

ASSEMBLY OF THE JUPITER II

CFP-125 COMPUTER FRONT PANEL UNIT

THIS MANUAL PROVIDES ALL INSTRUCTIONS REQUIRED TO ASSEMBLE THE CFP-125 COMPUTER FRONT PANEL UNIT OF THE WAVE MATE JUPITER II COMPUTER SYSTEM.

THE COMPUTER FRONT PANEL UNIT PROVIDES DISPLAYS AND CONTROLS THAT ARE USEFUL IN DEBUGGING USER GENERATED SOFTWARE. THE DISPLAYS INCLUDE; 4-DIGIT HEX ADDRESS, INTERRUPT REQUEST, AND HALT. CONTROL SWITCHES INCLUDE RUN/HALT/STEP, INTERRUPT, AND RESET. THE COMPUTER FRONT PANEL UNIT ALSO INCLUDES ALL CIRCUITS REQUIRED TO INTERFACE THESE DISPLAYS AND CONTROLS TO THE JUPITER II SYSTEM.

COPYRIGHT (C) 1976 WAVE MATE .

ALL RIGHTS RESERVED. THIS MANUAL CONTAINS DESIGNS AND OTHER INFORMATION WHICH ARE THE SOLE PROPERTY OF WAVE MATE. THIS MANUAL MAY NOT, IN WHOLE OR IN PART, BE DUPLICATED OR USED FOR MANUFACTURE WITHOUT THE PRIOR WRITTEN PERMISSION OF WAVE MATE. BY LAW, A PENALTY OF \$150 CAN AND WILL BE ASSESSED FOR EACH UNAUTHORIZED USE OF THIS MATERIAL.

TABLE OF CONTENTS

SECTION 1	INTRODUCTION
SECTION 2	UNPACKING AND PARTS LIST
2.1	UNPACKING INSTRUCTIONS
2.2	PARTS LIST
2.3	TOOLS
SECTION 3	CONSTRUCTION TIPS
3.1	SOLDERING
3.2	SOLDERING ON A PRINTED CIRCUIT BOARD
SECTION 4	HARDWARE
4.1	HOW TO USE THIS MANUAL
4.2	LED HEX CHARACTER DISPLAY UNIT SOCKETS
4.3	LED SINGLE DISPLAY UNITS
4.4	SWITCHES
4.5	FRONT PANEL MODULE CABLE CONNECTOR
4.6	BUSS BARS
4.7	HIGH-FREQUENCY BYPASS CAPACITORS
4.8	BOARD MOUNTED RESISTORS
4.9	JUMPER WIRE
4.10	LOW FREQUENCY BYPASS CAPACITORS
4.11	WIRE-WRAP PINS
4.12	18-PIN IC SOCKETS
4.13	GROUND PINS
SECTION 5	WIRE WRAPPING
5.1	PROPER TECHNIQUES
5.2	WIRELIST
5.3	CHAIN LIST
SECTION 6	COMPONENT INSTALLATION
6.1	INSTALLING 8-, 14-, 16-, AND 18-PIN IC'S
6.2	INSTALLING LED HEX CHARACTER DISPLAY UNITS
6.3	INSTALLING DISCRETE COMPONENTS

SECTION 1 INTRODUCTION

THIS KIT CONTAINS A PRINTED CIRCUIT BOARD, INTEGRATED CIRCUITS, SOCKETS, LED DISPLAYS, SWITCHES, CONNECTORS AND ALL OTHER COMPONENTS REQUIRED TO ASSEMBLE THIS UNIT. A PRE-ASSEMBLED CABLE IS PROVIDED FOR CONNECTING THE FRONT PANEL UNIT TO THE CPU MODULE. THIS CABLE INCLUDES A 26 PIN CONNECTOR ON BOTH ENDS.

THE FRONT PANEL UNIT UTILIZES A SPECIALLY DESIGNED PRINTED CIRCUIT BOARD, DESIGNED TO ACCOMMODATE THE FRONT PANEL SWITCHES AND DISPLAYS AS WELL AS THE REQUIRED INTEGRATED CIRCUITS (IC'S) AND DISCRETE COMPONENTS (RESISTORS AND CAPACITORS). THE UNIT AS PRESENTLY CONFIGURED UTILIZES 11 IC'S, A SPECIAL ASSEMBLY THAT PLUGS INTO AN IC SOCKET, 4 LED HEX CHARACTER DISPLAY UNITS, 2 LED SINGLE DISPLAY UNITS, AND 3 SWITCHES. HOWEVER THE PRINTED CIRCUIT BOARD WILL ACCOMMODATE 16 IC'S, 6 LED HEX DISPLAY UNITS, AND 3 LED SINGLE DISPLAY UNITS SO THAT ADDITIONAL FUNCTIONAL CAPABILITIES MAY BE ADDED.

THE PRINTED CIRCUIT BOARD PROVIDES TWO ROWS OF 18-PIN IC SOCKETS. EACH SOCKET LOCATION IS DESIGNATED BY A ROW (B OR C) AND COLUMN (1-8) NUMBER. THE IC'S ARE PLUGGED INTO THE SOCKETS. THE SOCKETS PERFORM THE FUNCTION OF HOLDING THE IC'S AND ALSO PROVIDE A WIREWRAP TERMINAL FOR EACH PIN ON AN IC.

THE FOUR HEX CHARACTER LED DISPLAY UNITS MOUNT INTO A SOCKET ASSEMBLY MADE UP OF FOUR 12 PIN SOCKET STRIPS. THESE STRIPS MOUNT INTO ROW A.

MOST DISCRETE COMPONENTS ARE PLUGGED DIRECTLY INTO THE SOCKETS. HOWEVER, THE RESISTORS ASSOCIATED WITH THE SINGLE LED DISPLAY UNITS AND THE POWER SUPPLY FILTER CAPACITORS MOUNT DIRECTLY ONTO THE PRINTED CIRCUIT BOARD. THE SINGLE LED DISPLAY UNITS AND THE SWITCHES ALSO MOUNT DIRECTLY ONTO THE BOARD.

THE FRONT PANEL UNIT USES REGULATED +5 VOLTS WHICH IS SUPPLIED FRGM THE CPU MODULE. THIS VOLTAGE IS TRANSMITTED TO THE IC'S VIA A POWER BUSS THAT SPANS EACH ROW. A (0.1 MICROFARAD) HIGH-FREQUENCY BYPASS CAPACITOR IS USED AT EACH END OF EACH POWER BUSS. A 15 MICRO FARAD LOW FREQUENCY BYPASS CAPACITOR IS ALSO PROVIDED AT ONE END OF EACH POWER BUSS.

SECTION 2 UNPACKING AND PARTS LIST

2.1 UNPACKING INSTRUCTIONS

BEFORE BEGINNING ASSEMBLY, UNPACK ALL PARTS AND COMPARE TO THE PARTS LIST. THE PARTS LIST SHOWS THE WAVE MATE PART NUMBER, QUANTITY REQUIRED, AND DESCRIPTION OF EACH PART INCLUDED IN THE KIT. THE DESCRIPTION INCLUDES INFORMATION NORMALLY PRINTED ON THE COMPONENT ITSELF SUCH AS VENDOR PART NUMBER, CAPACITANCE, ETC.

AN ILLUSTRATION OF EACH PART IS SHOWN TO AID IN IDENTIFICATION. THE IC'S ARE PACKED IN STYROFOAM AT THE BOTTOM OF THE BOX. OTHER PARTS ARE PACKED IN PLASTIC BAGS.

ALSO INCLUDED IS A LIST OF ALL THE TOOLS YOU WILL NEED TO ASSEMBLE THIS MODULE.

2.2 PARTS LIST

PARTS LIST FOR CFP-125 CIRCUIT CARD CONSTRUCTION.

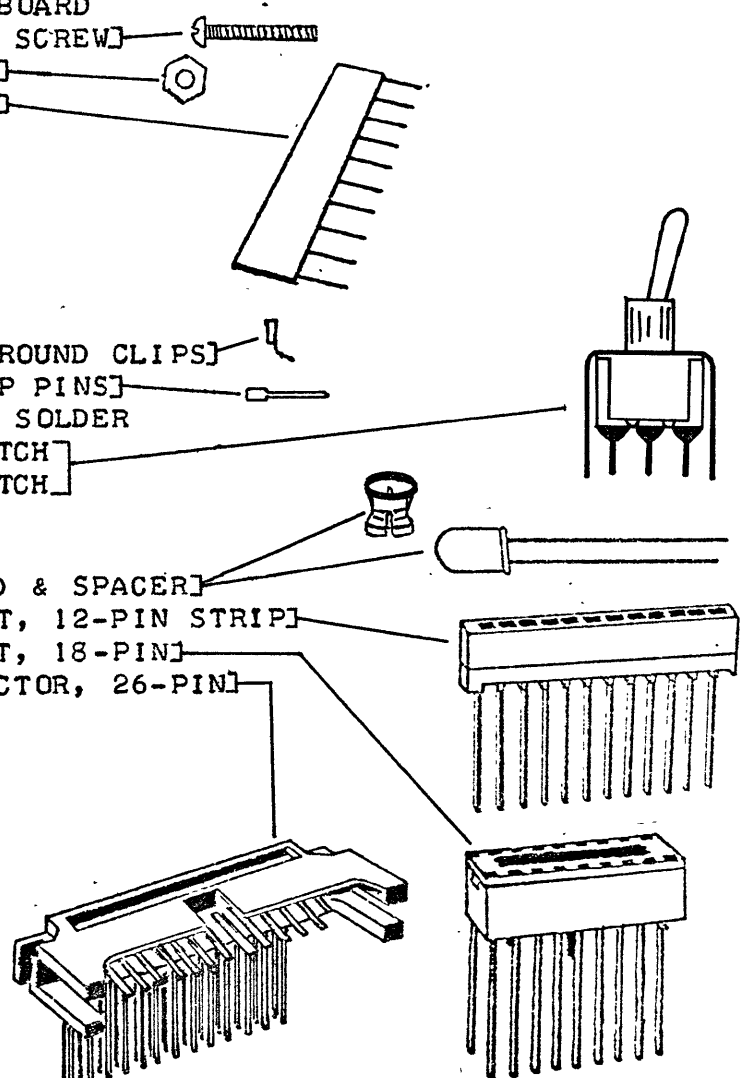
QNTY STOCK# PRICE@ DESCRIPTION

HARDWARE:

1	00-00-001	12.50	CIRCUIT BOARD
2	02-00-005	.05	2-56X1/2 SCREW
2	03-00-000	.05	2-56 NUT
2	06-00-001	1.00	BUSS BAR

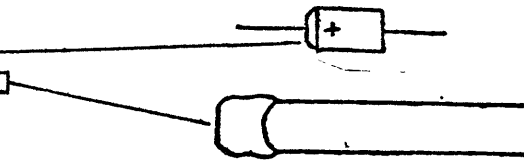
1	06-00-003	1.00	PKG-50 GROUND CLIPS
10	06-00-005	.07	WIRE WRAP PINS
2	06-01-036	.10/FT	0.04 DIA SOLDER
1	08-00-107	3.50	7107 SWITCH
2	08-00-108	3.50	7108 SWITCH

2	09-00-000	1.70	LED (RED) & SPACER
4	10-00-012	.60	IC SOCKET, 12-PIN STRIP
12	10-01-018	.77	IC SOCKET, 18-PIN
1	12-00-026	3.12	IO CONNECTOR, 26-PIN



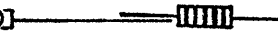
CAPACITORS:

2	17-01-156	.45	15UF, 15V TANTALUM]
4	18-00-104	.35	0.1UF CERAMIC (104M)]



RESISTORS:

2	19-00-390	.20	390 ^Ω (ORANGE, WHITE, BROWN)]
---	-----------	-----	--



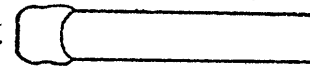
WIRE

100	05-00-035	1.05	3.5 INCH 30GA STRIPPED (BLACK)
75	05-00-040	.85	4.0 INCH 30GA STRIPPED (RED)
20	05-00-045	.34	4.5 INCH 30GA STRIPPED (YELLOW)
10	05-00-050	.17	5.0 INCH 30GA STRIPPED (GREEN)
10	05-00-055	.18	5.5 INCH 30GA STRIPPED (BLUE)
15	05-00-060	.27	6.0 INCH 30GA STRIPPED (WHITE)
15	05-00-065	.28	6.5 INCH 30GA STRIPPED (BROWN)
15	05-00-070	.28	7.0 INCH 30GA STRIPPED (ORANGE)
10	05-00-075	.20	7.5 INCH 30GA STRIPPED (PURPLE)
10	00-05-080	.20	8.0 INCH 30GA STRIPPED (GRAY)

PARTS LIST FOR CFP-125 PLUG-IN ASSEMBLY:

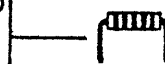
CAPACITORS:

2	08-01-104	.35	.01UF CERAMIC ("104M")]
---	-----------	-----	-------------------------



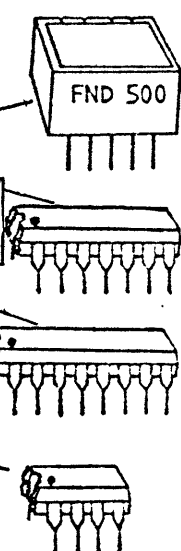
RESISTORS: 1/4 WATT 5% (FOURTH BAND GOLD)

2	19-00-332	.20	3300 ^Ω (ORANGE, ORANGE, RED)]
5	19-00-392	.20	3900 ^Ω (ORANGE, WHITE, RED)]
1	19-00-124	.20	120K ^Ω (BROWN, RED, YELLOW)]



INTEGRATED CIRCUITS: HIGH RELIABILITY TESTED UNITS

4	09-00-500	4.38	FND500 HEX CHARACTER DISPLAY]
1	22-00-016	.62	7416 HEX INVERTER BUFFER/DRIVER OC- HV]
1	22-04-010	.52	74LS10 TRIPLE 3-INPUT NAND]
2	22-04-074	.74	74LS74 DUAL D FF]
1	22-04-175	1.74	74LS175 QUAD D FF]
4	22-11-068	3.26	9368 7-SEG HEX DISPLAY DRIVER/LATCH]
2	24-00-055	.80	555 TIMER]



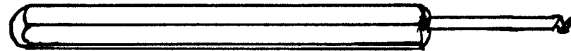
2.3 TOOLS

RECOMMENDED TOOLS FOR CONSTRUCTION OF THIS KIT:

07-00-000 20.00 { HAND WRAP TOOL OR }
07-00-001 130.00 { ELECTRIC WRAP TOOL }



07-00-002 5.00 HAND UNWRAP TOOL



07-01-002 1.00 1/4 NUT DRIVER



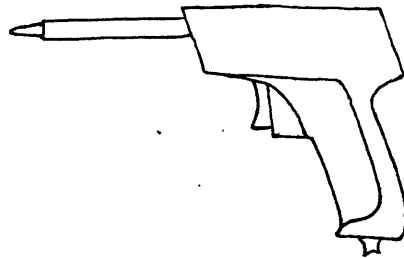
07-02-000 1.00 1/8 INCH BLADE SCREWDRIVER



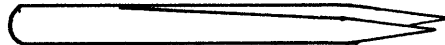
07-04-000 3.00 GROUND CLIP INSERTOR



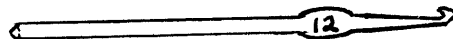
07-05-000 17.00 150 WATT 600 DEG F. SOLDERING GUN



07-06-000 1.50 POINTED TWEEZERS



07-07-012 1.00 SIZE 12 CROCHET HOOK



SECTION 4 HARDWARE ASSEMBLY

4.1 HOW TO USE THIS MANUAL

THE HARDWARE ASSEMBLY INSTRUCTIONS ARE DIVIDED INTO SUBSECTIONS. EACH SUBSECTION CONTAINS AN INTRODUCTION DESCRIBING THE GENERAL PROCEDURES TO BE FOLLOWED, AND THEN A DETAILED STEP-BY-STEP SET OF INSTRUCTIONS FOR EACH COMPONENT TO BE INSTALLED. THE STEP-BY-STEP INSTRUCTIONS PROVIDE A PLACE () FOR A CHECKMARK AFTER EACH STEP IS COMPLETED.

IF MULTIPLE COMPONENTS ARE TO BE INSTALLED REPEATING THE SAME INSTRUCTION, A PLACE IS PROVIDED FOR A CHECKMARK FOR EACH COMPONENT INSTALLATION STEP.

4.2 LED HEX CHARACTER DISPLAY UNIT SOCKETS

THE LED HEX CHARACTER DISPLAY UNIT SOCKETS ARE MADE UP OF 4 SEPARATE 12-PIN STRIPS. THESE SOCKETS OCCUPY AREAS LABELED D1, D2, D3, AND D4. THE DIMPLE NEAR THE END OF EACH STRIP SHOULD BE POINTED TOWARD THE LEFT SIDE OF THE BOARD.

WHEN THE TERMINALS ARE CORRECTLY ALIGNED WITH THE HOLES IN THE PRINTED CIRCUIT BOARD, GENTLY PUSH THE TERMINALS THROUGH THE HOLES UNTIL THE STRIP IS FLUSH AGAINST THE TOP OF THE BOARD.

HOLDING THE STRIPS, TURN THE BOARD OVER AND LAY IT DOWN ON THE WORK TABLE.

SOLDER THE PINS NEAR THE ENDS OF EACH STRIP TO THE SOLDER PAD AS IN FIGURE 4.2.1. DO NOT CUT THESE LEADS.

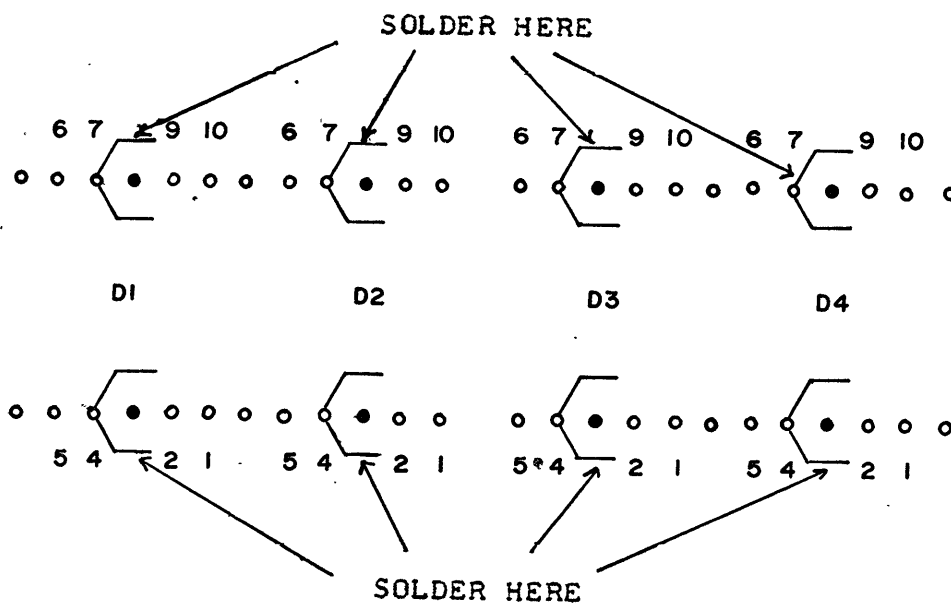


FIGURE 4.2.1- REVERSE SIDE OF BOARD.

THIS IS TWO TIMES SIZE.

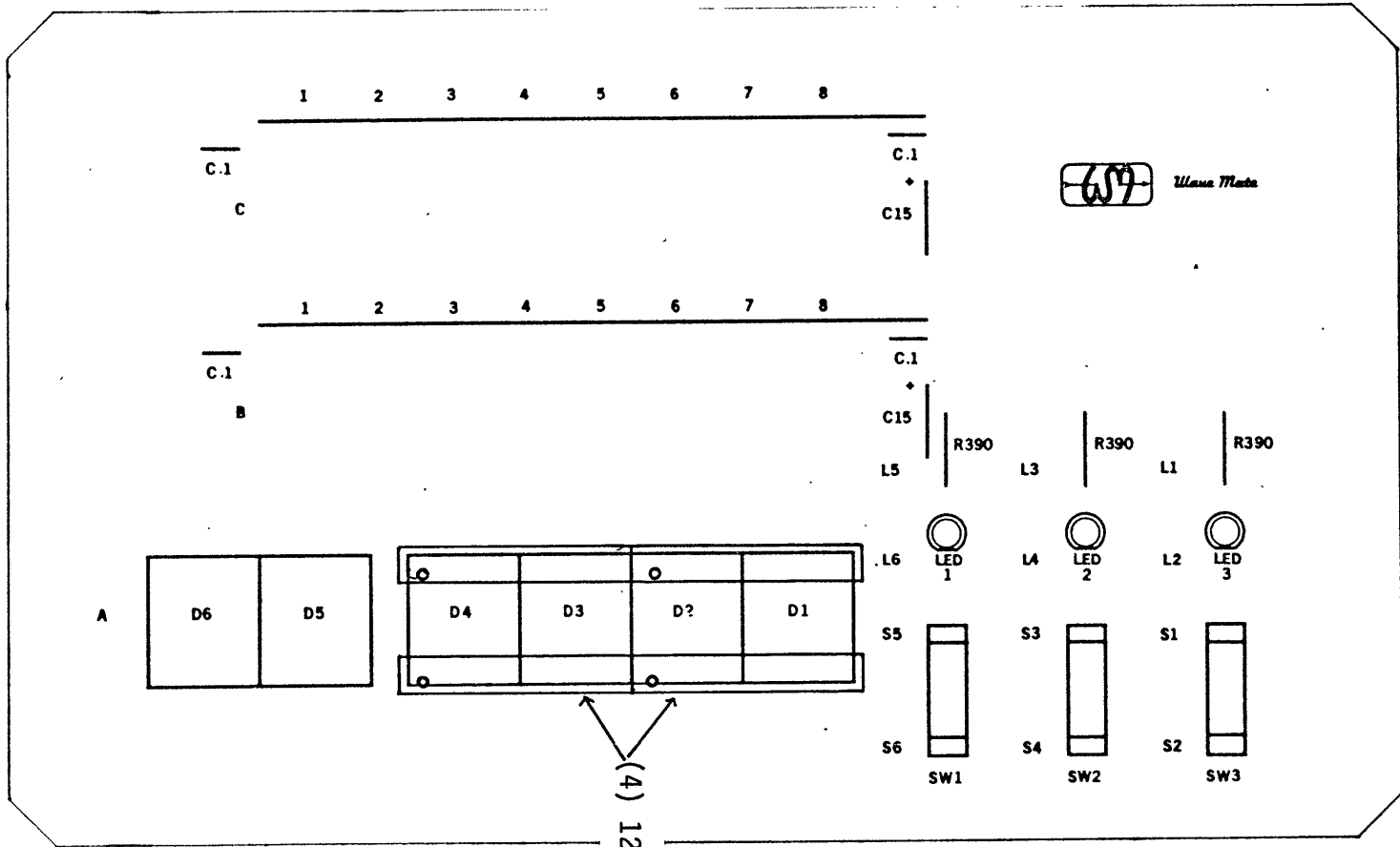
AFTER SOLDERING, CHECK FOR SOLDER BRIDGES AND FOR SOLDER ON THE TERMINALS OF THE STRIPS. SCRAPE OFF ANY SOLDER ON THESE STRIPS WITH A SCREWDRIVER OR AN EXACTO KNIFE.

24-PIN SOCKETS

- () () INSTALL AND SOLDER TWO 12-PIN STRIPS AT (D1, D2)
- () () INSTALL AND SOLDER TWO 12-PIN STRIPS AT (D3, D4)

CHECK ALL SOCKETS TO MAKE SURE THAT ALL STRIPS ARE DOWN FLUSH ON THE BOARD. IF ANY ARE NOT, REHEAT THE SOLDER PAD ON ONE, AND PRESS THE BOARD DOWN OVER THE SOCKET STRIP. DO THIS FOR ALL SOCKET STRIPS THAT ARE NOT FLAT ON THE BOARD.

- () CHECK FOR SOLDER BRIDGES
- () CHECK FOR SOLDER ON TERMINALS



(4) 12-PIN STRIP SOCKET

4.3 LED SINGLE DISPLAY UNITS

THE LED SINGLE DISPLAY UNITS ARE INSTALLED IN THE TWO END LOCATIONS MARKED LED 1 AND LED 3. A SPACER IS USED TO LOCATE THE BODY OF EACH UNIT APPROXIMATELY 1/4 INCH OFF THE BOARD. THE SPACER IS IN THE PACKAGE WITH THE LED.

PLACE THE SPACER OVER THE CIRCLE MARKED LED. THE WIDE FLANGE OF THE SPACER SHOULD BE FACING UP (AWAY FROM THE BOARD). THE FLAT PORTION OF THE LED SHOULD MATCH THE FLAT LINE ON THE BOARD ARTWORK. INSERT THE LED LEADS THROUGH THE 2 HOLES AND PUSH THE LED DOWN UNTIL IT HITS THE WIDE FLANGE OF THE SPACER. ADJUST THE LEADS SO THAT THE BODY OF THE LED IS PERPENDICULAR TO THE BOARD. BEND THE LEADS SLIGHTLY TO HOLD THE UNIT IN PLACE AND SOLDER THE LEADS.

- () () INSTALL LED
- () CHECK ALIGNMENT
- () BEND AND SOLDER LEADS
- () CLIP SOLDERED LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS

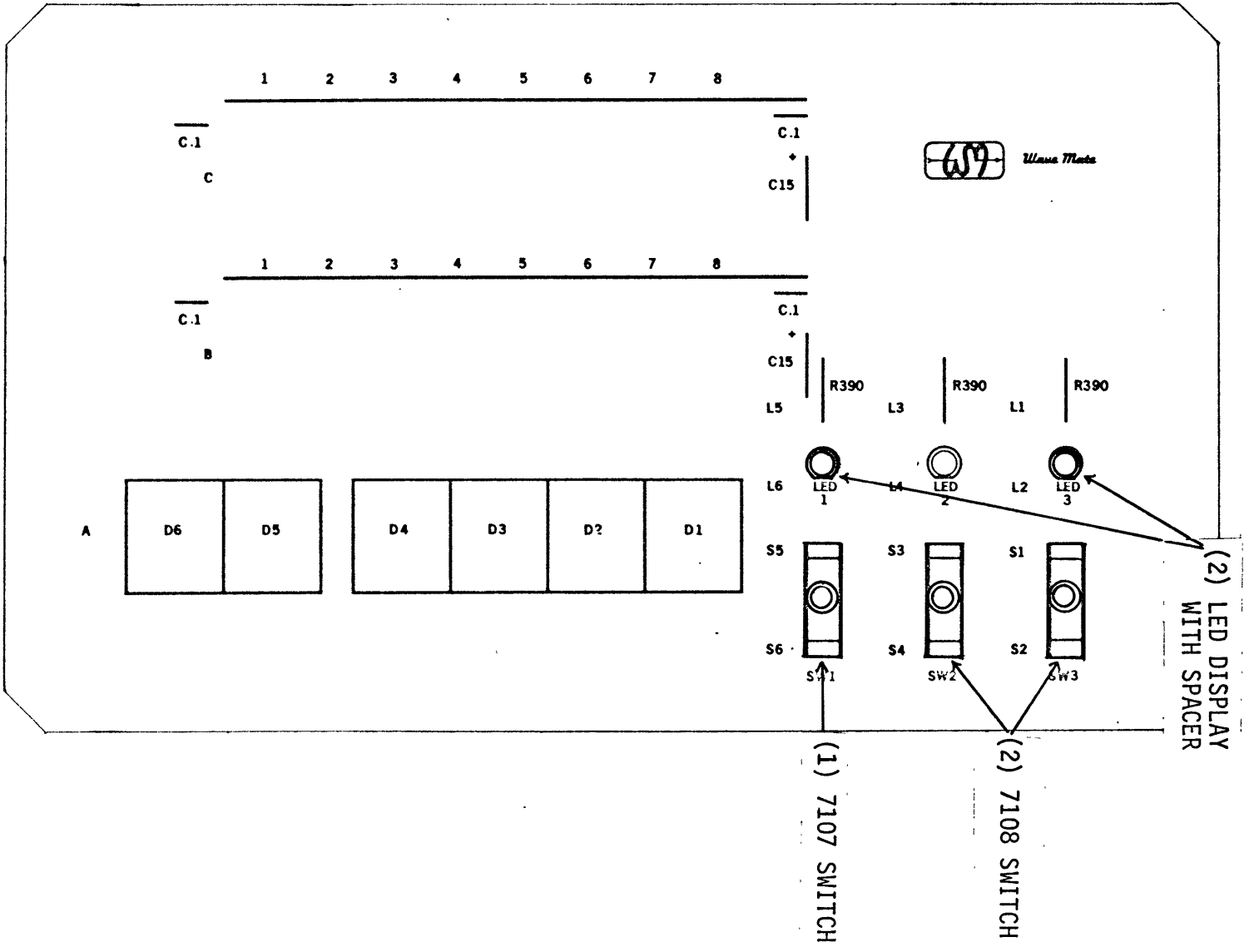
4.4 SWITCHES

THREE SWITCHES ARE PROVIDED. TWO OF THE UNITS ARE 2-POSITION SWITCHES (LABELED 7108). THE THIRD UNIT IS A 3-POSITION SWITCH (LABELED 7107). THE 3 SWITCHES ARE INSTALLED NEAR THE LOWER RIGHT HAND CORNER OF THE BOARD (SW1, SW2 AND SW3). THE 3-POSITION SWITCH IS INSTALLED IN THE LEFT-HAND LOCATION (SW1). ALL 3 SWITCHES ARE ORIENTED SO THAT THE LEVER IS PUSHED TOWARD THE BOTTOM OF THE CARD FOR THE MOMENTARY POSITION.

ORIENT THE WAVE MATE LOGO AT THE UPPER RIGHT CORNER OF THE BOARD. POSITION EACH SWITCH SO THAT THE 2 BRACKET LUGS ON EACH END ALIGN WITH THE MOUNTING HOLES IN THE BOARD. THE 3-SWITCH CONTACT LUGS SHOULD ALSO ALIGN WITH THE APPROPRIATE CENTER HOLES. INSERT THE LUGS INTO THE APPROPRIATE HOLES AND PUSH THE SWITCH ASSEMBLY DOWN UNTIL THE BRACKETS ARE RESTING ON THE BOARD.

SOLDER THE BRACKETS AT EACH END TO THE SOLDER PADS. MAKE SURE THAT THE BRACKETS REMAIN FLUSH WITH THE BOARD WHILE SOLDERING. SOLDER THE CONTACT LUGS. IF AFTER SOLDERING ONE SIDE THE BRACKET IS NOT FLUSH WITH THE BOARD, REHEAT THE JOINT AND PUSH THE SWITCH ASSEMBLY DOWN AGAINST THE BOARD.

- | | | | |
|------|------|------|--|
| SW1 | SW2 | SW3 | |
| 7107 | 7108 | 7108 | |
| () | () | () | INSTALL SWITCH ASSEMBLY |
| () | () | () | SOLDER MOUNTING BRACKETS |
| () | () | () | VERIFY THAT BRACKETS ARE FLUSH AGAINST BOARD |
| () | () | () | SOLDER CONTACT LUGS |
| () | | | CHECK ALL SWITCHES FOR SOLDER BRIDGES AND COLD SOLDER JOINTS |



4.5 FRONT PANEL MODULE CABLE CONNECTOR

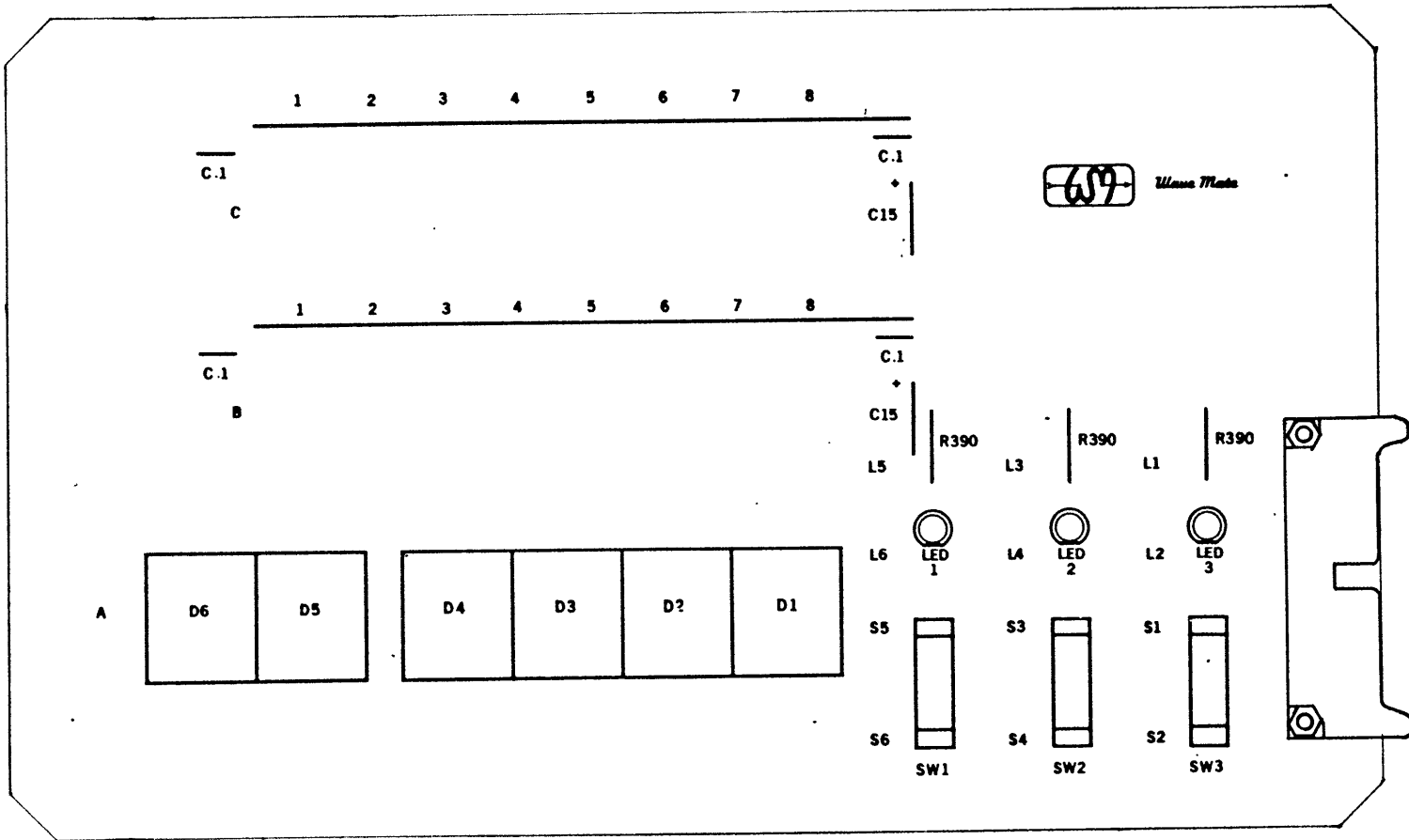
THE 26-PIN FRONT PANEL MODULE CABLE CONNECTOR IS MOUNTED ON THE COMPONENT SIDE OF THE BOARD. THE WAVE MATE LOGO SHOULD BE ORIENTED AT THE UPPER RIGHT HAND CORNER OF THE BOARD.

- () ORIENT THE 26-PIN CONNECTOR AT THE LOWER RIGHT-HAND SIDE OF THE BOARD SO THAT THE LONG LEADS POINT TO THE BOARD AND THE SHORT LEADS ARE FACING TO THE RIGHT. THE TWO LONG LEADS AT THE BOTTOM OF THE CONNECTOR SHOULD LINE UP WITH THE HOLES LEBELED 1 AND 2 (LABELED ON THE BACK SIDE OF THE BOARD). THE LEADS AT THE TOP OF THE CONNECTOR SHOULD LINE UP WITH THE HOLE LABELED 25.
- () WORK THE LONG LEADS THROUGH THE CORRESPONDING HOLES IN THE PRINTED CIRCUIT BOARD. PUSH THE CONNECTOR DOWN UNTIL IT IS FLAT AGAINST THE BOARD.
- () INSTALL A 2-56 X 1/2 SCREW AND NUT AT EACH END OF THE CONNECTOR. THE SCREW HEAD WILL BE ON THE BOTTOM OF THE BOARD AND THE NUT WILL BE ON THE TOP OF THE CONNECTOR.
- () SOLDER PINS 2 AND 4 (NON-COMPONENT SIDE OF BOARD) TO THE PAD.
- () SOLDER PIN 10 TO THE PAD.

IT IS IMPORTANT THAT GOOD SOLDER CONNECTIONS ARE MADE, AS THESE PINS PROVIDE POWER AND GROUND CONNECTIONS. A POOR SOLDER CONNECTION WILL CAUSE INTERMITTANT OPERATION.

DO NOT CUT THESE PINS!

- () CHECK THE ADJACENT CONNECTOR LEADS FOR SOLDER. SCRAPE ANY SOLDER OFF THESE LEADS WITH AN EXACTO KNIFE.
- () CHECK FOR SOLDER BRIDGES
- () CHECK FOR COLD SOLDER JOINTS



(1) 26-PIN CONNECTOR

4.6 BUSS BARS

EACH BUSS BAR CONTAINS 10 TERMINALS. THE TWO END TERMINALS ARE SOLDERED TO THE PRINTED CIRCUIT CARD. THE REMAINING 8 TERMINALS ARE USED TO SUPPLY POWER TO EACH OF THE SOCKETS THAT MAY BE INSTALLED IN THE ROW.

EACH BUSS BAR LOCATION IS INDICATED BY A WHITE LINE ON THE BOARD. WHEN INSTALLED, THE BUSS BAR SHOULD COMPLETELY COVER THE APPROPRIATE WHITE LINE.

VISUALLY CHECK THE BUSS BAR PINS TO CONFIRM THAT THEY ARE STRAIGHT. CHECK BY SIGHTING FROM THE END AS WELL AS FROM THE FRONT.

LINE UP THE PINS WITH THE HOLES IN THE BOARD AND WIGGLE IN UNTIL THE BOTTOM OF THE BUSS BAR IS FLUSH AGAINST THE BOARD.

BEND THE 2 END PINS OVER SLIGHTLY TO HOLD THE BARS IN THE BOARD.

- () INSTALL BUSS BAR ROW B
- () INSTALL BUSS BAR ROW C

- () SOLDER ALL BUSS BAR END PINS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS

4.7 HIGH-FREQUENCY BYPASS CAPACITORS

A HIGH-FREQUENCY BYPASS CAPACITOR IS INSTALLED AT BOTH ENDS OF EACH BUSS BAR.

BLUE 0.1 UF 50V CERAMIC CAPACITORS MARKED "104M" ARE USED FOR THE HIGH-FREQUENCY BYPASS.

INSERT THE LEADS THROUGH HOLES MARKED "C.1". BEND THE LEADS TO HOLD THE CAPACITORS IN THE BOARD.

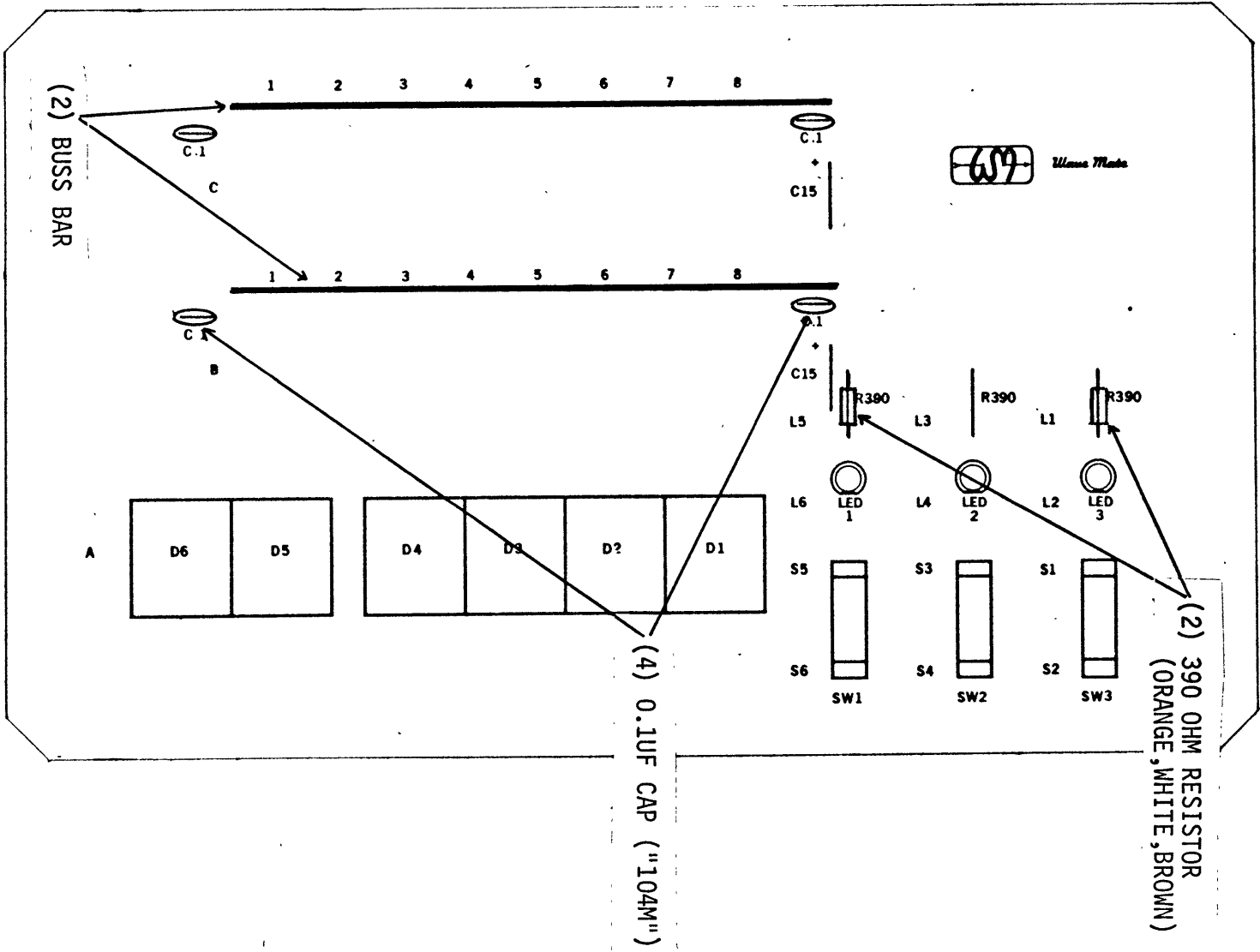
- R L
- () () INSTALL 0.1UF CAPACITOR ROW B
- () () INSTALL 0.1UF CAPACITOR ROW C

- () CHECK LOCATIONS
- () SOLDER ALL CAPACITORS
- () CLIP ALL CAPACITOR LEADS
- () CHECK FOR SOLDER BRIDGES
- () CHECK FOR COLD SOLDER JOINTS

4.8 BOARD MOUNTED RESISTORS

INSTALL 390 OHM (ORANGE-WHITE-BROWN) RESISTORS IN TWO END LOCATIONS MARKED R390. BEND BOTH LEADS DOWNWARD ABOUT 1/8 INCH FROM THE RESISTOR BODY AND INSERT THE LEADS THROUGH THE HOLES MARKED R390. BEND THE LEADS TO RETAIN THE RESISTORS.

- () () INSTALL 390 OHM RESISTOR
- () SOLDER BOTH RESISTORS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS



4.9 JUMPER WIRE

A JUMPER WIRE IS NEEDED BETWEEN THE TWO HOLES AT L2 TO GROUND ONE LEAD OF AN LED. USING A CUT RESISTOR LEAD FROM SECTION 4.8 BEND IT TO FIT BETWEEN THE TWO HOLES.

- () INSERT THE BENT WIRE
- () BEND ENDS SLIGHTLY TO HOLD IN PLACE
- () SOLDER ENDS
- () CLIP EXCESS LEADS
- () CHECK FOR SOLDER BRIDGES OR COLD JOINTS

4.10 LOW FREQUENCY BYPASS CAPACITORS

INSTALL 15UF 15V TANTALUM LOW FREQUENCY BYPASS CAPACITOR IN THE TWO LOCATIONS MARKED C15. THE POSITIVE END OF THE CAPACITOR IS INDICATED BY THE SLOPING EDGES AS WELL AS A WHITE + MARK. THE POSITIVE END OF THE CAPACITOR MUST LINE UP WITH THE WHITE + PRINTED ON THE BOARD.

BEND BOTH LEADS DOWNWARD CLOSE TO THE CAPACITOR BODY, INSERT THE LEADS THROUGH HOLES MARKED "C15" AND BEND THE LEADS TO RETAIN THE CAPACITORS.

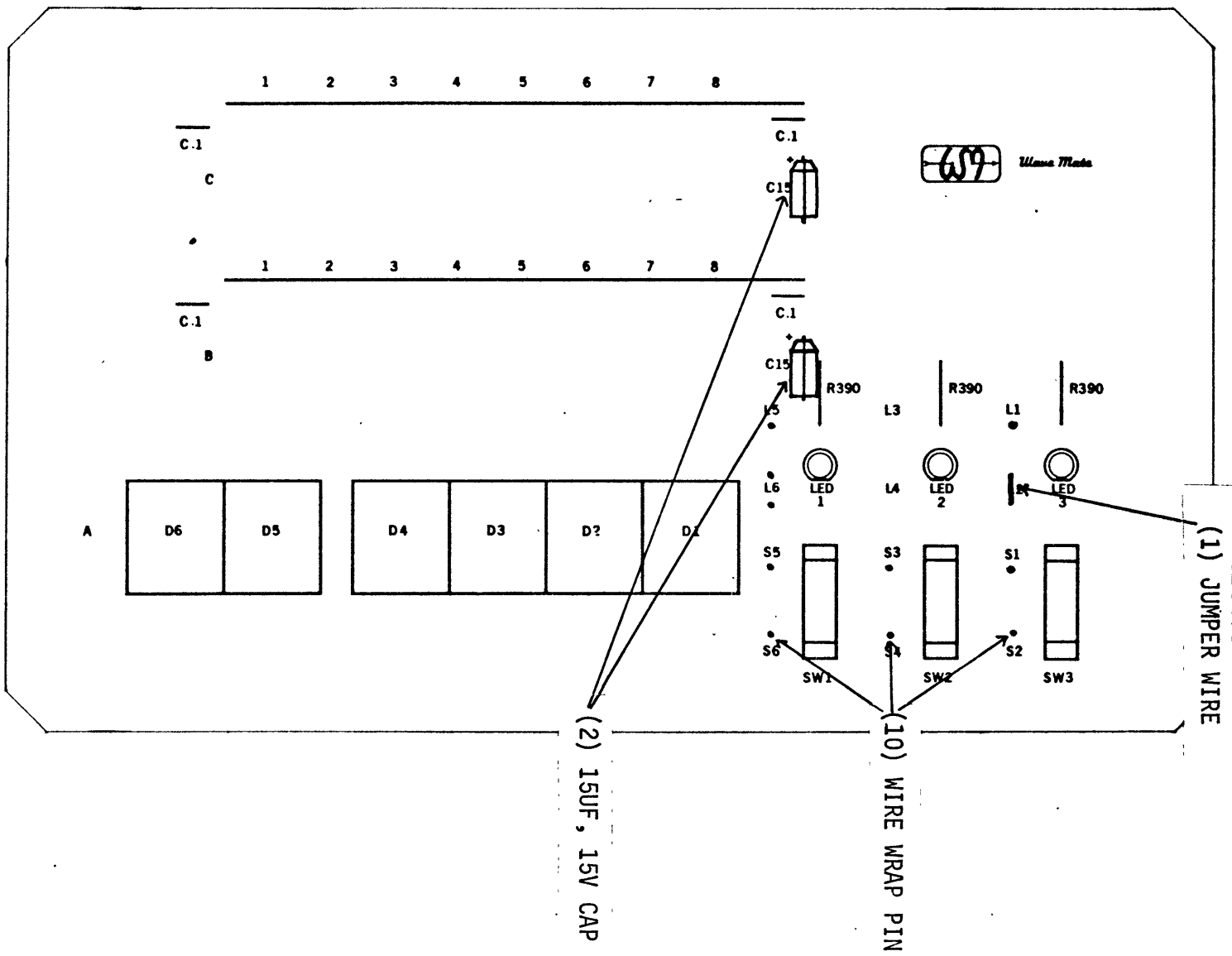
- () () INSTALL 15UF CAPACITORS
- () CHECK POLARITY
- () SOLDER CAPACITORS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS

4.11 WIRE-WRAP PINS

WIRE-WRAP PINS ARE INSTALLED IN 10 PLACES. USING NEEDLE-NOSED PLIERS, INSERT THE WIRE-WRAP PIN THROUGH THE DESIGNATED HOLE FROM THE COMPONENT SIDE. PUSH THE PIN THROUGH THE BOARD UNTIL THE WIDE PART OF THE PIN IS FLUSH WITH THE BOARD. SOLDER THE PIN TO THE PAD ON THE NON-COMPONENT SIDE OF THE BOARD.

INSTALL WIRE-WRAP PINS IN THE FOLLOWING LOCATIONS:

- () L1 () L5 () L6 - 2 PINS
- () S1 () S2 () S3 () S4 () S5 () S6
- () SOLDER ALL WIRE-WRAP PINS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS



4.12 18-PIN IC SOCKETS

SOCKETS FOR 18-PIN IC'S ARE INSTALLED IN THE LOCATIONS SPECIFIED BELOW.

PLACE THE CIRCUIT BOARD ON A TABLE, TOP UP, WITH THE IO CONNECTOR TOWARD THE LOWER RIGHT-HAND CORNER.

EACH ROW CONTAINS 8 POSITIONS FOR 18-PIN SOCKETS. WHEN INSTALLING THE SOCKET, ORIENT IT SUCH THAT THE SAE MARKING (OR DIMPLE) IS POINTED TOWARD THE TOP OF THE BOARD. BE SURE THAT THE CENTER OF THE SOCKET IS LINED UP WITH THE IDENTIFICATION NUMBER OF THE COLUMN (1-8). PIN 1 OF THE SOCKET (UPPER LEFT-HAND CORNER) SHOULD BE LINED UP WITH THE WHITE DOT ON THE BOARD.

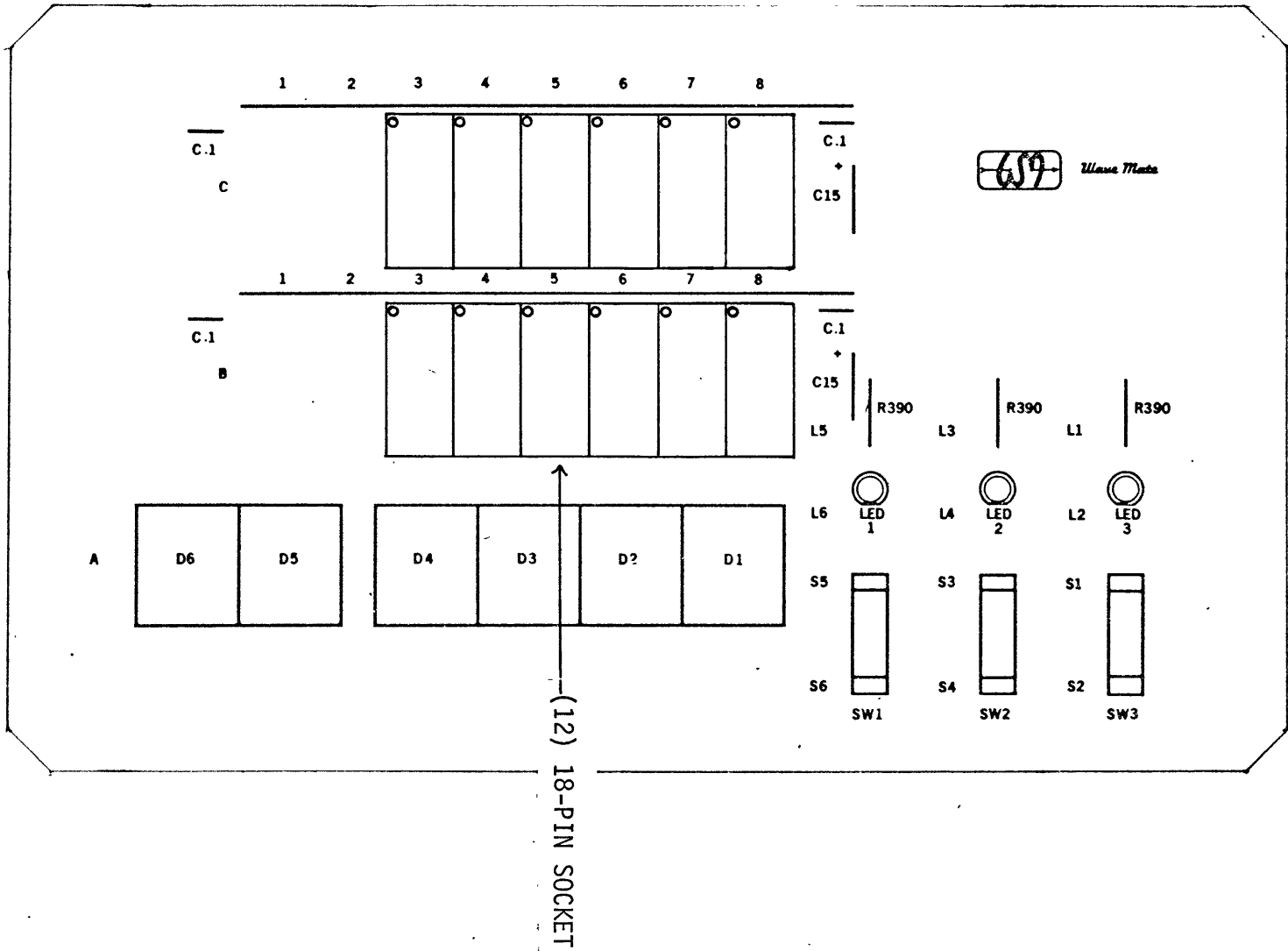
LINE UP THE SOCKET TERMINALS WITH THE CORRESPONDING HOLES IN THE PRINTED CIRCUIT BOARD AND GENTLY PUSH THE TERMINALS THROUGH THE HOLES. THEN SNAP THE SOCKET INTO THE CIRCUIT BOARD.

USING THE CLOSED TIP OF THE NEEDLENOSED PLIERS, PUSH THE PIN IN THE CENTER OF THE SOCKET DOWN UNTIL IT IS FLUSH WITH THE PLASTIC. THE SOCKET WILL BE LOCKED INTO PLACE.

()C3 ()C4 ()C5 ()C6 ()C7 ()C8

()B3 ()B4 ()B5 ()B6 ()B7 ()B8

IF IT IS NECESSARY TO REMOVE THE SOCKET, USE A SMALL SCREWDRIVER BLADE TO PUSH THE PIN BACK UP FROM THE BOTTOM. INSERT THE BLADE BETWEEN THE PLASTIC AND PUSH THE PIN UP. USE NEEDLENOSED PLIERS FROM THE TOP TO PULL THE PIN UP. THEN CAREFULLY PUSH THE SOCKET FROM THE BOTTOM OF THE BOARD UNTIL THE SOCKET SNAPS OUT OF THE BOARD.



4.13 GROUND PINS

INSTALL GROUND PINS ON THE DESIGNATED TERMINALS USING THE TOOL PROVIDED. PLACE THE GROUND PIN IN THE INSERTION TOOL. PLACE THE INSERTION TOOL OVER THE TERMINAL WITH THE LEG OF THE GROUND PIN POINTED TOWARD THE INSIDE OF THE SOCKET. PUSH THE INSERTION TOOL DOWN ON THE TERMINAL UNTIL THE LEG OF THE GROUND PIN IS FLUSH AGAINST THE SOLDER PLANE. BE CAREFUL NOT TO BEND THE ELBOW OF THE GROUND PIN.

SOLDER THE GROUND PIN TO THE GROUND PLANE BUT AVOID GETTING SOLDER ON ANY WIRE WRAP PINS. USE AN ADEQUATE AMOUNT OF SOLDER AND MOVE THE TIP OF THE SOLDERING IRON AROUND ON THE GROUND PLANE TO INSURE A SMOOTH SOLDER JOINT.

INSTALL GROUND PINS IN THE FOLLOWING LOCATIONS:

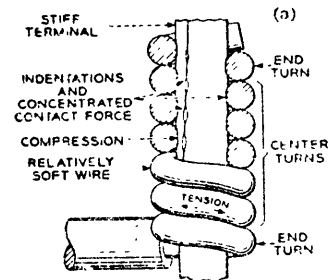
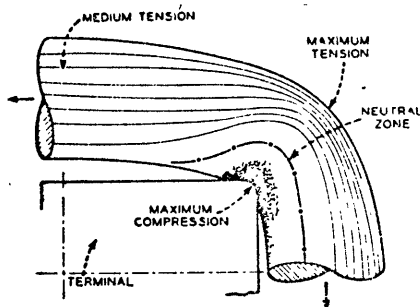
- | | | |
|---------------------------------|---------------------------------|-------------------------------|
| <input type="checkbox"/> C3-7 | <input type="checkbox"/> C4-7 | <input type="checkbox"/> C5-7 |
| <input type="checkbox"/> C6-1,8 | <input type="checkbox"/> C7-1,8 | |
| <input type="checkbox"/> B3-8 | <input type="checkbox"/> B4-8 | <input type="checkbox"/> B5-8 |
| <input type="checkbox"/> B6-8 | <input type="checkbox"/> B7-8 | <input type="checkbox"/> B8-7 |

- SOLDER ALL GROUND PINS
- CHECK FOR COLD SOLDER JOINTS

SECTION 5 WIRE WRAPPING

WIRE WRAPPING IS A SOLDERLESS TECHNIQUE FOR CONNECTING TERMINALS TOGETHER. THIS APPROACH TO WIRING HAS BEEN WIDELY ADOPTED WITHIN THE COMPUTER INDUSTRY BECAUSE IT PROVIDES ADVANTAGES OF INCREASED DENSITY AND FLEXIBILITY AS COMPARED TO PRINTED CIRCUIT OR SOLDER TERMINAL TECHNIQUES.

WHEN THE WIRE IS WRAPPED CORRECTLY, THE WIRE IS UNDER TENSION PRODUCING AN INDENTATION IN BOTH THE WIRE AND THE EDGES OF THE TERMINAL. TESTS HAVE SHOWN THAT OVER A PERIOD OF TIME THE WIRE MATERIAL ACTUALLY DIFFUSES INTO THE TERMINAL PRODUCING AN EXTREMELY RELIABLE CONNECTION.



■ By bending the wire around the sharp corner of the terminal the oxide layer on both wire and terminal is crushed or sheared, and a clean, oxide-free metal-to-metal contact is obtained.

WIRE WRAPPING IS ACCOMPLISHED THROUGH THE USE OF A WIRE WRAP TOOL. THE WIRE WRAP TOOL CONTAINS A BIT WHICH FITS OVER THE TERMINAL TO BE WRAPPED. THE TOOL THEN FORCES THE WIRE, UNDER TENSION, AROUND THE TERMINAL. IT IS IMPORTANT THAT THE BIT BE THE CORRECT SIZE FOR BOTH THE TERMINAL AND THE WIRE. THE TERMINALS USED ON YOUR WAVE MATE KIT ARE .025" X .025". THE WIRE SUPPLIED WITH YOUR KIT IS 30 GAGE WITH KYNAR INSULATION.

A WIRE USED FOR WRAPPING MUST HAVE THE INSULATION STRIPPED ONE INCH FROM EACH END. THE WIRE SUPPLIED WITH YOUR WAVE MATE KIT IS PRECUT, PRESTRIPPED, AND COLOR CODED.

BEFORE BEGINNING TO WIRE WRAP A BOARD, CLEAN THE BOARD AND TERMINALS THOROUGHLY WITH ALCOHOL AND A STIFF BRUSH. BE SURE TO CLEAN ALL EXCESS FLUX FROM THE BOARD AND TO BRUSH ALL PINS WELL.

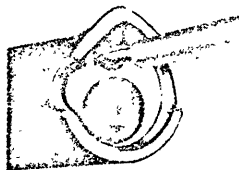
5.1 PROPER TECHNIQUE

TO WRAP A TERMINAL, HOLD THE WIRE WRAP TOOL WITH THE BIT FACING YOU. INSERT THE STRIPPED WIRE INTO THE HOLE IN THE BIT WHICH IS CLOSER TO THE EDGE.

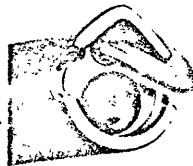
INSERT THE WIRE UNTIL THE INSULATION IS APPROXIMATELY 0.1 INCH INSIDE THE BIT. AT THIS POINT THE BIT CONSTRUCTION WILL PREVENT THE WIRE FROM BEING INSERTED FURTHER INTO THE WIRE HOLE.

BEND THE WIRE TO THE SIDE.

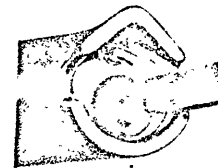
PLACE THE WIRE WRAP TOOL OVER THE TERMINAL SO THAT THE LARGE HOLE IN THE CENTER OF THE BIT FITS OVER THE TERMINAL. IF A LEVEL-1 CONNECTION IS BEING INSTALLED SLIDE THE TOOL AS FAR DOWN ON THE TERMINAL AS IT WILL GO. DO NOT FORCE! IF A LEVEL-2 CONNECTION IS BEING INSTALLED, SLIDE THE TOOL PARTIALLY DOWN THE TERMINAL. DO NOT MAKE CONTACT WITH THE ALREADY INSTALLED WIRE WRAP.



WIRE INSERTION



WIRE ANCHORING



TERMINAL INSERTION

FIGURE 5.1.1 WIRE WRAP TOOL INSERTED OVER TERMINAL

PUSH DOWN ON THE TOOL WITH MODERATE, EVEN PRESSURE AND TWIST THE TOOL IN A CLOCKWISE DIRECTION UNTIL THE BARE PORTION OF THE WIRE IS COMPLETELY WRAPPED AROUND THE TERMINAL (ABOUT 10 OR 11 REVOLUTIONS). LIFT THE TOOL OFF THE TERMINAL.

THE WIRE WRAP SHOULD LOOK LIKE THIS:

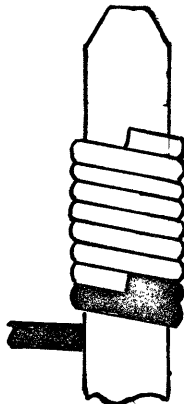


FIGURE 5.1.2 CORRECT WIRE WRAP

IF TOO LITTLE DOWNWARD PRESSURE IS USED THE WIRE WRAP WILL LOOK LIKE:

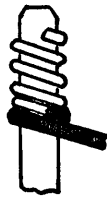


FIG. 5.1.3 OPEN WRAP

IF THE DOWNWARD PRESSURE WAS EXCESSIVE:

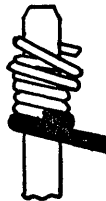


FIGURE 5.1.5 OVERWRAP

IF THE DOWNWARD PRESSURE IS NOT STEADY:



FIGURE 5.1.4 SPIRAL WRAP

IF THE INSULATION WAS NOT PUSHED DOWN FAR ENOUGH INTO THE BIT:

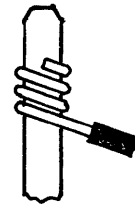


FIGURE 5.1.6 INSUFFICIENT INSULATION

WHEN WIRE WRAPPING, ROUTE THE WIRES AS NEATLY AS POSSIBLE. ALWAYS TRY TO ROUTE THE WIRES THROUGH LARGE OPENINGS, CENTERS OF SOCKETS, ETC. WHENEVER POSSIBLE, DO NOT ROUTE WIRES OVER THE SOLDERED CONNECTIONS ON THE SIDES OF THE BOARD.

WHEN WIRE WRAPPING IS COMPLETED, GENTLY PUSH THE WIRES DOWN SO THAT THEY DO NOT PROTRUDE ABOVE THE TERMINALS.

AFTER THE WIRING OF AN ASSEMBLY IS COMPLETED, MANY TERMINALS WILL HAVE TWO WIRES WRAPPED TO THEM. EACH WIRE WRAP IS CALLED A LEVEL. THE FIRST WIRE CONNECTED TO A TERMINAL IS CALLED A LEVEL-1 (BOTTOM LEVEL). THE SECOND WIRE WRAP IS LEVEL-2 (TOP LEVEL). IF THE WIRE LIST CALLS OUT LEVEL-1 AND THERE ALREADY IS A WIRE CONNECTED TO THAT TERMINAL YOU HAVE DISCOVERED A WIRING ERROR. BY THE SAME TOKEN IF THE WIRE LIST CALLS OUT LEVEL-2 AND THERE IS NO WIRE CONNECTED TO EITHER OF THE TERMINALS ANOTHER WIRING ERROR HAS BEEN FOUND. NO MORE THAN TWO WIRES WILL EVER BE CONNECTED TO ONE TERMINAL.

A WIRE WRAP CAN BE REMOVED USING AN UNWRAP TOOL. PLACE THE UNWRAP TOOL OVER THE TERMINAL AND TURN IN A COUNTER-CLOCKWISE DIRECTION UNTIL THE WIRE IS REMOVED (10 OR 11 TURNS). BE GENTLE, AND DO NOT HURRY. THE TOOL WILL BREAK IF YOU ARE IN TOO MUCH OF A RUSH.

ALSO, BE CAREFUL NOT TO DROP THE UNWRAP TOOL. THE BIT MIGHT BE DULLED, MAKING THE UNWRAP TOOL UNUSABLE.

5.2 WIRELIST

THE WIRELIST PROVIDES ALL INFORMATION REQUIRED TO WIRE WRAP AN ASSEMBLY. THE WIRE LIST IS DIVIDED INTO SEVERAL SECTIONS CORRESPONDING TO WIRING LEVEL AND LENGTH OF WIRE REQUIRED. FIRST ALL LEVEL-1 CONNECTIONS ARE LISTED, THEN LEVEL-2 CONNECTIONS. WITHIN EACH LEVEL THE WIRES ARE GROUPED BY LENGTH WITH THE LONGEST FIRST.

THE WIRELIST IDENTIFIES PINS BY XY COORDINATES. THE ROWS ARE LABELED BY LETTERS A THROUGH D. WITHIN EACH ROW THE SOCKETS ARE IDENTIFIED BY COLUMNS 1 THROUGH 8. AN ENTRY IN THE WIRELIST A4-2:B5-7 MEANS CONNECT A WIRE FROM PIN 2 OF THE SOCKET IN ROW A, COLUMN 4 TO PIN 7 OF THE SOCKET IN ROW B, COLUMN 5.

A PAPER OVERLAY HAS BEEN PROVIDED TO AID IN THE IDENTIFICATION OF SOCKETS AND PIN NUMBERS. THE USE OF THIS OVERLAY IS OPTIONAL. TO USE THIS OVERLAY, CUT IT OUT, PLACE THE CARD ON ITS BACK (WIRE WRAP PINS FACING UP) WITH THE BUSS CONNECTOR AT THE BOTTOM. USE A PIN TO PUNCH HOLES IN THE CORNER PINS OF THE OVERLAY. PLACE THE OVERLAY ON TOP OF THE WIRE WRAP PINS WITH THE PRINTED NUMBERS FACING UP. ALIGN THE CORNER PINS OF THE OVERLAY WITH THE CORNER TERMINALS ON THE BOARD. GENTLY AND EVENLY PUSH THE OVERLAY THROUGH THE WIRE WRAP PINS UNTIL THE ENTIRE OVERLAY IS FLUSH AGAINST THE BOARD. THE OVERLAY WILL PERMANENTLY REMAIN IN THIS POSITION AND CANNOT BE REMOVED WHEN WIRE WRAPPING IS COMPLETED.

RED 4.0 INCH WIRES:

LEVEL ONE WIRES:

GRAY 8.0 INCH WIRES:

() 1 CON-3 [8.0] C3-13

PURPLE 7.5 INCH WIRES:

() 2 CON-25 [7.5] B4-2

ORANGE 7.0 INCH WIRES:

() 3 CON-7 [7.0] C5-13
() 4 CON-19 [7.0] B5-7
() 5 CON-20 [7.0] B5-1
() 6 CON-21 [7.0] B5-2
() 7 CON-22 [7.0] B5-6
() 8 CON-23 [7.0] B4-7
() 9 CON-24 [7.0] B4-1
() 10 CON-26 [7.0] B4-6

BROWN 6.5 INCH WIRES:

() 11 SW3-1 [6.5] C8-3
() 12 CON-12 [6.5] B7-1
() 13 CON-13 [6.5] B7-2
() 14 CON-15 [6.5] B6-7
() 15 CON-16 [6.5] B6-1
() 16 CON-17 [6.5] B6-2
() 17 CON-18 [6.5] B6-6

WHITE 6.0 INCH WIRES:

() 18 SW1-1 [6.0] C8-2
() 19 SW3-3 [6.0] C8-4
() 20 CON-5 [6.0] B8-5
() 21 CON-6 [6.0] B8-4
() 22 CON-11 [6.0] B7-7
() 23 CON-14 [6.0] B7-6

BLUE 5.5 INCH WIRES:

() 24 CON-8 [5.5] B8-15

GREEN 5.0 INCH WIRES:

() 25 SW1-3 [5.0] C7-7
() 26 SW2-1 [5.0] B8-16

YELLOW 4.5 INCH WIRES:

() 27 SW2-3 [4.5] CON-9
() 28 L3-2 [4.5] B8-14
() 29 B3-11 [4.5] C6-3
() 30 B8-3 [4.5] C4-17

() 31 D1-1 [4.0] B7-11
() 32 D1-2 [4.0] B7-12
() 33 D1-4 [4.0] B7-13
() 34 D1-6 [4.0] B7-14
() 35 D1-7 [4.0] B7-15
() 36 D1-9 [4.0] B7-17
() 37 D1-10 [4.0] B7-16
() 38 D2-1 [4.0] B6-11
() 39 D2-2 [4.0] B6-12
() 40 D2-4 [4.0] B6-13
() 41 D2-6 [4.0] B6-14
() 42 D2-7 [4.0] B6-15
() 43 D2-9 [4.0] B6-17
() 44 D2-10 [4.0] B6-16
() 45 D3-1 [4.0] B5-11
() 46 D3-2 [4.0] B5-12
() 47 D3-4 [4.0] B5-13
() 48 D3-6 [4.0] B5-14
() 49 D3-7 [4.0] B5-15
() 50 D3-9 [4.0] B5-17
() 51 D3-10 [4.0] B5-16
() 52 D4-1 [4.0] B4-11
() 53 D4-2 [4.0] B4-12
() 54 D4-4 [4.0] B4-13
() 55 D4-6 [4.0] B4-14
() 56 D4-7 [4.0] B4-15
() 57 D4-9 [4.0] B4-17
() 58 D4-10 [4.0] B4-16
() 59 B8-1 [4.0] C8-1
() 60 C3-17 [4.0] B3-2
() 61 B3-4 [4.0] C3-16
() 62 B3-6 [4.0] B5-4
() 63 B3-13 [4.0] B6-4
() 64 B3-16 [4.0] B7-4
() 65 B7-3 [4.0] B4-3
() 66 C3-6 [4.0] C5-1
() 67 C5-3 [4.0] C7-3

BLACK 3.5 INCH WIRES:

() 68 B8-2 [3.5] B8-17
() 69 L1-1 [3.5] B8-6
() 70 B3-19 [3.5] B3-18
() 71 B3-3 [3.5] B4-4
() 72 B3-7 [3.5] B3-14
() 73 B3-12 [3.5] B3-15
() 74 C3-12 [3.5] C4-15
() 75 B5-3 [3.5] B6-3
() 76 B4-19 [3.5] B4-18
() 77 B5-19 [3.5] B5-18
() 78 B6-19 [3.5] B6-18
() 79 B7-19 [3.5] B7-18
() 80 B8-19 [3.5] B8-18
() 81 C3-4 [3.5] C3-5
() 82 C3-14 [3.5] C4-12
() 83 C3-19 [3.5] C3-18

() 84 C4-19 [3.5] C4-18
() 85 C4-16 [3.5] C4-14
() 86 C4-2 [3.5] C5-5
() 87 C5-19 [3.5] C5-18
() 88 C5-15 [3.5] C5-4
() 89 C6-2 [3.5] C6-16
() 90 C6-12 [3.5] C6-11
() 91 C6-19 [3.5] C6-18
() 92 C6-4 [3.5] C6-13
() 93 C6-7 [3.5] C6-6
() 94 C7-2 [3.5] C7-16
() 95 C7-12 [3.5] C7-11
() 96 C7-19 [3.5] C7-18
() 97 C7-4 [3.5] C7-13
() 98 C8-19 [3.5] C8-18
() 99 C8-17 [3.5] C8-16

() 116 C4-14 [3.5] C4-1
() 117 C6-16 [3.5] C6-12
() 118 C6-18 [3.5] C6-4
() 119 C6-6 [3.5] C6-17
() 120 C7-16 [3.5] C7-12
() 121 C7-18 [3.5] C7-4
() 122 C7-7 [3.5] C7-6
() 123 B8-16 [3.5] B8-1
() 124 C3-13 [3.5] C4-3
() 125 B3-18 [3.5] B3-1
() 126 B3-2 [3.5] B3-5
() 127 C4-18 [3.5] C4-16
() 128 C5-18 [3.5] C5-15
() 129 C5-4 [3.5] C5-2
() 130 C8-18 [3.5] C8-17
() 131 C8-16 [3.5] C8-15

LEVEL TWO WIRES:

GREEN 5.0 INCH WIRES:

() 100 B8-6 [5.0] C3-15
() 101 B8-4 [5.0] C3-3

YELLOW 4.5 INCH WIRES:

() 102 C8-2 [4.5] C4-4
() 103 B8-17 [4.5] SW2-3
() 104 B3-14 [4.5] C3-1

RED 4.0 INCH WIRES:

() 105 B3-15 [4.0] C3-2
() 106 C4-15 [4.0] B5-3

BLACK 3.5 INCH WIRES:

() 107 C8-3 [3.5] C5-14
() 108 C8-4 [3.5] C5-17
() 109 B6-3 [3.5] B7-3
() 110 B4-18 [3.5] B4-5
() 111 B5-18 [3.5] B5-5
() 112 B6-18 [3.5] B6-5
() 113 B7-18 [3.5] B7-5
() 114 C4-17 [3.5] C4-6
() 115 C3-5 [3.5] C4-5

5.3 CHAIN LIST

AFTER YOU HAVE FINISHED WIRING THE BOARD IT IS LIKELY THAT YOU WILL HAVE SOME MISTAKES IN THE WIRING. THESE MUST BE FOUND BEFORE INSERTING IC'S INTO THE SOCKETS. A SIMPLE PROCEDURE CAN BE FOLLOWED TO CHECK THE CORRECTNESS OF THE CONNECTIONS. FOR THIS PURPOSE WE HAVE PROVIDED A CHAIN LIST, WHICH TELLS WHICH POINTS ARE CONNECTED TOGETHER. FOR THIS TEST SOME KIND OF CONTINUITY CHECKER IS REQUIRED: FOR EXAMPLE, AN OHMMETER, A BATTERY WITH A LIGHT BULB, A LOGIC PROBE, OR A TONE GENERATOR. IN ANY CASE, THE TESTER SHOULD USE A LOW DC VOLTAGE (NO MORE THAN 5V) TO CHECK FOR CONTINUITY.

PUT THE BOARD ON A TABLE WITH THE SOCKETS FACING UP AND THE BUS CONNECTOR TOWARDS YOU. REMEMBER: PIN 1 IS LOCATED AT THE DIMPLE ON 18-PIN SOCKETS; FOR 24- AND 40-PIN SOCKETS, PIN 1 IS AT THE DIMPLE ON THE LOWER STRIP. WHEN A POWER CONNECTION IS REFERENCED (I.E., A PIN WITH A NUMBER HIGHER THAN IS ON THE SOCKET), THE CONNECTION SHOULD BE TESTED BY TOUCHING THE APPROPRIATE POWER BUSS BAR AT ITS LEFT OR RIGHT END.

PROBES ARE PROVIDED FOR CHECKING CONNECTIONS TO SOCKETS. CONNECT THE PROBES TO YOUR CONTINUITY CHECKER. TOUCH THE TWO PROBES TOGETHER AND CHECK THAT THE CIRCUIT IS COMPLETED.

START AT THE BEGINNING OF THE CHAIN LIST. INSERT ONE PROBE INTO THE FIRST LOCATION SPECIFIED BY THE CHAIN LIST. FOR EXAMPLE, IF THE FIRST LOCATION WERE "A4-2", THEN YOU WOULD INSERT ONE PROBE INTO PIN 2 OF THE SOCKET LOCATED AT A4. RUN THE SECOND PROBE THROUGH EACH LOCATION ON THE CHAIN, AND BE SURE THAT CONTINUITY IS INDICATED AT EACH POINT. IF ANY POINT IS NOT CONNECTED, YOU HAVE FOUND A MISTAKE. MAKE A NOTE OF THIS MISTAKE, TURN THE BOARD OVER AND CORRECT IT. WHEN YOU THINK YOU HAVE FIXED THE ERROR, TURN THE BOARD BACK OVER AND RECHECK THE CHAIN.

WHEN THE FIRST CHAIN CHECKS OUT, GO ON TO THE SECOND. CONTINUE THE ABOVE PROCEDURE UNTIL ALL CHAINS HAVE BEEN VERIFIED.

() AB0 CON-11 [1] B7-7 ;
() AB1 CON-12 [1] B7-1 ;
() AB10 CON-21 [1] B5-2 ;
() AB11 CON-22 [1] B5-6 ;
() AB12 CON-23 [1] B4-7 ;
() AB13 CON-24 [1] B4-1 ;
() AB14 CON-25 [1] B4-2 ;
() AB15 CON-26 [1] B4-6 ;
() AB2 CON-13 [1] B7-2 ;
() AB3 CON-14 [1] B7-6 ;
() AB4 CON-15 [1] B6-7 ;
() AB5 CON-16 [1] B6-1 ;
() AB6 CON-17 [1] B6-2 ;
() AB7 CON-18 [1] B6-6 ;
() AB8 CON-19 [1] B5-7 ;
() AB9 CON-20 [1] B5-1 ;
() BA CON-5 [1] B8-5 ;
() CLK2 CON-3 [1] C3-13 [2] C4-3 ;
() *FPI CON-7 [1] C5-13 ;
() *HALT CON-6 [1] B8-4 [2] C3-3 ;
() *INT CON-8 [1] B8-15 ;
() *RESET B8-2 [1] B8-17 [2] SW2-3 [1] CON-9 ;
() B3-3 [1] B4-4 ;
() B3-4 [1] C3-16 ;
() B3-6 [1] B5-4 ;
() B3-7 [1] B3-14 [2] C3-1 ;
() B3-11 [1] C6-3 ;
() B3-12 [1] B3-15 [2] C3-2 ;
() B3-13 [1] B6-4 ;
() B3-16 [1] B7-4 ;
() B3-19 [1] B3-18 [2] B3-1 ;

- () B4-19 [1] B4-18 [2] B4-5 ;
- () B5-19 [1] B5-18 [2] B5-5 ;
- () B6-19 [1] B6-18 [2] B6-5 ;
- () B7-19 [1] B7-18 [2] B7-5 ;
- () B8-3 [1] C4-17 [2] C4-6 ;
- () B8-19 [1] B8-18 ;
- () C3-4 [1] C3-5 [2] C4-5 ;
- () C3-6 [1] C5-1 ;
- () C3-12 [1] C4-15 [2] B5-3 [1] B6-3 [2]
B7-3 [1] B4-3 ;
- () C3-14 [1] C4-12 ;
- () C3-17 [1] B3-2 [2] B3-5 ;
- () C3-19 [1] C3-18 ;
- () C4-2 [1] C5-5 ;
- () C4-19 [1] C4-18 [2] C4-16 [1] C4-14 [2]
C4-1 ;
- () C5-3 [1] C7-3 ;
- () C5-19 [1] C5-18 [2] C5-15 [1] C5-4 [2]
C5-2 ;
- () C6-2 [1] C6-16 [2] C6-12 [1] C6-11 ;
- () C6-7 [1] C6-6 [2] C6-17 ;
- () C6-19 [1] C6-18 [2] C6-4 [1] C6-13 ;
- () C7-2 [1] C7-16 [2] C7-12 [1] C7-11 ;
- () C7-19 [1] C7-18 [2] C7-4 [1] C7-13 ;
- () C8-19 [1] C8-18 [2] C8-17 [1] C8-16 [2]
C8-15 ;
- () D1-1 [1] B7-11 ;
- () D1-2 [1] B7-12 ;
- () D1-4 [1] B7-13 ;
- () D1-6 [1] B7-14 ;
- () D1-7 [1] B7-15 ;
- () D1-9 [1] B7-17 ;

() D1-10 [1] B7-16 ;
() D2-1 [1] B6-11 ;
() D2-2 [1] B6-12 ;
() D2-4 [1] B6-13 ;
() D2-6 [1] B6-14 ;
() D2-7 [1] B6-15 ;
() D2-9 [1] B6-17 ;
() D2-10 [1] B6-16 ;
() D3-1 [1] B5-11 ;
() D3-2 [1] B5-12 ;
() D3-4 [1] B5-13 ;
() D3-6 [1] B5-14 ;
() D3-7 [1] B5-15 ;
() D3-9 [1] B5-17 ;
() D3-10 [1] B5-16 ;
() D4-1 [1] B4-11 ;
() D4-2 [1] B4-12 ;
() D4-4 [1] B4-13 ;
() D4-6 [1] B4-14 ;
() D4-7 [1] B4-15 ;
() D4-9 [1] B4-17 ;
() D4-10 [1] B4-16 ;
() L1-1 [1] B8-6 [2] C3-15 ;
() L3-2 [1] B8-14 ;
() SW1-1 [1] C8-2 [2] C4-4 ;
() SW1-3 [1] C7-7 [2] C7-6 ;
() SW2-1 [1] B8-16 [2] B8-1 [2] C8-1 ;
() SW3-1 [1] C8-3 [2] C5-14 ;
() SW3-3 [1] C8-4 [2] C5-17 ;

SECTION 6 COMPONENT INSTALLATION

6.1 INSTALLING 8-, 14-, 16-, AND 18-PIN IC'S

A STATIC ELECTRICITY DISCHARGE CAN DAMAGE THESE CIRCUITS. IT IS VERY IMPORTANT THAT CARE BE TAKEN TO AVOID BUILDUP OF STATIC ELECTRICITY WHEN HANDLING THESE COMPONENTS:

WORK ONLY ON AN UNCARPETED FLOOR. BEFORE HANDLING THESE COMPONENTS TOUCH A WATER FAUCET OR OTHER GROUND POINT TO DISCHARGE STATIC ELECTRICITY.

HOLD THE IC BY THE EDGES, NOT TOUCHING THE PINS, AND USING THE WORK SURFACE, BEND THE PINS ON EACH SIDE OF THE IC TO A 90-DEGREE ANGLE.

ORIENT THE CIRCUIT CARD SO THAT THE SOCKETS ARE FACING UP WITH THE DIMPLE IN THE LEFT CORNER, AND THE WAVE MATE LOGO IN THE UPPER RIGHT CORNER OF THE BOARD.

ORIENT THE IC SO THAT THE DOT OR NOTCH ON THE PACKAGE MATCHES THE DOT ON THE SOCKET. THE DOT SHOULD BE IN THE UPPER LEFT HAND CORNER.

USING A SLOW, FIRM, DOWNWARD PRESSURE, WORK THE IC INTO THE SOCKET.

IF A LEAD STARTS TO BEND, PULL OUT THE IC, STRAIGHTEN THE LEADS WITH A PAIR OF NEEDLENOSED PLIERS, AND START THE PROCEDURE AGAIN.

INSTALL THE FOLLOWING 8-PIN IC'S TOWARD THE TOP OF THE SOCKET. THE BOTTOM 10 PINS ARE LEFT EMPTY.

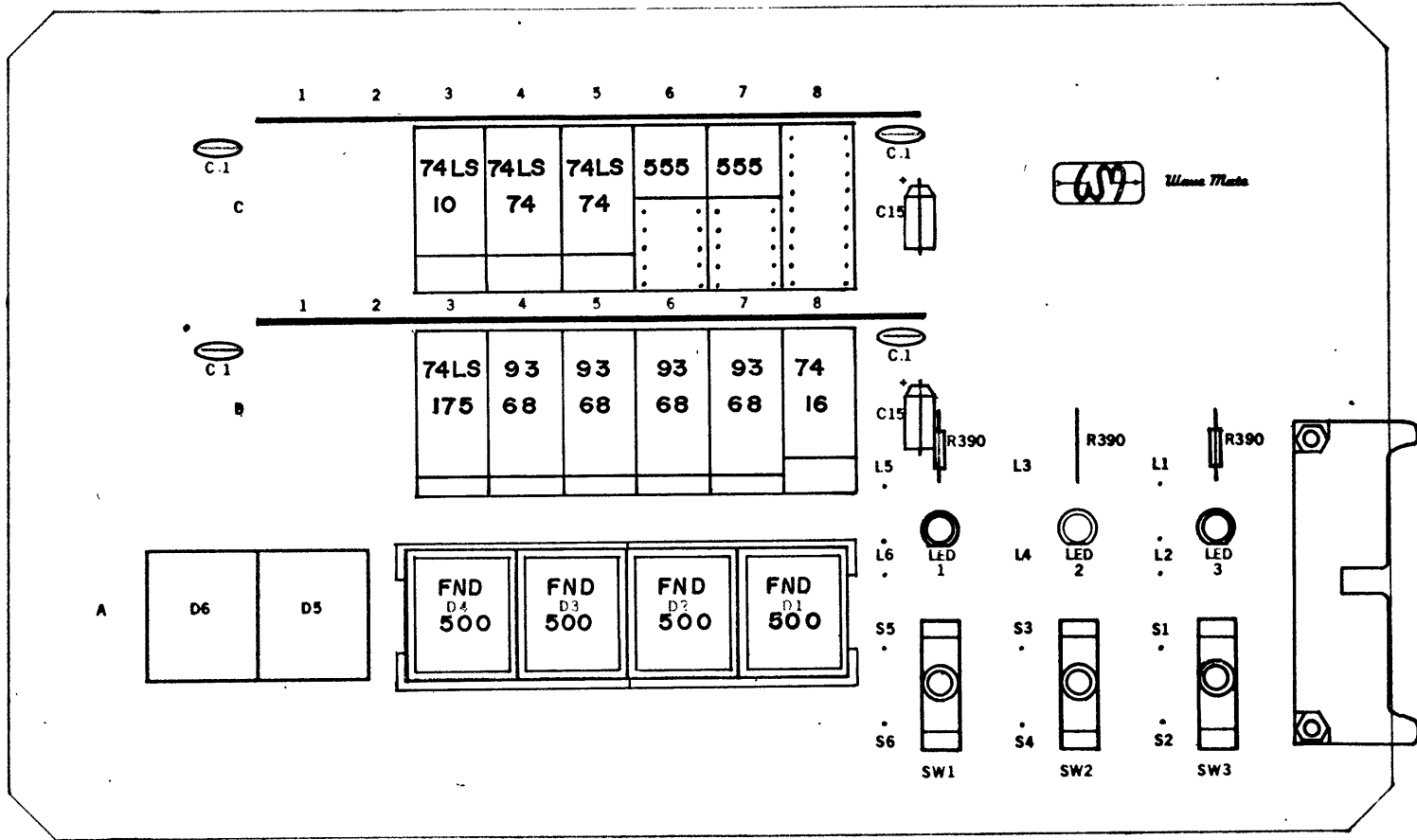
() LOCATION C6, PART 555 () LOCATION C7, PART 555

INSTALL THE FOLLOWING 14-PIN IC'S TOWARD THE TOP OF THE SOCKET. THE BOTTOM 4 PINS ARE LEFT EMPTY.

() LOCATION B8, PART 7416 () LOCATION C3, PART 74LS10
() LOCATION C4, PART 74LS74 () LOCATION C5, PART 74LS74

INSTALL THE FOLLOWING 16-PIN IC'S TOWARD THE TOP OF THE SOCKET. THE BOTTOM TWO PINS ARE LEFT EMPTY.

() LOCATION B3, PART 74LS175
() LOCATION B4, PART 9368 () LOCATION B5, PART 9368
() LOCATION B6, PART 9368 () LOCATION B7, PART 9368



6.2 INSTALLING LED HEX CHARACTER DISPLAY UNITS

INSTALL THE LED UNITS IN LOCATIONS D1, D2, D3, AND D4. ORIENT THE UNITS WITH THE SIDE CONTAINING THE PART NUMBERS FACING THE BOTTOM OF THE BOARD (LOGO AT UPPER RIGHT CORNER OF BOARD). WHEN ALL 4 UNITS ARE INSTALLED, ONE HOLE SHOULD REMAIN BLANK AT EACH END OF THE SOCKET ASSEMBLY. WHEN INSTALLING THE LED UNITS, WORK THE UNIT INTO THE SOCKET USING A SLOW, FIRM, DOWNWARD PRESSURE. IF A LEAD STARTS TO BEND, PULL THE UNIT OUT OF THE SOCKET AND STRAIGHTEN THE LEAD WITH NEEDLENOSE PLIERS.

- () INSTALL LED UNIT IN LOCATION D4 - LEAVE ONE HOLE AT THE LEFT-HAND END OF THE SOCKET EMPTY.
- () INSTALL LED UNIT IN LOCATION D3 - WHEN INSTALLED THIS UNIT SHOULD BE FLUSH WITH THE UNIT IN LOCATION D4.
- () INSTALL LED UNIT IN LOCATION D2 - THIS UNIT SHOULD BE FLUSH WITH THE UNIT IN LOCATION D3.
- () INSTALL LED UNIT IN LOCATION D1 - THIS UNIT SHOULD BE FLUSH WITH THE UNIT IN LOCATION D2. ONE HOLE SHOULD REMAIN BLANK AT THE RIGHT-HAND END OF THE SOCKET ASSEMBLY.
- () VERIFY THAT THE PART NUMBERS ON ALL UNITS FACE TOWARD THE BOTTOM OF THE BOARD.

6.3 INSTALLING DISCRETE COMPONENTS

LOCATION C6

INSTALL 3.3K OHM RESISTOR (ORANGE-ORANGE-RED) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

- () 6 AND 13
- () 7 AND 12

INSTALL 0.1 UF CAPACITOR ("104M") IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

- () 8 AND 11

LOCATION C7

INSTALL 3.9K OHM RESISTOR (ORANGE-WHITE-RED) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

- () 6 AND 13

INSTALL 120K OHM RESISTOR (BROWN-RED-YELLOW) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

- () 7 AND 12

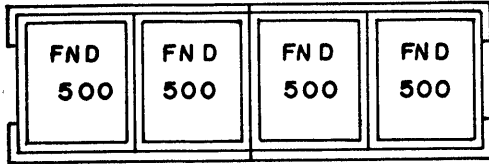
INSTALL 0.1 UF CAPACITOR ("104M") IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

- () 8 AND 11

LOCATION C8

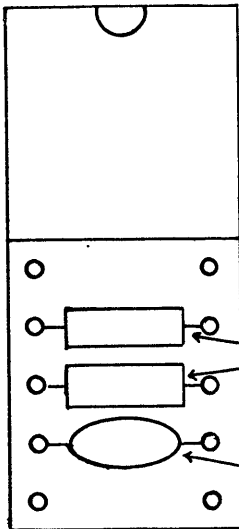
INSTALL 4 3.9K OHM (ORANGE-WHITE-RED) RESISTORS IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

- () 1 AND 18
- () 2 AND 17
- () 3 AND 16
- () 4 AND 15



(4) LED HEX CHARACTER DISPLAY UNIT

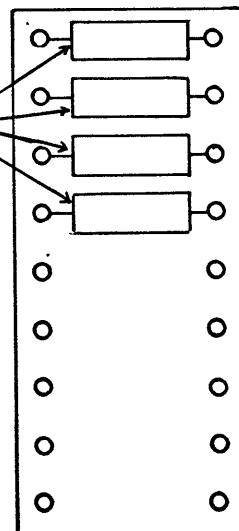
LOCATION C6



(2) 3.3K OHM RESISTOR (ORANGE,ORANGE,RED)

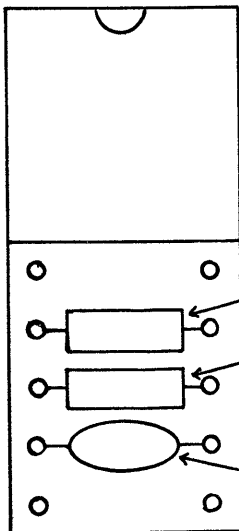
(1) 0.1UF CAP ("104M")

LOCATION C8



(4) 3.9K OHM RESISTOR (ORANGE,WHITE,RED)

LOCATION C7



(1) 3.9K OHM RESISTOR (ORANGE,WHITE,RED)

(1) 120K OHM RESISTOR (BROWN,YELLOW,RED)

(1) 0.1UF CAP ("104M")

HOW TO MAKE THE SDM-125 SWITCH SELECTABLE
FOR 6800 AND Z80 CPUS

REMOVE

D4-16 (2) D1-4 Red
C7-17 (2) D6-4 Black
D4-16 (1) D6-4 Red

ADD

C5-10 (1) C5-9 Black
D6-4 (1) C4-10 Yellow
C6-9 (1) C6-7 Black
D4-16 (2) C5-10 Yellow
C7-17 (2) C4-10 Red
D6-4 (2) D1-4 Green

For use with 6800 CPU: Switch pin between C4-10 and C5-9

For use with Z80 CPU: Switch pin between C5-10 and C6-9

ADDENDUM FOR SDM-125:

Add Yellow wire between BUS-10 and A2-10.

Remove
A5-14 [2] A3-2 Red
A3-2 [1] B3-5 *red*
C6-12 [1] A5-5 Blue

add
A5-14 [2] B3-5 Green
A3-2 [1] BUS-3/ Green
1-5-5 [3] A5-4 Black