$V_{SUB} (-2.6 V)$	1		*40	INTEGRATOR SUMMING JCT
AUTO ZERO LOGIC (AZL)	2		39	NC
RANGE CODE LINES	RGD	3	*38	AUTO ZERO (C408)
	RGE	4	37	NC
	NC	5	36	NC
	RGF	6	35	AUTO ZERO
FUNCTION CODE LINES	FNC	7	34	AC AUTO ZERO
	FNB	8	33	5 V REFERENCE
	FNA	9	32	AC RUN UP
$V_{DD} (+7 V)$	10	TEFLON SOLDER	31	NC
DIGITAL GROUND (DGD)	11	CUPS	*30	$\Omega$ 's RUN DOWN
RUN-UP CLOCK (RUC)	12		29	NC
RUN-UP ENABLE (RUE)	13		*28	$\Omega$ 's RUN UP
$\overline{R_{AMP}} (-) (\overline{R_{MM}})$	14		27	NC
$\overline{R_{AMP}} (+) (\overline{R_{MP}})$	15		26	POST AMP OUTPUT (DC RUN UP)
NC	16		25	POST AMP INPUT
$\Omega$ 's RUN UP (20 $\Omega$ )	17*		24	C204 (POST AMPI)
NC	18		23	NC
POST AMP SUMMING JCT	19		22	NC
ANALOG GROUND	20		*21	$\Omega$ 's AUTO ZERO

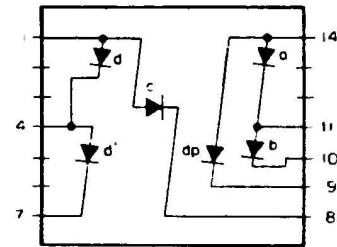
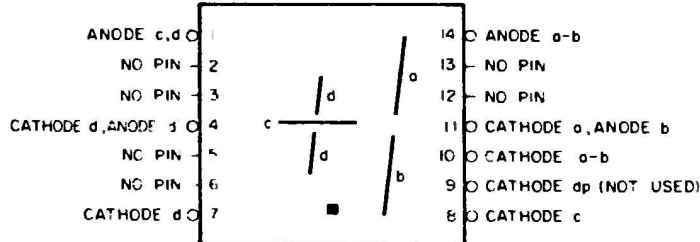
# COMPONENT LOCATOR FOR SCHEMATIC 3

Component	Location	Component	Location	Component	Location
C200	C4	JM705	D4	R438	C2
C202	C,D4			R440	B2
C204	C4	Q400	C4	R442	B2
C210	C,D3	Q401	C4	R444	A2
C300	B4	Q402	D2	R445	A2
C301	C4			R448	A2
C302	B3	R201	C3	R450	B2
C402	E2	R203	C4	R452	B2
C406	C2	R205	A2	R456	D1
C408	D1,2	R207	C3	R458	D3
C410	C3	R300	C2	R462	C3
		R301	C2,3	R464	D3
		R303	C1	R466	D2
CR400	C2	R304	C2,3	R600	F6,7
CR402	E3	R305	C2	R602	G6,7
CR404	E3	R306	E2	R604	G6,7
CR406	D4	R307	C1	R606	G6,7
CR408	D4	R404	D3	R608	G6,7
CR410	B2	R406	G5	R610	G6,7
CR600	H7	R408	E4	R612	G6,7
		R417	D4	R614	H7
J102	E2,4	R418	C4	R616	H7
JM1	H7	R419	C4	R618	H6,7
JM2	G7	R420	D4		
JM3	G7	R423	C4	RT300	C1
JM4	G7	R424	E1		
JM5	G7	R425	C4	U200	D4
JM101	F5	R426	E1	U300	C3
JM200	C4	R428	E1	U400	D1
JM201	C5	R430	C2	U402	D,E2,4
JM701	E4	R432	C2	U404	B2
JM703	E2	R434	C2	U406	A2
JM704	E2	R436	C2	U600	H7

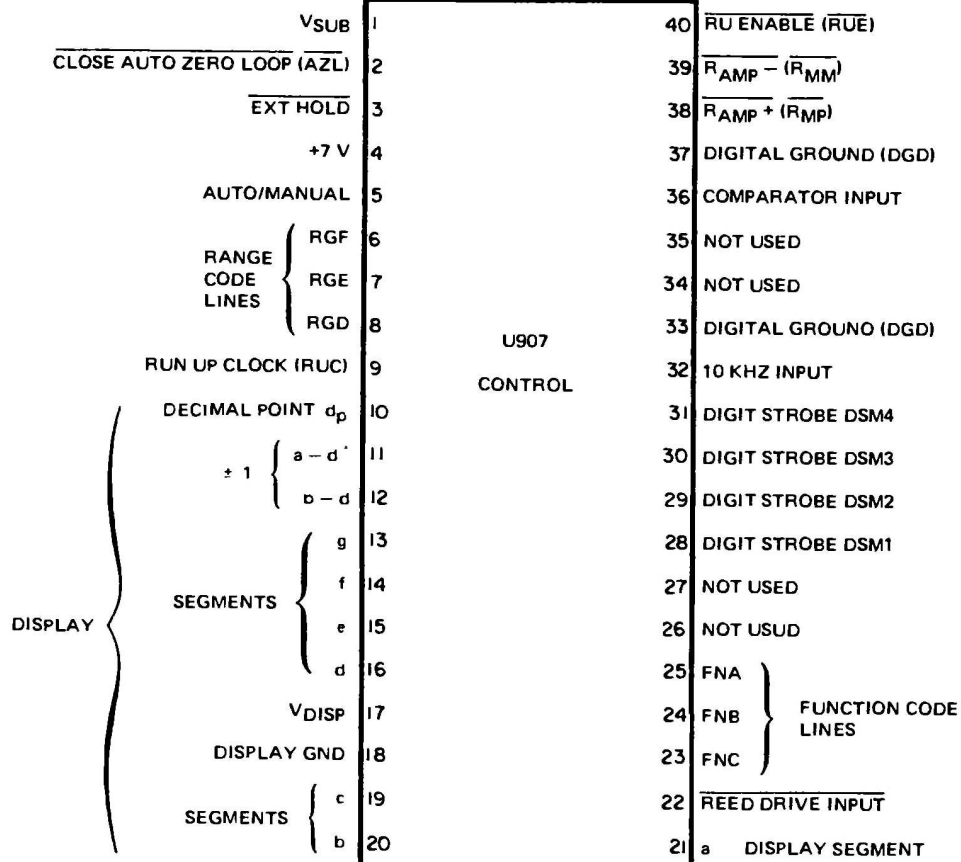
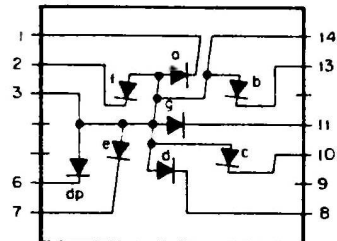
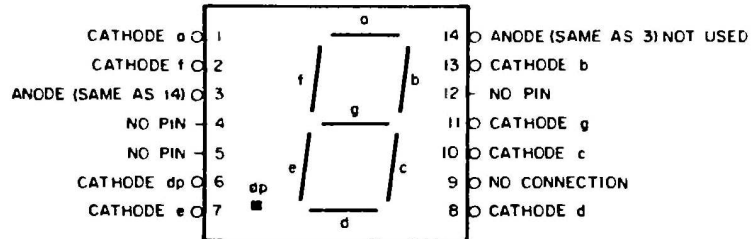




### DSMI (1990-0532)

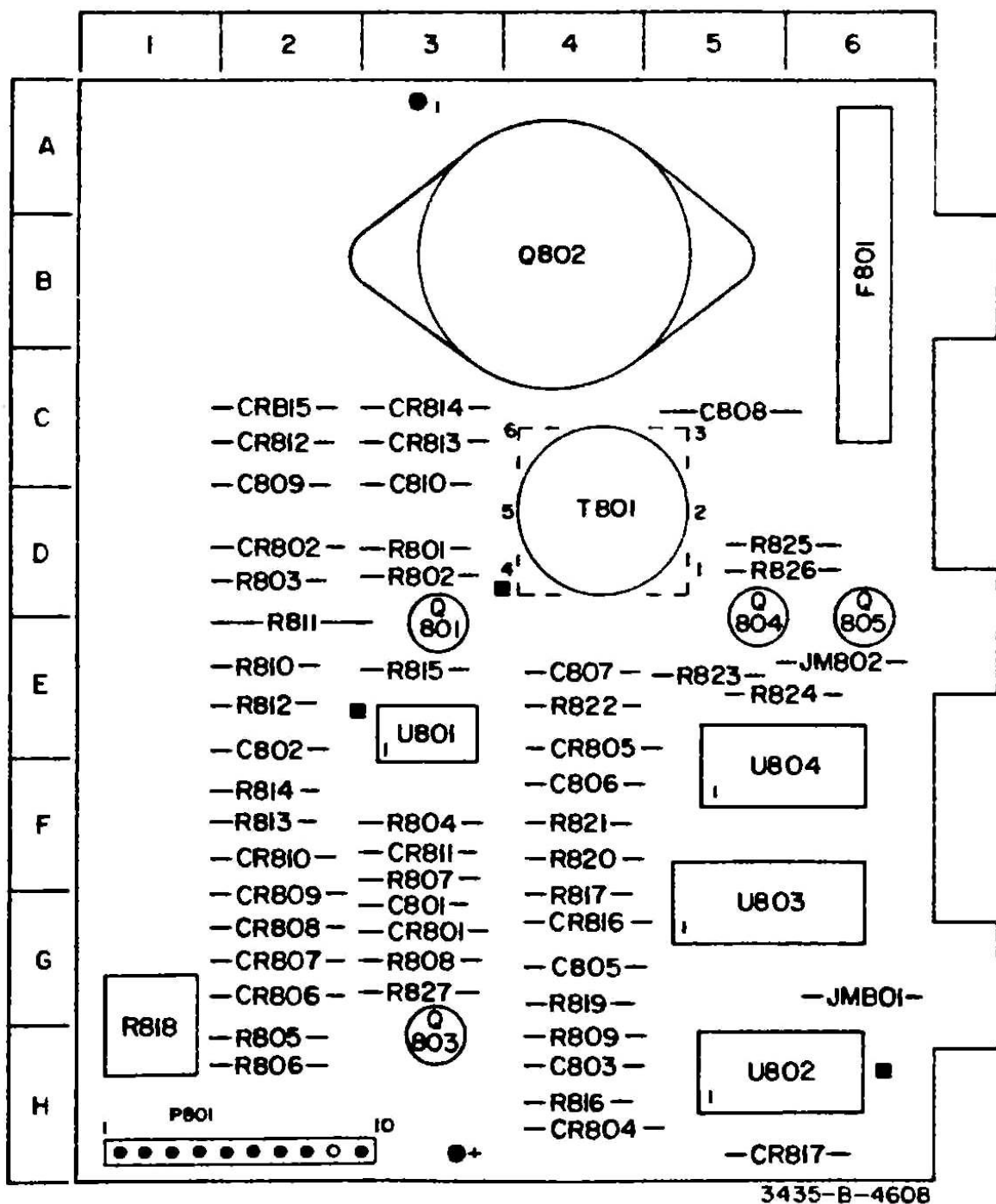


### DSM2, DSM3, DSM4, DSM5 (1990-0531)



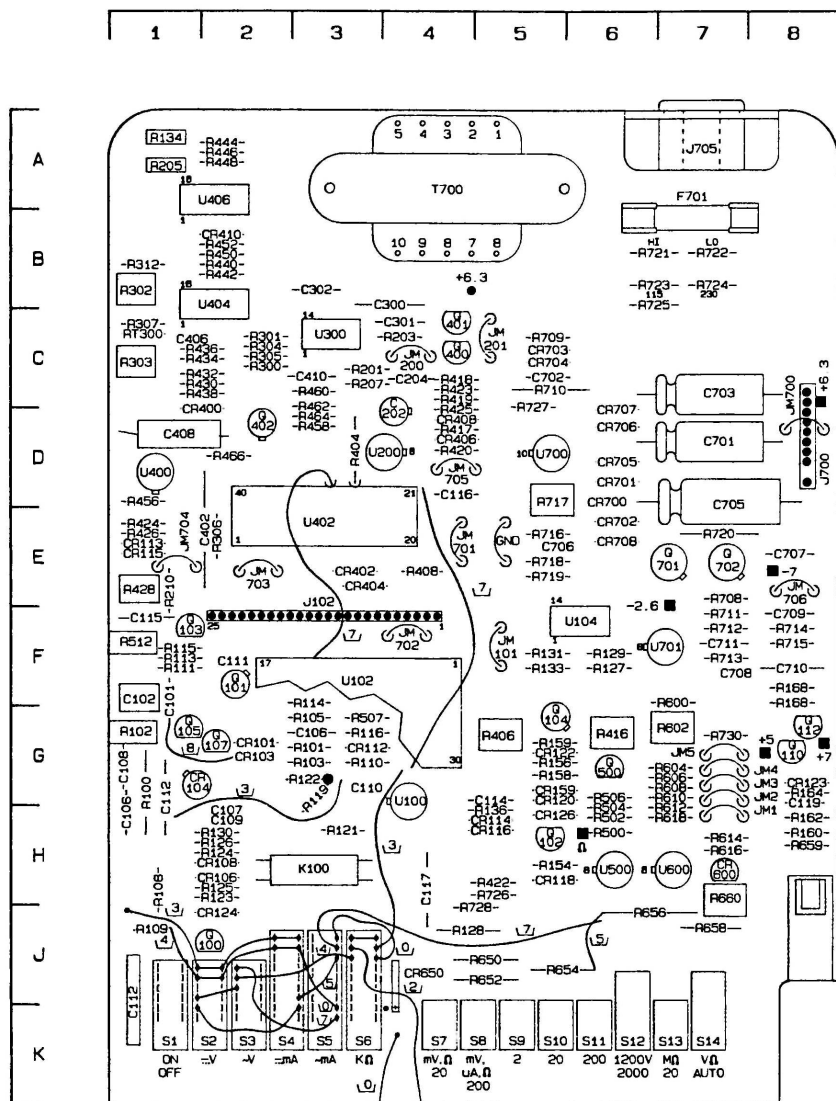






A3

-hp- Part No. 03435-66503



NOTE: ALL FLYING LEADS ARE WHITE (S) UNLESS OTHERWISE MARKED

A1

03466-66501

# COMPONENT LOCATOR FOR SCHEMATIC 5 (POWER SUPPLY)

Component	Location	Component	Location	Component	Location
C700	D6	CR706	D6	R711	F7
C701	D7	CR707	D6	R712	F7
C702	C5	CR708	E6	R713	F7
C703	C7			R714	F8
C705	D7	F701	A,B7	R715	F8
C706	E5,6			R716	E5
C707	E8	J700	C,D8	R718	E5
C708	F7	J705	A7	R719	E5
C709	F7			R720	E7
C710	F7	JM700	D8	R721	B6,7
C711	F7	JM706	E8	R722	B7
				R723	B6,7
CR701	D6	Q701	E6	R724	B7
CR702	E6	Q702	E7	R725	B6,7
CR703	C5			R727	C5
CR704	C5	R708	E7		
CR705	D6	R709	C5		
		R710	C5		

# COMPONENT LOCATOR FOR SCHEMATIC 5 (CHARGER CIRCUITRY)

Component	Location	Component	Location	Component	Location
C801	G3	CR813	C3	R808	G3
C802	E2	CR814	C3	R809	H4
C803	H4	CR815	C2	R810	E2
C805	G4	CR816	G4	R811	E2
C806	F4	CR817	H5	R812	E2
C807	E4			R813	F2
C808	C5	JM801	G6	R814	F2
C809	C2	JM802	E6	R815	E3
C810	C3			R816	H4
		Q801	D,E3	R817	G4
CR801	G3	Q803	G,H3	R818	G,H1
CR802	D2	Q804	D,E5	R819	G4
CR804	H4	Q805	D,E6	R820	F4
CR805	E4			R821	F4
CR806	G2	R801	D3	R822	E4
CR807	G2	R802	D3	R823	E5
CR808	G2	R803	D2	R824	E5
CR809	G2	R804	F3	R825	D5
CR810	F2	R805	H2	R826	D5
CR811	F3	R806	H2	R827	G3
CR812	C3	R807	F3		



