

ALTAIR 8800 POWER SUPPLY BOARD
PARTS/PRICE LIST

<u>P/N</u>	<u>PART</u>	<u>QTY</u>	<u>UNIT PRICE</u>
100718	IN4004	10	\$.20
100711	VJ 048	1	4.15
various	Resistors	4	.19
100327	Cap 0.1uF CER	5	.19
100312	Cap 0.1uF CER	2	.40
100318	Cap 500uF ELEC	1	.19
100375	Cap 2200uF ELEC	1	.19
100315	Cap 3300uF ELEC	6	1.80
102602	Transformer 133-P-5	1	3.70
102609	Transformer 110V	1	9.95
102611	Transformer P-6138	1	18.15
101742	Power cord-3 wire, 6'	1	2.55
101719	Strain relief	1	.10
101751	Rubber feet-small	2	.10
101773	Fuse, 3AG, 1A, 250V	1	.75
101726	Fuse clips, 3AG	2	.10
--	Fuse cover	1	.10
103062	Wire, AWG #18, black, 6'	1	.19
101801	Solder lug #7	17	.10
101868	Terminal block 10-141	1	1.95
various	Hardware, screws, nuts, washers	114	.10
103056	Wire (H.D. Buss-12")	1	.20
100167	PC Board 8800 P/S	1	10.00

Minimum order \$5.00
Effective March 1, 1975
Include \$1.00 for postage
Prices subject to change without notice.

ALTAIR 8800 CASE
PARTS/PRICE LIST

<u>P/N</u>	<u>PART</u>	<u>QTY</u>	<u>UNIT PRICE</u>
100505	Optima case	1	\$130.00
101867	Card rails	2	1.65
101714	Card guide	4	1.65
100918	Screw 6-32 x 1/2	4	.10
100904	Screw 4-40 x 5/8	4	.10
100932	Nut 4-40	4	.10
100941	Lockwasher 4-40	4	.10
100940	Flat washer 4-40	4	.10
100935	Screw 6-32 x 3/4	8	.10
100933	Nut 6-32	20	.10
100942	Lockwasher #6	12	.10
100943	Flat washer #6	12	.10
101826	Spacer 0.25"	8	.10
101740	Type A screen	1	1.25
101741	Type B screen	1	1.25
101759	8800 name plate	1	1.25
	Manual-Oper. (51 sheets)	1	7.50
	Manual-Assy. (38 sheets)	1	9.00
	Manual-Theory, etc.	1	9.00
	Manual Binder	1	2.50

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ALTAIR 8800 MOTHER BOARD
(This is P/N 88-EC)
PARTS/PRICE LIST

<u>P/N</u>	<u>PART</u>	<u>QTY</u>	<u>UNIT PRICE</u>
100904	Screw 4-40 x 5/8	2	.10
100912	Screw 4-40 x 5/16	2	.10
100932	Nut 4-40	4	.10
100941	Lockwasher #4	4	.10
103063	Wire, AWG #20, 2'	4	.10
101801	Solder lug #7	4	.10
100164	PC Board 8800 Mother	1	14.00
	Manual (3 pages)	1	

Minimum order \$5.00
Effective March 1, 1975
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ALTAIR 8800 DISPLAY CONTROL BOARD
PARTS/PRICE LIST

<u>P/N</u>	<u>PART</u>	<u>QTY</u>	<u>UNIT PRICE</u>
101020	7400	3	\$.50
101072	74L02	1	.95
101022	7404	2	.60
101073	74L04	1	.80
101042	74LS04	2	1.10
101052	7405	5	1.10
101081	74L10	2	.80
101059	7430	1	.50
101082	74L30	1	.90
101027	7473	1	.80
101060	74123	5	1.80
101040	8T97	1	2.80
101074	uA 7805	1	4.45
various	Resistors	63	.19
100327	Cap 0.1uF CER	27	.19
100304	Cap 0.01uF CER	1	.19
100328	Cap 0.001uF CER	1	.19
100334	Cap 20pF CER	4	.19
100326	Cap 33uF ELEC	1	.75
100702	RL-21 LED	36	.60
102366	Switch ST-1-1-C	17	2.35
102367	Switch ST-1-3-C	8	2.45
103060	Wire 3' white	59	.10
103061	Wire 3' black	4	.10
101801	Solder lug #7	4	.10
103022	Cable clamp 7/16"	1	.10
100917	Screw 6-32 x 1/4	1	.10
100919	Screw 6-32 x 1	1	.10
100920	Screw 6-32 x 1 1/4	3	.10
100933	Nut 6-32	5	.10
100942	Lockwasher #6	5	.10
101824	Spacer 0.6"	4	.10
100163	PC Board 8800 D/C	1	40.00
101768	10 pin plug	1	.30
101769	Terminals for 10 pin plug	8	.45
101870	Heat sink	1	.40

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ALTAIR 8800 CPU BOARD
PARTS/PRICE LIST

<u>P/N</u>	<u>PART</u>	<u>QTY</u>	<u>UNIT PRICE</u>
101070	8080 Intel	1	Factory Quote
101071	8212	1	8.75
101040	8T97	9	2.80
101080	74L00	1	.95
101072	74L02	1	.75
101022	7404	1	.60
101042	74LS04	1	1.10
101054	7406	1	.90
101063	74L74	1	2.05
101060	74123	1	1.85
101074	uA 7805	1	4.45
102806	CS 4410	1	.35
100721	5.1V Zener	1	1.00
100722	12V Zener	1	1.00
various	Resistors	44	.19
100301	Cap 10pF CER	1	.19
100334	Cap 20pF CER	1	.19
100361	Cap 100pF CER	1	.19
100321	Cap 0.01uF CER	1	.19
100327	Cap 0.1uF CER	24	.19
100333	Cap 35uF ELEC	4	.75
100917	Screw 6-32 x 1/4	1	.10
100933	Nut 6-32	1	.10
100942	Lockwasher #6	1	.10
101855	Crystal 2.000MHz	1	7.60
101866	Wafer conn 8 pin	1	.35
102106	Socket 40 pin	1	1.50
102105	Socket 24 pin	1	1.20
103048	Wire 16" white	1	.19
100161	PC Board 8800 CPU	1	30.00
101864	Edge connector	1	18.00
101870	Heat sink	1	.40

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●●●●●●●●●●●●●●●●●●●● **WARNING** ●●●●●●●●●●●●●●●●●●●●

ALWAYS TURN POWER OFF BEFORE CONNECTING OR DISCONNECTING ANY BOARDS TO THE EXPANDER BOARD CONNECTORS. FAILURE TO ADHERE TO THIS WARNING MAY RESULT IN PERMANENT DAMAGE TO YOUR UNIT.

●●●

*****ERRATA SHEET*****

THE FOLLOWING CHANGES ARE TO BE MADE TO THE PAGES INDICATED IN THE ASSEMBLY MANUAL. BE SURE TO READ THESE OVER CAREFULLY.

PAGE 26: There will be a 24-pin IC socket provided for IC K. This is to be installed in the same manner as the 40-pin socket. The socket for this IC may be of a different type. If it does not appear similar to the 40-pin socket it will be the "AMP" type socket. This will require you to separate it into two halves by cutting away the 4 cross pieces between the two 12-pin sides. Install each half in the same manner as the 40-pin socket.

PAGE 34: The 2 MHz crystal provided with your kit may not be provided with the cardboard container indicated in the instructions. In this case, use a piece of masking or electrical tape to wrap the metal body of the crystal to insulate it from the board.

PAGE 54: Before installing the transformers, cut the following wires off at a point near where they enter the coil winding:

✓ T1---cut off the YELLOW wire

✓ T2---cut off the 2 BLUE wires

✓ T3---cut off the YELLOW/GREEN stripped wire

When installing the transformers, orient them so that the primary leads (black wires) are as follows:

✓ T1---primary downward

✓ T2---primary upward

✓ T3---primary towards the left

PAGE 60: The Power Supply Board is to be mounted to the cross member using #6-32 X 3/4 inch screws instead of the 5/8 inch screws indicated in the drawing.

PAGE 60:
(cont.)

There is now only one small screen to be mounted on the back panel over the I/O connector openings on the side opposite the transformers. Slots have been provided in the back panel for the fan opening. Mount the screen over the connector openings using #4-40 screws, and add lockwashers (not shown in drawing) between the nuts and the flatwashers on each of the screen mounting screws.

PAGE 68:

Before installing the sub-panel, use a couple layers of plastic electrical tape to insulate the "AC SW" wire leads and the switch leads themselves (S8) at the points where they enter the board. These points will have 110VAC on them so insulating them will add an additional safety factor for handling.

PAGE 66:
&
PAGE 70

Your kit contains 6 cable clamps. Two should be mounted on the Display/Control Board itself; one as in the drawing on page 67 and the other on the corner diagonally opposite the one in the drawing.

Three clamps should be mounted on the card rail mounting screws; one on the rail closest to the D/C board on the right and the other two on both rails on the left side.

The last clamp should be mounted on the chassis itself in the last hole closest to the back on the left side.

Route the wires through these clamps as indicated in the instructions.

PAGE 19:

There is no longer any mounting hardware provided for mounting the Display/Control Board to the Sub-Panel as shown in the drawing. The switch mounting is more than adequate for securing these two together.

NOTE: The 35uf capacitors in your kit may be substituted with 33uf capacitors.

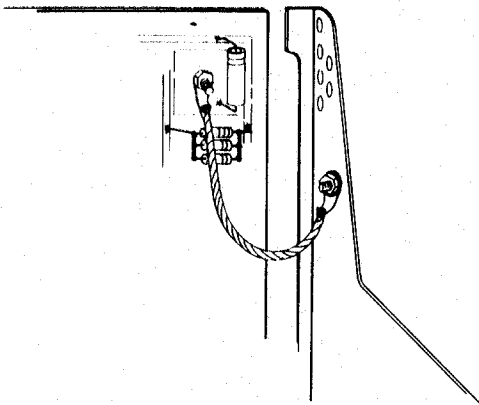
8800 GROUNDING MODIFICATION

There are several grounding straps to be added between various members of the chassis and some of the PC boards.

There are two sizes of braided wire provided in your kit for making these connections, 1/8 inch and 1/4 inch. The 1/4 inch size is used along the edge of the power supply board and the 1/8 inch is used to make all other connections.

The first connection is to be made between the display/control board and the chassis.

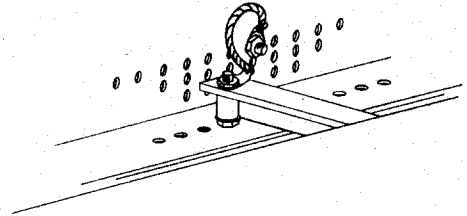
- (✓) Cut a length of the 1/8 inch braid approximately 3 inches and solder a solder lug in place on each end.
- (✓) Referring to the drawing below, attach the braid between the 7805 mounting screw on the back side of the display/control board and the chassis as shown.



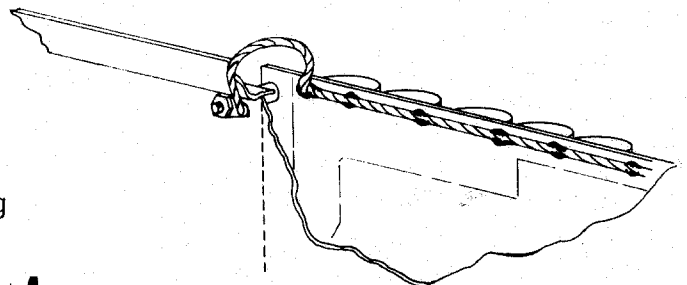
NOTE: At any point where a connection is made to the chassis, first rub the area around the connection point with sandpaper or some other abrasive to remove the anodizing.

This connection should be insulated using heat-shrink or some other such tubing.

- (✓) Prepare another length of 1/8 inch braid in exactly the same manner as the first piece.
- (✓) Connect this braid between the card rail towards the back of the unit on the side opposite the transformers and the chassis as shown in the drawing below.



- (✓) The 1/4 inch braid is to be soldered directly to the PC land on the bottom (non silk-screened) side of the power supply board. Solder this braid in place along its entire length between the negative side of C1 and the positive side of C14. (see drawing below)
- (✓) Prepare a 4 inch length of 1/8 inch braid by attaching a solder lug to one end.
- (✓) Solder the end opposite the lug on the 4 inch length to the end of the 1/4 inch braid beneath capacitor C1 as shown in the drawing below. The end of the 1/8 inch braid with the solder lug will be attached to the bottom side of the cross member with the same screw which mounts the closest corner of the power supply board.



A

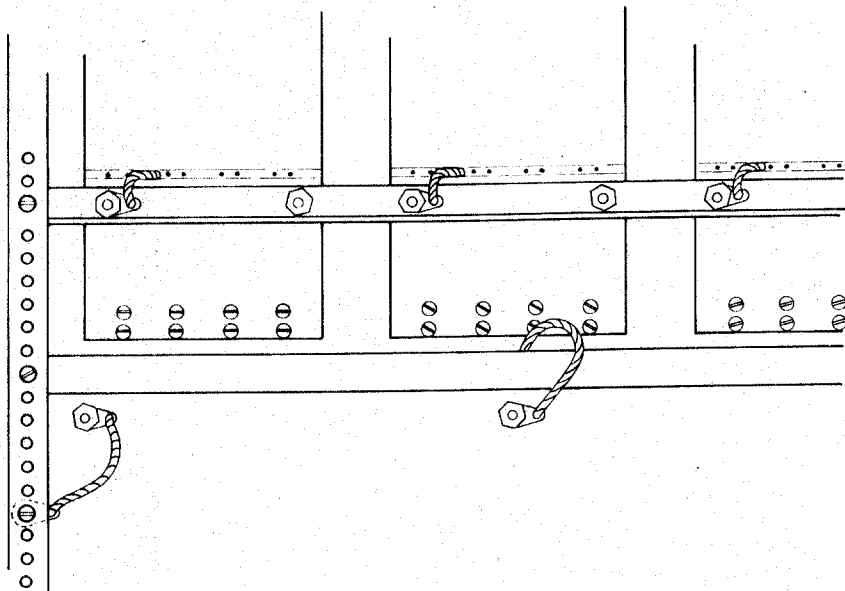
() Prepare another 3 inch length of 1/8 inch braid by attaching solder lugs to each end.

() Connect this length of braid between the cross member on the side opposite the transformers and the chassis as shown in the drawing below.

NOTE: The drawing below also shows the 4 inch length of braid from the power supply board properly attached to the cross member as previously instructed.

() Prepare a 3 inch length of 1/8 inch braid for each of the expander boards in your kit by attaching a solder lug to one end.

() Connect these wires between the card rail and the expander boards as shown in the drawing below. The end of the braid opposite the lug should be soldered directly to the land on the expander board which runs along the edge connecting pins 50 and 100 of each connector. Be very careful not to create any solder bridges when making this connection.



4K MEMORY BOARD ERRATA

REVISION 0.2

THE FOLLOWING ADDITIONS AND CHANGES APPLY TO ALL "REV 0.2" 4K RAM BOARDS. BE SURE TO READ THESE OVER CAREFULLY BEFORE BEGINNING CONSTRUCTION. WITH THESE EXCEPTIONS, THE REST OF THE ASSEMBLY PROCEDURE IS AS STATED IN THE MANUAL.

There are four additional components to be added to the board which are not shown on the silk-screen. These include a diode, a resistor and two capacitors.

Refer to the component layout drawing on page 3 of this errata and install the additional components in the positions shown.

NOTE: The .1uf capacitor is not shown in the schematic. This capacitor is merely for noise suppression.

THE LEFT SIDE OF JUMPER J6 SHOULD NOT BE CONNECTED TO THE PAD INDICATED BY THE SILK-SCREEN ON THE BOARD. IN THE DRAWING YOU WILL NOTE THAT THE PAD FOR THE LEFT SIDE OF THIS JUMPER IS NOW LOCATED JUST BELOW IC L.

The following information applies to specific pages of the assembly manual:

PAGE 3: IC B is now a 74LS04, IC L is now a 74LS00

PAGES 8 & 9: Diode D2, listed in the instructions as a 1N746A, 3.3v zener, will be so only if your kit contains TMS 4030 memory IC's. If your kit is supplied with the Intel C2107A's or TMS 4060-2's, then this diode will be a 1N4733, 5v zener instead.

PAGES 10 & 11: The markings on the silk-screen for two of the jumper wire connections are incorrect. Just beneath IC S, there are two pads next to each other labeled J2 & J10. These two pads have reverse markings; J2 should be J10, and J10 should be J2. Connect them accordingly.

4K MEMORY BOARD ERRATA

THERE HAVE BEEN IC SOCKETS ADDED TO YOUR KIT FOR MOUNTING SEVERAL OF THE INTEGRATED CIRCUITS.

A 24 PIN IC SOCKET HAS BEEN ADDED FOR IC N. THIS MAY BE ONE OF TWO TYPES. ONE TYPE IS A SINGLE UNIT AND WILL FIT DIRECTLY INTO THE HOLES ON THE BOARD FOR MOUNTING THE IC. THE OTHER TYPE IS ACTUALLY TWO HALVES JOINED TOGETHER BY SOME CROSS PIECES. USE WIRE CUTTERS TO REMOVE THE CROSS PIECES, SEPARATING THE HALVES. MOUNT THE SOCKET TO THE BOARD IN THE SAME MANNER AS YOU WOULD AN INTEGRATED CIRCUIT, THEN INSTALL THE IC INTO THE SOCKET.

SOCKETS HAVE ALSO BEEN PROVIDED FOR THE MEMORY IC'S, MC-0 THROUGH MC-7. THESE SOCKETS MAY ALSO BE ONE OF TWO DIFFERENT TYPES. ONE TYPE WILL BE A SINGLE 22 PIN UNIT AND SHOULD BE INSTALLED IN THE SAME MANNER AS THE ONE MENTIONED ABOVE. THE OTHER TYPE IS EXACTLY LIKE THE TWO PIECE ONE MENTIONED ABOVE, AND SHOULD BE SEPARATED IN THE SAME MANNER. THIS ONE WILL ALSO REQUIRE A MODIFICATION IN ORDER TO ACCOMODATE THE 22 PIN IC'S. USE NEEDLE-NOSE PLIERS TO PULL ONE OF THE END PINS FROM EACH OF THE 16 SOCKET HALVES. WHEN MOUNTING THESE, KEEP THE HOLE WITH THE PIN MISSING TOWARDS THE BOTTOM OF THE BOARD. KEEP THE IC TOWARDS THE TOP OF THE BOARD WHEN INSTALLING IT SO THAT THE HOLE WITH THE MISSING PIN IS NOT USED.

PAGE 13: Before installing IC MC-1, there is a track running close to one of the IC pads which should be inspected. On the side closest to capacitor C15 there is a PC land which runs between the pads for pins 7 & 8 of the IC. This land runs extremely close to the pad for pin 7.

✓ Check this area of the board very closely, and be sure that the land does not touch the pad. If there is a short, or if you are not certain; use a small sharp knife and cut slightly into the board between the two, just enough to be sure that there is no connection.

DISPLAY/CONTROL BOARD CAPACITOR MODIFICATIONS

NOTE: THE FOLLOWING CAPACITOR VALUE SUBSTITUTIONS ARE CRITICAL IN THE OPERATION OF AN ALTAIR SYSTEM USING 4K DYNAMIC MEMORY BOARDS. THE NECESSARY CAPACITORS WILL BE INCLUDED WITH EACH ALTAIR KIT AND WITH EACH 4K MEMORY BOARD KIT, BUT THE SUBSTITUTIONS NEED BE PERFORMED ONLY ONCE. PERFORM THE SUBSTITUTIONS WHETHER YOU HAVE 4K BOARDS OR NOT.

THE FOLLOWING CAPACITORS ON THE DISPLAY/CONTROL BOARD ARE TO BE CHANGED TO THE VALUES INDICATED BELOW:

C7 should now be 0.01 μ f

C8 should now be 0.1 μ f

THESE SUBSTITUTIONS ARE TO IMPROVE THE OPERATION OF THE ALTAIR'S DEPOSIT CIRCUITRY.

ALTAIR 8800

ASSEMBLY MANUAL

TABLE OF CONTENTS

ASSEMBLY HINTS _____	2
TRANSISTOR IDENTIFICATION CHART _____	3
IC ORIENTATION CHART _____	4
MOS IC SPECIAL HANDLING PRECAUTIONS _____	5
8800 DISPLAY/CONTROL BOARD ASSEMBLY _____	6
8800 DISPLAY/CONTROL BOARD HARDWIRE CONNECTIONS _____	14
CHASSIS AND SUB-PANEL REMOVAL _____	16
8800 CPU BOARD ASSEMBLY _____	26
1K STATIC MEMORY BOARD ASSEMBLY _____	40
8800 POWER SUPPLY BOARD ASSEMBLY _____	47
TRANSFORMER MOUNTING _____	54
TERMINAL BLOCK MOUNTING _____	55
CHASSIS ASSEMBLY _____	56
TERMINAL LUG INSTALLATION _____	58
POWER SUPPLY BOARD WIRE CONNECTIONS _____	59
POWER SUPPLY BOARD MOUNTING _____	60
POWER SUPPLY CONNECTIONS _____	61
POWER SUPPLY WIRING DIAGRAM _____	62
EXPANDER BOARD 8800 M/BD ASSEMBLY _____	64
EXPANDER BOARD WIRING _____	66
BOARD INSTALLATION _____	68
BUS POWER CONNECTIONS _____	70
8800 BUS STRUCTURE _____	72
INTERCONNECTIONS AND BOARD INSTALLATIONS _____	74
CASE TOP INSTALLATION _____	76

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ASSEMBLY HINTS

Before beginning the construction of your unit, it is important that you read the "Kit Assembly Hints" booklet. Pay particular attention to the section on soldering because most problems in the ALTAIR occur as the result of poor soldering. Failure to heed the warnings in the "Kit Assembly Hints" booklet may cause you to void your warranty.

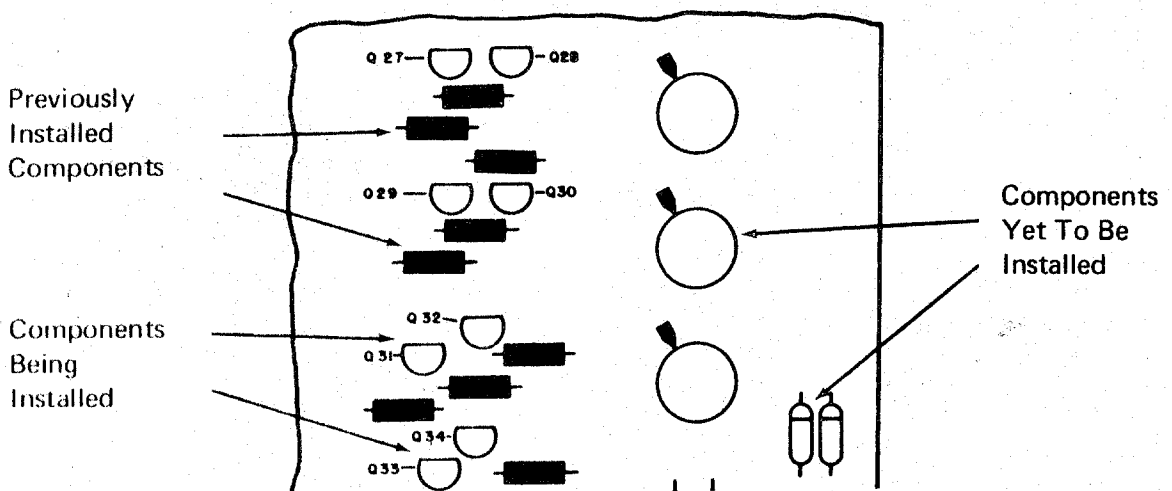
The type of soldering iron used is critical. Use a 30-40 watt iron with a chisel tip, such as an Ungar 776 with a 7155 tip. The delicate soldering necessary for this unit precludes using a blunt-tipped iron.

Each component should be installed in the order presented in the assembly instructions. Each component must be placed in its correct position on the board. There are drawings throughout the assembly instructions which will aid you in installing the components correctly. Some components (diodes, integrated circuits, some capacitors, and transistors) have special orientations on the board. These special orientations are called out in the assembly instructions; it is important that you note them carefully before installing the components.

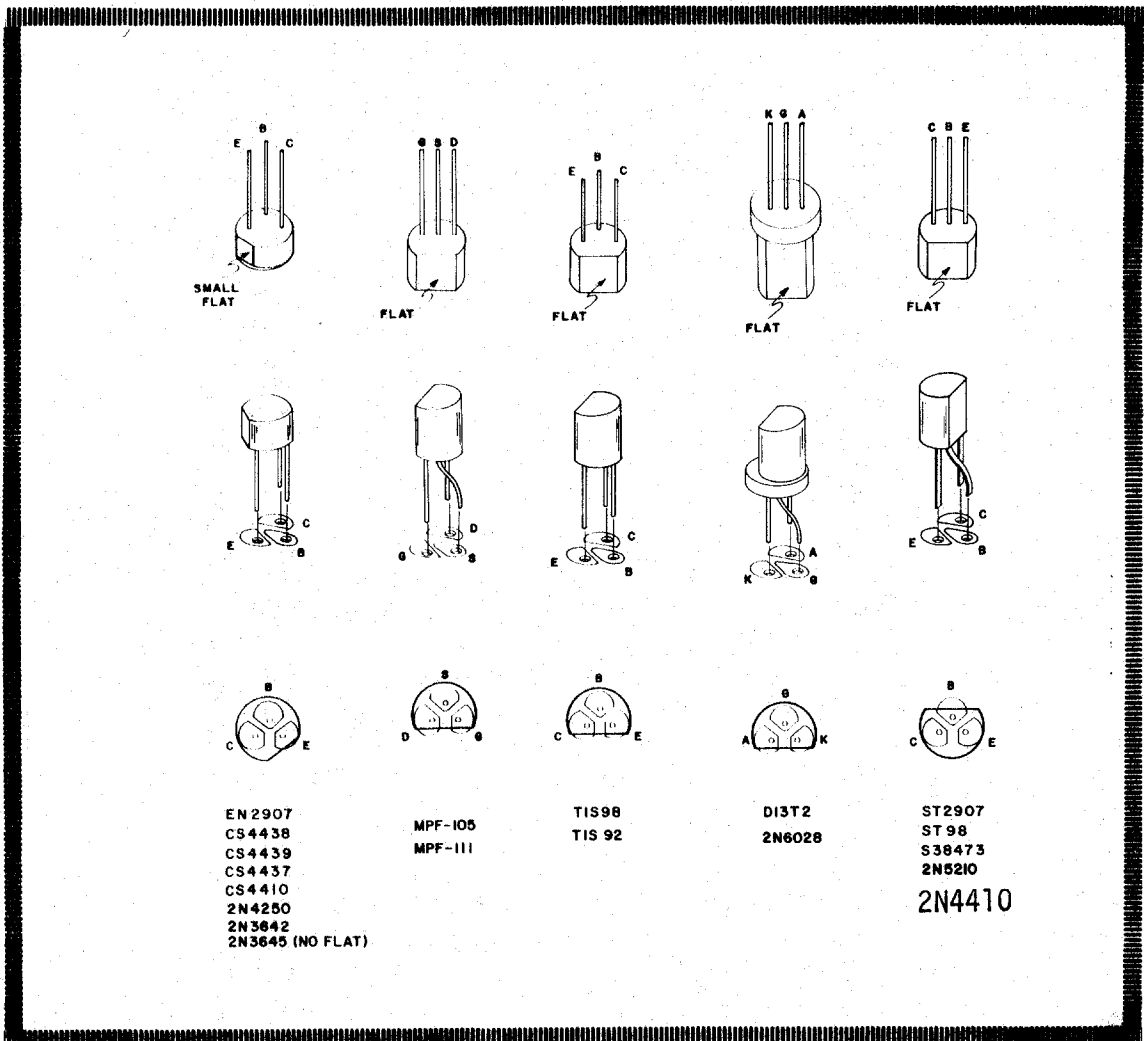
After a component has been soldered to the board, check it off in the space provided on the page. Before going on to a new page, check to make sure all the components on that page have been installed.

Check the contents of your kit against the enclosed parts list to make sure you have all the required components, hardware and parts. The components are in plastic envelopes; do not open them until you need the components for an assembly step. You will need the tools called for in the "Kit Assembly Hints" booklet.

To assist you in assembling your unit, a coding system is used to identify the components already installed, components being installed, and components to be installed later. Compare each page with your circuit board to ensure that all components are installed before going on to a new page.



TRANSISTOR IDENTIFICATION CHART



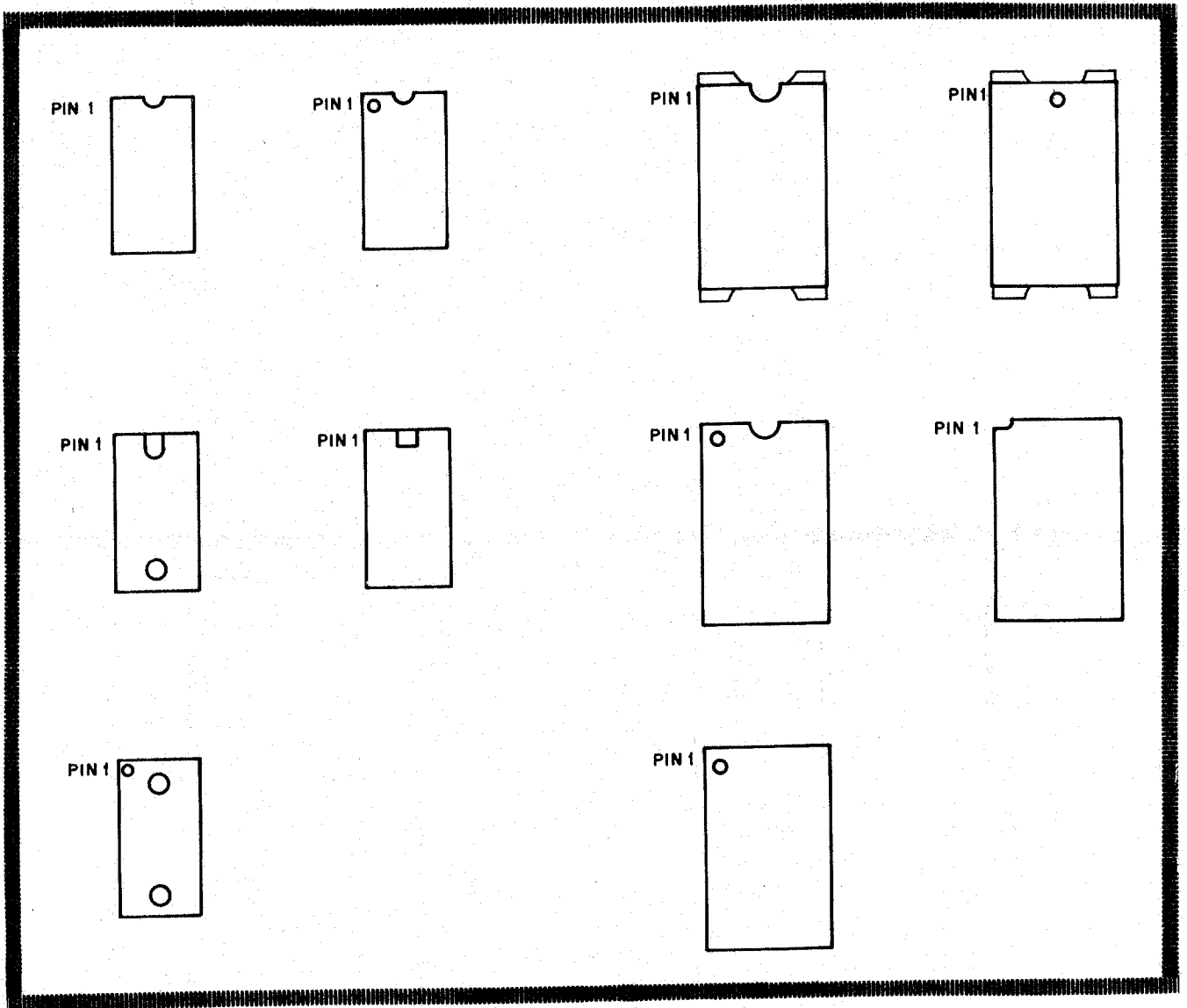
IN THE ILLUSTRATION ABOVE THE OUTLINE OF EACH TYPE OF TRANSISTOR IS SHOWN OVER THE PADS ON THE CIRCUIT BOARD WITH THE CORRECT DESIGNATION FOR EACH OF THE THREE LEADS. USE THIS INFORMATION TOGETHER WITH THE INFORMATION IN THE ASSEMBLY MANUAL FOR THE CORRECT ORIENTATION OF THE TRANSISTORS AS YOU INSTALL THEM.

THE FOLLOWING IS A LIST OF POSSIBLE SUBSTITUTIONS; IF ANY OTHERS ARE USED YOU WILL RISK DAMAGING YOUR UNIT:

2N4410 = CS4410 = CS4437, CS4438, TIS98, ST98, S38473 (NPN)
EN2907 = ST2907, CS4439 (PNP)

FOR SUBSTITUTIONS REFER TO THE INFORMATION ABOVE TO DETERMINE THE CORRECT ORIENTATION FOR THE THREE LEADS.

IC ORIENTATION CHART



INTEGRATED CIRCUITS (IC's) CAN COME WITH ANY ONE OF, OR A COMBINATION OF, SEVERAL DIFFERENT MARKINGS. THESE MARKINGS ARE VERY IMPORTANT IN DETERMINING THE CORRECT ORIENTATION FOR INSTALLATION. REFER TO THE ABOVE DRAWING TO DETERMINE THE POSITION OF PIN 1 OF THE IC AND USE THIS INFORMATION TO ORIENT IT AS DESCRIBED IN THE ASSEMBLY MANUAL.

WARNING: IF THE IC'S ARE NOT PROPERLY ORIENTED DURING INSTALLATION, IT MAY RESULT IN PERMANENT DAMAGE TO YOUR UNIT.

MOS IC SPECIAL HANDLING PRECAUTIONS

There are several MOS integrated circuits contained in this kit. These IC's are very sensitive to static electricity and transient voltages. In order to prevent damaging these components, read over the following precautions and adhere to them as closely as possible. FAILURE TO DO SO MAY RESULT IN PERMANENT DAMAGE TO THE IC.

- 1) All equipment (soldering iron, tools, solder, etc.) should be at the same potential as the PC board, the assembler, the work surface and the IC itself along with its container. This can be accomplished by continuous physical contact with the work surface, the components, and everything else involved in the operation.
- 2) When handling the IC, develop the habit of first touching the conductive container in which it is stored before touching the IC itself.
- 3) If the IC has to be moved from one container to another, touch both containers before doing so.
- 4) Do not wear clothing which will build up static charges. Preferably wear clothing made of cotton rather than wool or synthetic fibers.
- 5) Always touch the PC board before touching the IC to the board. Try to maintain this contact as much as possible while installing the IC.
- 6) Handle the IC by the edges. Avoid touching the pins themselves as much as possible.
- 7) Dry air moving over plastic can build up considerable static charges. Avoid placing the IC near any such area or object.
- 8) In general, never touch anything to the IC that you have not touched first while touching both it and the IC itself.

8800 DISPLAY/CONTROL BOARD ASSEMBLY

Integrated Circuit Installation

There are 25 integrated circuits (IC's) to be installed on the 8800 Display/Control Board.

- (✓) Referring to the component layout, remove the IC with the correct part number from its holder. If there are any bent pins, straighten these using needle-nose pliers. Ensure that you choose the IC with the correct part number as you install each one.
- (✓) Orient the IC so that its notched end corresponds with the notch printed on the PC Board, and pin 1 of the IC corresponds with the pad marked with an arrowhead on the board.

NOTE: If the IC does not have a notch on one end, refer to the IC Orientation Chart included with your manual for the identification of pin 1.

- (✓) When you have the correct orientation, start the pins on one side of the IC into their respective holes on the silk-screened side of the PC board. DO NOT PUSH THE PINS IN ALL THE WAY. If you have difficulty getting the pins into the holes, use the tip of a small screwdriver to guide them.

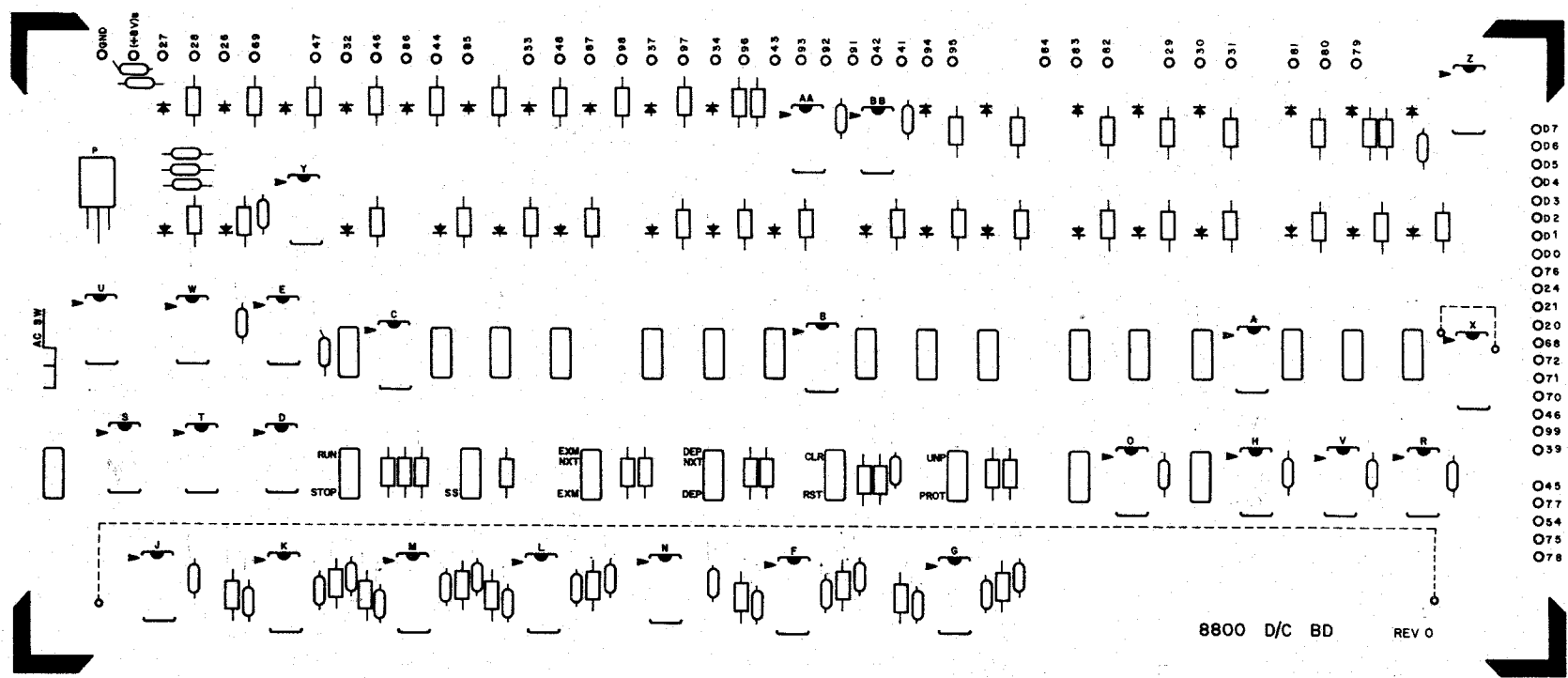
- (✓) Start the pins on the other side of the IC into their holes in the same manner. When all of the pins have been started, set the IC in place by gently rocking it back and forth until it rests as close as possible to the board. Make sure that the IC is perfectly straight and as close as possible to the board; then tape it in place with a piece of masking tape.
- (✓) Turn the board over and solder each pin to the foil pattern on the back side of the board. Be sure to solder each pin and be careful not to leave any solder bridges.
- () Turn the board over again and remove the piece of masking tape.

Use the same procedure to install each of the IC's. Be sure that you have the correct part number and the correct orientation as you install each one.

- (✓) AA & BB are 74LS04's
- (✓) Y is a 74L30
- (✓) U is a 7400
- (✓) W is a 7404
- (✓) E is a 7405
- (✓) B is a 7405
- (✓) A is a 7405
- (✓) X is an 8T97 *16 Pin*
- (✓) C is a 7405

- (✓) S & T are 74L10's
- (✓) D is a 7405 (✓) Z is a 74L04
- (✓) H is a 7400
- (✓) V is a 7404
- (✓) R is a 74L02
- (✓) O is a 7430
- (✓) J is a 7473
- (✓) K, M, L, F and G are 74123's *16 Pin*
- (✓) N is a 7400

7



- O07
- O06
- O05
- O04
- O03
- O02
- O01
- O00
- O76
- O24
- O21
- O20
- O66
- O72
- O71
- O70
- O46
- O39
- O39
- O45
- O77
- O54
- O75
- O78

Resistor Installation

There are 59 resistors to be installed on the 8800 Display/Control Board.

NOTE: Resistors are color-coded according to their value. The resistors in your kit will have four or possibly five bands of color. The fourth band in both cases will be gold or silver, indicating the tolerance. In the following instructions we will be concerned only with the three bands of color to one side of the gold or silver band. Be sure to match these three bands of color with those called for in the instructions as you install each resistor.

Using needle-nose pliers, bend the leads of the following resistors at right angles to match their respective holes on the PC board. (see component layout)

NOTE: All resistors on the 8800 Display/Control Board are either 1/4 or 1/2 Watt.

- (1) Install resistor R1 (1K-ohm, 1/2W, brown-black-red) into the correct holes on the silk-screened side of the PC board.
- (2) Holding the resistor in place with one hand, turn the board over and bend the two leads slightly outward.
- (3) Solder the leads to the foil pattern on the back side of the board; then clip off any excess lead lengths.

Referring to the component layout, install the remaining resistors in the same manner. Be sure you have the correct color-coding for each one as you install them.

(✓) R1, R2, R13, R14, R15, R16, R17, R18, R19, R22 and R34 are all 1K-ohm, 1/2W, brown-black-red.

(✓) R3, R5 and R11 are all 47K-ohm, 1/2W, yellow-violet-orange.

(✓) R6, R8 and R12 are 7.5K-ohm, 1/2W, violet-green-red.

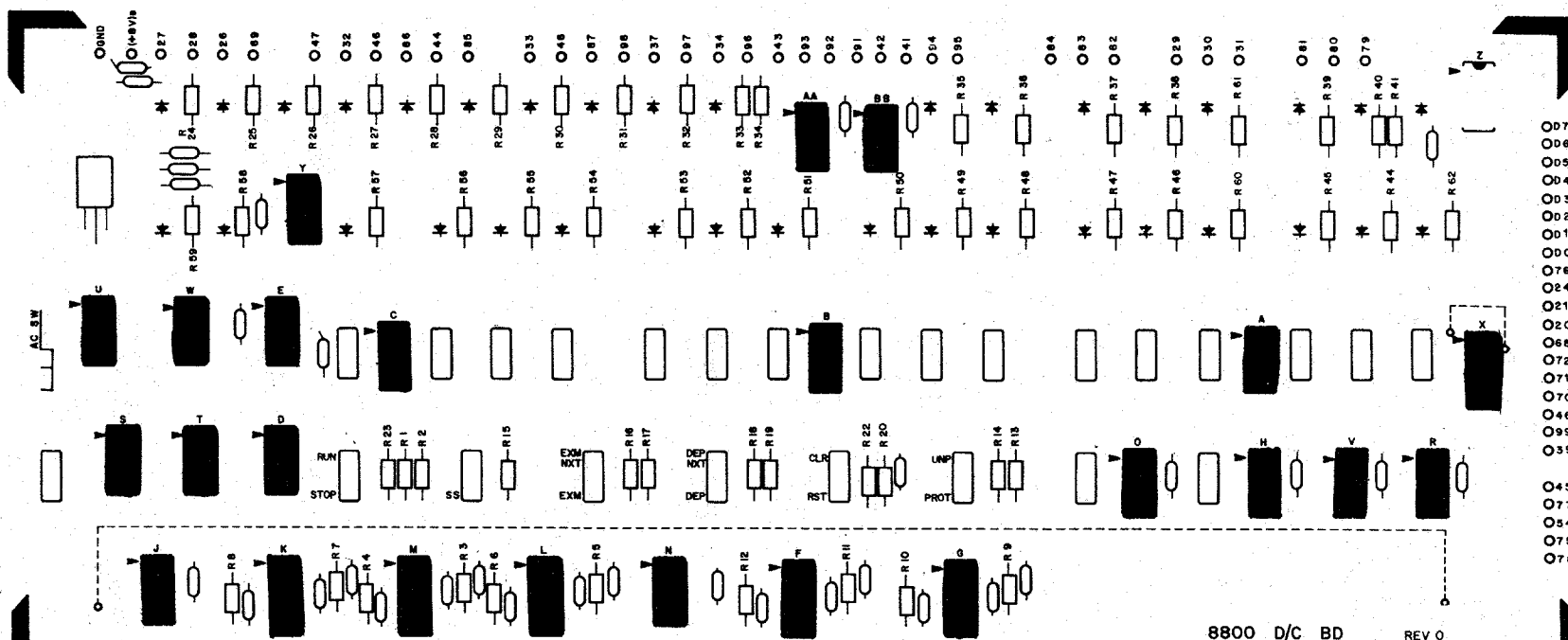
(✓) R7, R9 and R10 are all 30K-ohm, 1/2W, orange-black-orange.

(✓) R20 is 270K-ohm, 1/2W, red-violet-yellow.

(✓) R23 is 100-ohm, 1/2W, brown-black-brown.

(✓) R24 to R33, R35 to R41, and R44 to R62 are all 220-ohm, 1/2W, red-red-brown.

(✓) R4 is 1/2W, either 20K-ohm (red-black-orange) or 22K-ohm (red-red-orange).



Capacitor Installation

There are 33 ceramic disk capacitors to be installed on the 8800 Display/Control Board.

Refer to the component layout and install the capacitors according to the following procedure.

- (1) Choose the capacitor with the correct value as called for in the instructions. Straighten the two leads and bend them as necessary to fit their respective holes on the PC board.
- (2) Insert the capacitor into the correct holes from the silk-screened side of the board. Push the capacitor down until the ceramic insulation almost touches the foil pattern.
- (3) Holding the capacitor in place, turn the board over and bend the two leads slightly outward.
- (4) Solder the two leads to the foil pattern on the back side of the board; then clip off any excess lead lengths.

Install all of the capacitors in this manner. Be sure you have the correct value capacitor as you install each one.

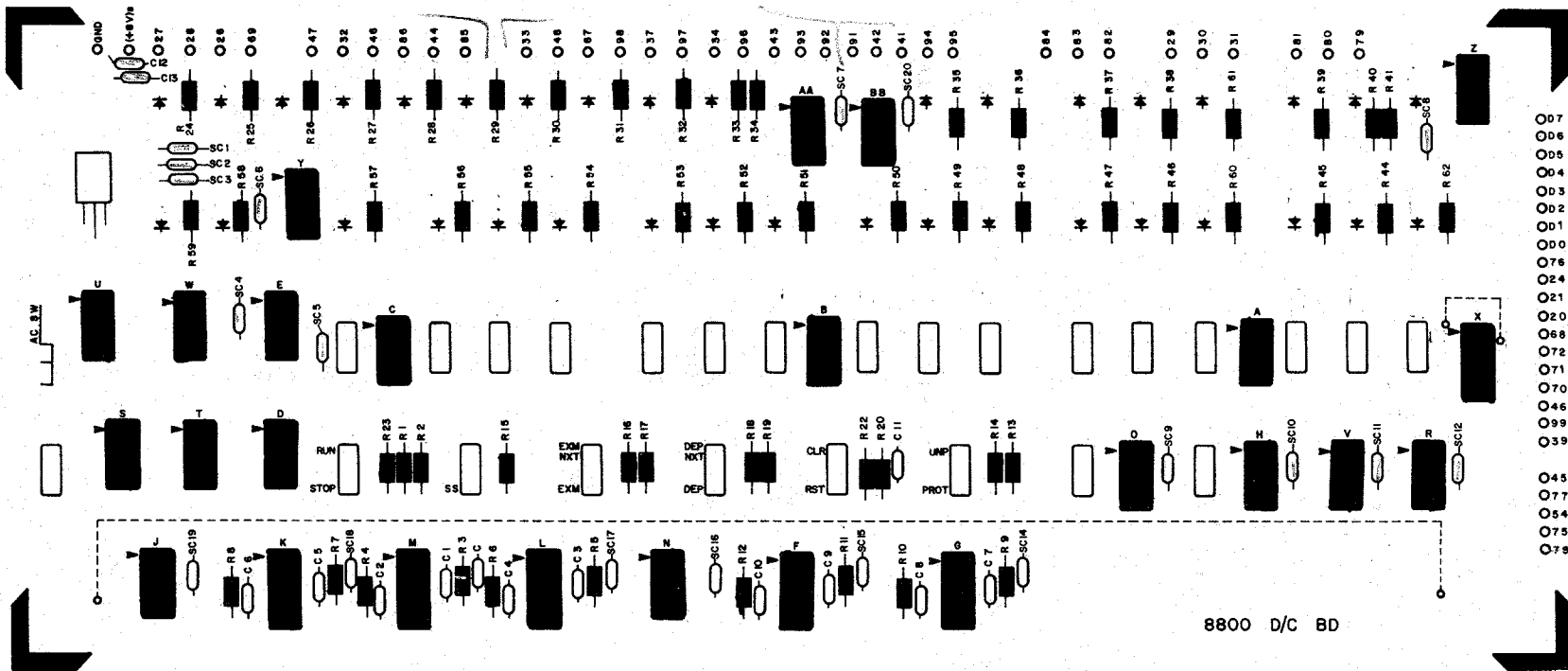
(✓) C1, C3, C5, C9, C11, C12, C13, and SC1 through SC20 are all .1uf.
 NOTE: SC13 is incorrectly marked on the silk-screen; it is the capacitor labeled "c" between R3 & R6.

(✓) C2, C4, C6 and C10 are 20pf.

(✓) C7 is 0.01uf

(✓) C8 is 0.1uf.

SEE COMPONENTS LIST PG 19



- O07
- O06
- O05
- O04
- O03
- O02
- O01
- O00
- O76
- O24
- O21
- O20
- O68
- O72
- O71
- O70
- O46
- O39
- O39
- O45
- O77
- O54
- O75
- O75