

SCELBI COMPUTER CONSULTING, INC.

ASSEMBLY INSTRUCTIONS - SCELBI CARD #: 1104-

FRONT PANEL CARD

DESCRIPTION

THE SCELBI 1104- FRONT PANEL CARD HAS BEEN SPECIALLY DESIGNED TO ALLOW A SCELBI-8H USER TO MONITOR THE OPERATION OF A SCELBI-8H MINI-COMPUTER. THE CARD CONTAINS AN ARRAY OF LOGIC CIRCUITRY AND LONG-LASTING SOLID STATE LIGHT EMITTING DIODES WHICH ALLOW THE OPERATOR TO DISPLAY THE CONTENTS OF MEMORY LOCATIONS, INTERNAL CPU REGISTER CONTENTS, CRITICAL CYCLE STATES, AND THE GENERAL STATUS OF THE CPU AND I/O OPERATIONS. THE CARD ALSO CONTAINS POWER SUPPLY VOLTAGE MONITOR INDICATORS.

KIT ASSEMBLY

YOU SHOULD HAVE THE ASSEMBLY DRAWING (1104A) BEFORE YOUR WORK AREA FOR READY REFERENCE. THIS DRAWING SHOWS THE EXACT LOCATION OF EACH PART ON THE BOARD.

AS YOU PERFORM EACH STEP MAKE A CHECK IN THE BOX PROVIDED TO THE RIGHT OF EACH INSTRUCTION AS A MEANS OF REMEMBERING WHERE YOU ARE IN THE ASSEMBLY PROCESS.

WORK SLOWLY AND CAREFULLY. MAKE SURE THE CORRECT COMPONENT IS INSERTED IN THE PROPER LOCATION AND THAT IT IS ORIENTED IN THE RIGHT MANNER. THIS IS ESPECIALLY IMPORTANT WITH INTEGRATED CIRCUITS, DIODES, AND OTHER POLARITY SENSITIVE COMPONENTS. COMPONENTS INCORRECTLY INSTALLED CAN BE CATASTROPHICALLY DAMAGED WHEN POWER IS APPLIED. IT IS BETTER TO TAKE A FEW EXTRA MINUTES DURING THE ASSEMBLY PROCESS TO ENSURE YOU ARE PROCEEDING CORRECTLY THAN TO HURRY AND HAVE TO TRY AND FIND AN ERROR AT A LATER TIME - POSSIBLY AFTER IRREVERSIBLE DAMAGE HAS OCCURED! A CAREFUL ASSEMBLER WILL BE ABLE TO COMPLETE THIS BOARD IN ONE TO TWO HOURS.

NOTES ON SOLDERING

USE A GOOD GRADE ROSIN-CORE SOLDER OF A TYPE INTENDED FOR USE WITH ELECTRONIC CIRCUITS. A SMALL 30 - 50 WATT SOLDERING IRON WITH A NARROW TIP SHOULD BE USED. DO NOT APPLY HEAT ANY LONGER THAN NECESSARY TO ALLOW THE SOLDER TO THOROUGHLY FLOW AROUND THE COMPONENT LEAD AND INTO THE HOLE SURROUNDING THE LEAD. THE 1104- P.C. BOARD HAS "PLATED-THROUGH" HOLES WHICH MEANS THAT THE CIRCUIT FOIL EXTENDS DOWN THROUGH EACH HOLE WHERE AN ELECTRICAL CONNECTION IS MADE TO ENSURE THAT ALL CONTACTS ARE GOOD. FOR SUCH "PLATED-THROUGH" HOLES, THE PROPER AMOUNT OF SOLDER HAS BEEN APPLIED WHEN THE SOLDER HAS JUST STARTED TO "CLIMB UP" THE COMPONENT LEAD ON THE OTHER SIDE OF THE BOARD FROM WHICH THE SOLDER IS APPLIED. NORMALLY SOLDERING SHOULD BE DONE FROM THE SIDE OPPOSITE TO THAT ON WHICH THE COMPONENTS

ST. AFTER EACH JOINT HAS BEEN SOLDERED CHECK TO ENSURE THAT THERE
NOT ANY SOLDER SHORTS TO ADJACENT CIRCUITRY.

INSTALLATION OF INTEGRATED CIRCUITS

NOTICE: WHEN INSTALLING INTEGRATED CIRCUITS MAKE SURE THAT EACH I.C. IS PROPERLY POSITIONED. PIN #1 ON AN I.C. NORMALLY HAS A SMALL DOT (OR DEPRESSION) NEXT TO IT ON THE BODY OF THE CHIP. THE LOCATION OF THIS DOT WHEN THE I.C. IS INSTALLED SHOULD BE THE SAME AS THAT SHOWN ON THE ASSEMBLY DRAWING. IF A MARKER CAN NOT BE FOUND ON AN I.C. THEN MAKE SURE THAT THE END OF THE INTEGRATED CIRCUIT WITH A DEPRESSION OR COLORED-IN AREA IS POSITIONED THAT SAME AS INDICATED ON THE ASSEMBLY DRAWING. ALL INTEGRATED CIRCUITS ON THE SCLEBI 1100- CARD MOUNT ON THE CARD SO THAT THEY ARE ORIENTED IN THE SAME DIRECTION. WHEN INSTALLING AN I.C. MAKE SURE THAT ALL OF THE PINS ON THE PACKAGE GO THROUGH THE PROPER HOLES IN THE P.C. BOARD (IT MAY BE OCCASSIONALLY NECESSARY TO STRAIGHTEN A PIN ON AN I.C.) AND THAT THE BODY OF THE I.C. IS FLUSH TO THE BOARD SURFACE. ONCE THE INTEGRATED CIRCUIT HAS BEEN INSTALLED SEVERAL OF THE PINS PROTRUDING THROUGH THE BOARD SHOULD BE BENT AGAINST THE FOIL ON THE BACK SIDE OF THE CARD SO THAT THE COMPONENT WILL BE HELD IN POSITION PRIOR TO THE TIME IT IS SOLDERED. WHEN IT IS TIME TO SOLDER THE COMPONENTS TURN THE CARD OVER SO THAT THE COMPONENTS ARE FACING DOWN AND CAREFULLY SOLDER EACH I.C. PIN TO ITS FOIL PAD.

- () INSTALL TWO TYPE 7L04 LOW POWER INTEGRATED CIRCUITS IN THE LOCATIONS LABELED ON THE ASSEMBLY DRAWING AS: Z1 AND Z3. WHEN THE TWO HAVE BEEN INSTALLED TURN THE CARD OVER AND SOLDER THE PINS ON EACH I.C. TO THEIR FOIL PAD.
- () INSTALL THREE TYPE 7416 INTEGRATED CIRCUITS AT THE LOCATIONS SPECIFIED FOR Z5, Z6 AND Z7. THEN SOLDER THE PINS OF THE INTEGRATED CIRCUITS TO THE BOARD.
- () INSTALL AND SOLDER TWO TYPE 7475 INTEGRATED CIRCUITS AT THE LOCATIONS SHOWN FOR Z2 AND Z4.

SPECIAL NOTE ABOUT LOCATING POSITIONS OF DISCRETE COMPONENTS ON THE PRINTED CIRCUIT CARD

SCLEBI PRINTED CIRCUIT CARDS HAVE NUMEROUS HOLES IN THE BOARD MATERIAL THAT ARE LINED WITH A CONDUCTIVE MATERIAL AND THAT ARE SIMPLY USED TO CONNECT CIRCUIT FOIL PATHS FROM ONE SIDE OF THE CARD TO THE OTHER SIDE. THESE HOLES ARE OFTEN TERMED "FEED-THROUGH" HOLES. IN ADDITION TO THE "FEED-THROUGH" HOLES THERE ARE ALSO HOLES PROVIDED FOR THE LEADS OF DISCRETE COMPONENTS TO PASS THROUGH AND THUS ALLOW ATTACHMENT OF SUCH COMPONENTS TO THE CARD AND ASSOCIATED CIRCUITRY. (THESE HOLES ALSO SOMETIMES SIMULTANEOUSLY SERVE AS "FEED-THROUGH" HOLES.) THE DISTINCTION BETWEEN HOLES THAT SIMPLY SERVE AS "FEED-THROUGH" HOLES AND THOSE THAT ARE FOR COMPONENT LEADS CAN BE MADE BY OBSERVING THE SIZE OF THE FOIL PAD THAT SURROUNDS A HOLE. HOLES FOR THE LEADS OF DISCRETE COMPONENTS ALWAYS HAVE LARGER FOIL PADS AROUND THEM THAN THE PLAIN "FEED-THROUGH" HOLES. THIS IS IMPORTANT TO REMEMBER WHEN INSTALLING DISCRETE COMPONENTS AS SOMETIMES A PLAIN "FEED-THROUGH" HOLE MAY BE CLOSE TO A HOLE THAT THE LEAD OF A DISCRETE COMPONENT IS SUPPOSED TO GO THROUGH. AN ADDITIONAL AID TO DISCERNING THE PROPER HOLE(S) FOR 1/4 WATT RESISTOR LEADS IS TO REMEMBER THAT THE HOLES FOR 1/4 WATT RESISTOR LEADS ARE ALWAYS SPACED 1/2 INCH APART.

INSTALLATION OF RESISTORS

NOTICE: TO PREPARE RESISTORS FOR MOUNTING ON THE P.C. CARD USE A PAIR OF NEEDLE POINT PLIERS TO BEND EACH LEAD PERPENDICULAR TO THE BODY OF THE RESISTOR AT A POINT 1/8 OF AN INCH AWAY FROM WHERE THE LEAD JOINS THE RESISTOR BODY. THE BENDING OF THE TWO LEADS SHOULD BE IN THE SAME DIRECTION SO THAT THE PREPARED RESISTOR HAS THE SHAPE OF A "U" WITH THE BODY OF THE RESISTOR FORMING THE BASE OF THE "U" AND THE TIPS OF THE "U" (FORMED BY THE LEADS) BEING 1/2 AN INCH APART. WHEN THIS HAS BEEN DONE THE RESISTORS LEADS WILL BE SPACED TO INSERT READILY IN THE HOLES ON THE P.C. CARD FOR RESISTORS. WHEN INSTALLING A RESISTOR, THE TWO LEADS ARE INSERTED IN THE APPROPRIATE HOLES AND THE LEADS PULLED FROM THE BACK OF THE BOARD UNTIL THE RESISTOR BODY IS PULLED UP NEXT TO THE P.C. BOARD. THE LEADS ARE THEN BENT OVER ON THE BACK SIDE OF THE CARD AND THE EXCESS LEAD MATERIAL CUT OFF LEAVING ABOUT 1/16 OF AN INCH OF THE LEAD AGAINST THE FOIL PAD. AFTER THE EXCESS LEAD HAS BEEN TRIMMED OFF THEN THE REMAINING 1/16 INCH OF LEAD IS SOLDERED TO ITS FOIL CONNECTION PAD.

IT IS ALSO IMPORTANT TO ENSURE THAT THE PROPER RESISTOR VALUE IS INSTALLED AT EACH LOCATION. RESISTOR VALUES ARE "COLOR-CODED" BY THREE COLOR BANDS ON THE BODY OF THE RESISTOR AND THE SEQUENCE OF THE COLORS (STARTING FROM THE BAND NEAREST ONE END OF THE RESISTOR AND READING TOWARDS THE MIDDLE) ARE GIVEN FOR EACH VALUE OF RESISTOR USED ON A CARD. ONLY THE FIRST THREE COLOR BANDS ARE USED TO DENOTE THE ACTUAL VALUE - ANY EXTRA BANDS ON A RESISTOR CAN BE IGNORED BY THE ASSEMBLER AS THEY ARE USED TO DESIGNATE PARAMETERS OTHER THAN THE ACTUAL RESISTOR VALUE.

- () INSTALL A 560 OHM (GRN-BLU-BRN) 1/4 WATT RESISTOR AT THE LOCATION SHOWN ON THE ASSEMBLY DRAWING FOR R2.
- () INSTALL A 1 K-OHM (BRN-BLK-RED) 1/4 WATT RESISTOR AT THE LOCATION SHOWN FOR R1. THEN INSTALL TWENTY NINE MORE 1 K-OHM RESISTORS AT LOCATIONS R3 THROUGH R31.

INSTALLATION OF CAPACITORS

- () INSTALL A 10 MFD ELECTROLYTIC CAPACITOR IN THE POSITION LABELED ON THE ASSEMBLY DRAWING FOR C1. BE CERTAIN THAT THE POSITIVE (+) END OF THE CAPACITOR IS ORIENTED IN THE SAME DIRECTION AS THAT SHOWN ON THE DRAWING (AND INDICATED ON THE P.C. CARD). AFTER THE CAPACITOR IS INSTALLED BEND THE LEADS DOWN ONTO THEIR FOIL PADS ON THE BACK SIDE OF THE BOARD AND TRIM OFF THE EXCESS LEAD LEAVING ABOUT 1/16TH OF AN INCH TO BE SOLDERED TO THE FOIL. THEN SOLDER EACH CAPACITOR LEAD TO ITS FOIL CONNECTION POINT
- () INSTALL TWO .1 UFD DISK CAPACITORS IN THE POSITIONS LABELED ON THE ASSEMBLY DRAWING AS: C2 AND C4. TRIM THE LEADS AND SOLDER THE CAPACITORS IN PLACE.
- () INSTALL AND SOLDER IN PLACE A .02 UFD DISK CAPACITOR AT THE LOCATION IDENTIFIED ON THE ASSEMBLY DRAWING FOR C3.

INSTALLATION OF LIGHT EMITTING DIODES

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* IMPORTANT NOTICE *
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THE LIGHT EMITTING DIODES USED ON THE SCELBI 1104- FRONT PANEL CARD SHOULD BE INSTALLED SUCH THAT THEIR BODY IS ABOUT 1/8 OF AN INCH ABOVE THE P.C. BOARD. THIS CAN BE DONE EASILY BY THE FOLLOWING METHOD: PREPARE SOME "SPACER" MATERIAL BY CUTTING SOME PAPER MATCH STICKS LENGTHWISE SO THAT STRIPS ABOUT 1/10 OF AN INCH WIDE ARE AVAILABLE. PLACE A PREPARED MATCH STICK UNDER EACH GROUP OF LIGHT EMITTING DIODES AS THEIR LEADS ARE INSERTED THROUGH THE BOARD. BRING EACH L.E.D. UP SNUG TO THE "SPACER" FORMED BY THE MATCH STICK BY PULLING THE LEADS ON THE BACK SIDE OF THE BOARD. BEND THE LEADS ON THE BACK SIDE OF THE BOARD, TRIM OFF THE EXCESS LEAD MATERIAL, AND SOLDER THE LEADS TO THEIR FOIL PADS. THEN REMOVE THE MATCH STICK "SPACER" THAT IS UNDERNEATH THE BODY OF THE L.E.D. ON THE FRONT SIDE OF THE CARD. THIS METHOD WILL ENABLE THE BUILDER TO ATTACH EACH LED WITH UNIFORM SPACING FROM THE CARD. IT IS ABSOLUTELY ESSENTIAL THAT THE L.E.D. PIECES BE SPACED AWAY FROM THE BOARD TO PREVENT THE METAL BODY OF THE L.E.D. FROM CONTACTING THE TWO FOIL PADS USED FOR THE L.E.D. LEADS!

IT IS EQUALLY IMPORTANT TO INSTALL THE L.E.D. PIECES SO THAT THE METAL TABS ARE POINTING TOWARDS APPROXIMATELY "ONE O'CLOCK" WHEN INSTALLED ON THE CARD. THE METAL TAB SPECIFIES THE ANODE PORTION OF THE L.E.D.. IF THE DIODE IS NOT PROPERLY ORIENTED, IT CAN BE PERMANENTLY DAMAGED WHEN POWER IS APPLIED TO THE CARD.

- () INSTALL TWENTY NINE LIGHT EMITTING DIODES IN THE POSITIONS SHOWN ON THE ASSEMBLY DRAWING FOR DS1 THROUGH DS29.

INSTALLATION OF FUSE CLIPS

- () INSTALL THE TWO P.C. MOUNTING FUSE CLIPS IN THE POSITIONS SHOWN TO HOLD F1. INSERT THE TWO TABS ON THE BASE OF EACH CLIP INTO THE HOLES PROVIDED FOR EACH CLIP, BEND THE TABS SLIGHTLY AGAINST THE FOIL ON THE OTHER SIDE OF THE BOARD TO HOLD THEM IN PLACE AND THEN SOLDER EACH TAB TO THE FOIL. ENSURE THAT THE CLIPS LINE UP SO THAT A FUSE WILL SEAT PROPERLY WHEN INSTALLED.

INITIAL INSPECTION AND TESTING

- () AT THIS TIME CAREFULLY INSPECT BOTH SIDES OF THE BOARD TO ASCERTAIN THAT THERE ARE NOT ANY SOLDER SHORTS BETWEEN P.C. FOIL LANDS. BE ESPECIALLY OBSERVANT ON THE COMPONENT SIDE OF THE CARD AROUND THE I.C. PINS. REMOVE ANY SOLDER SHORTS THAT MIGHT BE FOUND.
- () INSTALL A 3/8 AMP 8AG FUSE IN THE FUSE CLIPS FOR F1.

USE AN OHM METER TO MAKE THE FOLLOWING MEASUREMENTS:

METER BETWEEN PINS A1 AND A3 OF THE CARD CONNECTOR - AND THEN REVERSE THE METER LEADS TO OBTAIN A SECOND READING. THE READING IN BOTH DIRECTIONS SHOULD BE GREATER THAN FIVE (5) OHMS (ONE READING WILL BE TYPICALLY 3 TO 6 TIMES HIGHER THAN THE OTHER). IF THE READING(S) ARE LESS THAN 5 OHMS LOOK FOR SOLDER SHORT(S) BETWEEN THE +5 VOLT SUPPLY LINES AND THE COMMON RETURN LINES ON THE CARD.

NOW REPEAT THE ABOVE READINGS BETWEEN PINS A3 AND A5 OF THE CARD CONNECTOR. THIS TIME THE READING IN BOTH DIRECTIONS SHOULD BE GREATER THAN 50 OHMS. IF THIS IS NOT THE CASE THEN LOOK FOR SOLDER SHORT(S) BETWEEN THE -9 VOLT SUPPLY LINES AND THE COMMON RETURN LINES ON THE CARD.

FINALLY, TAKE SIMILAR READINGS BETWEEN PINS A1 AND A5 OF THE CARD CONNECTOR. AGAIN THE READINGS IN BOTH DIRECTIONS SHOULD BE GREATER THAN 50 OHMS. IF NOT, LOOK FOR SOLDER SHORT(S) BETWEEN THE +5 VOLT AND -9 VOLT SUPPLY LINES ON THE P.C. CARD.

FINAL TESTING

FINAL TESTING OF THE CARD MUST BE DONE WHEN THE CARD IS INSTALLED IN A SCELBI-8H MINI-COMPUTER SYSTEM. FINAL TESTING IS DESCRIBED IN DETAIL IN THE ASSEMBLY AND TESTING INSTRUCTIONS FOR THE SCELBI-8H MINI-COMPUTER CARD SET WHICH IS PROVIDED TO CUSTOMERS WHO PURCHASE SCELBI-8H MINI-COMPUTER CARD SETS. CUSTOMERS WHO HAVE PURCHASED TYPE 1104- BOARDS FOR OTHER TYPES OF SYSTEMS MAY DEVISE THEIR OWN FINAL CHECK-OUT PROCEDURES, OR MAY RETURN THE ASSEMBLED BOARD TO SCELBI COMPUTER CONSULTING, INC. FOR FINAL TESTING AT A MODEST FEE.