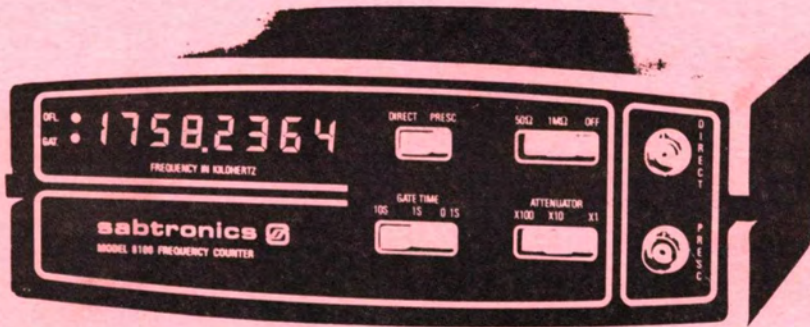


sabtronics

MODEL

8100

FREQUENCY COUNTER



ASSEMBLY AND OPERATING MANUAL



\$3

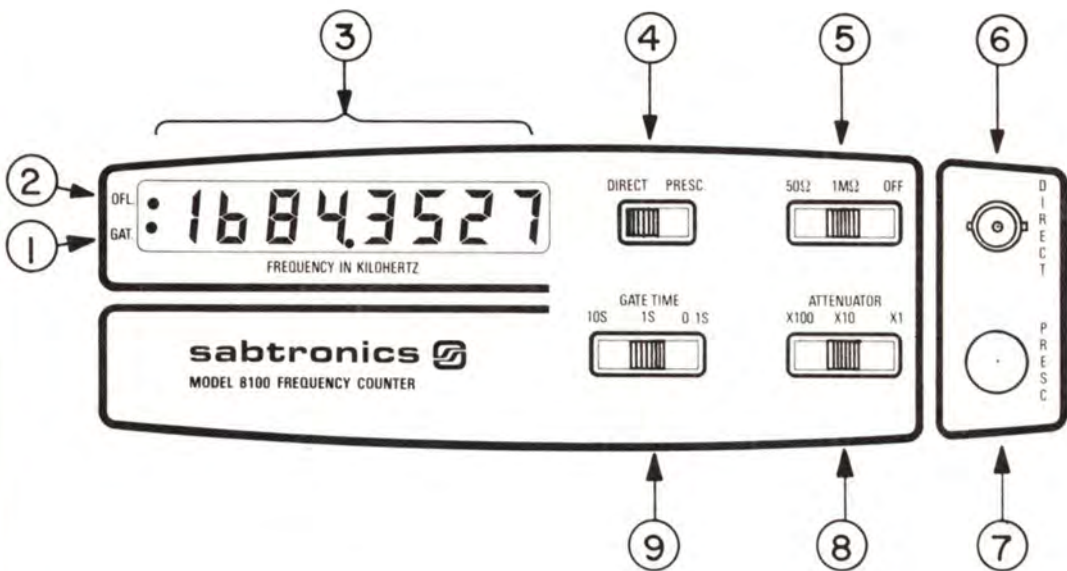
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SPECIFICATIONS - MODEL 8100 FREQUENCY COUNTER

RANGE	:	20 Hz to 100 MHz Guaranteed 10 Hz to 120 MHz Typical
RESOLUTION	:	0.1 sec. gate time = 10 Hz 1.0 sec. gate time = 1 Hz 10 sec. gate time = .1 Hz
INPUT SENSIVITY	:	20 Hz to 70 MHz - 15 mVRMS (10 mV typical) (Adjustable ± 10 mV): 70 MHz to 120 MHz - 25 mVRMS (20 mV typical)
INPUT IMPEDANCE	:	1 Mohm/25 pF or 50 Ohms, switch selectable
INPUT PROTECTION	:	150 VRMS, 20 Hz to 10 kHz 90 VRMS, 10 kHz to 2 MHz 30 VRMS, 2 MHz to 100 MHz (120 MHz) Max. Voltage in = VDC + 1.4 VAC equal or less than 400 V
INPUT ATTENUATION	:	X1; X10; X100 selectable
DISPLAY	:	8-digit, LED with automatic floating decimal, overflow indicator and gate status indicator
GATE TIMES	:	0.1 second, 1 second, 10 seconds switch selectable
TIME BASE	:	Frequency - 3.579540 MHz. Temp. Stability - ± 10 ppm, 0° to 40°C
SETABILITY	:	± 1 ppm
AVERAGE AGING RATE	:	± 1 ppm per month for first three months of continuous operation. ± 5 ppm per year after three months of continuous operation
ACCURACY OF MEASUREMENTS	:	After calibration of time base, accuracy shall be better than 2 ppm or ,0002%
POWER REQUIREMENT	:	9-15 VDC @ 330 mA (8-AA Cells) without prescaler, or optional AC Adapter
SIZE	:	8"w. x 6.5"d. x 3"h. (203 x 165 x 76 mm)

Specifications and prices subject to change without notice.



ITEM	NAME	DESCRIPTION
1	GAT. (GATE RATE INDICATOR)	Visual indication of sample rate or gate time of Counter
2	OFL. (OVERFLOW INDICATOR)	Indicates digit overflow in Display when lit.
3	FREQUENCY DISPLAY	An 8-digit display of measured input, including decimal point. (Frequency displayed in kiloHertz)
4	DIRECT/PRESCALE SWITCH	DIRECT: Switches input signal directly into basic counter. (Signal input to DIRECT jack) PRESC.: Switches input signal to to prescale input. (Used when optional Prescaler Module is installed. Signal input to PRESC. jack).
5	50 Ω - 1M Ω - OFF SWITCH	50 Ω : Applies power and switches DIRECT input for 50 Ω impedance. 1M Ω : Applies power and switches DIRECT input for 1M Ω impedance. OFF : Removes power from circuit. Always switch to OFF when counter is not used.
6	DIRECT INPUT JACK	Signal input for basic Counter. (120 MHz maximum frequency input).
7	PRESCALE INPUT JACK (Blank without optional prescaler).	Signal input for optional Prescaler. Extends maximum frequency measurement range of Counter to 600 MHz.
8	ATTENUATOR SWITCH	X1 POSITION: Direct input signal level applied to Counter. X10 POSITION: 1/10 (one-tenth) of input signal level applied to Counter. X100 POSITION: 1/100 (one-hundredth) of input signal level applied to Counter.
9	GATE TIME SWITCH	0.1S: 1/10 of a second sample rate. 1S: 1 Second sample rate. 10S: 10 Second sample rate.

Before the assembly process is begun, verify that all parts are present by examining the parts bags and comparing against the Parts List. The parts in this kit as well as all other SABTRONICS kits, are packaged in a manner which allows them to be checked and counted without breaking open the parts packages. Do not open parts packages until instructed to do so in the assembly instructions.

To speed the assembly process, examine and familiarize yourself with all parts in the kit so that identification will be readily accomplished.

When installing capacitors and resistors in the circuit board, ensure that they are seated flush against the board as shown in the illustrations on the following page. After a part is inserted in the board, bend out the leads at a slight angle (Fig. 3) to prevent the parts from falling off the board during the soldering process.

Place the soldering iron tip so that it makes contact with both the component lead and the foil on the board. Heat the lead and the foil about 2-3 seconds and apply solder to the joint while still keeping the soldering iron tip in the same position. As soon as solder starts to flow, remove solder and keep the iron at the connection for an additional 1-2 seconds. (Fig.4). Apply only enough heat and solder to make a good mechanical and electrical bond.

After soldering the leads, clip off excess lead lengths, while holding the lead to prevent it from flying off and causing possible injury to you or other persons in the vicinity of your workbench.

It is recommended that a 25 to 40-watt soldering iron be used with a tip small enough to allow easy soldering to the small IC foil pads, but not so small that heat is not retained for soldering the larger parts.

A good solder joint is one that appears smooth and shiny. Dull solder joints could possibly be a result of too little heat (cold solder joint). Applying excessive heat could cause the printed foil pads to lift off the circuit board and also possibly damage semiconductor devices.

Extra care should be exercised when soldering parts to a double-sided PC board with plated-through holes. In most instances, desoldering an incorrectly installed part for removal from the board could result in damage to the plated-through holes. Such damage is often difficult to detect and could render the entire circuit inoperative.

Therefore, before soldering any part to the board, ensure that the parts inserted are the correct ones and placed in their proper locations. Pay particular attention to parts with multiple leads or pins, such as IC's (Integrated Circuits) and IC sockets.

Observe the polarity of diodes and polarized capacitors (Electrolytic, Tantalum etc.) and note the orientation of transistors and IC's before actually soldering. When installing IC's or IC sockets, ensure that one or more pins do not bend out or under the IC or IC socket.

After the entire PC board is assembled, and prior to installing the board in its housing (case), clean the foil side of the board with flux removing solvent such as Trichloroethylene. This will prevent any dirt from accumulating and shortening the life of your completed instrument. When applying solvent, be sure to hold the board such that no solvent is allowed to enter the IC sockets, trim pots, controls or switches.



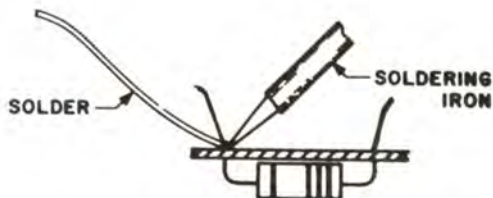
1. Insert component onto P.C. board at proper location.



2. Mount flush against the board.



3. Turn board over (etch side up) and bend out leads slightly to prevent component from falling out.



4. Apply heat to both the P.C. foil area and the component lead.








5. After soldering, clip off excess lead length while holding lead to prevent it from flying off.







6. Cross-section view of a good solder joint.

MODEL 8100 - PARTS LIST

S E M I C O N D U C T O R S





Ref No.	Part No.	Description	Qty.	Pictorial
D1,2	1N4148	Diode, signal	2	
D3,4,5	1N4001*	Diode, rectifier	3	
Z13	7805 or LM340T-5	Voltage regulator, 5V	1	
Q1	2N4403	Transistor, PNP	1	
Q2,3,4	MPS-H81	Transistor, NPN	3	
Q5	2N4400	Transistor, NPN	1	
Q6	2N5486	Transistor, FET	1	
CR1,2		Indicator, LED	2	

I N T E G R A T E D C I R C U I T S






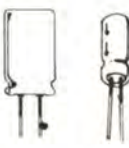
Z4	MM5369	Oscillator/Divider	1	 8-pin DIP
Z1	74LS196	Decade Counter	1	 14-pin DIP
Z2	74S196	Decade Counter	1	
Z7,11	MC14011	Quad 2-Inp. NAND Gate	2	
Z8	74LS74	Flip Flop	1	
Z12	74S10	3-Inp. NAND Gate	1	
Z15,16	F9664	(75492) Digit Driver	2	
Z3	MC14017	Decade Counter (4017)	1	 16-pin DIP
Z6	MC14518	BCD UP Counter (4518)	1	
Z9	MC10216	Triple Line Receiver	1	
Z10	MC14052	Analog Multiplexer	1	
Z14	MC14511	Segment Driver (20-788)	1	
Z5	7031	LSI Counter	1	 40-pin DIP

RESISTORS, 1/4-WATT

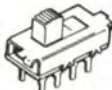

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Ref No.	Value	Color Code	Qty	Pictorial
R2	10 ohms	brown-black-black	1	<p>NOTE:</p> <p>Unless otherwise noted, all resistors are 1/4-watt, 5% tolerance (fourth color band = gold).</p> 
R52	33 ohms	orange-orange-black	1	
R17	39 ohms	orange-white-black	1	
R45 to R51	39 ohms	orange-orange-black	7	
R18	150 ohms	brown-green-black	1	
R16	220 ohms	red-red-brown	1	
R15,55,56	330 ohms	orange-orange-brown	3	
R9 to R14	470 ohms	yellow-violet-brown	6	
R3,4,28, 32,53,54	1 K	brown-black-red	6	
R5	1.5 K	brown-green-red	1	
R8	2.2 K	red-red-red	1	
R25,26,27	4.7 K	yellow-violet-red	3	
R44	9.1 K	white-brown-red	1	
R19,20,21, 29, 33	10 K	brown black-orange	5	
R22	33 K	orange-orange-orange	1	
R23	47 K	yellow-violet-orange	1	
R43	91 K	white-brown-orange	1	
R1	100 K	brown-black-yellow	1	
R6	220 K	red-red-yellow	1	
R42	910 K	white-brown-yellow	1	
R24	22 Meg 1/2-watt	red-red-blue-silver	1	
R41	51 ohms 2-watt.	green-black-black	1	
R7	1 K	Trimpot (X201R102B)	1	





CAPACITORS

Ref No.	Value	WV and Description	Marking	Qty.	Pictorial
C12	5-25pF	200V, Trimmer	None	1	
C15	.001uF	10V or more, Disc	.001	1	
C14, 20	.01uF	10V or more, Disc	.01 or 103	2	
C2, 5, 7, 8, 9, 11, 12, 18, 19, 25	.1uF	10V or more, Disc	.1 or 104	10	
C42	6pF	300V, Mica	6 \pm .5	1	
C41	10pF	300V, Mica	10 \pm 10%	1	
C22	30pF	500V, Mica	30K, 500V	1	
C43, 44	51pF	300V, Mica	51J	2	
C1	100pF	300V, Mica	Silver dot	1	
C45	.047uF	400V, Polyester	.047 \pm 10%	1	
C13	10uF	10-16V Electrolytic	Capacitance Value & Working Voltage.	1	
C4, 6	100uF	16V, Electrolytic		2	
C3, 10, 46	220uF	16, Electrolytic		3	
C16, 17	2200uF	16V, Electrolytic		2	

SWITCHES

Ref No.	Description	Qty.	Pictorial
S1	4-pole, 3-position, slide	1	
S2, 4	2-pole, 3-position, slide	2	
S3	2-pole, 2-position, slide	1	
Y1	CRYSTAL 3.579545 MHz, Quartz	1	

M I S C E L L A N E O U S

Qty.	Description and Part No.	Pictorial
1	Main Printed Circuit Board, #8100-19	
1	Display Printed Circuit Board, #8100-20	
8	Display, LED, Common Cathode, FND-357	
1	BNC input jack with washer, nut and solder lug	
2	Fuse mounting clips	
1	Fuse, 2-Amp, Slo-blow	
1	IC socket, 8-pin, solder tab	
8	IC socket, 14-pin, solder tab	
6	IC socket, 16-pin, solder tab	
1	IC socket, 40-pin, solder tab	
1	90° Edge connector, 10-pin	
2	90° Edge connector, 8-pin	
2	4-Cell AA-size Battery holder	
1	Heatsink, TO-220 type	
1	#6-32 x 1/4" machine screw	
1	#6-32 nut	
3	#4-40 x 1/4" self tapping screw	
1	Piece, 1 ft. (30cm) #18 Insulated wire	
1	Piece, 1 ft. (30cm) #18 Buss wire	

C A S E P A R T S

- 1 Case half, bottom
- 1 Case half, top
- 2 Rear panel
- 1 Battery compartment panel
- 2 Foot
- 1 Wire tilt bail
- 1 Strip (2 Pcs.) Decorative trim tape, black
- 4 #8 x 1-3/4" Self tapping screws
- 1 Front Panel
- 1 Display window lens, red

* * * * *

TOOLS AND MATERIALS REQUIRED TO COMPLETE ASSEMBLY

In addition to the parts supplied with the kit, the following are required to complete assembly of your kit.

- 1. 25-40 Watt soldering iron, 3-wire grounded type, with small and large tips.
- 2. 60/40 or better Resin-core solder.
- 3. Small, flush cutting diagonal cutters.
- 4. Needle-nose pliers.
- 5. 1/4" blade screw driver.
- 6. Phillips screw driver.
- 7. Solder wick or desoldering tool.
- 8. Epoxy cement.
- 9. 8 "AA" Alkaline cells.
- 10. Flux removal solvent. (Trichloroethylene or similiar).

A S S E M B L Y P R O C E D U R E

Before you start assembly of your model 8100 Frequency Counter kit, we suggest you read and understand the section of the manual entitled "ASSEMBLY TECHNIQUES". Even if you are an experienced kit builder, you will find useful suggestions to aid you in the successful completion of this fine product.

It is required that the assembly of your kit be performed in the order described in this manual. Before starting assembly, refer to the Parts List to become familiar with all the parts and to verify that all parts listed are actually present. Do not discard any packaging materials until all parts have been accounted for.

The instructions that follow have been designed to save you time in completing the assembly of your kit. Although every step does not begin with "Insert and solder", the step does imply that the part(s) referred to should be inserted into the PC board and soldered on the foil (bottom) side of the board.

EXAMPLE: "[] R5, 1.5 k resistor (brown-green-red)"

This step tells you to insert the 1.5 k resistor into the PC board, solder leads on the foil side and clip off excess lead lengths.

After a step has been completed, it should be checked [✓] to minimize errors during the assembly process.

A little extra time and care taken during assembly will save you much time and trouble later, if you have to troubleshoot the kit because of incorrect assembly.

M A I N B O A R D A S S E M B L Y

Unless otherwise instructed, refer to FIG.1 for the following steps:

[X] 8-pin IC socket at location Z4 (5369) NOTE ORIENTATION.

Six (6) 14-pin IC sockets at the following locations:

[X] Z1 [K] Z2 [X] Z7 [X] Z8 [X] Z11 [X] Z12 NOTE ORIENTATION.

Four (4) 16-pin IC sockets at the following locations:

[✓] Z3 [X] Z6 [X] Z9 [X] Z10 NOTE ORIENTATION.

[X] 40-pin IC socket at location Z5. NOTE ORIENTATION.

[X] D1, 1N4148 Diode. NOTE POLARITY BAND.

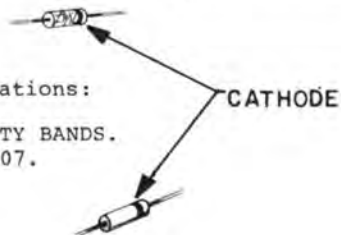
[X] D2, 1N4148 Diode. NOTE POLARITY BAND.

Three (3) 1N4001* Diodes at the following locations:

[X] D3, [X] D4, [X] D5, NOTE POLARITY BANDS.

*May be: 1N4001; 4002; 4003; 4004; 4005 or 4007.

CAUTION!
Do not insert
IC's into soc-
kets at this
time!!



R23, 47 k resistor (yellow-violet-orange). NOTE: See Detail A on page 14 for proper location of this resistor. If inserted into wrong holes, time base circuit would not operate! Also see FIG.1.

Five (5) 10 k (brown-black-orange) resistors at the following locations:

R19, R20, R21, R29, R33

Four (4) 1 k (brown-black-red) resistors at the following locations:

R3, R4, ~~XXXXXXXXXX~~, R32.

Three (3) 4.7k (yellow-violet-red) resistors at the following locations:

R25, R26, R27.

Six (6) 470 ohm (yellow-violet-brown) resistors at the following locations:

R9 R10 R11 R12 R13 R14.

R17, 39 ohms (orange-white-black).

R15, 330 ohms (orange-orange-brown).

R18, 150 ohms (brown-green-brown).

R2, 10 ohms (brown-black-black).

R5, 1.5k (brown-green-red).

R8, 2.2k (red-red-red)

R1, 100k (brown-black-yellow).

R6, 220k (red-red-yellow).

R22, 33k (orange-orange-orange).

R24, 22Megohm, 1/2-watt (red-red-blue-silver).
NOTE: PC board may be marked "20 M" or "22 M".

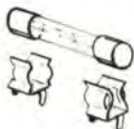


R7, 1k Trimpot (may be numbered: 1k or X201R102B)



Two fuse clips. NOTE: Fuse clips have a shoulder. Install so that shoulder faces away from fuse body as shown.

Insert fuse into clips.



Shoulder.

- [✓] Insulated Jumper wire near Q5.
- [X] Q5, 2N4400 Transistor. NOTE POLARITY FLAT SIDE.
- [X] Q2, MPS-H81 Transistor. NOTE POLARITY FLAT SIDE.
- [X] Q3, MPS-H81 Transistor. NOTE POLARITY FLAT SIDE.
- [✓] Q4, MPS-H81 Transistor. NOTE POLARITY FLAT SIDE.
- [✓] Q6, 2N5486 Transistor. NOTE POLARITY FLAT SIDE.
- [] R16, 220 ohm (red-red-brown) resistor.



Insert ten (10) .1uF Disc capacitors at the following locations:

- [X] C2 [X] C7 [X] C8 [X] C9 [X] C11
- [X] C12 [X] C18 [X] C19 [X] C25 [X] C5.



Marked .1 or 104

With a needle-nose pliers straighten the leads of C15, .001uF disc capacitor and insert into PC board.

- [X] C15



Insert two (2) .01uF disc capacitors at the following locations:

- [X] C14, .01uF disc.
- [X] C20, .01uF disc.

Marked .01 or 103



Insert the following Mica capacitors:

- [✓] C1, 100pF (marked with a silver dot).
- [✓] C22, 30pF (marked 30K or 300).



Insert the following Electrolytic capacitors. NOTE POLARITY MARKINGS:

- [X] C13, 10uF/10-16V.
- [X] C4, 100uF/16V.
- [X] C6, 100uF/16V.
- [X] C3, 220uF/16V.
- [X] C10, 220uF/16V.
- [X] C16, 2,200uF/16V.



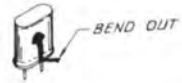
- [X] C17, 2,200uF/16V. NOTE: PC board supplied with your kit may be marked "1,000uF -16V" at this location, but a 2,200uF/16V type supplied with your kit should be installed here instead.

- [X] C21, 5-25pF Trimmer capacitor.



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EC

U1 3.579545 MHz Crystal. NOTE: If the Crystal supplied with your kit has three leads, bend the lead which is attached to the Crystal can out at a 90° angle as shown and solder this lead to the foil on the components side after inserting Crystal into appropriate holes on the board.



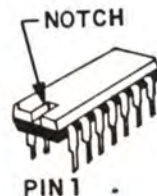
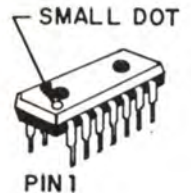
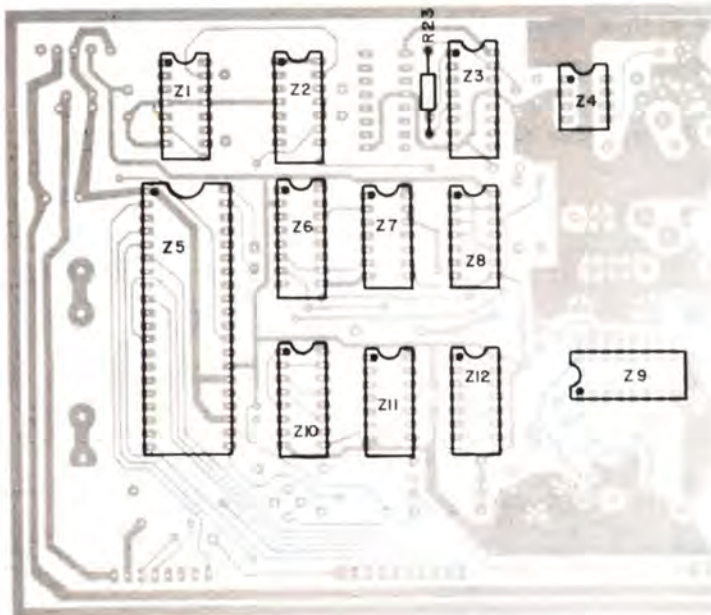
Integrated Circuits (IC's) will now be inserted into the sockets on the main PC board. When removing IC's from their conductive package, take care to not touch the IC pins. Handle IC's by their lengthwise ends and ensure that no foam particles are stuck to the pins.

It is a good practise to ground yourself, using a ground strap, before handling the IC's as some of them are Metal Oxide Semiconductor (MOS) devices and these are easily damaged by static. If you do not have access to a grounding strap, it is advisable to touch a metal object, such as a cold water pipe or table leg prior to handling the IC's.

As an extra precaution, wear only no-static clothing such as cotton. If available, use an IC Insertion Tool, preferably one that has metal jaws to remove IC's from their package and to insert them into the circuit.

Refer to the illustrations below to identify pin 1 on the IC's before inserting IC's into the circuit board. To simplify assembly, the PC boards have been designed so that pin 1 of all IC's face in the same direction when installed into the PC board. The only exception is Z9 (MC12016) which is placed at a right angle with respect to the other IC's. SEE PAGE FOLLOWING FOR ORDER IN WHICH IC'S ARE TO BE INSTALLED!

DETAIL "A"



[/] Z1, 74LS196 (14-pin DIP). NOTE: Z1 and Z2 are both 14-pin devices and have very similar part numbers. Ensure that you have the proper IC installed in its location.

[/] Z2, 74S196 (14-pin DIP). SEE NOTE ABOVE.

[/] Z3, MC14017 or 4017 (16-pin DIP).

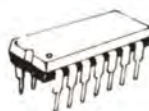


8-pin DIP

[X] Z4, MM5369 or 5369 (8-pin DIP)

[/] Z5, LSI-7031 (40-pin DIP)

[/] Z6, MC14518 or 4518 (16-pin DIP).



14-pin DIP

[/] Z7, MC14011 or 4011 (14-pin DIP).

[/] Z8, 74LS74 (14-pin DIP).

[/] Z10, MC14052 or 4052 (16-pin DIP).



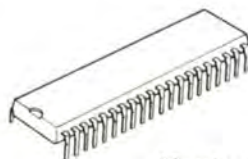
16-pin DIP

[/] Z11, MC14011 or 4011 (14-pin DIP).

[/] Z12, 74S10 (14-pin DIP).

[] Z9, MC10216 (16-pin DIP).

Before proceeding, check to be sure all IC are correctly installed. Ensure that one or more pins on any IC is/are not bent out or under the socket. In particular, check the 40-pin IC very thoroughly.



40-pin DIP

Place the remaining three IC's (one MC14511 and two F9664 or 75492) in a safe place for use later.

[] Clean the solder (bottom) side of the circuit board, using flux removing solvent such as Trichloroethylene and set board aside until called for later in the assembly instructions. NOTE: Circuit performance may be severely affected if the board is not cleaned. When cleaning flux off the board, hold board at an angle at which solvent will not enter IC sockets or the trimpot.

* * * * *

D I S P L A Y B O A R D A S S E M B L Y

Unless otherwise instructed refer to FIG. 2 for the following steps:

[/] 16-pin IC socket at Z14.

[/] 14-pin IC socket at Z15.

[/] 14-pin IC socket at Z16.

CAUTION: DO NOT INSERT IC'S INTO SOCKETS AT THIS TIME!

D I S P L A Y B O A R D

Install and solder six (6) jumpers, using the bare wire provided.

[] J [] J [✓] J [✓] J [✓] J [✓] J
 [] Install Jumper J7, using insulated wire provided.

Install seven (7) 39 ohm resistors (orange-white-black) resistors at the following locations:

[✓] R45 [✓] R46 [✓] R47 [✓] R48 [✓] R49 [✓] R50 [✓] R51

Install two (2) 330 ohm resistors (orange-orange-brown) at the following locations:

[] R55 [] R56

Install two (2) 1 k resistors (brown-black-red) at the following locations:

[✓] R53 [✓] R54

Install the following resistors:

[✓] R52, 33 ohms (orange-orange-black)
 [✓] R42, 910 k (white-brown-yellow)
 [✓] R43, 91 k (white-brown-orange)
 [✓] R44, 9.1 k (white-brown-red)
 [✓] R41, 51 ohms, 2-watt (green-brown-black)

Install the following Mica capacitors:

[✓] C41, 10pF (Marked 10+10%)

[✓] C42, 6pF (Marked 6+.5)

[✓] C43, 51pF }
 [✓] C44, 51pF } (Marked 51J)



[] Q1, 2N4403 Transistor. NOTE POLARITY FLAT SIDE.



[✓] C46, 220uF/10-16V Electrolytic. OBSERVE POLARITY (FIG.5)
 CAUTION! BEND LEADS AS SHOWN IN FIG.5 BEFORE INSTALLING.

[✓] C45, .047uF/400V Polyester capacitor. (FIG.5).

NOTE: Ignore dashed line bcx labelled .05 400V which is printed on the display PC board).

REFER TO FIG. 5.

- 10 DIS1 thru DIS8, eight (8) FND-357 LED displays. NOTE: Grooved edges of displays face up as shown. Insert and solder displays one at a time in the following manner:

After inserting one display ensure that it is seated flush against the board. Solder the top right hand pin and the bottom left hand pin. Check if display is straight and flush. If display is not seated straight and flush, reheat the two pins while pressing display gently until it is properly seated on the board. Then continue to solder all remaining pins.

Insert another display and solder as described above. Continue until all displays have been installed.

CAUTION: Do not apply too much heat as displays may become damaged!

- 11 Form the leads of two red LED's as shown, noting the longer lead on each LED.



Longer leads. (Also see FIG.5).

- 12 Insert and solder, noting that longer lead on one LED is adjacent to longer lead of the other LED. CAUTION: Avoid excessive heat.

- 13 Install Slide Switches S1 thru S4 in the following manner:

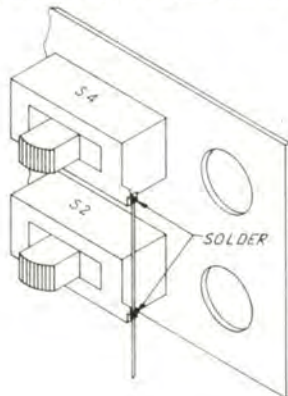
Insert switch into appropriate holes. Lay PC board with switch installed, face down and solder two center pins. Turn board over and check for straight and flush mounting. If switch is not straight and flush, reheat solder joints while pressing gently on switch until it is properly seated on the board. Then continue to solder remaining pins.

Continue with installing remaining switches as described above.

- 14 Solder a 3" (76mm.) length of buss wire to S4 and S2 as shown below. Do not cut excess wire as this will be soldered to the main board later.

NOTE:

File, sand or scrape with an Exacto blade the areas on the switches where the wire is to be soldered. Otherwise solder may not adhere to the switch body.



- [X] Install and solder the three (3) 90° edge connectors (one 10-pin and two 8-pin) to the display board as shown, noting that the straight pins are inserted into the display board. Cut off excess pin lengths. ENSURE THAT CONNECTORS ARE SEATED STRAIGHT AND FLUSH AGAINST THE DISPLAY BOARD! (See FIG.5).
- [] Install Z15, F9664 or MC75492. NOTE ORIENTATION AS SHOWN IN FIG.2.
- [] Install Z16, F9664 or MC75492, NOTE ORIENTATION AS SHOWN IN FIG.2.
- [] Install Z14, MC14511 or 4511, NOTE ORIENTATION AS SHOWN IN FIG.2. CAUTION: This device is an MOS type!
CLEAN THE DISPLAY BOARD SOLDER SIDE WITH FLUX REMOVING SOLVENT!!
Save white styrofoam on which IC's were packed for later use in assembly.

C A S E A S S E M B L Y

- [X] Locate the bottom case half. The bottom case half may be identified by the four holes that have been drilled through its surface. (The top case half has no holes). SEE FIGS. 6 & 8.
- [X] Lay the bottom case half on a flat surface and drill four (4) holes at the indent locations, using a 5/32" drill bit. These holes are for mounting the case feet. (FIG.6).
- [X] Locate the two plastic feet and apply epoxy around the two shafts on each foot and the entire surface which will mate against the case body. (FIG. 8).
- [X] Insert the feet into the holes in the case bottom as shown in FIG. 8.
- [X] Melt the two shafts on each foot to the inside of the case bottom with a hot soldering iron.
- [X] Locate the front panel and the red lens. Insert lens into window on Front Panel and melt the six bosses on the Front Panel to the lens, taking care to not damage the lens. (FIG. 7)
NOTE: Instead of melting the six bosses of the Front Panel to the lens, you may attach lens with epoxy cement. Apply only very minute amounts of epoxy to the four corners and lengthwise edges in the Front Panel window. Excessive epoxy may result in it overflowing to the lens and distorting the display digits when lit.
- [X] Thoroughly clean the tip of your soldering iron.

F I N A L A S S E M B L Y

- [X] Solder a 2" (50mm) length of buss wire to the solder lug.



- [] Mount BNC jack in upper (DIRECT) hole of front panel using solder lug with wire attached, lock washer, and nut as shown. Bend solder lug as shown, after securing nut.



- [] Solder a 1" (25mm) length of INSULATED wire to center pin of BNC jack.



- [] With a needle-nose pliers bend flat one contact pin on the hole plug. Insert plug into lower (PRESC.) hole in Front Panel.



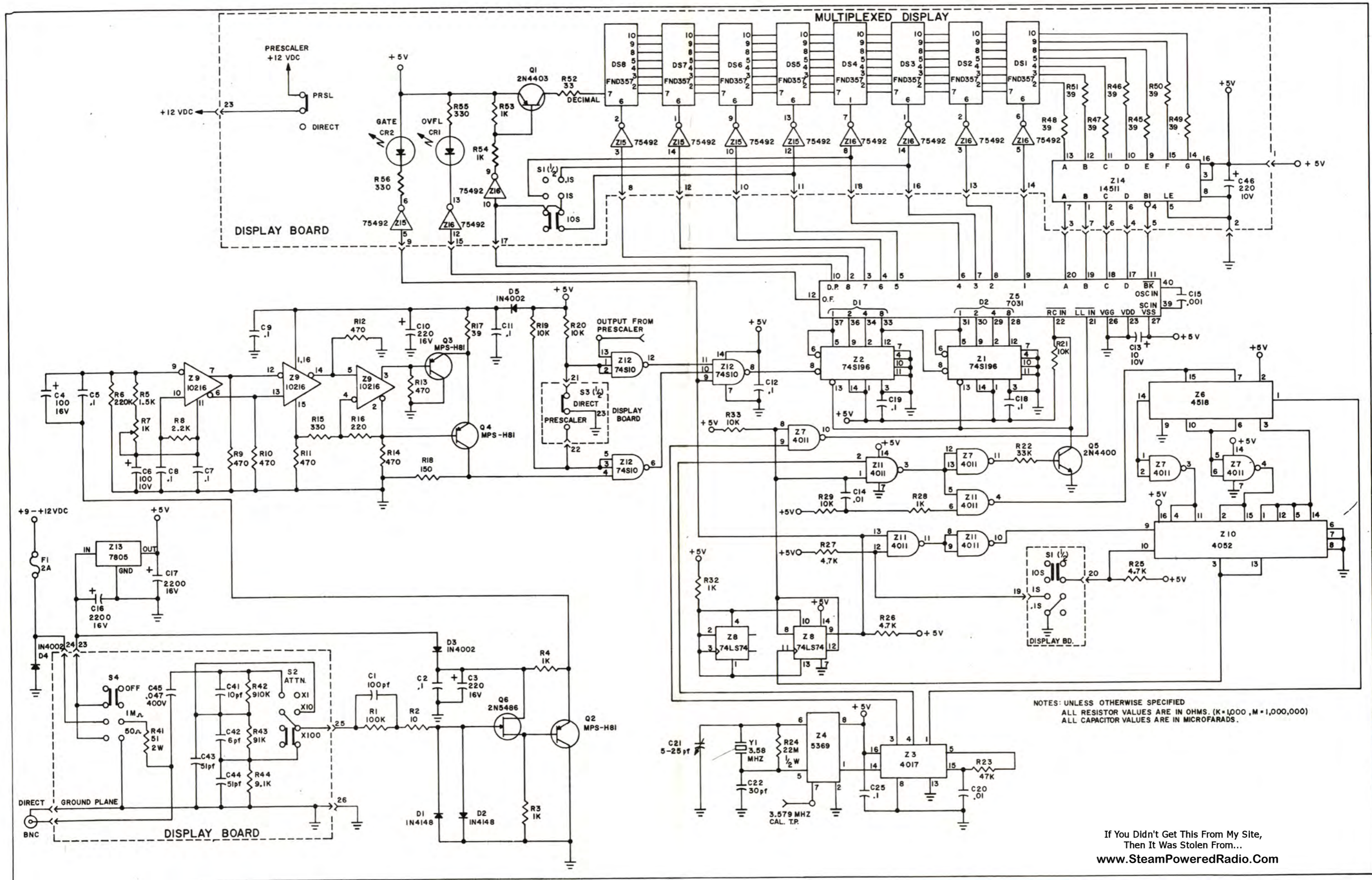
- [] Attach heatsink to 213, 7805 or LM340T-05 Voltage Regulator, using a #6-32 x 1/4" screw and nut as shown in FIG. 10. If available, use heatsink compound between Regulator and heatsink.
- [] Install and solder Regulator/Heatsink assembly on main PC board as shown in FIG. 10.
- [] Carefully and gently push connector pins of Display Board down into the mating holes on the Main Board. Check to be sure that Display board is seated flush against Main Board and at a perfect 90° angle. (FIGS. 4 & 5).
- [] Solder two outer pins on center connector to Main Board. Check to be sure both boards are seated against each other as described above. If not, straighten as necessary before proceeding.
- [] Continue to solder all remaining pins.
- [] Solder the wire from S2 and S4 to the foil on top side of the Main Board, directly below S2.
- [] Slide Front Panel over switches on the Display Board.
- [] Solder wire from center of BNC jack to the foil side of the Display Board. (FIG. 3a & 3b).
- [] Solder wire from solder lug to the foil side on the Display Board (FIG. 3a & 3b).

- [] Connect Red wire from one battery holder to Black wire of other battery holder. Solder connection and insulate with tape. (FIG.10).
- [] Insert and solder remaining Red and Black wires from battery holder assembly into Main Board as shown in FIGS. 1 and 10.
- [] Install PC board/Front Panel assembly into bottom case half as shown in FIG.10.
- [] Ensure that S4 is in the OFF position.
- [] Install 8-AA size Alkaline Cells into battery holder while observing correct polarity.
- [] Install battery holder into battery slot in the case.
- [] Insert the piece of white styrofoam into battery slot in the case.
- [] Insert battery slot cover into grooves in the case.
- [] Insert two rear panels into grooves in the case.
- [] Proceed to "OPERATIONAL TESTS".
- [] If Counter checks out OK, attach main PC board to bottom case half using three (3) #4-40 x 1/4" self tapping screws provided.
- [] Attach top case half to bottom case half, guiding the front and rear panels into their appropriate grooves. Use four (4) long screws provided.
- [] Attach black tape strips to recess on case sides.
- [] The wire Tilt Bail may be inserted in the holes on the case feet. Insert into holes towards the front for tilting case up. Insert into holes towards the rear for tilting case down when Counter is placed on a shelf above eye level. (FIG. 9).

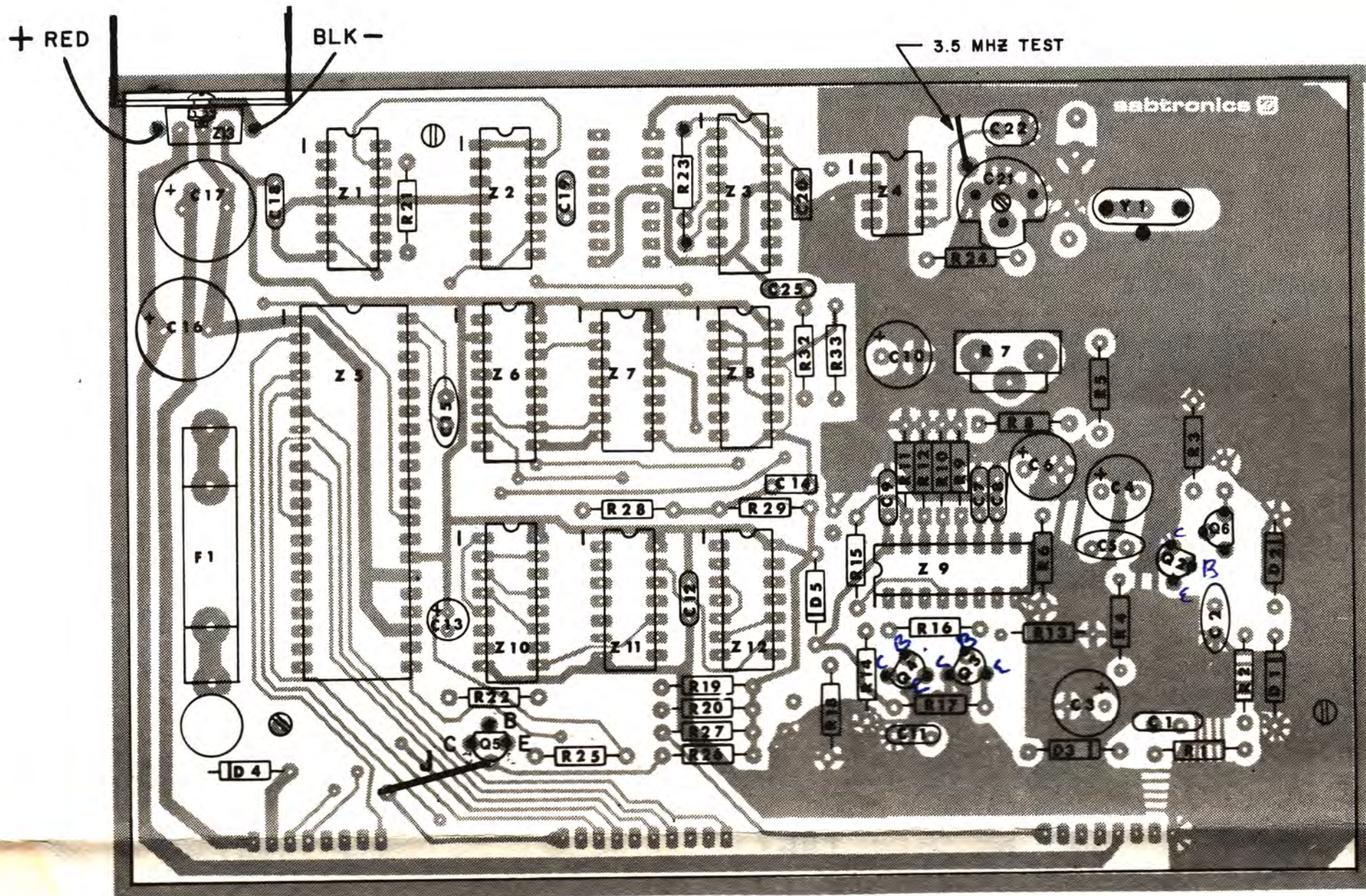
O P E R A T I O N A L T E S T S

- [] Now that your SABTRONICS MODEL 8100 FREQUENCY COUNTER has been assembled, check the instrument for proper parts placements and good solder joints before proceeding. Any parts, especially IC's that may have been incorrectly installed, should be corrected now. If IC's and transistors are installed incorrectly, damage to these devices may occur and would not be covered by any warranty.
- [] Check if batteries are installed correctly.
- [] Set the panel switches as follows:
 - S4 - 1 MegOhm position
 - S2 - X1 position
 - S3 - DIRECT position
 - S1 - 0.1S position
- [] Display should show "0.00" and GATE LED should be blinking.
- [] If numbers other than "0.00" are being displayed, adjust trimpot R7 (sensitivity control) until a display of "0.00" is obtained.
- [] Solder a 2" (50mm) piece of bare wire in the TEST POINT near crystal labelled "3.58 MHz TEST" as shown in FIG.1.
- [] A quick test for proper operation can be made by connecting a test lead wire from the "3.58 MHz TEST" point to the "DIRECT" BNC jack's center pin.

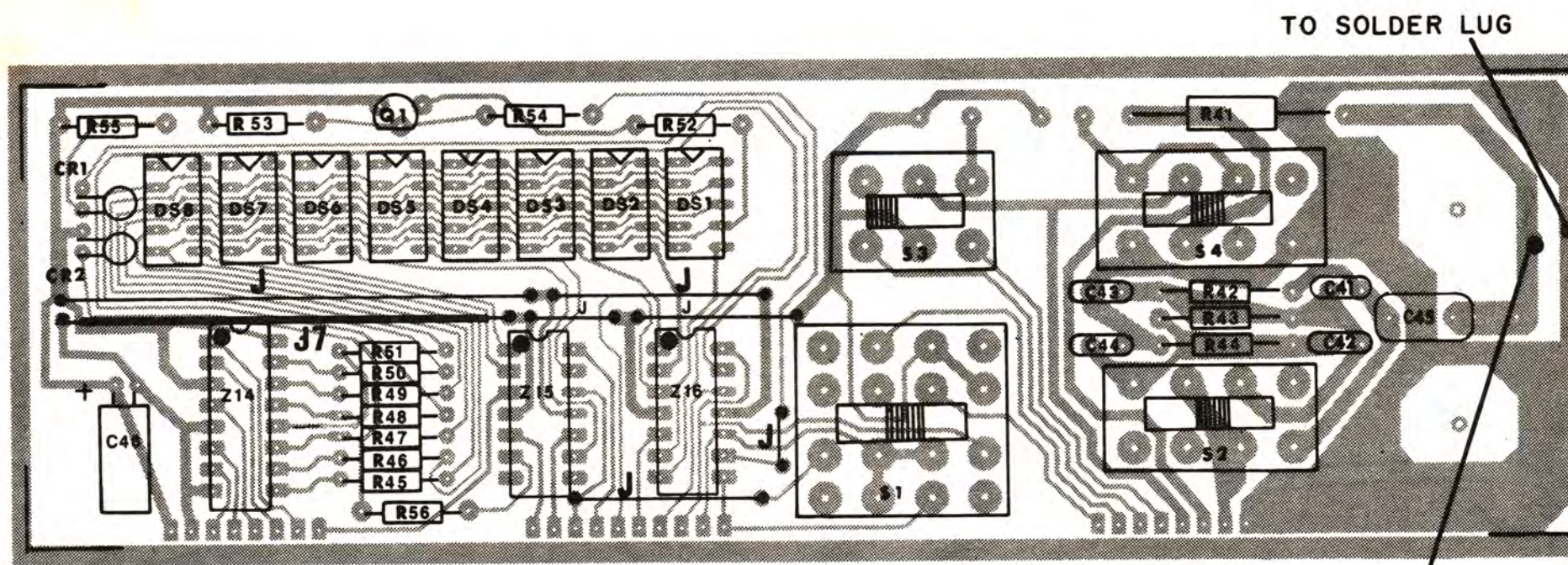
Display should read a number approx. "3579.54".
- [] Remove test lead wire from BNC input jack and 3.58 MHz TEST point.
- [] To set your Model 8100 Counter's precision time base oscillator, an accurate Frequency Counter capable of measuring at least 4 MHz should be used. A high-impedance input type is desirable.
- [] Connect the external counter to the 3.58 MHz TEST point and ground foil on the Model 8100.
- [] Using a non-metallic trimming tool, adjust trimmer capacitor C21 for a display of 3.579540 MHz on the external frequency counter.
- [] Further tests on your Model 8100 Frequency Counter may be performed using a calibrated RF Frequency Generator. Levels of 30 mV rms can be used to drive the Counter from 20 Hz to 100 MHz. Trimpot R7 will affect the sensitivity, so be sure you have this trimpot set for maximum sensitivity while maintaining a display of "0.00" with no input signal to the Model 8100.



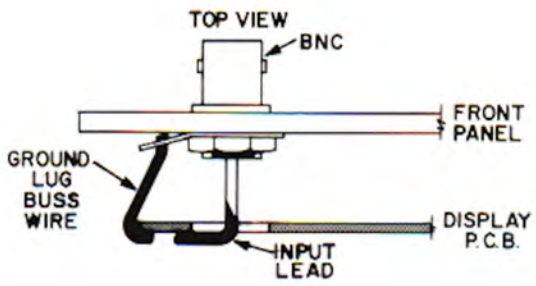
NOTES: UNLESS OTHERWISE SPECIFIED
 ALL RESISTOR VALUES ARE IN OHMS. (K=1,000, M=1,000,000)
 ALL CAPACITOR VALUES ARE IN MICROFARADS.



MAIN P.C.B.
FIG. #1



DISPLAY P.C.B.
FIG. 2



A

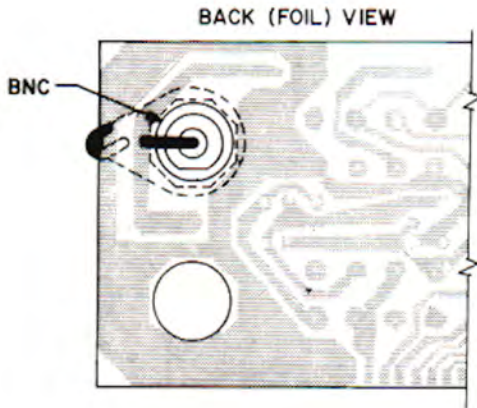


FIG. 3

B

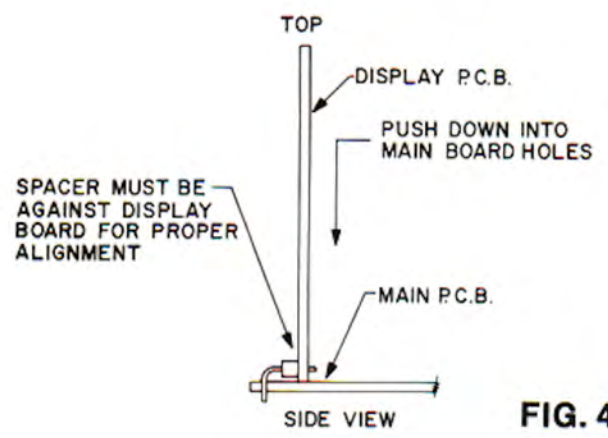


FIG. 4

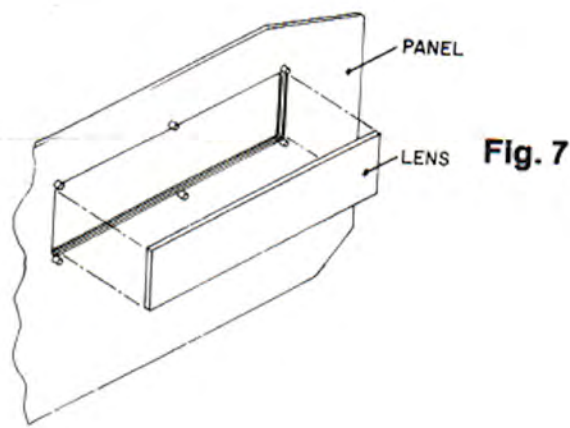


Fig. 7

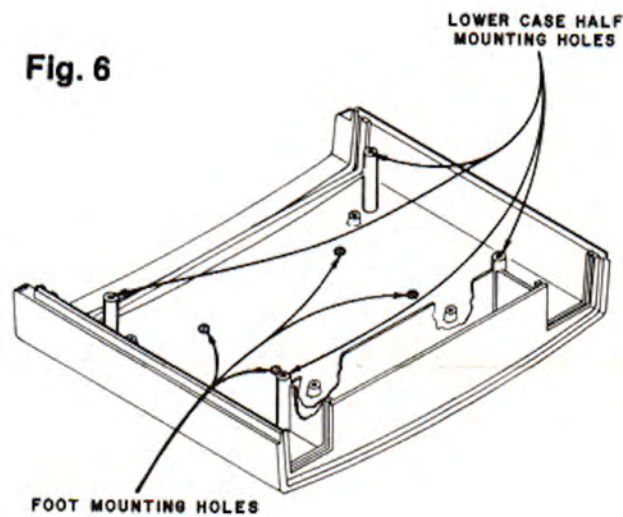


Fig. 6

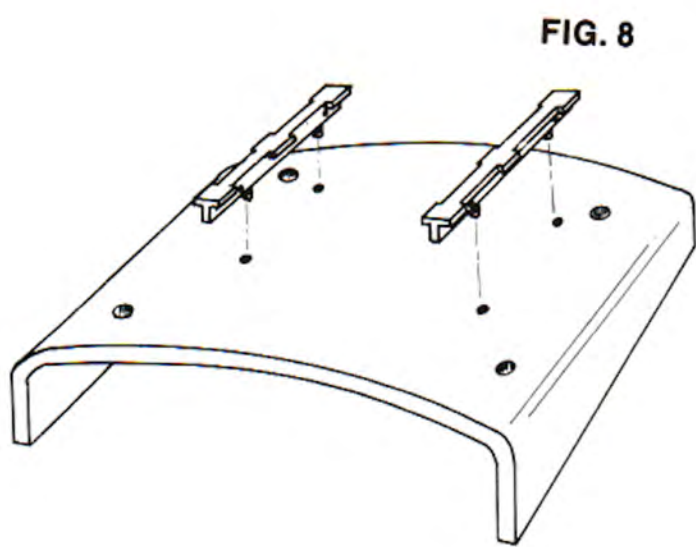


FIG. 8

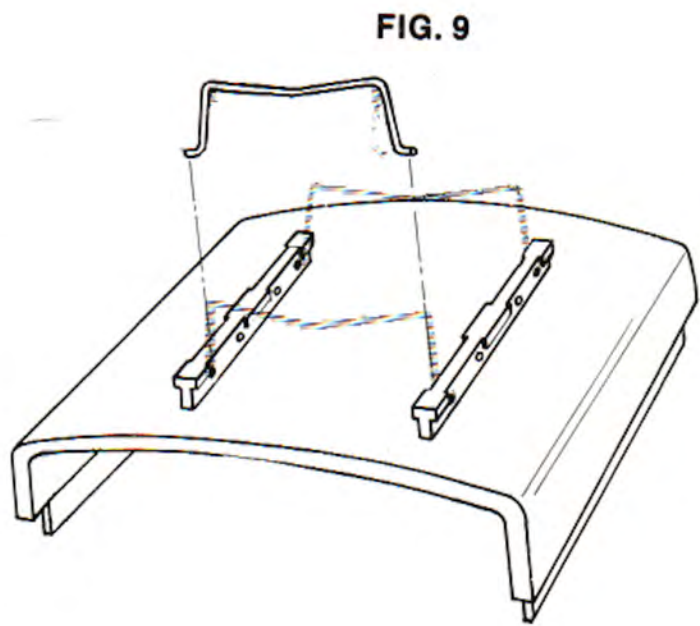


FIG. 9

