OPERATING INSTRUCTIONS

TYPE 1265-A

ADJUSTABLE DC POWER SUPPLY

1265-A

GENERAL RADIO COMPANY

A

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ADJUSTABLE DC POWER SUPPLY

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GENERAL RADIO COMPANY
WEST CONCORD, MASSACHUSETTS, USA

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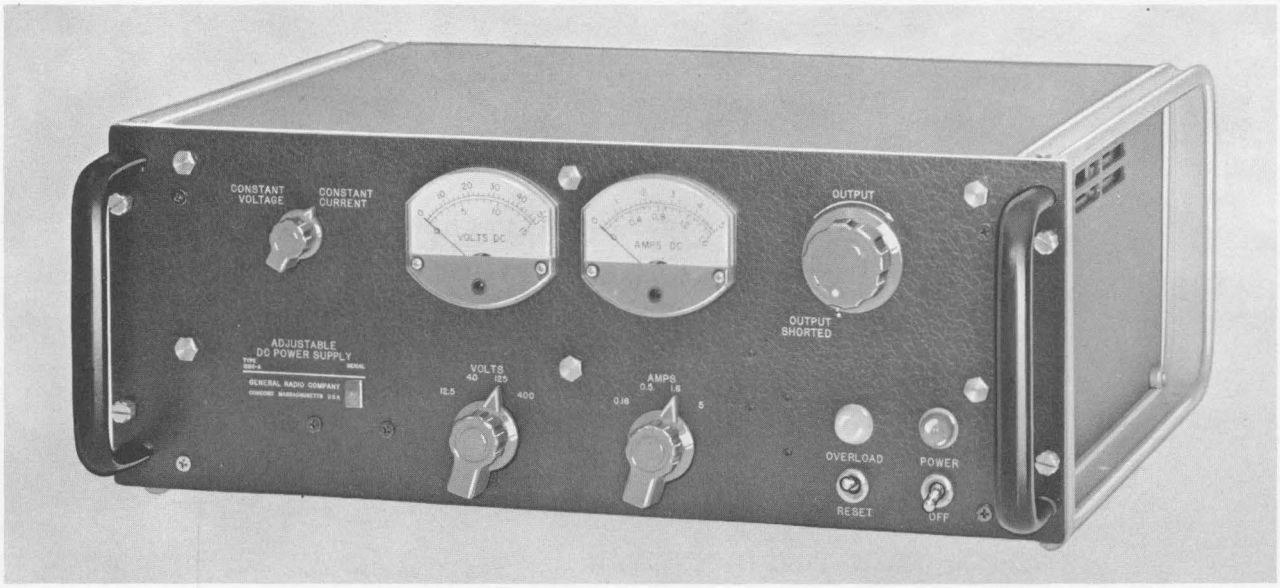


Figure 1-1.
Panel View of Type 1265-A Adjustable DC Power Supply.

SPECIFICATIONS

Full-Scale Output Ranges: 12.5, 40, 125, 400 volts, dc; 0.16, 0.5, 1.6, 5 amperes, dc; in any combination up to 200 watts.

Meters: Voltage and current; ranges are switched with output ranges. Accuracy — ±3%.

Overload Protection: Overload circuit trips at approximately 1½ times full-scale current.

Regulation: (Voltage or current) 0.2% for 10% line-voltage change; 1% for a change from full load to half load.

Speed of Response: Approximately 0.1 second.

Hum Level (rms): Approximately 70 db below full scale dc output (60 db on 12.5-volt, 5-ampere range).

Accessories Supplied: Type CAP-22 3-Wire Power Cord and spare fuses.

Mounting: Relay-rack panel with cabinet; Type 1265-AR includes fittings to permit either the instrument or the cabinet to be removed from the rack without disturbing the other; Type 1265-AM has end supports for table or bench use.

Dimensions: Bench model, width 19, height 7½, depth 17¼ inches (485 by 190 by 440 mm), over-all; rack model, panel 19 by 7 inches (485 by 180 mm), depth behind panel, 15 inches (385 mm).

Net Weight: 80 pounds (37 kg).

SECTION 1

INTRODUCTION

WARNING

This instrument is capable of delivering lethal energy. All loads and connections should be well insulated to avoid accidental contact. Always turn the OUTPUT to zero before disconnecting the load or changing the range.

The OUTPUT SHORTED position of the OUTPUT control ensures that the output voltage is zero. However, do not set this control to the OUTPUT SHORTED position unless the voltmeter indicates a low output voltage. This will prevent damage to the shorting switch.

Use particular care when operating the instrument in the CONSTANT CURRENT mode. In this case, an open-circuited output will result in a maximum value of output voltage. The open-circuit discharge time constant is approximately 16 seconds; therefore the output capacitors are not discharged immediately when the instrument is turned OFF or when the OUTPUT control is set to zero.

1.1 PURPOSE.

The Type 1265-A Adjustable DC Power Supply (Figure 1-1) is a multi-range unit that provides high power to a wide range of load resistances. It was designed primarily as a current bias supply for the Type 1630-A Inductance Measuring Assembly, for use at various impedance levels, over a wide control range. It is particularly useful where large variations in load resistance and power are needed.

1.2 DESCRIPTION.

1.2.1 GENERAL. The instrument supplies constant voltage (up to 400 dc volts) in four ranges and constant current (up to 5 dc amperes) at a maximum power of 200 watts. The output is adjustable and is monitored by front-panel voltage and current meters. The output circuit is passive; this permits a large alternating current to flow across the output, without overloading the regulating circuit. This feature is particularly useful when ac and dc voltages must be combined to give a composite waveform.

The control amplifier regulates the output level through control of the "firing angles" of the phase-controlled rectifiers (see Figure 1-2). A front-panel switch selects either voltage- or current-regulated output. Regulation is obtained by comparison of the output voltage or current with an adjustable reference signal. Any difference between the two signals changes the "firing angles" of the rectifiers to keep the output at the desired level.

The output is available at the red (high) and the gray (low) binding posts on the rear panel. The third (metallic) binding post connects directly to the chassis. This can be used as a grounding point for the chassis or for either side of the load.

A circuit breaker, reset by a switch on the front panel, provides overload protection to avoid damage to the instrument caused by short circuits that occur during constant-voltage operation.

1.2.2 MOUNTING. The instrument is available as either the Type 1265-AM, equipped with aluminum end frames (Type ZFRI-414-3) for bench mounting, or Type 1265-AR, for relay-rack mounting, with mounting brackets (Type ZSU-6-4) included. These brackets permit either the cabinet or the instrument to be withdrawn independently of the other. Instructions for installing the Type 1265-AR in a relay rack accompany these brackets.

1.2.3 ACCESSORIES SUPPLIED. One Type CAP-22 three-wire Power Cord and spare fuses are supplied with the instrument.

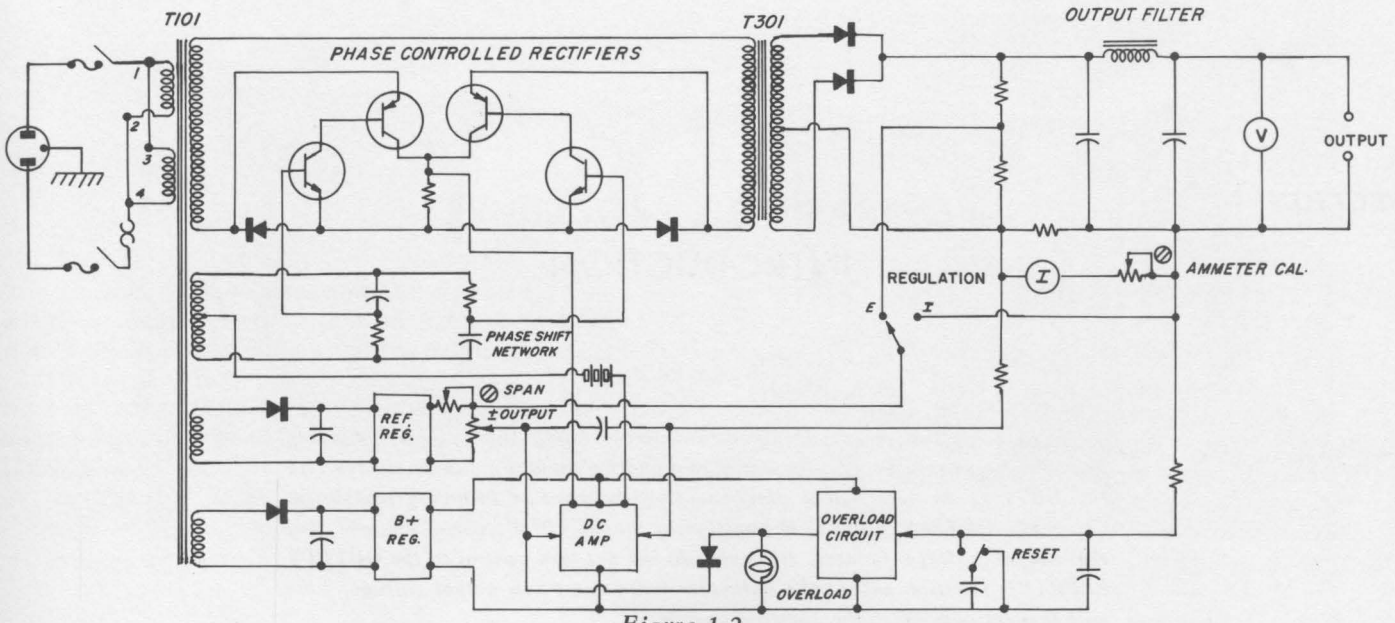


Figure 1-2.
Elementary Schematic Diagram for the Type 1265-A Adjustable DC Power Supply.

1.2.4 CONTROLS AND TERMINALS.

CONSTANT VOLTAGE CONSTANT CURRENT	S301	2-position rotary switch	Selects mode of operation (constant voltage or constant current).
OUTPUT	R206	Continuous rotary control, switch at extreme counter-clockwise end	Rotary control adjusts output level, switch shorts output. Pull knob to turn to OUTPUT SHORTED position.
VOLTS	S301	4-position rotary switch	Selects maximum available voltage (4 ranges).
AMPS	S302	4-position rotary switch	Selects full-scale current range for its associated ammeter (4 ranges).
OVERLOAD-RESET	S201	Momentary-contact toggle switch and pilot light	Restores operation after an overload trip-out.
POWER-OFF	S101	2-position toggle switch and pilot light	Connects and disconnects line input power.
None	PL101	3-wire power socket (on rear panel)	For connection to either 120- or 240- volt power mains.
None	J301, 302, 303	Jack-top binding posts (three, on rear panel)	For connection to any appropriate load.
None	SO301	4-wire receptacle (on rear panel)	For connection to Type 1633-A Incremental Inductance Bridge (as in the Type 1630 Inductance Measuring Assembly) or to any other load.

SECTION 2

OPERATING PROCEDURE

2.1 INPUT POWER CONNECTIONS.

2.1.1 120-VOLT OPERATION. Terminals 1 and 2 should be connected to terminals 3 and 4, respectively, on power transformer T101 (see the schematic diagram, Figure 4-2). The rating of each of the pair of fuses on the rear panel should be 5 amperes, and the voltage label (above the power input socket) should read "105-125 v, 50-60 c." (Refer to paragraph 2.1.3.)

2.1.2 240-VOLT OPERATION. Remove the connections between terminals 1 and 3 and terminals 2 and 4 on power transformer T101; connect terminals 2 and 3. The rating of each of the pair of fuses on the rear panel should be 2.5 amperes, and the voltage label (above the power input socket) should read "210-250 v, 50-60 c." (Refer to paragraph 2.1.3.)

2.1.3 GENERAL.

NOTE

Always be sure the POWER switch is turned OFF before the instrument is connected to the power mains.

Connect the instrument to a power source that corresponds with the reading of the nameplate above the power input socket (105-125 v or 210-250 v, 50-60 c). If a three-wire (grounded) power receptacle is not available for use with the three-wire power cord (supplied), a two-wire adaptor, Type CDPP-11 can be used. The case of the instrument should then be connected to a suitable ground.

2.2 LOAD CONNECTIONS.

WARNING

Always turn the OUTPUT control to zero before connecting or disconnecting the load; when the output voltmeter reads zero volts, turn the OUTPUT control to the OUTPUT SHORTED position.

Do not use the OUTPUT SHORTED position as a means of discharging the internal capacitors quickly, because the current rating of the switch may be greatly exceeded by the extremely large peak currents that are possible.

The load can be connected to either the pair of binding posts or to the multipoint connector, on the rear panel. Figure 2-1 shows the output connections. Either the positive (red) or the negative (gray) binding post can be grounded to the case of the instrument. The connecting link attached to the metal post can be used to ground the negative terminal; an additional lead is required to ground the positive terminal.

2.3 SELECTION OF CONSTANT CURRENT OR CONSTANT VOLTAGE MODE.

The CONSTANT CURRENT mode of operation should be used when the Type 1265-A Power Supply is used with the Type 1633-A Incremental Inductance Bridge (as in the Type 1630 Inductance Measuring Assemblies). This mode of operation keeps the dc magnetic field intensity constant as the resistance of the unknown inductor changes, due to internal heating.

The CONSTANT VOLTAGE mode is usually preferable for general applications of the power supply.

2.4 LOAD VOLTAGE AND CURRENT ADJUSTMENTS.

With the OUTPUT control set at the OUTPUT SHORTED position, select the desired ranges on the VOLTS and AMPS switches. These switches are mechanically interlocked to prevent the product of the two range settings from exceeding 200 watts.

Turn the POWER switch on, with the OUTPUT control still at the OUTPUT SHORTED position. The pilot lamp should light. If the OVERLOAD lamp also lights, operate its associated toggle switch to extinguish it and to restore the circuit.

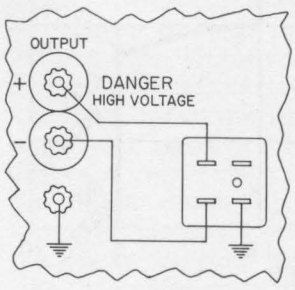


Figure 2-1. The load can be connected to either the binding posts or the multipoint connector, on the rear panel of the Type 1265-A Adjustable DC Power Supply, as shown.

Slowly increase the setting of the OUTPUT control until the panel meters indicate the desired output. The ranges of the meters and the output level are determined by the settings of the range switches. In the CONSTANT VOLTAGE mode of operation, a current approximately 1-1/2 times the full-scale value will trip the OVERLOAD relay, and will reduce the output to zero. The required output must be reduced or the switch settings changed to higher values and the OVERLOAD switch must be reset before output can be restored. The OUTPUT control must be returned to the OUTPUT SHORTED position whenever the range settings are changed, to avoid harmful transient effects. The best control resolution and the most accurate meter readings are obtained with the range switches set to the lowest values that will give the required output.

2.5 USE AT HIGH TEMPERATURES.

A thermally activated circuit breaker is included in the Type 1265-A. The power supply can deliver no power when this breaker is activated. This occurs only at very high temperatures, in which case the instrument should be turned off and allowed to cool until automatic resetting of the breaker takes place and the output is again available.

2.6 OPERATION WITH AC APPLIED TO OUTPUT.

For some applications, particularly the testing of iron core devices, a composite signal, containing both ac and dc, is required.[1] The low, passive, ac impedance of the power supply permits the passage of a large ac current whose value depends upon the settings of the VOLTS and AMPS switches, as given in Table 1. These values are for continuous operation, in an ambient temperature of 70 F. For low-duty-cycle, intermittent operation, these ratings may be increased 25%; for operation at higher temperatures, they should be reduced one percent per degree F.

Operation with an ac voltage across the OUTPUT terminals of the power supply that is larger than the dc output voltage should be avoided. Because of the low output impedance, this should offer no problem except when the dc is reduced to zero, in which case the OUTPUT control should be set to the OUTPUT SHORTED position.

2.7 IMPEDANCE RANGES.

This multi-range supply is designed to deliver maximum power (200 watts) to any of three impedances, 8, 80, or 800 ohms, as shown in Figure 2-2. The figure also indicates the maximum value of power that can be delivered to a load of any resistance. Note that, in the CONSTANT CURRENT mode of operation, the instrument regulates properly, even when the output voltage is above the nominal limit, as long as the output current is less than the maximum allowable value. For this reason, the scale of the voltmeter extends somewhat beyond the nominal range limit indicated on the VOLTS switch.

[1]The General Radio Type 1266-A Adjustable AC Power Source (at line frequency) and the Type 1308-A Audio Oscillator and Power Amplifier (20 cps to 20 kc) are recommended.

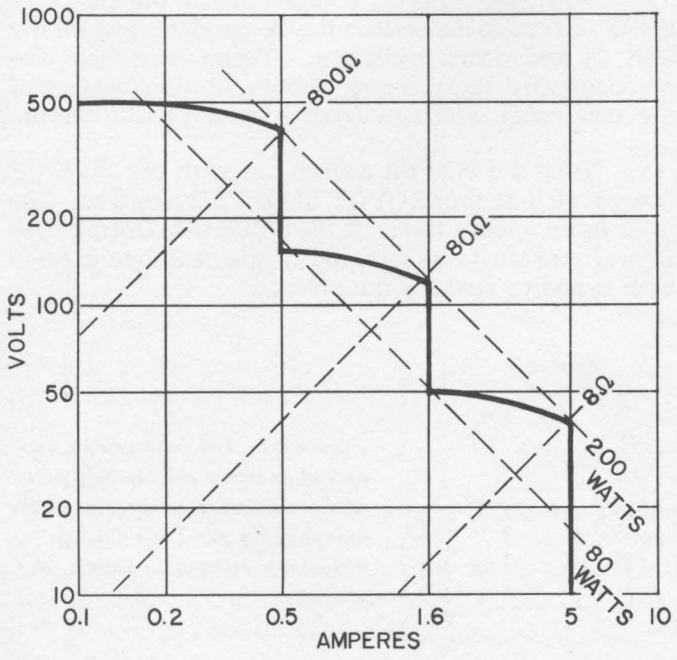


Figure 2-2. Maximum load capabilities of the Type 1265-A Adjustable DC Power Supply.

Table 1

Capacitance and Ripple Current VS Range Switch Setting

AMPS SWITCH SETTING	VOLTS SWITCH SETTING 12.5	40	125	400	
5	8100 μf	8100 μf			Output Capacitor
	5.6 amp	5.6 amp			60-Cycle Ripple Current
	7.0	7.0			120-Cycle Current
	9.8	9.8			400 Cps and Higher
1.6	8100 μf	3100 μf	1100 μf		Output Capacitor
	5.6 amp	3.6 amp	2.2 amp		60-Cycle Ripple Current
	7.0	4.5	3.2		120-Cycle Current
	9.8	6.3	4.5		400 Cps and Higher
0.5	3100 μf	1100 μf	320 μf	80 μf	Output Capacitor
	3.6 amp	2.2 amp	2.2 amp	1.1 amp	60-Cycle Ripple Current
	4.5	3.2	3.1	1.5	120-Cycle Current
	6.3	4.5	4.4	2.2	400 Cps and Higher
0.16	1100 μf	320 μf	80 μf	50 μf	Output Capacitor
	2.2 amp	2.2 amp	1.1 amp	0.75 amp	60-Cycle Ripple Current
	3.2	3.1	1.5	1.1	120-Cycle Current
	4.5	4.4	2.2	1.5	400 Cps and Higher

SECTION 3

PRINCIPLES OF OPERATION

3.1 GENERAL.

The output of the instrument is regulated by control of the current in the circuit loop that includes the secondary of the input transformer and the primary of the output transformer. This type of circuit permits the control of a wide range of output voltages by a single control circuit, since a variety of voltages can be obtained by the use of several different taps on the secondary of the output transformer. The elementary circuit diagram, Figure 1-2, shows how the voltage or current is sampled, amplified, and applied to the controlled rectifiers.

3.2 PHASE-CONTROLLED RECTIFIERS.

The controlled rectifiers are two, transistor, trigger circuits (see Figure 1-2). The second (PNP) transistor in the diagram actually consists of four transistors that provide the power gain and the rating needed to control the high peak currents (see the complete schematic diagram, Figure 4-2). The feedback resistor, R118, provides regeneration to ensure that these trigger circuits are either full off or full on.

These controlled rectifier circuits are triggered when the base voltages of the input (NPN) transistors are slightly positive with respect to the common emitter terminals. The dc controlling voltage from the amplifier is added to a line-frequency signal that lags the voltage across the rectifier by 90 degrees. As the controlling voltage varies, it changes the time at which this composite signal is sufficient to trigger the rectifiers. Thus the time duration of the output current pulse is adjusted. Figure 3-1 illustrates this operation.

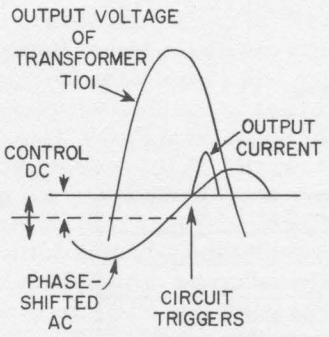


Figure 3-1. Method of varying "firing angle" of controlled rectifiers.

Actual current and voltage waveforms are shown in Figure 3-1. It should be noted that, due to the capacitor input of the output filter, the current pulse does not necessarily last to the end of the positive half-cycle of the voltage, particularly when the instrument is under light load.

3.3 OUTPUT CIRCUIT.

The output circuit consists of a full-wave rectifier that feeds a capacitive-input LC filter. The setting of the VOLTS switch determines the particular transformer voltage and the rectifiers that are used. The values of capacitance and inductance are selected by the settings of the VOLTS and the AMPS switches, as given in Table 2. The capacitors have values proportional to the optimum load for each range; thus the circuit time constants are independent of the range settings. The capacitors are shunted by internal resistors so that they are discharged when the output is an open circuit. This discharge time constant is approximately 16 seconds.

3.4 SAMPLING AND METERING CIRCUITS.

The instrument can be either current or voltage regulated, depending upon which output quantity is sampled. The current is sampled across a resistor in series with the output, and the voltage is sampled by a voltage divider network across the output. These quantities are measured before the output filter so that the phase shift due to the filter and the load does not affect the control loop. The sampled dc current and voltage are equal to the corresponding output quantities except for the direct current IR drop in the filter and the current in the resistors that shunt the capacitors. To compensate for these small differences, the appropriate voltages are added in the control loop.

The voltmeter is placed directly across the output, with an appropriate series resistor to select the range. The ammeter is placed across the current-sampling resistor, whose value is changed with the current range.

Table 2

Components in Output Filter with Various Range Switch Settings

AMPS SWITCH SETTING	VOLTS SWITCH SETTING 12.5	40	125	400
5	C313, C322 8100 μf L Tap #6 20 mh	C313, C322 8100 μf L Tap #6 20 mh		
1.6	C313, C322 8100 μf L Tap #8 60 mh	C312, C321 3100 μf L Tap #2 200 mh	C311, C320 1100 μf L Tap #2 200 mh	
0.5	C312, C321 3100 μf L Tap #2 200 mh	C311, C320 1100 μf L Tap #1 600 mh	C309, C310** C318, C319** 320 μf L Tap #3 2 h	C307, C308* C316, C317* 80 μf L Tap #3 2 h
0.16	C311, C320 1100 μf L Tap #1 600 mh	C309, C310** C318, C319** 320 μf L Tap #3 2 h	C307, C308* C316, C317* 80 μf L Tap #9 6 h	C305, C306* C314, C315* 50 μf L Tap #9 + 180 Ω 6 h

* In series.
**In parallel.

3.5 DIFFERENTIAL AMPLIFIER AND REFERENCE CIRCUITS.

The sampled voltage is proportional to either the voltage or current output and is in series with an adjustable reference voltage. These two voltages are placed across the input of a differential dc amplifier. They are of opposite signs so that, at equilibrium, the amplifier input has no net voltage. Any unbalanced voltage is amplified and is applied to the controlled rectifier circuits in such a manner as to change the value of the sampled voltage, to restore equilibrium.

The reference circuit provides an adjustable, regulated voltage. The internal SPAN control setting determines the maximum value of the reference voltage and therefore the maximum regulated output voltage or current.

3.6 OVERLOAD TRIGGER CIRCUIT.

An overload trigger circuit is included to avoid excessive output current when the instrument is operated in the constant-voltage mode. This transistor circuit trips at approximately 1-1/2 times rated current, which causes the OVERLOAD lamp to light and places a large voltage on the differential amplifier of such a sign as to turn off the controlled rectifiers. The RESET switch restores the circuit, which is triggered again if the cause of the excess current has not been removed.

The overload circuit is not required for the constant-current mode of operation; a short circuit will not increase the output current and an open circuit will raise the voltage to the finite open-circuit value without damage to the instrument.

SECTION 4

SERVICE AND MAINTENANCE

WARNING

This instrument is capable of delivering lethal energy. All loads and connections should be well insulated to avoid accidental contact. Always turn the OUTPUT to zero before disconnecting the load or changing the range.

The OUTPUT SHORTED position of the OUTPUT control ensures that the output voltage is zero. However, do not set this control to the OUTPUT SHORTED position unless the voltmeter indicates a low output voltage. This will prevent damage to the shorting switch.

Use particular care when operating the instrument in the CONSTANT CURRENT mode. In this case, an open-circuited output will result in a maximum value of output voltage. The open-circuit discharge time constant is approximately 16 seconds; therefore the output capacitors are not discharged immediately when the instrument is turned OFF or when the OUTPUT control is set to zero.

4.1 WARRANTY.

We warrant that each new instrument sold by us is free from defects in material and workmanship and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or component that is found, within the two-year period, not to meet these standards after examination by our factory, district office, or authorized repair agency personnel will be repaired or, at our option, replaced without charge, except for tubes or batteries that have given normal service.

4.2 SERVICE.

The two-year warranty stated above attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers

will assist in any way possible. If the difficulty cannot be eliminated by use of the following service instructions, please write or phone our Service Department (see rear cover), giving full information of the trouble and of steps taken to remedy it. Be sure to mention the serial and type numbers of the instrument.

Before returning an instrument to General Radio for service, please write to our Service Department or nearest district office (see rear cover), requesting a Returned Material Tag. Use of this tag will ensure proper handling and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

4.3 INTERNAL ADJUSTMENTS.

4.2.1 SPAN CONTROL. This control (potentiometer R202) adjusts the maximum value of the reference voltage, which in turn determines the maximum regulated output voltage or current (refer to paragraph 3.5). The SPAN control should be adjusted so that full voltage or current is obtained when the panel OUTPUT control is turned fully clockwise and a suitable load is connected.

4.2.2 AMMETER ADJUSTMENT. The panel meter (labelled AMPS DC) has been adjusted to give correct current readings. It should be readjusted only if measurements with an accurate external ammeter, connected in the output circuit, indicate that such adjustment is necessary.

4.4 TROUBLE SHOOTING.

The operator should read Section 2, Principles of Operation, before proceeding with any trouble shooting on this instrument.

A problem arises when an attempt is made to locate trouble, because the control circuit will not operate satisfactorily without an adequate supply voltage. This, in turn, requires a line voltage of about 90 volts or more. However, if the control circuits are not functioning properly, any attempt to operate the instrument at or near full line voltage can result in blown fuses or damaged transistors. To avoid this difficulty, the following procedure should be used, in which the controlled rectifiers are turned off while the rest of the circuit is being checked:

1. Connect the Type 1265-A to the power mains through an adjustable Variac® Autotransformer rated at 5 amperes or more. Set the autotransformer at zero volts. Connect a shorting lead directly across the OUTPUT terminals of the power supply. Set the function switch to CONSTANT CURRENT, the VOLTS switch to 40, and the AMPS switch to 1.6.

2. Connect a clip lead between the cathodes (large lugs) of rectifiers CR101 and CR102, located at the bottom of the right-hand end pan. This connection shorts out the controlled rectifier circuits; the instrument then acts as an unregulated supply.

3. Turn on the instrument POWER switch and slowly increase the line voltage by adjusting the Variac Autotransformer. If the ammeter indicates no output current, check the fuses, the thermal circuit breaker, the output circuit, or other passive components. The output current should increase linearly with the input voltage. If it does, measure the voltage between the clockwise end of the SPAN control (R202) and anchor terminal #12 on the etched board (see schematic diagram, Figure 4-2). A reading of one volt should be obtained when the ammeter reads full scale. If it is not, check the voltage across resistor R335 (0.625 ohm, 25 watts, mounted on the panel). Also check this sampled voltage on other current and voltage ranges.

4. Disconnect the shorting lead between the rectifier cathodes and connect clip leads from anchor terminals #101 and #102 on the power transistor terminal board to the common terminals (anodes) of rectifiers CR101 and CR102. This should keep the controlled rectifiers turned off. Note the reading of the ammeter as the line voltage is slowly increased. If any output current is observed, the controlled rectifiers are not operating properly. This is usually caused by a defective transistor. The faulty component can be located by successively shorting the base to the emitter of succeeding stages until the output current is held at zero.

If no output current is observed with the above procedure, the controlled rectifiers are either operating properly or they are open circuited. Reduce the line voltage to zero by means of the Variac Autotransformer and remove the clip leads from anchor terminals #101 and #102 to the common terminals of rectifiers CR101 and CR102. Connect terminal #10 to terminal #11 on the etched board (Figure 4-3). Slowly increase the line voltage, to be sure the rectifiers will pass current. If they do not, check the transistors involved (controlled rectifier circuit); if they do, proceed with step 5.

5. Again connect clip leads from terminals #101 and #102 to the junction of the anodes of rectifiers CR101 and CR102 (to maintain zero output current) and increase the line voltage to 100 volts. The ammeter should indicate zero output current. Connect a voltmeter between terminals #9 (+) and #12, and turn the OUTPUT control through its entire range. The voltmeter reading should vary between zero and 1 volt if the reference voltage is correct. If this voltage is incorrect, check the reference supply voltage against those given in Table 3.

Table 3

Transistor Voltages

TRANSISTOR (TYPE)	TEST POINTS (See Figure)	DC VOLTS
Q201 (TR-23/2N520A)*	Collector to A.T.3 Emitter to A.T.3	+9.5 +16.0
Q202 (TR-21/2N338)	Collector to A.T.3 Emitter to A.T.3	+15.5 +5.4
Q203 (TR-10/2N1374)	Collector to A.T.8 Emitter to A.T.8	+10.0 +15.5
Q204 (TR-31/2N445A)*	Collector to A.T.8 Emitter to A.T.8	+10.0 +15.5
Q205 (TR-31/2N445A)*	Collector to A.T.8 Emitter to A.T.8	+8.8 +1.7
Q206 (TR-10/2N1374)	Collector to A.T.8 Emitter to A.T.8	+6.0 +9.5
Q207 (TR-10/2N1374)	Collector to A.T.8 Emitter to A.T.8	+3.3 +9.5
Q208 (TR-31/2N445A)*	Collector to A.T.8 Emitter to A.T.8	+9.6 +1.6
Q209 (TR-21/2N338)	Collector to A.T.8 Emitter to A.T.8	+16.5 +0.48
Q210 (TR-23/2N520A)*	Collector to A.T.8 Emitter to A.T.10	+0.14 +17.0

*Selected for H_{fe} between 80 and 125.

6. Disconnect the cabled lead at anchor terminal #11 and measure the voltage between terminals #10 and #11. This voltage should vary and should reverse its sign as the OUTPUT control is turned through its range. If it does not, the differential amplifier is not operating properly, and its voltages should be compared with those given in Table 3.

7. Remove the clip leads from anchor terminals #101 and #102 to rectifiers CR101 and CR102. Replace the cabled lead to anchor terminal #11 and disconnect the soldered leads to terminals #101 and #102 on the controlled rectifier assembly. The voltage between the ends of these leads and the transistor mounting plate (not grounded) should vary about zero as the OUTPUT control is turned. This checks the continuity between the amplifier output and the controlled rectifier input current.

The above procedure will not locate all possible troubles, but it should determine the cause of most major difficulties. Each section of the control loop has now been checked. The loop can be closed and further servicing can be undertaken with normal operation of the instrument. More subtle irregularities should be traced by use of the voltage test data given in Table 3. For these voltage measurements, use a dc vacuum-tube voltmeter. Set switch S301 on the power supply at the CONSTANT CURRENT mode and turn the OUTPUT control to OUTPUT SHORTED. The OVERLOAD lamp should be off.

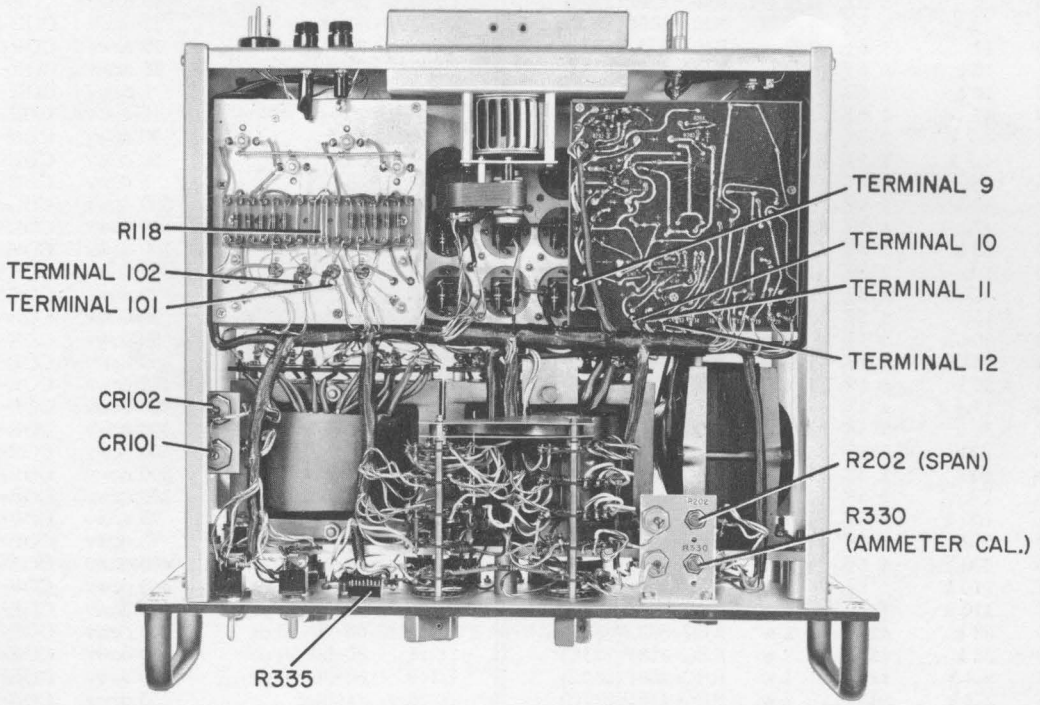


Figure 4-1. Bottom interior view of the Type 1265-A Adjustable DC Power Supply.

PARTS LIST

PARTS LIST

RESISTORS

R101	0.05			ESMW-29-290, 20
R102	0.05			ESMW-29-290, 20
R103	10	± 5%	1/2 w	REC-20BF(100B)
R104	10	± 5%	1/2 w	REC-20BF(100B)
R105	10	± 5%	1/2 w	REC-20BF(100B)
R106	100	± 5%	1/2 w	REC-20BF(101B)
R107	2.2 k	± 5%	1/2 w	REC-20BF(222B)
R108	2.2 k	± 5%	1/2 w	REC-20BF(222B)
R109	2.2 k	± 5%	1/2 w	REC-20BF(222B)
R110	2.2 k	± 5%	1/2 w	REC-20BF(222B)
R111	10	± 5%	1/2 w	REC-20BF(100B)
R112	100	± 5%	1/2 w	REC-20BF(101B)
R113	10	± 5%	1/2 w	REC-20BF(100B)
R114	10	± 5%	1/2 w	REC-20BF(100B)
R115	0.05			ESMW-29-290, 20
R116	0.05			ESMW-29-290, 20
R118	0.02			ESMW-29-290, 20
R119	6.8	±10%	1/2 w	REW-3C(068C)
R200	75 k	±5%	1/2 w	REC-20BF(753B)
R201	6.2 k	± 5%	1/2 w	REC-20BF(622B)
R202	5 k	±10%		POSC-11(502C)
R203	2.2 k	± 5%	1/2 w	REC-20BF(222B)
R204	2.2 k	± 5%	1/2 w	REC-20BF(222B)
R205	1.8 k	± 5%	1/2 w	REC-20BF(182B)
R206	1 k	±10%		POSC-26(102C)
R207	2.7 k	± 5%	1/2 w	REC-20BF(272B)
R208	3.3 k	± 5%	1/2 w	REC-20BF(332B)
R209	3.3 k	± 5%	1/2 w	REC-20BF(332B)
R210	2.2 k	± 5%	1/2 w	REC-20BF(222B)
R211	3.3 k	± 5%	1/2 w	REC-20BF(332B)
R212	4.7 k	± 5%	1/2 w	REC-20BF(472B)
R213	2 k	± 5%	1/2 w	REC-20BF(202B)
R214	10 k	± 5%	1/2 w	REC-20BF(103B)
R215	1 k	± 5%	1/2 w	REC-20BF(102B)
R216	220	± 5%	1/2 w	REC-20BF(221B)
R217	220	± 5%	1/2 w	REC-20BF(221B)
R218	20	± 5%	1/2 w	REC-20BF(200B)
R219	1 k	± 5%	1/2 w	REC-20BF(102B)
R220	47	± 5%	1/2 w	REC-20BF(470B)
R221	10 k	± 5%	1/2 w	REC-20BF(103B)
R222	10 k	± 5%	1/2 w	REC-20BF(103B)
R223	47	± 5%	1/2 w	REC-20BF(470B)
R224	4.7 k	± 5%	1/2 w	REC-20BF(472B)
R225	4.7 k	± 5%	1/2 w	REC-20BF(472B)
R226	1 k	± 5%	1/2 w	REC-20BF(102B)
R227	10 k	± 5%	1/2 w	REC-20BF(103B)
R228	470	± 5%	1/2 w	REC-20BF(471B)
R229	10 k	± 5%	1/2 w	REC-20BF(103B)
R230	1 k	± 5%	1/2 w	REC-20BF(102B)
R231	4.7 k	± 5%	1/2 w	REC-20BF(472B)
R232	150	± 5%	1/2 w	REC-20BF(151B)
R233	604 k	± 1%	1 w	REF-75(6043A)
R234	187 k	± 1%	1/2 w	REF-70(1873A)
R235	59 k	± 1%	1/4 w	REF-65(593A)
R236	17.4 k	± 1%	1/4 w	REF-65(1742A)
R237	30 k	± 5%	1/2 w	REC-20BF(300B)
R238	100	± 5%	1/2 w	REC-20BF(100B)
R239	300	± 5%	1/2 w	REC-20BF(300B)
R240	1 k	± 5%	1/2 w	REC-20BF(102B)
R241	100 k	± 5%	1/2 w	REC-20BF(104B)
R305	330 k	± 5%	1/2 w	REC-20BF(334B)
R306	330 k	± 5%	1/2 w	REC-20BF(334B)
R307	110 k	± 5%	1 w	REC-30BF(114B)
R308	110 k	± 5%	1 w	REC-30BF(114B)
R309	68 k	±10%	1 w	REC-30BF(683C)
R310	22 k	±10%	2 w	REC-41BF(223C)
R311	6.8 k	±10%	1 w	REC-30BF(682C)
R312	2.2 k	±10%	2 w	REC-41BF(222C)
R313	330 k	± 5%	1/2 w	REC-20BF(334B)
R314	330 k	± 5%	1/2 w	REC-20BF(334B)

RESISTORS (Continued)

R315	110 k	± 5%	1 w	REC-30BF(114B)
R316	110 k	± 5%	1 w	REC-30BF(114B)
R317	68 k	±10%	1 w	REC-30BF(683C)
R318	22 k	±10%	2 w	REC-41BF(223C)
R319	6.8 k	±10%	1 w	REC-30BF(682C)
R320	2.2 k	±10%	2 w	REC-41BF(222C)
R321	180	± 5%	5 w	REPO-43(181B)
R322	27 k	± 5%	1/2 w	REC-20BF(273B)
R323	1.3 k	± 5%	1/2 w	REC-20BF(132B)
R324	2.4 k	± 5%	1/2 w	REC-20BF(242B)
R325	1 k	± 5%	1/2 w	REC-20BF(102B)
R326	1.58 k	± 1%	1/4 w	REF-65(1581A)
R327	200	± 5%	1/2 w	REC-20BF(201B)
R328	200	± 5%	1/2 w	REC-20BF(201B)
R329	3.0 k	± 5%	1/2 w	REC-20BF(302B)
R330	1 k	±10%		POSC-11(102C)
R331	3.6 k	± 5%	1/2 w	REC-20BF(362B)
R332	4.3 k	± 5%	1/2 w	REC-20BF(432B)
R333	3.3 k	± 5%	1/2 w	REC-20BF(332B)
R334	0.2	± 1%	25 w	REPR-25(0020A)
R335	0.625	± 1%	25 w	REPR-25(000625A)
R336	2	± 1%	3 w	REPO-45(020A)
R337	6.25	± 1%	3 w	REPO-44(00625A)
R338	510	± 5%	1 w	REC-30BF(511B)
R339	76.8 k	± 1%	1/4 w	REF-65(7682A)
R340	1.69	± 1%	1/4 w	REF-65(1694A)
R341	536 k	± 1%	1/4 w	REF-65(5363A)
R342	174 k	± 1%	1/2 w	REF-70(1743A)
R343	56 k	± 5%	1/2 w	REC-20BF(563B)

CAPACITORS

C101	0.0033 µf	±20%	500 dcwv	COC-62(332D)
C102	0.0033 µf	±20%	500 dcwv	COC-62(332D)
C201	60 µf		25 dcwv	COE-47
C202	1 µf	±10%	100 dcwv	COW-17(105C)
C203	1 µf	±10%	100 dcwv	COW-17(105C)
C204	60 µf		25 dcwv	COE-47
C205	60 µf		25 dcwv	COE-47
C206	100 µf		25 dcwv	COE-35
C207	100 µf		25 dcwv	COE-35
C208	400 µf		6 dcwv	COE-68
C209	100 µf		15 dcwv	COE-46
C210	5 µf		50 dcwv	COE-57
C211	5 µf		50 dcwv	COE-57
C212	40 µf		6 dcwv	COE-54
C213	0.1 µf	±10%	600 dcwv	COL-71(104C)
C214	0.1 µf	±10%	600 dcwv	COL-71(104C)
C215	1 µf	±10%	200 dcwv	COW-16(105C)
C216	5 µf		50 dcwv	COE-57
C217	5 µf		50 dcwv	COE-57
C218	5 µf		50 dcwv	COE-57
C219	5 µf		50 dcwv	COE-57
C305	50-25-25 µf		450 dcwv	COE-10
C306	50-25-25 µf		450 dcwv	COE-10
C307	60-50-50 µf		300 dcwv	COE-41
C308	60-50-50 µf		300 dcwv	COE-41
C309	60-50-50 µf		300 dcwv	COE-41
C310	60-50-50 µf		300 dcwv	COE-41
C311	1100 µf		250 dcwv	COE-65
C312	3100 µf		75 dcwv	COE-66
C313	8100 µf		75 dcwv	COE-67
C314	50-25-25 µf		450 dcwv	COE-10
C315	50-25-25 µf		450 dcwv	COE-10
C316	60-50-50 µf		300 dcwv	COE-41
C317	60-50-50 µf		300 dcwv	COE-41
C318	60-50-50 µf		300 dcwv	COE-41
C319	60-50-50 µf		300 dcwv	COE-41
C320	1100 µf		250 dcwv	COE-65
C321	3100 µf		75 dcwv	COE-66
C322	8100 µf		75 dcwv	COE-67

PARTS LIST (Cont)

DIODES AND RECTIFIERS

CR101	2RE-1005/1N3660
CR102	2RE-1005/1N3660
CR201	2RE-1001/1N3253
CR202	2REZ-1004/1N752
CR203	2RE-1001/1N3253
CR204	2RE-1001/1N3253
CR205	2REZ-1004/1N752
CR206	2RED-1008/1N191
CR207	2RED-1008/1N191
CR208	2RE-1001/1N3253
CR209	2RE-1001/1N3253
CR301	2RE-1003/1N3255
CR302	2RE-1003/1N3255
CR303	2RE-1003/1N3255
CR304	2RE-1003/1N3255
CR305	2RE-1003/1N3255
CR306	2RE-1003/1N3255
CR307	
CR308	
CR309	2RE-1003/1N3255
CR310	2RE-1003/1N3255
CR311	2RE-1003/1N3255
CR312	2RE-1003/1N3255
CR313	2RE-1003/1N3255
CR314	2RE-1003/1N3255

SWITCHES

S101	SWT-333
S201	SWT-9
S301	SWRW-2690
S302	SWRW-2670
S303	SWRW-2680
S304	Part of R206

TRANSISTORS

Q101	TR-36/2N2077
Q102	TR-36/2N2077
Q103	TR-17/2N1540
Q104	TR-11/2N1377
Q105	TR-33/2N696
Q106	TR-36/2N2077
Q107	TR-36/2N2077

TRANSISTORS (Continued)

Q108	TR-17/2N1540
Q109	TR-11/2N1377
Q110	TR-33/2N696
Q201	TR-23/2N520A**
Q202	TR-21/2N338
Q203	TR-10/2N1374
Q204	TR-31/2N445A**
Q205	TR-31/2N445A**
Q206	TR-10/2N1374
Q207	TR-10/2N1374
Q208	TR-31/2N445A**
Q209	TR-21/2N338
Q210	TR-23/2N520A**

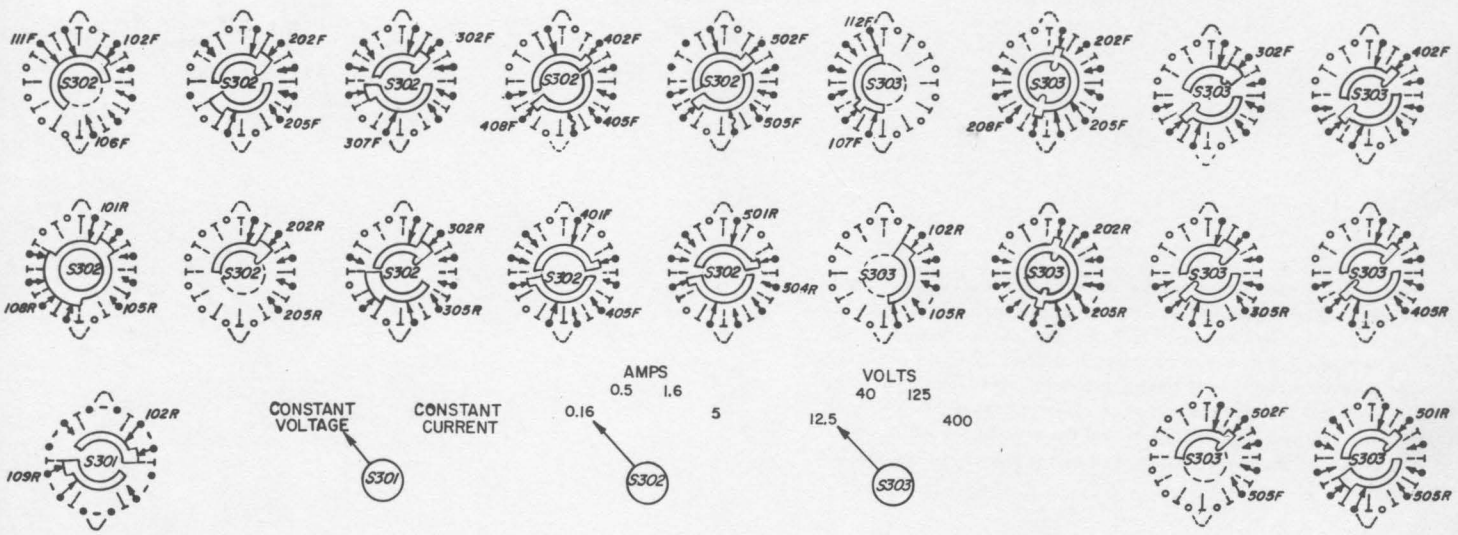
**Selected for H_{fe} between 80 and 125.

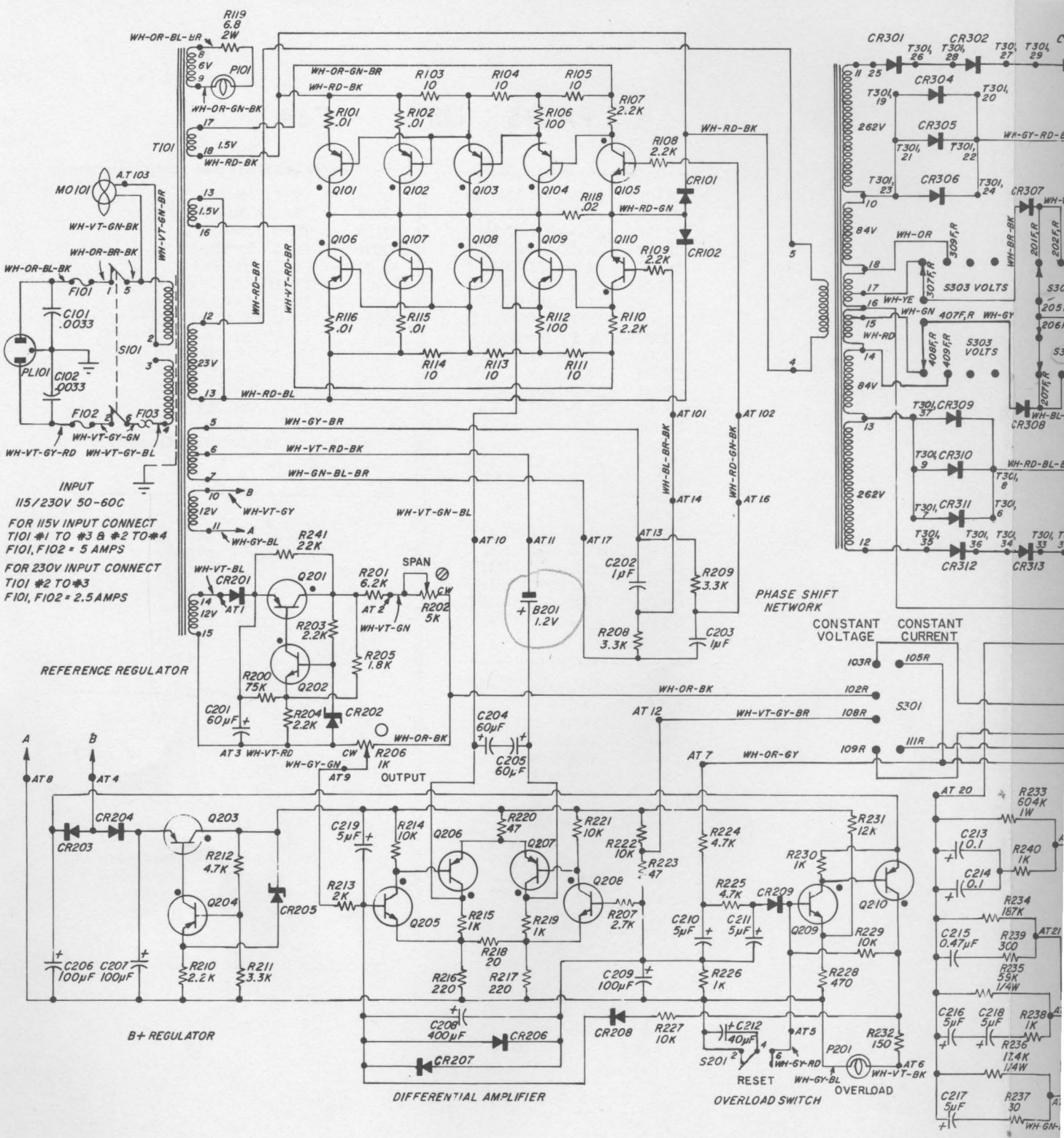
FUSES

115 v:		
F101	5 amp	FUF-1
F102	5 amp	FUF-1
F103		FUC-14
230 v:		
F101	2.5 amp	FUF-1
F102	2.5 amp	FUF-1
F103		FUC-14

MISCELLANEOUS

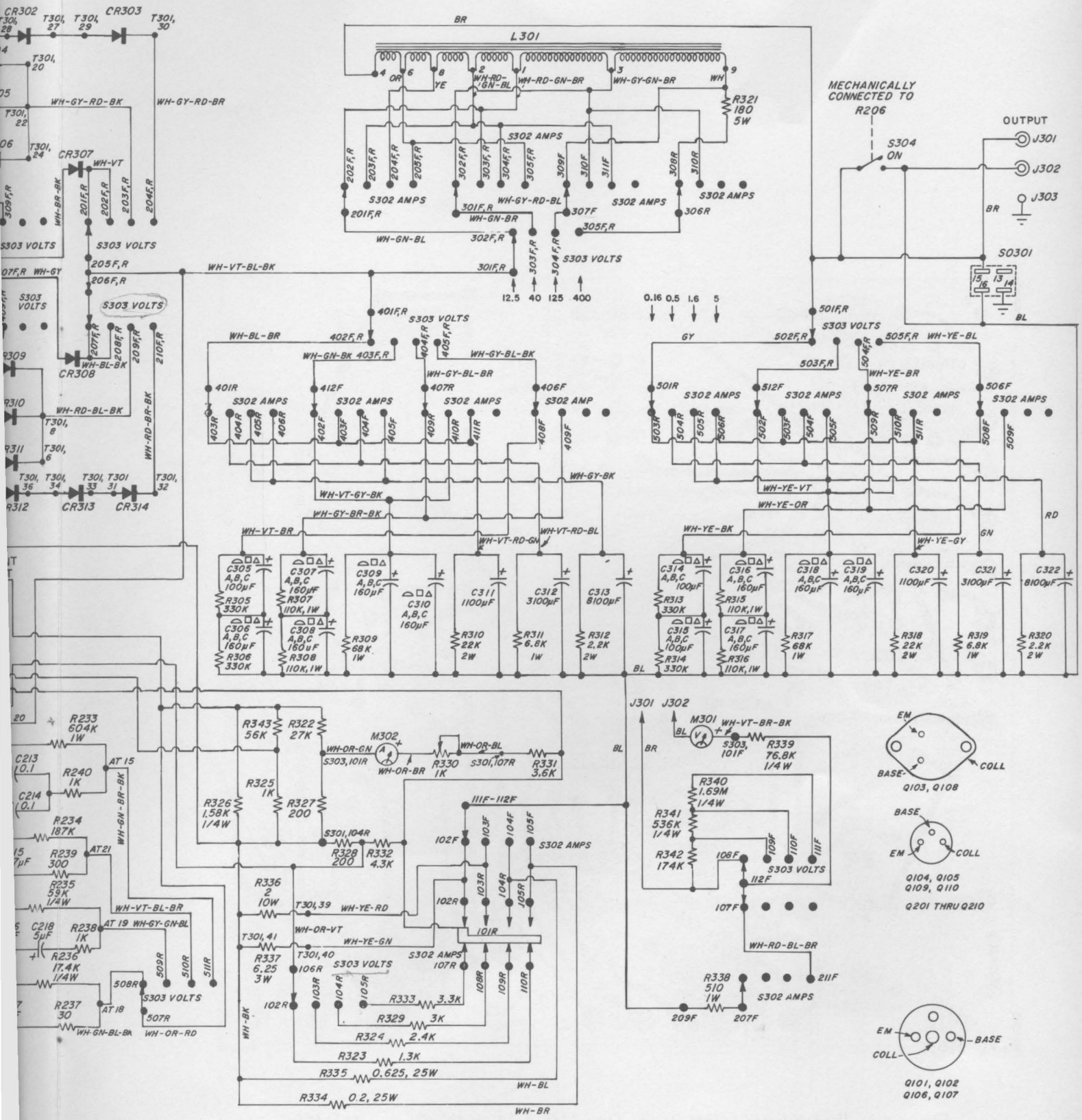
J301	JACK	BP-5R
J302	JACK	BP-5G
J303	JACK	BP-10, 11/16
M301	METER	MEDS-1330
M302	METER	MEDS-1340
P101	PILOT LIGHT	2LAP-939
P102	PILOT LIGHT	2LAP-939A
T101	TRANSFORMER	565-4210
T301	TRANSFORMER	565-4220
L301	INDUCTOR	685-4090
PL101	POWER PLUG	CDPP-10
SO301	SOCKET	CDMS-11-4
MO101	MOTOR	MOD-8
B201	BATTERY	1265-0400





Rotary switch sections are shown as viewed from the panel end of the shaft. The first digit of the contact number refers to the section. The section nearest the panel is 1, the next section back is 2, etc. The next two digits refer to the contact. Contact 01 is the first position clockwise from a strut screw (usually the screw above the locating key), and the other contacts are numbered sequentially (02, 03, 04, etc), proceeding clockwise around the section. A suffix F or R indicates that the contact is on the front or rear of the section, respectively.

Figure 4-2. Schematic diagram for the Type



...r the Type 1265-A Adjustable DC Power Supply.

POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE.

REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM.

RESISTORS 1/2 WATT.

RESISTANCE IN OHMS K =1000 OHMS M =1 MEGOHM

CAPACITANCE VALUES ONE AND OVER IN PICOFARADS, LESS THAN ONE IN MICROFARADS.

◯ KNOB CONTROL ⊘ SCREWDRIVER CONTROL

AT =ANCHOR TERMINAL

TP =TEST POINT

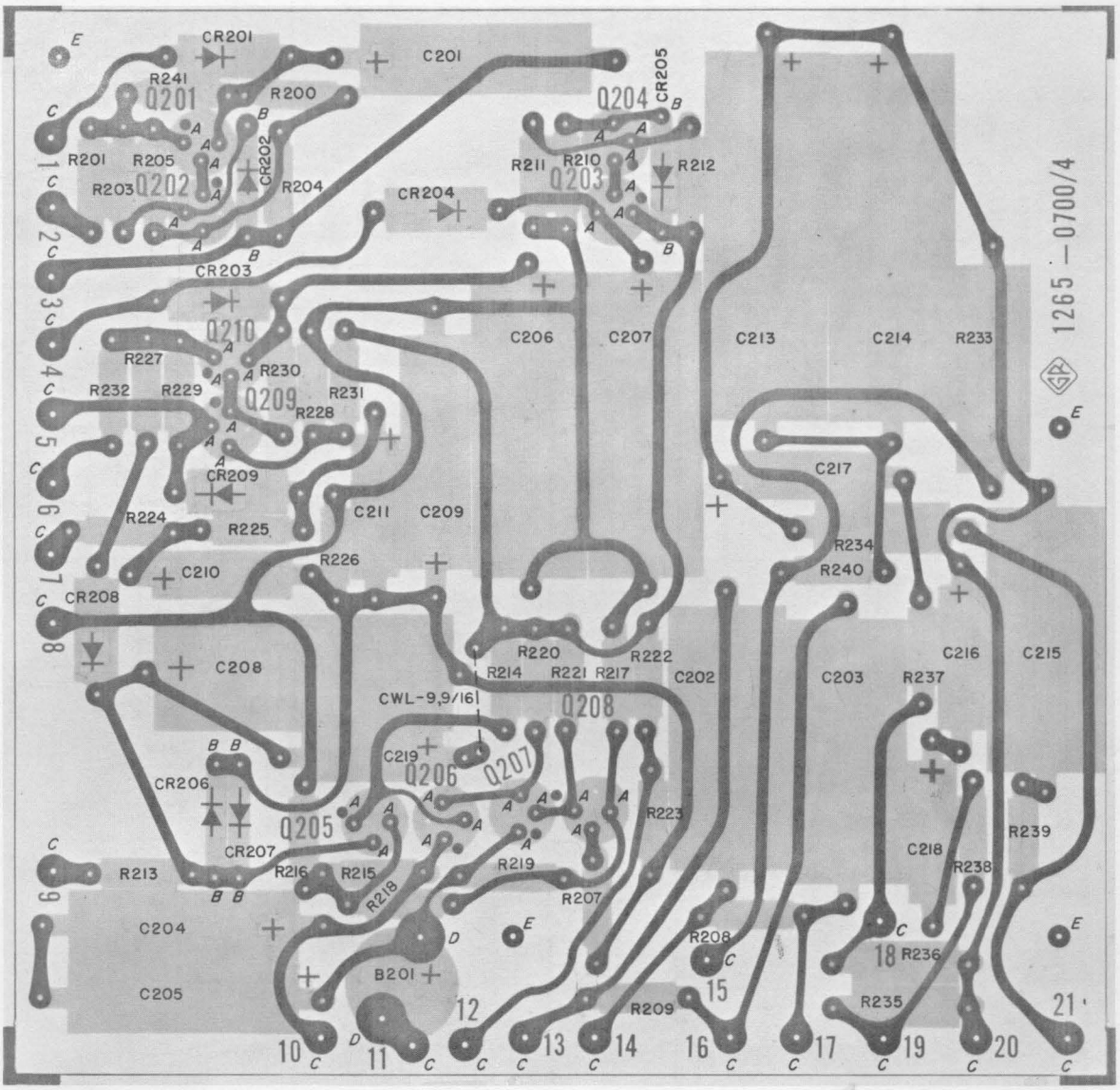


Figure 4-3. Etched board layout for the Type 1265-A Adjustable DC Power Supply.

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