# JADE COMPUTER PRODUCTS

Presents

# THE
# ISO-BUS
# MOTHERBOARD

JADE COMPUTER PRODUCTS
TECHNICAL SUPPORT GROUP
4901 WEST ROSECRANS
HAWTHORNE, CA 90250

# THE ISO BUS

One of the most important--and most often overlooked --pieces of equipment in any computer system is the motherboard. Far from being just a passive hunk of epoxy or fiberglass with a bunch of copper traces running around hither and yon, it is an active and integral part of the system--the very foundation of your computer.

You have just made the very wise decision to purchase one of the best motherboards in existence: the JADE ISO—BUS ™ Motherboard. Now that's a pretty sweeping statement, so we'd like to tell you why we feel that we can make it in good conscience. Along the way, hopefully, you'll get a few laughs while you're learning.

## A SHORT HISTORY OF SOME BAD MOTHERS

OK, let's face it. Not all mothers are good. And just as in the real world there are good mothers and bad mothers , so there are good motherboards and bad motherboards, and some of the bad ones are real bad mothers. Of course, if your mother is bad, you keep very quiet about it.

In the early days of hobbyist computers, a motherboard was considered to be just something that had a lot of convenient etched wires running around the place to which connectors could be attached to hold the little darlings--all the various computer cards.

Then the "little darlings" began to grow up, and started running around at 2 and 3 and 4 MegaHertz instead of lolling about at 125 or 250 or 500 KiloHertz, and people began to discover strange eccentricities in their signals. It began to dawn upon them that a motherboard was supposed to be something more than just a bunch of wires, because what you had at those frequencies was 95 or so little antennae, all interacting, putting out gobs of RF radiation (neatly screwing up Channels 2-5 of all the local TV receivers).

It seemed the mothers were gossiping over the back fence, and those nice theoretical square waves that their children were supposed to be speaking turned out to be not so square. In fact, these ill-mannered children had real garbage mouths. Their speech looked like somebody's unmown front yard with oodles of little grassy spikes all over the place. (See Oscilloscope Photo 1). In fact, there was as much confusion, with listeners trying to be talkers and talkers rambling on and on, as there is at a political convention. The wonder was that anything got done. So people began to learn that good mothers don't lean over the back fence gossipping while never telling their children to shut up.

The first stage cure for this problem was to ground one side of the motherboard with a nice wide ground plane. The problem with this approach is that anytime you run a ground plane on the other side of a signal line, with a fiberglass or epoxy board in between, what you get is a capacitor. (Fiberglass, et al, makes an excellent dielectric, you see).

So now what you had was tuned RF antennae.

Fortunately for the world, mothers have a tendency to improve with experience. And so do motherboards and the engineers who design them.

The next thing we noticed about mothers was that some of them let their children run hog wild. This phenomena is called "ringing" (See Oscilloscope Photo 2). According to Murphy's Law, no sooner do you think you finally have your kids straightened out than something else comes along to gum up the works. To corral the little buggers and make them walk the straight and narrow, a new feature was added to motherboards, called terminators.

There are two types of terminators: active and passive. A passive terminator is nothing more than two resistors, one going to a voltage supply and the other going to a ground, with the signal line tied between, and sometimes a bypass capacitor which is supposed to short the high-frequency stuff no one is interested in to ground.

There is a problem with this approach. All those resistors gobble up power, and they've no place to dine but the signal; q.e.d. the signal's power gets eaten. Also, there is a specific time-constant involved anytime you connect a capacitor to a resistor, and unless you do it exactly right (which most board designers don't), you foul up the rise and fall times of the signals.

Active terminators are a little bit better. They're about the same as a passive terminator, the exception being that in a properly designed active terminator the power drain doesn't come from the signals that are being terminated, but from the central power supply through an active component like an op amp.

This cured the ringing--somewhat. But engineers are sometimes like economic theoreticians--they attack the symptoms and neglect the root causes. And despite all these approaches, the basic problem of the bad mothers was still there: 95 or so little antennae, and lots of crosstalk.

Enter JADE.

JADE engineers--being halfway intelligent (or maybe just lucky), and of that peculiar breed that aren't snowblind--finally hit upon the solution; the JADE ISO—BUS ™. The theory being: if you've got something noisy, put it in a nice quiet box--if you surround a wire with a shield that is grounded, it can't radiate.

The ISO—BUS ™ is the result and the practical application of that theory--and it works as slick as a greased pig at a county fair.

Not only is each and every signal line surrounded on both sides by a ground line (thereby preventing crosstalk), these ground lines are interwoven, top and bottom, into a mesh. This isn't the place to go into network mesh theory, but if you're interested there are several good books on the subject although they're a little bit on the esoteric side.

In a real-world sense, the signals think they're running between two infinite ground planes, so they stay very quiet and well behaved. But at the same time, the ground planes know they're a mesh network, so they have a minimal capacitance effect.

A secondary benefit--and this might be one of the most important side effects--is the inductive reflectance. As a signal reverses in a line, it carries along with it a magnetic field. This magnetic field sweeping along the line induces a current flow in the next signal line. But the next signal line--on either side and top and bottom--on the ISO-BUS™ is a ground line. This line mirrors the inductive effects of the signal line, and eliminates it.

What all of this technical-sounding gibberish boils down to is that the JADE ISO—BUS ™ is a good mother board. It takes tender care of its children, holding them gently in its claws,

and it sees to it that they are quiet and well-behaved--speaking only when they're supposed to and shutting up otherwise.

It is SO good, in fact, that it will NEVER need termination, either active or passive. The distributed capacitance-inductance of the network mesh acts to prevent ringing . . . .as an added bonus, because the layout was done precisely enough to provide just the exact capacitance to prevent it. The 95 or so noisy antennae magically disappear and you have exactly what you're supposed to have: signal lines running quietly to various cards. (For proof, check out Oscilloscope Photo 3).

SOME SPECIFIC WARNINGS:

There are some problems connected with the ISO—BUS™ Motherboard. Because they are so precisely laid out, the leads run very close together. Although JADE has taken the trouble to use the most modern solder-masking techniques, it is possible to create solder bridges. So if you're heavy-handed with the soldering iron, beware. Too much heat, and the application of too much solder, will almost inevitably result in a phenomenon called "wicking", which means that the solder runs down the pins of the connectors and puddles up on the component side of the board, very neatly shorting out the signal lines to the ground lines.

You should be aware that JADE will not guarantee nor repair any board that is purchased as a kit. All ISO—BUS ™ Motherboards are tested individually for continuity and inter-line shorts before they leave our manufacturing facility, so we know they're good when they leave here. Unless you're a real artist with the soldering iron, don't even attempt to put this board together by yourself.

If you do insist on buying it as a kit, please be aware that JADE'S policy is as stated above. Since solder bridges are most likely to occur underneath the connectors on the component side of the board, the board is useless because the connectors are too difficult to unsolder without destroying the board in the process. It has to be scrapped, and we will not guarantee it.

For those hard-core people who buy the board as a bare board, please make certain to use the proper connectors. We strongly suggest that you buy them from JADE, because we've already gone through the hassle of finding the right connectors that are the least susceptible to wicking and other nasties.

WARNING: The JADE ISO—BUS™ is manufactured to conform to the proposed IEEE S-100 bus standards. This specification provides for ground lines on pins 53, 20, and 70 in addition to the old ground lines at pins 50 and 100. There are a few boards which use these pins for signals.

Under the old definitions, pin 53 was Sense Switch Disable*. Many CPU boards (including the JADE IA/Z80 and BIG Z) use this line. Under the IEEE definitions it is a ground line. This effectively halts the CPU, therefore the pin on the CPU card must be cut. If the signal is required for a front panel, it may be routed over the jumper cable connecting the CPU with the front panel board.

Pins 20 and 70 were formerly defined as Memory Protect/Unprotect respectively. Under the IEEE definitions, these are both grounds. This may create some problems with older-

style memory boards which use this feature. You should update your boards to conform to the IEEE S-100 Bus Standard Pinout enclosed in this manual. For most boards, this is a relatively simple fix, and many boards will not even have to be modified since the S-100 standard was designed to conform to the configuration of as many S-100-style cards as possible.

If you have a problem with a board and do not know what to do about it, send a Xerox or other copy of your board's schematic or circuit diagram to JADE COMPUTER PRODUCTS, TECHNICAL SUPPORT/ENGINEERING, 4901 W. ROSECRANS, HAWTHORNE, CA. 90250, with a stamped, self-addressed envelope, and JADE will do a paper study for you without cost. Incidently, this service is available for compatiblity problems on all the boards we sell.

## MAKING IT——FOR THE REAL HARD-CORE

## CONSTRUCTION AND SOLDERING TIPS

- Choose a well-lighted work space with enough room to place your tools, parts and instructions. If you have two light sources that can be adjusted, this will help eliminate shadows which interfere with seeing your work.

- Familiarize yourself with all of the general operations to be performed. It might even help to do a dry run.

- The tools you will need for each individual kit will be listed in the assembly instructions. A basic set would include: a low wattage soldering iron (20 watts or less), and with a 650° tip if you can get one, a holder which will keep you from accidentally touching the hot tip, a pair of wire cutters (also called dykes or side cutters, preferably beveled so that you can cut close to the board), a pair of needle-nose pliers, a damp sponge or a moistened cloth to use to wipe the soldering iron's tip, a magnifying glass to examine details, and a lead former to bend leads. The latter is available at most electronics parts houses in an inexpensive plastic version, or you can make your own out of wood, If your're into building lots of electronic kits, they're worth their weight in gold.

- Arrange your tools in order of their frequency of use and orient them so they're easy to reach. Make sure that they are clean and in good working order.

- Keep your work area clean and uncluttered.

- Make sure that your chair is set at a proper height and is comfortable for your work station.

- Try to keep food and drink away from your area. Always strive for neatness and uniformity. This means removing bits and pieces of scrap wire and solder blobs, as you work so they don't become buried in your board and short something out. Ineveitably, according to Murphy's Law, they will sneak underneath IC sockets, and if there is a place that's hardest to get to to fix, that's exactly where they'll lodge.

- Soldering can cause several different kinds of problems in kit building. Heat can damage the PC board and the components, especially diodes and transistors, or create unwanted electrical connections. Most problems can be eliminated by using the right soldering iron (and the right solder--resin core, NOT acid core), and by developing an efficient technique.

- Parts are inserted on the component (front) side of the board. Soldering is done on the back side. This is always a rule, unless you are specifically directed otherwise in the assembly instructions.

- If you plan on building many kits (and one memory board can be many kits), spend the few extra dollars to buy yourself a quality temperature-controlled soldering station. Spending the $30 can save you from ruining a $200 kit.

- Use only ROSIN CORE SOLDER when constructing electronic kits. Never, never, not ever use acid core--that's only for pipes and sheet metal. A solder with a high ratio of tin to lead is important. 60/40 is good, but 63/37 is excellent, and the difference will amaze you. If you can't get 63/37 at your local electronics parts house, JADE carries it.

- Make sure you have a well-tinned tip. A tip is well tinned when it has a thin film of solder coating on the surface of the iron. Oxide and resin will build up as you work with it and the bright shiny look will disappear. That's what the wet sponge or moistened cloth is for. The iron should be wiped clean about every ten connections or so to get rid of that oxide and resin. Copper-tipped irons are fairly good, but gold-coated ones are much better.

- Some DON'Ts: DON'T have any unnecessary items at your work station. DON'T use worn or damaged tools. NEVER solder equipment that is plugged in. DON'T use unknown cleaning solutions. DON'T pull on a solder joint to see if it's good. NEVER flip excess solder from the tip of your iron--use the sponge or cloth. NEVER put solder on your iron and then transfer it to a cold joint.

- Heat both the component wire and the solder pad with the tip of the iron until it looks wet or liquid. Then touch the solder to the junction between the iron, the pad and the wire. When the solder melts and flows onto the connection, quickly remove the

iron's tip. Allow the joint to cool without moving any of the components. A good joint will be smooth and bright. A bad one will be a dull lead-looking glob of solder.

- AVOID USING TOO MUCH SOLDER. From our experience at repairing customers' boards, this is the sin most often committed. If little drops of solder appear on the opposite side of the board, you're either using too much solder or too much heat. Be extremely careful when you solder adjacent pads because the heat may cause the solder to flow between them, making a solder "bridge". Bridges are only good for crossing rivers--they don't belong on electronic boards. They make an unwanted electrical connection.

- If you do find a bridge, the best way to remove it is to clean your iron on the dampened sponge and then touch the bridge with the clean hot tip until it wets and sticks to the tip. Then get rid of it.

- Excess wire can be removed with diagonal cutters. WAIT till the joint has cooled. Beware of flying pieces of wire. ALWAYS USE EYE PROTECTION WHEN SOLDERING OR CUTTING WIRE.

- After you're all done, use Freon solvent to remove the flux. Flux is that brown stuff that gets on the boards near your soldering joints, and it is formed of burned rosin. Not only does it look bad (preventing your wonderful soldering job from looking all bright and shiny), it can cause electrical headaches as well, especially in higher-frequency circuits. Not only this, but it makes it much more difficult to find bridges and shorting flakes, since the resin hides the solder under an effective coverup. Leave coverups to politicians--clean your board.

- JADE technical support people have found that a board works about like it looks. If it's been put together with care and good workmanship, it will work just fine. In life, you only get out of it what you put into it, and it works the same with electronic kits.

## ASSEMBLY INSTUCTIONS FOR THE JADE ISO-BUS™ S-100 IEEE STANDARD MOTHER BOARD

We suggest you start at a time with you will be able to complete it without interruption. Mark the check ( ) as you do each step. This kit could be assembled in several ways, but if you follow these step-by-step directions your assembly problems should be fewer.

( ) 1. Make sure you've the tools needed. For this kit you need the following: a soldering iron (20Watts Maximum), ROSIN CORE solder (preferably 63/37), cutters,a small magnifying glass, a screwdriver, and a lead former.

( ) 2.Check the PARTS RECEIVED against the PARTS LIST. Take special care to correctly identify look-alike parts; i.e., resistors, capacitors and diodes. If anything is missing, please call JADE's Customer Service Department.

( ) 3.Read the section called: Construction and Soldering Tips.

CAUTION: USE EYE PROTECTION WHILE SOLDERING OR CUTTING WIRE!

( ) 4.Begin the assembly by inserting the 100-pin edge connectors into the Motherboard. You will notice that there are rows of plated-though holes between the holes for the connectors. These have been arranged so that it is impossible to insert a connector into them. It is not necessary to inspect the board for plating errors, since this has already been done during manufacturing. Every board is thoroughly checked for continuity and shorts between leads.

( ) 5.The S-100 connectors should all face the same way. Place the side with the writing toward the front of the board. The front of the board is the edge that has the JADE insignia on it, and the top of the board is the side that is marked "connector side".

( ) 6.When all the connectors have been inserted, place the foam lid of the shipping container firmly against the top of the connectors and carefully turn the board over, pressing it firmly down onto the table top.

( ) 7. Inspect the connector pins to make sure that all of them came through in their proper holes, and none of them have gotten bent under.

( ) 8. Solder pins 1 and 100 of each connector, on a diagonal line across the connector.

( ) 9.Now turn the board over and carefully inspect the placement of this connectors. They should be flush with the top of th board. This is IMPORTANT, since the proper placement of the connectors will help prevent wicking. If any of them are floating off the top of the board, carefully heat the corner pins while pushing down on the top of the connector.

( ) 10. Turn the board back over and solder all the connector pins. It is helpful to do one entire row of pins at a time. Don't leave the job with a partially-soldered row, since it is easy to overlook unsoldered pins. If you have to leave the job, wait until you've finished a whole row.

( ) 11. When you're ready to solder a joint, apply heat to the joint first, then apply the solder to the opposite side of the joint from the iron. (See figure 1). Then remove the

solder, and finally remove the soldering iron. JADE has reflow-soldered these boards, which means that they already have some solder on them, so don't use too much solder. As soon as the joint looks wet and begins to liquify, apply the solder. This should take about two seconds with a decent iron. The iron should not be left on the joint longer than two or three seconds after the solder has been first applied. A good solder joint has an even flow of solder over the entire joint. A bad solder joint, commonly called a "cold" solder joint, will have a dull, lead-like appearance. Do not move the part or the board while the solder is cooling, or a cold or fractured solder joint will result (See figure 2).

( ) 12. Patience is a virtue, especially when assembling Motherboards. On a six-slot ISO—BUS™ there are over 600 connections to make 1200 on the twelve slot, and 1800 on an eighteen slot. Every one of these must be perfect. The board was designed to be wave-flow soldered. If you do not have the patience to correctly assemble it, return the bare board or the kit NOW and buy an assembled unit. JADE will NOT guarantee, repair or replace any ISO-BUS™ Motherboard assembled from a bare board or kit.

( ) 13. When the connectors have been soldered in place, take an ohmmeter and place the common lead on a ground. Test each and every signal point on every connector for a short to ground. Then test adjacent signal traces. (Pin 1 against 51 and pin 2; pin 2 against pin 1, 51, 52, 53, and 3, etc.). If wicking has occurred and a glob of solder is shorting out the traces the short is most likely to occur between a signal line and ground, and is also most likely to be located underneath the connectors on the top of the board. (See "WHAT TO DO IF MURPHY'S LAW GETS PASSED" for how to fix it. And our sympathy is with you.)

( ) 14. If the board has come this far, congratulations, You're a real artist with the soldering iron. Now comes the easy part.

( ) 15. Form the resistor as per Figure 3, and insert it at the rear right of the board (See Component Placement Diagram). Solder it and cut off the excess leads.

( ) 16. Form the LED diode leads as per figure 4, and insert it. Solder it and cut off the excess leads. Do NOT insert it backwards. Make certain that the cathode side goes toward the bar on the diagram on the board. (See Component Placement Diagram).

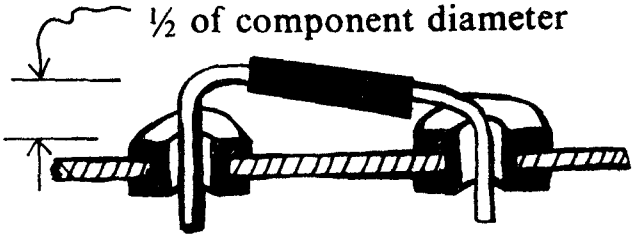
( ) 17. Sit back, relax, survey your workmanship and treat yourself to a nice long drink—you deserve it!

## COMPONENT INSTALLATION

Install all components in their proper location, and if polarity is important, observe the proper markings. The component should be installed flush with the circuit board, unless a clearance is specifically called out. This clearance is usually required for hot components that might burn or discolor the printed circuit board.

The lead should have a discernable length extending straight from the body of the component before beginning the bend. The component body shall not be damaged nor the body-to-lead seal damaged by the forming operation. The component should be centered between the bends, although this is not a requirement. Where feasible, all forming should be done so that the part number is visible when installed in the circuit board.

GOOD (before soldering)




ACCEPTABLE

## SOLDERING

Soldering techniques probably are the hardest to master of any electronic assembly technique. If you have never soldered at all, it is probably best that you practice on some old scrap printed circuit board available at most electronic part stores and surplus shops.

For electronic assembly, always use resin core solder, not acid core solder. Acid core solder will corrode, and it's impossible to stop the corrosion. It will eventually ruin the printed circuit board.

A soldering iron of small wattage, preferably 27 watts to 40 watts maximum, should be used. Always keep the tip clean and free from dross (oxidized solder) by wiping on a moistened sponge or folded-up Kleenex (moistened). Use small solder with a 60-40 ratio (60% tin and 40% lead).

When ready to solder a joint, apply heat to the joint first, then apply the solder to the opposite side of the joint from the iron (see figure 1). Then remove the solder and finally the soldering iron. A good solder joint has an even flow of solder over the entire joint. A good joint will have a bright glistening look. A bad solder joint, commonly called a cold solder joint, will have a dull appearance. Also, do not move the part or lead while the solder is cooling or a cold or fractured solder joint will result (see figure 2).

## SOLDERING TECHNIQUE

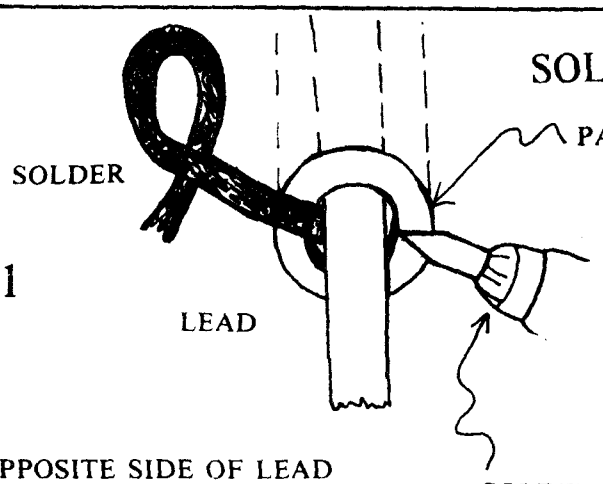
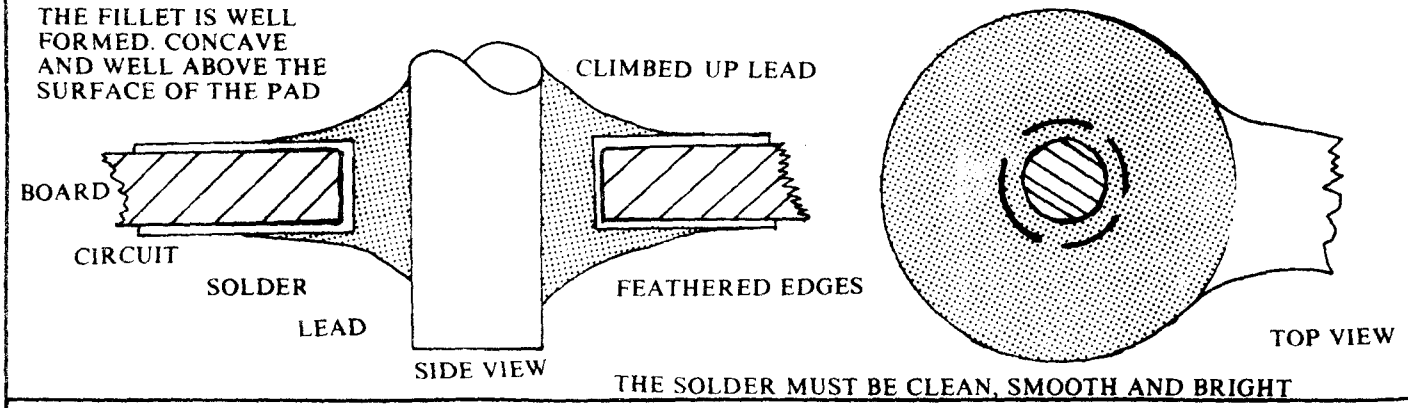



FIGURE 1

APPLY SOLDER TO OPPOSITE SIDE OF LEAD FROM THE SOLDERING IRON.

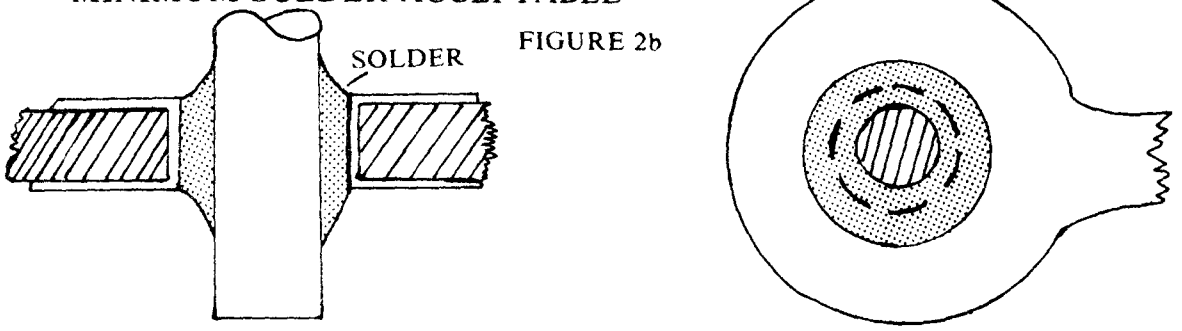
FIGURE 2a OPTIMUM JOINT




THE SOLDER MUST BE CLEAN, SMOOTH AND BRIGHT

MINIMUM SOLDER ACCEPTABLE

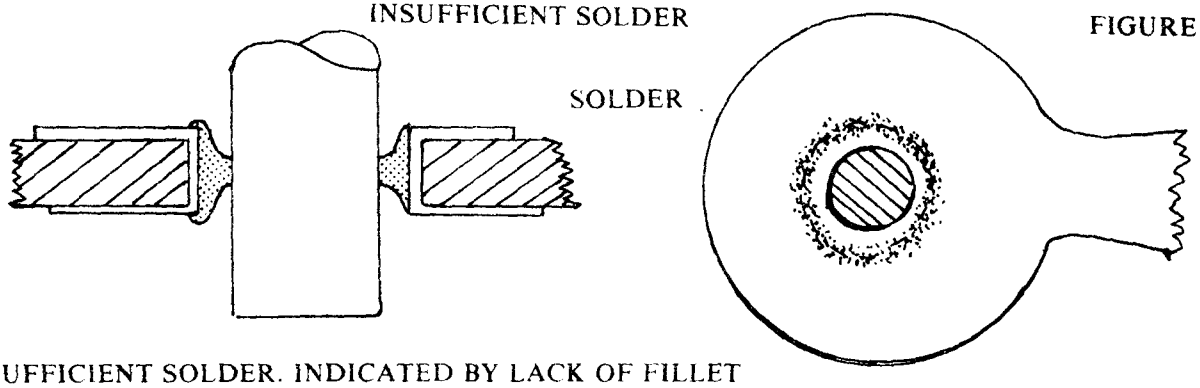
FIGURE 2b




SOLDER FLOW RESULTING IN A MINUTE FILLET RADIUS ON EITHER OR BOTH SIDES OF THE BOARD IS ACCEPTABLE

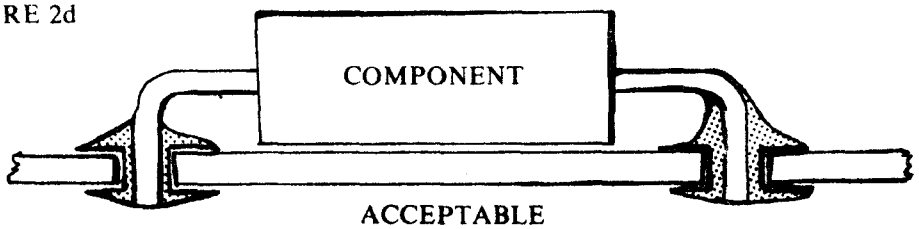
INSUFFICIENT SOLDER

FIGURE 2c



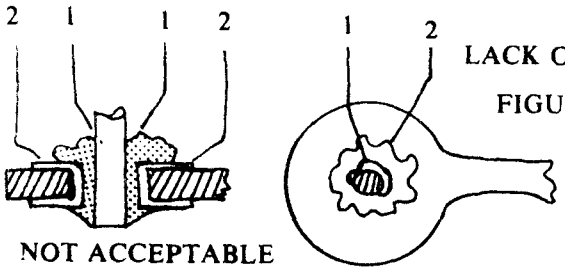

INSUFFICIENT SOLDER. INDICATED BY LACK OF FILLET ON ONE OR BOTH SIDES OF THE BOARD

FIGURE 2d




ACCEPTABLE

STRESS RELIEF AND SOLDER BUILD-UP ON AXIAL LEAD COMPONENTS
AT LEAST ONE END OF AXIAL LEAD COMPONENTS SHALL HAVE ADEQUATE STRESS RELIEF AND ABSENCE OF SOLDER BUILD UP.

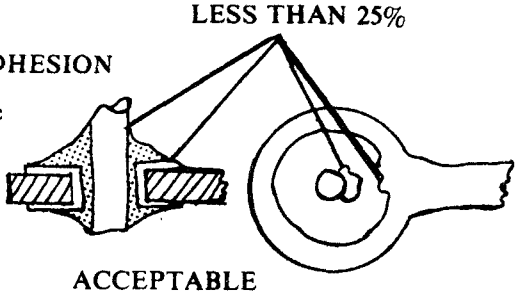



NOT ACCEPTABLE

LACK OF ADHESION INDICATED BY EVIDENCE 1 THE LEAD IS NOT WET ON COMPONENT SIDE, OR 2 THE PAD IS NOT WET AT THE SOLDER PAD INTERFACE.

LACK OF ADHESION

FIGURE 2e



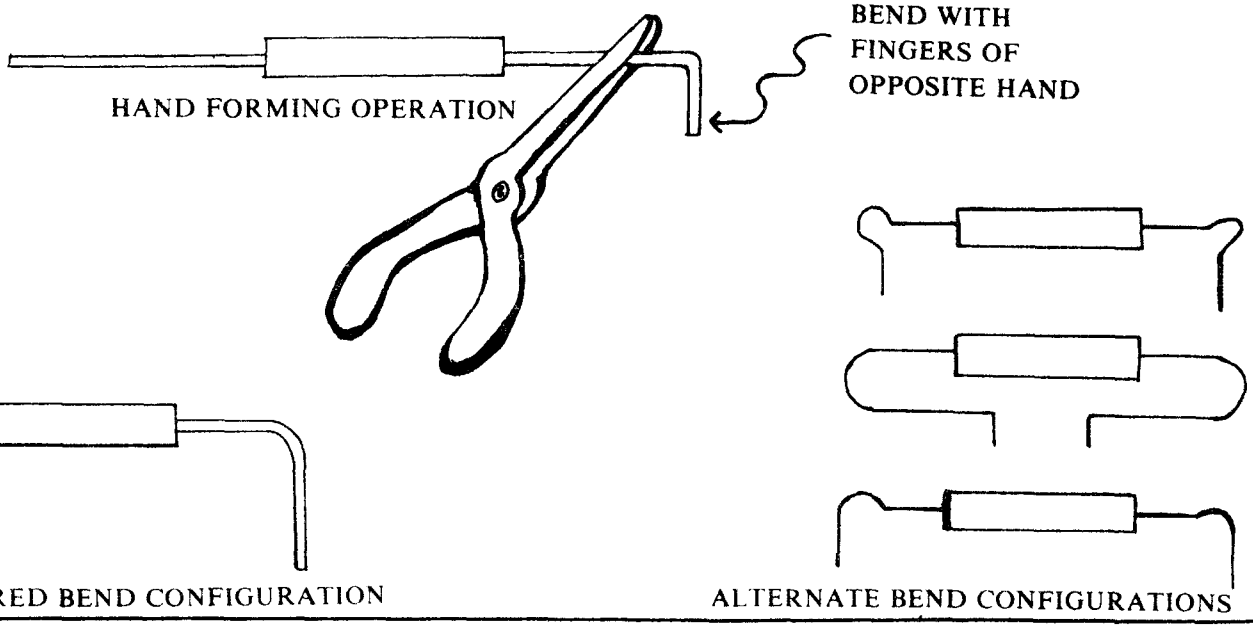

ACCEPTABLE

LACK OF ADHESION CONFINED TO LESS THAN 25% OF THE LEAD PERIMETER SHALL BE ACCEPTABLE PROVIDED THE LACK DOES NOT EXTEND BENEATH BOARD SURFACE. IF DEFECT EXTENDS BELOW THE LIMIT IS 10% OF LEAD PERIMETER.

## Lead forming

Lead forming is performed by grasping the body of the part with the fingers of one hand. With the other hand holding long-nose pliers, grasp the lead near the body with the taper of the pliers defining the length of lead from body of the part to the lead. Bend the lead with the opposite hand to form the bend as in the following figure.

FIGURE 3



## INSTALLING YOUR MOTHERBOARD

When you have completed your assembly (assuming you purchased your Motherboard as a kit), and you're ready to install it in your mainframe, here are a few tips and hints that will help you with a trouble-free installation.

1. Connect ALL power leads, using #14 gauge wire minimum. There is a reason for this: On the 6, 12, and 18-slot Motherboards, there is one lead for each voltage supply and one lead for ground for each 6 slots. These are distributed, from the lead pads, in a particular pattern which will help to minimize noise. In particular, you should always provide as many ground leads as possible.

2. Use ALL the holes for mounting the Motherboard. This will make it as stiff and unflexible as possible. If you do not choose to do this, then don't skip more than every other mounting hole. Above all, don't try to get by with a bolt at each corner.

3. A good installation would provide a plexiglass sheet underneath the Motherboard. This both insulates the Motherboard from chassis ground and makes it extremely stiff and unflexing. Plexiglass can be obtained at most local hardware stores or building supply companies.

## WHAT TO DO IF MURPHY'S LAW GETS PASSED

If you have assembled your Motherboard and discover that you have (horrors) a short between a signal line and ground (which is the most likely problem to occur), don't despair--it can be fixed. Cut the offending ground lead on BOTH sides of the connector where the short has occurred, and bypass it to the next ground lead. There are a row of plated through holes between the connector rows, and you can pick up your ground lead on one of these.

Be sure to test your signal paths again after you have make this fix to make sure the fix didn't create another problem.

| PARTS LIST | You should have received | Check off here |
|---|---|---|
| JADE ISO-BUS™ Motherboard | 1 | ☐ |
| R1, 220 ohm, ½ watt resistor (RED, RED, BROWN) | 1 | ☐ |
| D1, LED | 1 | ☐ |
| S-100 Card Connectors | 6, 12, or 18 | ☐ |

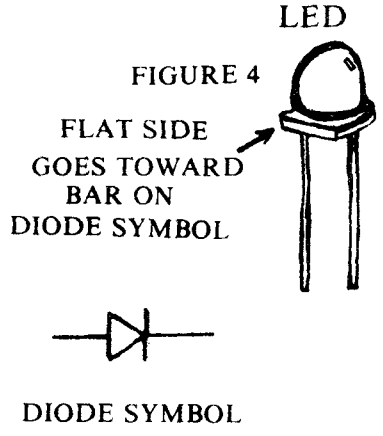



FIGURE 4

JADE would welcome your comments about this board. We are very much interested in you, our customer, and we want you to provide us with some feedback about how you like the product, its manual, and the completeness and thoroughness of the documentation provided, so that we can better serve you. JADE would appreciate your response. Please take a moment and fill out the questionaire and return it to us at the address below:

JADE COMPUTER PRODUCTS
TECHNICAL SUPPORT GROUP
4901 WEST ROSECRANS
HAWTHORNE, CA 90250

CIRCLE ONE

1. Was your ISO-BUS Motherboard received in a reasonable length of time? YES NO
2. Was anything damaged in shipment? YES NO
3. Were any parts missing? YES NO
   If yes, what were they?_____
4. Was the quality of the material and workmanship good? YES NO
5. Did you have any trouble understanding the manual? YES NO
   If yes, in what area/s? _____
   _____
6. Have you encountered any problems with the Motherboard? YES NO
   If yes, what?_____
   _____
7. Did you solve the problem? YES NO
   If yes, how? _____
   _____
   _____
8. Are you dissatisfied with your Motherboard? YES NO
   If yes, in what way? _____
   _____
9. Do you have any suggestions for design improvements? YES NO
   If yes, what?_____
   _____
   _____
10. In your opinion, what are the major advantages and disadvantages of the ISO-BUS Motherboard? YES NO
    _____
    _____
11. Other comments?_____
    _____
    _____
    _____
12. What is your name, address and phone number?_____
    _____
    _____
    _____
    _____

THE

# JADE ISO-BUS

# PIN OUT

PIN 1 +8 Volts DC Supply, no amperage specified
PIN 2 +16 Volts Dc Supply, no amperage specifed
PIN 3 XRDY
PIN 4 VIO* .....(Vectored Interrupt Lines)
PIN 5 VI1*
PIN 6 VI2*
PIN 7 VI3*
PIN 8 VI4*
PIN 9 VI5*
PIN 10 VI6*
PIN 11 VI7*
PIN 12 NMI* . (Non-maskable Interrrupt line) OPEN COLLECTOR
PIN 13 PWR FAIL* ..... (DC Power Failure, Non-maskable Interrupt)
PIN 14 DMA3* ..... (DMA Request Line) OPEN COLLECTOR
PIN 15 A18
PIN 16 A16
PIN 17 A17
PIN 18 STAT DSB* ..... (Status Disable) OPEN COLLECTOR
PIN 19 C/C DSB* ..... (Command Disable?Control Disable) OPEN COLLECTOR
PIN 20 GND .....(GROUND)
PIN 21 NDEF .....(Not to be defined)
PIN 22 ADD DSB* .....(Address Disable) OPEN COLLECTOR
PIN 23 DO DSB* .... (Data Output Disable) OPEN COLLECTOR
PIN 24 $\bar{\Phi}$(B) (SYSTEM MASTER TIMING CLOCK SIGNAL)
PIN 25 pSTVAL* ..... (Status Valid Strobe)
PIN 26 pHLDA ...(Hold Acknowledge to coordinate DMA Xfer)
PIN 27 RFU ..... (Reserved for future Use)
PIN 28 RFU ..... (Reserved for future Use)
PIN 29 A5
PIN 30 A4
PIN 31 A3
PIN 32 A15
PIN 33 A12
PIN 34 A9
PIN 35 D01
PIN 36 D00
PIN 37 A10
PIN 38 D04
PIN 39 D05
PIN 40 D06
PIN 41 D12
PIN 42 D13
PIN 43 D17
PIN 44 sM1 (Instruction Op Code Fetch Cycle Signal)
PIN 45 sOUT .. (Data Transfer to an Output Device)
PIN 46 sINP .. (Data Transfer from an Input Device)
PIN 47 sMEMR .....(Memory Read)
PIN 48 sHLTA ..... (Halt Acknowledge)
PIN 49 CLOCK* (2 MHz (2%) 40/60 duty cycle clock. No reference to any other bus signals).
PIN 50 GND
PIN 51 +8 Volts DC Supply, no amperage specified
PIN 52 -16 Volts DC Supply, no amperage specifed
PIN 53 GROUND
PIN 54 SLAVE CLR*(Signal from Bus Master to clear Bus Slave Device) OPEN COLLECTOR
PIN 55 DMA0* ..... (DMA Request Line) OPEN COLLECTOR
PIN 56 DMA1* ..... OPEN COLLECTOR
PIN 57 DMA2* ..... OPEN COLLECTOR
PIN 58 SXTRQ* ... (Signal Requesting a 16-bit data transfer)
PIN 59 A19*
PIN 60 SIXTN* (Signal granting a 16-bit data transfer from a Bus Device) OPEN COLLECTOR
PIN 61 A20*
PIN 62 A21*
PIN 63 A22 *
PIN 64 A23
PIN 65 NTD ..... (Not To Be Defined)
PIN 66 NTD ..... (Not To Be Defined)
PIN 67 PHANTOM* ..... OPEN COLLECTOR
PIN 68 MWRITE*
PIN 69 RFU .....(Reserved for Future Use)
PIN 70 GND
PIN 71 NTD
PIN 72 RDY ..... OPEN COLLECTOR
PIN 73 INT* ..... OPEN COLLECTOR
PIN 74 pHOLD ..... OPEN COLLECTOR
PIN 75 pRESET* ..... OPEN COLLECTOR
PIN 76 pSYNC
PIN 77 pWR*
PIN 78 pDBIN
PIN 79 A0
PIN 80 A1
PIN 81 A2
PIN 82 A6
PIN 83 A7
PIN 84 A8
PIN 85 A13
PIN 86 A14
PIN 87 A11
PIN 88 DO2
PIN 89 DO3
PIN 90 DO7
PIN 91 DI4
PIN 92 DI5
PIN 93 DI6
PIN 94 DI1
PIN 95 DI0
PIN 96 sINTA
PIN 97 sWO*
PIN 98 ERROR*
PIN 99 POC*
PIN 100 GND