

TOP DOOR 1

Proximity Sensor Removal and Installation

Top Door Window Cleaning

Top Door Removal and Installation

Proximity Sensor Actuator

The Proximity Sensor Actuators are magnets that will close the circuit of the Safety Interlock System. This will allow the laser beam to fire only if the doors are closed and the circuit is completed.

Removal

Unscrew the two(2) small nuts that attach the Actuator to the Top Door. Remove the Actuator.

Installation

Attach the new Actuator to the Top Door. Secure it with the two(2) small nuts that were removed off of the old Actuator.

Top Door Window Cleaning

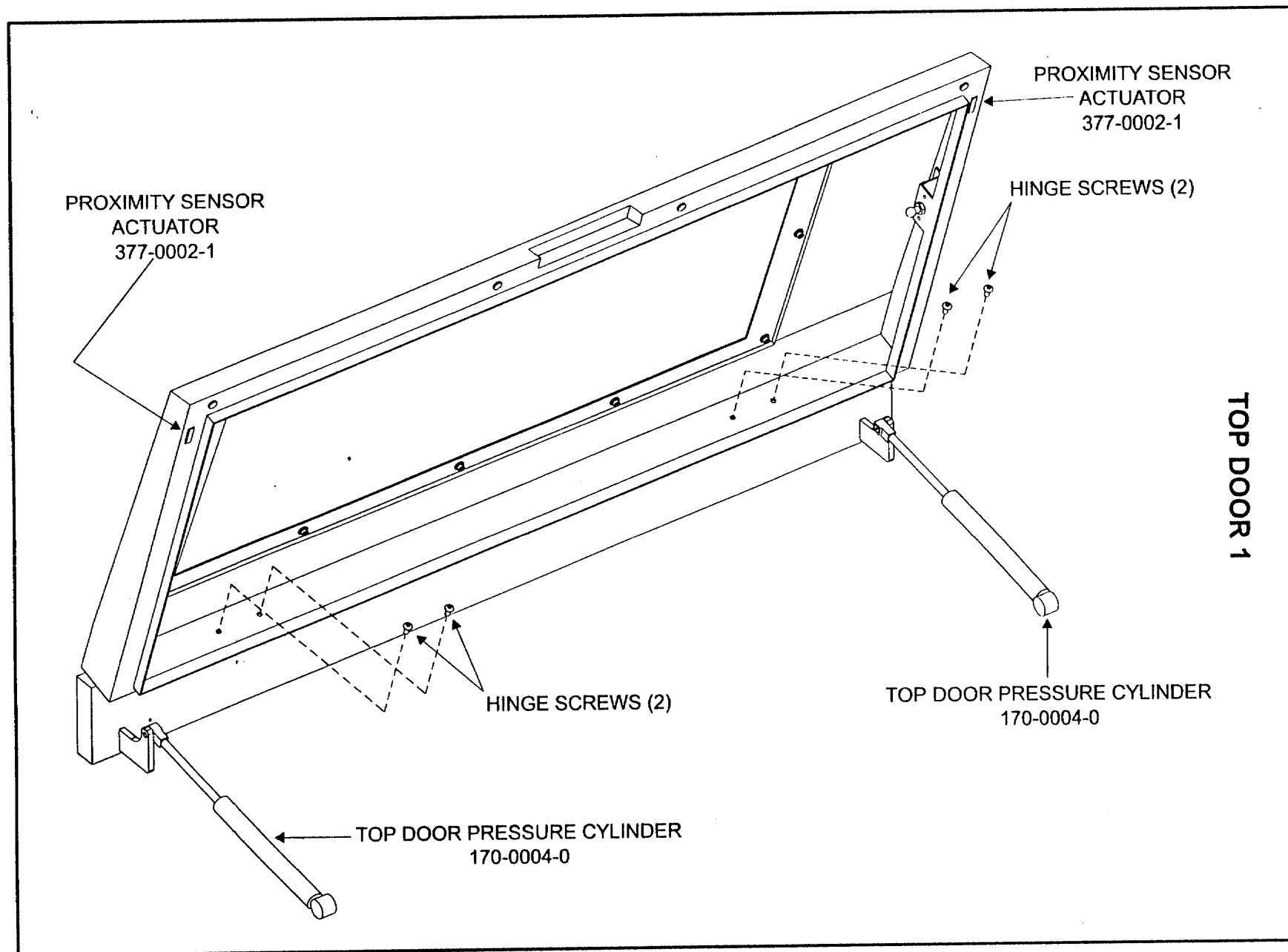
The Top Door Window is made of acrylic. Only use a mild solution of soap and water, along with a soft cloth such as a Kleenex tissue, to clean it. Do not use paper towels because it will scratch the Window. Do not use window cleaner, lens cleaner, or anything that has alcohol, acetone, or any volatile liquid as this will crack the acrylic. Dupont actually recommends a solution of (1) tablespoon of Joy dishwashing liquid mixed with 1 quart of water in a spray bottle to be used as a cleaning solution.

Top Door Removal

It is recommended that the Top Door Window be replaced by factory personnel. Removal of the Window by itself is not possible due to tamper proof securing nuts. If the Top Door Window needs replacement, the entire door needs to be replaced as a unit. To remove the Top Door, first disconnect the top part of the Pressure Cylinders from the door (see Top Door 2 procedure). Remove the four(4) Hinge Screws and gently lift the Top Door off the Main Enclosure.

Installation

Align new Top Door to the Hinges with the help of another person, and install all four(4) Hinge Screws. Attach the Pressure Cylinders to the Top Door Ball End Studs (see Top Door 2 procedure).



TOP DOOR 2

Pressure Cylinder Removal and Installation

Description

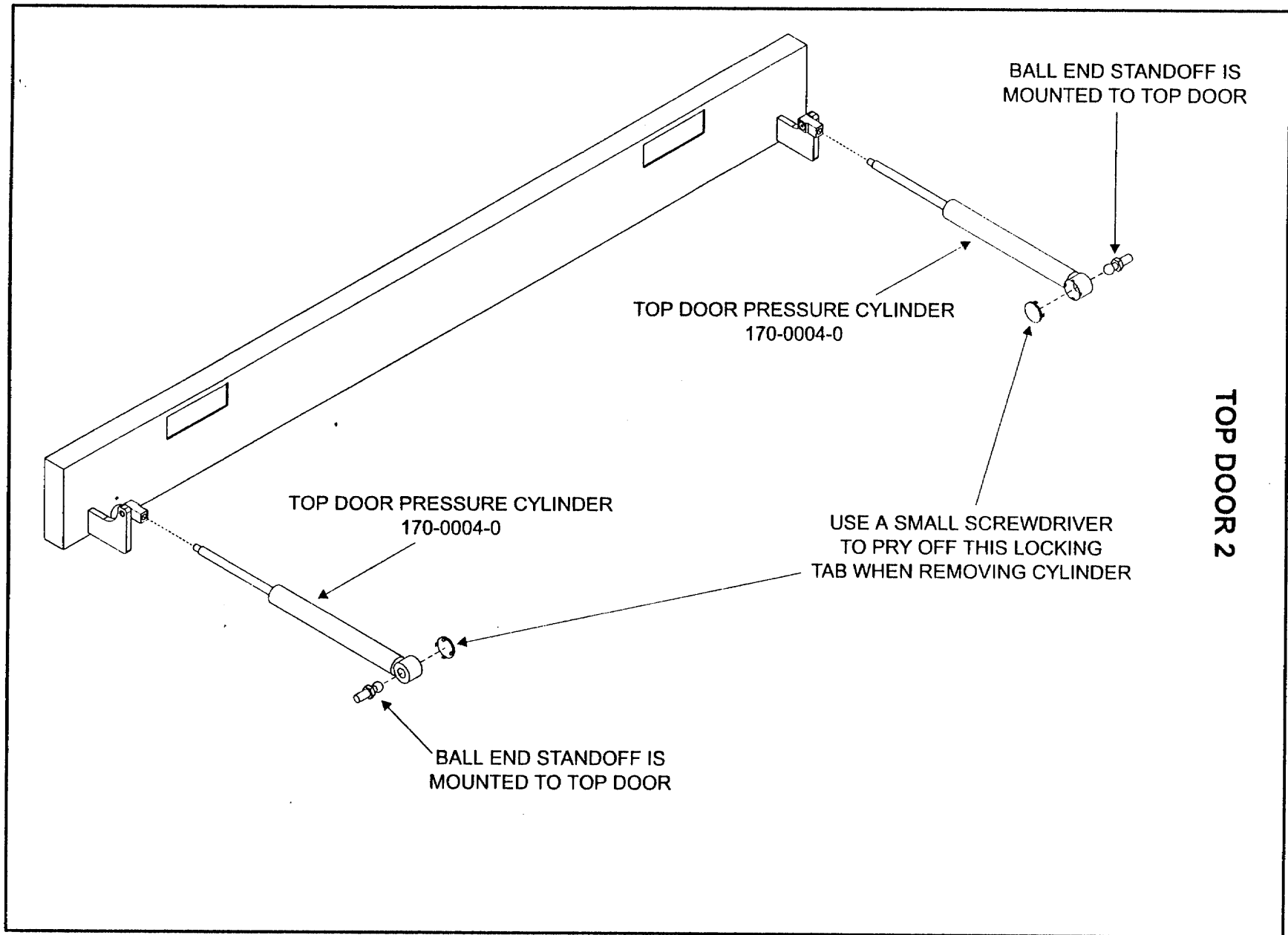
The Top Door Pressure Cylinders help lift the Top Door when opening and also assist in keeping the door tightly closed when it is in the closed position. It also prevents the Top Door from slamming when closing it. After some time they can lose their lifting or holding power.

Removal

Use a small screwdriver to pry off the Plastic Locking Tabs as the diagram indicates. Grasp the Pressure Cylinder and pop it off the Ball End Standoffs (shown in the previous diagram) that are mounted to the Top Door. Unscrew the Cylinder from the Bracket by grabbing the Cylinder by hand (the black part) and rotating it counterclockwise. It is not tight so it should unscrew easily.

Installation

Install the new Pressure Cylinder, **BY HAND ONLY**, by screwing it into the Bracket until it stops. **NEVER TOUCH THE SHAFT OF THE CYLINDER WITH ANY TOOL. SCRATCHES ON THE SHAFT WILL DESTROY THE SEALS WHEN THE DOOR OPENS AND CLOSES WHICH WILL LEAD TO PREMATURE FAILURE.** If the other end does not line up properly with the Ball End Standoffs, then loosen the Cylinder by turning it counterclockwise until it lines up. It is not necessary to have the Pressure Cylinder screwed into the bracket completely. Push the end onto the Ball End Standoffs until it snaps into place. Push in the Plastic Locking Tabs until it bottoms out.



TOP DOOR INTERLOCK

Proximity Sensor Description, Testing, Removal and Installation

Description

The Top Door is safety interlocked by the Proximity Sensors and the Actuators. The Proximity Sensor Actuators are simply magnets. When the Actuators are close enough to the Proximity Sensor Assembly (when the doors are closed), it closes the electrical connection inside the Sensor thus creating a closed circuit to energize the Solid State Relay. This, in turn, allows DC current to flow to the laser tube. When the doors are opened, it opens the electrical connection inside of the Sensor thus opening the Solid State Relay circuit. This opens the circuit between the DC Power Supply and the laser tube which shuts it off completely.

The Top Door Interlock System functions much the same as the Front Door Interlock with the exception that the Top Door Interlock can be overridden with the Interlock Defeat Tool. The Interlock Defeat Socket is wired in parallel to the Top Door Proximity Sensors. By plugging in the Interlock Defeat Tool into the Interlock Defeat Tool Socket, the Top Door Proximity Sensors are bypassed allowing the laser to fire with the Top Door Open. The Front Door is not overridden so it must be closed at all times to fire the beam even if the Interlock Defeat Tool is plugged in.

WARNING - The Safety Interlock Tool is only used for Beam Alignment purposes and should not be used for engraving. Installation of the Safety Interlock Tool changes the classification of the laser system from a Class I device to a Class 4 device. Safety goggles must be worn at all times while the laser system is powered on. Conscious awareness of the beam path must be observed at all times since the beam is invisible. Make sure that you do not cross the path of the beam with any part of your body.

Testing

Disconnect the Sensor wire from the Wire Harness. With an Ohmmeter, test continuity between the leads. If there is continuity, Sensor is shorted - replace. If it is open, close the door so the Actuator makes contact with the Sensor and perform the continuity test again. If you have continuity with the door closed, but not with the door open, Sensor is good. If you have still no continuity with the door closed, sensor is burned open - replace.

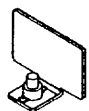
Removal

Unscrew the two(2) nuts that holds the Sensor in place and remove the Sensor. Disconnect Sensor Wire from Wiring Harness if you have not already done so.

Installation

Securely fasten the Sensor onto studs on the Main Enclosure with the two(2) nuts. Connect the Sensor Wire to the Wiring Harness

INTERLOCK DEFEAT
SOCKET ASSEMBLY
133-0028-0
(with wire and connector)



INTERLOCK DEFEAT
TOOL ASSEMBLY
133-0028-1

PROXIMITY SENSOR ASSEMBLY - UPPER
133-0027-1
(with wire and connector)

PROXIMITY SENSOR ASSEMBLY - UPPER
133-0027-1
(with wire and connector)

TOP DOOR INTERLOCK

TROUBLESHOOTING

REMINDER

Any removal of the electronic or electrical components of the laser system should be done with the power OFF and the system unplugged. Obviously, if you are testing voltages, you will need the system powered ON. This manual assumes that you have electrical and electronic skills. Please use common sense when servicing this equipment.

POWER INLET

This is simply a receptacle between the power cord and the AC wiring of the laser system. Failure of this component is highly unlikely if not impossible. If there is a problem (it is internally open) there will be AC voltage on the end of the power cord but no AC voltage coming out of the receptacle.

VARISTOR

If there is an over voltage situation that has occurred to the input power to the laser system, the Varistor will burn up and short out. This will cause the circuit breaker of the installation facility to trip. There will be a visible sign that the Varistor has burned. Re-setting the circuit breaker will only cause it to trip again once the laser is powered ON. It will be necessary to remove and replace the Varistor. The location of the Varistor at the top or the bottom of the fuse block does not matter and it is non-directional(polarized).

FUSES

If there is power coming through the power cord but the laser system does not turn ON, it is possible that the main fuses have blown. There may be no visible sign if the fuses have opened up. They must be either be removed and tested with an ohmmeter for continuity or AC voltage checked while on the laser system to chassis ground. If the fuses continue to blow when replaced, there is a component in the laser system that is drawing too much current that must be found and corrected. **DO NOT** replace the fuses with ones of a higher rating. Replace only with the same type and rating fuse otherwise damage to the electronics or a fire hazard can occur.

EMI FILTER

If this component should fail, an AC voltage check on the input versus the output will show this. There is a schematic diagram printed on the casing of the filter. Refer to this diagram for the proper electrical connections and voltage checks. If there is AC voltage present on the input side but not the output side, replace the component. Be sure to re-connect the wires in the same configuration as removal. Improper connections can damage the electronics.

28VDC POWER SUPPLY

If the laser does not fire and the cooling fans do not come on, there may be a problem with this component or the Standby Mode has been activated. There is one single purple/white striped wire that connects to the power supply from the LAS4.0 board. This is the Standby Mode trigger. When the Standby Mode has been activated, the LAS4.0 board sends this line to ground. This works just like a switch and turns off the Power Supply. This, in turn, turns off DC power to the laser tube and the cooling fans. To test, make sure the Standby Mode is not activated or simply turn the laser system OFF. Disconnect the purple/white striped wire by pulling out the connector to the Power Supply. Turn the laser system back ON again. If the Power Supply comes on, there is a problem with either the purple/white striped wire being shorted to ground or the LAS4.0 board itself. If the Power Supply does not come ON, check to see if there is input AC Voltage coming in. If there is proper AC voltage in but little or no DC voltage coming out, replace the Power Supply. Be sure to re-connect the wires in the same configuration as removal. Improper connections can damage the electronics. There is a connection diagram printed on the Power Supply and/or refer to the Schematics section if you are unsure of the connections.

SOLID STATE RELAY

OK -
checked 10/5/02
5V
3 → 4 28.3
1 → 2 28.3

The Solid State Relay (relay for short) is an electronic switch that is directly connected to the safety interlock system. If the top or front door is open, the input DC power to the relay is turned off thus opening the output circuit between the DC power supply and the laser tube. If the safety interlock system becomes shorted or bypassed, the relay will be energized and the laser can fire with the doors open thus violating its Class I rating. When plugged in, the Interlock Defeat Tool creates a closed loop circuit that energizes the relay which allows DC power to the laser. This has nothing to do with turning on the 28VDC power supply. The relay is merely an electronic switch that is located between the DC output of the 28VDC power supply and the laser tube itself. The relay has an electrical schematic printed on the relay's casing. To test the relay, turn on the laser system, close all doors, and measure the DC voltage from the terminal 4 to terminal 3 on the relay. It should read approximately 5VDC. If it does not, there is a problem with the interlock system - inspect and repair. If there is approximately 5 volts present, test the DC voltage from terminal 2 on the relay to chassis ground. It should read approximately 28VDC. If it does not, there is a problem with the wire to terminal 2 or the 28VDC Power Supply - inspect and repair. If you have 28VDC on terminal 2, then check the DC voltage from terminal 1 to chassis ground. It should also read approximately 28VDC. If it does not, replace the Solid State Relay.

BUZZER

The buzzer is actually a beeper. The buzzer beeps when the laser system has finished and engraving job. If the buzzer fails, it will sound off faintly or not at all. Replacement is simple and the connection is keyed to prevent an improper connection.

POWER SUPPLY(STEPPER MOTORS)

Please refer to the procedure "Electronics 2" for troubleshooting.

LAS4.0 BOARD (MOTHERBOARD)

The LAS4.0 board controls the Display Board, receives and stores print files, and sends laser pulsing information directly to the laser tube. If the Laser system will not accept files from the computer and it is known that the computer, its parallel port, and its printer cable are all good, the LAS4.0 board needs replacing. If there is no DC voltage, while running a file, coming out of the modulation cable that goes to the laser, and the modulation cable is good, the LAS4.0 needs replacement. If there is a failure of the LAS4.0 board, remove the board by first disconnecting the wiring harness connections. Then remove the socket head grounding screw located between the parallel and serial ports. Gently pry the board out away from the cover plate at the location of the snap connectors. Replacement is opposite of installation. The wiring connectors are keyed so improper installation cannot occur.

FRONT and TOP DOOR INTERLOCKS

Disconnect the Sensor wire from the Wire Harness. With an Ohmmeter, test continuity between the leads. If there is continuity, Sensor is shorted - replace. If it is open, close the door so the Actuator makes contact with the Sensor and perform the continuity test again. If you have continuity with the door closed, but not with the door open, Sensor is good. If you have still no continuity with the door closed, sensor is burned open - replace.

AIR INTAKE FILTER

Remove and inspect the filter. If it is very dirty, air flow will be restricted and the exhaust system will not work properly. Clean the filter by rinsing it out with soap and water. Wring it dry and re-install.

Z-AXIS ASSEMBLY 1

Engraving Table Description, Adjustment, Removal, and Installation

Description

The Engraving Table (Z-axis Table or Stage) is a Honeycomb centered, aluminum laminated table. It is very lightweight and surface ground so that it is very flat. The levelness of the Engraving Table is a very important requirement for proper laser engraving. If, for any reason, the Table comes out of level (highly improbable) with the Focus Carriage, It must be adjusted. It is not important the Table is level with the ground, it is important that it is level with the Focus Carriage.

Adjustment

To check Table levelness, turn off the laser system. Manually move the Focus Carriage by hand to Position 1 which is at the top center of the Table. Using the Focus Tool, adjust the Table so that you are focused on the Table's surface. Now move the Focus Carriage to Position 2 and focus on the Table there. While focusing, count the number of turns you make with the Hand Crank. One complete turn of the Hand Crank moves the Table up or down .030 inches (.75mm). Perform the same test for Position 3 and Position 4. The difference in focus between Position 1 and Position 2 or between Position 3 and Position 4 should be no more than ½ turn of the Hand Crank.

To adjust the Table first remove the Z-axis Belt Cover Plates (2). If the Table is not level from front to back, loosen the lockdown screw on the bottom of the Front Left Pulley Wheel. Hold the Pulley Wheel with one hand, and with the other hand, rotate the Front Left Lead Screw that the Pulley Wheel is attached to. By rotating the lead screw by hand, and getting grease all over your fingers, you will notice that the front part of the Table will move either up or down depending on which way you turn the screw. The objective is to adjust the Front Left Lead Screw until the focus height from the front to the back of the Table is at the same level. Do this by using the Focus Tool. Once this is achieved, tighten down the Front Left Pulley Wheel's Lockdown Screw. Front to back Table level adjustment is now complete.

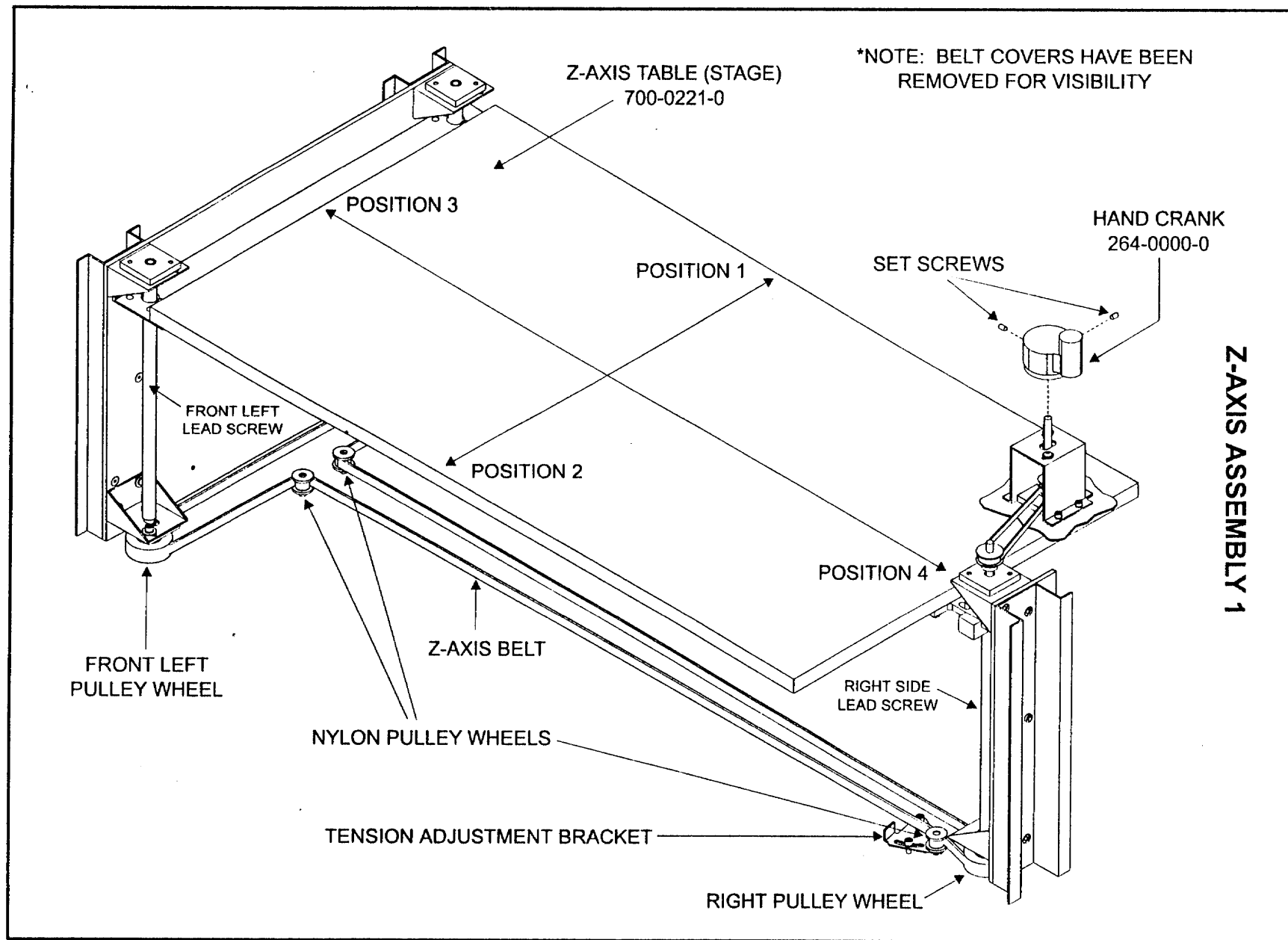
To adjust the Table level from left to right, perform the same procedure except adjust the Right Pulley Wheel and Lead Screw instead of the Left Front Pulley Wheel and Lead Screw. Always adjust front to back first (if needed) then adjust left to right second.

Removal

Bring Table up about ¾ of it's maximum. Open Front Door and find the three(3) screws that connect the Table to the left side bracket and the two(2) screws on the right side bracket. Remove all four(5) screws. Slide the Table out the Front Door.

Installation

If installing a new Table, remove the Rulers from the old Table. Install the new Table through the Front Door and bolt the three(3) screws on the left side down first. Then bolt down the remaining two(2) screws on the right side second. Table level adjustment should not be necessary but you can check it if you like. To install the Rulers, refer to the procedure "Z-axis Assembly 2".



Z-AXIS ASSEMBLY 2

Ruler Adjustment, Removal, and Installation

Adjustment

The rulers are bolted through the Engraving Table and secured on the back side with locknuts and washers. If a Beam Alignment has been performed, usually because the laser tube was replaced, or the Motion System had some components replaced, then the Rulers might need adjustment. The objective is to adjust the Rulers to the laser beam, not the laser beam to the Rulers.

If you loosen the top three(3) screws, for the X-axis Ruler, and the top two(2) screws for the Y-axis Ruler, you will notice that the Ruler can slide around a little. There is enough play to slide the X-axis Ruler back towards the laser and the Y-axis Ruler to the left side of the Engraving Table enough to get them out of the engraving area.

We need to find out where the edge of the engraving area will be. To do this, simply apply a strip of masking tape to where you think the edge of the field would be. Position the tape so that half of it would lie outside the engraving area and half on the inside. Do the same for the other axis.

In your Graphics software, create a vector rectangle that is exactly 24 x 12 inches in the Landscape mode. Set the Power settings to 100% power, 30% speed, 500 PPI and 1000 DPI resolution. Focus right on the tape, and engrave the file. The laser will cut out the rectangle which will cut the tape right down the middle. Remove the outside of the tape to leave a frame of the engraving area on the inside. Move the rulers up the edge of the tape and tighten them down (you might need to hold the nut with your hand on the bottom side of the table). Make sure that the 0,0 position is aligned correctly when tightening down the rulers. When you are finished, remove the remaining tape on the inside of the engraving area and ruler adjustment is now complete.

Removal

Sometimes debris builds up underneath the Rulers or you want to clean the table more thoroughly. In this case, it would be easier to remove the Rulers to clean them or to clean the table. To remove the Rulers, unscrew the three(3) screws that hold down the X-axis Ruler while holding on to the locknut underneath. Do the same for the two(2) Y-axis Rulers.

Installation

Perform the masking tape procedure defined earlier in this section. Install the Rulers by putting the screws through the table and attaching the washers and locknuts. Thread the locknuts up all the way but do not tighten them yet. Get all the screws and locknuts started and slightly snug but loose enough so that the Rulers can still slide around a little. Adjust the Rulers to the masking tape that you previously cut and tighten them down. Again, make sure that the 0,0 point of the Ruler intersection, lines up with the tape intersection in the upper left hand corner.

Z-AXIS ASSEMBLY 2

