INSTRUCTION MANUAL

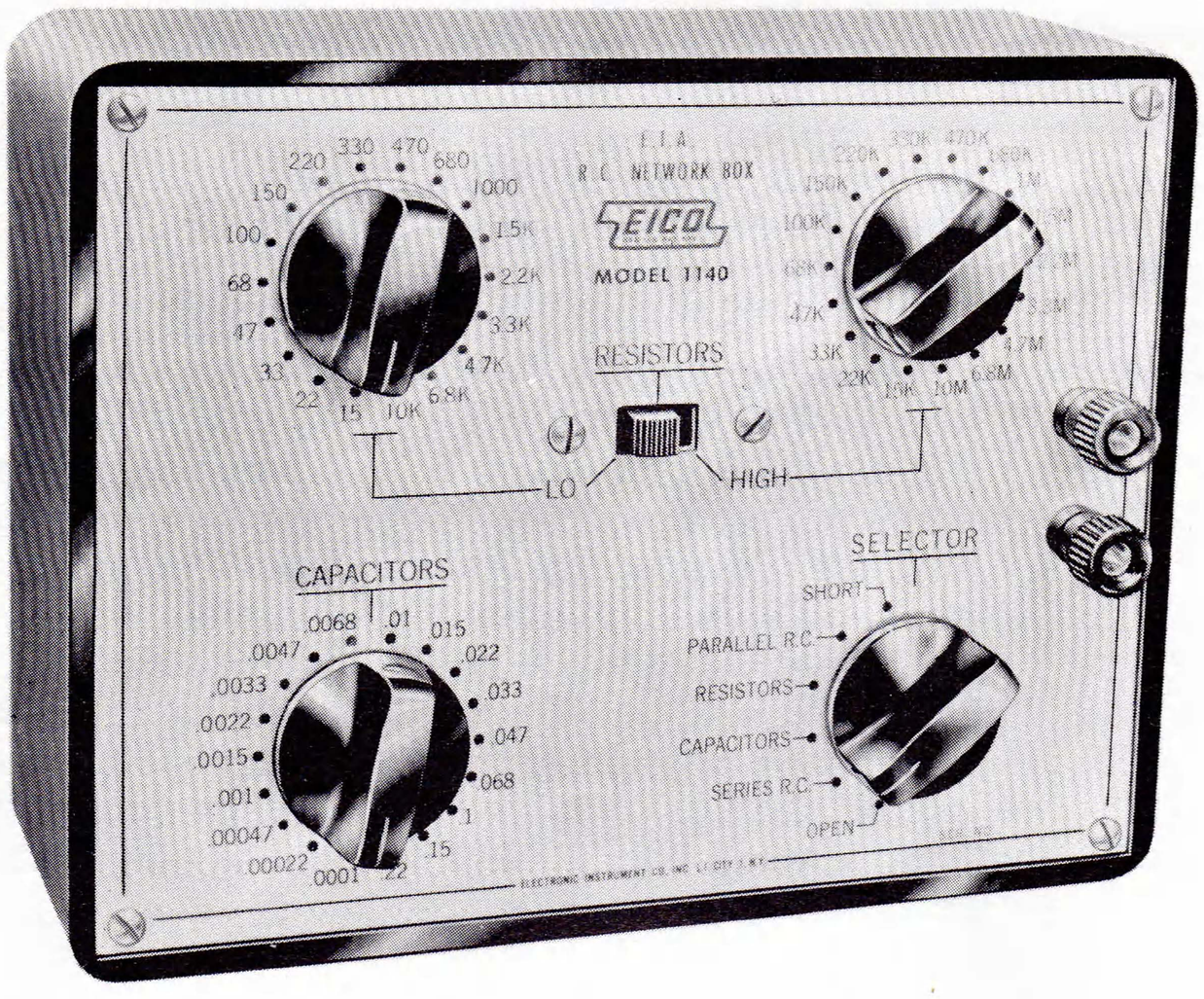
EICO

1140 SERIES-PARALLEL R-C COMBINATION BOX

1140-1

EICO

283 Malta Street, Brooklyn, N. Y. 11207



SERIES-PARALLEL

R-C COMBINATION BOX

MODEL 1140

general description

GENERAL

The EICO Model 1140* Series/Parallel R-C Combination 1 Box is an extremely valuable combination of the Model 1100 Resistance Box and the Model 1120 Capacitance Box with additional switching facilities that permit selection of any resistance along, any capacitance alone, or any combination of resistance and capacitance in either series or parallel. Open circuit and short circuit positions are provided as well. This box permits you to substitute or develop a desired integrating or differentiating RC network with a minimum of trouble. The Model 1140 is a valuable instrument for tv, radio and audio servicing, as well as general laboratory work and experimentation. Standard E. I. A. (RETMA) capacitance and resistance values with 10% are provided from 0. 0001 to 0. 22mfd and 15 ohms to 10 megohms. Capacitors are either molded or ceramic types, most conservatively rated at 600 volts. Resistors are of the standard 1 watt carbon type. Convenient jack-top binding posts are supplied.

SPECIFICATIONS

Capacitors (mfd): .0001, .00022, .00047
.001, .0015, .0022, .0033, .0047, .0068
.01, .015, .022, .033, .047, 068
.1, .15, .22

Resistors: 15 ohms to 10 megohms in decade multiples of 15, 22, 33, 47, 68, and 100 ohms.

*Patent #2, 954, 518

Rated Accuracy: capacitors .0001 mfd through .0047 mfd: ±5%.
capacitors .001 mfd through .22 mfd: ±10%.
resistors: ±10%

Voltage Ratings: capacitors 0001 mfd through .0047 mfd: 500 volts.
capacitors .001 mfd through .1 mfd 600 volts.
capacitors .015 and .22 mfd: 400 volts
resistors: 500 volts.

Power Rating (resistors): 1 watt

Type of components: capacitors: silver mica and molded plastic tubular.
resistors: carbon

Switched Modes of Operation: resistor (alone), capacitors (alone), series R-C, parallel R-C, short circuit, open circuit.

Panel: deep-etched, satin finish aluminum.

Cabinet: high-impact molded black bakelite.

Size: 6 3/4" x 5 1/4" x 2 3/8".

Weight: 2 lbs.

operation

Resistance Selection: a) Set the RESISTORS HIGH-LOW slide switch at LOW if the resistance desired is included in the LOW decade range (15 ohms to 10, 000 ohms) or at HIGH if the resistance desired is included in the HIGH decade range (15, 000 ohms to 10 megohms). b) Set the knob of the RESISTORS decade selected at the desired resistance value.

Capacitance Selection: Set the knob of the CAPACITORS switch at the desired capacitance value.

Mode of Operation Selection: The SELECTOR switch permits choice of modes of operation. Use the RESISTORS positions to obtain the selected resistance value alone, the CAPACITORS position for the selected capacitance value alone, the SERIES RC position to place the selected resistor and capacitor in series, the PARALLEL RC position to place the selected resistor and capacitor in parallel. The OPEN position is used to obtain an open circuit between the binding posts and the SHORT position to obtain a short circuit between the binding posts.

Notes: a) The Model 1140 has a stray wiring capacity of approximately .000020 mfd (20 mmfd) between binding posts when either factory assembled or wired according to the instructions given with the kit. This capacity is effectively in parallel with any combination of capacitance and resistance selected and should be considered when its effect might be significant. Cable capacity in the external leads is additive to the stray wiring capacity. b) Please bear in mind the voltage ratings of the capacitors and resistors as given in the specifications. Also note that the rated power dissipation of the resistors is one watt. Voltages over 500 volts may cause flashover within the unit.

maintenance

SERVICE CONSULATION

If you are experiencing trouble that you cannot diagnose yourself, you are invited to avail yourself of the EICO Service Consultation Department. The consultant handling your inquiry will make every effort to diagnose the cause of your particular difficulty based on the information that you provide. Please be as thorough as possible. Include the following information about your unit:

a) Have you made a thorough check of the wiring, checking also for cold solder joints, or accidental shorting between parts, or to chassis? (Check to see whether a bare wire or lead extends far enough to be shorted when the bottom plate is put on).

b) Does the trouble occur at one time or one operating situation, but not at another time or operating situation? Be as specific as possible in this respect.

c) Have you observed any pecularity about a part? If a part appears charred or otherwise damaged by excessive heat, please say so. If you think you have damaged a particular part in the assembly or wiring, please say so. In conjunction with the symptoms, the consultant may be able to determine whether such a part is likely to be defective.

In addition, list any code numbers in red under the words INSTRUCTION MANUAL on the cover of the book provided with your unit. If the unit bears a serial number, it is essential that you include this also.

PARTS REPLACEMENT

If it appears that a component is defective, and you desire a replacement from EICO, address your correspondence to our Customer Service Department.

If you are claiming the right to a no-charge replacement under the terms and conditions of the warranty, it is required that you shall have sent in the registration card within 10 days of the date of purchase, and you send back the defective part transportation prepaid. EICO will make the necessary replacement at no charge for parts eligible under the terms and conditions of the warranty.

Further information required on a part returned to the factory for a no-charge replacement under the terms and conditions of the warranty is as follows:

a) Model number and serial number, if any, of unit. Also any code numbers in red under the words INSTRUCTION MANUAL on the cover of the book supplied with the unit.

b) Stock number and description of part as given on the parts list.

c) Describe as completely as possible the nature of the defect, or your reason for requiring replacement.

FACTORY REPAIR SERVICE

EICO maintains a Factory Repair Service Department for in-warranty or out-of-warranty epair of EICO equip-

ment. It is intended to serve those customers who are not adequately familiar with electronics to make use of the EICO Service Consultation facilities, or whose difficulties cannot be solved by correspondence.

For all out-of-warranty units, there is a minimum labor and handling fee. For the Model No. 1140, this fee is $3.00. Charges for components replaced are additional to the minimum fee.

For in-warranty completed kit units, there is a minimum labor and handling fee. For the Model No. 1140,, this fee is $3.00. There is no charge for a replaced defective part provided that the terms and conditions of the warranty for no charge replacement are not violated in the judgement of EICO.

For in-warranty factory-wired units, there is no labor and handling fee if the unit complies with the terms and conditions of the warranty in the judgement of EICO. However, if the terms and conditions of the warranty are violated, then there will be charged to customer a minimum labor and handling fee plus the cost of parts replaced.

In all cases, the unit must be sent to the factory transportation prepaid, and the unit will be returned to the customer transportation collect.

The services rendered for the minimum labor and handling fee are the correction of any minor wiring errors (not extensive corrections or re-wiring), the labor involved in replacing defective parts, and any adjustments, alignment, or calibration procedures that would normally be performed on a factory-wired unit. Units not wired according to instructions, or modified in any way, or showing evidence of the use of acid core solder, will not be serviced and will be returned to the customer forthwith.

Units requiring extensive corrections or re-wiring will incur an additional labor charge which will be set by EICO. The customer will be informed of this situation and written authorization from the customer will be required before the work is done.

Please note: minimum labor and handling fees are subject to revision at any time.

LOCAL REPAIR FACILITIES

Out-of-warranty repair work may also be performed by authorized service stations as well as the EICO factory. A list of authorized service stations is provided with this manual. The roster of stations may change from time to time, and if considerable time has elapsed since you purchased your unit, you are advised to contact the station you choose before sending the unit to them for repair. Use of a local service station will often result in faster service, and, usually, lower transportation costs.

It is necessary that you comply with the Shipping Instructions that follow when sending in a unit for service.

SHIPPING INSTRUCTIONS

You are strongly advised to retain the original shipping carton and inserts in the case that re-shipment is required for service or any other purpose. The carton may be collapsed, for storage in as small a space as possible. In very many cases, the same carton is used for kit and factory-wired units so that the kit carton will serve for re-shipment of the completed kit.

To submit a unit for service, either to the factory or an authorized service station*, fill out completely the Service Work Order form provided with the manual. Pack the unit very carefully, preferably in the original shipping carton with the original inserts.

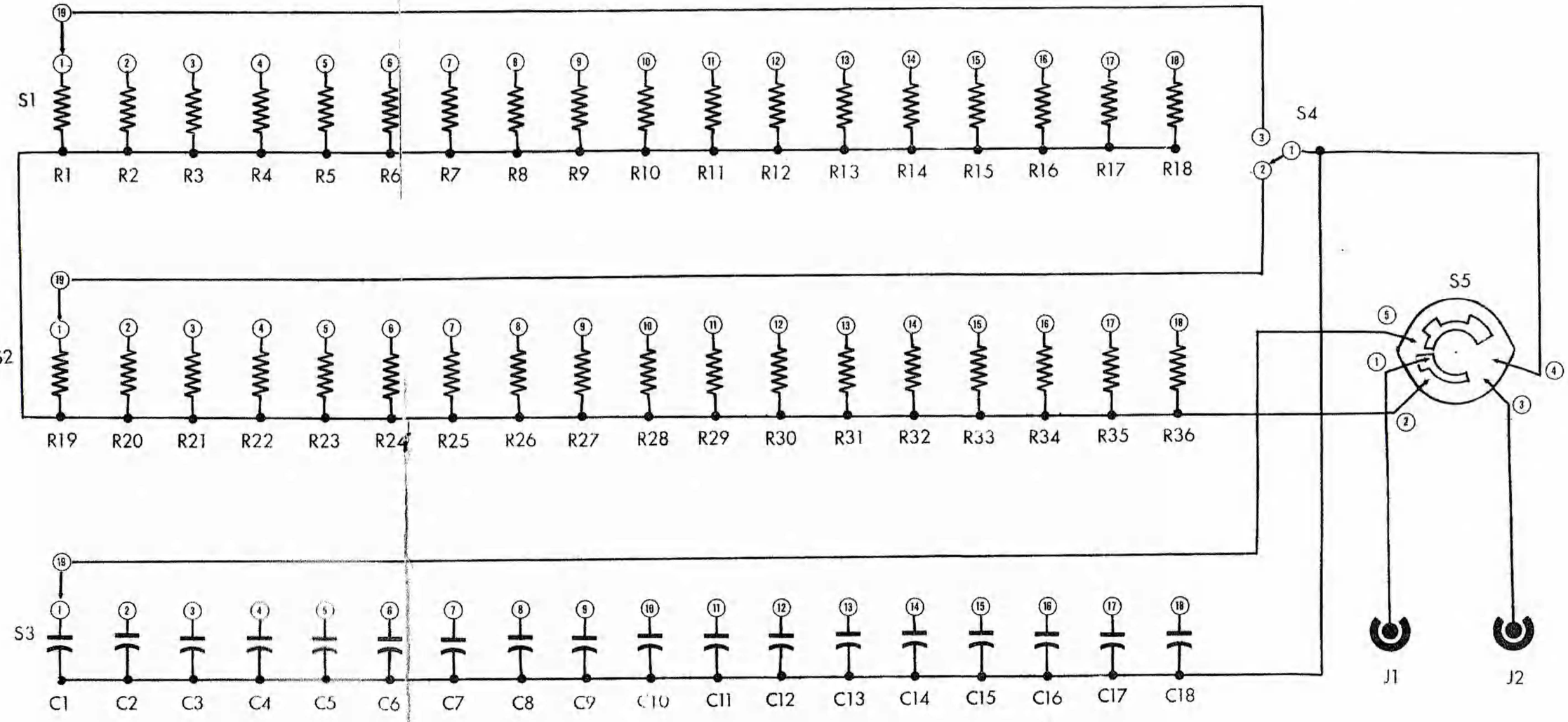
If this is not possible, use a strong oversize carton, preferably wood, allowing at least 3 inches of resilient packing material such as shredded paper or excelsior, to be inserted between all sides of the unit and the carton with strong gummed paper tape or strong twine, or both. Include the Service Work Order in the carton and in addition, attach a tag to the instrument on which is printed your name and address and brief reference to the trouble experienced. Affix "FRAGILE" or "HANDLE WITH CARE" labels to at least four sides of the carton, or print these words large and clear with a bright color crayon. Ship by prepaid Railway Express or parcel post to:

Customer Service
EICO Electronic Instrument Co., Inc.
283 Malta Street
Brooklyn, New York 11207

Include your name and address on the outside of the carton. Return shipment will be made transportation charges collect. Note that a carrier cannot be held liable for damages in transit, if packing, IN HIS OPINION, is insufficient.

*Authorized service stations are for out-of-warranty units only, unless the station is specifically noted on the List of Authorized Service Stations to be authorized for other work.

Stock#	Sym.	Description	Am't.
21005	C1	cap., sil., mica, .0001 mfd-500V, 5% (100 mmf)	1
21006	C2	cap., sil., mica, .00022 mfd-500V, 5% (220 mmf)	1
21007	C3	cap., sil., mica, .00047 mfd-500V, 5% (470 mmf)	1
20016	C4	cap., molded, paper, .001 mfd-600V, 10%	1
20017	C5	cap., molded, paper, .0015 mfd-600V, 10%	1
20018	C6	cap., molded, paper, .0022 mfd-600V, 10%	1
20019	C7	cap., molded, paper, .0033 mfd-600V, 10%	1
20020	C8	cap., molded, paper, .0047 mfd-600V, 10%	1
20021	C9	cap., molded, paper, .0068 mfd-600V, 10%	1
20022	C10	cap., molded, paper, .01 mfd-600V, 10%	1
20023	C11	cap., molded, paper, .015 mfd-600V, 10%	1
20024	C12	cap., molded, paper, .022 mfd-600V, 10%	1
20025	C13	cap., molded, paper, .033 mfd-600V, 10%	1
20026	C14	cap., molded, paper, .047 mfd-600V, 10%	1
20027	C15	cap., molded, paper, .068 mfd-600V, 10%	1
20028	C16	cap., molded, paper, .1 mfd-600V, 10%	1
20029	C17	cap., molded, paper, .15 mfd-400V, 10%	1
20030	C18	cap., molded, paper, .22 mfd-400V, 10%	1
52001	J1-2	binding post	2
10870	R1	res., 15Ω (brown, green, black, silver) 1W, ±10%	1
10869	R2	res., 22Ω (red, red, black, silver) 1W, ±10%	1
10868	R3	res., 33Ω (orange, orange, black, silver) 1W, ±10%	1
10867	R4	res., 47Ω (yellow, violet, black, silver) 1W, ±10%	1
10866	R5	res., 68Ω (blue, grey, black, silver) 1W, ±10%	1
10865	R6	res., 100Ω (brown, black, brown, silver) 1W, ±10%	1
10864	R7	res., 150Ω (brown, green, brown, silver) 1W, ±10%	1
10863	R8	res., 220Ω (red, red, brown, silver) 1W, ±10%	1
10862	R9	res., 330Ω (orange, orange, brown, silver) 1W, ±10%	1
10861	R10	res., 470Ω (yellow, violet, brown, silver) 1W, ±10%	1
10860	R11	res., 680Ω (blue, grey, brown, silver) 1W, ±10%	1
10859	R12	res., 1KΩ (brown, black, red, silver) 1W, ±10%	1
10858	R13	res., 1.5KΩ (brown, green, red, silver) 1W, ±10%	1
10857	R14	res., 2.2KΩ (red, red, red, silver) 1W, ±10%	1
10856	R15	res., 3.3KΩ (orange, orange, red, silver) 1W, ±10%	1
10855	R16	res., 4.7KΩ (yellow, violet, red, silver) 1W, ±10%	1
10854	R17	res., 6.8KΩ (blue, grey, red, silver) 1W, ±10%	1
10853	R18	res., 10KΩ (brown, black, orange, silver) 1W, ±10%	1
10852	R19	res., 15KΩ (brown, green, orange, silver) 1W, ±10%	1
10851	R20	res., 22KΩ (red, red, orange, silver) 1W, ±10%	1
10850	R21	res., 33KΩ (orange, orange, orange, silver) 1W, ±10%	1
10849	R22	res., 47KΩ (yellow, violet, orange, silver) 1W, ±10%	1
10848	R23	res., 68KΩ (blue, grey, orange, silver) 1W, ±10%	1
10847	R24	res., 100KΩ (brown, black, yellow, silver) 1W, ±10%	1
10846	R25	res., 150KΩ (brown, green, yellow, silver) 1W, ±10%	1
10845	R26	res., 220KΩ (red, red, yellow, silver) 1W, ±10%	1
10844	R27	res., 330KΩ (orange, orange, yellow, silver) 1W, ±10%	1
10843	R28	res., 470KΩ (yellow, violet, yellow, silver) 1W, ±10%	1
10842	R29	res., 680KΩ (blue, grey, yellow, silver) 1W, ±10%	1
10841	R30	res., 1MΩ (brown, black, green, silver) 1W, ±10%	1
10840	R31	res., 1.5MΩ (brown, green, green, silver) 1W, ±10%	1
10839	R32	res., 2.2MΩ (red, red, green, silver) 1W, ±10%	1
10838	R33	res., 3.3MΩ (orange, orange, green, silver) 1W, ±10%	1
10837	R34	res., 4.7MΩ (yellow, violet, green, silver) 1W, ±10%	1
10836	R35	res., 6.8MΩ (blue, grey, green, silver) 1W, ±10%	1
10835	R36	res., 10MΩ (brown, black, blue, silver) 1W, ±10%	1
60022	S1, 2, 3	switch, rotary, 1P - 18 Pos.	3
62002	S4	switch, slide, 1P - 2 Pos.	1
60059	S5	switch, rotary, 3P - 6 Pos.	1
40001		nut, hex, #3/8-32	4
40007		nut, hex, #4-40	2
40008		nut, hex, #8-32	4
41016		screw, #4-40 x 1/4	6
42000		washer, lock 3/8	4
42001		washer, flat 3/8	4
42007		washer, lock #4	2
42043		washer, bakelite shoulder	2
42044		washer, bakelite flat	2
42046		washer, flat #8	2
43004		lug, #8	2
53006		knob, bar	4
58000		wire, hook-up	length
58300		spaghetti	length
58500		wire, #18 bare	length
58501		wire, #22 bare	length
80060		panel	1
88042		cabinet	1
66065		manual of instructions (wired)	1
66314		manual of instructions (kit)	1



MODEL 1140 SERIES-PARALLEL R-C COMBINATION BOX SCHEMATIC DIAGRAM

REPLACEMENT PARTS LIST

GENERAL INSTRUCTIONS

The section of the manual beginning with this page is the CONSTRUCTION section. All pages in this section have page numbers followed by "C" (1C, 2C, etc.). The INSTRUCTION section resumes on the pages following the CONSTRUCTION section. Note that the CONSTRUCTION section is located centrally in the book and may be removed without desrupting the INSTRUCTION section that both precedes it and follows it.

Care taken in the construction of this instrument will reward the constructor with many years of satisfactory service and greater confidence in his instrument. We urge you to not rush the construction, but to take all the time necessary for proper assembly and wiring.

Furthermore, we urge strongly that you follow the wire and parts layout shown in the pictorial diagrams as closely as possible. Very often wires are placed as shown for a good reason, and certainly the appearance of the completed instrument will be improved and the difficulty of finding a wiring error will be reduced by the following the wire and parts layout shown.

UNPACKING THE KIT: Unpack the kit carefully and check each part against the parts list including those parts that are mounted to the chassis. If you have trouble identifying any parts refer to the pictorial diagrams or the color code chart.

You will find that the value of a component will vary within the allowable circuit tolerance. For example, the 4.7KΩ, ±10% resistor may measure anywhere between 4.2KΩ and 5.2KΩ. Tolerances on paper capacitors are substantially greater, and the tolerance for electrolytics is usually +100% and -50%.

CONSTRUCTION HINTS: USE THE BEST GRADE OF ROSIN CORE SOLDER ONLY, preferably one containing the new activated fluxes such as Kester "Resin-Five", Ersin "Multicore" or similar types. UNDER NO CIRCUMSTANCES USE ACID CORE SOLDER OR ACID FLUX since acid flux can cause serious corrosion. Before soldering make a certain of a good mechanical connection. Use a clean, freshly tinned soldering iron, no smaller than 100 watts, and place the solder on the joint (not on the iron) so that the solder is melted by the heat from the joint itself. Do not remove the soldering iron until the solder flows and check to see that the resulting joint is smooth and shiny when the solder has cooled. There are two extremes to be avoided; too little heat and too much heat. If too little heat is supplied, the joint will appear pitted and grey, indicating a rosin joint which is unsatisfactory. On the other hand, if too much heat is applied to a joint, the parts connected to it may either change value, loose their protective coating, or break down. If you are soldering close to a part, hold the lead between the part and the joint being soldered with the tip of a pair of longnose pliers. The pliers will conduct the heat away and prevent the component from being unduly overheated. If for any reason it is necessary to resolder a joint, be sure to use new solder.

It should also be noted that the leads on resistors, capacitors, and transformers are often longer than required. These leads should be trimmed to the proper length when necessary. Do not cut any lead until you have determined the required length when the lead is routed as shown in the diagrams.

BASIC TOOLS REQUIRED: These basic tools are required for the construction of the amplifier.

1. Screwdriver - 3/16" to 1/4" blade
2. Screwdriver - 1/8" blade
3. Longnose pliers - 5 or 6"
4. Diagonal cutters
5. Soldering iron (100 watts), or soldergun, or pencil iron (35 watts)
6. Gas pliers
7. High quality rosin or equivalent synthetic flux core solder. Do not use acid or paste flux under any circumstances.

A set of spintites and a wire stripper are also very useful supplementary tools.

PARTS IDENTIFICATION: Please note that very many of the parts for which color coding is given may not be color coded, but have their values and ratings printed. The letter K is a multiplier (X1000) and on resistors or capacitors indicates that the printed numerical value must be multiplied by one thousand to obtain the value in ohms or micro-micro farads respectively. Note also that one microfarad (mf) is equal to one million; micro-microfarads (mmf). To aid in rapid identification, keep in mind that 5%, 10%, and 20% resistors are color coded whereas 1% resistor have their values printed; also that molded tubular capacitors may or may not be color coded, whereas disc capacitors and electrolytics will always have their values printed. Please note the following relationships between the units used to express resistance or capacity.

1,000,000 ohms (Ω) = 1000 kilohms (KΩ) = 1 megohm (MΩ)
1,000,000 micro-micro farads (mmf) = 1 micro farads (mf)

CONSTRUCTION PROCEDURE: The complete step-by-step mounting and wiring procedure follows. To keep the drawings uncrowded, unnecessary repetition of mounting or wiring details may be omitted. Note: The abbreviation (C) means connect but do not solder (until other leads have been connected). The abbreviation (S) means connect and solder.
Bend the ground lug tabs on the sockets toward the chassis to prevent accidental shorting to the socket pins.

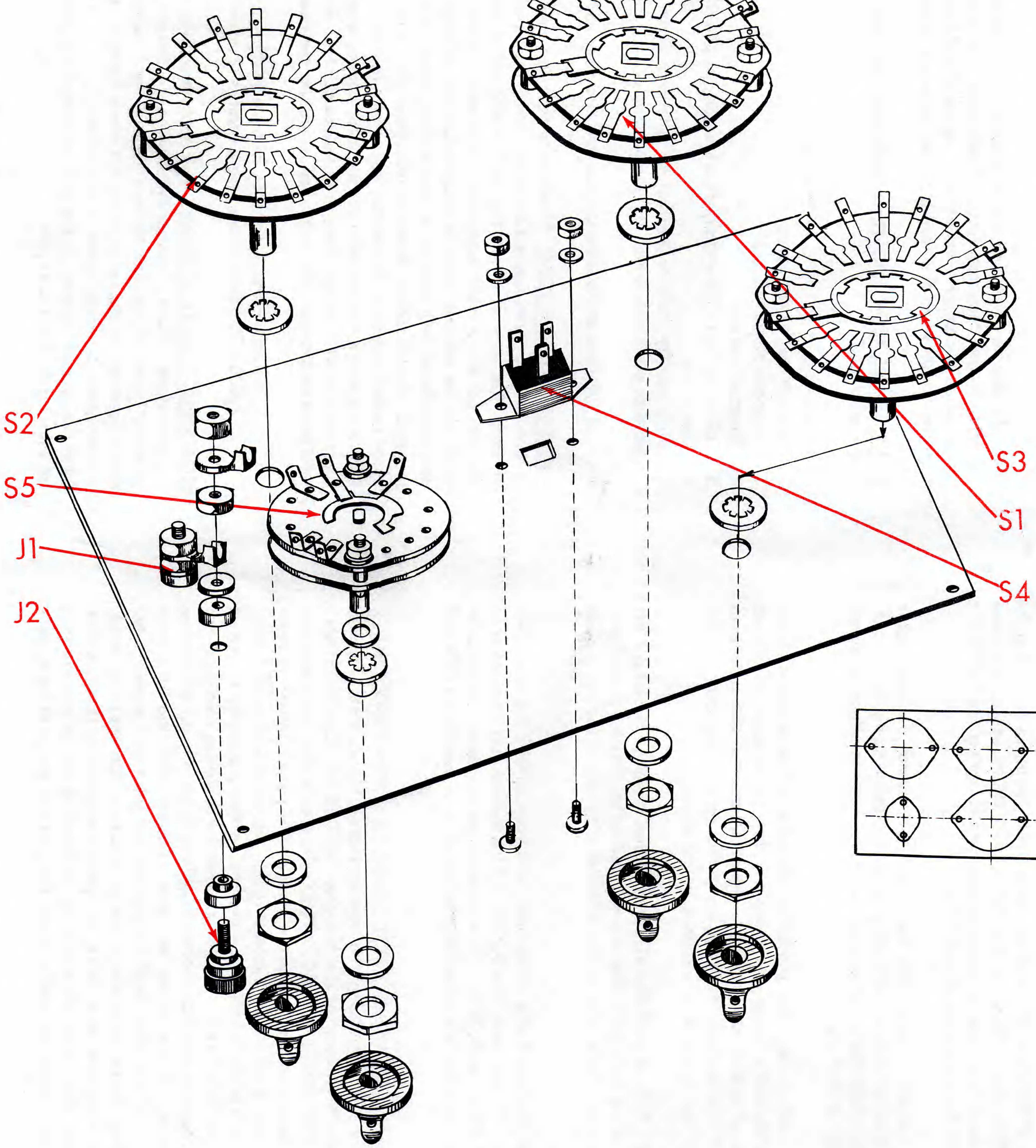


Fig. 1

PANEL MOUNTING

Note insert drawing for correct position in mounting of all switches.

1. ( ) Fig. 1. Turn switches S1, S2 and S3 to the maximum counter-clockwise position. In this position, the rotor hits contact #1. Mount each switch as shown, using one 3/8 lockwasher behind the panel, one 3/8 flatwasher and one 3/8 hex nut on the front of the panel.

2. ( ) Fig. 1. Mount slide switch, S4 as shown. Use two #4-40 screws, two #4 lockwashers and two #4-40 hex nuts.

3. ( ) Fig. 1. Turn the small rotary switch, S5 to maximum counter-clockwise position. Mount as shown using one 3/8 lockwashers behind the panel, one 3/8 flatwasher and one 3/8 hex nut on the front of the panel.

4. ( ) Fig. 1. Mount the insulated binding posts, J1 and J2 as shown. Mount each jack, using a bakelite shoulder washer on the front of the panel and a bakelite flatwasher behind the panel. Tighten each post with one #8 lockwasher and one #8-32 hex nut. Slide a #8 lug over the nut and secure with another #8-32 hex nut as shown.

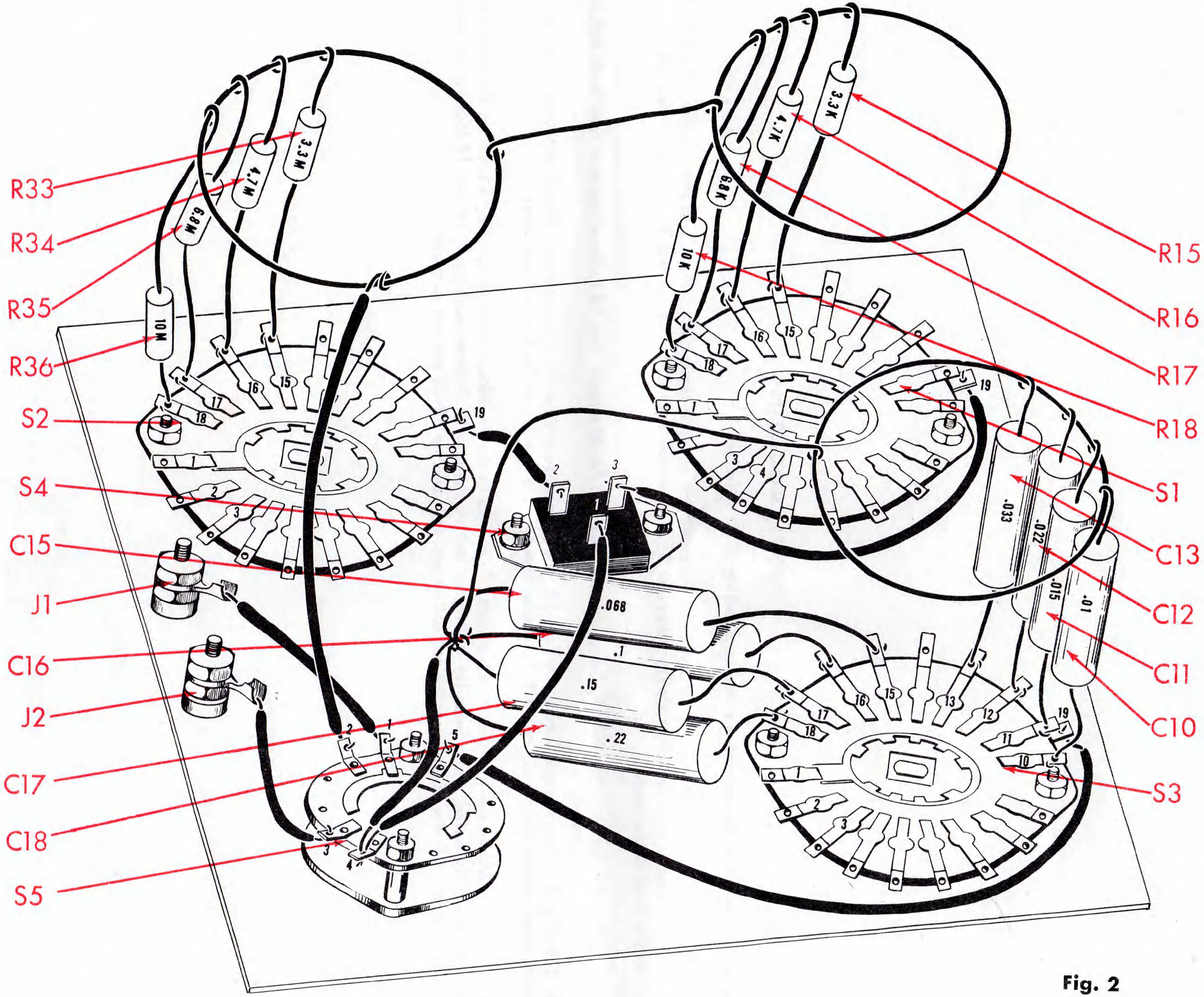

R33
R34
R35
R36
S2
S4
C15
J1
C16
J2
C17
C18
S5
R15
R16
R17
R18
S1
C13
C12
C11
C10
S3
3.3M
4.7M
6.8M
10M
10K
6.8K
4.7K
3.3K
.068
.1
.15
.22
.033
.022
.015
.01

Fig. 2

WIRING

1. ( ) Fig 2. Stretch the piece of heavy bare wire to eliminate any kinks. Cut three 7 1/4" lengths. Form each piece of wire into a ring of approximately 2" diameter. Overlap the extra langths of wire and solder.

2. ( ) Fig. 2. Cut both leads on all resistors to 1/2".

3. ( ) Fig. 2. Low value resistors (15Ω to 10KΩ) are mounting on switch S1. High value resistors (15KΩ to 10MΩ) are mounted on S2. Connect one end of the 10KΩ (brown, black, orange, silver) resistor, R18, to S1-18 (S). Leave approximately 1/4" of wire between the resistor body and the switch contact.

4. ( ) Fig. 2. Similar to the above, connect and solder the following resistors to the indicated contact on the switches.

	RESISTOR			CONTACT
( )	R17	6.8KΩ	blue,grey, red, silver	S1-17
( )	R16	4.7KΩ	yellow, violet, red, silver	S1-16
( )	R15	3.3KΩ	orange, orange, red, silver	S1-15
( )	R14	2.2KΩ	red, red, red, silver	S1-14
( )	R13	1.5KΩ	brown, green, red, silver	S1-13
( )	R12	1KΩ	brown, black, red, silver	S1-12
( )	R11	680Ω	blue, grey, brown, silver	S1-11
( )	R10	470Ω	yellow, violet, brown, silver	S1-10
( )	R9	330Ω	orange, orange, brown, silver	S1-9
( )	R8	220Ω	red,red, brown, silver	S1-8
( )	R7	150Ω	brown, green, brown, silver	S1-7
( )	R6	100Ω	brown, black, brown, silver	S1-6
( )	R5	68Ω	blue, grey, black, silver	S1-5
( )	R4	47Ω	yellow, violet, black, silver	S1-4
( )	R3	33Ω	orange, orange, black, silver	S1-3
( )	R2	22Ω	red, red, black, silver	S1-2
( )	R1	15Ω	brown, green, black, silver	S1-1
( )	R36	10MΩ	brown, black, blue, silver	S2-18
( )	R35	6.8MΩ	blue, grey, green, silver	S2-17
( )	R34	4.7MΩ	yellow, violet, green, silver	S2-16
( )	R33	3.3MΩ	orange, orange, green, silver	S2-15
( )	R32	2.2MΩ	red, red, green, silver	S2-14
( )	R31	1.5MΩ	brown, green, green, silver	S2-13
( )	R30	1MΩ	brown, black, green, silver	S2-12
( )	R29	680KΩ	blue, grey, yellow, silver	S2-11
( )	R28	470KΩ	yellow, violet, yellow, silver	S2-10
( )	R27	330KΩ	orange, orange, yellow, silver	S2-9
( )	R26	220KΩ	red, red, yellow, silver	S2-8
( )	R25	150KΩ	brown, green, yellow, silver	S2-7
( )	R24	100KΩ	brown, black, yellow, silver	S2-6
( )	R23	68KΩ	blue, grey, orange, silver	S2-5
( )	R22	47KΩ	yellow, violet, orange, silver	S2-4
( )	R21	33KΩ	orange, orange, orange, silver	S2-3
( )	R20	22KΩ	red, red, orange, silver	S2-2
( )	R19	15KΩ	brown, green, orange, silver	S2-1

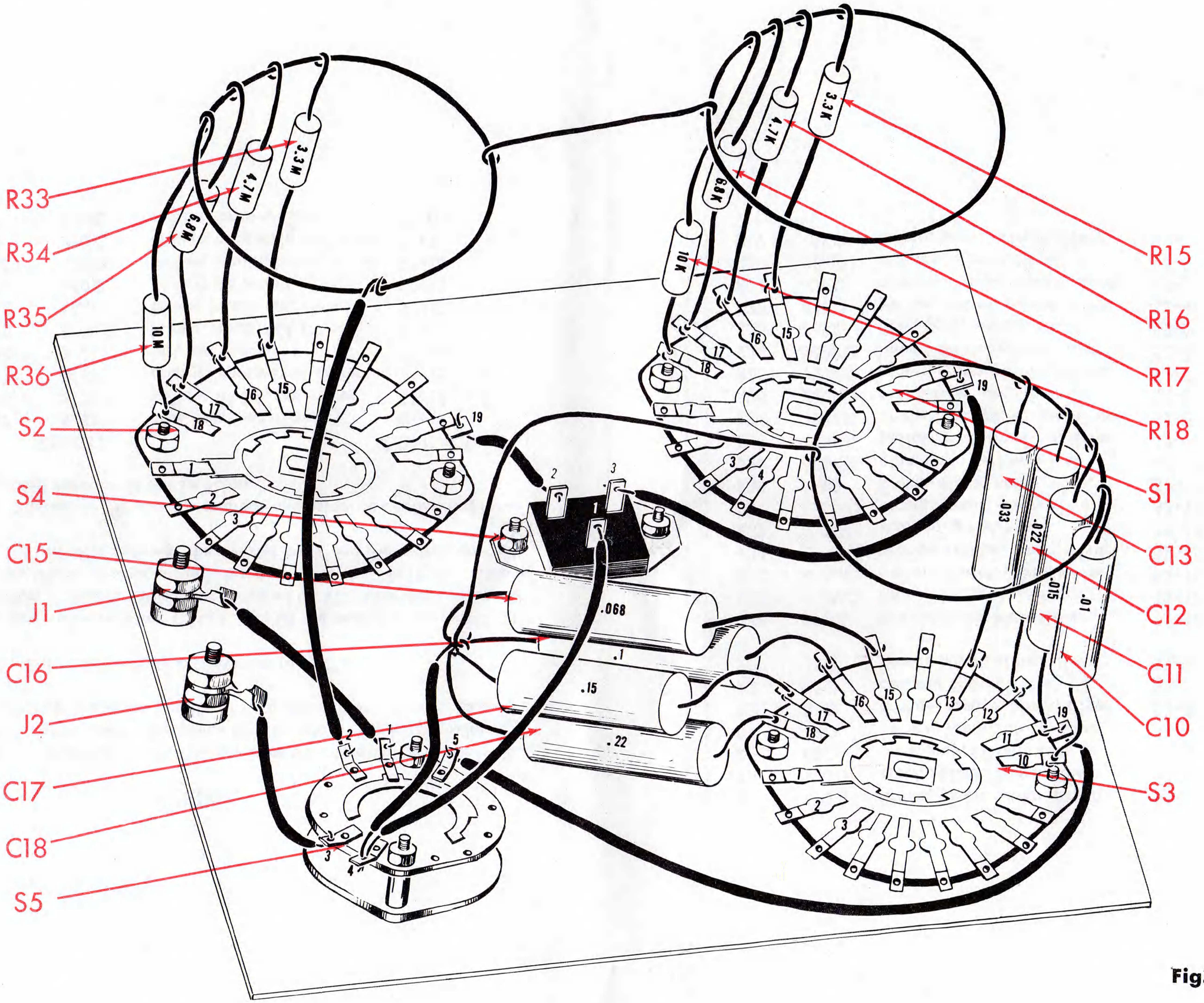

R33
R34
R35
R36
S2
S4
C15
J1
C16
J2
C17
C18
S5
R15
R16
R17
R18
S1
C13
C12
C11
C10
S3
3.3M
4.7M
6.8M
10M
6.8K
4.7K
3.3K
10K
.068
.1
.15
.22
.033
.022
.015
.01

Fig. 3

1. ( ) Fig. 3. All capacitors are to be mounted on S3. On the following capacitors, cut all leads to 3/4". Solder one lead to the contacts indicated below. Leave a 1/2" lead length between the contact and the body of the capacitor.

( )	C1	100 mmf	brown, black, brown, green	S3-1
( )	C2	220 mmf	red, red, brown, green	S3-2
( )	S3	470 mmf	yellow, violet, brown, green	S3-3

2. ( ) Fig. 3. On the following capacitors, cut all leads to 1/2". Solder one end to the contact indicated below. Leave a 1/4" lead length between the contact and the body of the capacitor.

( )	C4	.001 mfd	brown, black, red, silver, blue	S3-4
( )	C5	.0015 mfd	brown, green, red, silver, blue	S3-5
( )	C6	.0022 mfd	red, red, red, silver, blue	S3-6
( )	C7	.0033 mfd	orange, orange, red, silver, blue	S3-7
( )	C8	.0047 mfd	yellow, violet, red, silver, blue	S3-8
( )	C9	.0068 mfd	blue, grey, red, silver, blue	S3-9

3. ( ) Fig. 3. On the following capacitors, cut one lead to 1/2" and the other lead to 3/4". Solder the 3/4" lead from one end of each capacitor to the contact indicated below. Leave a 1/2" lead length between the contact and the body of the capacitor.

( )	C10	.01 mfd	brown, black, orange, silver, blue	S3-10
( )	C11	.015 mfd	brown, green, orange, silver, blue	S3-11
( )	C12	.022 mfd	red, red, orange, silver, blue	S3-12
( )	C13	.033 mfd	orange, orange, orange, silver, blue	S3-13

4. ( ) Fig. 3. Cut both leads on a .047 mfd (yellow, violet, orange, silver, blue) capacitor, C14, to 3/4". Cover one lead with a 1/2" piece of spaghetti and connect to S3-14 (S).

5. ( ) Fig. 3. Cut one lead on each of the remaining four capacitors to 1". Cut the remaining lead on each of the capacitors to 1 1/2". Cover each of the longer leads with a 1 1/4" piece of spaghetti and connect to the switch contact indicated below.

( )	C15	.068 mfd	blue, grey, orange, silver, blue	S3-15
( )	C16	.1 mfd	brown, black, yellow, silver, blue	S3-16
( )	C17	.15 mfd	brown, green, yellow, silver, yellow	S3-17
( )	C18	.22 mfd	red, red, yellow, silver, yellow	S3-18

6. ( ) Fig. 3. Wrap unsoldered leads of all resistors (soldered to S1) around one of the previously prepared rings as shown. Solder all leads from the 18 resistors to this ring. The ring should be suspended in the air by the resistors parallel to the switch.

7. ( ) Fig. 3. Similar to the above, wrap unsoldered leads of all resistors (soldered to S2) around a second one of the previously prepared rings as shown. Solder all leads from the 18 resistors to this ring. The ring should be suspended in the air by the resistors parallel to the switch.

8. ( ) Fig. 3. Similar to the above, wrap unsoldered leads of capacitors, C1 through C14 (soldered to S3) around the third of the previously prepaired rings as shown. Solder the leads of these capacitors to the ring. The ring should be suspended in the air by the capacitors parallel to the switch. The height of each ring should be no greater than 2-1/8" above the panel.

9. ( ) Fig. 3. Twist the lead of the remaining four capacitors, C15 through C18, together as shown. Around these leads, twist one end of a 5" piece of bare wire and a 2 1/2" piece of insulated wire. Solder all these leads together. Be careful that solder should flow over all of these wires at the twisted connection. Connect the remaining end of the insulated wire to S5-4 (C) and the remaining end of the bare wire to the ring (S) over the capacitor switch S3.

10. ( ) Fig. 3. Connect a 4" piece of wire from S5-4 (S) to S4-1 (S).

11. ( ) Fig. 3. Connect an 8" piece of wire from S5-5 (S) to lugs (S) on front side of S3.

12. ( ) Fig. 3. Connect a 6" piece of wire from S4-3 (S) to lug (S) on front side of S1.

13. ( ) Fig. 3. Connect a 2" piece of wire from S4-2 (S) to lug (S) on front side of S2.

14. ( ) Fig. 3. Connect a 2" piece of wire from S5-1 (S) to jack J1 (S).

15. ( ) Fig. 3. Connect a 2" piece of wire from S5-3 (S) to jack J2 (S).

16. ( ) Fig. 3. Connect a 2" piece of bare wire from the ring (S) suspended above S1 to the ring (S) suspended above S2.

17. ( ) Fig. 3. Connect a 2 1/2" piece of wire from S5-2 (S) to ring (S) suspended above S2.

18. ( ) Fig. 3. Mount the panel in the cabinet. Use four #4 screws.

19. ( ) Fig. 2. Put knobs over all four shafts on the controls. The LOW resistor knob should face "15", the HIGH resistor knob should face "15", the CAPACITOR knob should face ".0001" and the SELECTOR knob should face "OPEN". Tighten all set screws. Your instrument is now complete and ready for use.

IN CASE OF DIFFICULTY

If the completed kit does not operate properly, refer to the MAINTENANCE section and read it thoroughly. The information provided may itself lead to a solution of the problem without outside assistance, and also includes the course of action you may take to obtain assistance from EICO. In any case, do not neglect the checking procedures which usually correct 90% of the difficulties that may be encountered. If you omitted to perform step 1 of the Final Steps "To catch any wiring errors.....", do it now, and do it thoroughly. Often, a person is unable to detect his own errors because he misunderstands an instruction. For this reason, have a friend go over the wiring with you, if possible. Also, do not neglect the obvious kind of mistake or trouble such as tubes or transistors placed incorrectly, shields not making proper contact, accidental shorting of leads or parts to the bottom plate, line cord plug making improper contact in outlet, blown fuse, etc.

EICO
Service Policy

PARTS REPLACEMENT

If it appears that a component is defective, and you desire a replacement, contact your EICO Distributor, the nearest EICO Authorized Service Agency or our Customer Service Department.

If you are claiming the right to a no-charge replacement under the terms and conditions of the warranty, it is required that you shall have sent in the registration card within 10 days of the date of purchase, and that you send back the defective part transportation prepaid. In claiming warranty service or parts, please send or show your original sales slip plus the IBM card from the carton. EICO or its authorized agency will make the necessary replacement at no charge for parts eligible under the terms and conditions of the warranty. In returning tubes, pack them very carefully to avoid breakage in shipment. Broken tubes will not be replaced. Please read the warranty on the subject of parts eligible for replacement.

Further information required on a part returned for a no-charge replacement under the terms and conditions of the warranty is as follows:

a) Model number and serial number, if any, of unit. Also any code numbers in red under the words INSTRUCTION MANUAL on the cover of the book supplied with the unit or Revision number, such as Rev. 1, Rev. 2, etc.

b) Stock number and description of part as given on the parts list. If the part is not listed (of itself) in the parts list, it means that the part is integral with a sub-assembly, which we consider replaceable only as an entity. Parts integral with a sub-assembly may be listed in the parts list, so identified, if we consider that some or all of the parts may be individually replaced in the field under appropriate circumstances. If your unit is out of warranty, you are generally advised to order a replacement sub-assembly.

c) Describe as completely as possible the nature of the defect, or reason for requiring replacement.

REPAIR SERVICE

EICO maintains a national network of authorized service agencies, in addition to repair facilities at the factory, for in-warranty or out-of-warranty repair of EICO equipment. It is intended to serve those customers who are not sufficiently familiar with electronics to make use of the EICO Service Consultation facilities, or whose difficulties cannot be solved by correspondence.

For all out-of-warranty units repaired at the factory there is a minimum labor and handling fee. Charges for parts replaced are additional to the minimum fee.

For in-warranty completed kit units repaired at the factory there is a minimum labor and handling fee. There is no charge for a replaced defective part provided that the terms and conditions of the warranty for no charge replacement are not violated in the judgement of EICO.

For in-warranty factory-wired units, there is no charge for labor or parts if the unit complies with the terms and conditions of the warranty in the judgement of EICO. However, if the terms and conditions of the warranty are violated there will be a charge for labor plus parts.

In all cases, the unit must be sent to the factory or service agency transportation prepaid, and the unit will be returned to the customer transportation collect.

On kits, the services rendered for the minimum labor and handling fee by the factory are the correction of any minor wiring errors (not extensive corrections or rewiring), the labor involved in replacing defective parts, and any adjustments, alignment, or calibration procedures that would normally be performed on a factory-wired unit. Units not wired according to instructions, or modified in anyway, or showing evidence of the use of acid core solder, will not be serviced and will be returned to the customer forthwith.

SEE SCHEDULE OF FACTORY SERVICE CHARGES

Units requiring extensive corrections or rewiring will incur an additional labor charge. An advance estimate will be submitted.

Please note: minimum labor and handling fees and service charges are subject to revision at any time.

LOCAL REPAIR FACILITIES

A list of authorized service stations is provided with your manual. The roster of stations may change from time to time, and if considerable time has elapsed since you purchased your unit, you are advised to contact the station you choose before sending the unit to them for repair. Use of a local service station will often result in faster service, and, usually, lower transportation costs.

It is necessary that you comply with the Shipping Instructions that follow when sending in a unit for service.

SHIPPING INSTRUCTIONS

You are strongly advised to retain the original shipping carton and inserts should reshipment be required for service or any other purpose. The carton may be collapsed for storage in as small a space as possible. In very many cases, the same carton is used for kit and factory-wired units so that the kit carton will serve for reshipment of the completed kit.

When sending a unit for service pack the unit very carefully, preferably in the original shipping carton with the original inserts. Be sure to place the bottom plate, cover, and supporting bracket, if any, on the unit before shipping.

If this is not possible, use a strong oversize carton, preferably wood, and using at least 3 inches of resilient packing material such as shredded paper or excelsior inserted between all sides of the unit and the carton. Seal the carton with strong gummed paper tape or strong twine or both. Attach a tag to the instrument on which is printed your name and address and brief reference to the trouble experienced. Affix "FRAGILE" or "HANDLE WITH CARE" labels to at least four sides of the carton or print these words large and clear with a bright color crayon. Ship prepaid.

Include your name and address on the outside of the carton. Return shipment will be made transportation charges collect. Note that a carrier cannot be held liable for damage in transit, if packing, IN HIS OPINION, is insufficient.

THE EICO WARRANTY

The Electronic Instrument Company, Inc., hereafter referred to as EICO, warrants that, for a period of 90 days from the date of purchase, any EICO kit will be free of defects in parts, and that any EICO factory-wired unit will be free of defects in parts and workmanship. For an EICO kit, EICO's obligation is limited to those parts which are returned transportation prepaid to the factory or authorized service agency without further damage, and in the judgement of EICO are either originally defective or have become defective in normal use. EICO's obligation does not include any labor required to locate trouble in or repair a kit. For an EICO factory-wired unit, EICO's obligation is limited to replacement or repair, at EICO's option, of those parts, sections, or entire units returned transportation prepaid to the factory or authorized service agency without further damage, and in the judgement of EICO are either originally defective or have become defective in normal use.

The warranty does not apply to any parts damaged in the course of handling, assembling, or wiring by the customer, or damaged due to abnormal usage or in violation of instructions or reasonable practice, or further damaged to a consequential degree in return shipment. Furthermore, the foregoing warranty is made only to the original customer, and is and shall be in lieu of all other warranties, whether expressed or implied, and of all other obligations or liabilities on the part of EICO, and in no event shall EICO be liable for any anticipated profits, consequential damages, loss of time, or other losses incurred by the customer in connection with the purchase or operation of EICO products or components thereof.

The registration card, which accompanies each EICO kit or factory-wired unit, must be filled in and returned to the company within 10 days after the date of purchase. This warranty applies only to registered units.

SCHEDULE OF FACTORY SERVICE CHARGES

(Consult your local EICO authorized service agency for THEIR charges.)

THESE CHARGES SUPERCEDE CHARGES WHICH MAY BE INDICATED IN YOUR MANUAL OR PREVIOUS SCHEDULES.

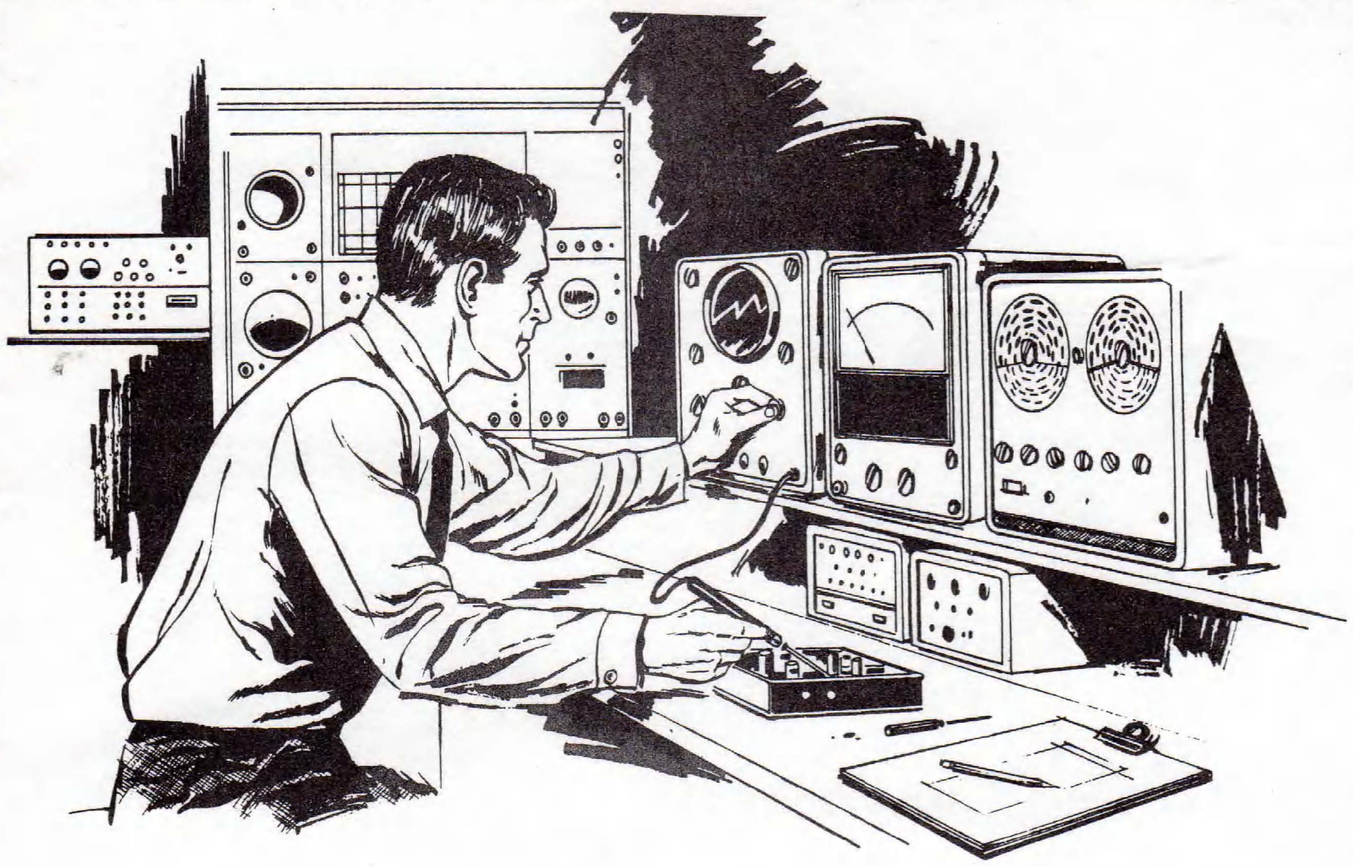
1. Same prices for wired units or completed kits.
2. Charges are based on the schedule of minimum charges above.
3. All labor charges are calculated at $7.50 per hour. For example, if the minimum labor and handling fee is $15.00, this covers up to 2 hours. Any labor time (in this example only) required over 2 hours is charged for at $7.50 per hour.
4. Above prices are for labor only. Parts are additional.
5. ESTIMATES: An estimate for repairs will be given before repairs are made where repairs will exceed stated minimum charges. If you choose not to have your unit repaired, a charge of $4.00 for estimating time will be made.
6. All prices are subject to change without notice.

IE 1371-358

MINIMUM LABOR AND HANDLING FEES

CRA & CRU	$ 3.50	488	$ 7.50
Probes	3.50	495	7.50
AF4	11.50	526	7.50
RA6	7.50	536	7.50
HF12	11.50	540	7.50
HF14	7.50	555	7.50
HF20	15.00	556	7.50
HF22	7.50	565	7.50
HF30	7.50	566	7.50
HF32	14.50	567	7.50
HF35	7.50	584	7.50
ST40	22.50	610	7.50
HF50	7.50	612	7.50
HF52	15.00	615	7.50
HF60	7.50	625	9.00
HF61	9.00	628	10.50
HF61A	9.00	630	7.50
HF65	10.00	632	10.50
HF65A	10.00	636	7.50
ST70	22.50	666	15.00
HF81	20.50	667	15.00
ST84	15.00	680	9.00
HF85	12.00	706	7.50
HF86	13.50	710	7.50
HF87	13.50	711	10.50
HF89	13.50	712	15.00
HFT90	11.50	715	7.50
HFT92	13.50	717	11.50
HFT94	11.50	720	20.50
ST96	20.50	722	13.50
ST97	20.50	723	15.00
MX99	11.50	730	15.00
RP100	45.00	740	13.50
Playback Amp only	11.50	751	16.50
Power Supply only	11.50	752	16.50
Record Amp only	11.50	753	37.50
Head Alignment only	15.00	760	13.50
145	7.50	761	13.50
145A	7.50	762	13.50
147	7.50	770	18.00
214	9.00	771-2	18.00
221	9.00	777	30.00
222	10.50	779, A	25.50
232	9.00	791	7.50
235	10.50	803	7.50
249	9.00	888	9.00
250	10.50	902	37.50
255	10.50	944	7.50
260/261	10.50	950	7.50
315	9.00	955	9.00
320	7.50	965	22.50
322	7.50	1020	7.50
324	7.50	1030	15.00
342	22.50	1040	11.50
352	7.50	1050	7.50
360	7.50	1055	7.50
368	19.00	1060	7.50
369	19.00	1064	9.00
377	9.00	1073	7.50
378	10.50	1078	7.50
380	24.00	1100	7.50
425	9.00	1120	7.50
427	19.00	1140	7.50
430	19.00	1171	7.50
435	22.50	1180	7.50
460	22.50	2036	20.50
470	22.50	2050	20.50
		2080	20.50
		2200	15.00
		2400	30.00
		2510	18.00
		2536	26.50
		2715/16	15.00
		3070	18.00
		3200	18.00
		3566	37.50
		3570	39.50
		4000	30.00
		7923	28.50

AUTHORIZED EICO® WARRANTY SERVICE AGENCIES



AT YOUR SERVICE: 100 AUTHORIZED SERVICE CENTERS COAST-TO-COAST

For your added convenience—Eico has set up a network of 100 service stations to make available to you on a local neighborhood basis the same high-quality technical service competence and replacement parts you get from our factory, should you ever need them.

AT YOUR SERVICE: FREE FACTORY CONSULTATION

Should you have **any** questions about the selection or applications of any EICO product, you may at any time consult by mail with our technical correspondence staff. There's no charge for this service.

AT YOUR SERVICE: 2500 EICO ELECTRONIC CENTERS COAST-TO-COAST

The local Electronics Dealer in your neighborhood offers you a host of benefits. He's nearby. He stocks the complete EICO line so that you enjoy instant off-the-shelf availability of your choice, actual demonstration of the product, fast personal attention, and experienced technical guidance.

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Huntsville
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Stereo Services
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(Hi-Fi Only)
Mobile
Universal Electronics & Inst.
3058 Brookline Dr., W.
Montgomery
Stereo Svces. of Montgomery
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Tucson
Park Music Shop
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Orange
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475 Barneveld
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Southeastern Communications, Inc.
2055 N.E. 151st St.
Tampa
Maurice Wood
1949 W. Buffalo

GEORGIA
Atlanta
S.A. Sparks Communications Svce.
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B & S Electronics
6326 W. Roosevelt Rd.

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Electronic Engineers
3835 N. Kercheval Dr.

KANSAS
Wichita
Main Electronics, Inc.
353 Pattie

KENTUCKY
Louisville
Maury's Flourescent & Appl.
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New Orleans
Electronics Diversified Corp.
221 N. Dorgenois St.
Shreveport
Audio & Instruments Assoc.
5511 Sussex St.
(Test Equip. & Hi-Fi Only)

MAINE
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Bartlett Radio Co.
181 Brackett St.

MARYLAND
Baltimore
Clayton Electronics, Inc.
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4925 Bethesda Ave.

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Stereo Components Svce.
73 River St.
Wellesley
Central Electronics Svce Co.
170 Worcester Rd.
(Route 9 at Route 128)
Worcester
Audio-Visual Assoc.
8 Boylston St.

MICHIGAN
East Detroit
Sealand Electronics, Inc.
23043 Gratiot
Lincoln Park
Lincoln Park Sound Svce.
2884 Fort St.

MINNESOTA
Anoka
Component Assemblers
17225 Round Lake Blvd.

MISSOURI
St. Louis
A.A. Kelley Radio Elect.
4181 Manchester
Scherrer Instruments, Inc.
7170 Manchester Ave.

MONTANA
Billings
Montana Precision Measurements
1021 Cook Ave.
(Test Equip. & Ham Only)

NEBRASKA
Omaha
Hi-Pix Stereo Svce.
3427 S. 42nd St.
(Hi-Fi Only)

NEVADA
Las Vegas
Neva Tronics
1928 Western

NEW JERSEY
Pennsauken
Pennsauken Elect. Svce.
5045 Route 38
Singac
Hosica Laboratories
715 Main St.
Upper Saddle River
Eastern Stereo Servicenter
127 Pleasant Ave.

NEW MEXICO
Alburquerque
The Audio Clinic
1616 Eubank Blvd., N.E.
P.O. Box 11545

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Binghamton
Ross Radio and TV Svce.
116 Main St.
Hastings on the Hudson
(Westchester)
Central TV and Hi-Fi Svce.
543 Warburton St.
Huntington Station
Suffolk Sound Repair, Inc.
1671 New York Ave.

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Manhattan
Winter's Radio Laboratory
11 Warren St.
Queens
Great Northern Tronics
145-04 Jamaica Ave.
Syracuse
Radio & Electronic Svce.
401 N. Townsend St.

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Component Industries
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West Hempstead
Audotronic, Inc.
96 Hempstead Turnpike
(Hi-Fi & Test Equip. Only)

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Tryon Repair Service
3125 Tuckaseegee Rd.
Raleigh
Speed Instrument Co.
3028 E. Rothgeb Dr.

OHIO
Cleveland
Electronic Instrument Labs,
3617 Detroit Ave.
(Instr. & Test Equip. Only)
Dayton
Audio Labs
3470 Salem Ave.
East Cleveland
Whitlow Electronic Corp.
2150 Noble Rd.
Toledo
Don's Electronics
1628 Belmont Ave.
(Ham Only)

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Dick Millhouse
Hi-Fi Stereo Service
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Havertown
Michael's TV and Radio Svce.
1127 West Chester Pike
Levittown
Mort's TV
4119 Woerner Avenue
Electronic Servicenter, Inc.
13 South 21st Street
Sunshine Scientific Inst.
1810 Grant Ave.
Red Lion
Electronic Maintenance Co.
103 E. Broadway
W. Mifflin
Mr. Ivan D. Livi
Pittsburgh Institute of Aeronautics
Alleghany County Airport
Woodlyn
Alton Electronics Co.
1309 Jefferson Ave.

SOUTH CAROLINA
Charleston Heights
Custom Audio Lab
2202 Meeting St.
(Hi-Fi Only)

TENNESSEE
Chattanooga
Edwin Bohr Electronics
5880 Dayton Blvd.
(Instr. & Test Equip. Only)

TEXAS
El Paso
Test Equipment Co.
5319 Harlan Drive
La Feria
La Feria Radio & TV Svce.
San Antonio
Audio Media
8015 Webbles
Texas City
Ham's Communication Svce.
3001 Somerset

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Bountiful
Anderton Electronic Lab
129 E. 1800, South
Provo
Brickey Electronics
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Salt Lake City
Radio Electronics TV Svce
1557 E. Stratford

VIRGINIA
Arlington
Washington Elect. Svce.
4110 Wilson Blvd.
Newport News
F. Blount
Tidewater Electronics
11218 Jefferson Avenue
Virginia Beach
Electronic Lab
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Brooklyn, New York 11207

CANADA
EICO Canada Limited
20 Millwick Drive
Weston, Ontario, Canada

EXPORT DIVISION
Roburn Agencies, Inc.
349 W. 14th Street
New York, N.Y. 10014

Military Personnel Overseas
EICO Military Sales Division
283 Malta Street
Brooklyn, New York 11207

THE EICO WARRANTY

The Electronic Instrument Company, Inc., hereafter referred to as EICO, warrants that, for a period of 90 days from the date of purchase, any EICO kit will be free of defects in parts, and that any EICO factory-wired unit will be free of defects in parts and workmanship. For an EICO kit, EICO's obligation is limited to those parts which are returned transportation prepaid to the factory without further damage, and in the judgement of EICO are either originally defective or have become defective in normal use. For an EICO factory-wired unit, EICO's obligation is limited to those parts, sections, or the entire unit which is returned transportation prepaid to the factory without further damage, and in the judgement of EICO are either originally defective or have become defective in normal use.

The warranty does not apply to any parts damaged in the course of handling, assembling, or wiring by the customer, or damaged due to abnormal usage or in violation of instructions or reasonable practice, or further damaged to a consequential degree in return shipment. Furthermore, the foregoing warranty is made only to the original customer, and is and shall be in lieu of all other warranties, whether expressed or implied, and of all other obligations or liabilities on the part of EICO, and in no event shall EICO be liable for any anticipated profits, consequential damages, loss of time, or other losses incurred by the customer in connection with the purchase or operation of EICO products or components thereof.

The registration card, which accompanies each EICO kit or factory-wired unit, must be filled in and returned to the company within 10 days after the date of purchase. This warranty applies only to registered units.