

# Laser Scribe AJT

## User's Manual

Automatic Jedec Tray

**Version 1.0**  
**June 13, 2000**



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# EXATRON LASER STACKER SYSTEM

## SAFETY ISSUES

Before running the AUTOMARK Laser Stacker system be sure all safety precautions have been taken. For all safety procedures please refer to the HAAS LASER VMc-Manual and the Laser Safety Manual from Rockwell Laser Industries.

## PHYSICAL DESCRIPTION

The Laser Stacker system consists of two primary sub-systems, the laser/enclosure and the stacker/conveyor, each with its own operating software found on the system PC.

### **LASER/ENCLOSURE**

The laser/enclosure subsystem is manufactured by HAAS-LASER, a subsidiary of Trumpf GMBH, of Stuttgart, Germany. This subsystem consists of the following components:

#### **DIODE-PUMPED LASER**

The heart of this system is the diode-pumped Nd:YAG laser, which is housed in the laser head inside the laser cabinet. The laser is housed in the white "barn" shaped box which travels up and down on the motorized Z-axis. This box encloses the YAG crystal, the optical path, the laser pump diode module, a power supply, and a motorized focusing lens. These items are more fully described in the Trumpf "VMc Manual" that was shipped with this system. **THE LASER HEAD IS A VERY PRECISION MECHANICAL DEVICE WITH DELICATE OPTICS AND HIGH-AMPERAGE POWER SUPPLIES. ONLY FACTORY-TRAINED SERVICE TECHNICIANS SHOULD EVER ATTEMPT SERVICE ON THIS COMPONENT.**

#### **SCANHEAD**

The scan head has the galvanometer motors and small mirrors which move the laser beam around the marking field. In addition, the scan head has a "field flattening lens" which assures that the laser beam stays in focus across the entire marking field. **THE SCAN HEAD IS A VERY PRECISION MECHANICAL DEVICE WITH DELICATE OPTICS. ONLY FACTORY-TRAINED SERVICE TECHNICIANS SHOULD EVER ATTEMPT SERVICE ON THIS COMPONENT.**

#### **ENCLOSURE**

The laser and working surface are enclosed in a CDRH Class 1 laser enclosure – safe for unprotected external viewing. The enclosure contains two lights, an automatic door with laser-safe glass, and a motorized Z-axis for moving the laser head up and down to proper focusing heights.

#### **FUME EXTRACTION**

A metal pipe with flexible hose can be seen inside the laser cabinet. This hose connects to a vacuum filter found inside the base of the laser enclosure. This filter traps particulate contaminants created by the laser process. The vacuum has replaceable filters which should be checked occasionally for excess contamination.

## LASER CONTROL / COOLER UNIT

The laser controller with cooler unit is mounted in the rear of the enclosure base. This unit has an industrial PC, interface boards, power supplies, and a self-contained cooler unit. This unit has some customer-serviceable components, and some that are not. Please consult the VMc manual for further information.

## DEIONIZED WATER FILLING

The cooler unit requires 4 liters of Deionized water. The internal tank is filled by means of a flexible hose which is accessed by the main door on the Laser control unit. The hose is located behind the black fabric pre-filter, which must be removed (two screws) to access the water hose. A detailed explanation of the water filling process is given in the VMc Manual, Chapter 9, Section 9.7.7, page 9-95 in the July 1999 revision. Please follow **all** the steps outlined in this section including bleeding the air out of the system.

## AC POWER SELECTION

The system should be set properly when shipped, but it may be useful to double-check the AC power setting on the system before running it. Main power is connected to the control unit by way of a plug, located inside the control unit, in the bottom corner of the PCB mounted to the right side of the upper portion of the unit. There are receptacles for 115V\_AC and 220 V\_AC. These are marked clearly on the PCB. Simply confirm that the power connector is in the correct receptacle for your location. If the power connector is incorrect, please call Exatron at 1-800-EXATRON before switching on main power.

## STACKER/CONVEYOR UNIT

Docked to the left side of the laser enclosure is the stacker/conveyor unit. This unit has two motorized stacker units and a motorized conveyor with tray platform.

## STACKERS

Each stacker uses a servo motor to raise and lower the lifting arms. Each arm has four pneumatic pins which actuate to engage JEDEC tray cutouts for lifting and lowering the trays. The trays are supported above the moving platform by another set of pneumatic pins mounted in the permanent corner guides for each stack.

## PLATFORM/CARRIAGE

The trays are transported on a platform with pneumatic pins which are actuated to push the tray into one corner of the platform, assuring uniform placement of trays. This platform is supported on two linear bearings. The platform is driven by a servo motor identical to the motors in the stacker unit.

## MOTORS

A separate note about the motors is in order. These motors are programmable and must be programmed before they will work. In the event a motor has to be replaced in the field, please contact Exatron for the correct procedure for reprogramming the motor.

## SAFETY

Safety is always of paramount importance in Exatron systems. The laser stacker system incorporates interlocks on the enclosure door, and interlocks and locks on the stacker doors.

### **VIEWING WINDOW**

The viewing window in the enclosure door is coated with a material that blocks transmission of light in the wavelength of the laser. Thus, no laser energy can be seen through the window.

### **GLASSES**

Every Exatron system is supplied with at least one pair of laser safety goggles, specially treated to prevent transmission of light at the wavelength of the laser. These glasses are generally not required for normal laser system use. However, any person servicing the laser should wear these goggles.

### **ELECTRICAL HAZARDS**

The laser system operates at very high currents. **THESE CURRENTS POSE A SERIOUS THREAT TO ANY PERSON EXPOSED TO IT.** All high-current components of the system are protected by covers requiring tools to remove. No such cover should be ever removed by any operator. Only trained technical staff should ever remove any cover of the laser system. In particular, the covers on the laser head itself should never be removed by any person other than a Trumpf or Exatron service technician or a highly-trained customer service technician.

### **CHEMICAL HAZARD**

The Trumpf laser cooler uses Deionized water for cooling. DI water does not pose any specific hazard and does not require special handling. DI water is not intended for drinking and can cause sickness is consumed.

# EXATRON SUPPORT SERVICES

## TOLL-FREE TELEPHONE CUSTOMER SERVICE LINE

For factory technical support, call 1-800-EXA-TRON, between 8:00 AM and 5:00 PM Pacific time, Monday through Friday, or e-mail us anytime at **service@exatron.com**. When calling/e-mailing, please have your EXATRON equipment close at hand, along with the following information:

- ◆ The **exact wording** of any messages that appeared on your programmer's display.
- ◆ A description of what happened and what you were doing when the problem occurred.
- ◆ A description of how you tried to solve the problem.

WHO TO CALL AT EXATRON:	800-EXA-TRON, TOLL-FREE 408 629-7600, DIRECT 408 629-2832, FAX
TO PLACE AN ORDER:	DIXIE MEYER, HANDLING SYSTEMS MARINA CLARK, SPARE PARTS
FOR SERVICE:	KEN DOWNEY
PURCHASING:	RUTH KURIMOTO
GENERAL MANAGER:	ERIC HAGQUIST
<i>IF ALL ELSE FAILS:</i>	ROBERT HOWELL, PRESIDENT

PLEASE SUPPLY THE FOLLOWING INFORMATION WHEN PLACING A SPARE PARTS ORDER:

1. The part number(s) required. If the part number is not known, photocopy the part and fax the photocopy to EXATRON.
2. The full shipping address.
3. The full billing address.
4. Method of shipment, such as: Federal Express, UPS, DHL, U.S. Mail, or the name of your chosen freight forwarder.

In most cases, faxed requests/e-mail requests and shipment of replacement parts orders are processed within twenty-four hours of receipt by Exatron. E-mail and faxes received after 4:00 PM Pacific time will be answered on the following business day.

## STANDARD WARRANTY

All EXATRON products are under warranty for one year from the date of purchase. EXATRON agrees to repair any mechanical or electrical assembly, subassembly, or entire unit which fails during normal use within its first year. The Customer agrees to follow the recommended maintenance procedure as defined in the User's Manual.

EXATRON DOES NOT warrant test contactors. EXATRON uses the finest materials available in our contactor designs. However, programmer test contactors are fragile and may be easily ruined by operator abuse.

All warranty work must be performed at the EXATRON factory or at an authorized Representative Service location. As described on this page, in-house service done by our customers on non-laser equipment is encouraged.

**EXATRON does not warrant the following:**

1. Damage caused by improper packaging of equipment returned to EXATRON for repair.
2. Damage caused by the freight forwarder.
3. Damage caused by acts of God: flood, fire, earthquake, etc.
4. Damage caused by equipment connected to improper power line voltages.
5. Operator abuse.
6. Damage caused by bad air supply.
7. Interface hardware not manufactured by EXATRON.
8. Test contactors.

## AUTHORIZED CUSTOMER SERVICE CENTERS

EASTERN UNITED STATES: JOHN TIERNEY  
BOSTON MICRO  
65 CARDIGAN ROAD  
TEWKSBURY, MA 01876  
(978) 640-1980 FAX: (978) 640-1968

EUROPE/U K: ROY QUAIFE, PAUL CHANDLER  
CHARNTEC ELECTRONICS  
UNIT 4 CLAYLANDS ROAD  
INDUSTRIAL EST. BISHOPS WALTHAM  
HAMPSHIRE S032 1BH  
ENGLAND  
011-44-1489-894456  
FAX: 011-44-1489-895477

JAPAN: KOJI YAOITA  
DIRECTOR OF SALES  
GENERAL BUSSAN CO., LTD.  
18-2, NAKANO 2-CHOME  
NAKANO-KU, TOKYO 164-0001  
JAPAN  
(03)-3383-1711 FAX: (03)-3383-1719

## CUSTOMER IN-HOUSE SERVICE

Except in the case of the Model 1910, Model 1960, or FI Laser Marker, EXATRON encourages customer in-house equipment service by qualified technical personnel and tries to make in-house service as easy as possible to perform. There are no "Void Warranty" warning stickers on EXATRON programmers. EXATRON will even honor the warranty on a unit when an in-house repair attempt leads to further damage to the unit. By using the built-in diagnostic software and diagnostic tools, it is usually possible for the operator to isolate a problem quickly and effect a repair.

## OFFSHORE WARRANTY SERVICE

An EXATRON Programmer purchased in the United States and then shipped offshore will be warranted through EXATRON in California. Replacement *parts* are furnished for a period of one year from date of purchase with the exception of replacement contactors. It may be necessary to return the worn part from the offshore user location.

To receive offshore *service* support, the programmer must be purchased through your local EXATRON Representative or an extended warranty agreement must be purchased directly from your local EXATRON Representative.

Please supply the following information when requesting offshore service or replacement parts:

1. The part number(s) required. If the part number is not known, photocopy the part and fax it to EXATRON.
2. The Model number of the Programmer.
3. The type of device being run by the Programmer, such as: DIP, SOIC, SOJ, PLCC, LCC, SIP, PGA, PCB, ZIP, etc.
4. The Programmer's serial number.
5. The full shipping address.
6. Any special shipping or customs instructions.
7. Method of shipment, such as: Federal Express, UPS, DHL, U.S. Mail, or the name of your chosen freight forwarder.

In most cases, faxed requests/e-mail requests and shipment of replacement parts orders are processed within twenty-four hours of receipt by EXATRON.

# SETUP

The system is shipped in two pieces – the laser enclosure with laser head, PC, cooler, etc., and the stacker unit. The two will be assembled by Exatron personnel.

## RUNNING A JOB

### **THEORY OF RUNNING A JOB**

The basic procedure of running a job is shown here. More detailed descriptions of each step follow below.

- A. Switch on all systems
  - 1. Laser Enclosure
  - 2. Stacker Enclosure
- B. Reset Winmark Software
- C. Home Z-axis
- D. Set Z-axis to correct height
- E. Call up correct laser mark in Winmark software
- F. Load trays
- G. Call up correct tray layout in Exatron software
- H. Execute job

### **SWITCH ON ALL POWER**

#### LASER ENCLOSURE

There are two primary power switches in this system. The first is the laser enclosure subsystem. A large round switch can be found under the monitor arm mount on the right side of the machine. When this switch is in the vertical position, the power is off. When it is horizontal, the power is on. A small key switch is located under the main switch. This is an interlock which, if closed, allows the system to operate. When this switch is open, the system will not mark and an error will appear on the Trumpf software.

#### STACKER ENCLOSURE

Inside the front doors of the stacker base is a 24V power supply unit, labeled Exatron 3000B Power Supply. A large red E-stop switch provides power to this unit. Turn the switch to activate power (the switch will “pop” out). Push it in to cut power.

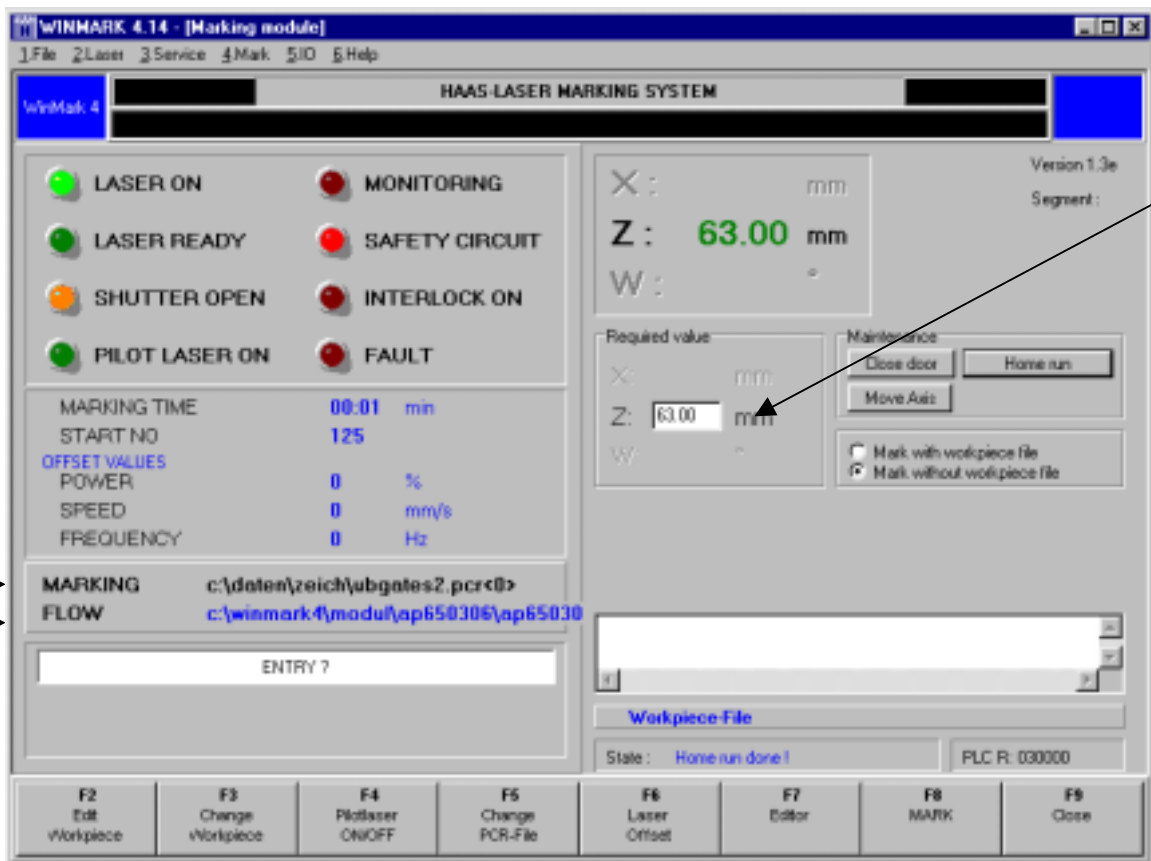
### HOME Z-AXIS

When the system PC boots, it will automatically launch the Trumpf Winmark software. After the software is initialized, a message will appear generally in the middle of the computer screen saying “**Home Run Gets Started**” with an **OK** button. Click on the **OK** button. The laser head will slowly move up until it reaches its home position.



You should now see the system settings screen on the computer monitor.

### SYSTEM SETTINGS SCREEN



The screenshot shows the Winmark 4.14 software interface. On the left, there are status lights for LASER ON, LASER READY, SHUTTER OPEN, PILOT LASER ON, MONITORING, SAFETY CIRCUIT, INTERLOCK ON, and FAULT. Below these are marking parameters: MARKING TIME (00:01 min), START NO (125), and OFFSET VALUES (POWER, SPEED, FREQUENCY all at 0). The MARKING FLOW is set to c:\daten\zeich\ubgates2.pcr<0>. On the right, the current Z-axis height is 63.00 mm. Callouts point to the status lights, the current marking file path, the current flow program (ENTRY 7), and the current laser height (63.00 mm). The bottom of the screen features a row of function keys: F2 (Edit Workpiece), F3 (Change Workpiece), F4 (Pilotlaser ON/OFF), F5 (Change PCR-File), F6 (Laser Offset), F7 (Editor), F8 (MARK), and F9 (Close).

## RESET SOFTWARE

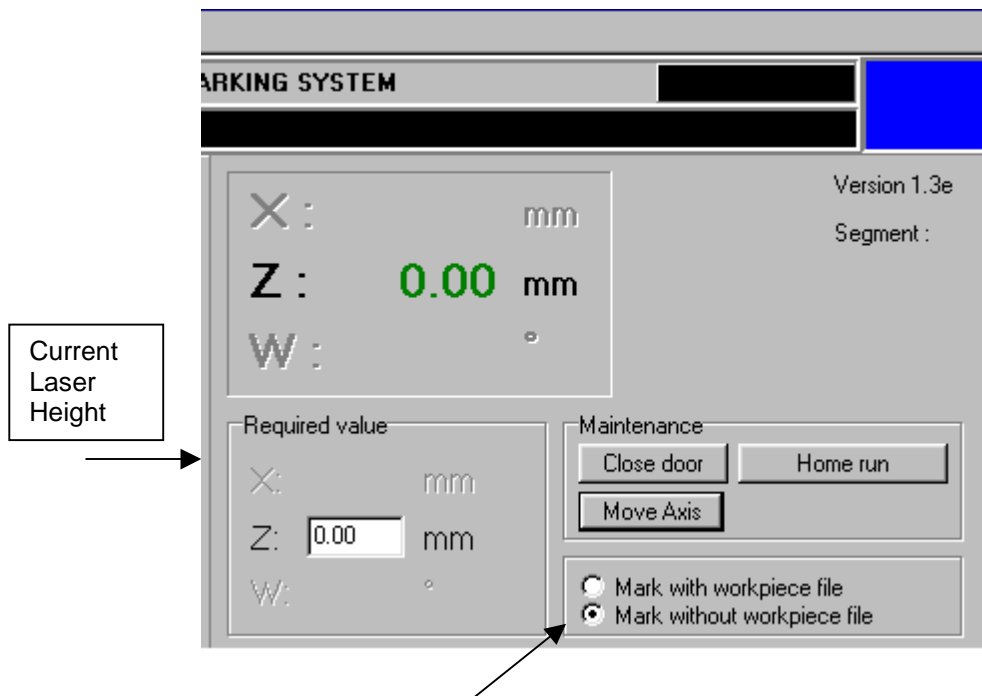
If the fault light turns on, you need to reset the system. Under the “Laser” menu choose “Reset”. The fault light should now be off.



## ADJUST LASER HEAD HEIGHT

After the Z-axis has moved up to the home position, the head must be moved down to the correct laser marking height. This height will be the height of the devices in the trays, measuring from the bottom of the trays. Typically, this measurement will be in the range of 5 to 15mm. This measurement must be in millimeters, as the Winmark software does not accept Imperial measurements.

Enter the height in the box entitled “**Required Value**” next to the “**Z:**”. Then click the **Move Axis** button. The head will lower to the correct position.

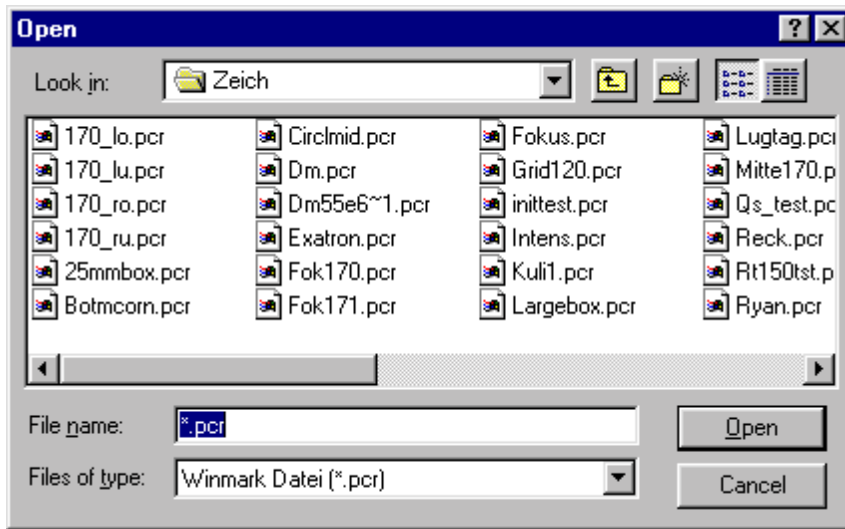


Make sure that “**Mark without workpiece file**” is selected.

## LOAD MARK FILE

This instruction assumes that the mark files have already been created. If so, use the “F5 Change PCR-File<sup>1</sup>” command. Either click on this button on the screen or press the F5 key on the keyboard. This will launch a standard Windows-style **Open** menu. Choose the correct mark file and click the **Open** button. Note that the path and name of your mark file will appear next to the word **MARKING** in the lower left portion of the Winmark software screen. (Creating mark files is covered in Section 5.0, *below*.)

<sup>1</sup> All Winmark mark files have the extension .pcr; hence the name PCR-File. Also, Winmark files must conform to DOS file name conventions: [8 Alphanumeric characters maximum].[3 characters]



The selected mark file should appear on the system settings screen above **FLOW**. It should read the following:

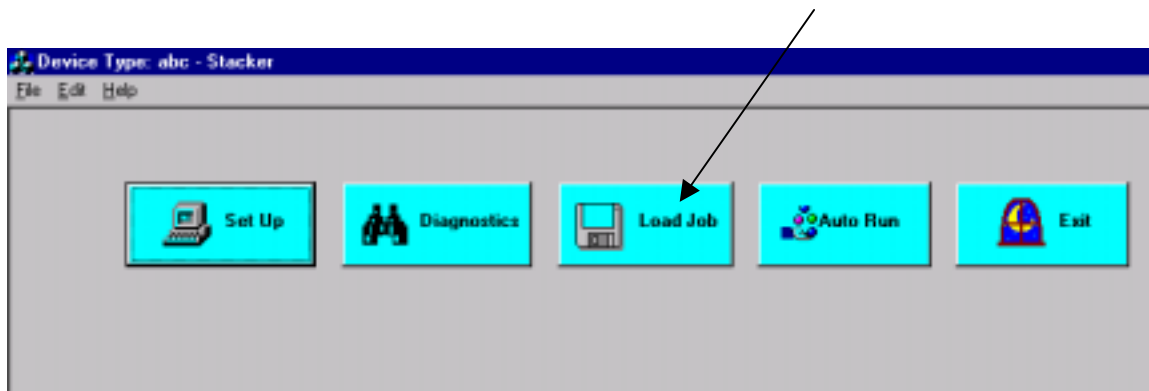
**MARKING**                                    **c:\daten\zeich\“Markfile”.pcr<0>**

**LOAD TRAYS**

The operator may now load trays into the stacker mechanism. The left-most stacker is the input stacker. Make sure to always place an empty tray on top of the input tray stack. In addition, make sure to place an empty tray in the output stacker – this will act as the cover tray for the eventual output. Note that the stacker doors have interlock switches and the stacker will only operate if the doors are closed.

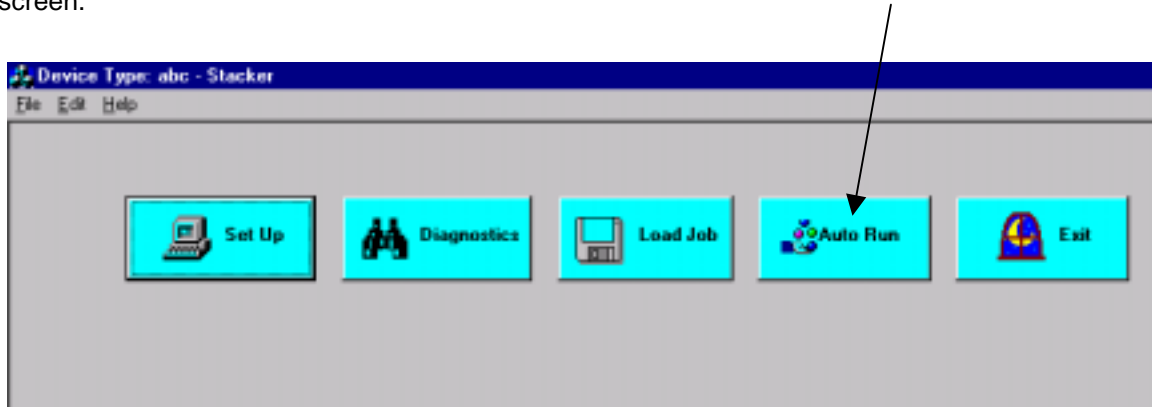
**CALL CORRECT TRAY FILE IN EXATRON SOFTWARE**

Minimize (DO NOT EXIT!) the Winmark software and launch the Exatron stacker software by clicking the icon on the main desktop screen. Click the button called **Load Job** which will open a typical Windows-style file selection screen. Choose the appropriate file and click **Open**. (To define a job, see SetUp Parameters below.)

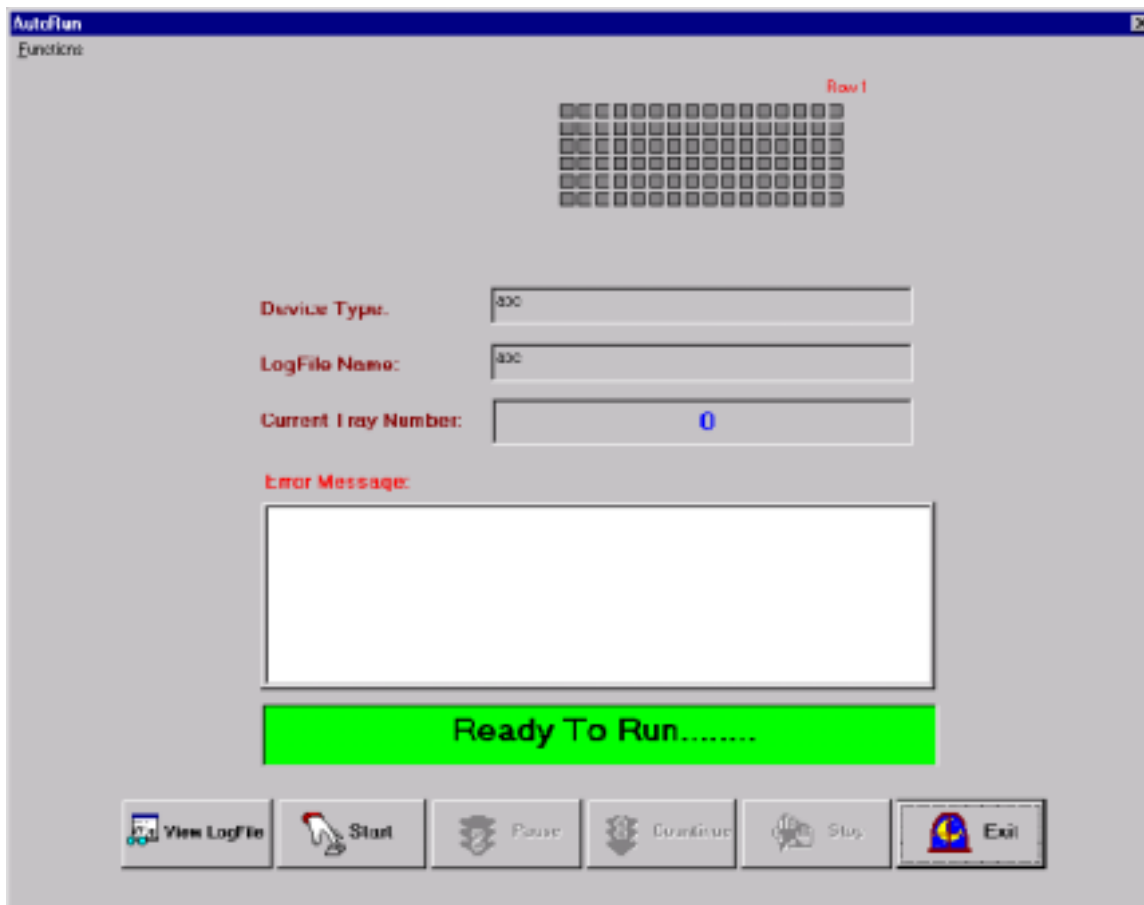


### RUN JOB

The Exatron software communicates with the Winmark software to issue fire commands, so the operator only has to 'run' the job from the Exatron software. Click the **AutoRun** button on the Exatron software screen.



This will open a new screen titled **AutoRun**.



The screen will show a representation (not to scale) of the tray layout, with Row 1 indicated on the screen. A green bar saying "Ready to Run....." appears near the bottom of the screen, below a white error message screen. A row of buttons appears at the bottom of the screen.

It is always good practice to put the motors through a homing procedure before running a job. This procedure is done by pulling-down the **Functions** menu in the upper left corner of the screen. Under this menu is the **ResetMotors** command. This command, when executed, sends all the motors home and aligns the system properly.

Once ready, the operator can click on the **Start** button at the bottom of the screen. The **Pause** button will become active and can be pressed at any time to stop the process of the job.<sup>2</sup> **Continue** can be clicked to pick up where the system left off during a **Pause**.

The **Stop** button will become active when the system is Paused or when it is out of trays and the operator has indicated that he does not wish to continue. This button ends the current job, closes the log file, etc. **Exit** closes this screen and returns to the initial Exatron screen.

When the last tray of a stack is input to the carriage, an error message will appear on the screen asking the operator whether to run that tray, or output that tray. This is to avoid marking the last tray which is often an empty tray which was placed on the stack to protect the tops of the devices.

Either way, when the last tray is output, the operator will be given a prompt to reload the system and continue or to end the job.

A **log file** is maintained showing the start time, stop time and number of trays processed (i.e., marked, empty trays output without marking are not counted). This log file can be viewed

## CREATING A MARK FILE

The process of creating a mark file will include use of the Winmark Editor, the Winmark main software, and the Diagnostic software of the Exatron stacker. Please see the Winmark software manual for more details.

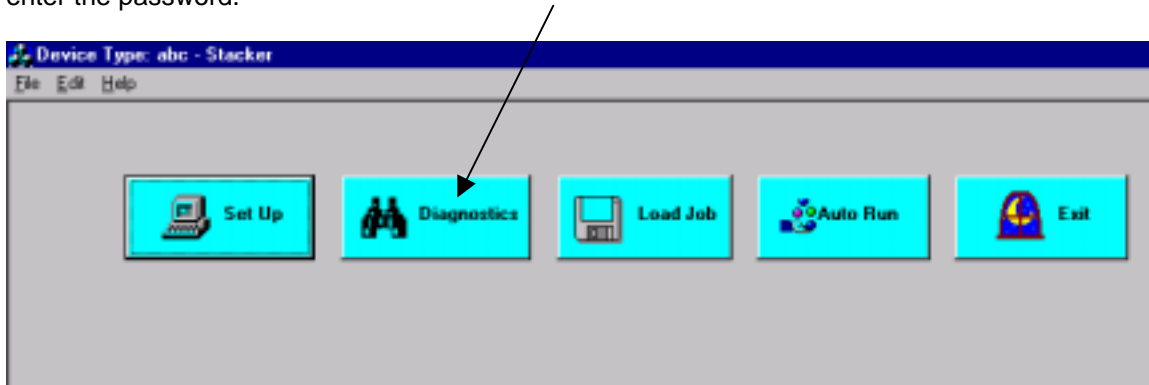
The technician will use the Winmark Editor to define the text of the mark, and the location and spacing of the marks. The Diagnostic software of the Exatron stacker includes a routine to move the tray to the nominal first marking position, where the technician can then verify the location of his mark.

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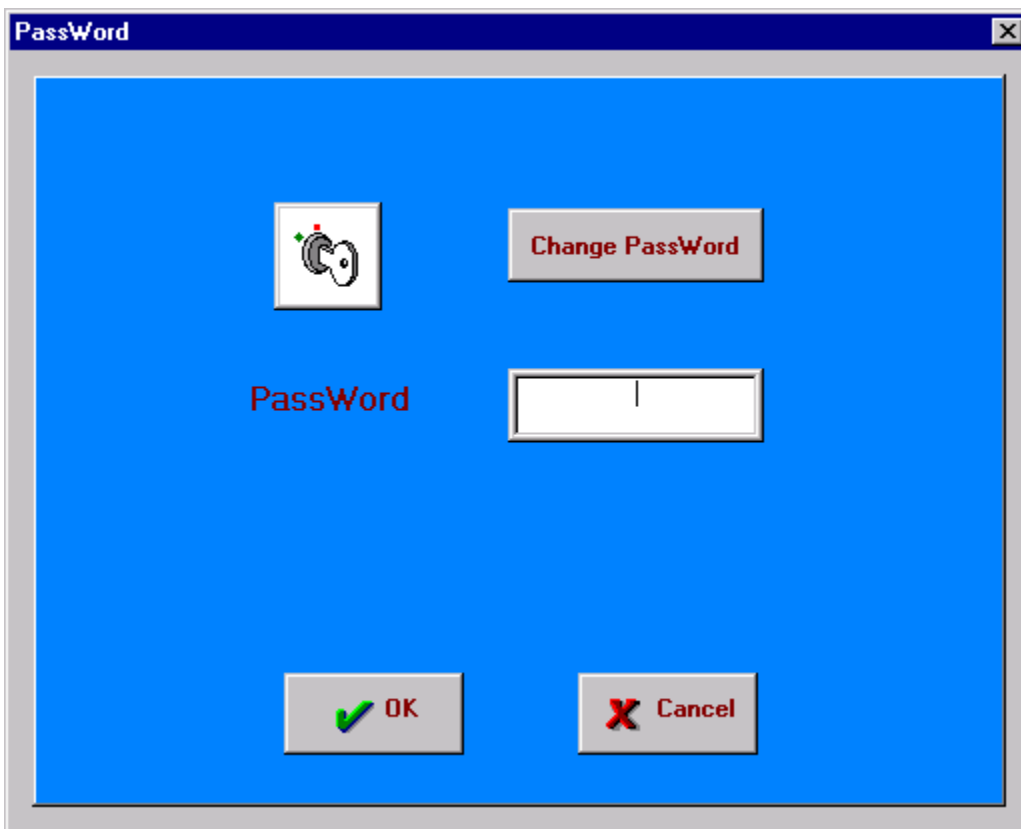
<sup>2</sup> Note: Pausing the job has the effect of stopping any motion on the system after whatever motion is currently in process is complete. Thus, if the system is going through a stacking procedure, it will halt after the stacking procedure is complete.

## EXATRON STACKER DIAGNOSTICS

The technician should first place a tray of devices, with empty cover tray, into the input stacker unit. Also put an empty tray in the output stack. Enter the Exatron software. Click on the Diagnostics button, and enter the password.

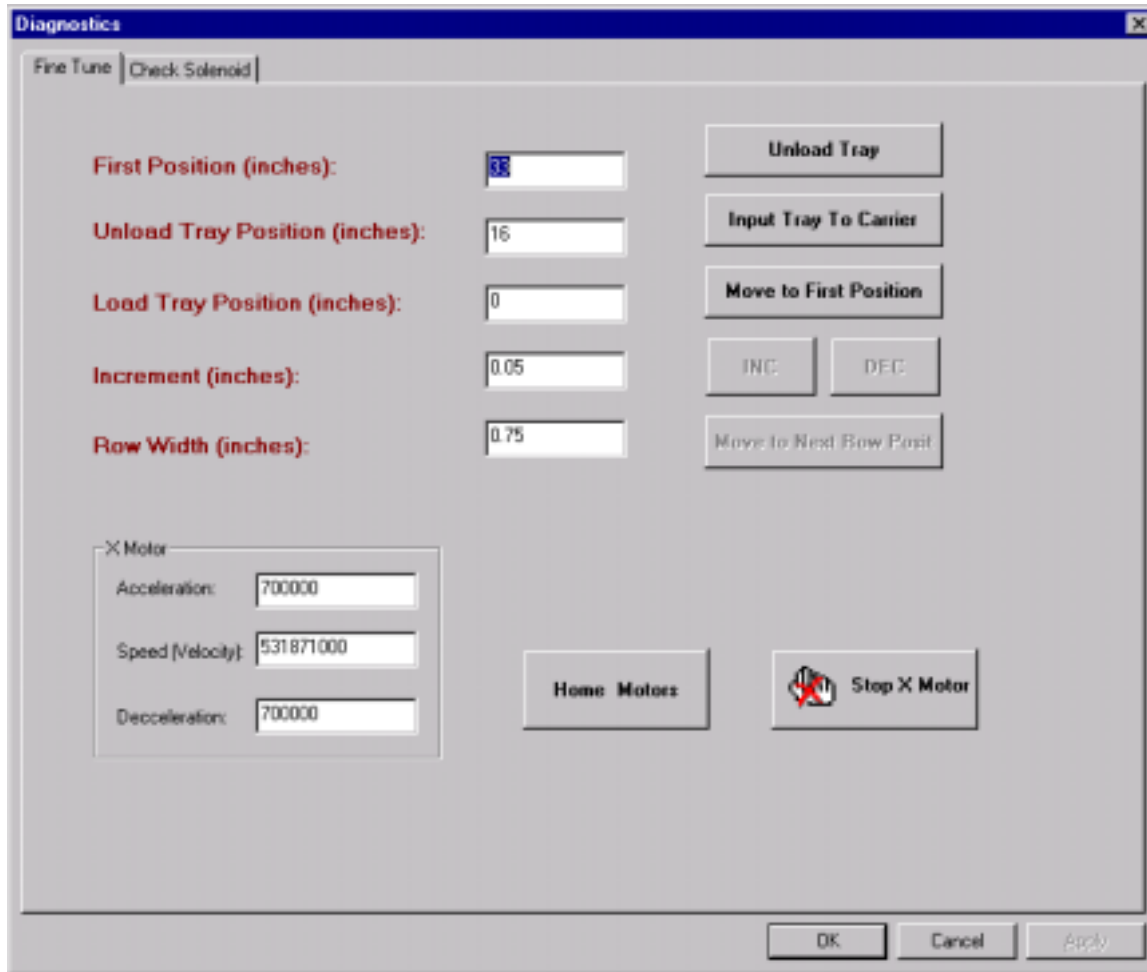


**PASSWORD SCREEN**



Enter the password and click OK. The Diagnostics screen will now appear.

**DIAGNOSTICS SCREEN**



From this screen, the technician should follow these steps:

- A. Press the **Home Motors** button to have all the motors reset themselves.
- B. Press the **Input Tray to Carrier** button to have the stacker place the tray of devices onto the conveyor carriage.
- C. Press the **Move to First Position** button. This will move the carriage to the first laser marking position. This position is determined by a setting discussed in the Setup Parameters section of this manual at Section 6.0, *below*.
- D. Perform the mark testing by following the steps below in Section 5.3.
- E. The operator may move the tray from one row to the next by pressing the **Move to Next Row Posit** button.
- F. When the mark testing is complete, the tray can be removed from the system by pressing the **Unload Tray** button.

## WINMARK EDITOR

This system shipped with a Winmark manual from Trumpf. This manual is an excellent guide to the use of the Winmark software, creating, editing, etc. Not all of the features described in the manual are available on all systems. For example, the True Type Font software and DataMatrix coding software are options not normally purchased with a system.

The technicians should spend some time with the laser marker simply exploring the Winmark software and becoming familiar with it. This brief manual will assume the technician has some familiarity with the Winmark software and that when a Winmark function is referenced (in bold italics below), it does not have to be explained in detail.

The first thing the technician needs is the text of the mark. This can be entered in the ***Draw Text*** command under Winmark, described in the Winmark manual. The mark can be ***shifted, scaled, modified***, etc., with the commands in the Winmark software.

Once the mark is defined, the mark can be copied [***Copy (linear)***] however many times there are devices in a row of the tray. Be careful to check the “***Left lower reference point***” box on the “***Copy Element (tabular)***” box when inputting the distances – this assures proper center-to-center intervals. Again, all measurements are in Metric, no Imperial measurements are accepted.

It may be necessary to delete the copies and try again to get the spacing just right. Once the copies are correct, it is useful to ***Group*** the elements so they can be moved as one unit.

Save the drawing (only use the ‘.pcr’ suffix) and minimize the editor screen. Maximize the Winmark main software and ***Change PCR-File*** to select the file just created.

Once this is done, turn on the Pilot laser and fire the laser to watch the outline of the intended mark. The pilot laser will draw a rectangle around the intended mark. By going back and forth between the editor screen and the main laser screen, it will be possible to move the entire group of marks into the correct position.

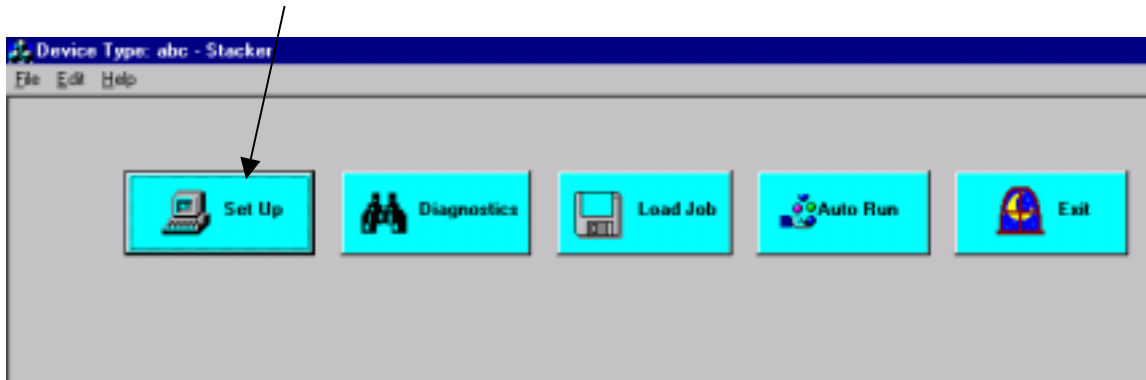
Once the position is set, it will be possible to actually mark the parts using the laser parameters chosen during mark setup. Simply turn off the pilot laser and fire the laser. The front door will close if it is not already closed, and the laser will fire. The door will open when the mark is done. Follow the Diagnostic routine for emptying the tray, outlined in Section 3.2, above, to check the appearance of the mark.

## SETUP PARAMETERS

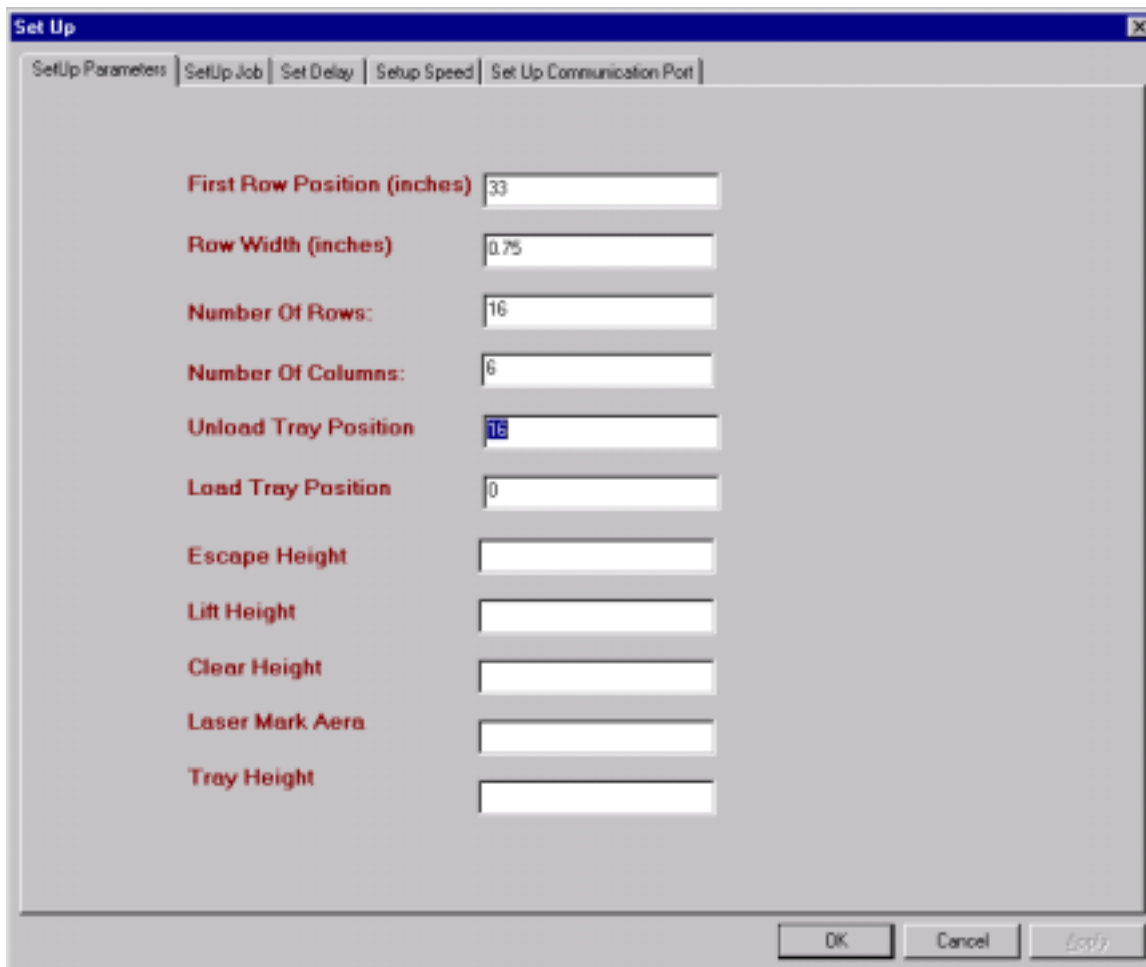
The Setup Parameters screen is where technicians can define tray settings (saved as job files) as well as global parameter settings. Various parameters of the stacker mechanism have user-variable settings, including first marking position, speeds and accelerations of motors, etc.

**WARNING: CHANGING ANY SETTING MAY HAVE SUBSTANTIAL EFFECTS ON THE OPERATION OF THE STACKER SYSTEM AND SHOULD ONLY BE DONE WITH EXTREME CAUTION, AND ONLY AFTER WRITING DOWN THE PREVIOUS SETTING SO YOUR TRACKS CAN BE RETRACED.**

From the main Exatron screen, press the Setup button to enter the parameter screen. A password is necessary to continue to the setup screen. When any changes are made, and the technician attempts to leave the screen, a save screen will come up giving the technician the opportunity to save the changes under the old, or a new, name.



There are five tab screens under Setup for parameter settings:



## **SetUp Parameters**

The SetUp Parameters screen is primarily used for defining the tray layout for the stacker, as well as the location for the input, output, and first mark locations.

### **First Row Position (inches)**

This is the distance, from the input tray position, the carriage will move to line up for the first row marking. It will probably be easier to leave this setting, once determined, for all future jobs, and then move the laser mark around (following the instructions in Section 5.3) to match the first position for all trays.

### **Row Width (inches)**

This is the spacing of the devices from center to center of the pockets in the long axis of the tray. This is the distance the system will move the tray between mark shot and the next. **This is the most important variable from one job to the next.**

### **Number of Rows**

This is simply the number of rows in the long axis of the tray.

### **Number of Columns**

This is the number of columns in the tray (the short axis of the tray). This number is not actually used for any movement, but rather is used to prepare the small diagram of the tray seen on the running screen.

### **Unload Tray Position**

This is the distance from the input home position to the output home position. Usually this number will be very nearly, or exactly, the theoretical perfect of 16 inches. There will be no need to alter this setting from one job to the next.

### **Load Tray Position**

This is the home position, which when properly calibrated will be zero inches.

### **Escape Height**

Currently, this parameter is hard coded in the software and is not available for alteration.

### **Lift Height**

Currently, this parameter is hard coded in the software and is not available for alteration.

### **Clear Height**

Currently, this parameter is hard coded in the software and is not available for alteration.

### **Laser Mark Area**

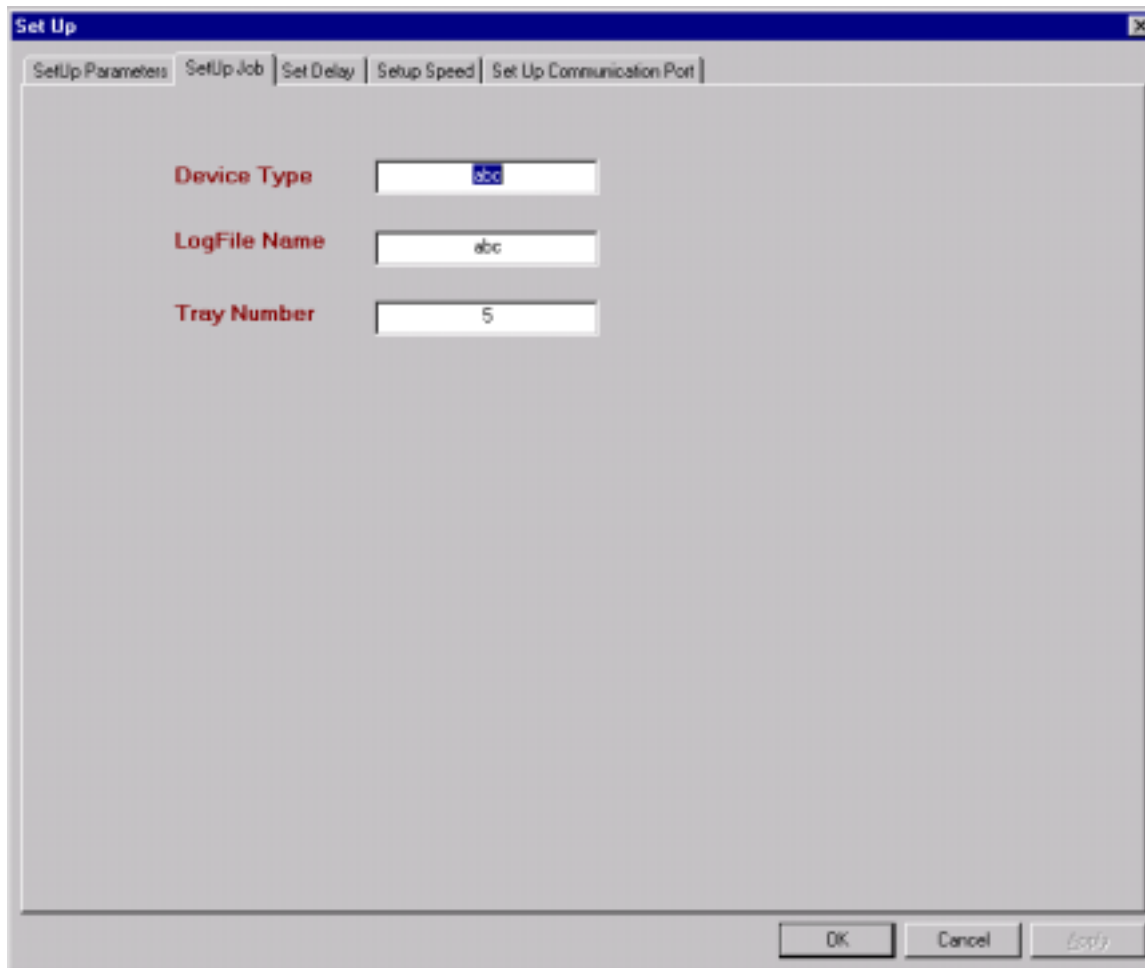
Currently, this parameter is hard coded in the software and is not available for alteration.

## Tray Height

Currently, this parameter is hard coded in the software and is not available for alteration.

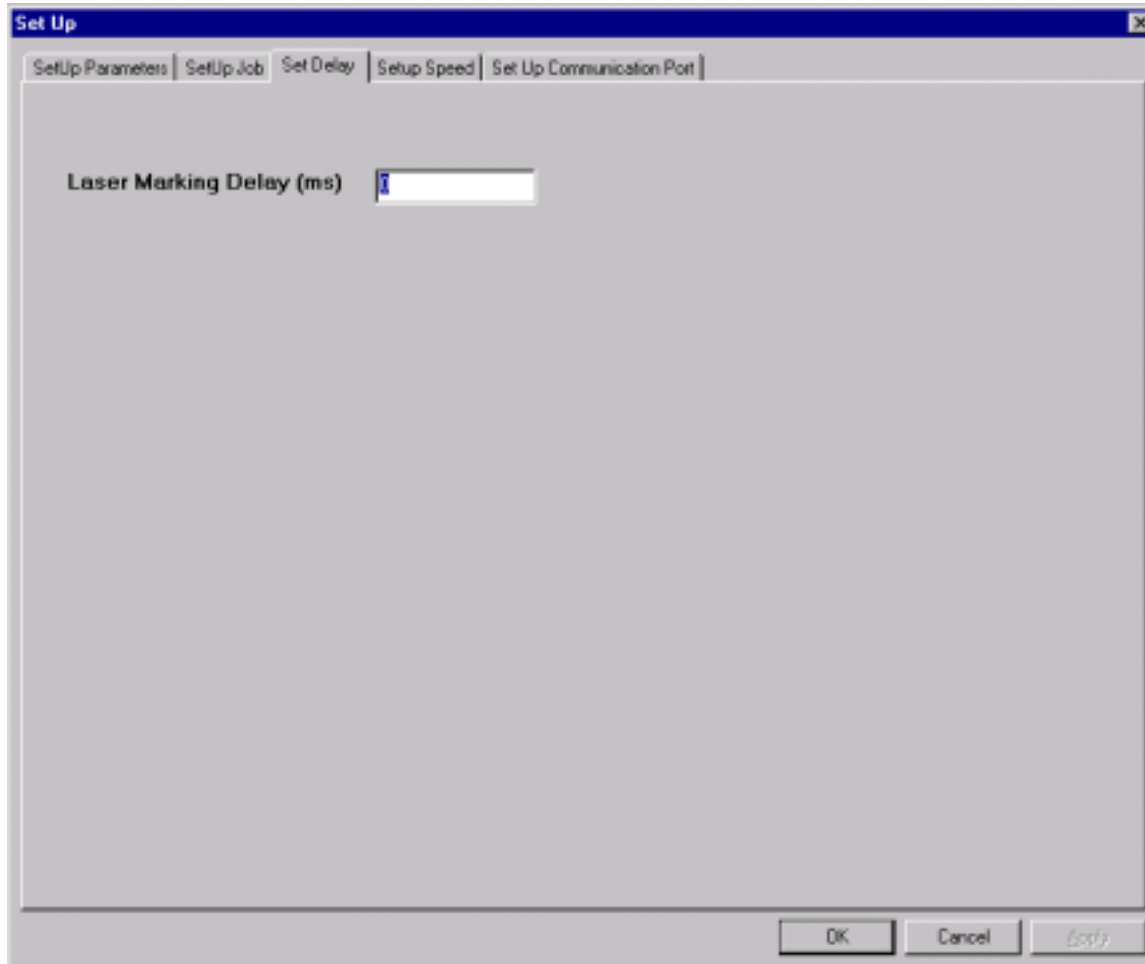
## SetUp Job

This tab screen allows the technician to type in the device type and give a log file name for the job being set up. The third box, Tray Number, is reserved for future use. The name can be a part number, device type, lot number, customer name, etc. The names must follow Microsoft Windows naming protocols. These names will be displayed on the running screen.



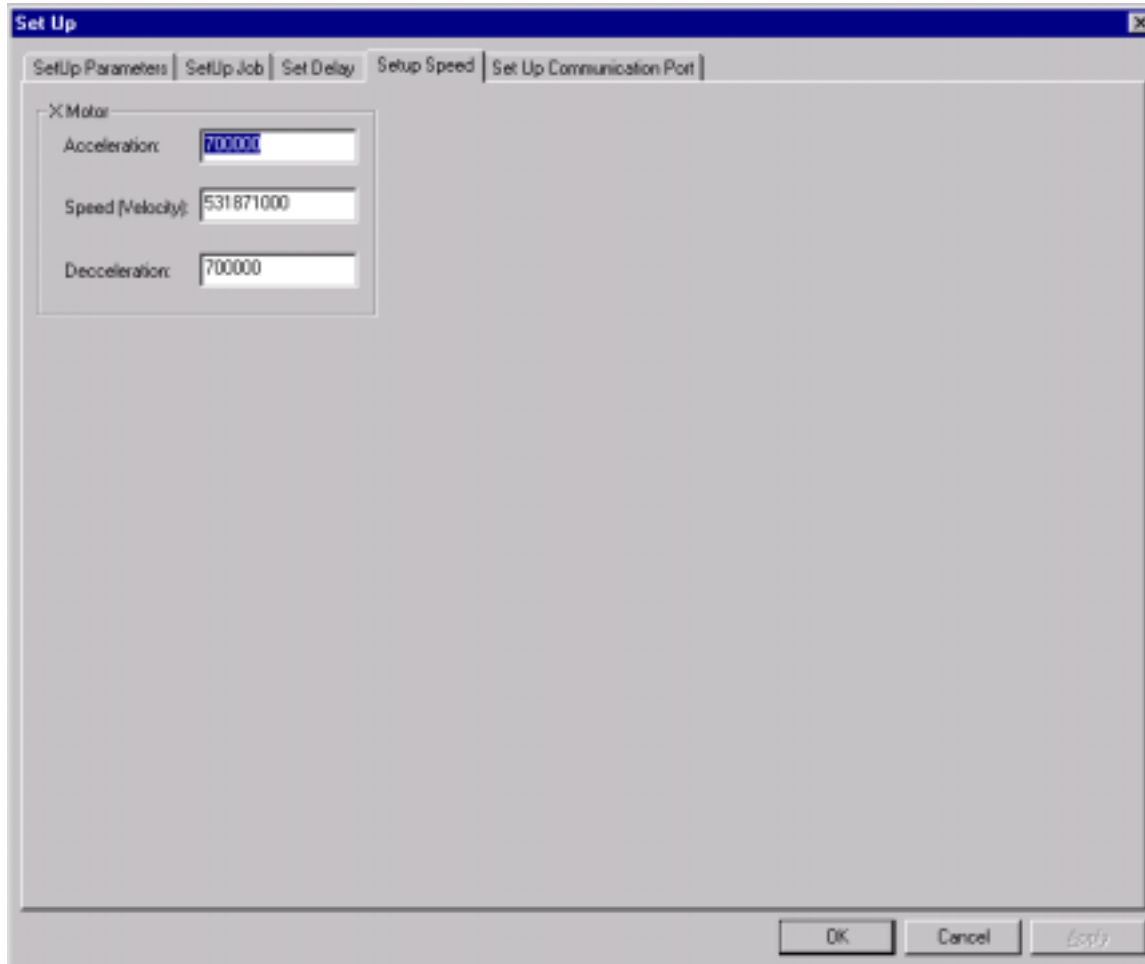
## Set Delay

The Set Delay tab screen allows the technician to add an additional time delay between when the motors are done moving and the fire laser command is issued to the laser. This may be useful for devices with very loose trays so the devices can 'settle' before they are marked.



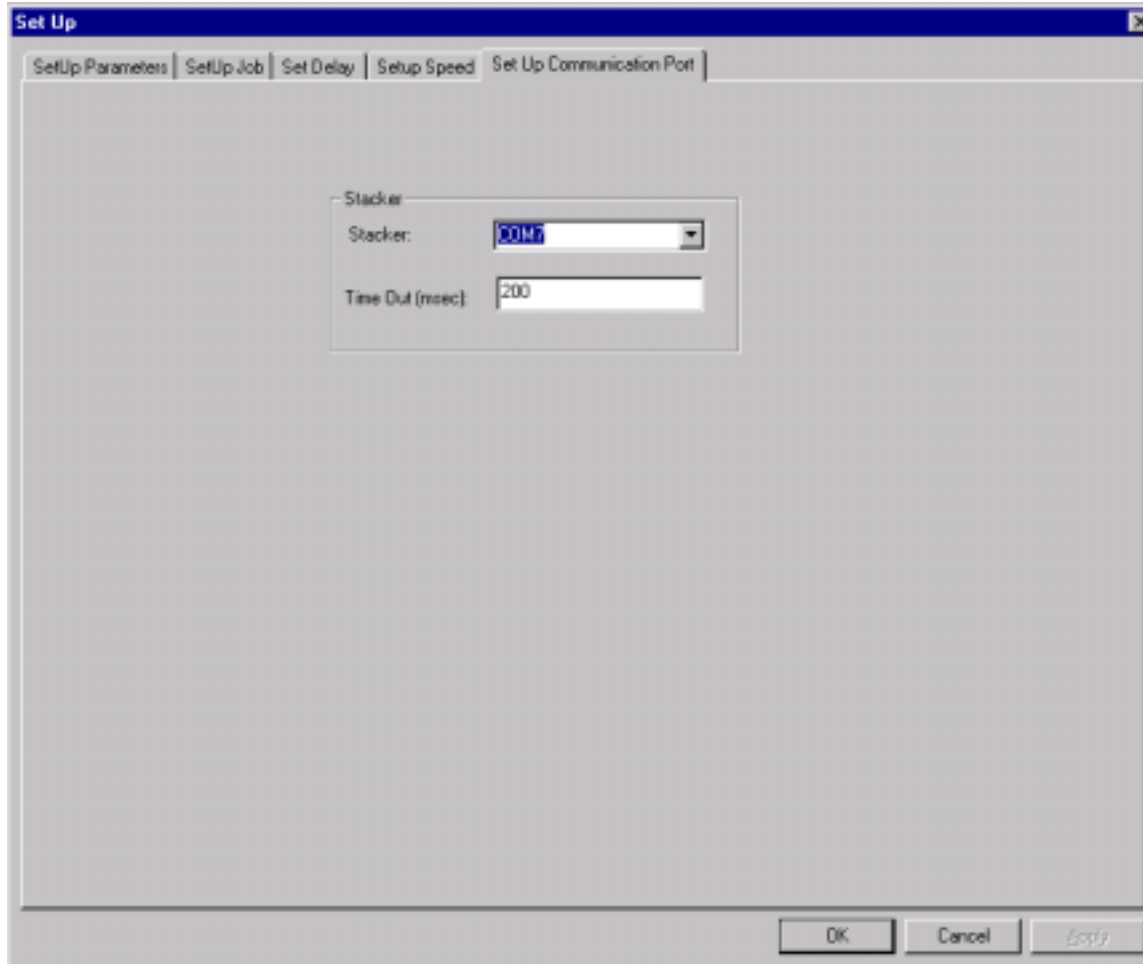
## Setup Speed

Currently, the technician can change the speed and acceleration rates for the X-axis motor, i.e. the primary axis of motion. The factory settings are Acceleration and Deceleration = 700000, while the Speed = 531871000. Minor deviations from these settings may be acceptable, but are not recommended.



## Set Up Communication Port

Finally, the last tab screen under SetUp is the communication port screen. This allows the technician to define the com port over which the communications between the computer and the stacker mechanism will communicate, and also allows the definition of a time out for the serial port.



## DEFINING A JOB

Defining a job is a subset of the SetUp Parameters described above. Defining a job includes the following steps:

- Enter the pitch of the tray in the long axis of the tray.
- Enter the number of pockets in the tray in the long axis of the tray.
- Enter the number of pockets in the tray in the short axis of the tray.
- Name the job.
- Save the job setup.

## MAINTENANCE

The laser system should require relatively little maintenance. These are the elements which may require occasional service:

Air filter. The vacuum air filter may require occasional changing, depending on use of the system. An error message in the Trumpf software will alert the user to low airflow through the system, suggesting a clogged filter. The filter is accessed by removing the panel from the lower front of the laser enclosure, and then opening the door to the left compartment.

Ion filter. This is a filter to remove ions from the deionized water flowing through the system. An error message will appear when the filter is becoming too conductive – indicating a too-high concentration of ions in the cooling water. The filter is a clear plastic cylindrical unit, filled with a dark sandy material, mounted to the right-hand wall of the cooler unit. A procedure for replacing the filter is found in the VMc manual at Section 9.7.4, Page 9-77.

Particle Cup Filter. This is the small plastic cup in the front of the cooler unit. It has a small screen for filtering out any particulate matter in the cooling water. This cup can become too clogged, slowing water flow, which will generate an error message. A procedure for cleaning this cup is found at Section 9.7.3, Page 9-74 of the VMc manual.

Filter Mat. This is the black material mounted in the screen screwed down in front of the cooler unit. This mat catches dust and other contaminants and can get clogged. This will slow air flow into the cooler, which will generate an error message in the Trumpf software. This mat can be cleaned or replaced, following the procedure found at Section 9.7.5, page 9-84 of the VMc manual.

Water Level. Barring a leak, the water level should remain more or less constant. It is good practice to change the water every six months or so, just because. Also, if the Ion Filter requires replacement, the water should be drained and refilled at that time.

Pneumatic Liquid Filter. The air supply to the stacker unit passes through a pressure regulator with an attached liquid catching basin. This basin should be occasionally checked and drained if necessary. The customer should endeavor to use only clean, dry air at all times as liquid in the air system can rust and jam air valves and cause other mischief.