MULTITRONIKS

LVX SERIES

FLEXIBLE SMD

PLACEMENT SYSTEM

LVX SERIES Automatic Pick & Place Manual

USER MANUAL

- INSTALLATION
- MAINTENANCE
- CALIBRATION
- TROUBLESHOOTING

Section 2 - Installation

Site Preparation

The Multitroniks 2000 LVX assembly system has been designed to use feeders on all four sides, and therefore requires placement away from any walls or other equipment. FIGURE 1 shows that a minimum of three feet (1 meter) is required on all sides for an operator to comfortably load or remove component feeders.

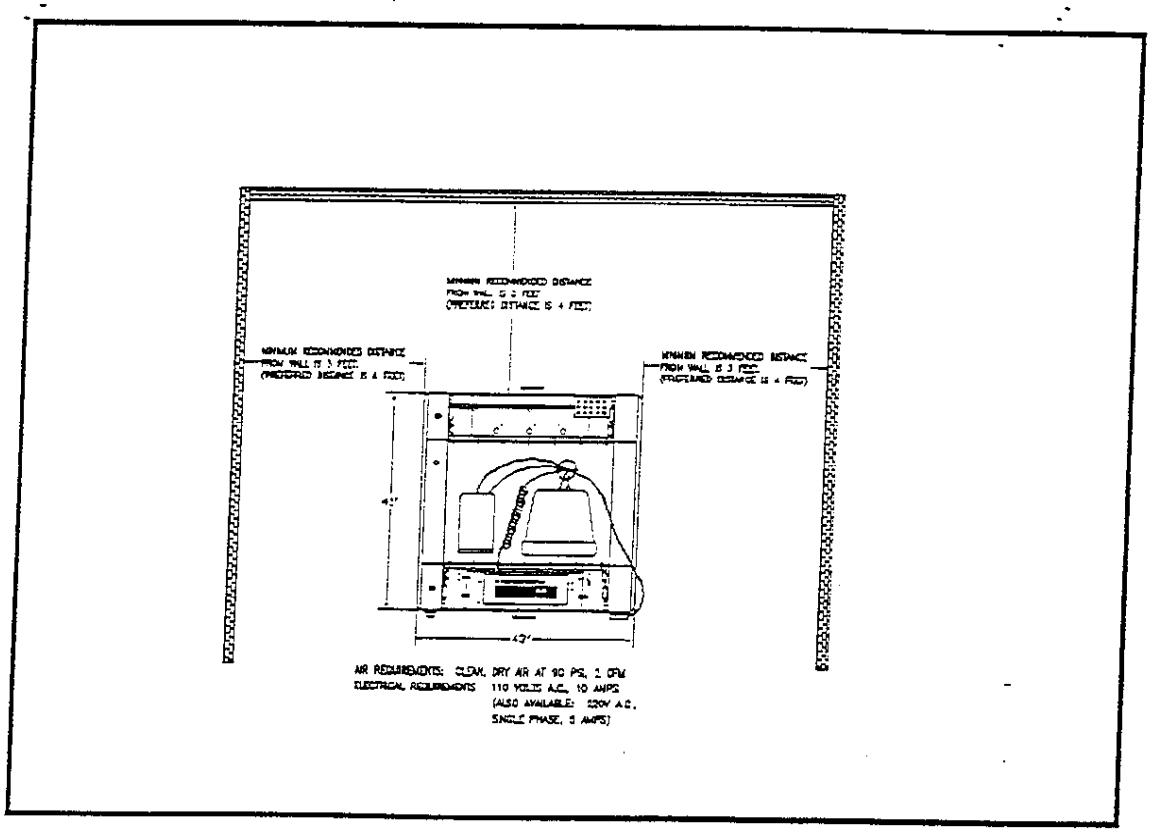

Figure 1

The floor that supports the 2000 LVX should be level and capable of supporting three to four times the weight of the machine itself. This is primarily due to inertia genereated by the movement of the X and Y axis of the machine. Insufficient floor support may cause excessive "shaking" of the machine during normal operation. The machine frame is in a weight range

where it can not be moved by hand and requires the use of a fork-lift or pallet jack. It is recommended that the 2000 LVX be located on a ground floor level because of the added difficulty of lifting or supporting the machine to above ground floors. **Be sure to remove side panels before lifting to prevent damage.**

Unpacking the Assembly Machine

The Multitroniks 2000 LVX Surface Mount Assembly system has been shipped to you in two crates. The larger crate contains the main assembly system, and the smaller crate contains the computer and all accessories.

1. Remove the sides and top from the larger crate.

2. Remove the protective plastic wrapping. Be careful not to scratch the machine when cutting packaging material. Inspect and report any significant damage immediately to MultiTroniKs.

3. Pull open the scrap collection drawer, located in the rear access panel.

4. Locate the black plastic rail locks which are located on each slide rail of the drawer. Snap both left and right rail locks up and lift the drawer up. When the drawer has been unlocked from the slides, remove the drawer by pulling it straight out.

5. The front, rear, and side panels are attached with hook-and-loop fasteners "Velcro". Remove the front and rear panels by first pulling out the bottom and then sides of the panel.

6. Using a socket wrench, remove the nuts on the two shipping brackets which hold the machine frame to the shipping skid.

7. Raise the machine off the skid using a forklift. Be sure that outer panels are removed since the panels hang beyond the bottom of the cross-members. Be sure that the forks extend beyond the cross-members by a few inches. (SEE FIGURE 2).

8. Move machine to final position.

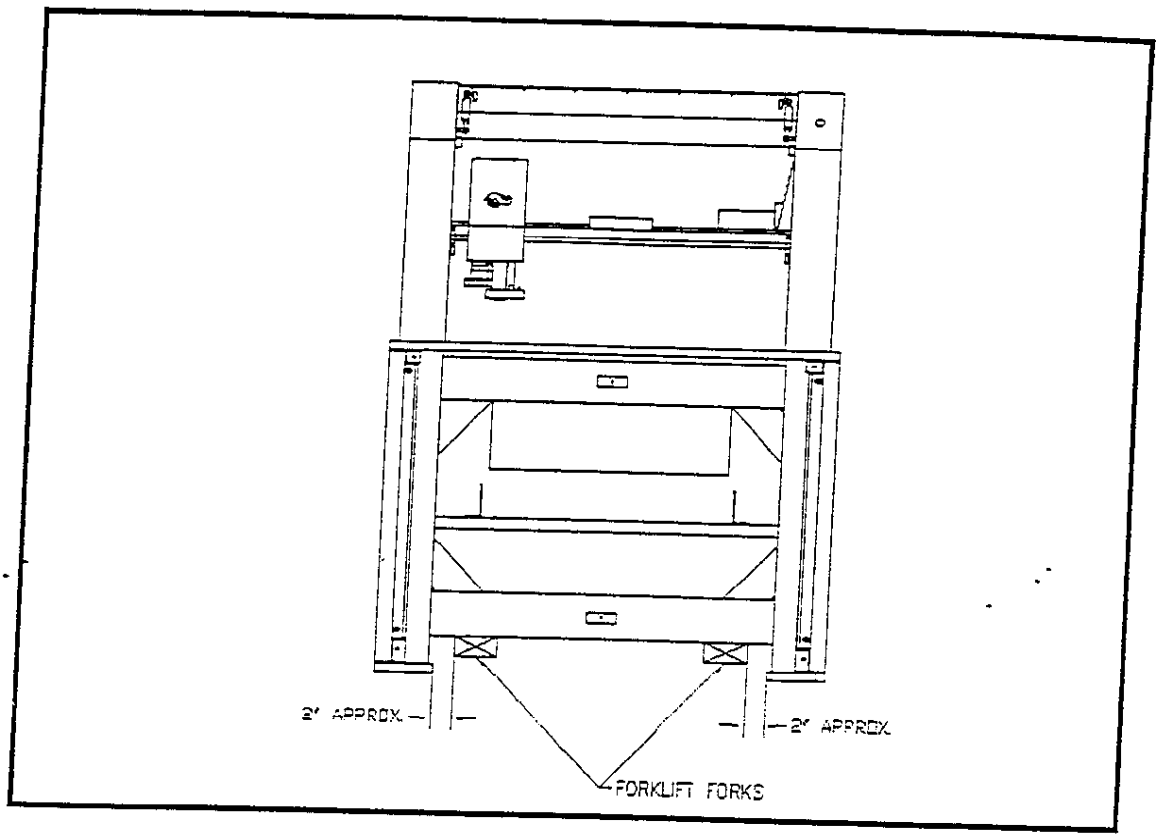

FIGURE 2

9. Before lowering the machine to the floor, attach the 4 leveling pads into the holes located in the leveling pad mounting plates. Be sure to leave about one inch of the threads exposed between the leveling pad and the plate to allow for minor adjustments in either direction. (SEE FIGURE 3).

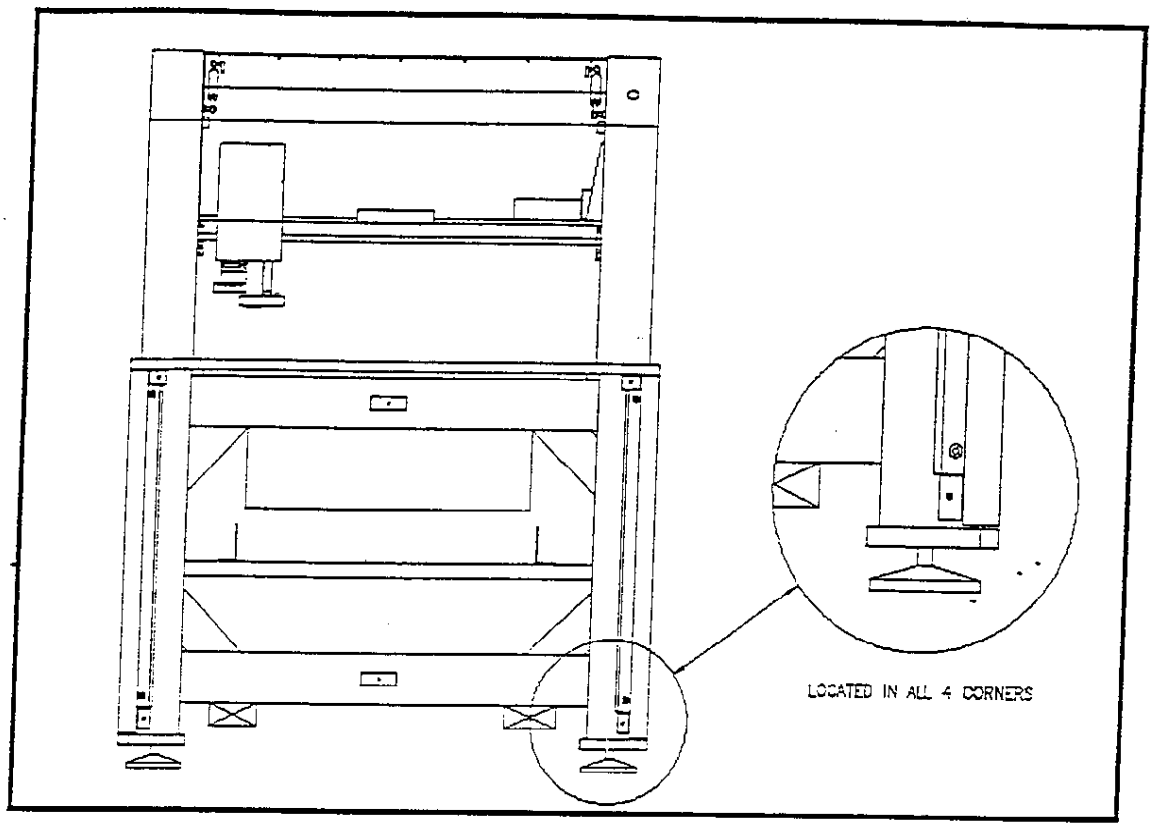

FIGURE 3

10. The lock nut should be located halfway between the full lower and upper stop points so that it turns freely, and yet does not block the 'flat' edges of the threaded foot bolt.

11. After lowering the machine to the floor, adjust the 4 feet by turning the flattened part of the foot bolt with a wrench so that the machine base plate is level and the machine does not rock.

12. Tighten the locking nuts up against the mounting plate.

13. Notify MultiTroniKs Service department that the machine is in place and ready for setup by a Field Engineer.

14. Save all crating and packaging materials unless otherwise instructed.

Unpacking the Accessory Package Crate

The accessory package contains the computer system and all the standard and optional accessories ordered with the assembly system. Please compare your packing list with accessories provided. If you are not familiar with the items, ask your MultiTroniKs Field Engineer to confirm your order for you. *Note that this section will only describe the set up and use of the standard items and is generally done by a Factory Trained Representative.*

1. Remove the top from crate
2. Remove the computer, keyboard and monitors from their shipping boxes.
3. Remove the front and rear panels from the machine.
4. Remove Hook and Loop fasteners from one end and slide out the electronics cover plate.
5. Slide the computer in from the front of the machine with the computer facing you.
6. Connections to the PC will be labeled on both the PC and the cables. Observe polarity and secure all connections to the PC. Note: An additional cable may be present that is not used. This was previously used for a jog pendent that is now software driven.
7. Mount the keyboard onto hook and loop fasteners attached to the Plexiglas cover.
8. Place the computer monitor and video camera monitor screens on the top of the machine facing the front.
9. Remove the three of the six 1/8" button head cap screws from Cable Access Plates located on the top rear side of the machine. Note: only one of the half circles need to be removed for sufficient access.
10. Feed the keyboard, monitor and power cables neatly into this hole.
11. Replace Cable Access Plate.
12. From the Front of the machine, open the Plexiglas cover and *loosen* by about three turns the four screws which secure the ceiling panel to the top of the machine.
13. From the rear side of the machine, open the Plexiglas cover and *remove* all four screws which secure the ceiling panel to the top of machine.
14. Carefully move the Placement Head to the middle of the machine.

15. Gently Pulling down the ceiling panel from the rear of the machine you will notice female connectors for your associated peripherals. Be sure to secure all connections.

16. Secure ceiling panel.

17. Place Calibration component into holder on the front right side of the machine. Be sure the Black side with the white circle is facing up.

18. Remove the CyberOptics laser from its packaging and secure it to the mounting bracket so that this laser 'surrounds' the nozzle holder. NOTE: The hex head mounting screws are metric for this item. Connect the white coaxial cable to the laser.

19. Remove nozzles from their packaging and insert them in sequential size order (largest to smallest from front to rear respectively) into the nozzle magazine located at the front left side of the machine. The magnets will self align these nozzles. Be sure that the smallest nozzle is toward the back of the machine.

20. Carefully manually move the head to the far points of all axis, be sure that there are no obstructions. Observe limit switches and sensor flags for proper actuation. Be sure to leave the head in the center of the machine when done.

21. Connect power cord to machine, connect male end to a high quality power filter/surge protector.

22. Be sure all emergency stop switches are up (off) and the head is in the center of the machine.

23. Start Machine by turning the green power button. Be sure that the PC and Monitors switches are also on.

24. The Windows 95 desktop should appear with an Icon labeled either Multitroniks or P2000. Click on this Icon to start machine program.

25. The machine will initialize all motors.

26. Connect Air to the machine and adjust main vacuum to 80-85 PSI. The vacuum generator must be turned on while adjusting the regulator (turn on/off in the I/O Test menu).

27. Adjust Blow back pressure to 8 PSI. The blower must be turned on while adjusting the regulator (turn on/off in the I/O Test menu).

28. Be sure to use standard "Windows" operating procedure when shutting down the machine. All programs should be exited before powering down the system.

29. Replace the panels.

30. Replace the scrap drawer.

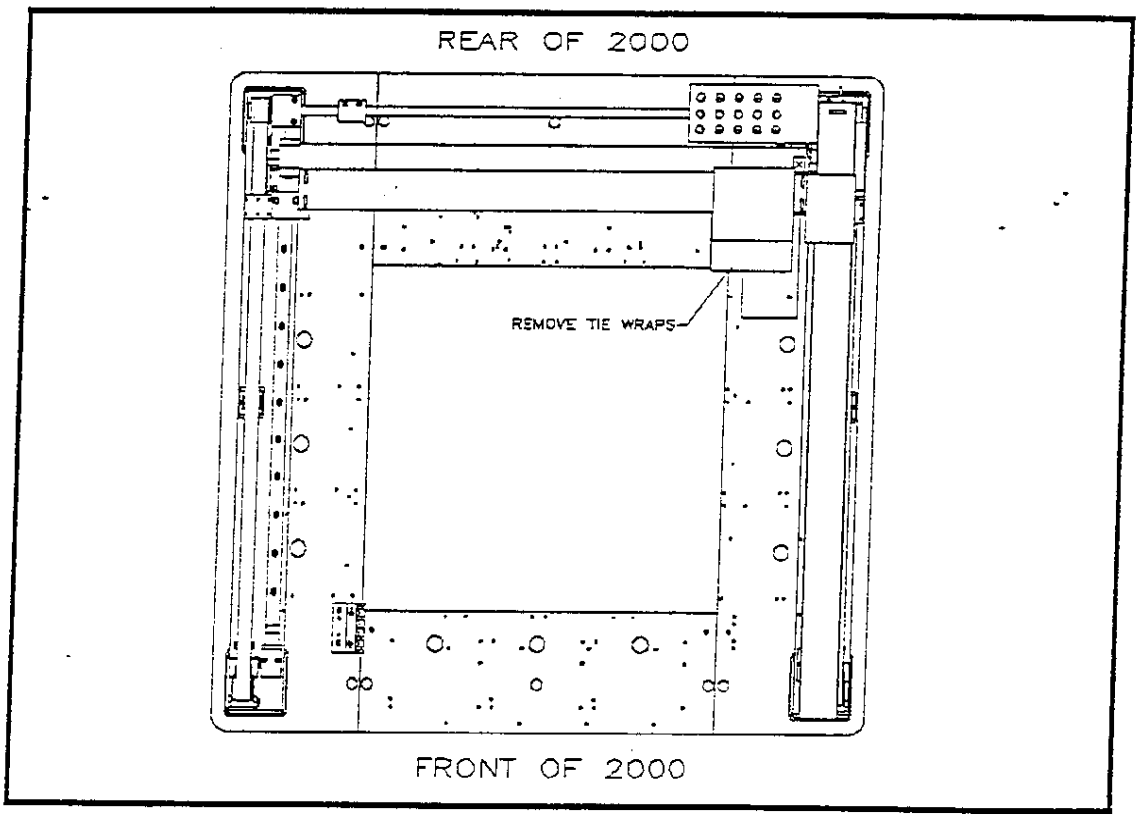

FIGURE 4

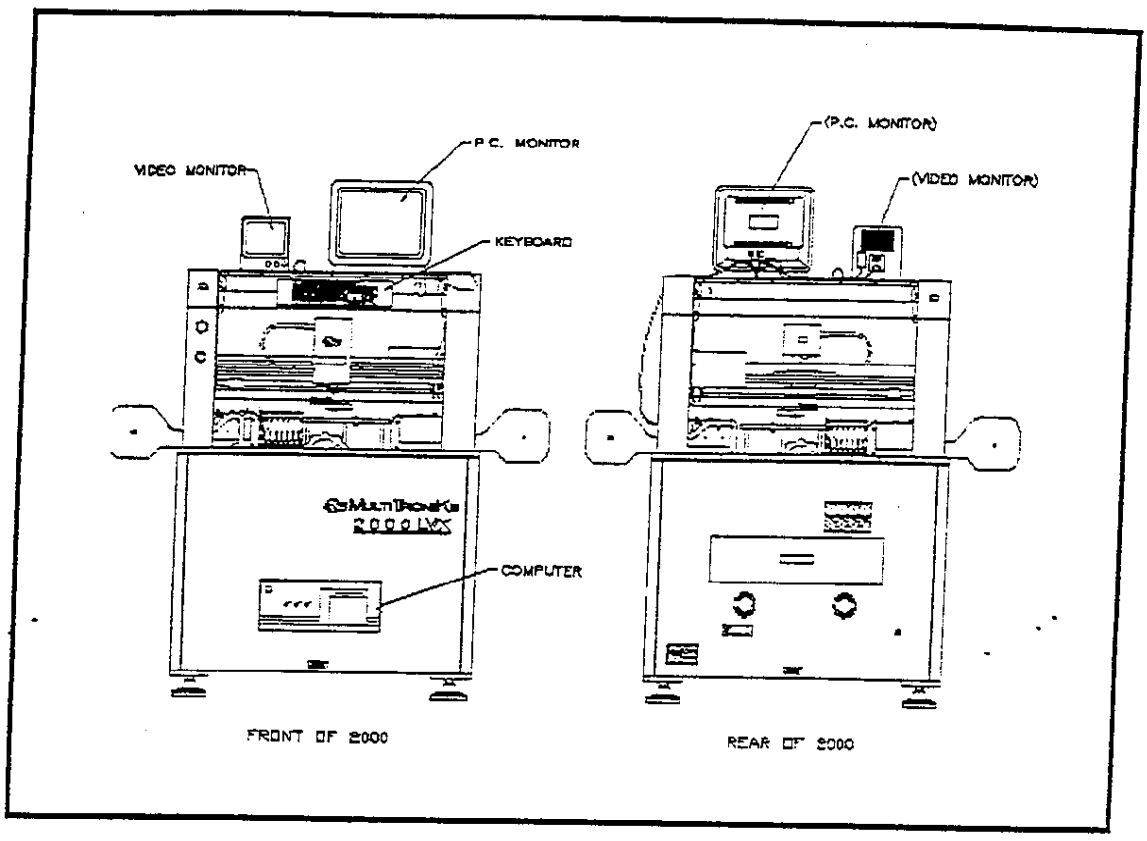

FIGURE 5

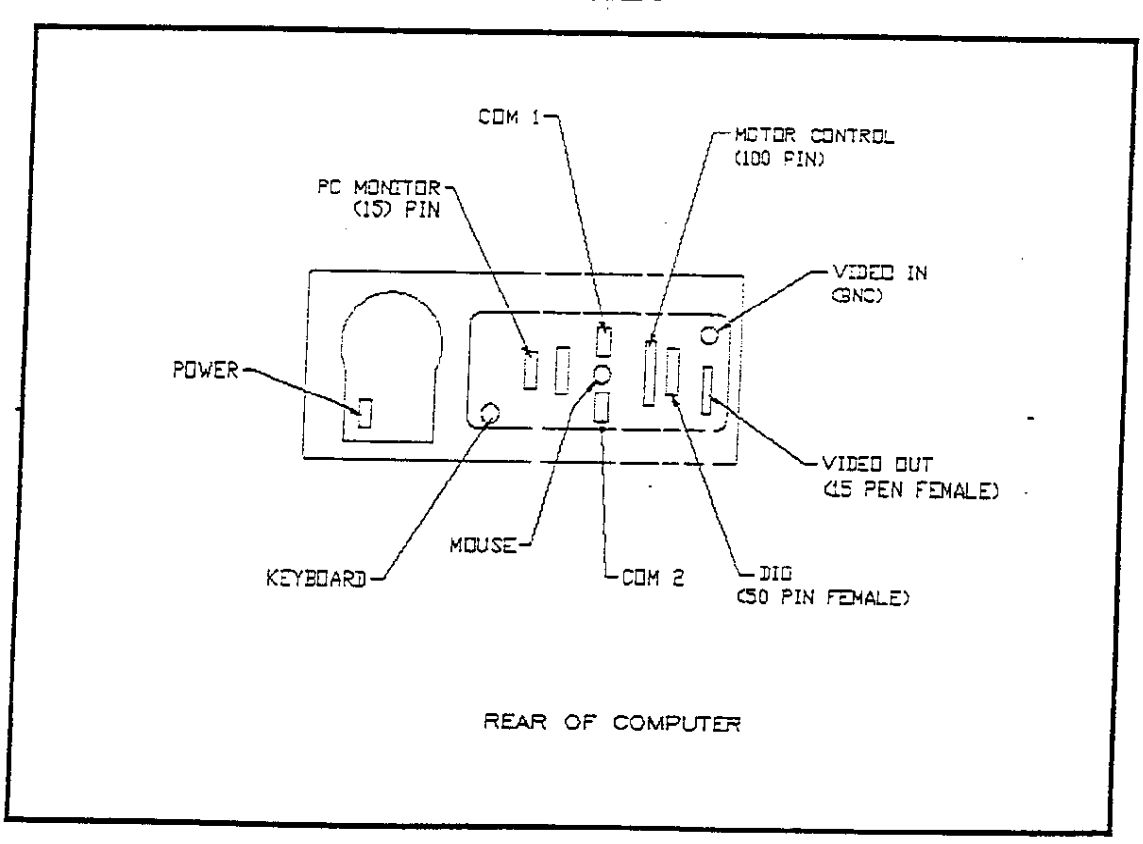

FIGURE 6

machine off and no nozzle in the head, move the four axes through their range of motion. Carefully listen and feel for any abnormalities. Check each nozzle for wear and deterioration of the rubber part. While the machine is placing, listen for any abnormal sounds. Watch the motion system through the eye of the camera when it is settling on a fiducial. It should be 'tight' not 'lazy'. And finally, remember that mechanical problems usually do not just happen -- they develop. Only the operator who is attuned to the normal behavior of his machine will recognize a subtle fault before it causes a breakdown.

The MultiTroniKs LVX needs periodic maintenance with the interval for each item based on your use of the system. The following list contains maintenance items and their recommended service intervals for a machine operated one shift per day in a clean environment.

The Mechanical System

1. Lubrication of the X-axis and Y-axis linear slide bearings

The X and Y-axis linear slide bearings should be greased every 2 to 3 months with approved grease (see appendix for list or purchase part number 40082 from Multitroniks.) Before applying fresh grease wipe away old with paper towels. Using standard grease gun, pump two shots of grease into each bearing's Zerk fitting. Carefully move axis back and forth to spread grease over rails. If needed use one more shot of grease. Wipe excess grease from end of bearing with paper towel. The rails should never become dry to the touch otherwise lubrication is necessary.

MultiTroniKs LVX Maintenance Manual

Typical of so many machines, the LVX will provide optimum service if it is operated and maintained in a consistent and thorough manner. Operators, who develop good habits from the beginning and stick with them, will minimize any problems for themselves in the future. This includes regular inspections of the machine and the implementation of a maintenance program based on the recommended intervals listed below.

Careful attention paid to the movement, sound, and look of the machine will, many times, bring to light a fault before it becomes a major problem. One particularly good practice for an operator to routinely (at least weekly) do is to inspect the mechanical system. With the machine off and no nozzle in the head, move the four axes through their range of motion. Carefully listen and feel for any abnormalities. Check each nozzle for wear and deterioration of the rubber part. While the machine is placing, listen for any abnormal sounds. Watch the motion system through the eye of the camera when it is settling on a fiducial. It should be 'tight' not 'lazy'. And finally, remember that mechanical problems usually do not just happen -- they develop. Only the operator who is attuned to the normal behavior of his machine will recognize a subtle fault before it causes a breakdown.

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2. Lubrication of the Z-axis

The Z-axis linear bearings should be lubricated every 2 to 3 months with light machine oil (standard '3 in 1' oil works well.) First clean axis bearing with paper towel. Then using a plastic straw or similar device dipped in oil, touch the top of the rail so that a small amount of oil runs down it. Manually move the head up and down to work oil into bearing. Wipe off any excess oil with a paper towel. The rail should never become dry to the touch otherwise lubrication is necessary.

3. Lubrication of the X-axis and Y-axis Ball Screws (if equipped)

The X and Y-axis ball screws should be greased every 2 to 3 months with approved grease (see appendix for list or purchase part number 40082 from Multitroniks.) Before applying fresh grease wipe away old with paper towels. Using standard grease gun, pump one shot of grease into each bearing's Zerk fitting. Carefully move axis back and forth to spread grease over screw. If needed use one more shot of grease. Wipe excess grease from end of bearing with paper towel. The screws should never become dry to the touch otherwise lubrication is necessary.

4. Lubrication of the Electric Feeders

A small amount of silicon spray should be used on the worm gear inside the feeder.
With older style feeders, without a lubrication access hole, it is required to remove four screws and cover to access the worm gear. Avoid over spraying other parts, particularly the rubber drive belt, with the lubricant. If a feeder sees extra high use, it may require lubrication each month.

5. Cleaning of the picker boots

The five picker boots should be inspected and cleaned on a daily basis. The magnets on the exterior of the picker boots can pick up stray pieces of metal and require cleaning with a cloth. The central vacuum channel should also be checked to make sure that it is clear. If this becomes clogged with dust, dirt or solder paste, you will notice an increase in dropped parts due to a reduction in the amount of vacuum.

6. Cleaning of the vacuum tip

The nozzle holder should be inspected every 3-6 months for deterioration of the rubber lip seal.

7. Cleaning of the video camera lens

The video camera lens should be cleaned every 2 to 3 months using an optical cleaning cloth. It is important to use a material which will not scratch the glass lens, and should be specifically designed for cleaning optical surfaces. Be careful not to move the camera focus.

8. Cleaning of the laser align optical surfaces

The laser align unit has two optical surfaces, an emitter and a detector, which should be wiped cleaned every 2 weeks with an optical cleaning cloth.

9. Cleaning the Linear Scales (if equipped)

The linear scales, on the x and y axis should be wiped with a soft lint free cotton cloth. The towel should be dampened with alcohol. Be extremely careful not to scratch the scales.

10. Cleaning or replacing the vacuum filter

The vacuum generator contains a filter to catch any dust, dirt or other debris that might be picked up by the picker boots. This filter should be cleaned or replaced every 24 months, or sooner if the filter becomes clogged.

11. Replacing the compressed air filters

At the compressed air input are two filter cartridges that should be replaced every 24 months, or sooner if the filters show signs of pressure drop.

12. Setting the Regulators

The air regulators should be checked and, if needed, adjusted every 6 months. To check, click on the Test Functions menu and select the I/O Tests option. A window with a list of inputs and outputs on the machine is shown. Click on Vac 1 button to turn the poppet valve on, adjust the regulator, and click the button again to turn the poppet valve off. Repeat this for the blow off using the Blow 1 button. The regulators should be set to 85-90 PSI for Vacuum 1 and 6-8 PSI for Blow 1.

The Computer System

1. The Hard Disk

It is recommended that Scandisk, a disk utility, is run each month. To start the program first quit all programs which will return you to the Windows 95 main screen. Click on the Start button - Program - Accessories - System Tools - Scandisk. Scandisk will start and the user should select standard and then start. If problems occur follow the prompts provided. Rerun scandisk until no problems are found.

Another disk utility, Disk Defragmentor, should be run every 6 months. To start the program first quit all programs which will return you to the Windows 95 main screen. Click on the Start button - Program - Accessories - System Tools - Disk Defragmentor. The program will start and the user should follow the prompts provided.

2. The Video Monitor and the B+W Monitor

The monitor screens should wiped down with a soft cloth and glass cleaner as needed. Spray the glass cleaner on the cloth then wipe the monitor clean.

3. The Keyboard

The keyboard should be vacuumed and wiped with a soft lint free cloth sprayed with window cleaner every 12 months or as needed.

4. The Mouse

The computer mouse contains a hard rubber ball that, with enough use, can become dirty. Every 12 months, or as needed, remove the ball by first turning the mouse over, sliding or rotating the ball cover, and then turning the mouse right side up. Inspect the ball and the mouse's inner mechanism. If dirty, blow away lint and/or wipe away dirt with a cotton swab dipped in alcohol.

Software Backups

Software should be periodically backed up to minimize lose of information caused by hardware failure or operator error. Generally, the software can be divided into three categories: machine files, libraries, and user files. The machine files should be backed up before a new software release is installed and after any machine calibration. The libraries and user files should be backed up based on the amount of new data not protected by a previous backup. As the user adds and edits files and makes changes in the libraries, he should be aware that a hard disk failure, though fairly rare, is very possible. Therefore, the user should

make backups whenever substantial amounts of new information has been entered into the machine. At minimum, it is recommended that a backup is made every other month.

Lubrication of IKO Linear Way, Linear Roller Way

Lubricant and lubrication method must be carefully select considering operating conditions to reduce friction and wear and to obtain stable running accuracies of Linear Motion Rolling Guides.

1, Lubricant

Grease or oil is used to lubricate Linear Motion Rolling Guide. Some special case, IKO can supply dry lube type Linear Motion Rolling Guide.

a, Grease is used in wide applications including general industrial use. Ease of handling and maintenance and cost saving in lubrication equipment will be achieved. IKO Linear Way / Linear Roller Way series are generally pre-packed with SHELL Alvania EP-2 grease, and ready to use on delivery. And IKO can supply with special grease DUPONT KRYTOX240AD for vacuum or clean room specification.

b, Oil with viscosity range 30 to 100 cSt is recommended. When using light oil, care must be taken to prevent leakage of oil from raceway grooves.

c, Special case, IKO can supply dry lube type. The Linear Way / Linear Roller Way race way has dry film lubricant as DICRONITE. This lubricant is for special conditions such as low or high temperature(-35CF to 100CF), inspection system(eliminate oil composition give influence sensor) or vacuum condition.

2, Lubricating Method

Grease may be applied directly on the raceway or supplied through the grease nipple attached to the slide unit using a hand grease gun or a central lubrication equipment. Oil may be dripped on the raceway or supplied using a central lubrication equipment.

In case of central oil or grease lubrication, grease nipple must be taken off and special pipe joints must be attached to the slide unit. If user pipe thread is not same as IKO Linear Way or Linear Roller Way thread, IKO can supply two type of pipe joint adapter as attached drawing (Model number ZE series). There two adapter types, one is Straight connector and the other is L connector. Because some Linear Way or Linear Roller Way slide unit thread is made by engineering plastic, so, pay attention to connect pipe joint. Generally, connect by hand and after feel tight, turn 1/4 to 1/2 by wrench by carefully. In some setting positions of Linear Motion Rolling Guides, oil may not be delivered to the raceways located above the oil inlet level. Oil route must be carefully checked.

3, Amount of lubricant

Grease is supplied through the grease nipple using a grease gun until all the used grease come out from the seal gap. The amount supplied at this time is the standard amount of re-greasing. Before re-greasing, deteriorated grease left on the track rail must be wiped off. Again, after re-greasing, deteriorated grease leaked through the seal must be wiped off.

4, Inspection interval and re-lubrication interval

a, Grease

Inspect initial operation and every 2 to 3 months interval. The initial operation, check rail raceway surfaces. If there is grease film at the race way surface to check by finger touch or eye examination, can increase inspection interval months. The very long track rail case, it is very important, because the rail surface area is very large. And also, check grease condition if there is mixed with cutting chips, dirt, e.t.c. The dusty condition, IKO recommend 2 to 3 months inspection interval. If the track rails protected by bellows or metal cover (or not dusty condition), it is not necessary to inspect every 2 to 3 months. Generally, IKO recommend every 6 months grease re-lubrication for machine tool application. But, the grease re-lubrication interval is depend on the applications, decide the suitable interval. Check track rail race way. If there is grease film and not so dirty, it is possible to increase grease re-lubrication time. Short length rail, clean condition and light load, it is possible to increase grease re-lubrication time as few years. Some electric small application case, there is no re-lubrication on their machine life. This is special case. But some times, used this idea for ball bearings application(Small motor bearing, Computer hard disk bearing, e.t.c.)

And after give grease(re-lubrication), recommend to move end to other end(full stroke) for spread grease film to all raceway area.

b, Oil

Inspect initial operation and Every 1 week(or every morning when machine will be started). Check race way surface there are oil films at the both race way surfaces. And every 1 week(or every morning), check oil amount of oil feeder and dusty condition. Re-lubrication or changing interval is depend on system. Check oil amount, dirt, e.t.c. If oil lube system is circulation type, check oil color and amount. And supply oil at every inspection if necessary. In case of oil central lubrication, check oil amount. The supply oil to slide unit is generally 0.1 to 0.3cc per 30 minutes per one slide unit. This amount is one of the sample. If track rail is very long, check race way wet condition and increase oil amount.

5, Examples of lubricants

Grease

General purpose types

ALVANIA NO.1 (SHELL):-35 to +120C, centralized greasing,Li soap

ALVANIA NO.2 (SHELL):-20 to +120C, centralized greasing,Li soap

ALVANIA NO.3 (SHELL):-20 to +120C,Li soap

MOBILAX GREASE NO.2 (MOBIL):-20 to +120C, Li soap

ANDOC C (ESSO):-20 to +120C, Na complex, Low temperature

ALVANIA GREASE RA (SHELL):-40 to +130C,Li soap

BEACON 325 (ESSO):-55 to +120C, Low torque, Li soap

ISOFLEX LDS18 SPECIAL A (KLUBER):-50 to +120C,High speed,Extreme pressure, Li soap

ISOFLEX SUPER LDS 18(KLUBER):-50 to +120C, High speed,Low noise, Li sorp

Wide temperature

ANDCC 260 (ESSO): -20 to +150C. High speed. Low water proof. Na sorp

TEMPREX N3 (ESSO):-20 to +160C. Li complex

RPM GREASE SRI 2 (CALTEX):-20 to +150C, Polyurea base, Extreme pressure

ALVANIA EP-2 (SHELL): -10to+110C,Extreme pressure,Centralized greasing, Li sorp

MOLYKOTE BR2-PLUS (DOW CORNING):-30 to +150C,with MoS2, Li sorp

MOLUB-ALLOY #777-2 (IMPERIAL):0 to +135C, with MoS2, Li sorp

Others

KRYTOX 240AD (DUPONT) :-29 to +288C. Stability in high temperature,Chemical non-activation, Anti-solvent, Fluorinated (for clean room, vacuum area)

BARRIERTA L55/2 (KLUBER) :-35 to +260C. Low evaporation in high temperature,Chemical non-activation, Fluorinated

BARRIERTA IMVV (KLUBER) :-50 to -220C, For high vacuum, Fluorinated base

DOLIUM GREASE R (SHELL):-30 to +150C, Anti-high temperature,Superior in high temperature with stable anti-oxidation.

Polyurea base

VALLANT GREASE U2 (SHELL):-20 to +180C, Anti-high temperature with stable anti-oxidation, Polyurea base

Note:Generally, IKO recommend SHELL ALVANIA EP-2 for general use. And for clean room application, IKO recommend DUPONT KRYTOX 240AD. If automatic lube system, it is necessary to select soft grease looks like as ALVANIA EP-2, No.1, No2. If use for food machinery, can use Aluminum sorp base grease which is approved by FDA.

Oil

MOBIL VACTRA OIL No.2 or No.4

Can use other oils between 30 to 100 cSt viscosity

6, Grease amount based on the room volume of Linear Motion Rolling Guide

For re-lubrication of grease, followings Linear Motion Rolling Guide internal room volume show you how much grease give to slide unit when change all grease(Old to New).

LWH15 1.5CC, LWH20 2CC, LWH25 4CC, LWH30 6CC, LWH35 9CC,LWH45 16CC, LWH55 27CC,LWH65 53CC

LWHG20 3CC, LWHG25 5CC,LWHG30 8CC, LWHG35 11CC, LWHG45 20CC,LWHG55 27CC, LWHG65 53CC

Note:Applicable to LWHS,LWHD,LWHT types.(Almost same as LWA, LWS types too)

LRW20 3CC, LRW30 5CC, LRW40 16CC, LRW50 30CC, LRW60 50CC

LRWH25 3CC, LRWH35 6CC, LRWH45 14CC, LRWH55 26CC, LRWH65 44CC

LRWX35 10CC, LRWX45 19CC, LRWX55 34CC, LRWX75 73CC

MultiTroniks LVX Troubleshooting

Laser Analysis Problems

A distinguishing characteristic of a laser problem is after picking and moving a component over the placement point the theta axis does a series of turns and then the part is put back. The laser is not seeing the part. This is most likely caused by the part's scan depth not being set up correctly. The scan depth should be set according to the type of package as follows:

For a chip type component the scan depth should be set to approximately 50% of its height as shown in figure 1.

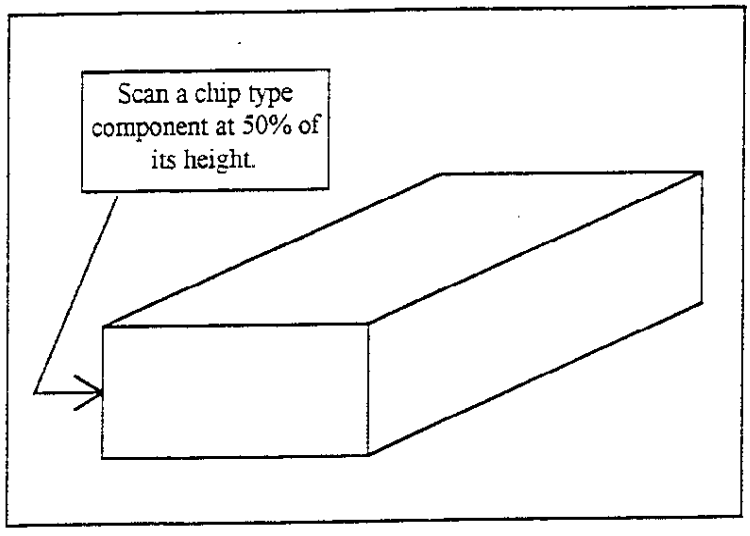

Figure 1

For an package with leads the scan depth should be set to scan the vertical part of the lead as shown in figure 2.

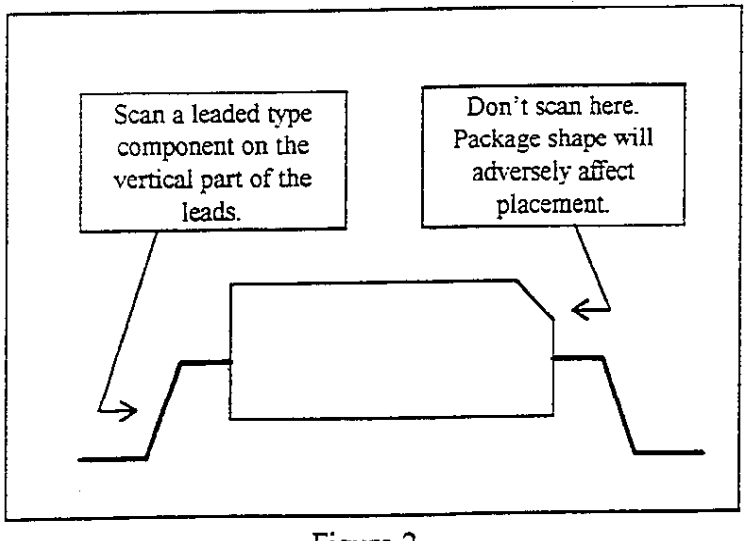

Figure 2

Odd shaped parts should be scanned where the outline of the part best describes the shape of the part. Avoid scanning a thin edge on a large part. Try to scan at the point with the greatest substance. See figure 3. For some unusual parts a little trial and error may be necessary to find a suitable scan depth.

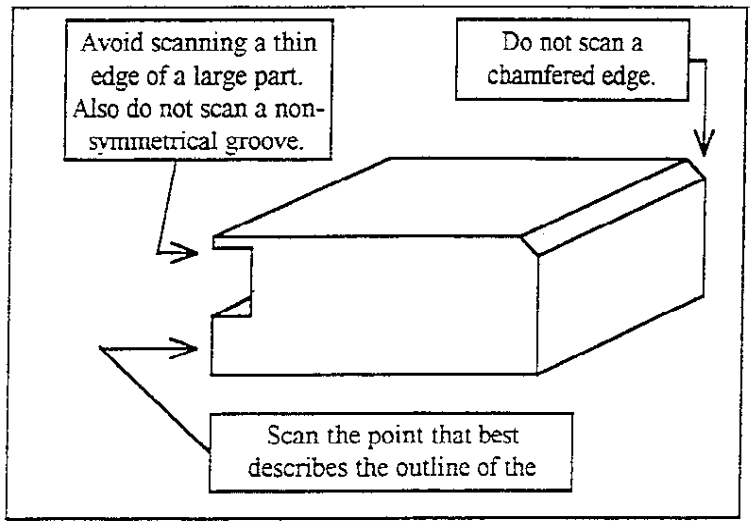

Figure 3

Melfs and melf nozzles present a special situation and require a slightly different package settings. First, since the melf itself sits partly inside the nozzle as opposed to on the tip of the nozzle, the package height should be roughly half the melfs diameter (see figure 4). An accurate measurement of the height can be attained by measuring the overall length of the nozzle and then measure the length of the nozzle with the part on the tip in its picking position. The difference of these two measurements is the working package height. The melf should then be scanned approximately five thousandths (.005) below the nozzle tip (see figure 4).

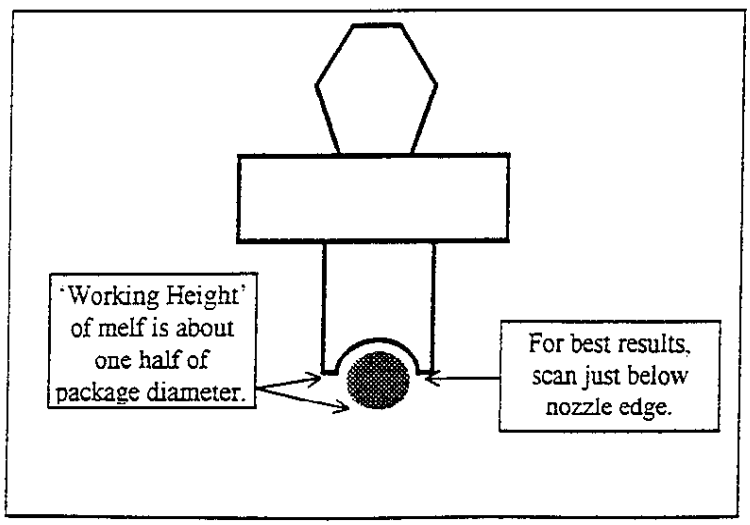

Figure 4

If you are confident that the scan height is set correctly and the part still cannot be placed then there are two other possible problems. First, the nozzle scan height may not be set properly (this may be especially true if you've changed to a new nozzle or have severely damaged a nozzle tip). To correct this, inspect the problem nozzle (replace if bad) and/or run the laser calibration on that nozzle.

The second reason may be a problem with the laser itself. Clean the laser as described in the maintenance manual and then reboot the machine. If the problem persists then contact a Multitroniks service person.

Fine Pitch Camera Analysis Problems

If you are having trouble with the fine pitch camera analysis you should review the section on teaching a part in the programming manual. In addition to this there are a few things you can do to help discover the problem.

Go into the vision processor screen. With the mouse over the black picture window click the right mouse button. A menu will be displayed with Open, Save, Save As. Debug Off, and Debug On options. Choose Debug On. This enables a feature that automatically stores the last good part and the last bad part in a gray scale file format. After you run an assembly a picture will be saved under the name 'lastgood' if the part passed inspection or under 'lastbad' if the part failed inspection.

If there is a part that analyzes as bad for no known reason you can look at it with the vision processor. This is done by starting the Package Editor, selecting the package you are analyzing, and then selecting Vision Processor from the menu line option Function. With the mouse pointer positioned over the black picture window, click the right mouse button. Select open and choose the file 'LastBad.raw'. The problem part will be displayed and at this point you can analyze it using Memory Analyze and Test Mode Analyze. Change threshold and minimum area settings as needed but be aware that these new values will save unless you return them to their initial value before exiting.

After pressing Test Mode Analyze look closely at the green grid lines and green circles drawn. The green grid is derived from the length and width of the part. If the part is outside of this green grid check the package parameters and orientation of the part in the feeder.

The green circles represent where the machine has 'found' a lead. Count the green circles to see if this matches what is in the leads definition editor – maybe you have the wrong package for this part. Or maybe some of the leads are bent together and appear as one. Also check the leads pitch setting. An error with pitch will cause what appears to be a perfectly good part to fail because the leads are not where they should be.

Picking Problems

There are several major functions of the machine that will affect part picking. They are as follows:

X,Y,Z pick up point. Confirm that the X,Y coordinate and the Z coordinate are programmed properly.

Feeder. Check to make sure the feeder is in working order. If this is a tape feeder, check the pitch number and compare to the pitch of the tape.

Package Parameters. A larger pick delay may be necessary so that the vacuum has enough time to grab a heavy part. Head speed may also be decreased to help picking.

Nozzles. If there are two nozzles that might fit the part try both to see if one works better. Make sure the nozzle you use is in good condition.

Vacuum Sensor. (**Note**: This section only applies to machines with the old style vacuum system. If the vacuum turns on for a brief moment each time a nozzle is picked up the machine is equipped with the new system. In this case, the sensor automatically sets up and no adjustment is necessary.) A part that is picked up and then dropped usually signifies an incorrect adjustment of the vacuum sensor. To check the vacuum sensor have the head pick up a nozzle (use a small nozzle like #1 or #2). Using the jog panel move the head to the back of the machine. Select Test Functions from the menu and then select the I/O Test option. The menu shown in figure 5 will be shown. Click on the Vacuum button. This will turn the vacuum on.

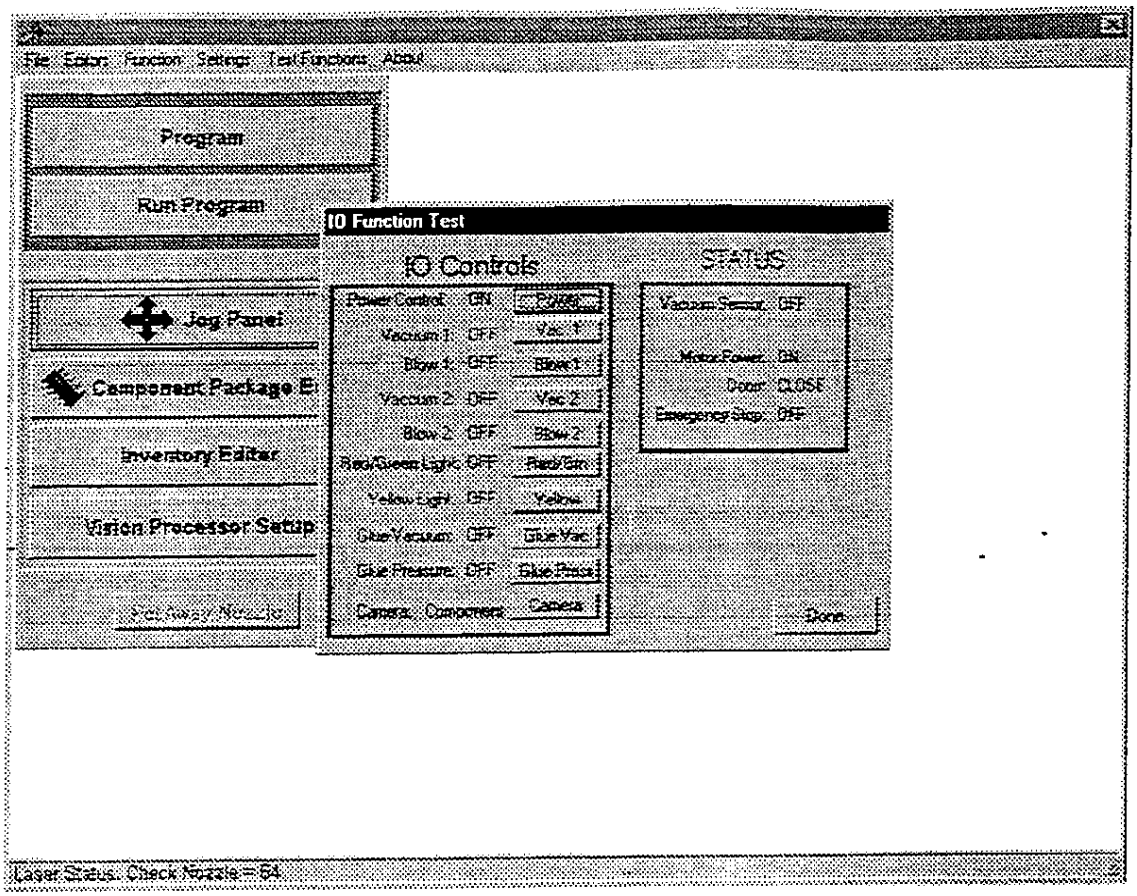

Figure 5

Go to the back of the machine and open the door. The vacuum sensor can be seen through the opening in the head cover. See figure 6. Touch the bottom of the nozzle with your finger to block the vacuum(try using your thumbnail, though it is difficult to get the correct angle, it is a better representation of a part than the fleshy part of your finger). The vacuum sensor LED should light signifying that the sensor has switched (you should also see the change occur on the I/O Test menu in software). Using a smallish straight blade screw driver turn the adjustment screw counter clockwise to make it less sensitive or clockwise to make it more sensitive. The sensor should react reasonably fast to the tap of a finger against the nozzle tip.

Once you are satisfied with the switch performance close the rear door and turn the vacuum off by clicking the Vacuum button again. Close the I/O Test menu and retest your part. If the problem persists you may need to make the sensor slightly more sensitive.

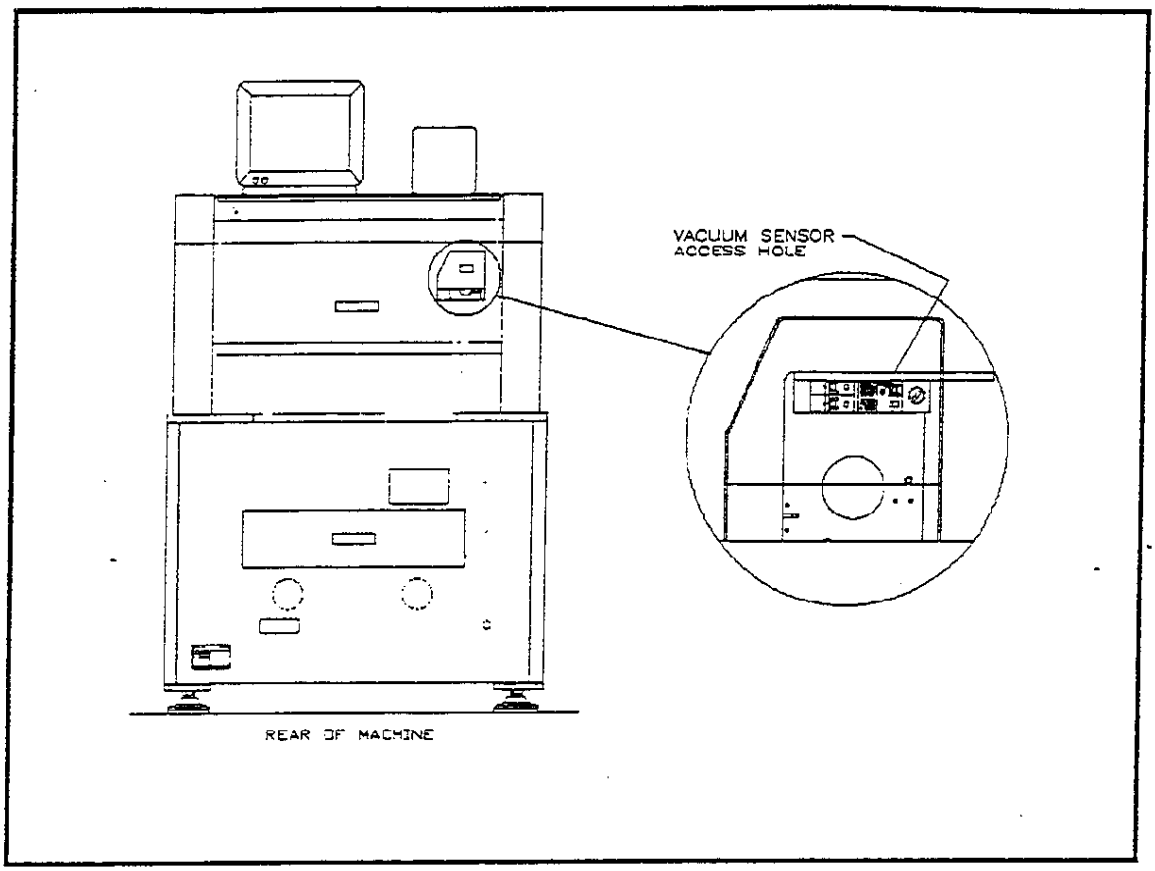

Figure 6

Placement Problems

There are several major functions of the machine that will affect placement. They are as follows:

Calibration of the machine. Poor machine calibration will effect all parts being placed though it may be more noticeable on some parts like fine pitch qfps. If you suspect poor machine calibration see the Calibration section in the Installation and Maintenance Manual.

Component analysis. See the above section on troubleshooting laser and fine pitch camera analysis.

Nozzles. If there are two nozzles that might fit the part try both to see if one works better. Make sure any nozzle you use is in good condition.

Package measurement parameters. Check all measurement parameters against the actual part. Although the settings in the package library were based on industry standards (if there is such a thing), packages from different manufacturers will vary - sometimes critically. Double check the package height because this will

determine if the part is pushed down onto the board causing a shift or dropped from above the board causing a shift.

Package delay parameters. Inappropriate delay and head speed settings will adversely affect the quality of placement. Large and heavy parts will require longer delays. Vacuum Off and Pressure On parameters may also need adjustment to ensure the package to nozzle seal is broken before the head is moved up.

A special feature, useful in placing light qfp packages, is activated when ever the place delay is set greater than 200 ms. This feature will first place the part, wait the specified delay, and then move the z axis up slowly for the first fifty thousandths after which it will speed up to normal speed. This helps to eliminate any hop of the part due to its tendency to follow the nozzle.

Board parameters. There are several methods of measuring the board base height and all are dependent on the operator for accurate results. One method that helps the operator minimize any error is one in which a piece of paper is used to feel when the nozzle makes contact with the board. This can be done very fast because the operator can focus his attention on the jog panel.

To do this first select nozzle #3 (three dots) and using the jog panel move over the board. Using an ordinary piece of notebook paper between the board and the nozzle move the head down in High so that some pressure is put on the paper. Then switch to Low speed and click up until you can just move the paper. Switch to Fine speed and click down until you feel a pressure on the paper. Finally, switch to Step and click up (or down as needed) until the paper has a very slight drag from being pinched between the nozzle and board. Click on Read Coordinates and remember the Z value. You must also add another -0.003 to the Z value for the paper. You may consider taking several measurements across the board to check the level of the board.

Compare the board base height under miscellaneous system settings with the value you found in the last step. Also check the board thickness setting. For a standard setup using the magnetic holders this value should be zero. If you are using a fixture or jig this value will be the measured board thickness. See figure 7.

Board condition. A poor quality board will give the appearance of poor placement. If a printed circuit board is produced inconsistently the pads may be shifted from board to board or from run to run of boards. The machine, programmed on one board, will place the parts off the pads of another board. If possible, use local fiducials. Also place several boards and adjust X,Y position for the best compromise between boards.

A board may be thin and therefore flimsy. Because of this, the board may flex and may not clamp in the holders securely causing differences in the board base height. See figure 7. To help this problem make use of properly sized holders and board supports. In some cases it may be necessary to use some type of fixture to hold the board flat and stable.

The magnetic board holders are available in three sizes. The standard size, shipped with the machine, are designed for boards .06"-.09" in thickness. The other two sizes, available by special order, are made for boards .03"-.06" and .09"-.125" in thickness.

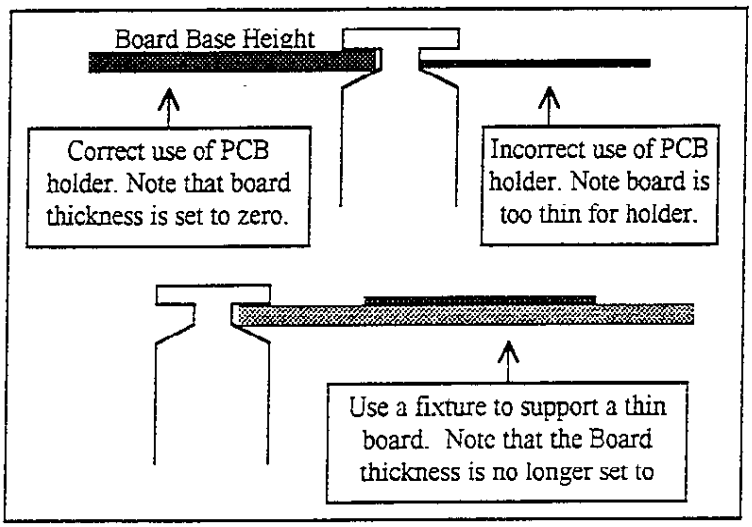

Figure 7