

ASSEMBLY OF THE JUPITER II

CPU-125 CENTRAL PROCESSOR UNIT MODULE

THIS MANUAL PROVIDES ALL INSTRUCTIONS REQUIRED TO ASSEMBLE THE CPU-125 CENTRAL PROCESSOR UNIT MODULE OF THE WAVE MATE JUPITER II COMPUTER SYSTEM.

THE CENTRAL PROCESSING UNIT MODULE IS THE HEART OF THE JUPITER II SYSTEM CONTAINING THE MICROPROCESSOR CHIP, CLOCK, DMA, PRIORITY INTERRUPT, REFRESH CLOCK AND OTHER ASSOCIATED CIRCUITS. THE MODULE ALSO PROVIDES A 26 PIN FRONT PANEL MODULE CABLE CONNECTOR.

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SECTION I INTRODUCTION TO THE WAVE MATE UNIVERSAL CARDS

THIS KIT CONTAINS A PRINTED-CIRCUIT CARD, INTEGRATED CIRCUITS, SOCKETS, CONNECTORS AND ALL OTHER COMPONENTS REQUIRED TO ASSEMBLE THIS MODULE.

ALL WAVE MATE PLUG-IN MODULES USE A STANDARD PRINTED-CIRCUIT CARD. HOWEVER, EACH MODULE CONTAINS A UNIQUE COMBINATION OF INTEGRATED CIRCUITS AND OTHER COMPONENTS. THE STANDARD CARD IS DESIGNED TO ACCOMMODATE THE MAXIMUM NUMBER OF COMPONENTS REQUIRED TO IMPLEMENT ANY FUNCTION. THUS IT IS UNLIKELY THAT ANY MODULE WOULD REQUIRE THE BOARD TO BE COMPLETELY FILLED WITH COMPONENTS.

THE PRINTED-CIRCUIT BOARD IS DESIGNED TO ACCOMMODATE FOUR ROWS OF SOCKETS. IF THE SOCKETS CONTAIN 18 PINS, THEY ARE MOUNTED VERTICALLY, PROVIDING CAPACITY FOR EIGHT SOCKETS PER ROW. IF 24- OR 40-PIN SOCKETS ARE USED, THEY ARE MOUNTED HORIZONTALLY. EACH 24-PIN SOCKET DISPLACES THREE 18-PIN SOCKETS IN A ROW; SO A ROW CAN CONTAIN TWO 24-PIN AND TWO 18-PIN SOCKETS OR ONE 24-PIN AND FIVE 18-PIN SOCKETS. A 40-PIN SOCKET DISPLACES FIVE 18-PIN SOCKETS.

EACH SOCKET LOCATION IS DESIGNATED BY A ROW AND COLUMN NUMBER.

ALL INTEGRATED CIRCUITS (IC'S) USED ON THE CARD ARE PLUGGED INTO SOCKETS. THE SOCKETS PERFORM THE FUNCTION OF HOLDING THE IC'S AND ALSO PROVIDING A WIREWRAP TERMINAL FOR EACH PIN ON AN IC.

ALL DISCRETE COMPONENTS ARE PLUGGED DIRECTLY INTO SOCKETS.

THE CARD CONNECTS TO THE SYSTEM BUS THROUGH A 72-PIN CONNECTOR LOCATED AT THE BOTTOM OF THE CARD.

ANY CONNECTIONS REQUIRED TO A PERIPHERAL DEVICE ARE PROVIDED BY CONNECTORS AT THE TOP OF THE CARD.

THE PRINTED-CIRCUIT CARD IS CAPABLE OF PROVIDING FOUR DIFFERENT VOLTAGES TO EACH SOCKET MOUNTED ON THE CARD. EACH VOLTAGE IS TRANSMITTED TO THE SOCKETS BY A POWER BUSS THAT SPANS EACH ROW. A POWER BUSS FOR EACH VOLTAGE IS ONLY INSTALLED ON A ROW IF THAT VOLTAGE IS REQUIRED BY AN IC ON THAT ROW.

A REGULATOR IS PROVIDED FOR EACH VOLTAGE USED ON THE CARD. THE REGULATORS ARE MOUNTED ON AN ALUMINUM HEAT SINK. SILICON GREASE IS APPLIED BETWEEN EACH REGULATOR AND THE HEAT SINK TO PROVIDE MAXIMUM HEAT CONDUCTION. THE VOLTAGE REGULATORS HAVE A PLASTIC INSULATOR BETWEEN THE REGULATOR AND THE HEAT SINK.

A SET OF 1UF BYPASS CAPACITORS (LOCATED NEXT TO THE I/O BUS CONNECTOR) FILTER THE INPUT TO EACH OF THE REGULATORS. UP TO THREE 15UF TANTALUM LOW-FREQUENCY BYPASS CAPACITORS ARE PROVIDED FOR EACH OF THE VOLTAGES USED ON THE BOARD. IN ADDITION, TWO 0.1UF HIGH-FREQUENCY BYPASS CAPACITORS ARE USED AT EACH END OF EACH BUSS BAR.

A REVERSE-POLARITY-PREVENTION DIODE IS SUPPLIED FOR EACH OF THE VOLTAGES USED ON THE CARD.

THE PART IDENTIFICATION OF ALL REGULATORS AND CAPACITORS IS INDICATED ON THE TOP OF THE BOARD. THE REGULATOR PART NUMBERS ARE ALSO SHOWN ON THE BOTTOM OF THE BOARD.

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 CPU-125 CIRCUIT CARD CONSTRUCTION.

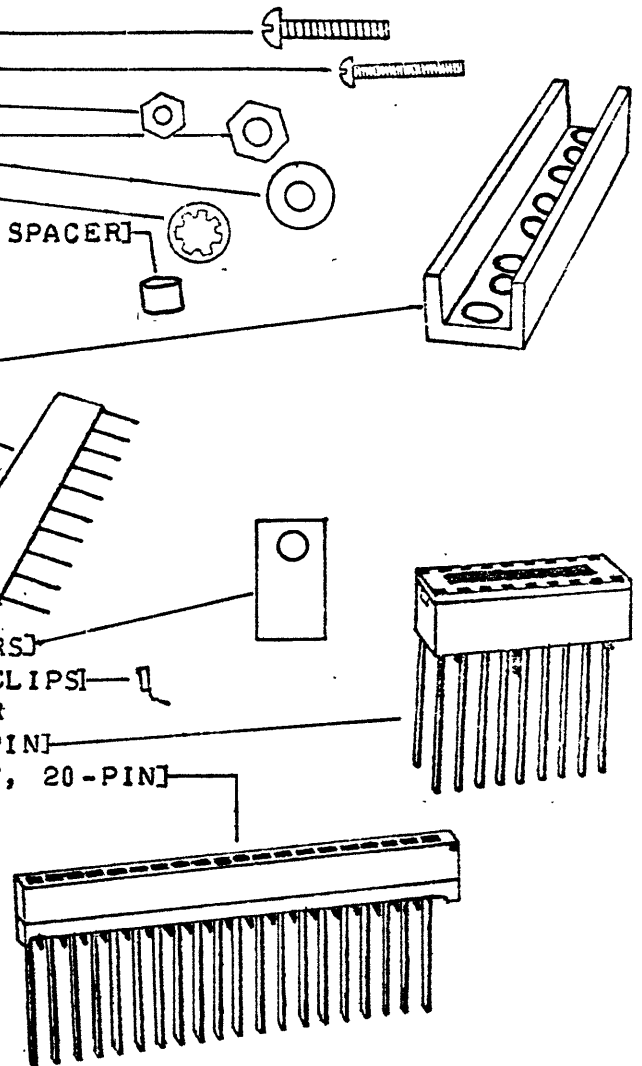
QNTY STOCK# PRICE# DESCRIPTION

HARDWARE:

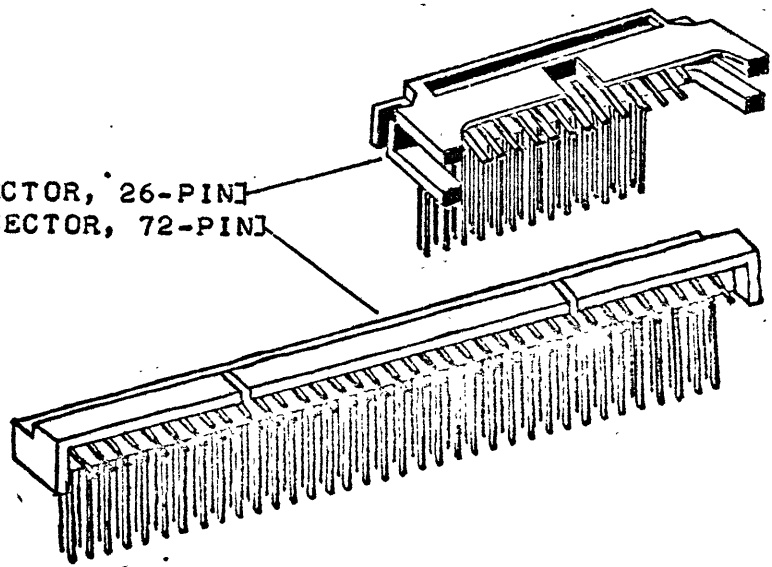
1	00-00-000	12.50	CIRCUIT BOARD
4	02-00-005	.05	2-56X1/2 SCREW
2	02-02-005	.05	6-32X1/2 SCREW
4	03-00-000	.05	2-56 NUT
2	03-02-000	.05	6-32 NUT
1	04-02-003	.05	#6 FLAT WASHER
4	04-07-000	.05	#6 LOCK WASHER
2	04-12-025	.05	#6 X 1/4 NYLON SPACER

1	06-00-000	4.00	HEAT SINK
4	06-00-001	1.00	BUSS BAR

1	06-00-002	.20	MYLAR INSULATORS
1	06-00-003	1.00	PKG-50 GROUND CLIPS
3	06-01-036	.10/FT	0.04 DIA SOLDER
26	10-01-018	.77	IC SOCKET, 18-PIN
2	10-00-020	.60	IC STRIP SOCKET, 20-PIN

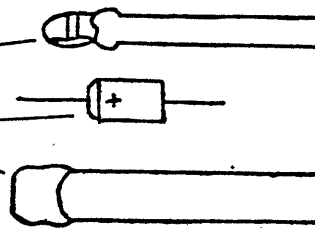


1	11-00-026	3.12	IO CONNECTOR, 26-PIN]
1	12-01-072	6.00	BUS CONNECTOR, 72-PIN]



CAPACITORS:

1	17-00-105	.35	1UF, 35V TANTALUM] (BROWN, BLACK, GREEN)
3	17-01-156	.45	15UF, 15V TANTALUM]
8	18-00-104	.35	0.1UF CERAMIC (104M)]



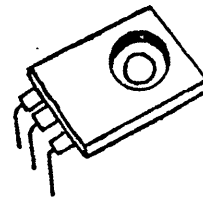
DIODES:

1	21-00-4001	.20	IN400]
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INTEGRATED CIRCUITS:

1	24-00-805	2.40	MC7805CP 5V REGULATOR
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WIRE

350	05-00-035	3.15	3.5 INCH 30 GA STRIPPED (BLACK)
100	05-00-040	1.09	4.0 INCH 30 GA STRIPPED (RED)
75	05-00-045	1.11	4.5 INCH 30 GA STRIPPED (YELLOW)
50	05-00-050	.71	5.0 INCH 30 GA STRIPPED (GREEN)
25	05-00-055	.44	5.5 INCH 30 GA STRIPPED (BLUE)
50	05-00-060	.75	6.0 INCH 30 GA STRIPPED (WHITE)
25	05-00-065	.46	6.5 INCH 30 GA STRIPPED (BROWN)
10	05-00-070	.20	7.0 INCH 30 GA STRIPPED (ORANGE)
35	05-00-075	.70	7.5 INCH 30 GA STRIPPED (PURPLE)
10	00-05-080	.20	8.0 INCH 30 GA STRIPPED (GRAY)
10	00-05-085	.20	8.5 INCH 30 GA STRIPPED (BLUE)
10	00-05-090	.22	9.0 INCH 30 GA STRIPPED (WHITE)

PARTS LIST FOR CPU-125 PLUG-IN ASSEMBLY:

CAPACITORS:

1	17-00-226	.12	22UF TANTALUM (RED, PINK, BLUE)]
2	18-01-103	.60	.01UF 10% X7R CERAMIC (103]
2	18-02-101	4.34	100PF CERAMIC (101J)]



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

1	19-00-102	.20	1000 ^Ω (BROWN, BLACK, RED)
1	19-00-222	.20	2200 ^Ω (RED, RED, RED)
1	19-00-223	.20	22K ^Ω (RED, RED, ORANGE)
1	19-00-273	.20	27K ^Ω (RED, PURPLE, ORANGE)
1	19-00-513	.20	51K ^Ω (GREEN, BROWN, ORANGE)

RESISTORS: 1/4 WATT 2% (FOURTH BAND WHITE)

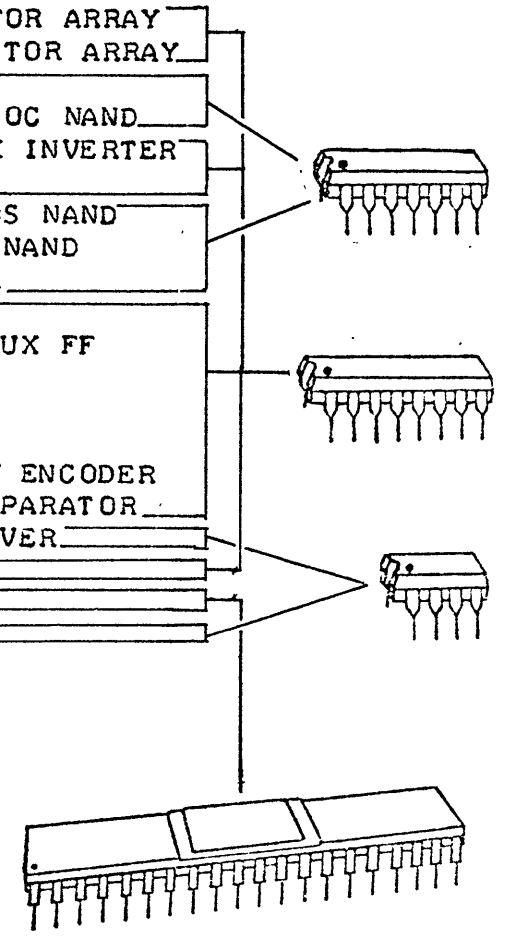
1	19-01-113	.20	11K ^Ω (BROWN, BROWN, ORANGE)
1	19-01-153	.20	15K ^Ω (BROWN, GREEN, ORANGE)

DIODES:

2	21-00-914	.20	1N914
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INTEGRATED CIRCUITS: HIGH RELIABILITY TESTED UNITS

1	19-02-562	1.22	4116R-001-562 8-RESISTOR ARRAY
1	19-03-102	1.22	4116R-002-102 15-RESISTOR ARRAY
1	22-00-004	.50	7404 HEX INVERTER
1	22-00-026	.50	7426 QUAD 2-INPUT HV- OC NAND
2	22-00-158	1.30	74158 QUAD 2-INPUT MUX INVERTER
1	22-00-279	1.26	74279 QUAD S-R LATCH
1	22-04-000	.54	74LS00 QUAD 2-INPUT POS NAND
1	22-04-010	.52	74LS10 TRIPLE 3-INPUT NAND
1	22-04-014	1.90	74LS14 HEX ST INVERTER
2	22-04-133	.62	74LS133 13-INPUT NAND
2	22-04-298	2.78	74LS298 QUAD 2-INPUT MUX FF
1	22-05-033	5.30	82S33 QUAD 2-INPUT MUX
3	22-06-095	.94	8T95 HEX TS INVERTER
1	22-07-015	1.08	9015 4-2-2-2-INPUT NOR
1	22-08-018	5.10	93L18 8-INPUT PRIORITY ENCODER
1	22-08-024	5.60	93L24 DUAL 5-INPUT COMPARATOR
1	22-10-042	3.80	3642 DUAL HV CLOCK DRIVER
2	22-13-002	1.32	9602 DUAL ONE SHOT
1	23-00-000	39.95	MC6800 CPU
1	24-00-055	.80	555 TIMER



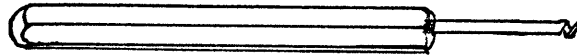
2.3 TOOLS

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



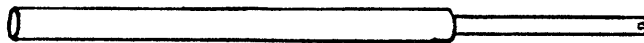
07-01-002 1.00 1/4 NUT DRIVER



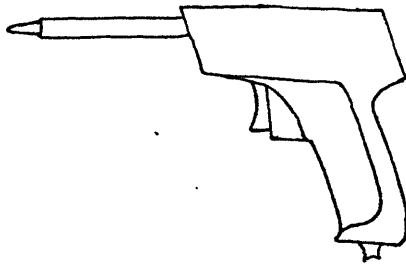
07-02-000 1.00 1/8 INCH BLADE SCREWDRIVER



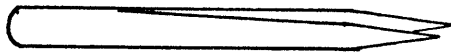
07-04-000 3.00 GROUND CLIP INSERTOR



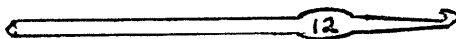
07-05-000 17.00 150 WATT 600 DEG F. SOLDERING GUN



07-06-000 1.50 POINTED TWEEZERS



07-07-012 1.00 SIZE 12 CROCHET HOOK



3.1 SOLDERING

IT IS EXTREMELY IMPORTANT THAT GOOD SOLDERING TECHNIQUES BE FOLLOWED. ONE CARELESS SOLDER JOINT CAN CAUSE A PROBLEM THAT MAY BE VERY TIME CONSUMING TO PIN POINT AND CORRECT.

SOLDERING TOOL

USE A GOOD QUALITY SOLDERING IRON OR GUN WITHIN THE RANGE OF 75 TO 150 WATTS, WITH A 1/4 INCH TIP. WE RECOMMEND USING A WELLER TEMPMATIC WITH A CONE TIP. KEEP THE SOLDERING TIP CLEAN BY WIPING FREQUENTLY WITH A DAMP CLOTH OR SPONGE.

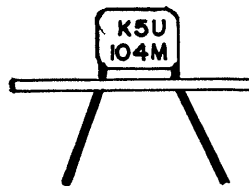
SOLDER

ROSIN CORE SOLDER IS SUPPLIED WITH YOUR WAVE MATE KIT. SHOULD ADDITIONAL SOLDER BE REQUIRED, USE ROSIN CORE SOLDER DESIGNED FOR ELECTRICAL CONNECTIONS. DO NOT USE ACID CORE SOLDER OR PASTE FLUXES.

3.2 SOLDERING ON A PRINTED CIRCUIT BOARD

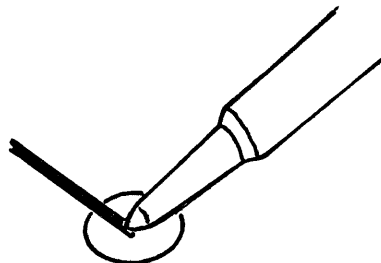
OFTEN, COMPONENTS OR LEADS ARE ATTACHED DIRECTLY TO A PC BOARD BY SOLDERING THEIR LEADS TO SOLDER PADS ON THE BOARD. A SOLDER PAD IS A SOLDER-PLATED AREA, USUALLY SURROUNDING A HOLE DRILLED THROUGH THE BOARD. ALTHOUGH THIS IS SIMPLE, IT IS IMPORTANT THAT IT BE DONE RIGHT.

INSERT THE LEADS OF THE COMPONENT THROUGH THE APPROPRIATE HOLES FROM THE OTHER SIDE OF THE BOARD. (IN SOME CASES, THIS MAY REQUIRE BENDING THE LEADS TO FIT). NOW BEND THE LEADS AWAY FROM EACH OTHER. YOU SHOULD NOW HAVE SOMETHING LIKE THIS:



DON'T TRIM THE LEADS YET.

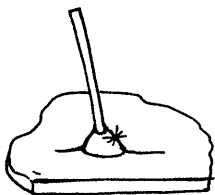
NOW, PUT THE BOARD ON A TABLE OR IN A JIG SO THAT THE LEADS FACE YOU AND SO THAT THE BOARD WON'T MOVE. HEAT A PAD AND THE LEAD WITH THE TIP OF THE IRON:



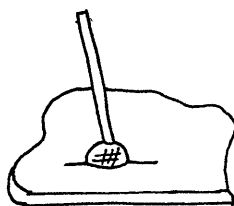
AFTER A FEW SECONDS APPLY SOLDER TO THE TIP AND THE CONNECTION.

THE SOLDER SHOULD FLOW ONTO THE LEAD AND MAKE A JOINT BETWEEN THE LEAD AND THE SOLDER PAD. REMOVE THE TIP AND LET THE SOLDER COOL AND SOLIDIFY BEFORE MOVING THE LEAD OR THE BOARD.

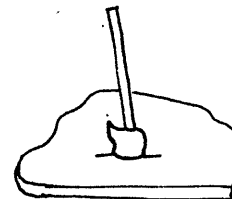
A GOOD SOLDER JOINT WILL BE SMOOTH AND BRIGHT. A POOR SOLDER JOINT WILL LOOK CRYSTALLINE AND GRAINY, OR THE SOLDER WILL TEND TO BLOB.



GOOD JOINT



GRAINY JOINT



BLOBBY JOINT

IF EXCESS SOLDER IS APPLIED, IT MAY FORM A CONNECTION TO AN ADJACENT SOLDER PAD. THIS IS CALLED A SOLDER BRIDGE. IF ALLOWED TO REMAIN, A SOLDER BRIDGE WILL CAUSE A SHORT CIRCUIT. AFTER EACH SOLDERING OPERATION, CAREFULLY CHECK FOR SOLDER BRIDGES AND REMOVE WITH A POINTED TOOL OR BY REHEATING THE SOLDER JOINT.

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.

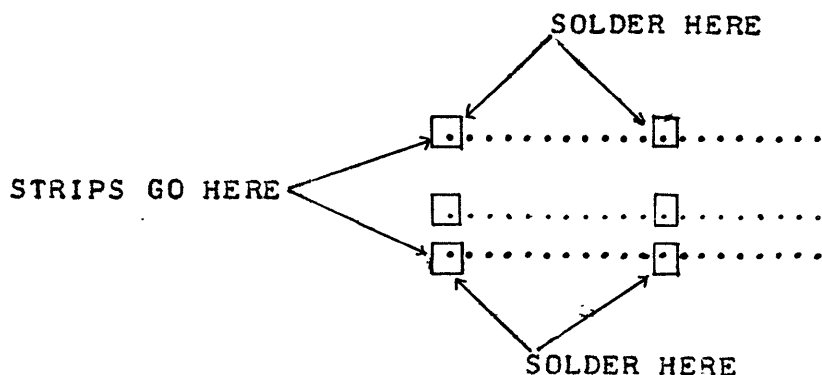
4.2 24- OR 40-PIN SOCKETS

EACH 24- OR 40-PIN SOCKET CONSISTS OF TWO SEPARATE 12- OR 20-PIN STRIPS. THE 24-PIN SOCKETS ARE ALWAYS INSTALLED HORIZONTALLY AT THE EXTREME RIGHT OR LEFT END OF A ROW. THAT IS, THESE SOCKETS ALWAYS OCCUPY COLUMN 1, 2, AND 3 OR 6, 7, AND 8 OF A ROW. A 40-PIN SOCKET IS ALWAYS INSTALLED AT THE EXTREME RIGHT END OF A ROW. THAT IS, THESE SOCKETS ALWAYS OCCUPY COLUMNS 4, 5, 6, 7, AND 8 OF A ROW. A WHITE DOT ON THE COMPONENT SIDE OF THE BOARD DENOTES PIN 1 OF A SOCKET. THE DIMPLE NEAR THE END OF THE SOCKET SHOULD ALWAYS 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.

REFER TO SECTION 4.11 TO DETERMINE IF A GROUND CLIP IS TO BE INSTALLED ON A LEAD TO BE SOLDERED TO THE BOARD. IF SO, REFER TO THE INSTRUCTIONS IN 4.11 AND INSTALL THE GROUND CLIP TO THE PIN. THEN SOLDER THE GROUND CLIP TO THE GROUND PLANE AND THE PIN TO THE SOLDER PAD.

SOLDER THE PINS AT THE ENDS OF EACH STRIP TO THE SOLDER PAD AS SHOWN. DO NOT CUT THESE LEADS.



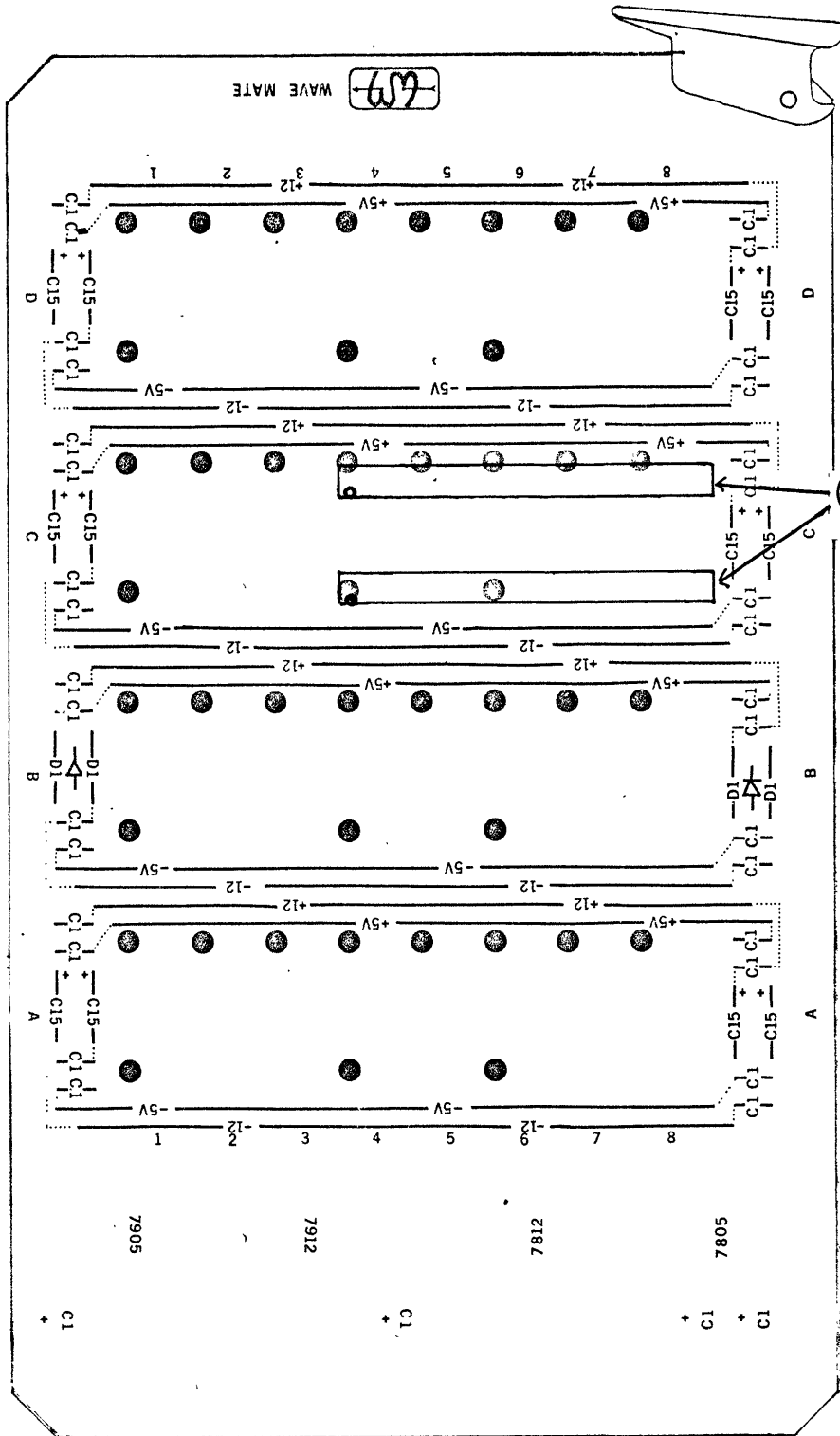
AFTER SOLDERING, CHECK FOR SOLDER BRIDGES AND FOR SOLDER ON THE TERMINALS OF THE STRIPS. SCRAPE OFF ANY SOLDER ON THESE STRIPS WITH A SCREWDRIVER OR AN EXACTO KNIFE.

40-PIN SOCKETS

- () INSTALL AND SOLDER TWO 20-PIN STRIPS AT (C4, 5, 6, 7, 8)

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.



4.3 INPUT VOLTAGE FILTER CAPACITORS

INSTALL 1UF 35V TANTALUM CAPACITORS (COLOR CODE BROWN, BLACK, GREEN) IN THE LOCATIONS MARKED "C1" NEAR THE BOTTOM OF THE BOARD. REFER TO THE ASSEMBLY DRAWING TO DETERMINE WHICH OF THE 4 C1 LOCATIONS ARE TO BE FILLED.

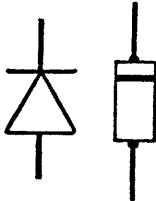
THE BLUE STRIPE ON THE CAPACITOR MUST LINE UP WITH THE + MARKED ON THE BOARD.

AFTER INSTALLING EACH CAPACITOR BEND THE LEADS TO RETAIN THE CAPACITORS.

- () INSTALL 1UF CAPACITOR
- () CHECK POLARITY
- () SOLDER ALL CAPACITORS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS

4.4 REVERSE VOLTAGE PROTECTION

INSTALL 1N4001 1 AMP DIODES IN LOCATIONS MARKED D1. THE BANDED END OF THE DIODE MUST LINE UP WITH THE BAR ON THE DIODE SYMBOL ON THE BOARD:



BEND BOTH LEADS DOWNWARD CLOSE TO THE DIODE BODY, TO MATCH THE SPACING IN THE BOARD. INSERT THE DIODE LEADS THROUGH THE HOLES MARKED "D1" AND BEND THE LEADS OUT TO RETAIN THE DIODES.

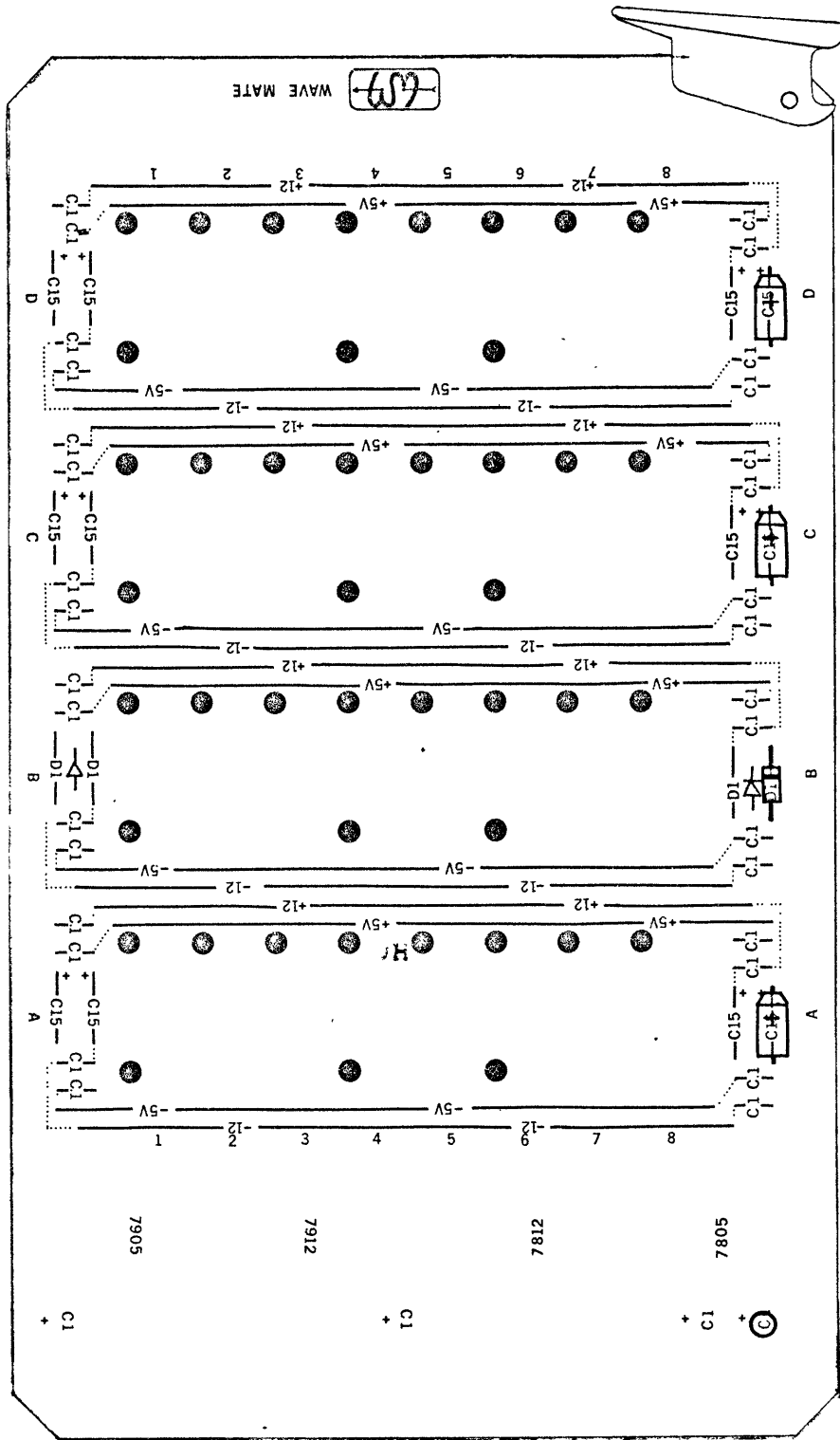
- () INSTALL DIODE, ROW B
- () SOLDER ALL DIODE LEADS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS

4.5 LOW FREQUENCY BYPASS CAPACITORS

INSTALL 15UF 15V TANTALUM LOW FREQUENCY BYPASS CAPACITOR IN 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.

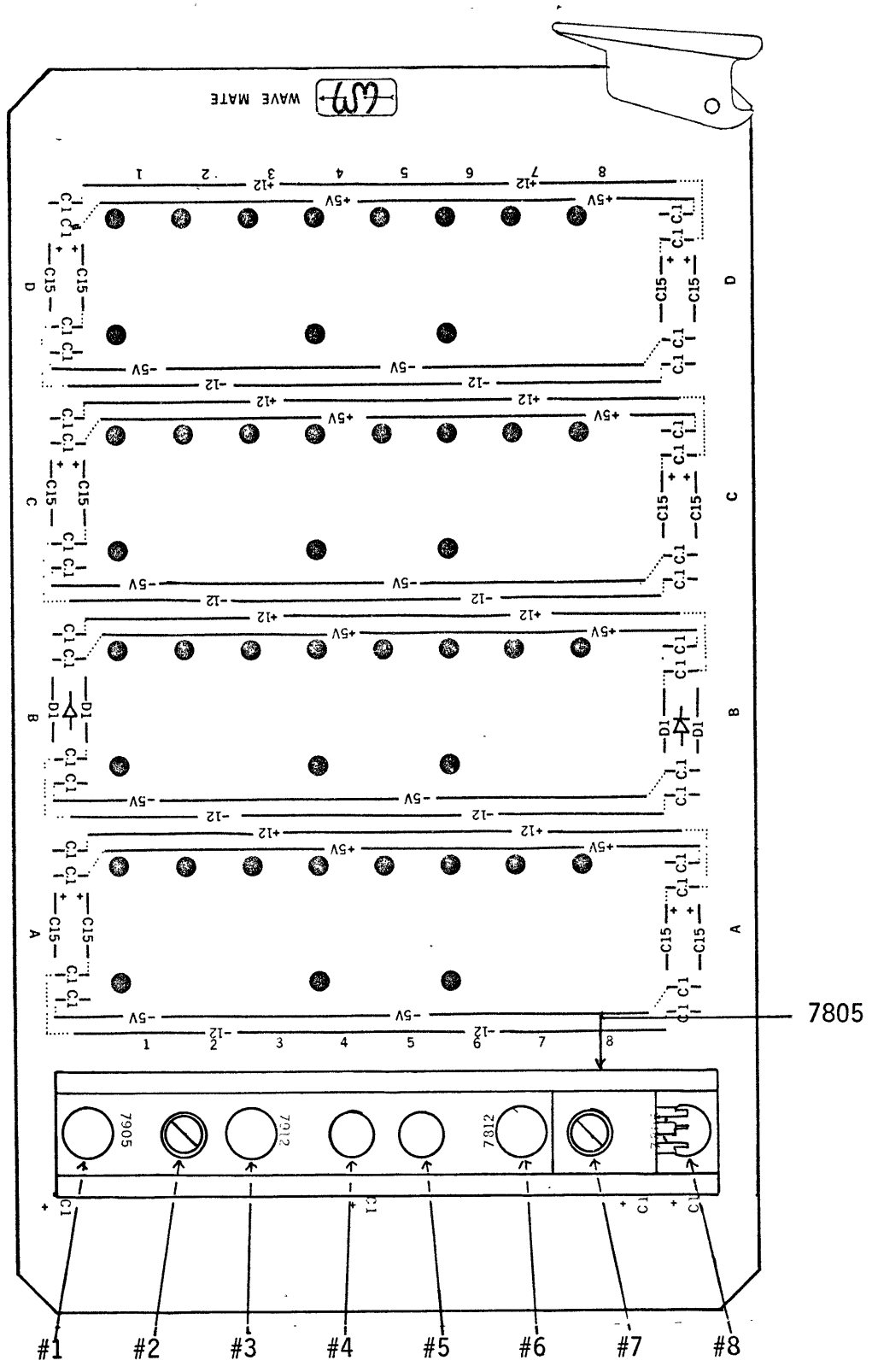
BEND BOTH LEADS DOWNWARD CLOSE TO THE CAPACITOR BODY, INSERT THE LEADS THROUGH HOLES MARKED "C15" AND BEND THE LEADS TO RETAIN THE CAPACITORS.

- () INSTALL 15UF CAPACITOR, ROW A
- () INSTALL 15UF CAPACITOR, ROW C
- () INSTALL 15UF CAPACITOR, ROW D
- () CHECK POLARITY
- () SOLDER ALL CAPACITORS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS



4.6 VOLTAGE REGULATORS

- () PLACE THE HEAT SINK ON THE BOARD ABOVE THE BUSS-CONNECTOR SO THAT THE NUMBERS 7805, 7812, 7912, 7905 ARE COVERED UP, AND THE SMALL HOLES IN THE HEAT SINK LINE UP WITH THE LARGE HOLES ON THE BOARD.
- () PLACE A 1/8" NYLON SPACER IN HOLE #7
- () PLACE A 1/8" NYLON SPACER IN HOLE #2
- () PLACE ONE PLASTIC INSULATOR ON EACH REGULATOR SUPPLIED. THESE INSULATORS ARE COATED ON BOTH SIDES WITH A SPECIAL HEAT TRANSFER COMPOUND. LINE UP THE HOLE ON THE PLASTIC WITH THE HOLE IN THE REGULATOR.
- () PLACE THE 7805 REGULATOR LEADS THROUGH HOLE #8 AND THE THREE HOLES IN THE CIRCUIT BOARD. THE HOLE IN THE REGULATOR SHOULD LINE UP WITH HOLE #7.
- () PLACE A #6 LOCKWASHER ON A #6-32 X 1/2 ROUND HEAD SCREW AND PUSH THROUGH EACH REGULATOR FROM HEAT SINK SIDE OF BOARD.
- () PLACE A #6 FLAT WASHER ON A #6-32 X 1/2 ROUND HEAD SCREW AND PUSH THROUGH HOLE #2 FROM HEAT SINK SIDE OF BOARD.
- () () PICK BOARD UP ON EDGE AND PLACE A #6 LOCK WASHER AND A #6-32 HEX NUT ON EACH SCREW.
- () TIGHTEN ALL HARDWARE FROM THE NUT SIDE WITH A SOCKET WRENCH. DO NOT OVER TIGHTEN.
- () SOLDER THE TWO OUTSIDE LEADS OF EACH REGULATOR.
- () CLIP ALL THREE LEADS OF EACH REGULATOR.
- () CHECK FOR SOLDER BRIDGES.
- () CHECK FOR COLD SOLDER JOINTS.



4.7 BUS AND IO CONNECTORS

- () ORIENT THE BUS CONNECTOR AT THE BOTTOM OF THE BOARD SO THAT THE LONG LEADS POINT TO THE BOARD AND THE SHORT LEADS ARE FACING TOWARDS THE BOTTOM OF THE BOARD.
- () WORK THE LONG LEADS THROUGH THE CORRESPONDING HOLES BEING CAREFUL NOT TO CRUNCH THE FILTER CAPACITORS IN THE 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 IS ON BOTTOM OF BOARD AND THE NUT IS ON TOP OF CONNECTOR.
- () IN THE SAME MANNER INSTALL A 26-PIN IO CONNECTOR IN THE TOP LEFT HAND CORNER OF THE BOARD. THE HOLES IN THE CONNECTOR SHOULD LINE UP WITH THE HOLES IN THE BOARD.
- () INSTALL A 2-56 X 1/2 SCREW AND NUT AT EACH END OF THE CONNECTOR.
- () TURN THE BOARD OVER. THE 4 BUS CONNECTOR LEADS ON THE RIGHT HAND SIDE AND THE IO ON THE LEFT HAND SIDE ARE TO BE SOLDERED. EXCEPT FOR PIN 70 (SEE FIG. 4.7.1) CLIP THESE LEADS WITH WIRE CUTTERS CLOSE TO THE BOARD.

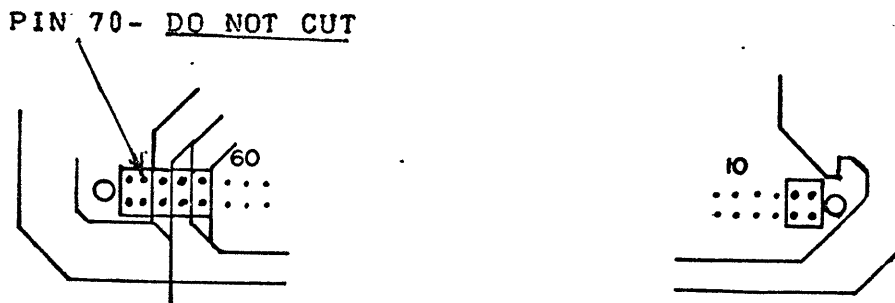
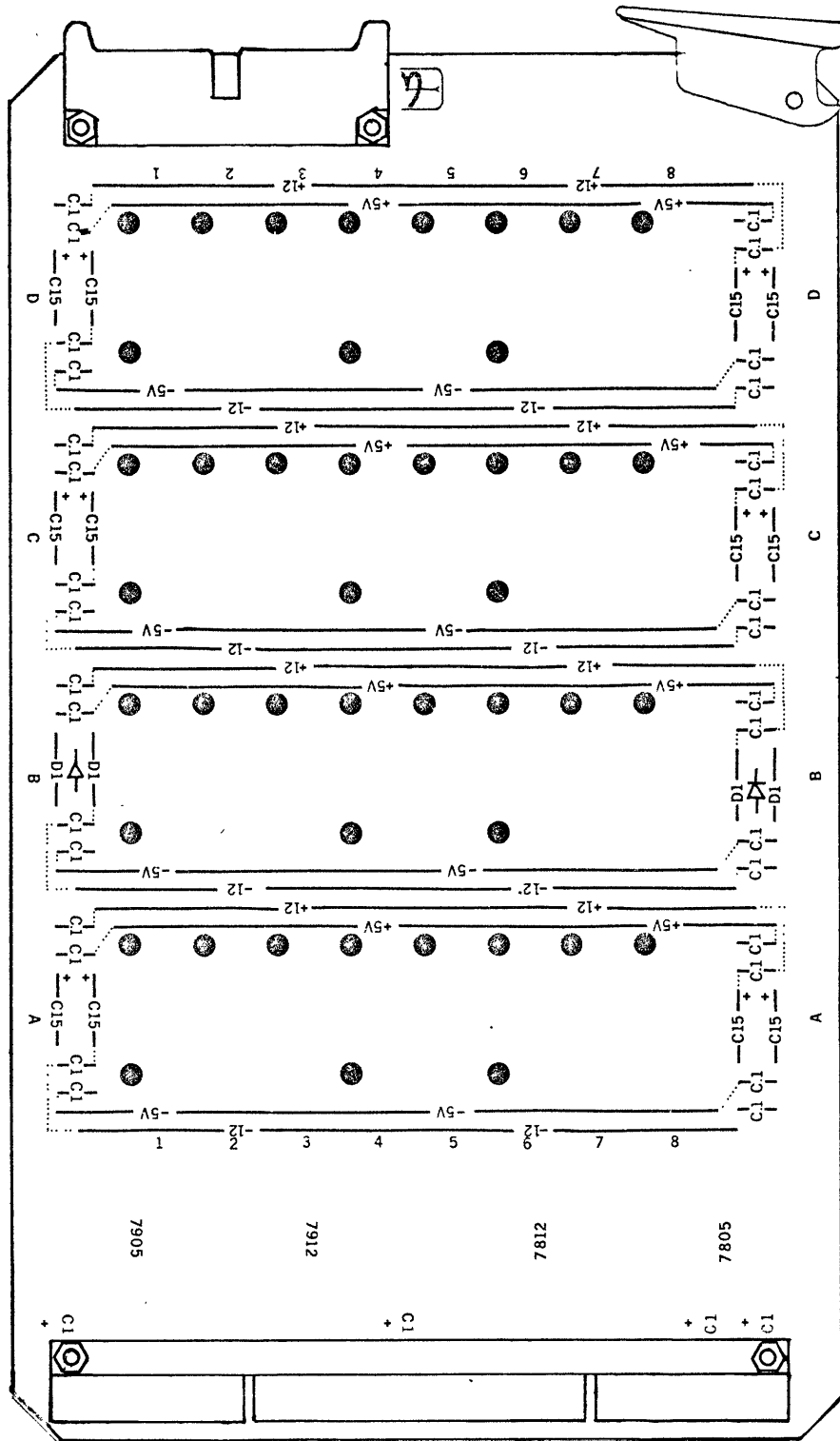


FIGURE 4.7.1

- () SOLDER THE 4 LEADS ON THE RIGHT-HAND SIDE COMMON PAD FORMING A SMOOTH SOLDER LAKE.
- () SOLDER THE PINS ON THE LEFT-HAND SIDE TO THE PADS BEING CAREFUL NOT TO FORM BRIDGES. IT IS IMPORTANT THAT GOOD SOLDER CONNECTIONS ARE MADE, AS THESE PINS SUPPLY POWER TO THE CARD. A POOR SOLDER CONNECTION WILL CAUSE INTERMITTANT OPERATION.
- () CHECK THE ADJACENT (UNCLIPPED) CONNECTOR LEADS FOR SOLDER. SCRAPE ANY SOLDER OFF THESE LEADS WITH A KNIFE.
- () CHECK FOR SOLDER BRIDGES
- () CHECK FOR COLD SOLDER JOINTS

26-PIN CONNECTOR



BUS CONNECTOR

4.8 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 RGW.

EACH BUSS BAR LOCATION IS INDICATED BY A WHITE LINE ON THE BOARD WITH THE VOLTAGE INDICATED (+12, +5, -5, -12). WHEN INSTALLED, THE BUSS BAR SHOULD COMPLETELY COVER THE APPROPRIATE WHITE LINE.

THE +5 AND +12 VOLT BUSS BARS ARE LOCATED ABOVE EACH ROW, WHILE THE -5 AND -12 VOLT BUSS BARS ARE LOCATED BELOW EACH ROW.

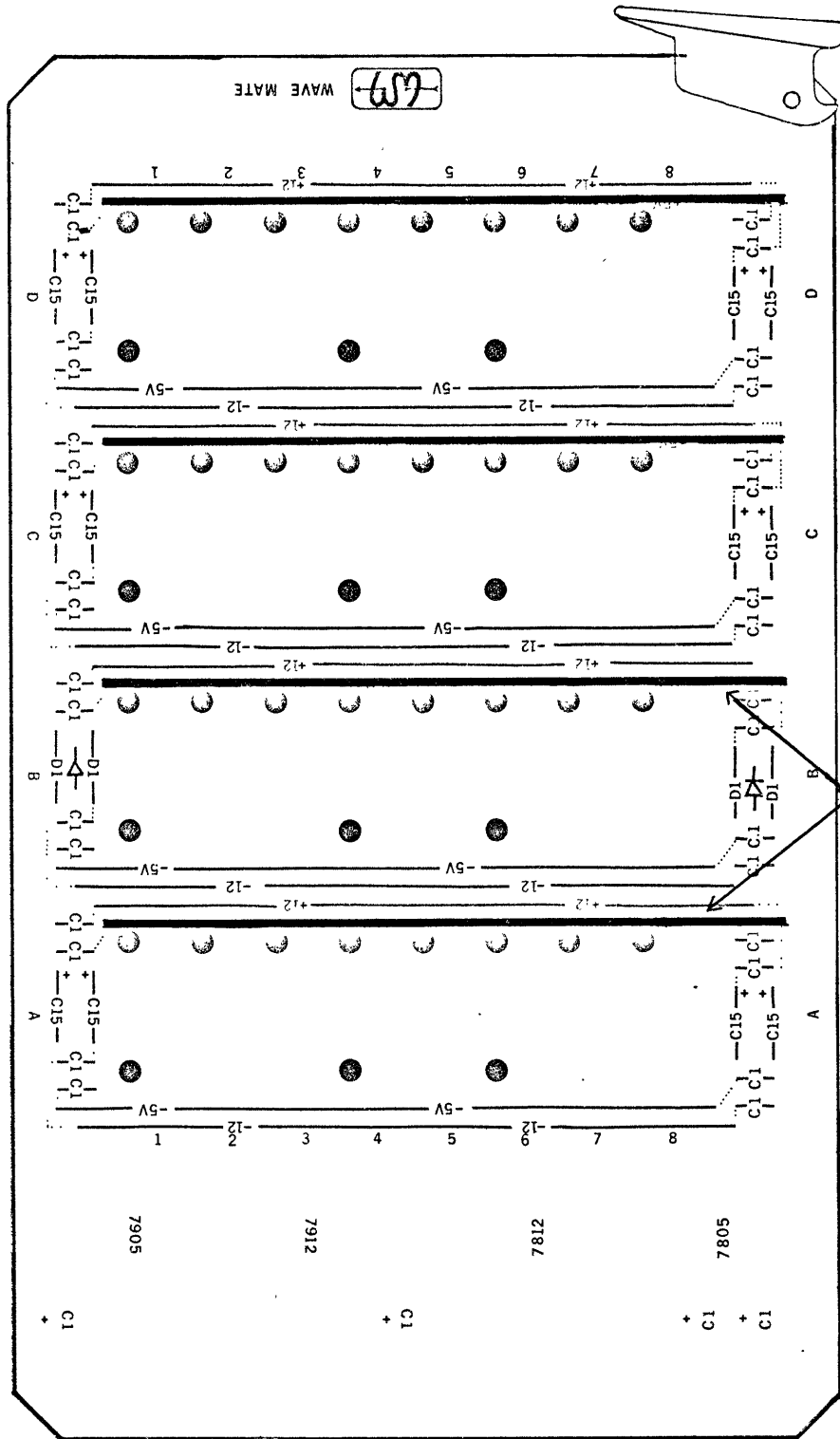
VISUALLY CHECK THE BUSS BAR PINS TO CONFIRM THAT THEY ARE STRAIGHT. CHECK BY SIGHTING FROM THE END AS WELL AS FROM THE FRONT.

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 +5V, ROW D
- () INSTALL BUSS BAR +5V, ROW C
- () INSTALL BUSS BAR +5V, ROW B
- () INSTALL BUSS BAR +5V, ROW A

- () RECHECK POSITIONS
- () SOLDER ALL BUSS BAR END PINS
- () CLIP ALL BUSS BAR END PINS
- () CHECK FOR SOLDER BRIDGES
- () CHECK ALL PINS FOR STRAIGHTNESS



4.9 HIGH-FREQUENCY BYPASS CAPACITORS

A HIGH-FREQUENCY BYPASS CAPACITOR IS INSTALLED AT BOTH ENDS OF EACH BUSS BAR. A DOTTED WHITE LINE ON THE PRINTED CIRCUIT BOARD POINTS FROM EACH BUSS BAR TO THE LOCATION OF THE CORRESPONDING BYPASS CAPACITOR.

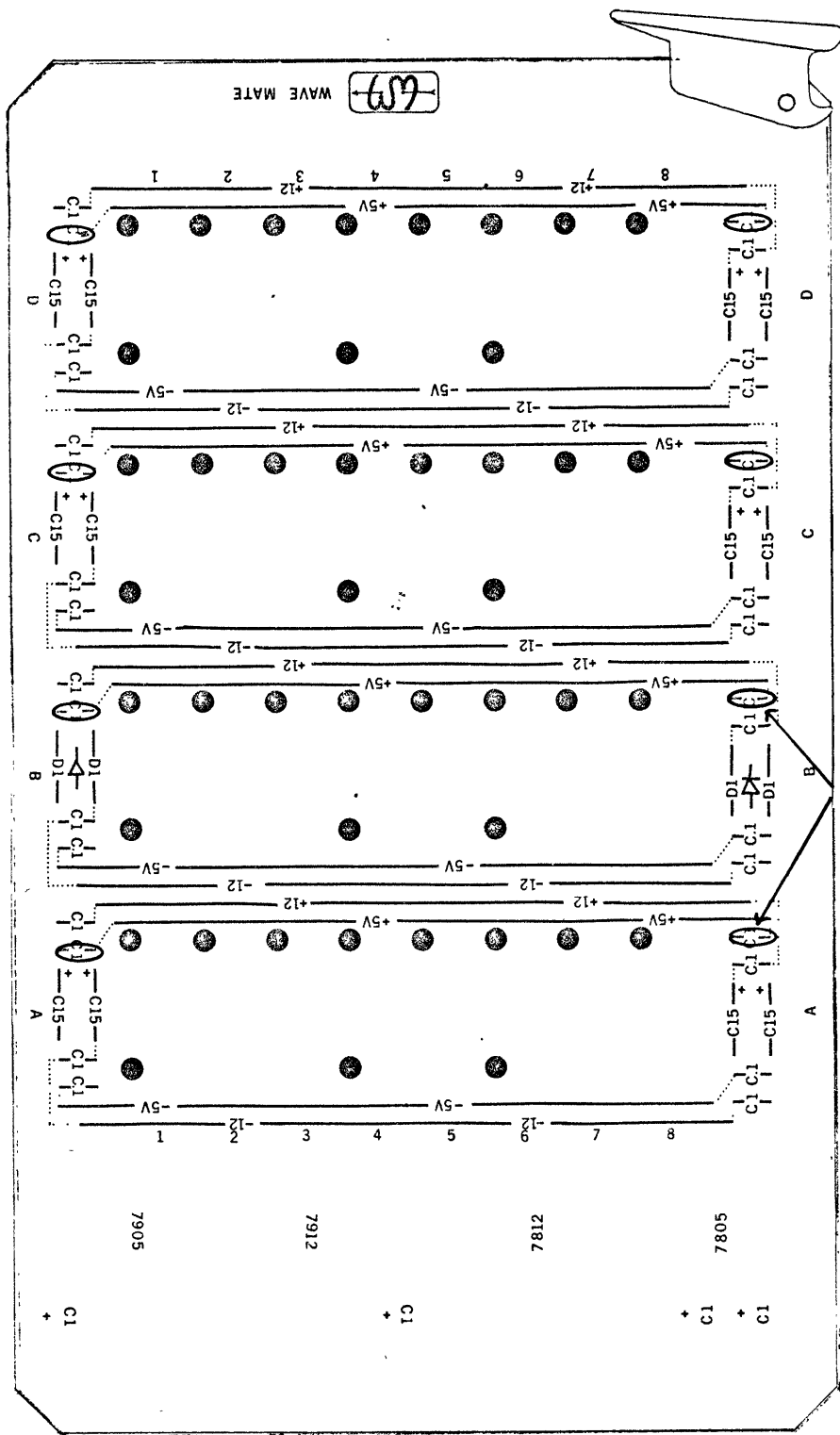
BLUE 0.1 UF 50V CERAMIC CAPACITORS MARKED "104M" ARE USED FOR THE HIGH FREQUENCY BYPASS.

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

R L

() () INSTALL 0.1UF CAPACITOR +5V, ROW D
() () INSTALL 0.1UF CAPACITOR +5V, ROW C
() () INSTALL 0.1UF CAPACITOR +5V, ROW B
() () INSTALL 0.1UF CAPACITOR +5V, ROW A

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



4.10 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 BUS CONNECTOR TOWARD YOU.

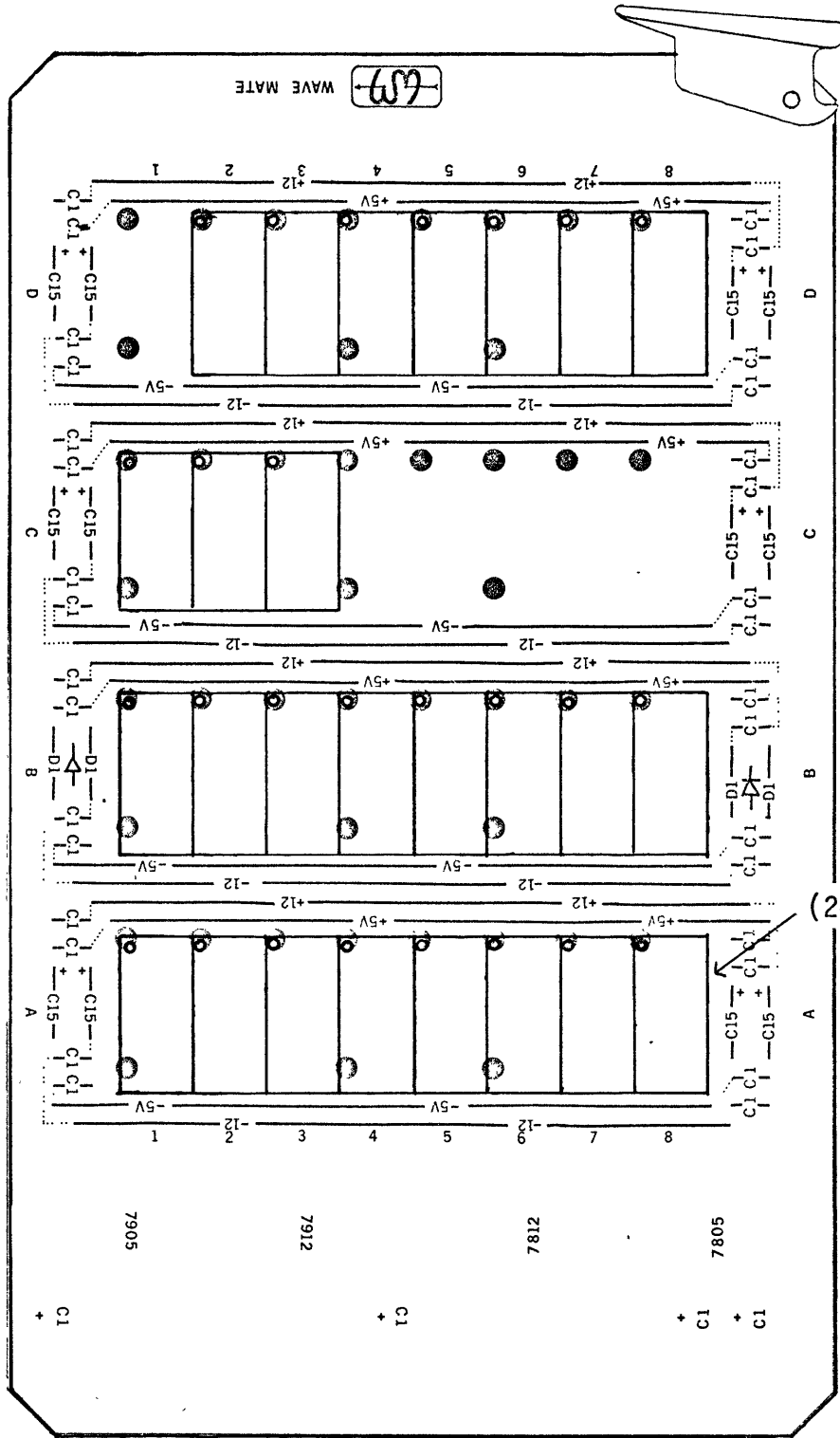
EACH ROW CONTAINS 8 POSITIONS FOR 18-PIN SOCKETS. WHEN INSTALLING THE SOCKET, ORIENT IT SUCH THAT THE SAE MARKING (OR DIMPLE) IS POINTED TOWARD THE TOP OF THE BOARD. BE SURE THAT THE CENTER OF THE SOCKET IS LINED UP WITH THE IDENTIFICATION NUMBER OF THE COLUMN (1-8). PIN 1 OF THE SOCKET (UPPER LEFT-HAND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

()D2 ()D3 ()D4 ()D5 ()D6 ()D7 ()D8
()C1 ()C2 ()C3
()B1 ()B2 ()B3 ()B4 ()B5 ()B6 ()B7 ()B8
()A1 ()A2 ()A3 ()A4 ()A5 ()A6 ()A7 ()A8

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.



(26) 18-PIN SOCKET

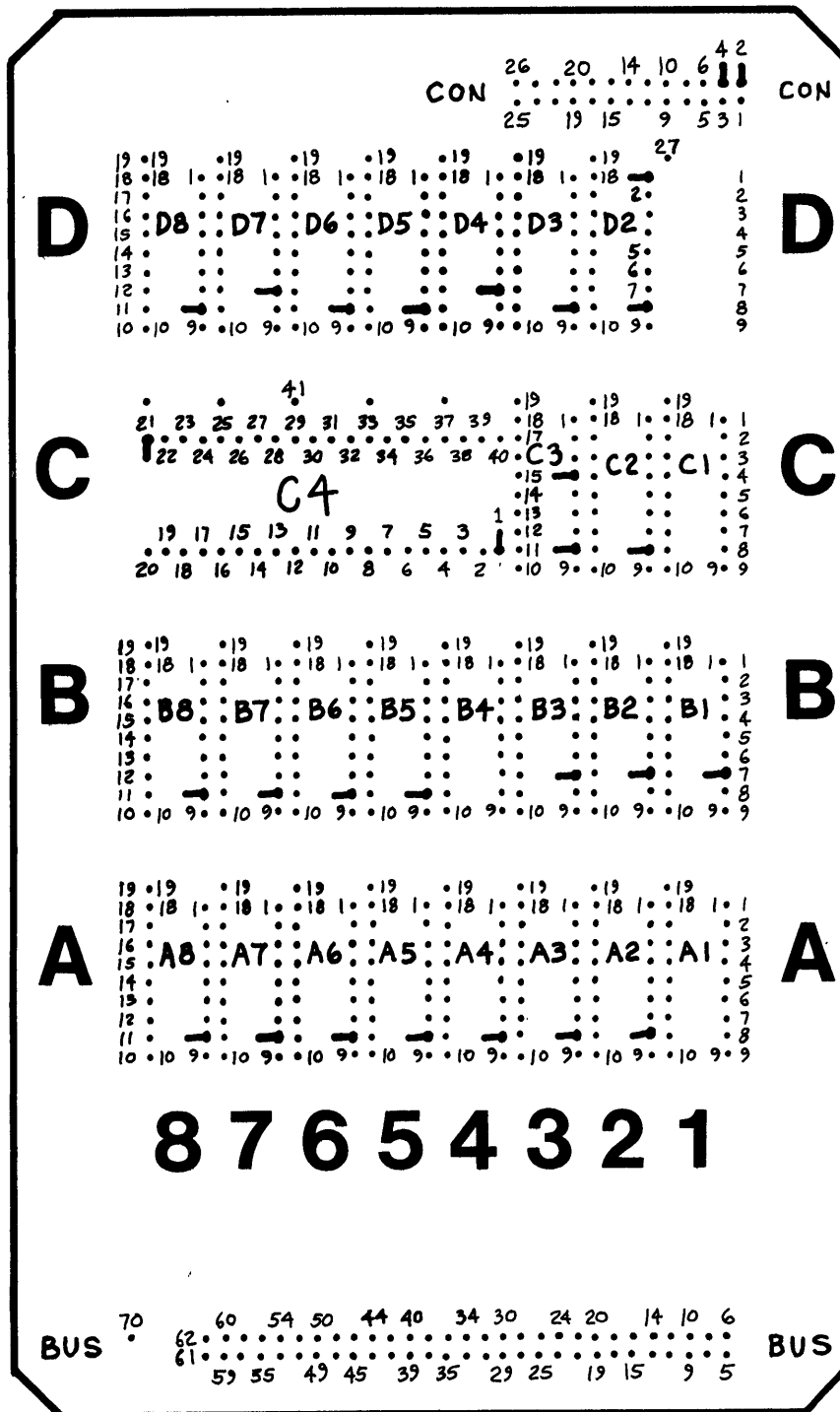
4.11 GROUND PINS

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:

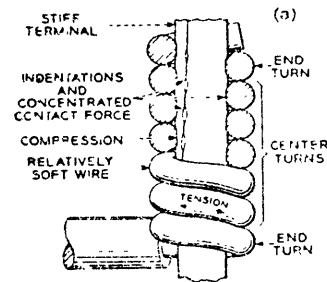
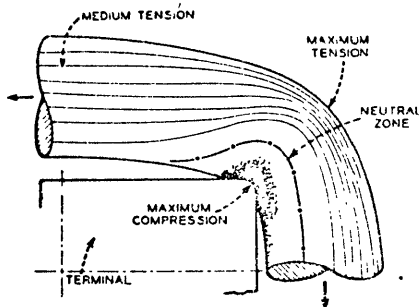
- | | | | |
|--------------------------------|---------------------------------|---------------------------------|----------------------------------|
| <input type="checkbox"/> D5-8 | <input type="checkbox"/> D2-1,8 | <input type="checkbox"/> D3-8 | <input type="checkbox"/> D4-7 |
| | <input type="checkbox"/> D6-8 | <input type="checkbox"/> D7-7 | <input type="checkbox"/> D8-8 |
| <input type="checkbox"/> CON-2 | <input type="checkbox"/> C2-8 | <input type="checkbox"/> C3-4,8 | <input type="checkbox"/> C4-1,21 |
| | <input type="checkbox"/> CON-4 | | |
| <input type="checkbox"/> B1-7 | <input type="checkbox"/> B2-7 | <input type="checkbox"/> B3-7 | |
| <input type="checkbox"/> B5-8 | <input type="checkbox"/> B6-8 | <input type="checkbox"/> B7-8 | <input type="checkbox"/> B8-8 |
| <input type="checkbox"/> A5-8 | <input type="checkbox"/> A2-8 | <input type="checkbox"/> A3-8 | <input type="checkbox"/> A4-8 |
| | <input type="checkbox"/> A6-8 | <input type="checkbox"/> A7-8 | <input type="checkbox"/> A8-8 |
| <input type="checkbox"/> | SOLDER ALL GROUND PINS | | |
| <input type="checkbox"/> | 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.

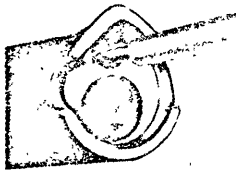
5.1 PROPER TECHNIQUE

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.

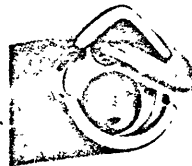
INSERT THE WIRE UNTIL THE INSULATION IS APPROXIMATELY 0.1 INCH INSIDE THE BIT. AT THIS POINT THE BIT CONSTRUCTION WILL PREVENT THE WIRE FROM BEING INSERTED FURTHER INTO THE WIRE HOLE.

BEND THE WIRE TO THE SIDE.

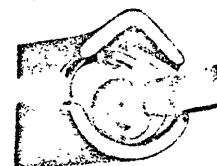
PLACE THE WIRE WRAP TOOL OVER THE TERMINAL SO THAT THE LARGE HOLE IN THE CENTER OF THE BIT FITS OVER THE TERMINAL. IF A LEVEL-1 CONNECTION IS BEING INSTALLED SLIDE THE TOOL AS FAR DOWN ON THE TERMINAL AS IT WILL GO. DO NOT FORCE! IF A LEVEL-2 CONNECTION IS BEING INSTALLED, SLIDE THE TOOL PARTIALLY DOWN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

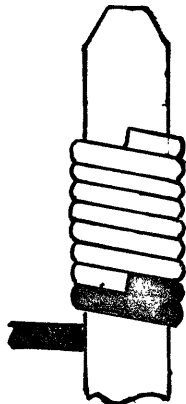


FIGURE 5.1.2 CORRECT WIRE WRAP

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

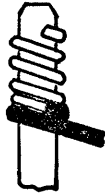


FIG. 5.1.3 OPEN WRAP

IF THE DOWNWARD PRESSURE IS NOT STEADY:

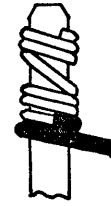


FIGURE 5.1.4 SPIRAL WRAP

IF THE DOWNWARD PRESSURE WAS EXCESSIVE:

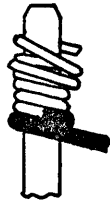


FIGURE 5.1.5 OVERWRAP

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

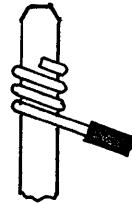


FIGURE 5.1.6 INSUFFICIENT INSULATION

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 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.

LEVEL ONE WIRES:

WHITE 9.0 INCH WIRES:

() 1 BUS-10 [9.0] D7-12

BLUE 8.5 INCH WIRES:

() 2 D8-11 [8.5] BUS-61

() 3 D7-6 [8.5] BUS-20

PURPLE 7.5 INCH WIRES:

() 4 C4-26 [7.5] BUS-58

() 5 C4-27 [7.5] BUS-57

() 6 C4-28 [7.5] BUS-56

() 7 C4-29 [7.5] BUS-55

() 8 C4-30 [7.5] BUS-54

() 9 CON-12 [7.5] A3-5

() 10 CON-13 [7.5] A3-13

() 11 CON-14 [7.5] A3-16

() 12 CON-16 [7.5] A4-5

() 13 CON-17 [7.5] A7-3

() 14 CON-18 [7.5] A4-16

() 15 CON-20 [7.5] A5-2

() 16 CON-21 [7.5] A5-3

() 17 CON-22 [7.5] A3-15

() 18 CON-23 [7.5] A4-3

() 19 CON-24 [7.5] A4-6

() 20 CON-25 [7.5] A4-12

() 21 CON-26 [7.5] A4-15

ORANGE 7.0 INCH WIRES:

() 22 CON-11 [7.0] A3-2

() 23 CON-15 [7.0] A4-2

() 24 CON-19 [7.0] A5-1

BROWN 6.5 INCH WIRES:

() 25 CON-6 [6.5] B3-5

() 26 D7-1 [6.5] B1-16

() 27 BUS-60 [6.5] B4-1

() 28 B4-2 [6.5] BUS-7

() 29 B4-3 [6.5] BUS-8

WHITE 6.0 INCH WIRES:

() 30 CON-3 [6.0] B2-2

() 31 C4-34 [6.0] A8-14

() 32 BUS-18 [6.0] B4-7

() 33 D6-5 [6.0] B3-6

() 34 B7-11 [6.0] D7-16

() 35 B4-11 [6.0] D5-15

() 36 BUS-21 [6.0] B3-13

() 37 D8-2 [6.0] B3-15

() 38 B2-4 [6.0] D7-4

() 39 B2-12 [6.0] BUS-23

() 40 B2-14 [6.0] BUS-24

() 41 D5-3 [6.0] B5-12

BLUE 5.5 INCH WIRES:

() 42 D6-11 [5.5] B3-12

() 43 BUS-26 [5.5] A8-13

() 44 B8-11 [5.5] B1-15

() 45 D3-14 [5.5] B1-4

() 46 B4-6 [5.5] D4-6

() 47 B2-13 [5.5] D4-13

() 48 B1-1 [5.5] D4-12

() 49 B5-13 [5.5] D5-14

GREEN 5.0 INCH WIRES:

() 50 C4-7 [5.0] B1-5

() 51 C4-9 [5.0] A6-2

() 52 B1-17 [5.0] C4-10

() 53 D7-2 [5.0] C4-11

() 54 CON-5 [5.0] D6-6

() 55 A2-7 [5.0] B5-4

() 56 A2-11 [5.0] B5-3

() 57 A6-3 [5.0] BUS-35

() 58 A6-15 [5.0] BUS-40

() 59 A3-6 [5.0] A7-11

() 60 D3-12 [5.0] D8-17

() 61 A3-4 [5.0] BUS-27

() 62 A4-4 [5.0] BUS-31

() 63 D8-5 [5.0] B6-17

() 64 D8-15 [5.0] D4-1

YELLOW 4.5 INCH WIRES:

() 65 D4-15 [4.5] C4-2

() 66 B1-13 [4.5] C4-5

() 67 C4-21 [4.5] C4-39

() 68 C4-22 [4.5] B8-14

() 69 C4-23 [4.5] B8-15

() 70 C4-24 [4.5] B8-16

() 71 C4-31 [4.5] B5-5

() 72 C3-1 [4.5] D6-13

() 73 A2-6 [4.5] B5-11

() 74 A2-16 [4.5] B6-12

() 75 B7-3 [4.5] A6-4

() 76 B7-4 [4.5] A6-6

() 77 B7-14 [4.5] A6-12

() 78 B7-15 [4.5] A6-14

() 79 A6-5 [4.5] BUS-36

() 80 A6-7 [4.5] BUS-37

() 81 A6-11 [4.5] BUS-38

() 82 A6-13 [4.5] BUS-39

() 83 A4-13 [4.5] BUS-41

() 84 A7-5 [4.5] BUS-42

() 85 A3-3 [4.5] A7-7

() 86 A3-12 [4.5] A7-13

() 87 D3-16 [4.5] C3-5

() 88 D3-17 [4.5] C3-6

() 89 A3-7 [4.5] BUS-28

() 90 A3-11 [4.5] BUS-29

() 91 A3-14 [4.5] BUS-30

() 92 A4-7 [4.5] BUS-32

() 93 A4-11 [4.5] BUS-33

() 94 A4-14 [4.5] BUS-34

RED 4.0 INCH WIRES:

() 95 C4-4 [4.0] B4-12
 () 96 C4-6 [4.0] B2-16
 () 97 C4-41 [4.0] C4-8
 () 98 C4-14 [4.0] B8-3
 () 99 C4-15 [4.0] B8-4
 () 100 C4-16 [4.0] B8-5
 () 101 C4-17 [4.0] B8-6
 () 102 C4-18 [4.0] B8-7
 () 103 C4-19 [4.0] B8-12
 () 104 C4-20 [4.0] B8-13
 () 105 C4-25 [4.0] B8-17
 () 106 C4-32 [4.0] B5-1
 () 107 C4-33 [4.0] B5-2
 () 108 B3-1 [4.0] C4-40
 () 109 D4-3 [4.0] CON-9
 () 110 D7-5 [4.0] D5-1
 () 111 C2-4 [4.0] B2-1
 () 112 D8-13 [4.0] D6-16
 () 113 B7-16 [4.0] B6-7
 () 114 A5-4 [4.0] A7-15
 () 115 A5-5 [4.0] A8-3
 () 116 A5-6 [4.0] A8-5
 () 117 A5-7 [4.0] A8-7
 () 118 A5-12 [4.0] A8-11
 () 119 B3-2 [4.0] B1-6
 () 120 B3-17 [4.0] B1-12
 () 121 A5-11 [4.0] A4-1
 () 122 A3-1 [4.0] B2-15
 () 123 D4-14 [4.0] D8-3
 () 124 B1-2 [4.0] C1-12
 () 125 B1-3 [4.0] C3-7
 () 126 D5-12 [4.0] D8-7.

() 150 D6-14 [3.5] D7-3
 () 151 D6-17 [3.5] D5-2
 () 152 D6-19 [3.5] D6-18
 () 153 A2-1 [3.5] A1-4
 () 154 A2-2 [3.5] A1-3
 () 155 A1-2 [3.5] A2-3
 () 156 A2-4 [3.5] A1-1
 () 157 A2-8 [3.5] A2-5
 () 158 A2-12 [3.5] A1-8
 () 159 A2-13 [3.5] A1-7
 () 160 A2-14 [3.5] A1-6
 () 161 A2-15 [3.5] A1-5
 () 162 A2-19 [3.5] A2-18
 () 163 B7-2 [3.5] B6-3
 () 164 B7-5 [3.5] B6-4
 () 165 B7-8 [3.5] B7-7
 () 166 B7-13 [3.5] B6-5
 () 167 B7-19 [3.5] B7-18
 () 168 A6-8 [3.5] A6-1
 () 169 A6-19 [3.5] A6-13
 () 170 A7-8 [3.5] A7-1
 () 171 A7-19 [3.5] A7-18
 () 172 A8-8 [3.5] A8-1
 () 173 A8-19 [3.5] A8-18
 () 174 B8-19 [3.5] B8-18
 () 175 D3-3 [3.5] D3-13
 () 176 D2-3 [3.5] D3-4
 () 177 D3-19 [3.5] D3-18
 () 178 D3-15 [3.5] D3-5
 () 179 B3-14 [3.5] B4-5
 () 180 A5-17 [3.5] A5-16
 () 181 A5-15 [3.5] A5-14
 () 182 B3-16 [3.5] B4-4
 () 183 B3-19 [3.5] B3-18
 () 184 B2-19 [3.5] B2-18
 () 185 D8-6 [3.5] D8-16
 () 186 D7-17 [3.5] D7-14
 () 187 D7-19 [3.5] D7-18
 () 188 B1-19 [3.5] B1-18
 () 189 A3-8 [3.5] A3-17
 () 190 A3-19 [3.5] A3-18
 () 191 A4-8 [3.5] A4-17
 () 192 A4-19 [3.5] A4-18
 () 193 B5-19 [3.5] B5-18
 () 194 B5-8 [3.5] B5-7
 () 195 A5-19 [3.5] A5-18
 () 196 D5-4 [3.5] D5-16
 () 197 D5-5 [3.5] D5-6
 () 198 D5-19 [3.5] D5-18
 () 199 D8-8 [3.5] D8-12
 () 200 D8-19 [3.5] D8-18
 () 201 D4-19 [3.5] D4-18
 () 202 B6-8 [3.5] B6-6
 () 203 B6-19 [3.5] B6-18
 () 204 C3-2 [3.5] C3-16
 () 205 C3-19 [3.5] C3-18
 () 206 C3-14 [3.5] C3-12
 () 207 D2-2 [3.5] D2-16
 () 208 D2-12 [3.5] D2-11
 () 209 D2-19 [3.5] D2-18

BLACK 3.5 INCH WIRES:

() 127 C4-3 [3.5] C3-3
 () 128 D4-16 [3.5] D5-13
 () 129 C4-12 [3.5] B8-1
 () 130 C4-13 [3.5] B7-17
 () 131 C4-36 [3.5] C4-37
 () 132 C2-1 [3.5] C1-2
 () 133 C2-2 [3.5] C1-17
 () 134 C2-19 [3.5] C2-18
 () 135 C2-15 [3.5] C2-13
 () 136 C2-5 [3.5] C2-3
 () 137 C3-17 [3.5] C2-11
 () 138 C2-7 [3.5] C2-14
 () 139 C2-16 [3.5] C1-15
 () 140 C1-13 [3.5] C1-3
 () 141 C2-17 [3.5] C1-4
 () 142 D6-1 [3.5] D6-4
 () 143 D4-4 [3.5] D4-5
 () 144 D6-2 [3.5] D5-11
 () 145 D6-3 [3.5] D5-7
 () 146 B3-3 [3.5] B3-4
 () 147 A6-17 [3.5] A7-17
 () 148 D6-8 [3.5] D6-7
 () 149 D6-12 [3.5] D6-15

() 210 D2-4 [3.5] D2-13
() 211 D2-7 [3.5] D2-6
() 212 C1-5 [3.5] C1-6
() 213 C1-19 [3.5] C1-18
() 214 C1-16 [3.5] C1-14
() 215 A1-19 [3.5] A1-18
() 216 A1-17 [3.5] A1-16
() 217 A1-15 [3.5] A1-14
() 218 A1-13 [3.5] A1-12
() 219 B4-19 [3.5] B4-18
() 220 CON-27 [3.5] CON-10

LEVEL TWO WIRES:

GRAY 8.0 INCH WIRES:

() 221 C3-16 [8.0] BUS-70

ORANGE 7.0 INCH WIRES:

() 222 A1-1 [7.0] CON-7
() 223 B6-12 [7.0] CON-8
() 224 B2-2 [7.0] BUS-59

BROWN 6.5 INCH WIRES:

() 225 B5-1 [6.5] BUS-52
() 226 B5-2 [6.5] BUS-51

WHITE 6.0 INCH WIRES:

() 227 B5-5 [6.0] BUS-53
() 228 D6-16 [6.0] B2-3
() 229 B4-5 [6.0] BUS-22
() 230 B4-4 [6.0] BUS-25

BLUE 5.5 INCH WIRES:

() 231 D6-6 [5.5] B3-3
() 232 D5-2 [5.5] B2-17
() 233 B2-15 [5.5] D4-14

GREEN 5.0 INCH WIRES:

() 234 A1-4 [5.0] BUS-15
() 235 A1-3 [5.0] BUS-16
() 236 A2-3 [5.0] BUS-17
() 237 A7-15 [5.0] BUS-46
() 238 A8-3 [5.0] BUS-47
() 239 D3-13 [5.0] D8-11

YELLOW 4.5 INCH WIRES:

() 240 C4-5 [4.5] D7-13
() 241 D5-13 [4.5] C4-6
() 242 B8-16 [4.5] A8-6
() 243 B8-17 [4.5] A8-12
() 244 D5-1 [4.5] C3-17
() 245 B3-4 [4.5] A6-17
() 246 A1-8 [4.5] BUS-11
() 247 A1-7 [4.5] BUS-12
() 248 A1-6 [4.5] BUS-13
() 249 A1-5 [4.5] BUS-14
() 250 A7-7 [4.5] BUS-43
() 251 A7-11 [4.5] BUS-44
() 252 A7-13 [4.5] BUS-45
() 253 A8-5 [4.5] BUS-48
() 254 A8-7 [4.5] BUS-49
() 255 A8-11 [4.5] BUS-50
() 256 A8-13 [4.5] B4-11
() 257 B5-12 [4.5] B1-14

RED 4.0 INCH WIRES:

() 258 C4-2 [4.0] B4-8
() 259 C4-11 [4.0] B7-6
() 260 B8-3 [4.0] A6-16
() 261 B8-4 [4.0] A7-2
() 262 B8-5 [4.0] A7-4
() 263 B8-6 [4.0] A7-6
() 264 B8-7 [4.0] A7-12
() 265 B8-12 [4.0] A7-14
() 266 B8-13 [4.0] A7-16
() 267 B8-14 [4.0] A8-2
() 268 B8-15 [4.0] A8-4
() 269 C4-40 [4.0] D4-3
() 270 A3-2 [4.0] A6-3
() 271 A3-5 [4.0] A6-5
() 272 A3-16 [4.0] A6-11
() 273 A4-2 [4.0] A6-13
() 274 A4-5 [4.0] A6-15
() 275 B3-15 [4.0] A5-17
() 276 D4-13 [4.0] D8-4
() 277 D7-14 [4.0] D5-3
() 278 B4-1 [4.0] B1-1

BLACK 3.5 INCH WIRES:

() 279 C4-10 [3.5] B7-1
() 280 B8-1 [3.5] B7-12
() 281 C4-37 [3.5] C3-15
() 282 B4-7 [3.5] B3-1
() 283 C2-11 [3.5] C2-4
() 284 C2-14 [3.5] C3-1
() 285 D6-4 [3.5] D4-4
() 286 D4-5 [3.5] D3-6
() 287 A7-17 [3.5] A8-17
() 288 D6-15 [3.5] D4-17
() 289 D7-3 [3.5] D8-14
() 290 B5-11 [3.5] B6-13
() 291 B5-4 [3.5] B6-14

() 292 B5-3 [3.5] B6-15
() 293 A3-13 [3.5] A6-7
() 294 A7-3 [3.5] A4-13
() 295 A4-16 [3.5] A7-5
() 296 A5-1 [3.5] A3-3
() 297 A5-2 [3.5] A3-6
() 298 A5-3 [3.5] A3-12
() 299 A3-15 [3.5] A5-4
() 300 A4-3 [3.5] A5-5
() 301 A4-6 [3.5] A5-6
() 302 A4-15 [3.5] A5-12
() 303 D5-15 [3.5] D7-15
() 304 D3-4 [3.5] D4-2
() 305 A4-1 [3.5] A3-1
() 306 B5-18 [3.5] B5-6
() 307 D8-12 [3.5] D8-1
() 308 B6-6 [3.5] B6-1
() 309 B6-18 [3.5] B6-11
() 310 C3-18 [3.5] C3-14
() 311 D2-16 [3.5] D2-12
() 312 D2-18 [3.5] D2-4
() 313 D2-6 [3.5] D2-17
() 314 B7-17 [3.5] B8-2
() 315 C1-17 [3.5] C1-1
() 316 C2-18 [3.5] C2-15
() 317 C2-13 [3.5] C2-5
() 318 C1-15 [3.5] C1-13
() 319 B6-3 [3.5] B5-17
() 320 B6-4 [3.5] B5-16
() 321 B6-5 [3.5] B5-15
() 322 B6-7 [3.5] B5-14
() 323 A4-12 [3.5] A5-7
() 324 D3-18 [3.5] D3-15
() 325 C3-5 [3.5] C3-13
() 326 B3-5 [3.5] B3-14
() 327 B3-13 [3.5] B4-6
() 328 A5-16 [3.5] A5-15
() 329 A5-14 [3.5] A5-13
() 330 D7-12 [3.5] D8-6
() 331 C3-7 [3.5] C3-11
() 332 D5-16 [3.5] D5-17
() 333 D5-6 [3.5] D5-12
() 334 C1-6 [3.5] C1-7
() 335 C1-18 [3.5] C1-16
() 336 A1-18 [3.5] A1-17
() 337 A1-16 [3.5] A1-15
() 338 A1-14 [3.5] A1-13
() 339 A1-12 [3.5] A1-11

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] A3-2 [2] A6-3 [1] BUS-35 ;

() AB1 CON-12 [1] A3-5 [2] A6-5 [1] BUS-36 ;

() AB10 CON-21 [1] A5-3 [2] A3-12 [1] A7-13 [2]
BUS-45 ;

() AB11 CON-22 [1] A3-15 [2] A5-4 [1] A7-15 [2]
BUS-46 ;

() AB12 CON-23 [1] A4-3 [2] A5-5 [1] A8-3 [2]
BUS-47 ;

() AB13 CON-24 [1] A4-6 [2] A5-6 [1] A8-5 [2]
BUS-48 ;

() AB14 CON-25 [1] A4-12 [2] A5-7 [1] A8-7 [2]
BUS-49 ;

() AB15 CON-26 [1] A4-15 [2] A5-12 [1] A8-11 [2]
BUS-50 ;

() AB2 CON-13 [1] A3-13 [2] A6-7 [1] BUS-37 ;

() AB3 CON-14 [1] A3-16 [2] A6-11 [1] BUS-38 ;

() AB4 CON-15 [1] A4-2 [2] A6-13 [1] BUS-39 ;

() AB5 CON-16 [1] A4-5 [2] A6-15 [1] BUS-40 ;

() AB6 CON-17 [1] A7-3 [2] A4-13 [1] BUS-41 ;

() AB7 CON-18 [1] A4-16 [2] A7-5 [1] BUS-42 ;

() AB8 CON-19 [1] A5-1 [2] A3-3 [1] A7-7 [2]
BUS-43 ;

() AB9 CON-20 [1] A5-2 [2] A3-6 [1] A7-11 [2]
BUS-44 ;

() BA CON-5 [1] D6-6 [2] B3-3 [1] B3-4 [2]
A6-17 [1] A7-17 [2] A8-17 ;

() CLK2 CON-3 [1] B2-2 [2] BUS-59 ;

() DB0 C4-33 [1] B5-2 [2] BUS-51 ;

() DB1 C4-32 [1] B5-1 [2] BUS-52 ;

() DB2 C4-31 [1] B5-5 [2] BUS-53 ;

() DB3 C4-30 [1] BUS-54 ;

() DB4 C4-29 [1] BUS-55 ;

() DB5 C4-28 [1] BUS-56 ;

() DB6 C4-27 [1] BUS-57 ;

() DB7 C4-26 [1] BUS-58 ;

() IO B2-14 [1] BUS-24 ;
() MEM B2-12 [1] BUS-23 ;
() V30 BUS-62 ;
() V7 C3-2 [1] C3-16 [2] BUS-70 ;
() VMA B1-13 [1] C4-5 [2] D7-13 ;
() *A008 A3-4 [1] BUS-27 ;
() *A109 A3-7 [1] BUS-28 ;
() *A210 A3-11 [1] BUS-29 ;
() *A311 A3-14 [1] BUS-30 ;
() *A412 A4-4 [1] BUS-31 ;
() *A513 A4-7 [1] BUS-32 ;
() *A614 A4-11 [1] BUS-33 ;
() *A715 A4-14 [1] BUS-34 ;
() *CLK2 D7-5 [1] D5-1 [2] C3-17 [1] C2-11 [2]
C2-4 [1] B2-1 ;
() *DMA1 BUS-19 ;
() *DMA0 D7-6 [1] BUS-20 ;
() *DREQ BUS-21 [1] B3-13 [2] B4-6 [1] D4-6 ;
() *ENA B3-16 [1] B4-4 [2] BUS-25 ;
() *FPI A2-4 [1] A1-1 [2] CON-7 ;
() *HALT CON-6 [1] B3-5 [2] B3-14 [1] B4-5 [2]
BUS-22 ;
() *INT A2-16 [1] B6-12 [2] CON-8 ;
() *IRQ0 A2-12 [1] A1-8 [2] BUS-11 ;
() *IRQ1 A2-13 [1] A1-7 [2] BUS-12 ;
() *IRQ2 A2-14 [1] A1-6 [2] BUS-13 ;
() *IRQ3 A2-15 [1] A1-5 [2] BUS-14 ;
() *IRQ4 A2-1 [1] A1-4 [2] BUS-15 ;
() *IRQ5 A2-2 [1] A1-3 [2] BUS-16 ;
() *IRQ6 A1-2 [1] A2-3 [2] BUS-17 ;
() *NMI D4-16 [1] D5-13 [2] C4-6 [1] B2-16 ;
() *REFR D3-3 [1] D3-13 [2] D8-11 [1] BUS-61 ;

() *RESET BUS-18 [1] B4-7 [2] B3-1 [1] C4-40 [2]
D4-3 [1] CON-9 ;

() *RPLY BUS-60 [1] B4-1 [2] B1-1 [1] D4-12 ;

() *SVCT B4-2 [1] BUS-7 ;

() *VCTI BUS-9 ;

() *VCTO BUS-10 [1] D7-12 [2] D8-6 [1] D8-16 ;

() *WP B4-3 [1] BUS-8 ;

() *WRITE BUS-26 [1] A8-13 [2] B4-11 [1] D5-15 [2]
D7-15 ;

() A1-19 [1] A1-18 [2] A1-17 [1] A1-16 [2]
A1-15 [1] A1-14 [2] A1-13 [1] A1-12 [2]
A1-11 ;

() A2-6 [1] B5-11 [2] B6-13 ;

() A2-7 [1] B5-4 [2] B6-14 ;

() A2-8 [1] A2-5 ;

() A2-11 [1] B5-3 [2] B6-15 ;

() A2-19 [1] A2-18 ;

() A3-8 [1] A3-17 ;

() A3-19 [1] A3-18 ;

() A4-8 [1] A4-17 ;

() A4-19 [1] A4-18 ;

() A5-11 [1] A4-1 [2] A3-1 [1] B2-15 [2]
D4-14 [1] D8-3 ;

() A5-19 [1] A5-18 ;

() A6-8 [1] A6-1 ;

() A6-19 [1] A6-18 ;

() A7-8 [1] A7-1 ;

() A7-19 [1] A7-18 ;

() A8-8 [1] A8-1 ;

() A8-19 [1] A8-18 ;

() B1-2 [1] C1-12 ;

() B1-3 [1] C3-7 [2] C3-11 ;

() B1-17 [1] C4-10 [2] B7-1 ;

() B1-19 [1] B1-18 ;
() B2-4 [1] D7-4 ;
() B2-13 [1] D4-13 [2] D8-4 ;
() B2-19 [1] B2-18 ;
() B3-2 [1] B1-6 ;
() B3-17 [1] B1-12 ;
() B3-19 [1] B3-18 ;
() B4-19 [1] B4-18 ;
() B5-8 [1] B5-7 ;
() B5-13 [1] D5-14 ;
() B5-19 [1] B5-18 [2] B5-6 ;
() B6-8 [1] B6-6 [2] B6-1 ;
() B6-19 [1] B6-18 [2] B6-11 ;
() B7-2 [1] B6-3 [2] B5-17 ;
() B7-3 [1] A6-4 ;
() B7-4 [1] A6-6 ;
() B7-5 [1] B6-4 [2] B5-16 ;
() B7-8 [1] B7-7 ;
() B7-11 [1] D7-16 ;
() B7-13 [1] B6-5 [2] B5-15 ;
() B7-14 [1] A6-12 ;
() B7-15 [1] A6-14 ;
() B7-16 [1] B6-7 [2] B5-14 ;
() B7-19 [1] B7-18 ;
() B8-11 [1] B1-15 ;
() B8-19 [1] B8-18 ;
() C1-5 [1] C1-6 [2] C1-7 ;
() C1-19 [1] C1-18 [2] C1-16 [1] C1-14 ;
() C2-1 [1] C1-2 ;
() C2-2 [1] C1-17 [2] C1-1 ;
() C2-7 [1] C2-14 [2] C3-1 [1] D6-13 ;

BEFORE PROCEEDING ANY FARTHER:

- () PLUG THE CARD INTO THE EXTENDER CARD.
- () PLUG THE EXTENDER CARD INTO THE CARD CAGE, INCLUDING POWER SUPPLY.
- () PLUG IN THE POWER.

TEST THE FOLLOWING VOLTAGES WITH A VOLTAGE METER:

- () () () () +5V ON +5V BUSS BAR.
- ~~() () () () +12V ON +12V BUSS BAR.~~
- ~~() () () () +12V ON -12V BUSS BAR.~~
- ~~() () () () -5V ON -5V BUSS BAR.~~

IF THESE VOLTAGES ARE NOT CORRECT, CHECK FOR SOLDER BRIDGES OR COLD SOLDER JOINTS ON THE SOLDERED COMPONENTS ON THE EDGE OF THE CARD. IF THERE ARE ANY SOLDER BRIDGES, FIX THEM AND RETEST THE VOLTAGES.

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 BUS CONNECTOR TOWARD YOU.

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

() LOCATION C3, PART DS3642 () LOCATION D2, PART 555

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

() LOCATION B1, PART 74LS14 () LOCATION D4, PART 7426
() LOCATION B2, PART 7404 () LOCATION D7, PART 74LS10
() LOCATION B3, PART 74LS00

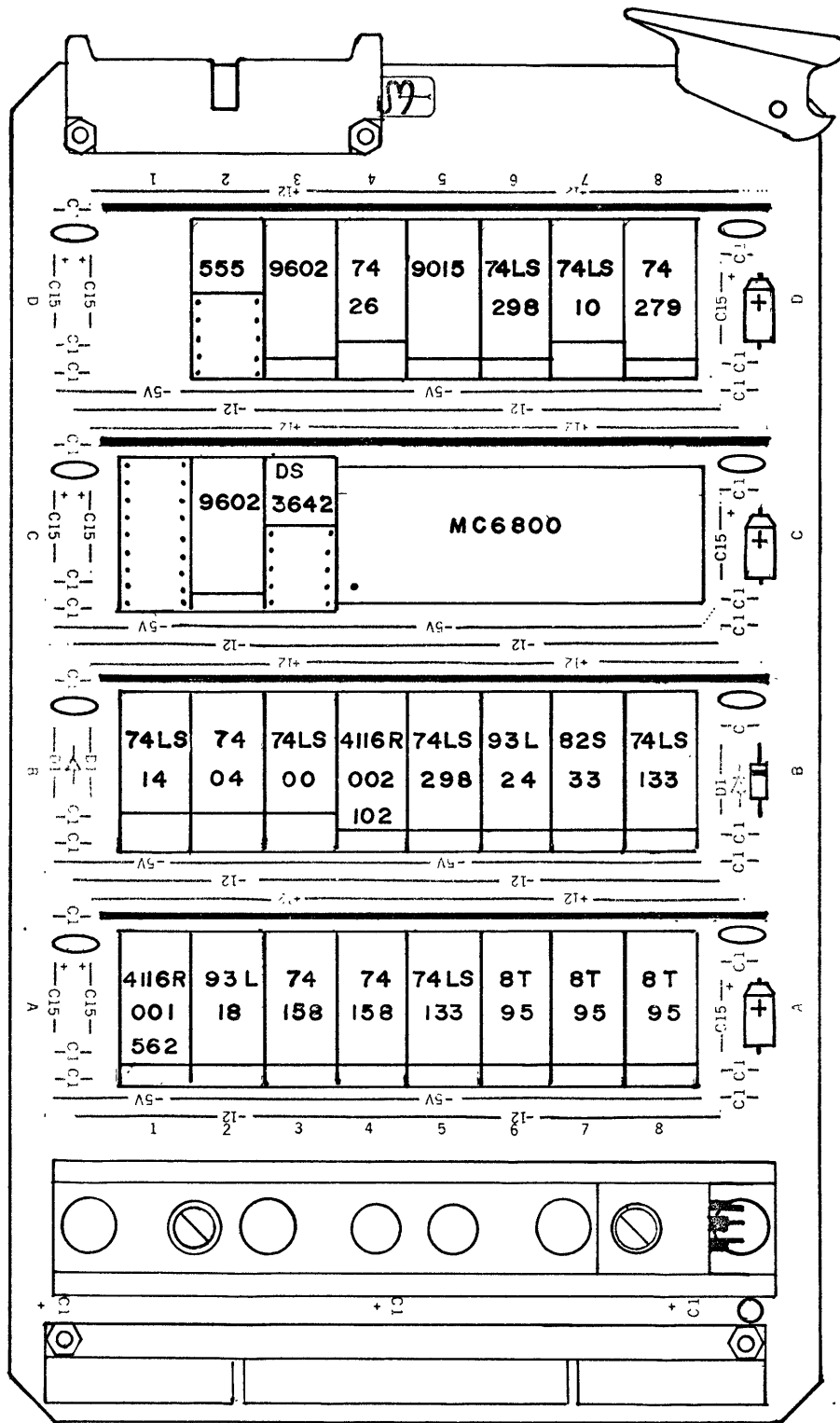
INSTALL THE SPECIFIED 16-PIN IC'S TOWARD THE TOP OF THE SOCKET. THE BOTTOM 2 PINS ARE LEFT EMPTY.

() LOCATION A1, PART 4116R-001-562
() LOCATION B4, PART 4116R-002-102
() LOCATION A2, PART 93L18 () LOCATION B5, PART 74LS298
() LOCATION A3, PART 74158 () LOCATION B6, PART 93L24
() LOCATION A4, PART 74158 () LOCATION B7, PART 82S33
() LOCATION A5, PART 74LS133 () LOCATION B8, PART 74LS133
() LOCATION A6, PART 8T95
() LOCATION A7, PART 8T95 () LOCATION D3, PART 9602
() LOCATION A8, PART 8T95 () LOCATION D5, PART 9015
() LOCATION D6, PART 74LS298
() LOCATION C2, PART 9602 () LOCATION D8, PART 74279

6.2 INSTALLING 24- AND 40-PIN IC'S

INSTALL THE SPECIFIED 40-PIN IC IN FOLLOWING SOCKETS. ORIENT THE DOT ON THE IC TOWARD THE LOWER LEFT-HAND CORNER.

() LOCATION C4,5,6,7,8 PART MC6800
() CONFIRM DOT IN LOWER LEFT-HAND CORNER.



6.3 INSTALLING DISCRETE COMPONENTS

LOCATION C1

INSTALL 11K OHM 2% RESISTOR (BROWN, BROWN, ORANGE) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 1 AND 18

INSTALL 100PF CAPACITOR ("101J") IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 2 AND 17

() 4 AND 15

INSTALL 15K OHM 2% RESISTOR (BROWN, GREEN, ORANGE) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 3 AND 16

INSTALL 51K OHM RESISTOR (GREEN, BROWN, ORANGE) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 5 AND 14

INSTALL 1N914 DIODE IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 6 AND 13

() 7 AND 12

LOCATION C3

INSTALL 27K OHM RESISTOR (RED, PURPLE, ORANGE) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 5 AND 14

INSTALL .01UF CAPACITOR ("103") IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 6 AND 13

INSTALL 22K OHM RESISTOR (RED, RED, ORANGE) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 7 AND 12

INSTALL 22UF CAPACITOR (RED, PINK, BLUE) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET (ORANGE = PLUS):

() 8 AND 11

LOCATION D2

INSTALL 2.2K OHM RESISTOR (RED, RED, RED) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 6 AND 13

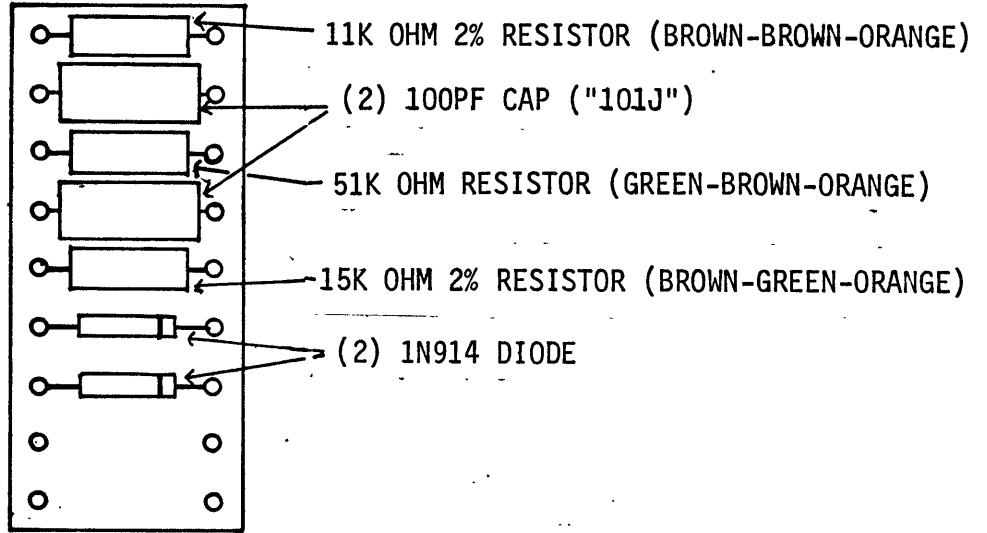
INSTALL 1K OHM RESISTOR (BROWN, BLACK, RED) IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 7 AND 12

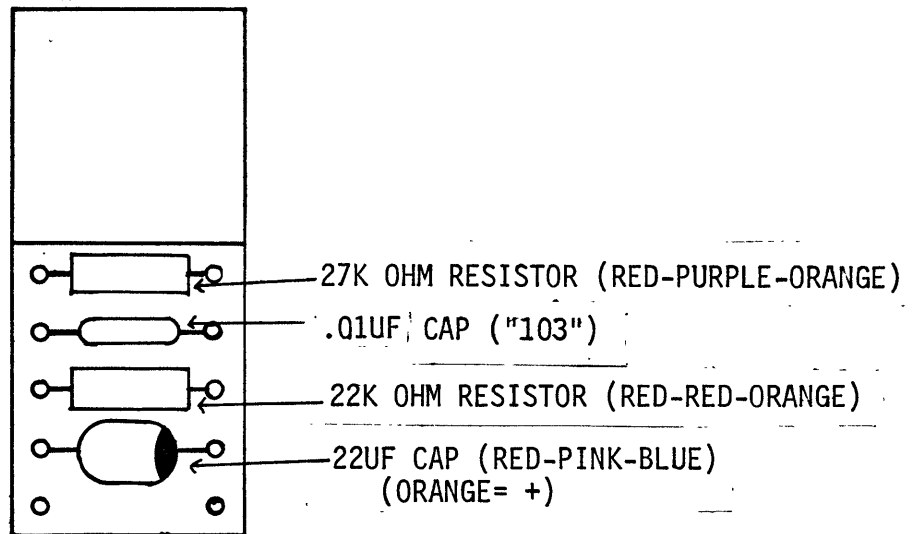
INSTALL .01 UF CAPACITOR ("103") IN HOLES CORRESPONDING TO THESE PINS OF THE SOCKET:

() 8 AND 11

LOCATION C1



LOCATION C3



LOCATION D2

