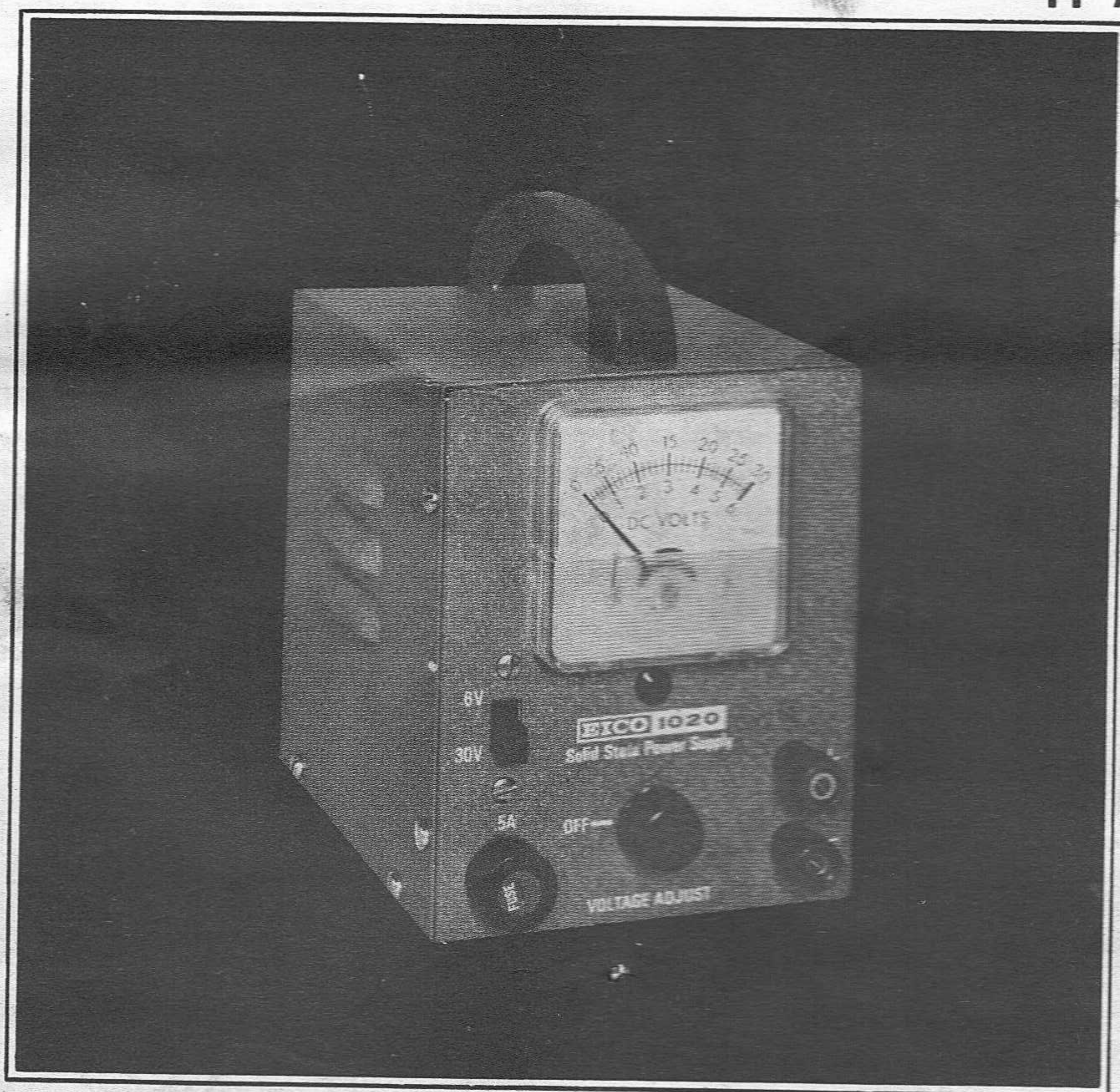




1020 | Solid State Power & Bias Supply



OPERATING MANUAL

GENERAL DESCRIPTION

The EICO Model 1020 is a transistorized d-c power and bias supply. The output, monitored by a dual range voltmeter (0-6 volts and 0-30 volts) is continuously variable from 0 to 30 volts. The maximum ripple under any possible voltage or current condition, is only 1/200 of 1%. The permissible load current is 300 ma. A power transistor in a TO-3 case and a rugged power transformer are used to permit safe and reliable operation over the complete functional range of the instrument. A fuse, accessible from the front panel, protects the unit against shorts and overload. The power supply is housed in a rugged, grey wrinkle, steel case.

FEATURES AND APPLICATIONS

The extremely low ripple and wide voltage range permit the use of this instrument in a wide variety of applications.

The technician can use the 1020 power supply during the servicing of transistor radios, hearing aids and preamplifiers. Any unit, drawing no more than 300 ma, transistorized or otherwise, may be used with this power supply. It can also be used in television and radio servicing work, to offset the AVC and AGC voltages during alignment. In color TV adjustments, the EICO Model 1020 power supply can be used to cut off the color burst amplifier. DC filament supply voltages can be taken from this unit if the current rating of the 1020 is not exceeded.

In the laboratory, the EICO Model 1020 has innumerable applications. It can be used advantageously in design of transistor radios, tuners, and preamplifiers. The low ripple characteristics will permit the engineer to use this unit as a variable bias supply in the development of transistor or vacuum tube circuits. The application as a filament bias supply is obvious. It also permits the checking of the current and voltage characteristics of high resistance relays.

SPECIFICATIONS

Voltage Range: 0-30V, continuously variable

Voltmeter Ranges: 0-6V, 0-30V. Ranges selected by slide switch.

Maximum Current Capacity: 300 ma

Ripple: Full load - 1/200 of 1% - 120 Hz

Fuse: 1/2 Amp slow blow in DC circuit

Power Line Requirements: 110-120 volts, 50/60 Hz AC

Power Consumption: 20 watts

CIRCUIT DESCRIPTION

The power supply is essentially a full wave circuit. The transistor is in a grounded collector circuit, maintaining the ripple at a negligible level.

In the primary circuit of the transformer, the switch (physically on the rear of the voltage output control) turns the power supply as well as the neon bulb indicator on and off. There is no fuse in this circuit. Thus, the fuse protecting the transistors and DC circuitry may be blown while the neon bulb remains lit.

The center tapped secondary is converted to DC by employing the full wave rectifier circuit, using two silicon diodes. The cathode side of these diodes is positive (+), while the center tap of the transformer is the negative (-) side. A 500 mfd filter capacitor smooths the ripple.

The transistor is connected in a grounded collector circuit — not unlike the cathode follower circuit in vacuum tubes.

The base current of the transistor is controlled by the potentiometer. This current will affect the emitter current, which will in turn determine the output voltage.

Any ripple that may get through this circuit is reduced by the 50 mfd capacitor across the output terminals of the EICO Model 1020. Do not add more capacity here, or elsewhere, as optimum values have been selected.

A meter monitors the output voltage. When the 1.5K resistor in series with the meter movement is shorted, the meter reads 6 volts full scale. When the resistor is in the circuit, the reading is 30 volts full scale.

One further circuit refinement is the location of the fuse. In its location, it is the most direct method in preventing any continuous current overload of the transistor. If it were in the primary, its action would not be as exact, due to transformer resistive and core losses. In the primary circuit, the ratio of the short circuit current to the working current is not as high as in the secondary circuit.

FUNCTION OF CONTROLS & TERMINALS

The two jacks at the lower, right hand corner of the panel are for voltage output. The polarities are as marked. The negative (-) terminal is also chassis ground. The positive (+) terminal should, therefore, never be shorted to the chassis or panel.

The VOLTAGE ADJUST control regulates the amount of voltage across the output terminals. As the control is advanced in the clockwise direction, the voltage across the terminal jacks is increased. In the maximum counter-clockwise position, the unit is turned "OFF" when the click of the switch on the control is heard.

The slide switch at the left determines the voltage range of the meter. When the slide is advanced upward, the full range meter reading is 6 volts. With the slide switch in the "down" position, the full range meter reading is 30 volts. Do not switch from the 30 volt to the 6 volt position unless the meter reads less than 6 volts on the 30 volt scale.

The fuse is a 1/2 amp, slow blow type. When replacing this fuse, use only the exact replacement, as marked on the fuse.

The indicator bulb, below the meter, can be on, whether or not the fuse is blown. It indicates if your power supply is switched on or off.

OPERATION

The first step is to determine the voltage you will need. Set the meter range selector to the desired position. If you require less than 6 volts, put the slide switch in the 6V position and read the voltage on the black meter scale. If you require from 6 to 30 volts, put the slide switch in the 30V position and read the voltages on the red meter scale. Never switch from the 30 volt range to the 6 volt range unless the meter reads less than 6 volts on the 30 volt scale.

Next, connect the load (radio, hearing aid, etc.) across the output terminals. Note the polarity required for the load. Reversing the polarity may ruin the Model 1020 power supply, as well as the item you have connected to it. When the load you are using has no specific polarity requirements, such as a relay, it may be connected in either direction.

You are now ready to apply voltage. Set the range switch in the proper position, as described above, with the load connected. Turn the VOLTAGE ADJUST knob up slowly, until the meter reads the voltage you require.

A milliammeter, in series with the load is useful. If, when increasing the voltage, you find the milliammeter reads more than expected, DO NOT increase the voltage any further until you have discovered the trouble with the item under test.

After using the instrument, turn the Model 1020 off by turning the VOLTAGE ADJUST knob to the maximum counterclockwise position, until a click is heard and the light from the indicating bulb under the meter movement is extinguished.

APPLICATIONS

1. Transistor radios usually run on batteries. For use at home, when AC power is available, it is wasteful to power your radio by battery. Disconnect your battery from the radio and connect the terminals, previously connected to the battery, to the power supply. It must be connected to the power supply with the same polarity as it was previously connected to the battery. The terminal that has been connected to the (+) on the battery is now to be

connected to the (+) jack on the 1020 power supply. The remaining terminal is to be connected to the (-) jack on the 1020. Turn your VOLTAGE ADJUST control up until the rated battery voltage is reached.

2. For repair work, the EICO Model 1020 power supply can be substituted for a battery when current requirements are consistent with the current limitations of the 1020. This unit can be used to supply power for transistor radios, transistor hearing aids, transistorized preamplifiers, transistorized instruments, etc. In each case, adhere to the polarity and voltage of the battery ordinarily used with the item to be repaired. A milliammeter, connected in series with the unit under repair, is a necessity to indicate current drain. It safeguards the item you are testing while indicating a possible overload of your power supply.

3. In aligning radios and television sets, it is frequently necessary to "kill" the AVC and AGC. A method for doing this, without upsetting the operation of the receiver, is to supply a low impedance voltage of average value across the AVC and AGC line. This is discussed in full detail in "TV Sweep Alignment Techniques" by Art Liebscher on page 52 (Rider), in "How to use Signal and Sweep Generators" by J. R. Johnson on page 87 (Rider), and in "Sweep and Marker Generators for TV and Radio" by R. G. Middleton on page 177 (Gernsback).

The Model 1020 power supply is extremely important in this application.

4. In color television sets, manufacturers recommend that the color killer be biased up to 30 volts during the alignment procedure. In this application, the EICO Model 1020 power supply is ideal. For exact procedure in each individual case, see the manufacturer's service manual.

5. The Model 1020 can be used as a substitute bias supply in designing vacuum tube or transistor circuits. Connected in the proper polarity to the transistor or vacuum tube element under test, vary the voltage until the optimum operating condition for the device in question is achieved.

6. Filament current can be supplied by your Model 1020 power supply, in some applications. In any case, be certain that you do not exceed the current rating of your Model 1020 as indicated in the specifications.

7. It is frequently possible to reduce the hum in a high fidelity preamplifier by biasing the filaments to a DC voltage above or below ground potential. To determine the best voltage for this application, remove any connection from the filament circuit to ground in your preamplifier. Connect the (-) jack on your model 1020 to the chassis, and the point in the filament circuit lifted off ground to the (+) jack. Turn the VOLTAGE ADJUST knob until minimum hum conditions are achieved.

Next reverse the connection to the power supply, connecting the chassis to the (+) jack on your 1020 and the (-) jack to the filament circuit, as above. Once again, turn the VOLTAGE ADJUST up until the minimum hum condition is achieved. The lower minimum hum condition is the desired voltage and polarity to be applied to the heater circuit. It is frequently difficult to ascertain the optimum bias voltage due to only slight variations.

8. To check low current, high resistance relays, connect the relay through a milliammeter to the power supply. These units are usually not polarized so they may be connected in either direction to the 1020. Turn the voltage up until the relay closes. The reading on the 1020 meter will indicate the voltage necessary to actuate the relay, while the milliammeter will read the current at this voltage.

9. This unit can be used in small electroplating applications. Connect the negative (-) jack on your Model 1020 to the item to be plated, the cathode. Connect the positive (+) jack on your Model 1020 power supply, through a milliammeter, to the remaining anode terminal. Turn the voltage adjust control up until the milliammeter shows a reading of 100 to 150 ma. The lower the current, the better the plating deposit, but the longer in time consumption. It may take several hours until the plating process is completed to your satisfaction. Refer to your chemistry text books for complete details as to plating solutions, materials, and spacings.

MAINTENANCE

Your instrument should require very little servicing if the precautions as to overloading and polarity are observed scrupulously. To facilitate servicing, some possible troubles and their causes are listed in the TROUBLESHOOTING CHART. Before proceeding, make certain your unit has been wired correctly. A RESISTANCE CHART is also provided as an aid to locating defective components.

RESISTANCE CHART

CONDITIONS OF MEASUREMENT: VOLTAGE ADJUST knob turned to OFF. Model 1020 disconnected from AC line. Slide switch set to "30V" position. Transistor removed from socket. Positive lead of ohmmeter always goes to given test point, and negative lead of ohmmeter to negative output terminal J2 (ground) unless specified otherwise. R2 at max counterclockwise position. NOTE: After the resistance checks are completed, do not forget to replace transistor in socket in the same orientation as before.

TEST POINT	OHMS	COMMENT
Collector terminal on socket	500-2K	If high, check wiring. If low, check for shorts (partial), defective C1, and/or silicon diodes.
Base terminal on socket	200	If not obtained, check components or wiring in path for shorts.
Emitter terminal on socket	500-2100	If not obtained, check for defective components or wiring in path. Check C4.

If diodes are suspected, disconnect each one from the circuit. First connect your ohmmeter leads across each diode in one direction and then in the reverse direction. Use a low ohms scale. If the two readings do not differ by a ratio of greater than 20 to 1, the diode is defective.

While it is out of the circuit, check the transistor. Connect the more positive lead of your ohmmeter to the base of Q1, using the low range. (This is the lead with the more positive voltage and not necessarily the lead connected to the positive jack on your ohmmeter. You can check which lead is more positive by connecting the leads to another d-c voltmeter and noting the connection that gives a deflection on the meter.) Note the resistance to the collector and to the emitter. Now connect the negative lead of your ohmmeter to the base. The readings to the collector and emitter should be much higher than they were in the first reading.

When you remount the transistor onto the chassis, check the resistance between the case and the chassis. It must be more than 500 ohms when the negative lead is at ground or J2. If it is less or shorted, the insulating mica must be replaced. Be sure to use silicon grease between the transistor, mica, and chassis.

TROUBLESHOOTING CHART

Symptom	Cause	Remedy
Pilot light does not light	Lead broken Line cord on plug open	Resolder Replace
Pilot light on, but no meter indication	Open fuse Defective meter Open power transformer Defective transistor	Replace Replace Replace Test and replace
Voltage cannot be adjusted to zero	Shorted transistor	Test and replace
Meter does not read on 6V range	Open meter Open 1.5K resistor	Replace Replace
Voltage cannot be adjusted to 30 volts	Body of transistor shorted to chassis Low capacity at C1 Defective D1 or D2 Defective pot Defective transistor	Check mica washer between transistor and chassis Replace Replace Replace Test and replace
Tunable cross-modulation in application	Plug inserted in wrong direction in AC line outlet	Reverse plug in AC line outlet

PARTS LIST

<u>PRICE EA.</u>	<u>STOCK NO.</u>	<u>SYM. NO.</u>	<u>DESCRIPTION</u>	<u>QTY</u>
<u>RESISTORS</u>				
.04	10018	R1	22K, 1/2W, 10%	1
.05	10439	R3,4	100 ohm, 1/2W, 10%	2
.43	11068	R5	1.5K, 1/2W, 1%	1
<u>POTENTIOMETER</u>				
2.64	18221	R2/S1	lin., 2K, 1/2W, w/switch, spst	1
<u>CAPACITORS</u>				
.52	23011	C4	elect., 50 mfd, 50V	1
1.98	23026	C1,3	elect., 500 mfd, 50V	2
1.28	23093	C2	elect., 300 mfd, 50V	1
<u>TRANSFORMER</u>				
6.12	30032	T1	power	1
<u>HARDWARE</u>				
.01	40000		nut, hex, #6-32 x 1/4	4
.02	40001		nut, hex, 3/8-32	1
.01	40008		nut, hex, 8-32 x 5/16	4
.02	40012		nut, hex, 10-32	2
.06	40016		nut, hex, 1/2-24	1
.12	40034		nut, tinnerman, #4	2
.05	40050		nut, hex, 6-32 x 5/16, KEP	2
.01	41006		screw, 10-24 x 3/8, b.h.	2
.06	41014		screw, 6-32 x 3/8, b.h.	2
.01	41016		screw, 4-40 x 1/4, b.h.	2
.01	41035		screw, 6 x 1/4 P.K. b.h.	8
.01	41086		screw, 6-32 x 5/16, b.h.	2
.01	41145		screw, 6 x 1/2 hex head, PK	2
.02	41153		screw, 6-32 x 3/8 #3, b.h.	2
.01	42000		washer, lock, 3/8	1
.01	42001		washer, 3/8 flat metal	1
.01	42002		washer, lock, #6	4
.04	42029		washer, rubber, 1/2"	1
.07	42043		washer, shoulder, black	1
.01	42044		washer, flat, black	1
.01	42046		washer, flat metal, #8	2
.08	42048		washer, mica	1
.01	42080		washer, shoulder, red	1
.01	42081		washer, flat, red	1
.06	43000		lug, ground, #6	2
.03	43001		lug, pot, ground, 3/8	1
.03	43019		lug, ground, #8	2
.06	43021		lug, ground, #10	2
.05	46000		grommet, 3/8, rubber	1

<u>PRICE</u> <u>EA.</u>	<u>STOCK</u> <u>NO.</u>	<u>SYM.</u> <u>NO.</u>	<u>DESCRIPTION</u>	<u>QTY</u>
<u>BINDING POSTS, TERMINAL STRIPS & KNOB</u>				
.56	52001	J2	binding post, black, #8, 5 way	1
.56	52002	J1	binding post, red, #8, 5 way	1
.48	53027		knob, round instr. 15/16" dia.	1
.05	54000		terminal strip, 1 post, left	1
.09	54008		terminal strip, 4 post	1
.06	54024		terminal strip, 2 post, left	1

SWITCH

.52	62001	S2	slide, spst	1
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METER

6.75	74025	M1	D. C. volts	1
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SHEET METAL & MISCELLANEOUS

.90	57004		line cord	1
.03	58300		sleeving	3-1/2"
1.50	66591		manual, operating	1
2.00	66592		manual, assembly	1
4.20	81176		front panel	1
3.85	81177		cover	1
2.30	81713		chassis	1
1.14	87000		handle	1
.12	89749		silicone grease capsule	1
.05	97710		jewel, pilot light assy, red	1

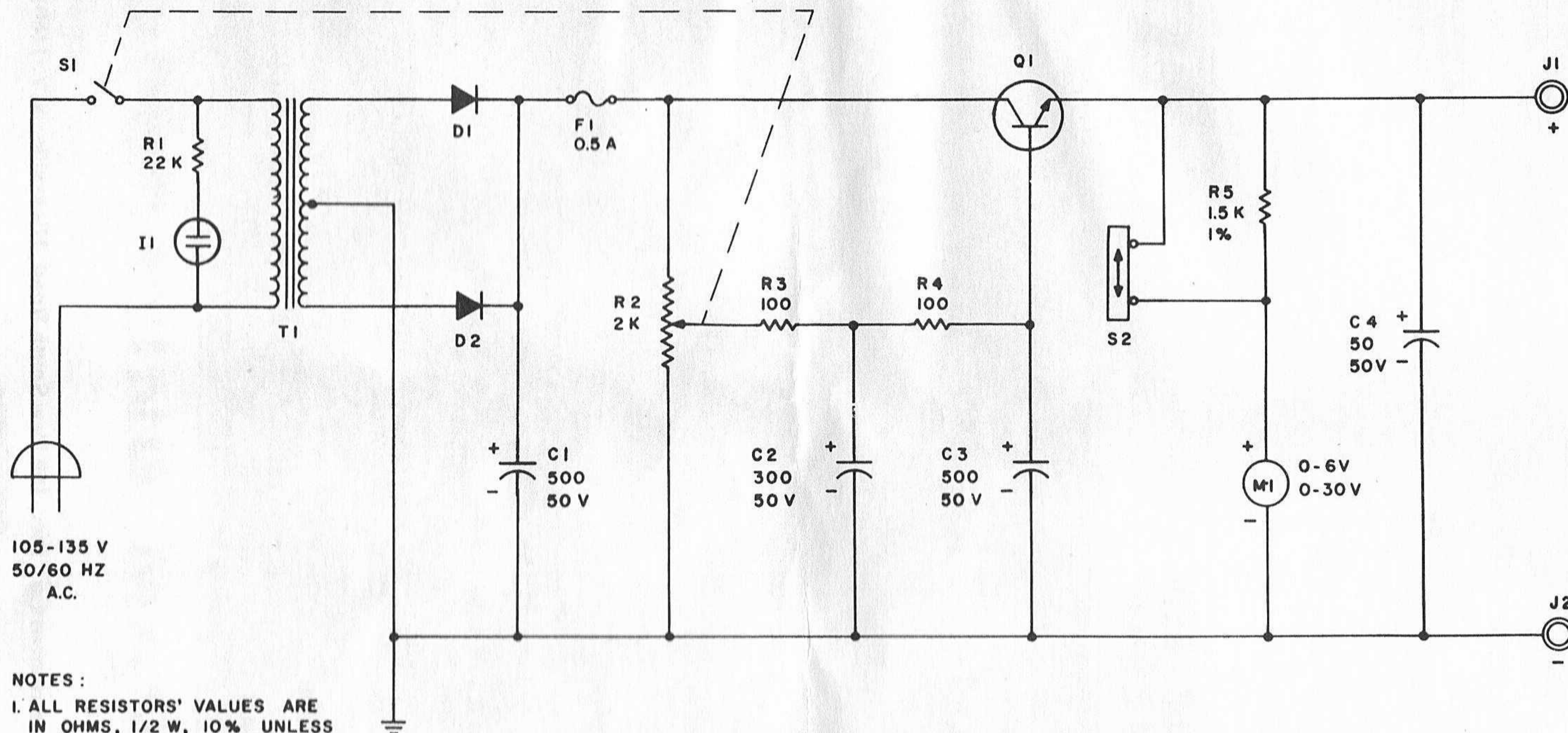
TRANSISTOR, DIODES, FUSE & BULB

.37	91007	F1	fuse, .5 AMP	1
.47	92008	I1	bulb, NE2H	1
.36	93005	D1,2	diode, sil.	2
2.30	94059	Q1	transistor	1

SOCKET & FUSE HOLDER

.20	97101	XQ1	socket, transistor	1
1.79	97803	XF1	fuse holder	1

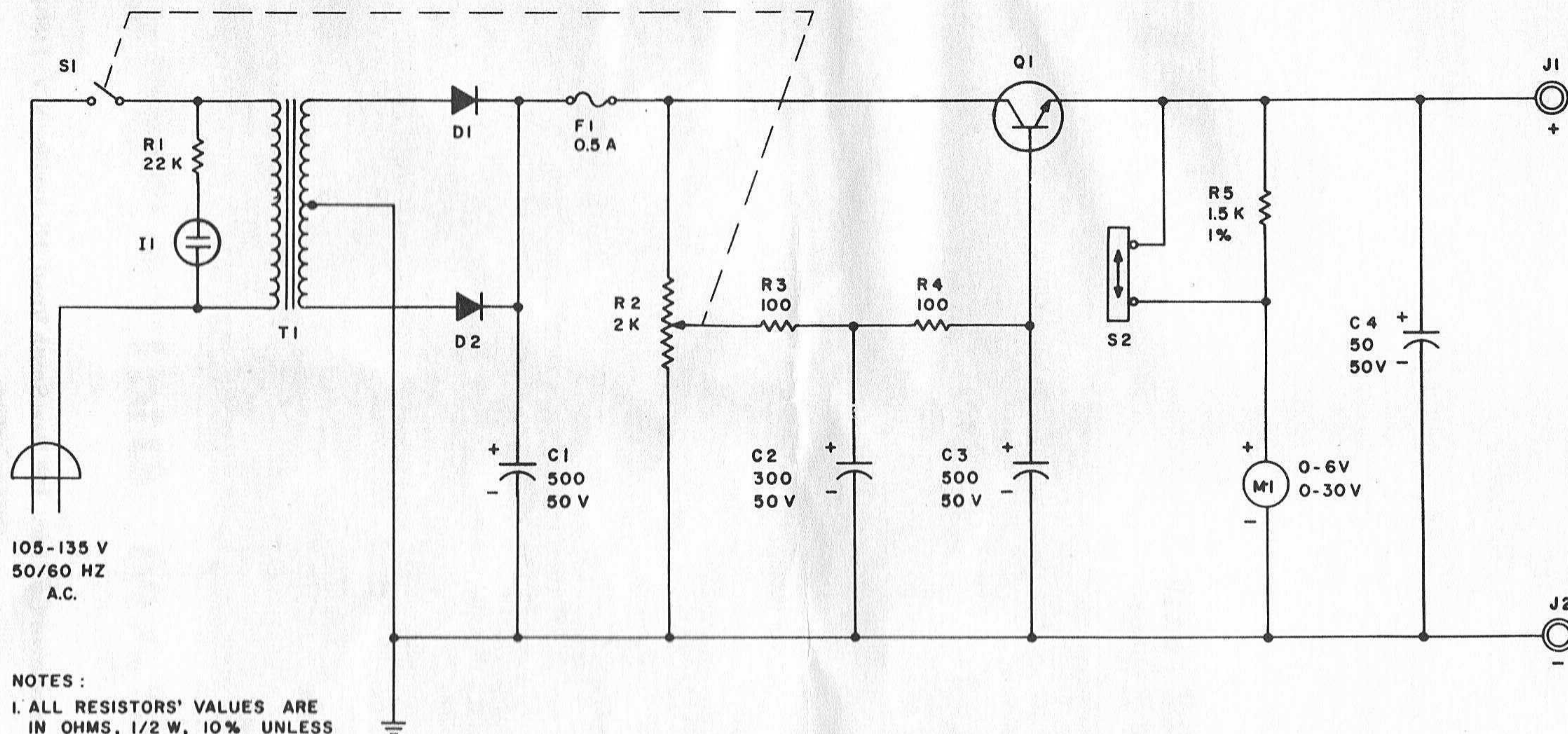
Prices and specifications subject to change without notice. To order replacement parts, remit with order; specify part number and description. Add \$1.00 for mailing and handling; if a power transformer is included in the order, add \$1.50 for mailing and handling.



SCHEMATIC DIAGRAM

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