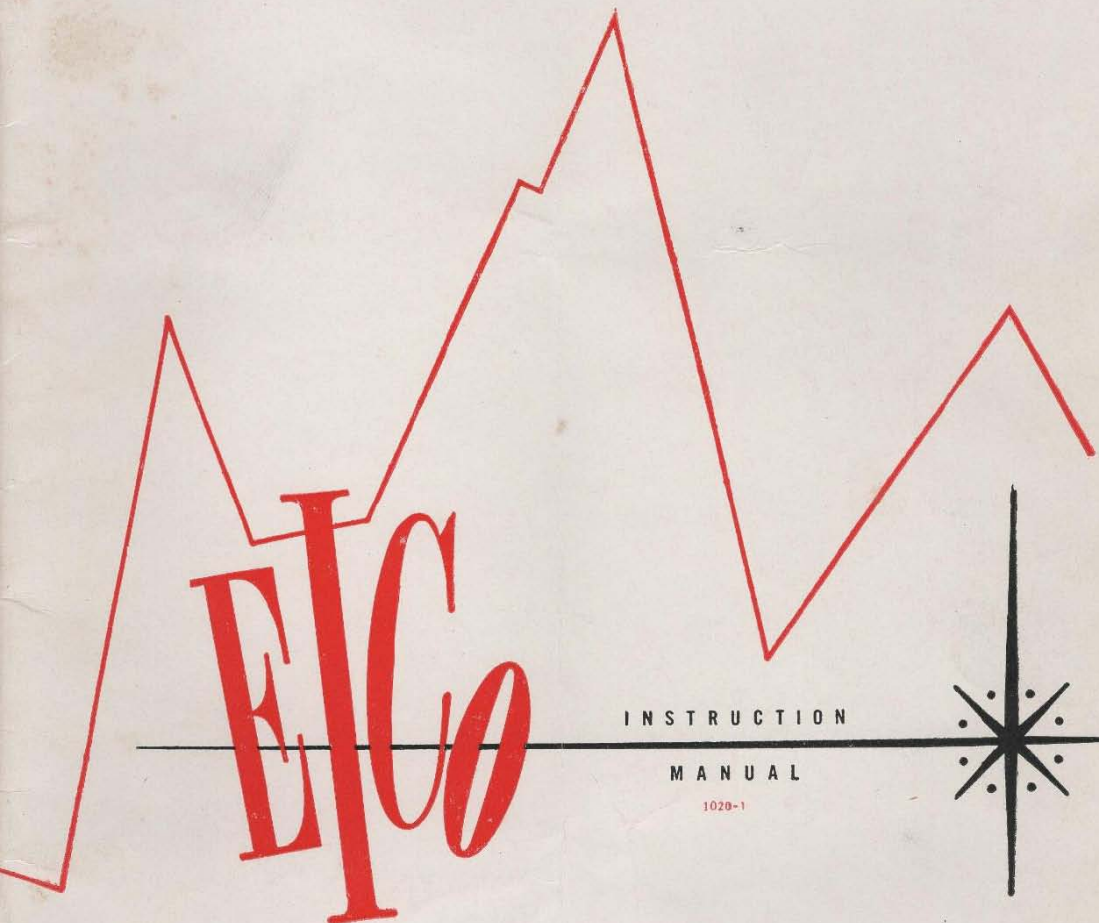


TRANSISTORIZED POWER & BIAS SUPPLY

MODEL

1020



EICO

INSTRUCTION

MANUAL

1020-1



ELECTRONIC INSTRUMENT CO. INC.
3300 NORTHERN BLVD., L. I. CITY 1, N. Y.



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 150 ma when operating the unit from 0-12 volts, 200 ma when operation is from 12 to 24 volts and 300 ma when operation is from 24 to 30 volts. Two type 2N256 power transistors 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 permits 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 the currents recommended above, 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 ratings of the 1020 are 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:

Voltage Output: 0-12V, Max. current: 150 ma

Voltage Output: 12-24V, Max. current: 200 ma

Voltage Output: 24-30V, Max. current: 300 ma

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

Fuse: 1/2 Amp slow flow in DC circuit

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

Power Consumption: 20 watts

Size (HWD): 5" x 4" x 5 1/2"

Shipping Weight: 4 1/2 lbs.

CIRCUIT DESCRIPTION

The power supply is essentially a full wave circuit. Two transistors in series, connected in grounded collector circuitry, maintain the ripple at a negligible level.

In the primary circuit of the transformer, the switch (physically on the rear of the dual pot, 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, going through the fuse, is the negative (-) side. A 500 ufd filter condenser smooths out the ripple.

Two PNP transistors are connected in series, so that the full voltage from the diode circuit may be applied across the two units. They are connected in a grounded collector circuit — not unlike the cathode follower circuit in vacuum tubes.

The collector-base voltage for each transistor is controlled by the dual potentiometer. This voltage will affect the emitter current, which will in turn determine the output voltage. The transistors are operated at the saturation region of the curve, so that small voltage variations in the collector circuit will not result in current variation in the emitter circuit. These small variations may be ripple voltages at the transistor input, which are thus not transformed into ripple current at the transistor or power supply output. This results in an extremely good ripple factor.

Any ripple that may get through, is further reduced by the 50 ufd 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 out, 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 transistors. 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. Next, find the current drawn by the unit to be powered by your 1020. If you need 0 to 12 volts, do not use loads requiring more than 150 ma from your 1020. If you need 12 to 24 volts, do not use loads requiring more than 200 ma from your 1020. If you need 24 to 30 volts, do not use loads requiring more than 300 ma from your 1020. The actual current drawn can be determined by inserting a milliammeter in series with the unit connected to the power supply.

After you have decided upon the voltage you need, and have determined that the current drain is within the specifications of your EICO Model 1020 power supply, 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 counter-clockwise 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 which 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. If 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 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 ratings 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 in 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 TROUBLE-SHOOT-been wired correctly. VOLTAGE and RESISTANCE charts are also provided as an aid to locating defective components.

SERVICE

If trouble develops in your instrument which you can not remedy yourself, write to our service department listing all possible indications that might be helpful. If desired you may return the instrument to our factory where it will be placed in operating condition for \$4.00 plus the cost of parts replaced due to their being damaged in the course of construction. NOTE: Before returning this unit, be sure all parts are securely mounted. Attach a tag to the instrument, giving your home address and the trouble with the unit. Pack very carefully in a rugged container, using sufficient packing material (cotton, shredded newspaper, or excelsior), to make the unit completely immovable within the container. The original shipping carton is satisfactory, providing the original inserts are used or sufficient packing material inserted to keep the instrument immovable. Ship by prepaid Railway Express, if possible, to Electronic Instrument Co., Inc., 33-00 Northern Blvd., Long Island City 1, New York. Return shipment will be made by express collect. Note that a carrier cannot be held liable for damages in transit if packing IN HIS OPINION, is insufficient.

RESISTANCE CHART

TEST POINT	OHMS	COMMENT
TR1, TR2 body and all mounting screws	3-4K	If high, check wiring If low, check for shorts (partial) If zero, transistor body probably shorted to chassis; check mica washers for damage
XTR1-1 XTR1-2	2-4K	If not obtained, components or wiring in path defective
XTR2-1	2-3K	If not obtained, components or wiring in path defective.
XTR2-2	0	If not obtained, components or wiring in path defective
pos. ohmmeter lead to pos. lead of C2 neg. ohmmeter lead to neg. lead of C2	3K after one minute	Near or dead short indicates defective wiring or shorted silicon rectifier
J1	1-2K	Near or dead short indicates wiring error or shorted C5 capacitor

CONDITIONS OF MEASUREMENT: Voltage ADJUST knob turned to OFF. Model 1020 disconnect from AC line. Slide switch set to "30V" position. Both transistor sockets XTR1 and XTR2 removed from the transistor and left hanging free by their leads. Positive lead of ohmmeter always goes to given test point, and negative lead of ohmmeter to negative output terminal J2 (ground) unless specified otherwise. NOTE: After the resistance checks are completed, do not forget to replace sockets XTR1 and XTR2 on transistors TR1 and TR2 in the same orientations they had previously. See Fig. 1 below.

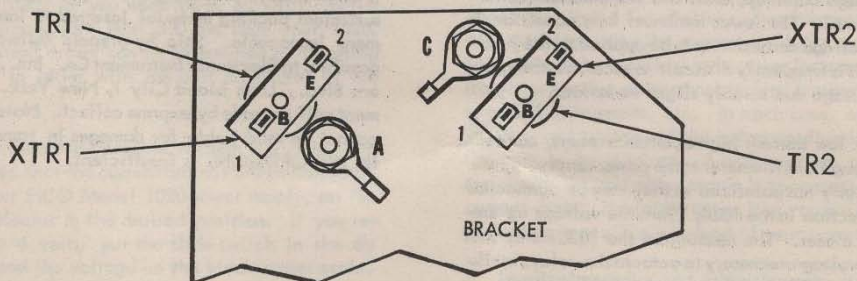


Fig. 1. Transistor socket lug identification & location of test points

VOLTAGE CHART

MEASURED BETWEEN

DC VOLTS

Pt. A on schematic (neg. voltmeter lead)
and XTR1-2 (pos. voltmeter lead)

20-26

Pt. C on schematic (neg. voltmeter lead)
and XTR2-2 (pos. voltmeter lead)

20-26

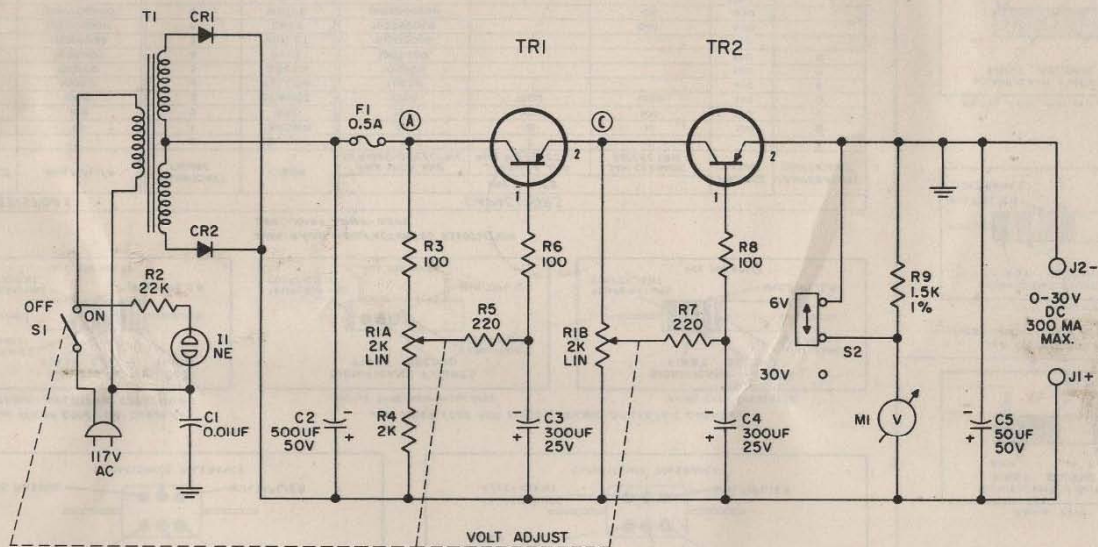
CONDITIONS OF MEASUREMENT: Voltage ADJUST control turned on, but left at the furthest counter-clockwise setting (advancing the VOLTAGE ADJUST control will decrease the voltages measured above). Slide switch set to 30V position. Power supply plugged into 117VAC line. Turn instrument off between measurements and during connection or disconnection of voltmeter leads. Voltmeter should be a VTVM or a VOM of at least 5000 ohms/volt. DO NOT operate the power supply unless the voltages measured above are within the prescribed range.

TROUBLE-SHOOTING 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 can not be adjusted to zero	Body of transistor shorted to chassis Shorted transistor	Check mica washer between transistor and chassis Test and replace
Meter does not read on 6V range	Open meter Open 1.5K resistor, K9	Replace Replace
Voltage can not be adjusted to 30 volts	Low capacity at C2 Defective CR1 or CR2 Defective dual pot Defective transistor	Replace Replace Replace Test and replace
Tunable cross-modulation in application	Defective C1 Plug inserted in wrong direction in AC line outlet	Replace Reverse plug in AC line outlet

REPLACEMENT PARTS LIST

Stock #	Symbol	Description	Am't.	Stock #	Symbol	Description	Am't.
22519	C1	cap., disc., .01mfd $\pm 10\%$ (10k or 10,000)	1	41006		screw, #10-24	2
23026	C2	cap., elec., 500mfd, 50V	1	41014		screw, #6-32 x 3/8	4
23017	C3, 4	cap., elec., 300mfd, 25V	2	41016		screw, #4-40 x 1/4	2
23011	C5	cap., elec., 50mfd, 50V	1	41035		screw, #6 PK	8
93005	CR1, 2	rectifier, silicon, 200 ma.	2	42000		washer, 3/8 lock	1
91007	F1	fuse, .5A	1	42001		washer, 3/8 flat	1
92008	II	bulb, NE-2H	1	42002		washer, #6 lock	4
52002	J1	binding post, red (PLUS)	1	42004		washer, #10 lock	2
52001	J2	binding post, black (MINUS)	1	42006		washer, #6 fibre shoulder	4
74007	M1	meter	1	42011		washer, #10 flat	2
18056	R1A, 1B	pot., dual 2K Ω with switch	1	42029		washer, rubber for fuseholder	1
10018	R2	res., 22K Ω , 1/2W, $\pm 20\%$	1	42043		washer, bakelite shoulder	2
10439	R3, 6, 8	res., 100 Ω , 1/2W, $\pm 10\%$	3	42044		washer, bakelite flat	2
10423	R4	res., 2.2K Ω , 1/2W, $\pm 10\%$	1	42046		washer, #8 flat metal	2
10004	R5, 7	res., 220 Ω , 1/2W, $\pm 20\%$	2	42048		washer, mica for transistor	2
11068	R9	res., 1.5K Ω , 1/2W, $\pm 1\%$	1	43000		lug, #6	1
	S1	switch, SPST on R1	1	43001		lug, 3/8 flat	1
62001	S2	switch, slide SPST	1	43002		lug, #10	2
30032	T1	transformer, power	1	43004		lug, #8	6
54003	TB1	term. strip, 2 post	1	46000		grommet, 3/8	2
54018	TB2	term. strip, 4 post w/gnd.	1	53027		knob	1
54008	TB3	term. strip, 4 post	1	57000		line cord	1
54014	TB4	term. strip, 3 post, 2 left	1	58004		wire hookup	length
94004	TR1, 2	transistor, 2N256 <i>2N307?</i>	2	58300		spaghetti	length
97800	XF1	fuseholder	1	58501		wire, bare	length
97045	XTR1, 2	socket, transistor	2	81176		front panel	1
40000		nut hex, #6-32	9	81177		cover	1
40007		nut hex, #4-40	2	81910		chassis	1
40008		nut hex, #8-32	4	87000		handle	1
40012		nut hex, #10-32	2	97710		jewel, red	1
40016		nut hex, 1/2-24 (for fuseholder)	1	66075		Manual of Instruction (Wired)	1
40018		nut hex, 3/8-32	1	66324		Manual of Instruction (Kit)	1
41000		screw, #6-32 x 1/4	5				



(A), (C) ARE TEST POINTS

EICO

MODEL 1020

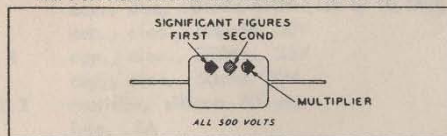
TRANSISTORIZED POWER & BIAS SUPPLY

EICO

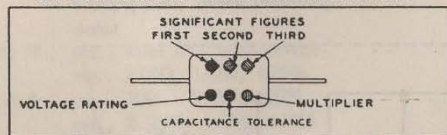


CAPACITOR COLOR CODES

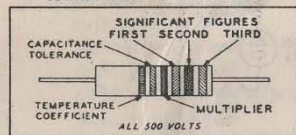
RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



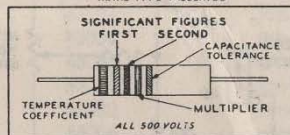
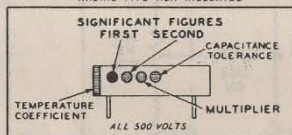
RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



JAN COLOR CODE FOR FIXED CERAMIC-DIELECTRIC CAPACITORS

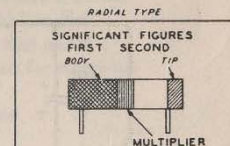
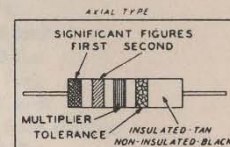


RMA: RADIO MANUFACTURERS ASSOCIATION
JAN: JOINT ARMY-NAVY

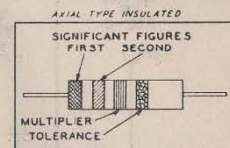
RESISTORS				CAPACITORS				
TOLERANCE	MULTIPLIER	SIGNIFICANT FIGURE	COLOR	MULTIPLIER			VOLTAGE RATING	TEMPERATURE COEFFICIENT
	1	0	BLACK	RMA MICA AND CERAMIC-DIELECTRIC	JAN MICA AND PAPER-DIELECTRIC	JAN CERAMIC DIELECTRIC		A
	10	1	BROWN	10	10	10	100	B
	100	2	RED	100	100	100	200	C
	1000	3	ORANGE	1000	1000	1000	300	D
	10000	4	YELLOW	10000	10000	10000	400	E
	100000	5	GREEN	100000			500	F
	1000000	6	BLUE	1000000			600	G
	10000000	7	VIOLET	10000000			700	
	100000000	8	GRAY	100000000		0.01	800	
	1000000000	9	WHITE	1000000000		0.1	900	
5	0.1		GOLD	0.1	0.1		1000	
10	0.01		SILVER	0.01	0.01		2000	
20			NO COLOR				500	

RESISTOR COLOR CODES

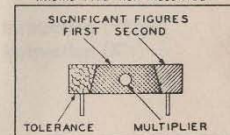
RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS



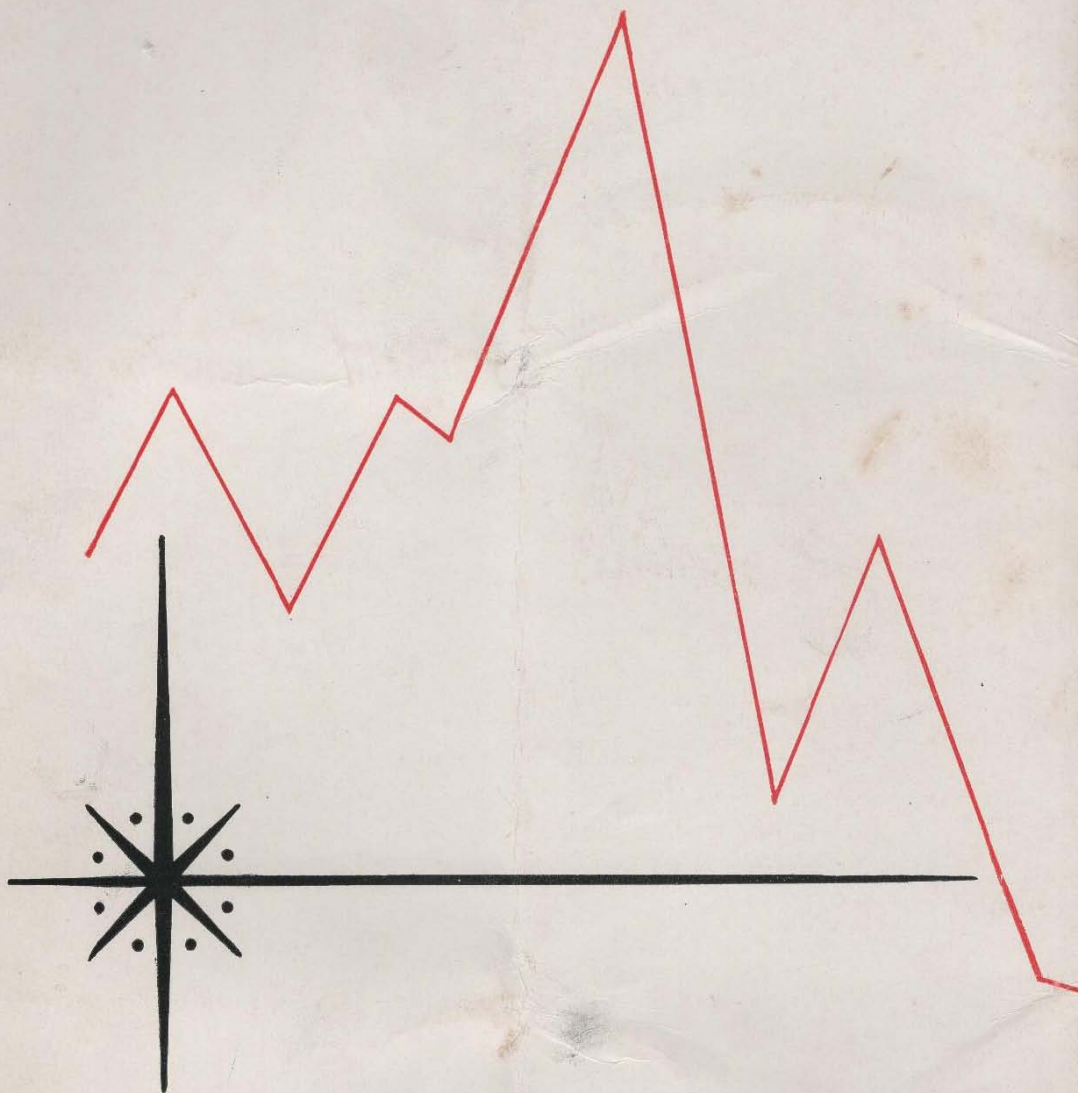
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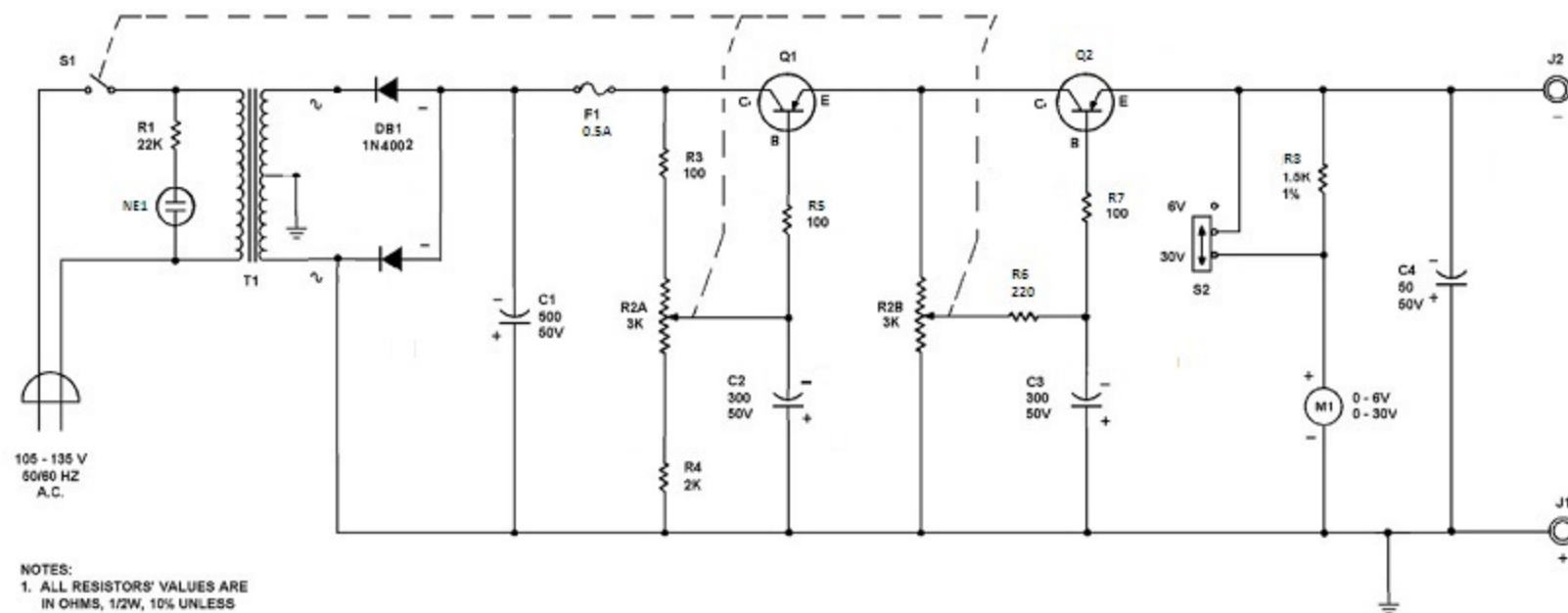
RADIAL TYPE NON-INSULATED



\$1.00



ANOTHER PERFORMANCE PROVEN PRODUCT



Eico Model 1020 Power Supply Schematic
Early Two Transistor Output Version

Drawn By: *Don & Tracie* 03/09/2018