

SCELBI COMPUTER CONSULTING INC.

ASSEMBLY INSTRUCTIONS - SCELBI-8B P.C. CARD SET

INTRODUCTION

The following instructions apply to the assembly of all cards in the SCELBI-8B minicomputer kit. These instructions should be read before proceeding to the individual parts installation instructions which follow this section.

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 cards supplied with the SCELBI-8B have 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 solid. 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 solder is applied. Normally soldering should be done from the side opposite to that on which the components mount. After each connection has been soldered check to ensure that there are not any solder shorts to adjacent circuitry.

NOTES ON INSTALLATION OF INTEGRATED CIRCUITS

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 cannot 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 the same as indicated on the assembly drawing. All integrated circuits on the SCELBI-8B printed circuit cards mount on the cards 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 occasionally 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.

LOCATING POSITIONS OF DISCRETE COMPONENTS ON THE P.C. CARDS

Scelbi 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 distinc-

tion 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 holes for 1/4watt resistor leads and similar components such as most diodes is to remember that the holes for such components are spaced 1/2 inch apart.

NOTES ON INSTALLATION OF RESISTORS

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 resistor's leads will be spaced to insert readily in the holes on the p.c. Card. 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. Card. 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 away the remaining 1/16 inch of lead is soldered to the p.c. Foil.

It is also important to ensure that the proper resistor value is installed at each location. Resistor values are "color-coded" by three or more color bands on the body of the resistor. The sequence of the colors (starting from the band nearest one end of the resistor and reading towards the middle of the resistor) are given for each value of a resistor used on a card. (Only the first three color bands are used to denote the actual resistor value - any extra bands on a resistor may be ignored by the assembler as they are used to designate parameters other than the actual resistor value.)

NOTES ON INSTALLATION OF DIODES

Diodes are prepared for mounting on the P.C. Card in a fashion similar to that used for resistors. The base of the "u" is the body of the diode and the distance between the tips of the "u" made by the bent leads should be 1/2 inch. Diodes have a colored band or a series of bands at one end of their body. This band marks the cathode (negative) end of the diode. The cathode end of a diode is denoted by a band or bar on the end of the diode symbol (consisting of a triangle pointing towards a bar) that will be found at locations on a p.c. Card where a diode or diodes are to be installed. When installing diodes it is essential that the components are installed with their cathodes at the position indicated by the assembly drawing. Diodes are polarity sensitive devices and circuits utilizing them will not operate properly if they are installed incorrectly. Diodes are mounted flush to the surface of the p.c. Board the same as resistors. The excess lead length is then trimmed off leaving 1/16 inch to be soldered to the p.c. Foil pad.

GENERAL ASSEMBLY NOTES

As you perform each step in the assembly procedures 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.

Refer to the component location drawing provided for each card as you install the components. The drawings are essentially on a one-to-one scale with the actual printed circuit card to facilitate locating the placement of each component.

Work slowly and carefully. Make sure the specified component is inserted at the proper location and that it is oriented in the correct direction. This is especially important with integrated circuits, diodes, electrolytic capacitors, and other polarity sensitive devices. Components incorrectly installed may be catastrophically damaged when power is applied. It is better to take a few extra minutes during the assembly process to insure you are proceeding correctly than to hurry and have to try and find an error at a later time - possibly after irreversible damage has occurred to a component. A careful assembler will be able to complete each card in the SCELBI-8B kit in about two hours.

Step-by-step instructions for each card begin on the next page!

SCELBI COMPUTER CONSULTING, INC.

ASSEMBLY INSTRUCTIONS - SCELBI CARD #: 1100

CPU CARD

DESCRIPTION

The scelbi #1100 CPU card is the primary card in a SCELBI-8B minicomputer. This card contains a microprocessor "cpu-on-a-chip," a network of control and timing logic, and a master clock system. All computer operations emanate from and terminate at this card. This card provides signals that control and synchronize the overall operations of all other cards in a SCELBI-8B system.

NOTE

If the customer has purchased the option, the scelbi #1100 CPU card is shipped with a number of components already installed. These components are the network of parts that form the master clock system. The master clock system forms a critical portion of a SCELBI-8B minicomputer as the master clock must be carefully adjusted in order to insure proper computer operation. For those who purchased the option of having the master clock installed and adjusted at the factory, the resistive trimpots used to make the master clock adjustments have been sealed to prevent their being accidentally altered. Customers are cautioned. Not to tamper with the trimpot adjustments once they have been set by the factory.

KIT ASSEMBLY

You should refer to the assembly drawing shown on the next page during the assembly process. The drawing is to scale and shows the exact location of each part on the p.C. Card.

INSTALLATION OF INTEGRATED CIRCUITS

- () Install four type 7400 integrated circuits in the locations labeled on the assembly drawing as: Z6, Z13, Z21 and Z25. When all four have been installed turn the card over and solder the pins on each I.C. to their foil pad.
- () Install. A type 7402 I.C. At the location specified for Z14 on the assembly drawing. Solder the pins of the integrated circuit to the card.
- () Install and solder two type 7403 integrated circuits at the locations shown for Z2 and Z3.
- () Install and solder four type 7404 integrated circuits at locations Z5, Z12, Z15 and Z24.

- () Install and solder two type 74104 (low power) integrated circuits at locations Z1 and Z10.
- () Install and solder two type 7410 integrated circuits at locations Z7 and Z20.
- () Install and solder a type 7420 I.C. At location Z19.
- () Install and solder a type 7442 I.C. At location Z4.
- () Install and solder three type 7474 integrated circuits at locations Z18, Z22 and Z26.
- () Install and solder a type 7476 I.C. At location Z23.
- () Install and solder five type 74121 integrated circuits at locations Z8, Z9, Z16 Z17 and Z21a.

INSTALLATION OF RESISTORS

- () Install eight 1 k ohm (brn-blk-red) 1/4 watt resistors at the locations shown on the assembly drawing for: r1, r3 r18, r23, r32, r33, r36 and r37.
- () Install nine 3.3 K ohm (or-or-red) 1/4 watt resistors at the locations shown for r6, r8, r10, r11, r12, r14, r15, r16 and r17.
- () Install eighteen 10 k ohm (brn-blk-op) 1/4 watt resistors at the locations shown for: r1a, r2, r4, r5, r7, r9, r13, r19, r20, r21, r22, r24, r26, r28, r30, r35, r38 and r39.
- () Install a 33 k ohm (or-or-or) 1/4 watt resistor at the location shown for r34.
- () Install four 5 k ohm trim pots at the locations shown for r25, r27, r29 and r31.

INSTALLATION OF DIODES

- () Install eight computer diodes at the locations shown for: cr1 through cr8.
- () Install one 6.3 Volt zener diode at the location shown for vri. Be sure and observe correct polarity as indicated on the drawing.
- () Install one 12.0 Volt zener diode at the location shown for vr2. Observe correct polarity!

TRANSISTOR INSTALLATION

- () Install a type 2n2907 transistor at the location shown on the assembly drawing for q1. The body of the transistor should be spaced about 1/8 inch away from the p.C. Card. As an aid in maintaining this distance as the transistor is installed, place a paper match stick under the transistor when the transistor leads are first inserted in their holes. Push the transistor lead through the card until the body is touching the match stick. Then turn the card over bend the transistor leads against their respective foil pads, trim the excess lead material off leaving 1/16 inch of lead to be soldered to the foil pad. Solder the leads of the transistor. Then, remove the matchstick that was used as a spacer. Note: when installing the transistor be sure that the small tab on the body of the transistor (denoting the emitter junction lead of the device) is oriented in the direction shown on the assembly drawing.

INSTALLATION OF CAPACITORS

- () Install three 10.Mfo electrolytic. Capacitors in the positions labeled on the assembly drawing as: c1, c9 and c14. 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). As each capacitor is installed bend the leads down onto their foil pads on the back side of the board and trim off the excess lead. Then solder each capacitor lead to it's foil connection point.
- () Install seven .1 Ufd disk capacitors in the positions labeled on the assembly drawing as: c2, c3, c4, c5, c6, c8 and c17. Trim the leads and solder the capacitors in place.
- () Install and solder in place a .02 Ufd disk capacitor at the location specified on the assembly drawing for c7.
- () Install and solder in place four 330 pf disk capacitors at the locations for: c10, c11, c12 and c13.

INSTALLATION OF FUSE CLIPS

- () Install the four p.C. Mouting fuse clips in the positions shown to hold f1 and f2. Insert the two tabs on the base of each clip into the holes provided, bend the tabs slightly against the foil on the other side of the card 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 are found.
- () Install a 0.75 Amp type 8ag fuse in the fuse clips for f1.
- () Temporarily "jumper" the fuse clips for f2 with a piece of wire or a length of solder.

- () 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 typically be several times higher than the other.) If the readings are less than 5 ohms look for solder shorts 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 one direction should be very high (greater than 50 k ohms) and the reading with the meter leads reversed should be greater than five (5) ohms. If this is not the case, look for solder shorts 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. The reading in one direction should be more than 50 K ohms, and in the other more than five (5) ohms. If not, look for solder shorts between the +5 volt and -9 volt supply lines on the card.

- () Remove the jumper from the fuse clips at f2 and install a 1/8 ampere type 8ag fuse.

ADJUSTING THE MASTER CLOCK

If you purchased a CPU card that did not have the master clock circuit installed and adjusted you should refer to the appendix on the next page and perform the clock circuit adjustments before going further. If you purchased a CPU card with the clock circuitry already installed and adjusted you may proceed directly to the next step.

INSTALLATION OF THE '8008' INTEGRATED CIRCUIT

- () Before installing the 8008 integrated circuit take a short piece of wire and install a jumper between the foil pads on the card marked "e1" and "e2" (next to I.C. Z14). Make sure the jumper does not short to any of the foil lands that it crosses over.
- () The 8008 "cpu-on-a-chip" requires an 18 pin socket which may be readily fashioned using "molex" (rtm) pins. The 8008 should be installed in its socket at Z11 making sure that the small dot or arrow which designates pin 1 on the I.C. is oriented as shown on the assembly drawing. When installing the '8008' take extreme care to ensure that each pin fits into its individual clip of the "molex" socket. Do not force the device into its socket as this may subsequently bend and possibly break I.C. pins. When the I.C. is fully seated in the socket check to see that none of the molex pins are shorting to an adjacent pin.

FINAL TESTING

Final testing of the card must be done when the card is installed in a SCELB-8B minicomputer system.

ADJUSTING THE MASTER CLOCK CIRCUITRY ON THE SCELBI #1100 CPU CARD

The master clock circuitry for the SCELBI-8B mini-computer is on the scelbi #1100 CPU card. This circuitry must be adjusted correctly or the unit will not function properly. To adjust the master clock circuitry you will need the following instruments.

1. A frequency counter.
2. A good oscilloscope, either a dual trace, or a single trace unit that can be "externally" triggered.

ADJUSTMENT SETUP

Connect a +5 volt supply between pins a1 (+) and a3 (common) of the CPU card. (The card may be placed on your work bench - it does not have to be installed in a chassis or system.) The +5 volt supply should be controlled by a switch so that power can be applied and removed at will.

Connect the "a" trace of a dual trace scope and set the scope to trigger on sweep "a," or, if a single trace scope is being used attach the "external" trigger lead to pin 6 of I.C. Z8. (This signal can also be readily accessed at the left lead of resistor r2.) This signal will be designated "clock phase 1" for this discussion.

Connect a frequency counter to pin 6 of Z17 (or pick up the signal on the right lead of resistor r1.) This signal is designated "clock phase 2." If you are using a dual trace scope you may also connect trace "b" to this point. Otherwise, use this point to examine "clock phase 2" when necessary during the adjustment procedure.

Naturally, both the oscilloscope and the frequency counter should have their common terminals connected to the common point on the CPU card (at pin a3.)

ADJUSTMENT PROCEDURE

The master clock circuit has a "self starting" network consisting of resistor r24 and capacitor c9. In order for the circuit to start two conditions must be met. First, the power supply voltage must come on rapidly when power is applied to the card, and second, the clock circuit must be adjusted within its oscillating range.

The first step in the adjustment procedure is to apply power to the card and observe that a signal appears at "clock phase 1." If a signal does not appear, turn the power off, adjust trimpots r25 and r27 several turns and re-apply power. Continue this procedure until a signal appears at "clock phase 1" when power is applied.

Customer's who provide their own power supplies should be cautioned that some power supplies, when turned on by a switch in the a.c. Line, will not build up to the proper d.c. level at a fast enough rate to activate the clock circuit. In such cases, a switch should be installed in the d.c. supply line to the computer. After the power supply has been initially turned on by the a.c. line switch, and has had time to build up the proper voltage levels, the d.c. switch can be used to connect the supply voltages to the computer.

Once a steady signal has appeared at "clock phase 1", look for a signal at "clock phase 2." If necessary, adjust trimpots r29 and r31 until a signal appears.

When a signal is present at both "clock phase 1" and "clock phase 2" one may proceed to make the fine adjustments to the clock circuitry.

To make the fine adjustments go back and carefully adjust trimpots r25 and r27 until "clock phase 1" is high for approximately 850 nanoseconds and low for 1150 nano-seconds. Once the signal is close to this range observe the frequency counter and carefully tweak the trimpots for a frequency reading of 500 kilohertz while maintaining the indicated high/low ratios as closely as possible. Set the frequency as close to 500 kilohertz as practical - at least within plus or minus 5 KHz., Preferably within several kilohertz.

Next, with the scope being triggered by "clock phase 1," observe "clock phase 2." Use trimpots r29 and r31 to obtain the following conditions. "Clock phase 2" should go high about 200 nano-seconds after the fall of "clock phase 1," and should remain high for approximately 550 nano-seconds. When this condition is met, and "clock phase 1" has been properly adjusted, the distance between the fall of "clock phase 2" and the rise of "clock phase 1" will be about 400 nano-seconds.

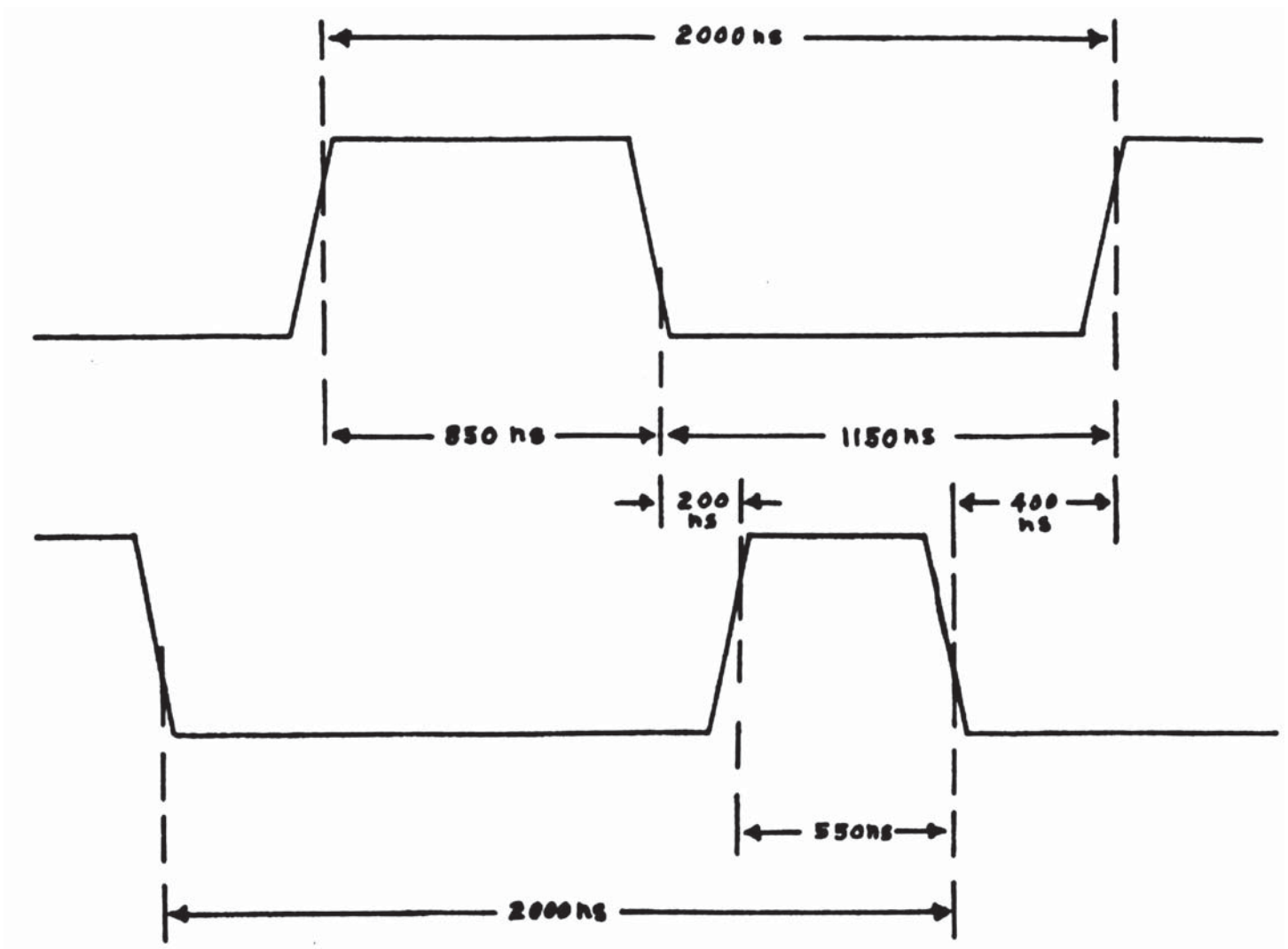
Note! If at any time during the adjustment procedure the clock signal(s) disappear it will be necessary to re-apply power to restart the clock.

When "clock phase 1" and "clock phase 2" have been adjusted for the waveforms as described, you should allow the circuit to operate. For approximately 30 minutes and then recheck the frequency. You may make minor adjustments to bring the frequency to 500 KHz. After the circuit has been operating for this period. This completes the master clock circuitry adjustment procedure.

A summary of the adjustment limits and a pictorial of the waveforms and timing relationships is shown on the next page.

CLOCK PERIOD (Phase 1 or 2):	2,000 Nano-seconds +/- 100 Nano-seconds
Minimum pulse width at CLOCK PHASE 1:	700 Nano-seconds
Minimum pulse width Of CLOCK PHASE 2:	550 Nano-seconds
Minimum delay from fall of PHASE 1 to rise of PHASE 2:	200 Nano-seconds
Minimum delay from fall of PHASE 2 to rise of PHASE 1:	400 Nano-seconds
Minimum delay from fall of PHASE 1 to fall of PHASE 2:	700 Nano-seconds
Maximum delay from fall of PHASE 1 to fall of PHASE 2:	1,100 Nano-seconds

REPRESENTATIVE WAVEFORMS



SCELBI COMPUTER CONSULTING INC.

ASSEMBLY INSTRUCTIONS - SCELBI CARD I: 1101-

DBB & OUTPUT CARD

DESCRIPTION

The SCELBI #1101 DBB & output card contains memory address and state control latches and logic for selecting banks of memory words. In addition the card contains multiplexing logic for selecting output ports. While the card is capable of selecting 16 different output ports, if it is installed in a standard SCELBI-8B chassis only eight of the output ports will be wired to the I/O connectors on the back of the chassis unit.

KIT ASSEMBLY

You should refer to the assembly drawing shown on the next page during the assembly process. The drawing is to scale and shows the exact location of each part on the P.C. card.

INSTALLATION OF INTEGRATED CIRCUITS

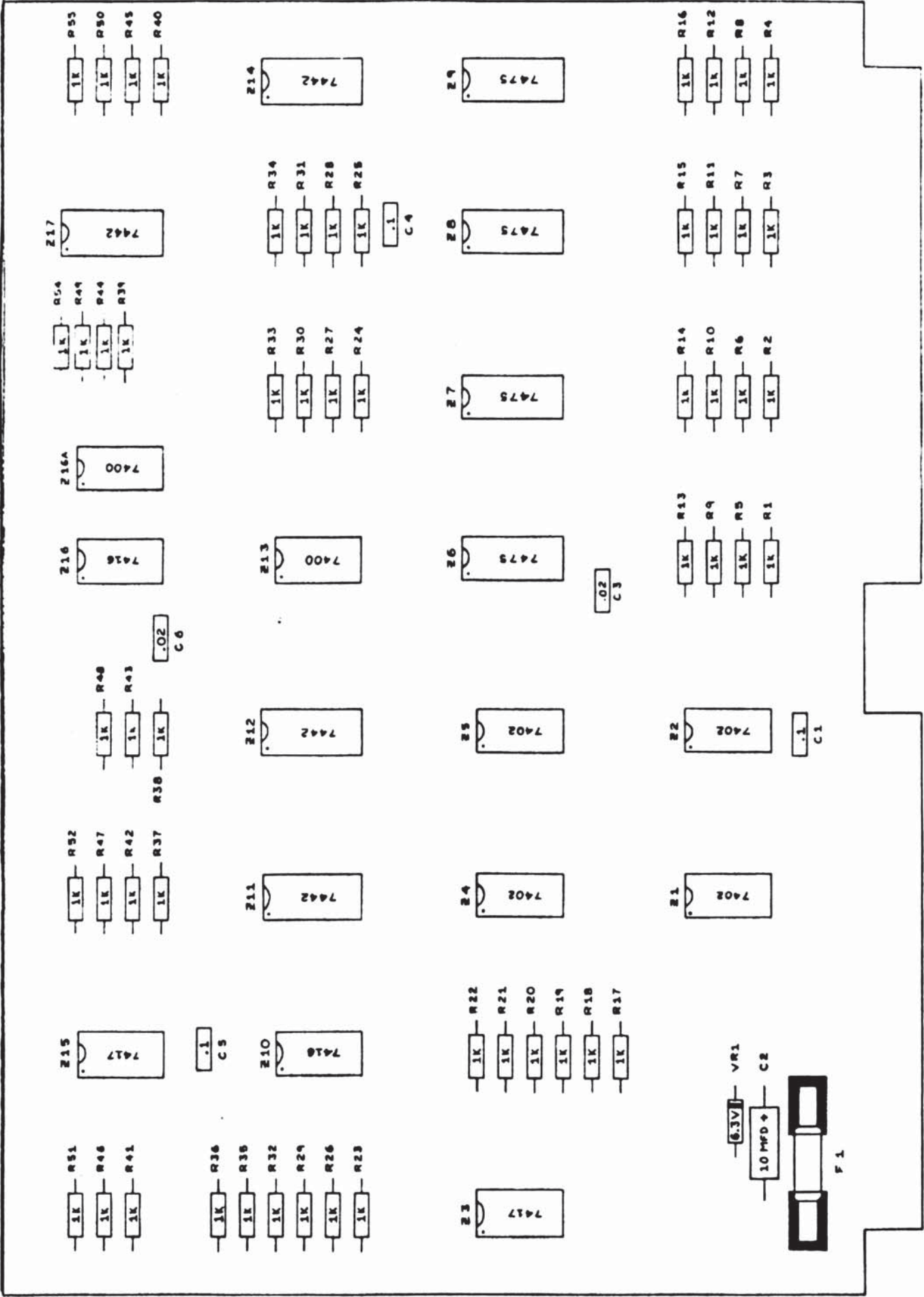
- () Install two type 7400 integrated circuits in the locations labeled on the assembly drawing as: Z13 & Z16A. When they have been installed turn the card over and solder the pins on the I.C. to their foil pad.
- () Install four type 7402 integrated circuits at the locations specified for Z1, Z2, Z4 and Z5. Then solder the pins of the integrated circuits to the card foil.
- () Install and solder two type 7416 integrated circuits at the locations shown for Z10 and Z16.
- () Install and solder two type 7417 integrated circuits at the locations shown for Z3 and Z15.
- () Install and solder four type 7442 integrated circuits at the locations shown for Z11, Z12, Z14 and Z17.
- () Install and solder four type 7475 integrated circuits at the locations shown for Z6, Z7, Z8 and Z9.

INSTALLATION OF RESISTORS

- () Install fifty-four 1 K ohm (BRN-BLK-RED) 1/4 watt resistors at the locations shown on the assembly drawing for R1 through R52, as well as R54 and R55. (R53 designation not used.)

INSTALLATION OF DIODES

- () Install one 6.3 volt zener diode at the location shown for VR1. Be sure and observe correct polarity as indicated on the drawing



INSTALLATION OF CAPACITORS

- () Install one 10 MFD electrolytic capacitor in the position labeled on the assembly drawing for C2. 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.
- () Install three .1 UFD disk capacitors in the positions labeled on the assembly drawing as: C1, C4 and c5.
- () Install two .02 UFD disk capacitors at the locations identified on the assembly drawing for C3 and C6.

INSTALLATION OF FUSE CLIPS

- () Install the two P.C. Mounting fuse clips in the positions shown to hold fuse F1. Insert the two tabs on the base of each clip into the holes provided for each clip, bend the tabs slight 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.
- () Install a 1.0 ampere type 8AG fuse in the fuse clips for F1.

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 are found.
- () 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 typically be several times higher than the other.) If the readings are less than five ohms look for solder shorts between the +5 volt supply lines and the common return lines on the card.

FINAL TESTING

Final testing of the card must be done when the card is installed in a SCEL-BI-8B minicomputer system.

SCELBI COMPUTER CONSULTING INC.

ASSEMBLY INSTRUCTIONS - SCELBI CARD #: 1102-

INPUT CARD

DESCRIPTION

The SCELBI #1102 input card contains multiplexing logic which selects the input to the central processor unit. The card allows the input to the "CPU" to arrive from the memory banks, the console switches (which are used to allow control of the computer by manual means), or any one of six different input ports.

KIT ASSEMBLY

You should refer to the assembly drawing shown on the next page during the assembly process. The drawing is to scale and shows the exact location of each part on the P.C. card.

INSTALLATION OF INTEGRATED CIRCUITS

- () Install a type 7400 integrated circuit in the location labeled on the assembly drawing as Z5. When it has been installed turn the card over and solder the pins on the I.C. to their foil pad.
- () Install a type 7404 integrated circuit at the location specified for Z11. Then solder the pins of the I.C. to the card.
- () Install and solder a type 7410 I.C. at the location shown for Z6.
- () Install and solder eight type 74151 integrated circuits at the locations shown for: Z1, Z2, Z3, Z4, Z7, Z8, Z9 and Z10.

INSTALLATION OF RESISTORS

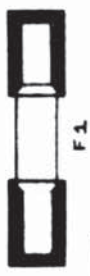
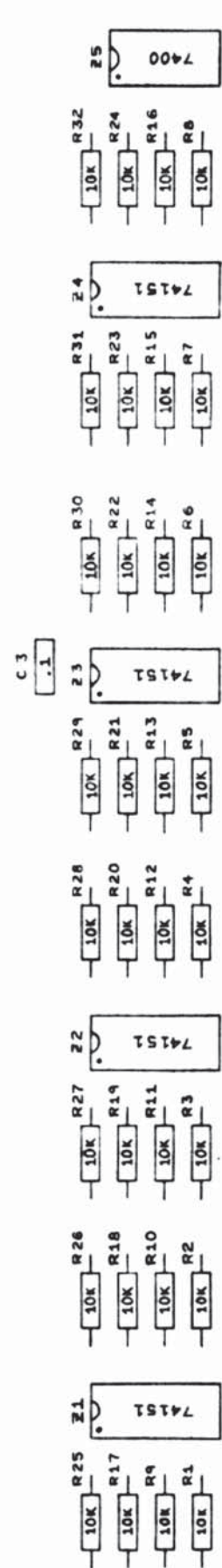
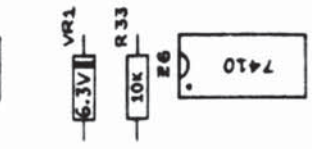
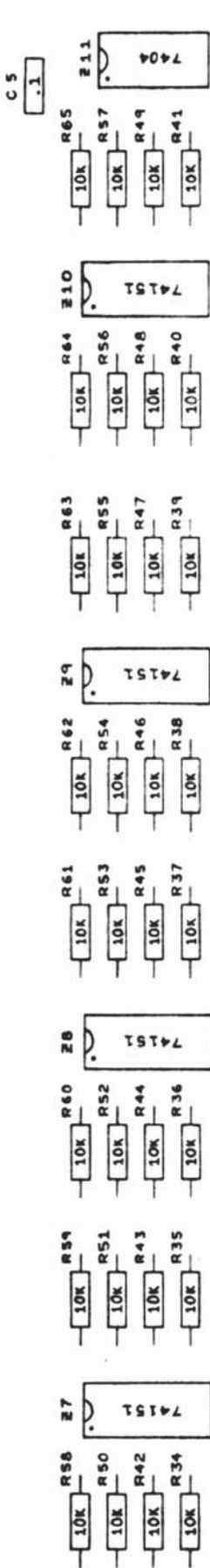
- () Install sixty five 10 K ohm (BRN-BLK-OR) 1/4 watt resistors at the locations shown on the assembly drawing for R1 through R65.

INSTALLATION OF DIODES

- () Install one 6.3 volt zener diode at the location shown for VR1. Be sure and observe correct polarity as indicated on the drawing.

INSTALLATION OF CAPACITORS

- () Install one 10 MFD electrolytic capacitor in the position labeled on the 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.



F1

- () Install two .1 UFD disk capacitors in the positions labeled on the assembly drawing as: C3 and C5.
- () Install two .02 UFD disk capacitors in the positions labeled on the assembly drawing as: C2 and C4.

INSTALLATION OF FUSE CLIPS

- () Install the two P.C. mounting fuse clips in the positions shown to hold fuse F1. Insert the two tabs on the base of each clip into the holes provided, bend the tabs slightly against the foil on the other side of the card 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 side 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 are found.
- () Install a 3/8 ampere type 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 the reverse the meter leads to obtain a second reading. The reading in both directions should be greater than five (5) ohms. (One reading will typically be several times higher than the other.) If the readings are less than five ohms look for solder shorts between the +5 volt supply lines and the common return lines on the card.

FINAL TESTING

Final testing of the card must be done when the card is installed in a SCEL-BI-8B minicomputer chassis unit.

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-8B user to monitor the operation of a SCELBI-8B 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 refer to the assembly drawing shown on the next page during the assembly process. The drawing is to scale and shows the exact location of each part on the P.C. Card.

INSTALLATION OF INTEGRATED CIRCUITS

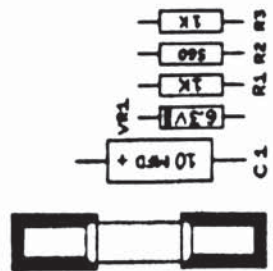
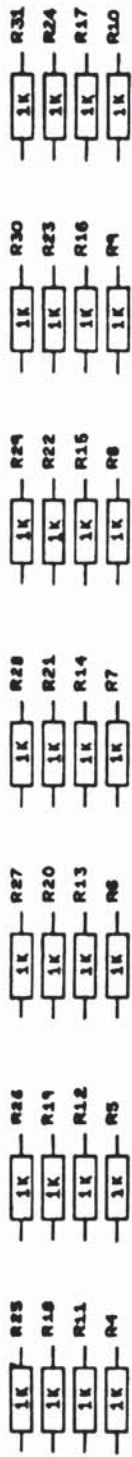
- () Install two type 74L04 (low power) integrated circuits in locations labeled on the assembly drawing as: Z1 and Z3. When the two have been installed turn the card over and solder pins on each I.C. to their foil pad.
- () Install three type 7416 integrated circuits at the locations specified for: Z5, Z6 and Z7. Then solder the pins of the integrated circuits to the card.
- () Install and solder two type 7475 integrated circuits at the locations shown for: Z2 and Z4.

INSTALLATION OF RESISTORS

- () Install one 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 1/4 watt resistors at locations R3 through R31.

INSTALLATION OF DIODES

- () Install one 6.3 volt zener diode at the location shown for VR1. Be sure and observe correct polarity as indicated on the drawing.



INSTALLATION OF CAPACITORS

- () Install one 10 MFD electrolytic capacitor in the position labeled on the 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.
- () Install two .1 UFD disk capacitors in the positions labeled on the drawing as: C2 and C4.
- () Install one .02 UFD disk capacitor at the location identified on the assembly drawing for C3.

INSTALLATION OF LIGHT EMITTING DIODES

- () Install twenty nine type MV520 light emitting diodes in the positions labeled on the drawing for DS1 through DS29. The anode of the L.E.D. (shorter lead) goes in the top most hole (furthest away from the card connector). The cathode of the L.E.D. (longer lead) goes in the bottom hole. Push the diode leads through the hole until the wider portion of the leads are flush with the board. Then turn the card over, solder the leads to the foil, and trim off the excess lead.

INSTALLATION OF FUSE CLIPS

- () Install the two P.C. mounting fuse clips in the positions shown to hold fuse F1. Insert the two tabs on the base of each clip into the holes provided, bend the tabs slightly against the foil on the other side of the card 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 card to ascertain that there are no 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 are formed.
- () Install a 3/8 ampere type 8AG fuse in the fuse clips for F1.
- () Use an ohm meter to make the following measurements:

Meter between pins A1 and 3 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 typically be several times higher than the other.) If the readings are less than five ohms look for solder shorts 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 readings in both directions should be greater than 50 ohms. If this is not the case, look for solder shorts 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 shorts between the +5 volt and -9 volt supply lines on

the P.C. card.

FINAL TESTING

Final testing of the card must be accomplished when the card is installed in a SCELBI-8B minicomputer chassis unit.

SCELBI COMPUTER CONSULTING, INC.

ASSEMBLY INSTRUCTIONS - SCELBI CARD #: 1106

MEMORY EXPANSION CARD

DESCRIPTION

The SCELBI #1106 memory expansion card contains memory address logic which enables the computer to select the desired "page" of memory in a system that may contain "pages" or "banks" of memory elements.

KIT ASSEMBLY

You should refer to the assembly drawing shown on the next page during the assembly process. The drawing is to scale and shows the exact location of each part on the P.C. Card.

INSTALLATION OF INTEGRATED CIRCUITS

- () Install nine type 7442 integrated circuits in the locations labeled on the assembly drawing as: Z1 - Z7, Z9 & Z10. When all nine have been installed turn the card over and solder the pins on each I.C. to their foil pad.
- () Install a type 7417 I.C. at the location specified for Z8 on the assembly drawing. Solder the pins of the integrated circuit to the card.

INSTALLATION OF RESISTORS

- () Install 67 10 k ohm (BRN-BLX-OR) 1/4 watt resistors at the locations shown on the assembly drawing for, R1 - R67.

INSTALLATION OF DIODES

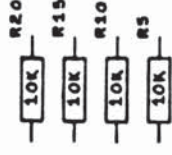
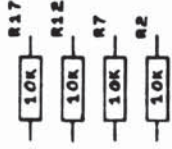
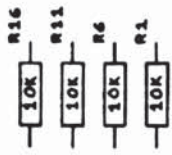
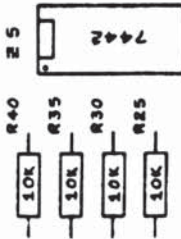
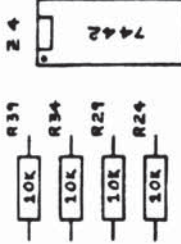
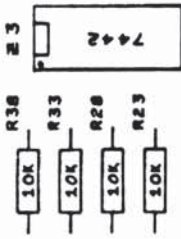
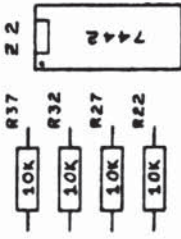
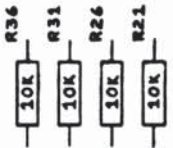
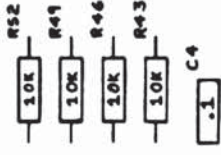
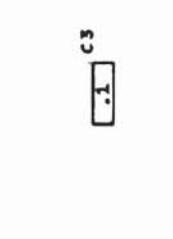
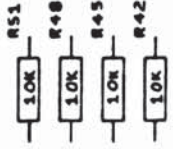
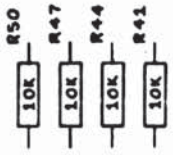
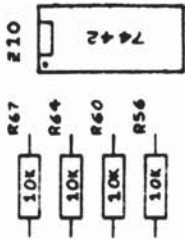
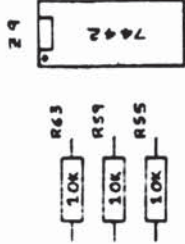
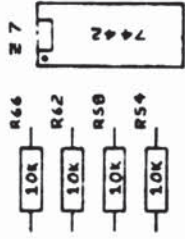
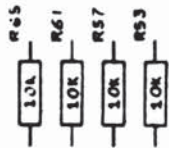
- () Install one 6.3 volt zener diode at the location shown for VR1. Be sure and observe correct polarity as indicated on the drawing.

INSTALLATION OF CAPACITORS

- () Install one 10 MFD electrolytic capacitor in the position labeled on the 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.
- () Install three .1 UFD disk capacitors in the positions labeled on the drawing as: C2, C3 & C4.

INSTALLATION OF FUSE CLIPS

- () Install the two P.C. mounting fuse clips in the positions shown to hold fuse F1. Insert the two tabs on the base of each clip into the holes provided. Bend the tabs slightly against the foil on the other side of the card 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 card to ascertain that there are no 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 are found.
- () Install a 3/8 ampere type 8AG fuse in the fuse clips for F1.
- () Use an ohm meter to make the following measurements.

Meter between pins at 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 several times higher than the other.) If the reading(s) are less than five ohms look for solder shorts between the +5 volt supply lines and the common return lines on the card.

FINAL TESTING

Final testing of the card must be accomplished when the card is in-stalled in a SCELBI-8B minicomputer chassis unit.

SCELBI COMPUTER CONSULTING, INC.

ASSEMBLY INSTRUCTIONS - SCELBI CARD #: 1107-

4K RAM MEMORY CARD

DESCRIPTION

The SCELBI #1107 RAM memory card may be populated with type 2102 (static RAM) memory elements in groups of 1,024 words to a maximum of 4,096 words per card. The card also contains memory bank selection logic. These cards serve as the "read and write" memory bank(s) for a SCELBI-8B system. The standard SCELBI-8B chassis has P.C. card sockets to accept up to 16,384 words of memory to be used by the computer.

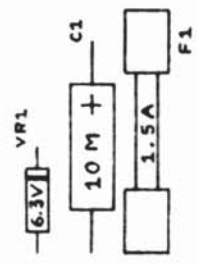
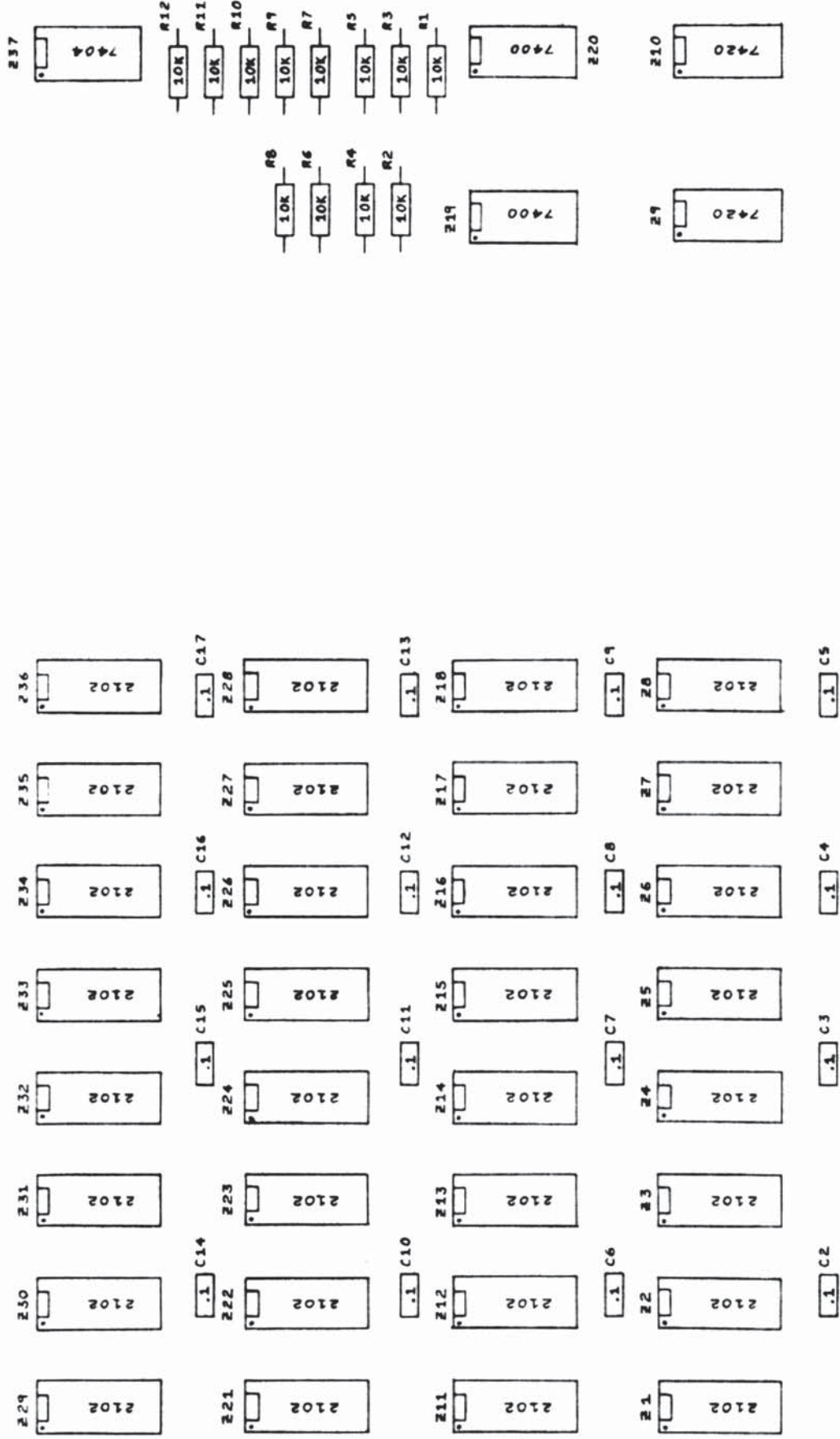
KIT ASSEMBLY

You should refer to the assembly drawing shown on the next page during the assembly process. The drawing is to scale and shows the exact location of each part on the P.C. card.

INSTALLATION OF INTEGRATED CIRCUITS

Notice. The following four steps detail the installation of the RAM memory integrated circuits for an 1107 memory card supplied with 4,096 words of memory (32 memory chips). If you purchased a board with less memory. Then perform the steps in order for each group of eight memory chips provided.

- () Install eight type 2102 integrated circuits in the locations labeled on the drawing as Z29 - Z36. When all eight have been installed turn the card over and solder the pins on each I.C. to their foil pad. (This provides four pages of memory on the four lowest valued select lines for the card.)
- () Install eight type 2102 integrated circuits in the locations labeled on the drawing as Z21 - Z28. (This provides four pages of memory on the next higher order select lines for the card.)
- () Install eight type 2102 integrated circuits in the locations labeled on the drawing as Z11 - Z18. (This provides four pages of memory on the next higher order select lines for the card.)
- () Install eight type 2102 integrated circuits in the locations labeled on the drawing as Z1 - Z8. (This provides four pages of memory on the four highest valued select lines for the card.)
- () Install two type 7400 integrated circuits in the locations labeled on the assembly drawing as Z19 and Z20.
- () Install two type 7420 integrated circuits in the locations labeled on the assembly drawing as, Z9 and Z10.
- () Install a type 7404 integrated circuit in the location labeled on the assembly drawing as: Z37.



INSTALLATION OF RESISTORS

- () Install twelve 10 K ohm (BRN-BLK-OR) 1/4 watt resistors at the locations shown on the assembly drawing for: R1 - R12.

INSTALLATION OF DIODES

- () Install one 6.3 volt zener diode at the location shown for VR1. Be sure and observe correct polarity as indicated on the drawing.

INSTALLATION OF CAPACITORS

- () Install one 10 MFD electrolytic capacitor in the position labeled on the 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.
- () Install sixteen .1 UFD disk capacitors in the positions labeled on the drawing as: C2 - C17.

INSTALLATION OF FUSE CLIPS

- () Install the two P.C. mounting fuse clips in the positions shown to hold fuse F1. 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 card to ascertain that there are no 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 are found.
- () Install a 1.5 ampere type 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 several times higher than the other.) If the readings are less than five ohms look for solder shorts between the +5 volt supply lines and the common return lines on the card.

FINAL TESTING

Final testing of the card must be accomplished when the card is installed in a SCELBI-8B minicomputer chassis unit.

SCELBI COMPUTER CONSULTING, INC.

ASSEMBLY INSTRUCTIONS - SCELBI CARD #: 1109-

ROM/PROM MEMORY CARD

DESCRIPTION

The SCELBI #1109 ROM/PROM memory card is an optional card. The card may be populated with up to 16 type 1602 or 1702 PROMS. At 256 words per ROM this allows up to 4,096 words of ROM memory to be stored on each card. The card may be plugged into any memory card slot in a SCELBI-8B system to substitute ROM/PROM memory for RAM memory.

KIT ASSEMBLY

You should refer to the assembly drawing shown on the next page during the assembly process. The drawing is to scale and shows the exact location of each part on the P.C. card.

INSTALLATION OF DIODES

- () Install one 6.3 volt zener diode at the location shown for VR1. Be sure and observe correct polarity as indicated on the drawing.
- () Install one 12.0 volt zener diode at the location shown for VR2. Be sure and observe correct polarity as indicated on the drawing.

INSTALLATION OF CAPACITORS

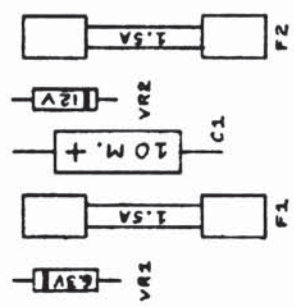
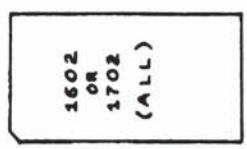
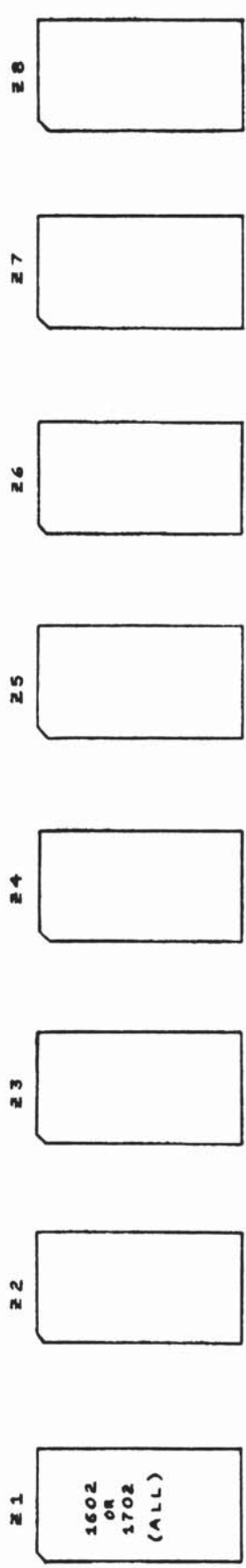
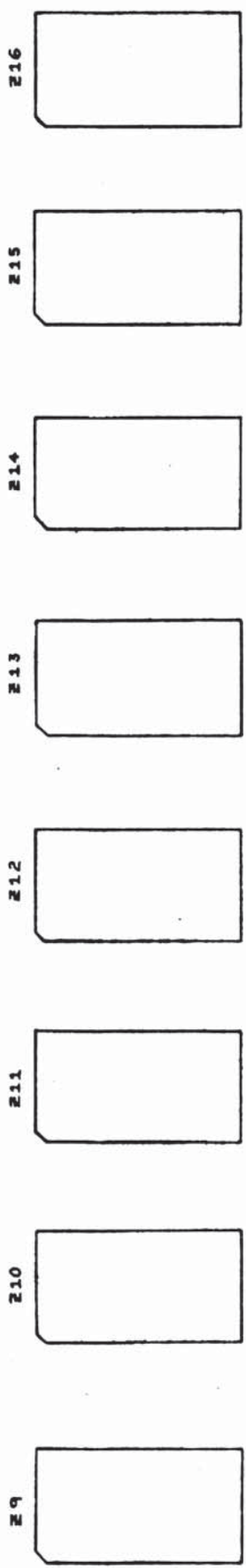
- () Install one 10 MFD electrolytic capacitor in the position labeled on the drawing for C1. Be certain that the positive (+) end of the capacitor is oriented in the same direction as that shown on the drawing and indicated on the P.C. card.
- () Install four .1 UFD disk capacitors in the positions labeled on the drawing as: C3, C5, C7 AND C9.
- () Install four .02 UFD disk capacitors in the positions labeled on the drawing as: C2, C4, C6 AND C8.

INSTALLATION OF FUSE CLIPS

- () Install the four P.C. mounting fuse clips in the positions shown to hold fuses F1 and F2. Ensure that the clips line up so that a fuse will seat properly when installed.
- () Install two 1.5 ampere type 8AG fuses in the fuse clips for F1 and F2.

INSTALLATION OF ROMS/PROMS

It is recommended that sockets be installed on the card and the ROMS or PROMS then installed in the sockets. The ROM/PROM positions on the card are des-



ignated as Z1 through Z16. Each ROM/PROM position corresponds to a "page" in memory - with A1 being the position for the lowest "page" address on the card and Z16 being the position for the highest page address on the card. When a ROM/PROM is to be installed, select the correct position on the card for the "page" address in memory for which the program on the prom is designed to operate. Install a 24 pin integrated circuit socket on the card and solder the socket pins. Then install the ROM/PROM.

As an example, if it were desired to install a ROM with a program on it designed to operate when addressed as page 67 in a SCELBI-8B system, the ROM would be installed at location Z7 on the card. The card would then be installed in the last memory card slot (XA9) on a SCELBI-8B chassis unit.