ACT-1

ANALOG CIRCUITS TRAINER

INSTRUCTION MANUAL

Global Specialties
22820 Savi Ranch Parkway
Yorba Linda, CA 92887
800-572-1028

80-01-0240
3/2009

WARNING

FEDERAL REGULATION (PART 15 OF FCC RULES) PROHIBITS THE USE OF COMPUTING EQUIPMENT WHICH CREATES RADIO OR TV INTERFERENCE

Interplex Electronics specifically warns the user of this instrument that it is intended for use in a classroom or laboratory environment for the purpose of learning and experimentation. When building experimental circuits, it may emit interference that will effect radio and television reception and the user may be required to stop operation until the interference problem is corrected. Home use of this equipment is discouraged since the likelihood of interference is increased by the close proximity of neighbors.

CORRECTIVE MEASURES:

Interference can be reduced by the following practices.

1) Install a commercially built RFI power filter in the power line at the point where the cord enters the unit.

2) Avoid long wires. They act as antennas.

3) If long wires must be used, use shielded cables or twisted pairs which are properly grounded and terminated.

TABLE OF CONTENTS

INTRODUCTION

The E & L Instruments ACT-1 (Analog Circuits Trainer) is an analog breadboarding instrument with built-in power supplies and function generator. It can be used for design and training purposes and its unique combination of built-in functions and uncommitted devices makes it one of the most convenient breadboarding systems available.

Power supplies - The ACT-1 has four regulated DC power supplies available for breadboarding. Two of the supplies are fixed at plus and minus 12 volts. The remaining two supplies are completely variable from 0 to plus 7.5 volts DC and 0 to minus 7.5 volts DC respectively. All four supplies are short circuit protected.

Function Generator - The ACT-1 is capable of producing sine, triangle, square and TTL signals over the range of 0.1Hz to 100KHz. An internal capacitor sets the frequency to 1KHz but the full range can be attained by installing external capacitors of the appropriate value. (See app note #1 of this manual).

Uncommitted devices - The ACT-1 has a number of "uncommitted" devices installed in it to support your breadboarding needs:

Two slide pots, 10k and 100k
Two SPDT slide switches
Two BNC connectors
One 2" speaker

Breadboarding - All of the above functions are internally connected to a solderless interconnect socket with 5 tie points for each signal. In addition an E & L Instruments SK-10 Solderless Breadboarding Socket is attached to the unit this providing a convenient work area for circuitry being designed or studied. Both sockets allow insertion of components or wires up to#20 AWG. For components with larger diameter leads use E & L's BP-24 adapter pins which can accept wire leads up to #16 AWG.

The unit is housed in a durable attractive plastic box with a hinged protective cover thus making it portable and stackable for storage purposes.

SPECIFICATIONS ACT - 1

A. POWER SUPPLY

Type: Regulated wall mount adaptor w/3.5mm stereo male plug
plus and minus 12VDC +/-5%. *200ma each at 115VAC 60Hz

ON BOARD VOLTAGES

Fixed Supplies: Plus and minus 12VDC +/-5%
150ma each @115VAC
short circuit protected

Variable Supplies: 0 to +7.5VDC +/-10%
0 to -7.5VDC +/-10%
50ma each @115VAC
both supplies short circuit
protected and have LED short
indicators

B. FUNCTION GENERATOR

Type: EXAR 2206 integrated circuit

Frequency: Factory set to 1Khz +/-20%
*User variable by ext capacitor (0.1Hz to 100Khz)
*User FM control line

Amplitudes: (typical)

Sine	4V peak to peak 10k ohm load
Triangle	9V peak to peak 10k ohm load
Square	8V peak to peak 10k ohm load
TTL	Logic "0" 0.3V max. at 1 TTL load
	Logic "1" 4V min. at 1 TTL load
	Rise and fall times less than 1 usec.

*User AM control line, (only effects sine and triangle waves)

Duty cycle: 50% all waves

C. UNCOMMITTED FUNCTIONS

2 Slide pots, 10k and 100k +/-20%
2 SPDT slide switches
2 BNC connectors
1 Speaker, 2", 8 ohms

D. SIGNAL CONNECTIONS

All signals and functions connected to an E&L Instruments SK-50/IF-33 solderless interconnect socket which has 5 tie points available for each signal

E. BREADBOARDING

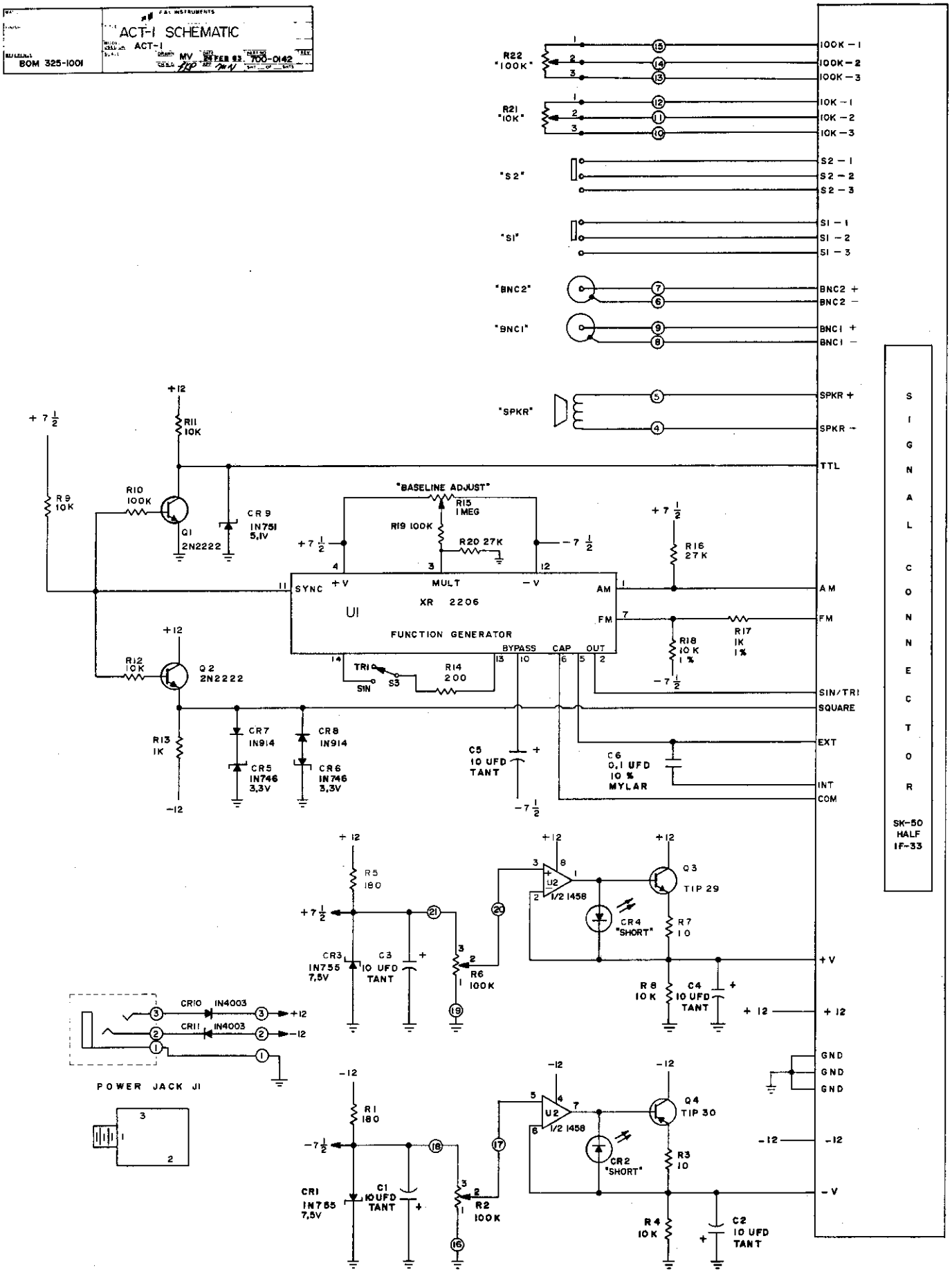
One E&L Instruments SK-10 solderless breadboarding socket is permanently attached to the unit. The SK-10 can accomodate up to eight 14 pin ICs with 4 tie points per pin plus 8 power rails with 25 tie points each

F. PHYSICAL

Length	10"	25.4cm
Width	7.5"	19.05cm
Height	2.562"	6.51cm

G. WEIGHT (minus adaptor)

1 lb 10 oz	0.737 Kg


ACT-1 SCHEMATIC
ACT-1
BOM 325-1001
700-0142
R22 "100K"
R21 "10K"
"S2"
"S1"
"BNC2"
"BNC1"
"SPKR"
100K-1
100K-2
100K-3
10K-1
10K-2
10K-3
S2-1
S2-2
S2-3
S1-1
S1-2
S1-3
BNC2 +
BNC2 -
BNC1 +
BNC1 -
SPKR +
SPKR -
TTL
AM
FM
SIN/TRI
SQUARE
EXT
INT
COM
+V
-V
GND
GND
GND
+12
-12
SIGNAL CONNECTOR
SK-50 HALF IF-33
R11 10K
R9 10K
R10 100K
Q1 2N2222
CR9 IN751 5,1V
"BASELINE ADJUST"
R15 1MEG
R19 100K
R20 27K
R16 27K
R17 1K 1%
R18 10K 1%
U1
XR 2206
FUNCTION GENERATOR
SYNC
MULT
BYPASS
CAP
OUT
TRI
SIN
S3
R14 200
R12 10K
Q2 2N2222
R13 1K
CR7 IN914
CR8 IN914
CR5 IN746 3,3V
CR6 IN746 3,3V
C5 10 UFD TANT
C6 0,1 UFD 10 % MYLAR
R5 180
R6 100K
CR3 IN755 7,5V
C3 10 UFD TANT
U2 1/2 1458
Q3 TIP 29
CR4 "SHORT"
R7 10
R8 10K
C4 10 UFD TANT
CR10 IN4003
CR11 IN4003
POWER JACK J1
R1 180
R2 100K
CR1 IN755 7,5V
C1 10UFD TANT
Q4 TIP 30
CR2 "SHORT"
R3 10
R4 10K
C2 10 UFD TANT

GENERAL ASSEMBLY PRACTICES

A. Most of your kit items have been packed in plastic bags. Check the contents of the bags against the BILL OF MATERIAL LISTING to insure that all of the correct parts are in your kit. Inspect packing material for any loose parts before discarding.

   Please bring all shortages or discrepancies to the immediate attention of E & L Instruments as this helps us correct errors and make a better kit for the next person.

B. Excessive heat can damage solid state devices. Avoid soldering with guns or irons which exceed 35 watts.

C. Use only rosin core solder. The use of corrosive solders such as acid core or pastes or fluxes voids any and all warranties on your kit.

D. We recommend that you use a yellow high-lighter pen on the CONSTRUCTION FIGURES to mark off items as you assemble the kit. This simple bookeeping method allows you to put the kit aside and pickup where you left off at another time in an orderly fashion.

E. Electronic devices of similar function often come in different form. Please study the COMPONENT IDENTIFICATION DIAGRAMS to become familiar with the various types of devices which are apt to be supplied in your kit before actual construction.

F. Some Integrated Circuits (ICs) are easily damaged by STATIC ELECTRICITY! These ICs are packed on black conductive foam. Use the following precautions when handling such ICs.

   1) Do NOT remove the IC from the conductive foam until you are actually ready to install it into the circuit.
   2) Avoid carpeting or other furnishings that promote static build up.
   3) Ground soldering tips and test equipment before contacting such ICs.

SOLDERING TIPS

The quality of your unit is going to depend on the quality of your assembly and soldering techniques. We have outlined, below, some standard practices that you should adhere to.

1 There is more to a soldered connection than two or more pieces of metal held together by a "blob" of solder. When molten solder is applied to a metal, the solder actually disolves some of the metal's surface. Thus, metals which have been soldered together are bonded by a solidified solution of solder and parts of the metals which were joined. Soldering is an easy task, but it is a task that must be done correctly. If your soldering techniques are poor you will have a great deal of trouble with the kit that you are about to assemble.

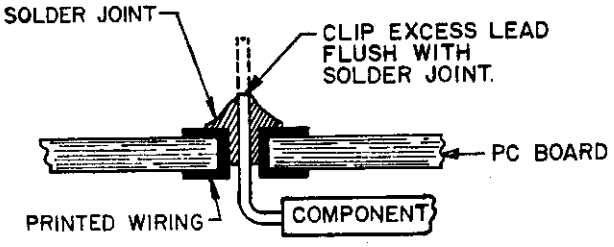
2 In order for molten solder to perform its function of joining metals together, the oxides on the surfaces of the metals must be removed. The oxides are removed by a FLUX. A flux is a material which, when heated, dissolves surface oxides and suspends them away from the surface of the metal. With the surface oxides removed, the molten solder can dissolve some of the surface metal and bond itself tightly to the metal.
We recommend the use of Rosin flux core solder with a mixture of 63% tin and 37% lead. This is the only mixture that goes directly from liquid state to solid state thus, bypassing the plastic state which causes cold solder joints.

3 A good solder connection is made in two steps: The first step is to make the mechanical connection. Then the molten solder is applied to the connection. After you have stripped a wire, always check to see that the wire is clean and free from heavy oxidation, grease or oil. Oxidation can be scraped off, and oil or grease can be removed with a rag. Steel wool or sandpaper is excellent for cleaning badly oxidized wires. Stranded wire should be tinned (covered with solder) to prevent the bare ends from fraying and possibly causing a short circuit.

The next step in making a solder connection is to secure the wire or wires to the terminal or lug. The wire should make sufficient contact with the terminal or lug, but should not be tightly fastened. The solder will provide both mechanical strength and a low resistance junction.

After the mechanical connections are complete, the next step is to apply the solder. First heat the mechanical connection, with the iron, to allow the solder to flow on the hot metal. Apply the solder to the point where the iron meets the contact to be soldered. The flux should melt and flow freely over the contact, dissolving all oxides, and aiding heat transfer from tip to connection. The solder should then melt and flow freely, covering the area to be soldered. Make sure you apply enough solder to cover the contact.

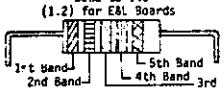
4 To prepare p.c. boards for soldering, clean the area to be soldered on the printed wiring by rubbing with a pencil eraser, and clean the component leads with a piece of steel wool. Place the component on the board, on the side with the nomenclature printed on it, with the leads extending through the holes indicated for the component. Flip the board over and solder the leads. The same general rule for soldering conventional circuitry should be adhered to.



RESISTOR IDENTITICATION

Resistor Color Code Chart #1

3 significant figures (1%)



Color	BANDS				
	1st	2nd	3rd	4th	5th
Black	0	0	0	X 1.0	
Brown	1	1	1	X 10	1%
Red	2	2	2	X 100	2%
Orange	3	3	3	X 1000	.01
Yellow	4	4	4	X 10000	.001%
Green	5	5	5	X 100000	
Blue	6	6	6	X 1000000	
Purple	7	7	7	--	
Grey	8	8	8	--	
White	9	9	9	--	
Gold	-	-	-	÷ 10	
Silver	-	-	-	÷ 100	
-----	-	-	-		

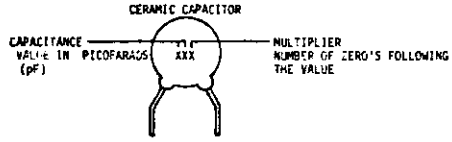
Resistor Color Code Chart #2

Color	BANDS				
	1st	2nd	3rd	4th	5th
Black	0	0	X 1.0	-	
Brown	1	1	X 10	-	
Red	2	2	X 100	-	
Orange	3	3	X 1000	-	
Yellow	4	4	X 10000	-	
Green	5	5	X 100,000	-	
Blue	6	6	X 1000,000	-	RC=MIL-R-39008
Purple	7	7	--	-	
Grey	8	8	--	-	
White	9	9	--	-	
Gold	-	-	÷ 10	-+ 5%	
Silver	-	-	÷ 100	-+ 10%	
-----	-	-	-	-+ 20	RC=MIL-R-11

807-0001

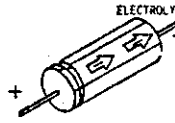
CAPACITOR IDENTIFICATION

CERAMIC CAPACITOR



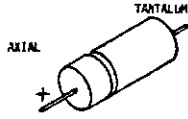
EXAMPLES: 103 = 10000 pF OR .01 μF
302 = 3000 pF OR .002 μF
676 = 67000000 pF OR 6 μF

ELECTROLYTIC CAPACITOR

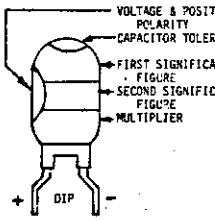


CAPACITANCE IS INDICATED ON CAPACITOR IN MICROFARADS (μF)

TANTALUM CAPACITOR



CAPACITANCE IS INDICATED ON CAPACITOR IN MICROFARADS (μF)

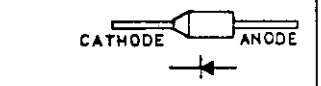


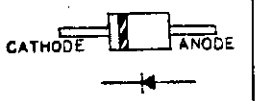
COLOR	VOLTAGE	VALUE	MULTIPLIER
BLACK	4	0	----
BROWN	6	1	----
RED	10	2	----
ORANGE	15	3	----
YELLOW	20	4	10000
GREEN	25	5	100000
BLUE	35	6	1000000
VIOLET	50	7	10000000
GRAY	----	8	----
WHITE	----	9	----

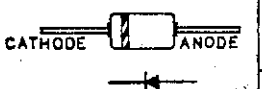
CAPACITANCE MAY BE MARKED ON CAPACITOR IN MICROFARADS (μF) OR BY COLOR CODE IN PICOFARADS (pF)

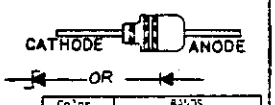
807-0005

DIODE & LED IDENTIFICATION

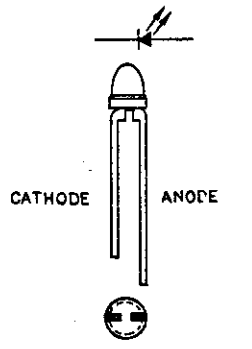


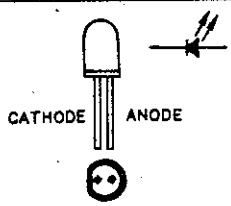






Color	BANDS		
	1st	2nd	3rd
Black	0	0	0
Brown	1	1	1
Red	2	2	2
Orange	3	3	3
Yellow	4	4	4
Green	5	5	5
Blue	6	6	6
Purple	7	7	7
Grey	8	8	8
White	9	9	9

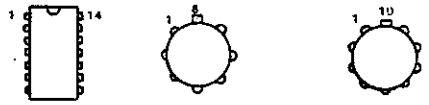




807-0010

IC IDENTIFICATION

TOP VIEW

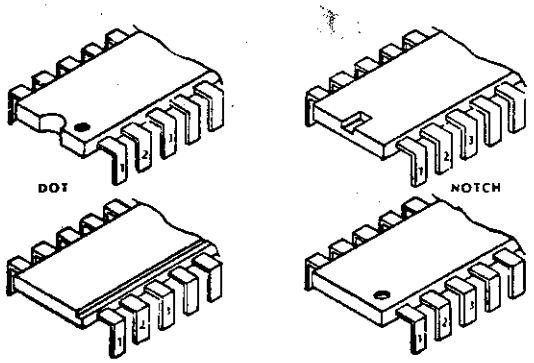


14 PIN DIP 8 PIN CAN 16 PIN CAN

PIN COUNT IS SEQUENTIAL IN A COUNTERCLOCKWISE FASHION

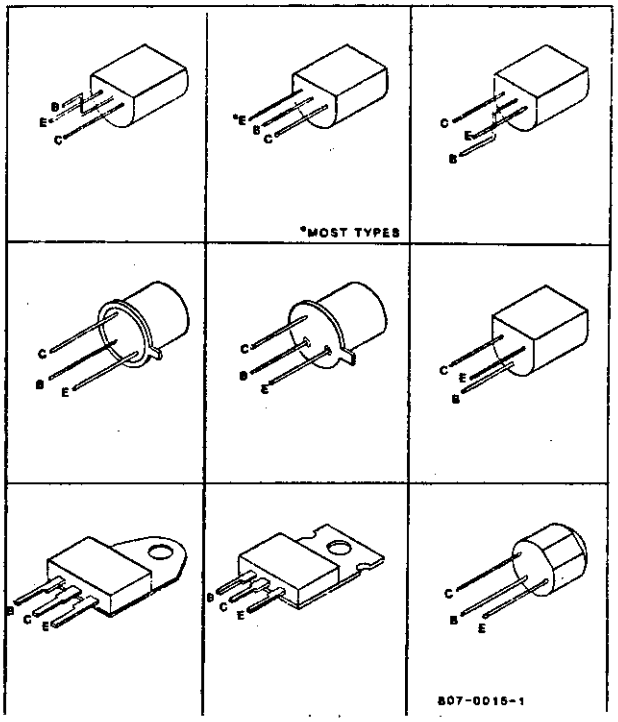
PIN 1 LOCATION

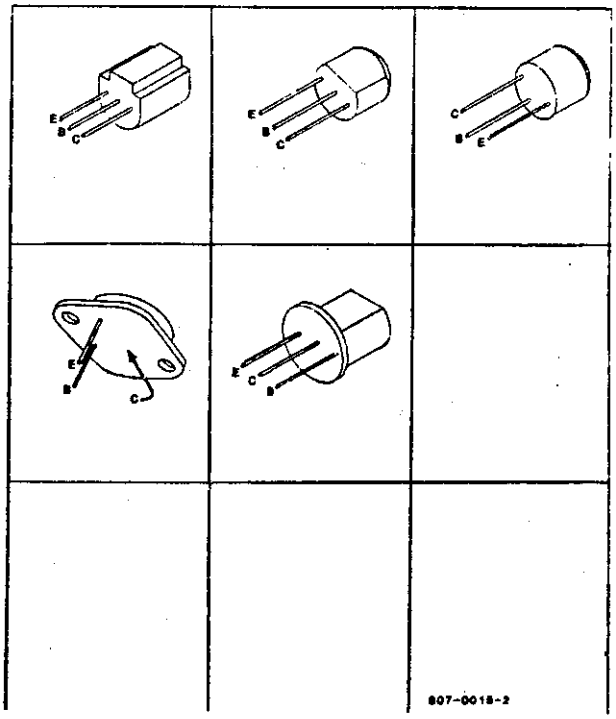
CAN STYLE TAB IS ALWAYS PLACED ON HIGHEST PIN NUMBER WITH PIN 1 TO THE LEFT SIDE



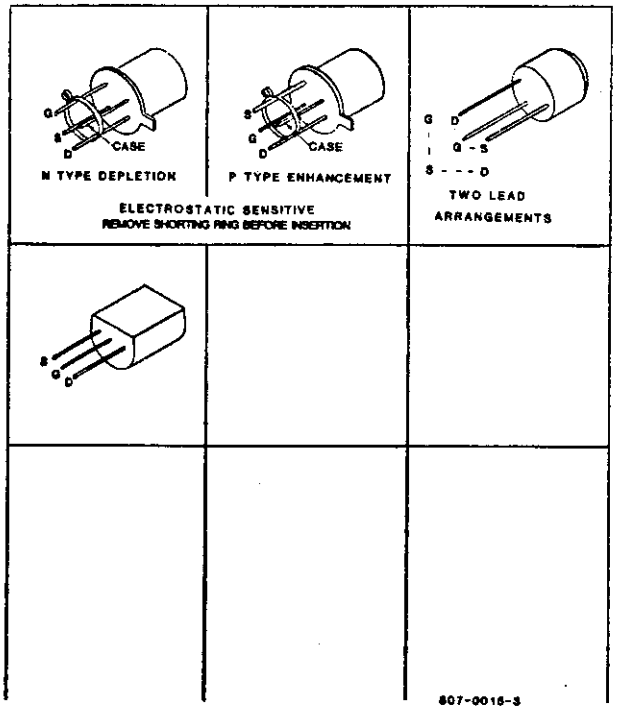
807-0030

TRANSISTOR IDENTIFICATION



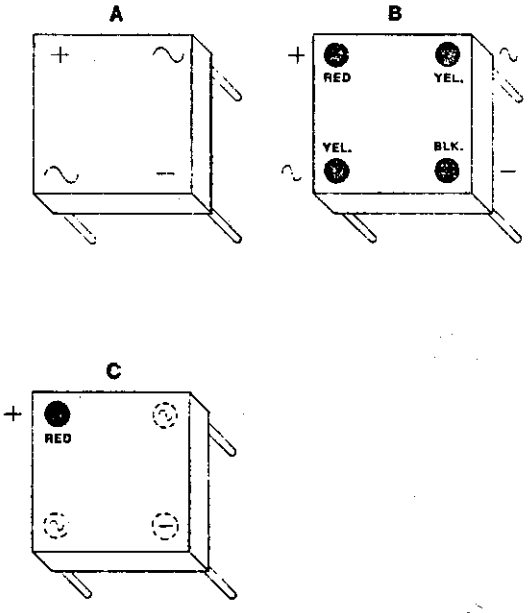


F.E.T. IDENTIFICATION



FULL WAVE BRIDGE RECTIFIER IDENTIFICATION

CASES MAY BE EITHER SQUARE OR ROUND



CONSTRUCTION

Note: For convenience of construction remove FIGURES 1 thru 15 from manual

A. Assemble unit as per FIGURES 1 thru 12 as follows:

1. Prepare and install 8 bus wire jumpers (#22 AWG) locations indicated on PC board (see FIG. 1), solder, clip leads flush to board
2. Install all resistors, solder, clip
3. Install all LEDs. Leave 1/8" space between bottom of LEDs and top of PC board to prevent damage to LED when soldering, note polarity, solder, clip
4. Install remaining diodes except for CR10 & CR11 (see FIG. 9), solder, clip
5. Install transistors Q1 and Q2, refer to "transistor identification" chart for orientation, solder, clip
6. Install transistors Q3 and Q4 as per FIG. 3, solder, clip
7. Install all capacitors except C6, note polarity, solder, clip
8. Install all IC sockets, note orientation, solder
9. Install all switches, solder, clip
10. Install SK-50/IF-33 socket taking care that all pins protrude thru PC board, secure as shown in FIG. 4, solder
11. Attach self stick signal label to SK-50/IF-33 socket as shown in FIG. 5. Carefully align signal names with tie points on socket
12. Install a bus wire jumper (#22 AWG) between "INT" and "COM" on the SK-50/IF-33 socket (see FIG. 5)
13. Install speaker as per FIG. 6 as follows: Install screw "A" and secure with nut and lockwasher to form a stud, screw tinnerman fastener onto stud and slide speaker under it, note orientation (see FIG. 9)
14. Complete speaker installation using center two mounting screws of SK-10 socket and remaining two tinnerman nuts (see FIG. 6), complete SK-10 mounting as per FIG. 6
15. Install 1 megohm thumbwheel potentiometer on BOTTOM of PC board, solder in place using care not to damage potentiometer
16. Slide 1/2" of teflon sleeving over each lead of C6 (.01 ufd mylar cap), install on BOTTOM of PC board, solder, clip
17. Install BNC connectors with internal tooth lockwashers under nuts as per FIG. 7
18. Install power jack as per FIG. 8
19. Install 4 slide pots (R2,6,21, & 22) with M2.6 x 0.45 black screws (see FIG. 9 for orientation)
20. Install CR10 & CR11 between the power jack and solder pads on PC board as per FIG. 9, note polarity, solder, clip
21. Wire the four slide pots, power jack, BNC connectors and speaker to the PC board, use #22 AWG stranded wire and follow FIG. 9 closely for proper connections
22. Install all ICs into sockets (see "IC identification" sheet for orientation), Be carefull not to fold pins of IC
23. Install 4 rubber bumpers in plastic housing as per FIG. 10
24. Install remaining rubber bumper on PC board as per FIG. 11
25. Install nylon flex clip as per FIG. 12, Be certain clip is perpendicular to front edge of PC board
26. Install knobs onto slide pot levers

B. Final Assembly

1. Attach PC board to plastic housing as per FIG. 13.
2. Affix self stick labels to inside of lid and top of plastic housing as per FIGS. 14 & 15.

C. Hinge Operation

The front of the PC board can be swung up as much as 6 inches for access to solder connections and the spare parts bag.

1. Raise PC board by pulling on the rubber bumper at the front center of the board.
2. Lock PC board by guiding nylon clip under lip of plastic housing with finger.

D. Component Container

Locate the vinyl ziplock bag and the 1" x 3" piece of conductive foam. Use the ziplock bag to store components for experiments and use the conductive foam to store static sensitive ICs. Place the foam in the bag (so it doesn't get lost) and place the bag in the plastic housing under the PC board for convenient storage.

CHECKOUT

1. Inspect the unit for missing parts, improper part orientation, cold solder joints etc.. Correct any obvious problems before proceeding.

2. Power Section - AC Adaptor Operation
   Plug AC adaptor into J1 then in wall outlet. Check for -12 volts between "-12 v" and "GND". Check for +12 volts between "+12 v" and "GND". Voltages should measure +/-12 volts +/-5%.

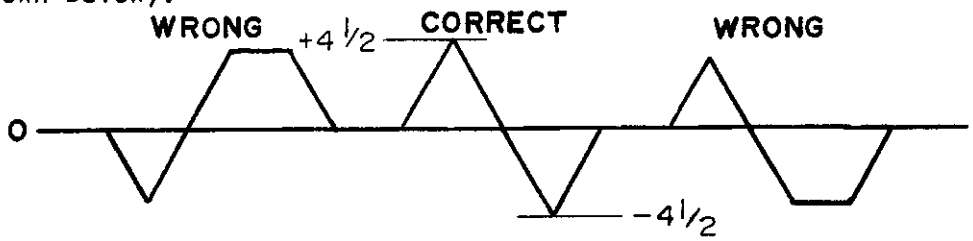
3. Variable Supplies
   Measure the voltage between "-V" and "GND", using the slide pot (R2) the supply voltage should vary from 0 to -7.5 volts +/-10%. measure the voltage between "+V" and "GND", using the slide pot (R6) the supply voltage should vary from 0 to +7.5 volts +/-10%.

4. Short Circuit Indicators
   Set both variable supplies to 7.5, place a jumper from "-V" to "GND" CR2 should light indicating a shorted condition. Place a jumper from "+V" to "GND" CR4 should light indicating a shorted condition. Remove jumpers the LEDs should go out.

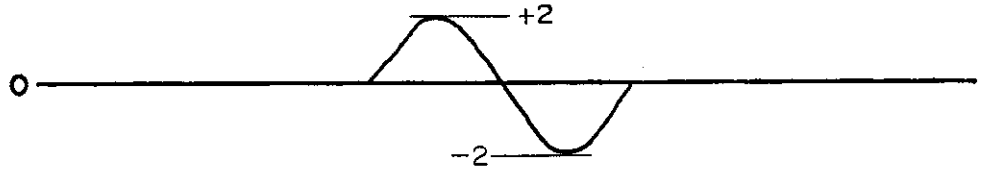
5. Function Generator

   NOTE: All waveforms should be 1khz +/-20% with a 50% duty cycle

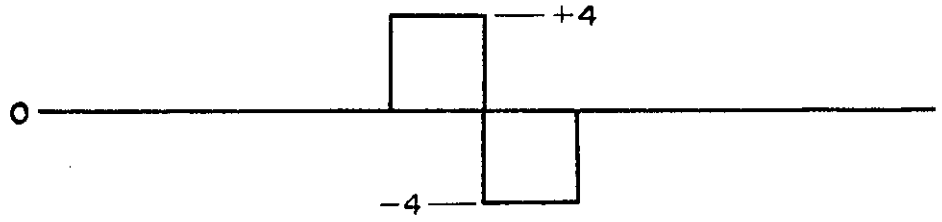
   (Triangle) Set S3 to "TRI" position, attach an oscilloscope between "SIN/TRI" and "GND". Adjust R15 (located under PC board) for a symmetrical waveform with approximately a 9v p.p. amplitude (as shown below).



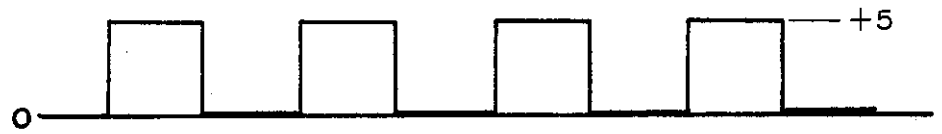
   (Sine) Set S3 to "SIN" position. The wave form on your oscilloscope should be a symmetrical sinusoid with approximately a 4v p.p. amplitude (as shown below).



(Square) Move oscilloscope lead from "SIN/TRI" to "SQR". The waveform on your oscilloscope should be a symmetrical squarewave with an 8v p.p. amplitude (as shown below).



(TTL) Move the oscilloscope lead from "SQR" to "TTL". The waveform on your oscilloscope should be a pulse train going from 0 to +5 volts (as shown below). Disconnect oscilloscope from unit.



6. Speaker
Jumper "SPKR-" to "GND" and "SPKR+" to "SQR", a 1khz tone should be audible from the speaker. Remove the jumper between "SPKR+" and "SQR", the tone should no longer be audible.

7. Uncommitted Switches (S1 & S2)
(S1) Set S1 to the "1,2" position, jumper "SQR" to "S1-2" and "SPKR+" to "S1-1" a 1khz tone should be audible from the speaker. Set S1 to the "2,3" position, the tone should no longer be audible. Move the jumper from "S1-1" to "S1-3", again the tone should be audible. Set S1 to the "1,2" position, the tone should no longer be audible. Remove jumpers (except for "SPKR-" to "GND").
(S2) Set S2 to the "1,2" position, jumper "SQR" to "S2-2" and "SPKR+" to "S2-1" a 1khz tone should be audible from the speaker. Set S2 to the "2,3" position, the tone should no longer be audible. Move the jumper from "S2-1" to "S2-3", again the tone should be audible. Set S2 to the "1,2" position, the tone should no longer be audible. Remove all jumpers.

8. Uncommitted Pots (R21 & R22)
10k (R21) Set the 10k slider to it's left-most position. Connect an ohmeter (10k range) between "10k-1" and "10k-2". The meter should read zero ohms. Move the slider gradually to the right and watch the ohmeter. The reading on the meter should increase from 0 to 10k ohms in proportion to the movement of the slider. Move the ohmeter lead from "10k-2" to "10k-3" and check for approximately 10k ohms.

8. (Continued)
100k (R22) Set the 100k slider to it's left-most position. Connect an ohmeter (100k range) between "100k-1" and "100k-2". The meter should read zero ohms. Move the slider gradually to the right and watch the ohmeter. The reading on the meter should increase from 0 to 100k ohms in proportion to the movement of the slider. Move the ohmeter lead from "100k-2" to "100k-3" and check for approximately 100k ohms.

9. BNC Connectors (BNC-1 & BNC-2)
(BNC-1) Check for continuity between "BNC-1-"and the metal shell of BNC-1. Check for continuity between "BNC-1+" and the center pin of BNC-1. Check for an open circuit between "BNC-1-" and "BNC-1+".
(BNC-2) Check for continuity between "BNC-2-" and the metal shell of BNC-2. Check for continuity between "BNC-2+" and the center pin of BNC-2. Check for an open circuit between "BNC-2-" and "BNC-2+".

CHECKOUT COMPLETED

BILL OF MATERIAL LISTING

BOM # 325-4001 ACT-I/K

LINE	COMPONENT	DESCRIPTION	QTY	LVL
1	02-05-0378	HOUSING BAG		1
2	05-03-0207	LD-1 HOUSING ASSY		2
3	94-03-0088	HSNG AIRMLD RH 2 3/8	1	3
4	86-05-0001	TINRMN FAST C13090-6A	2	3
5	66-00-0128	REF DWG 419-0068		4
6	92-01-0009	RBBR BMPRS SMITH #2451	5	3
7	77-01-0174	ACT-1 PKG LBL	1	3
8	77-01-0176	ACT-1 BLCK DIA LBL R/A	1	3
9	02-05-0330	SOLID STATE BAG		1
10	02-05-0369	ANALOG PC BD ASSEMBLY		2
11	95-01-0214	ACT-1 PC BD R/-	1	3
12	44-01-0181	EXAR XR-2206CP	1	3
13	44-01-0268	LM1458CN DUAL OP-AMP	1	3
14	20-02-0007	8PIN DIP SKT COM STD	1	3
15	20-02-0004	16 PIN DIP SKT STD	1	3
16	30-01-0012	TIP29 XSTR	1	3
17	30-01-0013	TIP30 XSTR	1	3
18	30-01-2222	2N2222 XSTR	2	3
19	10-01-0746	IN746 DIODE	2	3
20	10-01-0751	1N751A 5.2V 5% 400MW	1	3
21	10-01-0755	IN755 DIODE (7.5V ZEN)	2	3
22	10-01-4148	IN4148 DIODE	2	3
23	10-01-4003	IN4003 DIODE	2	3
24	10-02-0018	MINI RED LED 100 CENT*	2	3
25	02-05-0322	RESIST AND CAP BAG		1
26	37-01-1005	CCRES 1/4W 10 OHM 5%	2	3
27	37-01-1815	CCRES 1/4W 180 OHM 5%	2	3
28	37-01-2015	CCRES 1/4W 200 OHM 5%	1	3
29	37-01-1025	CCRES 1/4W 1K OHM 5%	1	3
30	37-01-1035	CCRES 1/4W 10K OHM 5%	5	3
31	37-01-2735	CCRES 1/4W 27K OHM 5%	2	3
32	37-01-1045	CCRES 1/4W 100K OHM 5%	2	3
33	37-02-0010	MFRES 1/4W 1K OHM 1%	1	3
34	37-02-0003	MFRES 1/4W 10K OHM 1%	1	3
35	08-06-0003	MYL CAP .1MFD 100V 10%	1	3
36	08-02-0020	10UF TAN CAP 20V 1.5"	5	3
37	02-05-0325	MISCELLANEOUS BAG		1
38	20-03-0010	BNC W/NUT/INT TOTH WSR	2	3
39	24-02-0001	8 OHM 2 INCH SPEAKER	1	3
40	20-03-0120	3.5MM PHONE JACK 3COND	1	3
41	88-02-0004	NYL FLX CLP	1	3
42	02-03-0001	SK10-PL UNIV SKT NEW	1	3
43	02-03-0018	SK-50 IF-33 HF SKT R/-	1	3
44	38-01-0001	1 MEG THUMBWHEEL POT	1	3
45	38-05-0002	100K SLIDE POT ALPS	3	3
46	38-05-0003	10K SL POT LIN CT DET	1	3

BILL OF MATERIAL LISTING

BOM # 325-4001 ACT-I/K

LINE	COMPONENT	DESCRIPTION	QTY	LVL
47	40-03-0025	SPDT PC SLIDE CUST *	3	3
48	91-01-0025	KNOB ALCO KSS-1A	4	3
49	77-01-0175	ACT-1 SKT LBL R/A	1	3
50	02-05-0320	HARDWARE BAG		1
51	66-00-0150	LBR HDWR BG ACT-1 R/-		2
52	84-05-0001	4-40X1/4" FLHD MS	1	3
53	84-03-0015	4-40X1/4"PAN HD BLACK	2	3
54	84-04-0002	4-40 X 5/8" FL HD. SC	8	3
55	85-02-0013	#4 SPLIT LW 1/32	9	3
56	86-03-0004	4-40X3/16" HEXNUT SMAL	9	3
57	84-02-0004	6-32X1/4"PAN HD SC BLK	1	3
58	85-01-0015	#6 FLAT WASHER	1	3
59	86-02-0006	6-32 HEX NUT STANDARD	1	3
60	84-01-0004	6-19X1/2 PLSTTE BLK	2	3
61	86-05-0002	TINRMN FAST C-7000-436	3	3
62	84-02-0005	M3X.45MMX4MM PNHD BLK	8	3
63	02-05-0324	WIRE BAG		1
64	66-00-0151	LBR WIRE BG ACT-1 R/-		2
65	34-99-2209	STRAND WIRE 22GA WHITE	48	3
66	34-05-0005	BUSS WIRE 22 GAGE	12	3
67	34-06-0009	226 TEF SLEEVING	1	3
68	41-01-0034	ADPTR +-12 REG .2A 115	1	3
69	94-03-0067	COMPONENT CONTAINER	1	3
70	15-01-0049	ANTI-STAT FOAM 1.5 X 3	1	3
71	66-00-0131	FOAM IN BAG		3
72	80-01-0162	WARRANTY & REPAIR INFO	1	1
73	80-01-0240	ACT-1 OP MAN R/-	1	1

APPLICATION NOTE
#1

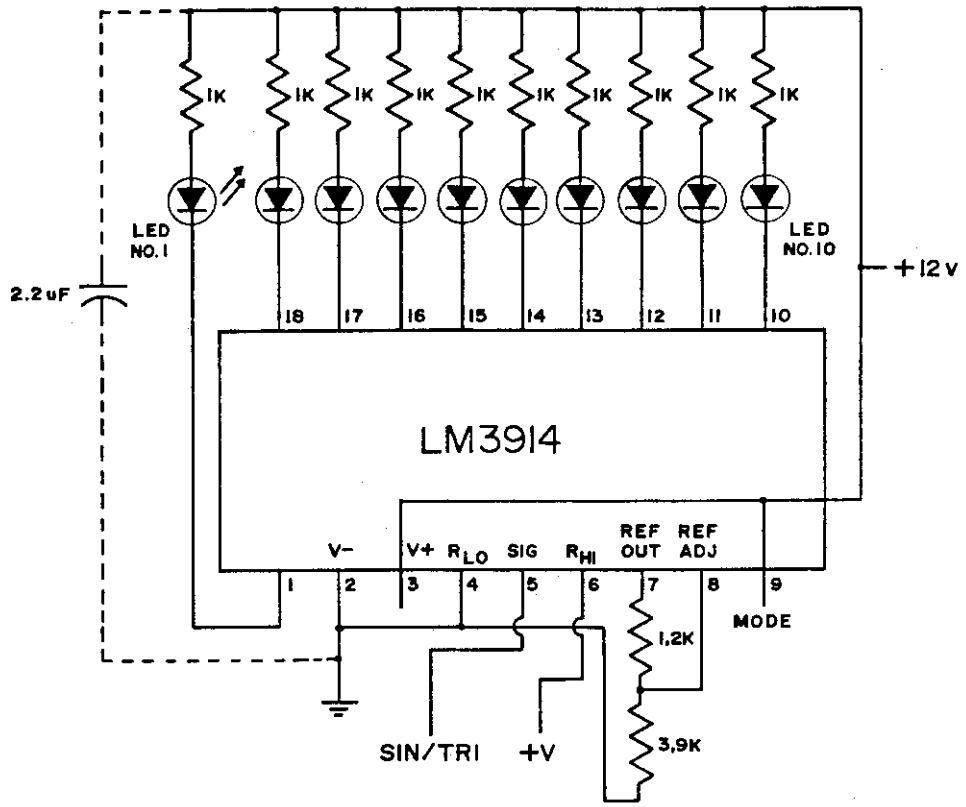
Function generator operating frequency with "INT" to "COM" jumper removed and external capacitor installed.

External capacitor (microfarads)	Frequency (Hertz)
1000	0.1
100	1
10	10
1	100
.1	1K
.01	10K
.001	100K

APPLICATION NOTE #2 - Dot/Bar display driver

This circuit is a Dot/Bar display which utilizes a LM3914 IC, and can be very useful in analog circuitry as a display or circuit monitoring device. In this application it is being used to display the positive half of the Sine wave output from the Act-1's function generator.

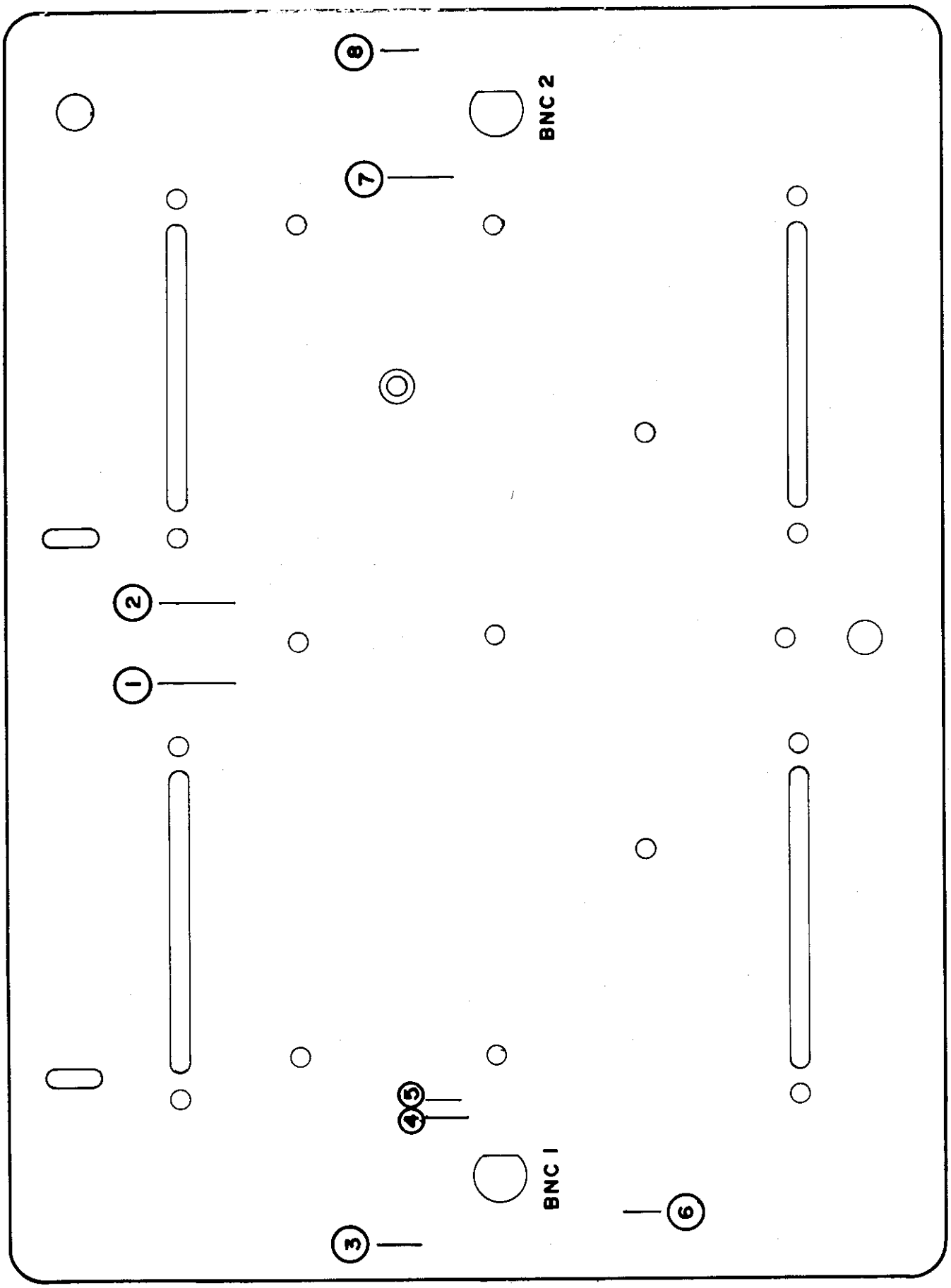
NOTE: 2.2uf capacitor is needed if leads to the LED supply are 6" or longer.



Procedure:
1) Unplug the Act-1's AC adapter from the wall
2) Carefully insert the LM3914 IC into the SK-10 socket straddling the center divider.
3) wire the circuit as per schematic diagram
4) "SIN/TRI", "+V" and "+12" shown on schematic are to be connected to coresponding points on Signal Connector
5) Remove the jumper between "INT" and "COM" on Signal Connector and insert a 100uf capacitor between "EXT" and "COM" (this will set the frequency of the function generator to 1Hz)
6) Set the +V supply to 1½ volts
7) Set switch S3 to the "SIN" position
8) Plug AC adapter into wall, The 10 LEDs should now act as a bar graph showing the rise and fall of the positive half of the Sine wave output.

Note: If pin 9 of the LM3914 is disconnected from +12v the display will be a moving "dot" instead of a "bar".

FIG. I



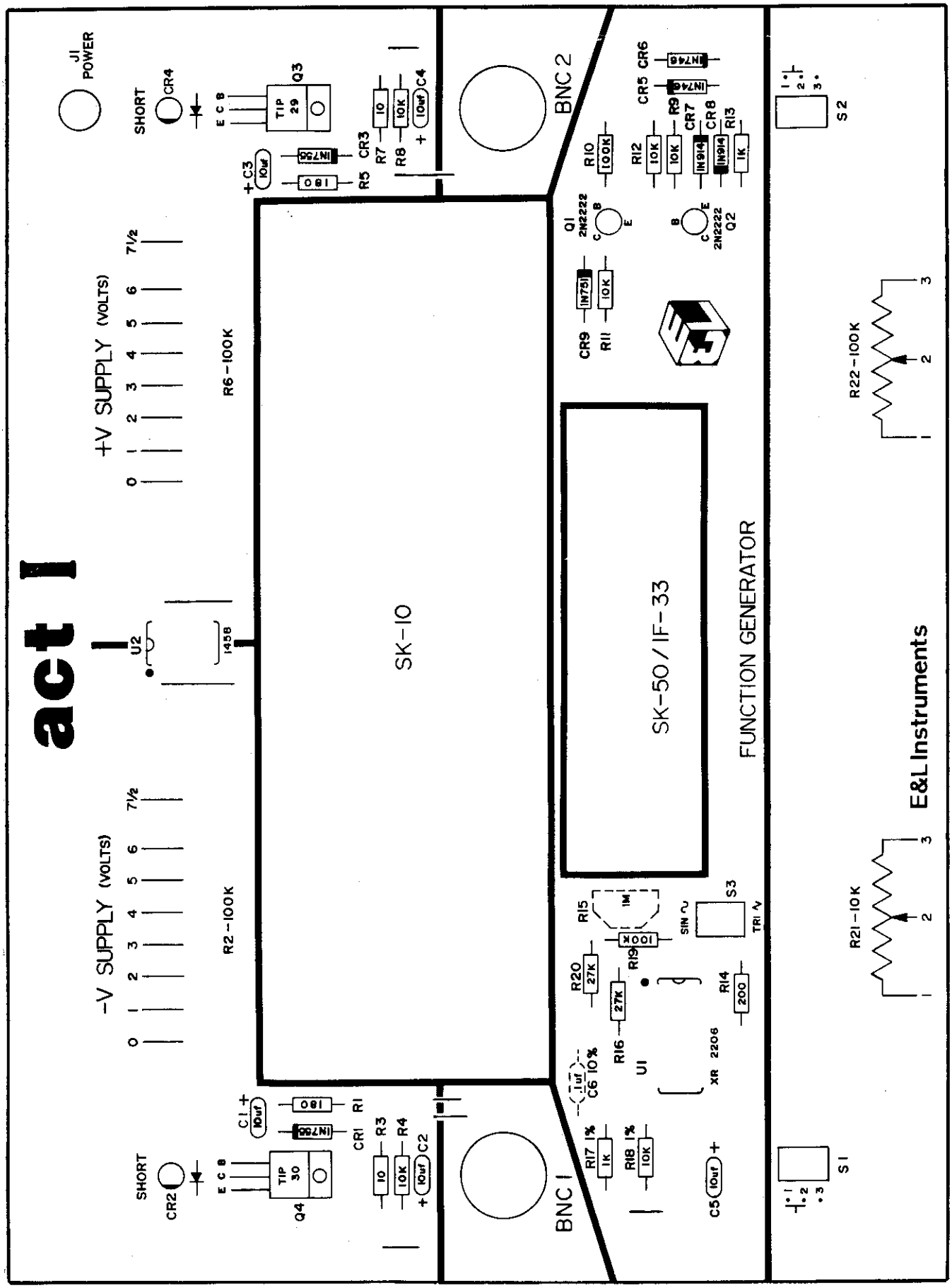


FIG. 2 COMPONENT PLACEMENT

FIG. 3

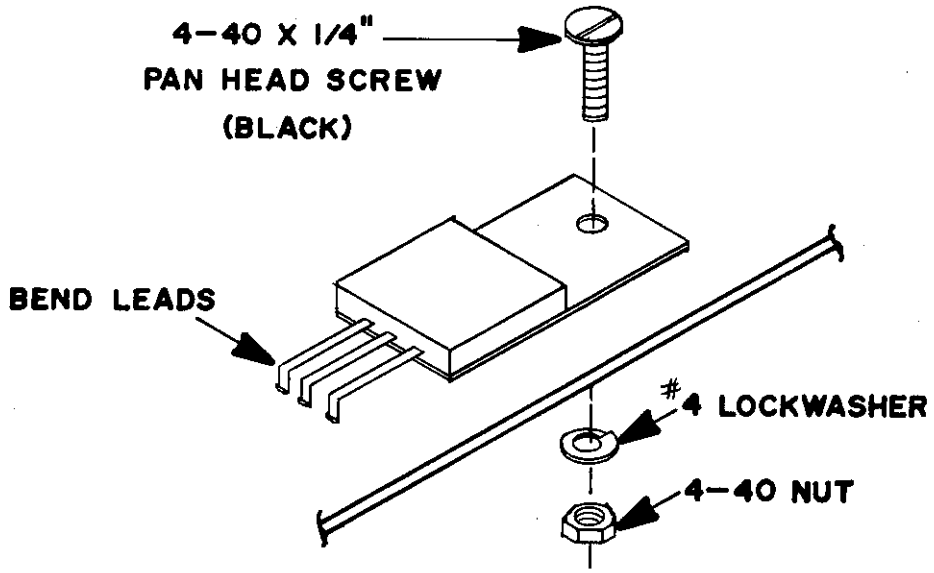


FIG. 4

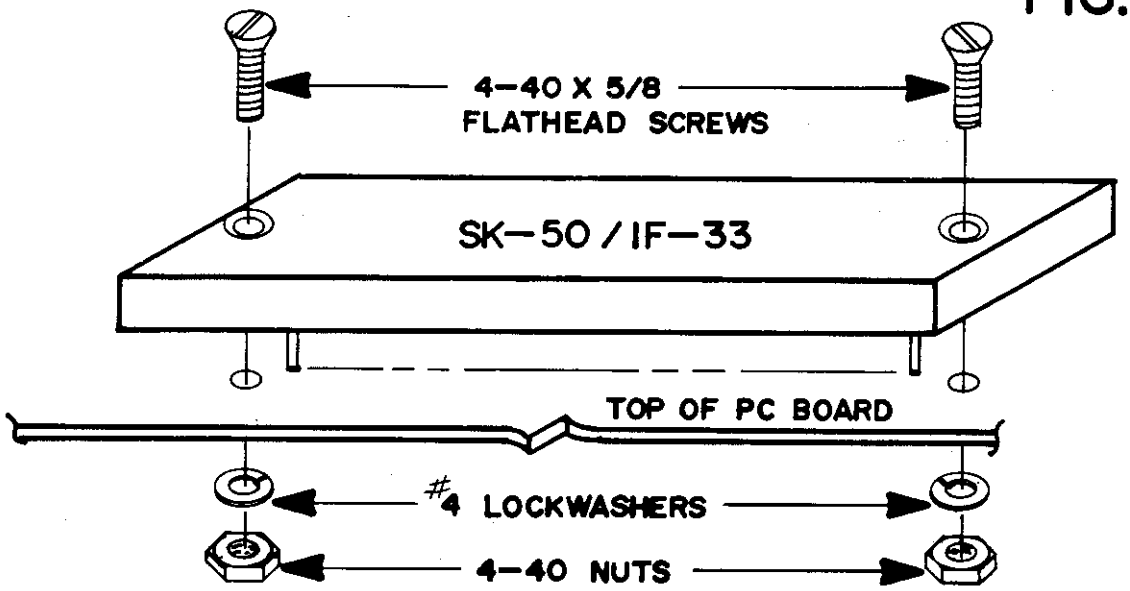


FIG. 5

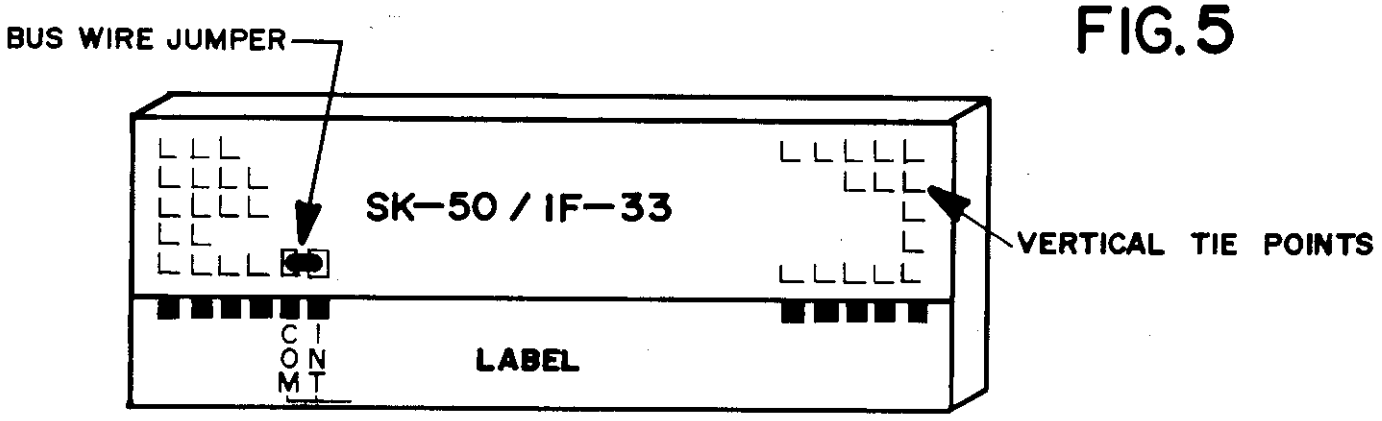
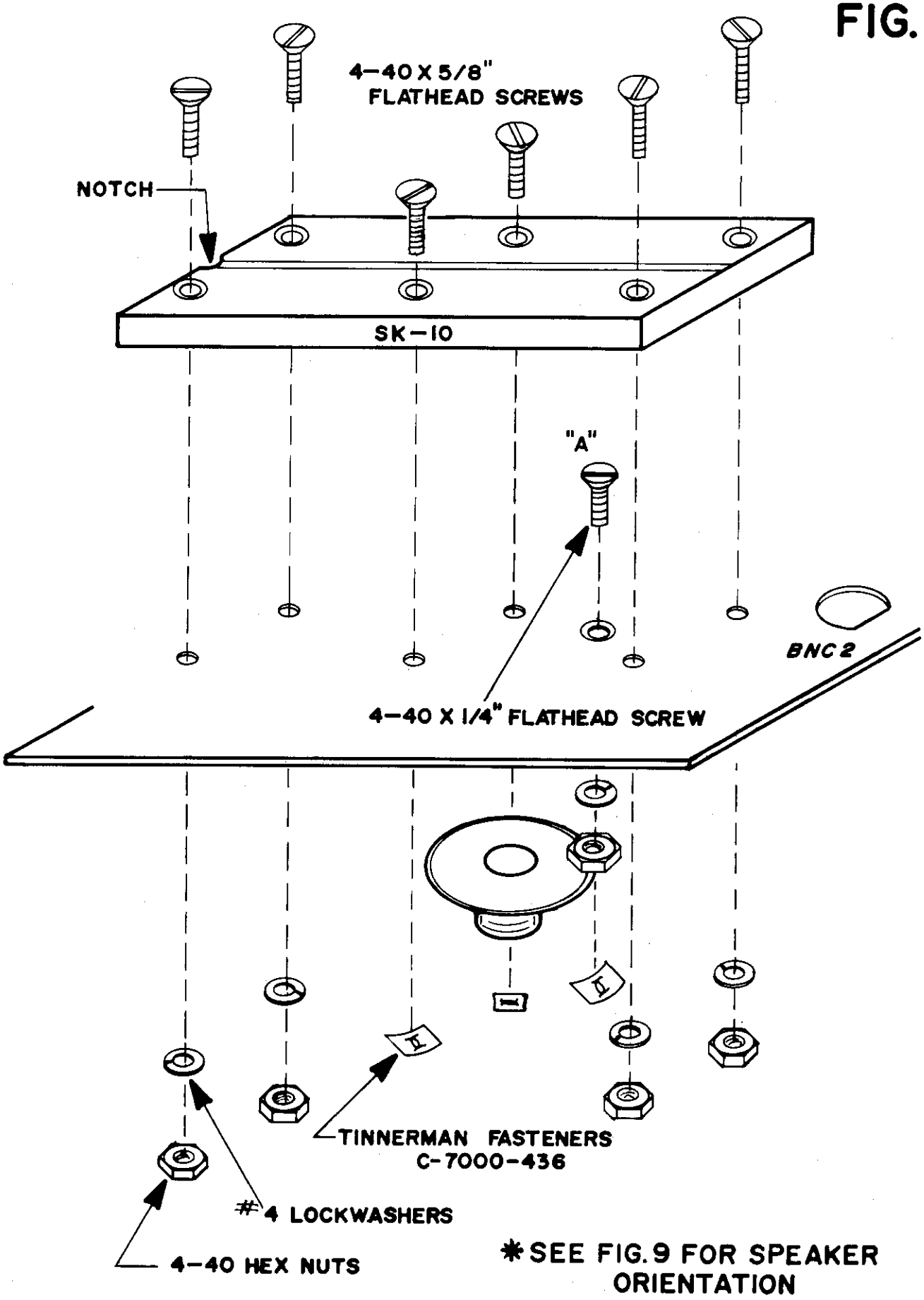


FIG. 6



*SEE FIG. 9 FOR SPEAKER ORIENTATION

FIG. 7

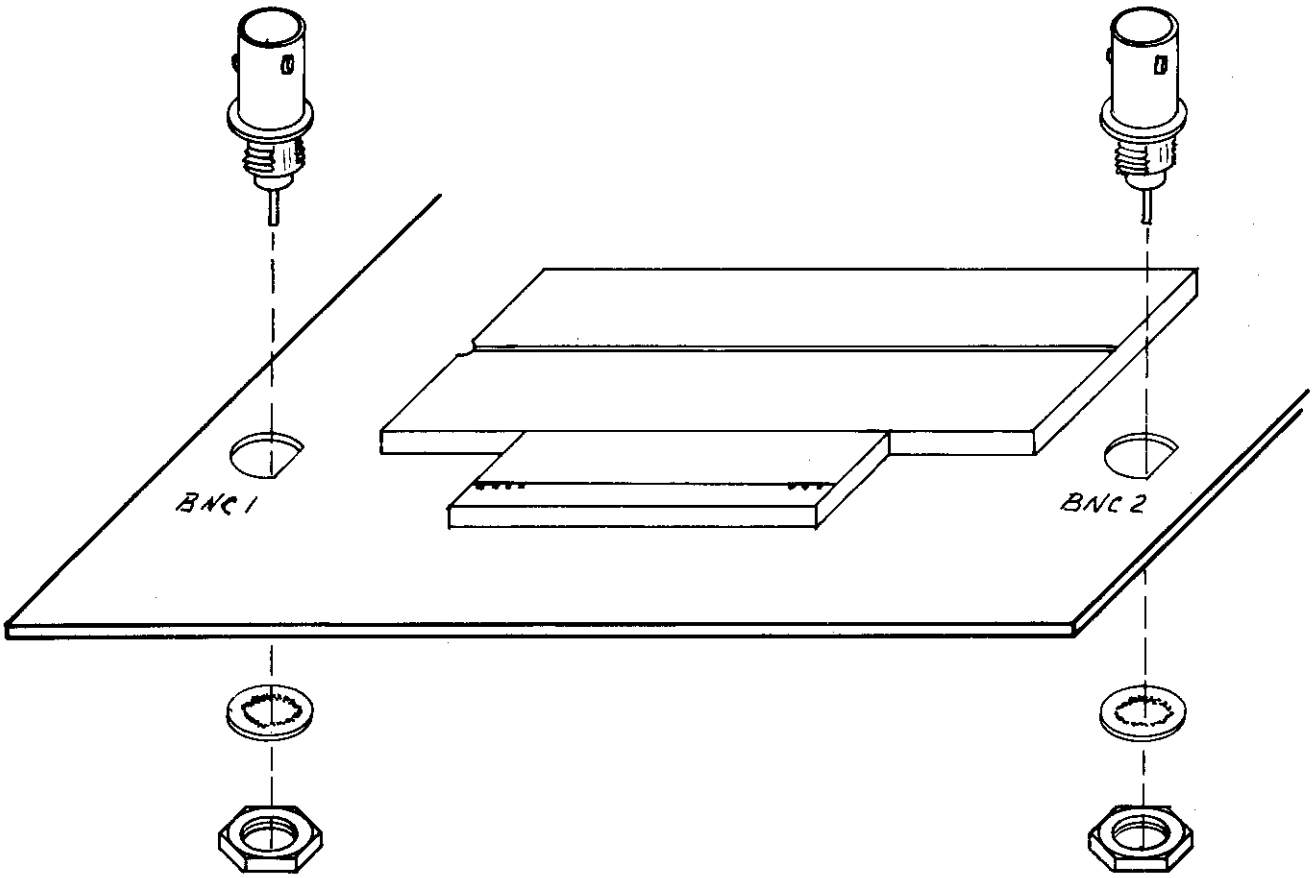


FIG. 8

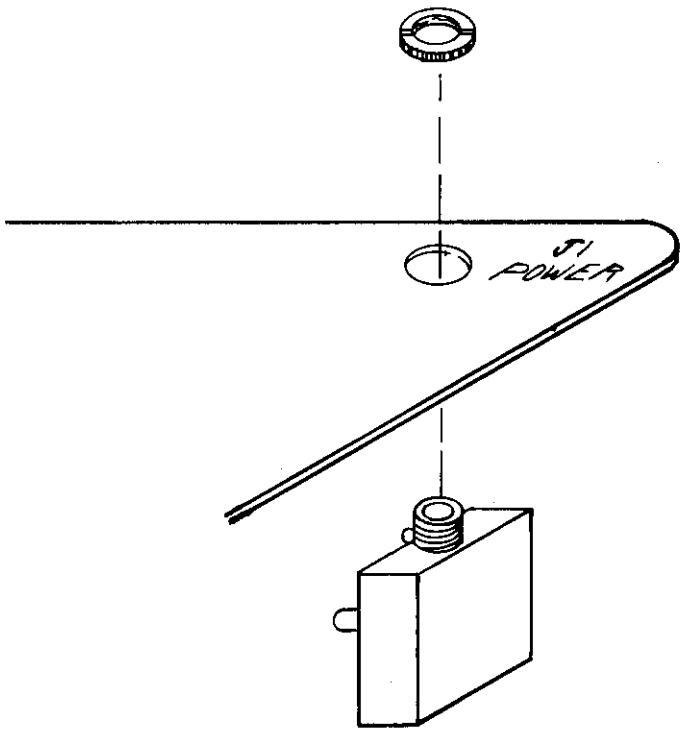
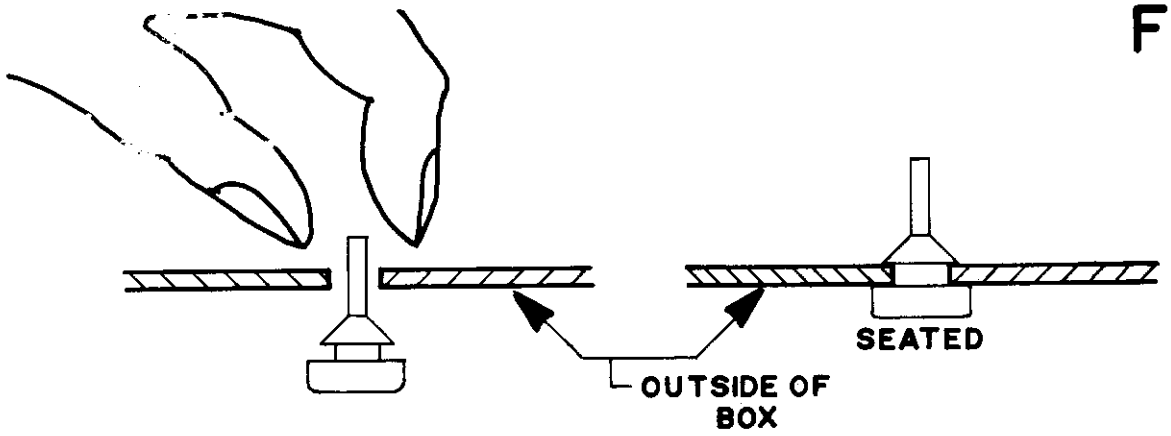


FIG. 10



ROTATE BUMPER WHILE GENTLY PULLING UP

FIG. 11

MOUNT ONE BUMPER ON PC BOARD AS SHOWN

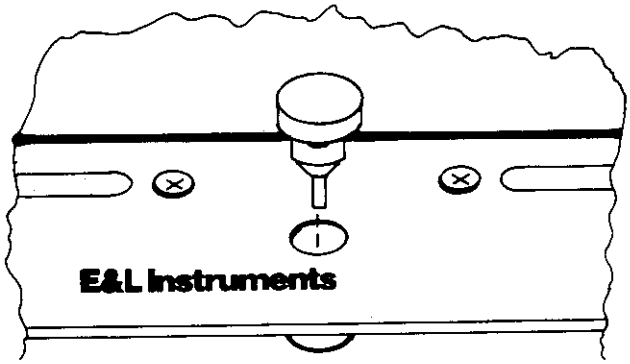
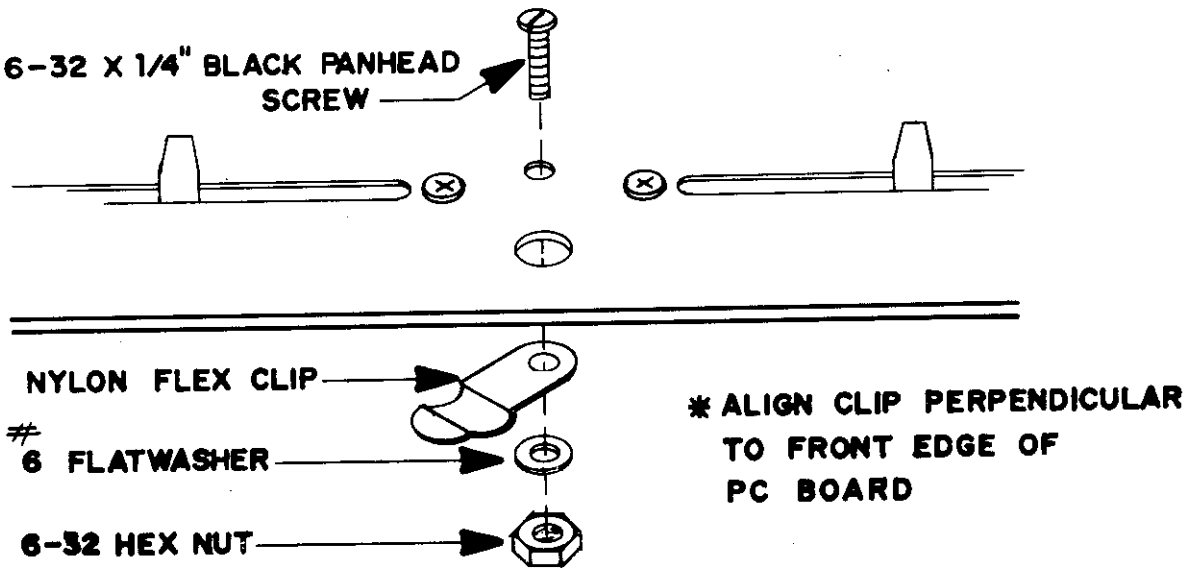


FIG. 12



* ALIGN CLIP PERPENDICULAR TO FRONT EDGE OF PC BOARD

FIG. 9

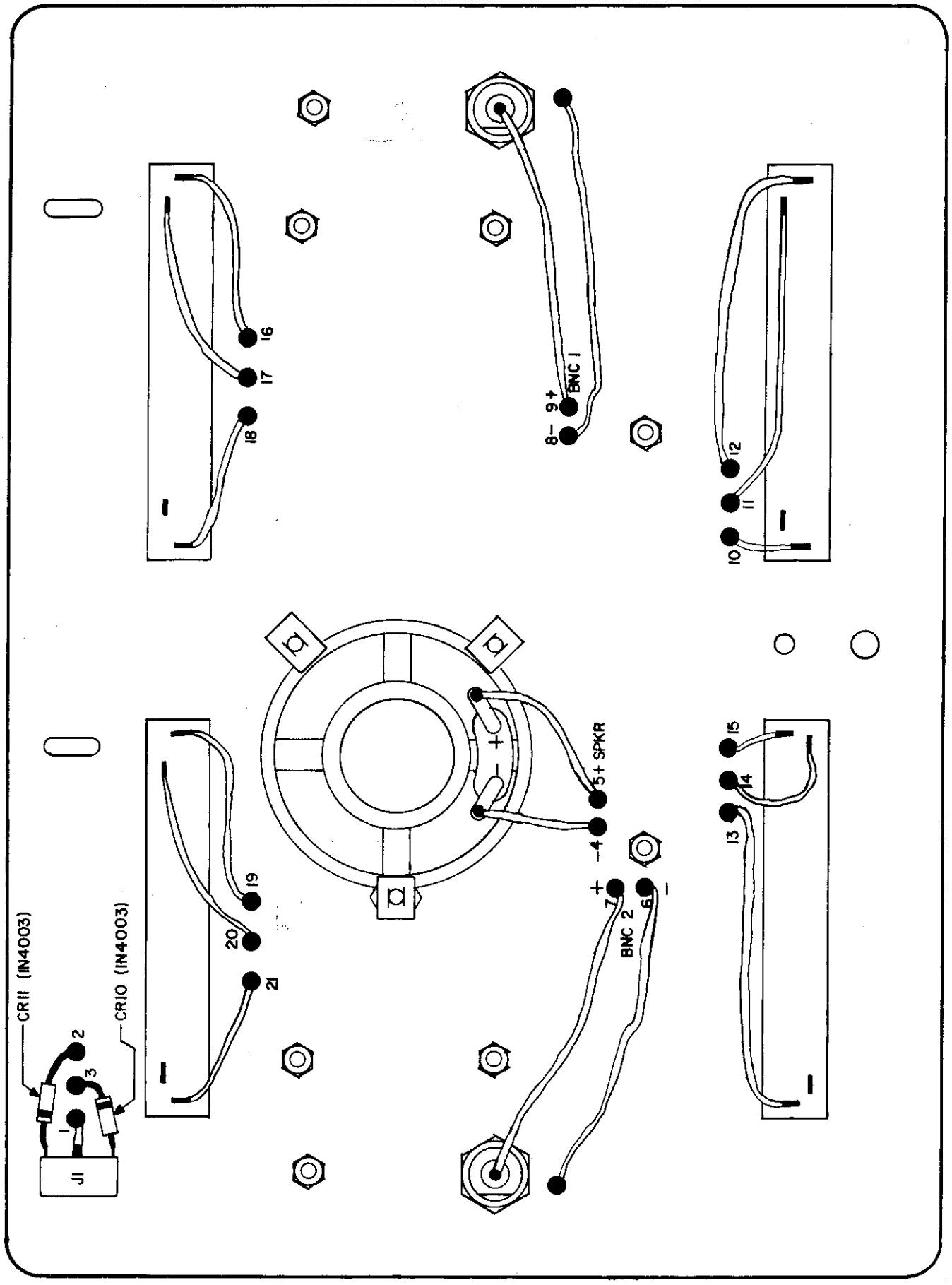

CR11 (IN4003)
CR10 (IN4003)
J1
2
3
1
16
17
18
19
20
21
8-
9+
BNC 1
12
11
10
15
14
13
5+ SPKR
4-
7+
6-
BNC 2

FIG. 13

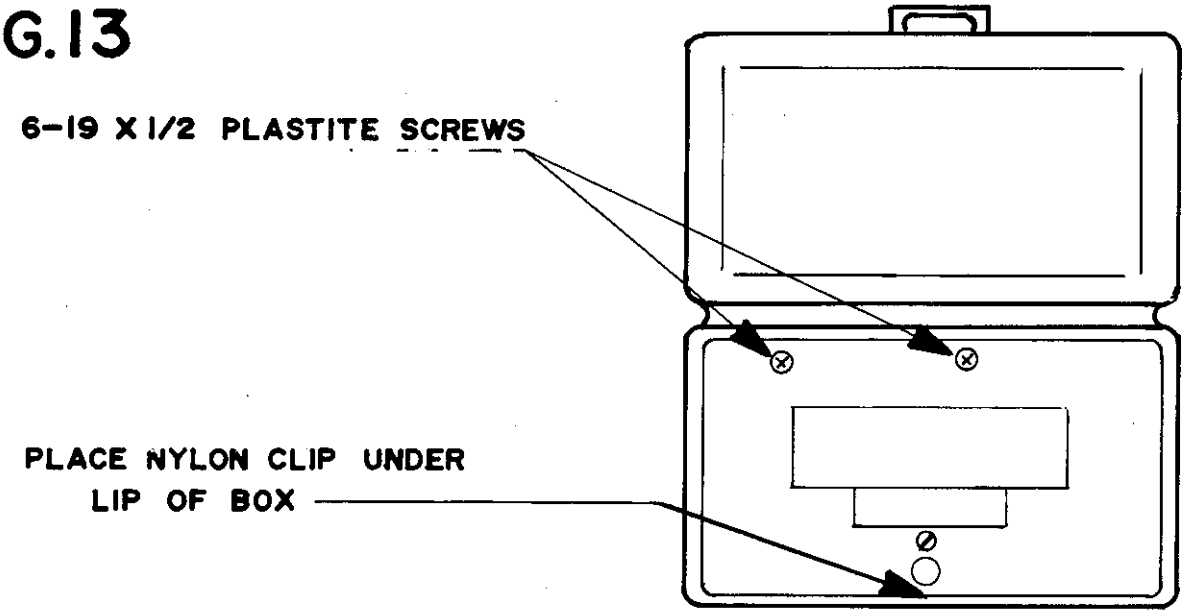


FIG. 14

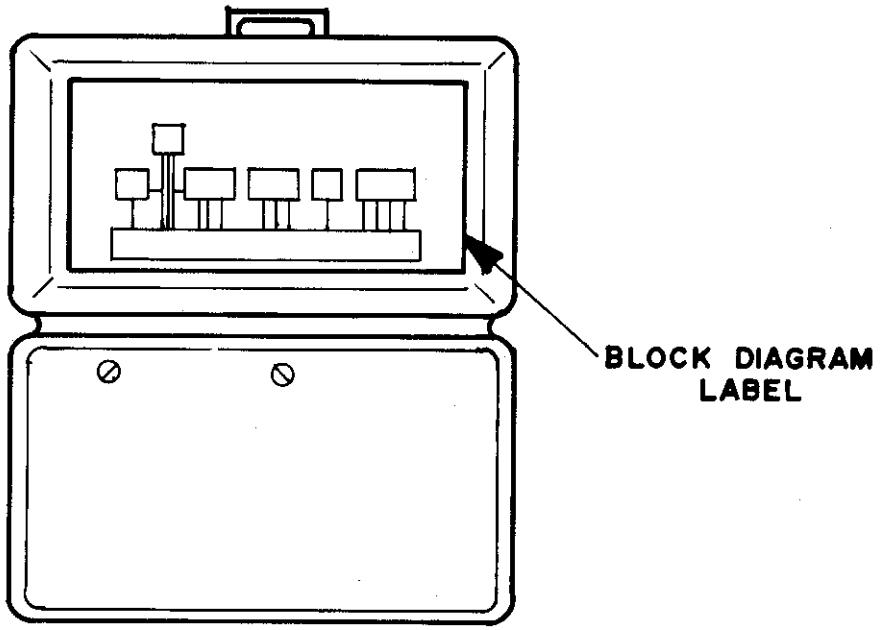


FIG. 15