



SPECTRUM

Preventive Maintenance Manual



SPECTRUM

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Introduction

About the Spectrum Engraver

Congratulations on your purchase of a Spectrum engraver from OHIO Gravure Technologies. This engraver was designed with advanced capabilities; however, the machine cannot take care of itself, and routine maintenance is important to the performance of the machine. With that in mind, we present this preventive maintenance program to assist you in this task and protect your investment.

The people of OHIO GT wish to thank you for purchasing this engraver and look forward to a continuing partnership with you.

CAUTION: Do not perform any procedures in this maintenance manual without utilizing the correct materials outlined in each procedure. Doing so could cause damage to the machinery and void the warranty.

Purpose Of Manual

This manual was written for Customers and Service personnel to accomplish the following requirements:

- ❖ To implement an ongoing preventive maintenance program for all OHIO GT equipment.
- ❖ To structure guidelines for the period that preventive maintenance is to be performed.
- ❖ To provide concise procedures that enable customers to perform maintenance without training from OHIO GT.
- ❖ To provide all necessary information regarding tools and materials needed for preventive maintenance.

About this manual

This manual is divided into three separate chapters: Introduction/Safety, Preventive Maintenance Schedule, and Preventive Maintenance Procedures.

If specific information is needed, refer to either the table of contents or the Master PM Schedule found on page 8.

Document Conventions

This manual uses the following conventions:

BOLD type to indicate emphasis.

Italics to refer to other publications or documents.

Tip! To provide helpful hints on performing a maintenance procedure.

Note: to indicate important information pertaining to the procedure.

CAUTION: to indicate the potential for damage to equipment.

WARNING: to indicate conditions that may lead to personal injury.

Safety

OHIO GT equipment is built with the latest technology and is totally safe to operate when used in accordance with provided operation manuals. Improper use of the equipment or inexperienced personnel can lead to dangerous situations. Operating procedures affecting the safety of the equipment is forbidden.

The operator is responsible for

- Ensuring that no unauthorized personnel are working on the machine.
- Reporting any signs of change affecting safety to his supervisor or OHIO GT.
- Operating the machine in good condition only.

Modifications and changes affecting equipment safety are strictly forbidden. Every person operating or maintaining this unit must read and understand the complete operation manual. The correct usage includes following the manufacturer's recommendations for installation, operation and maintenance. Only authorized and trained personnel are allowed to service and install the machine. These people have been instructed about the possible dangers. The operator may perform preventive maintenance routines, provided the instructions are strictly followed.

All service and maintenance work must be performed while the machine is shut off. Safety covers, doors and flaps that are mounted for safety reasons are only to be removed or opened after the machine is shut off.

OHIO GT strongly recommends the use of original parts for repairing or replacing worn parts, and lubrication. OHIO GT regrets that we cannot accept responsibility for machine damage or problems encountered due to outside material.

Replacment Parts

CAUTION: Use of non-OHIO parts is strongly discouraged. OHIO warranty coverage requires the customer use of genuine OHIO parts. Failure to do so may limit warranty claims and introduce unexpected engraving results.



Schedule

Preventive Maintenance Schedule

An important piece of maintaining equipment is performing the maintenance on a routine schedule. The remainder of this document identifies the various routine maintenance procedures that must occur as well as the schedule.

The *Master PM Schedule* on the next page provides a quick review of all the necessary procedures and the required schedule. The Master PM Schedule is a table that shows the assembly or item, the procedure, the page number for the procedure, and the period for performing the procedure. Use this table to determine which procedures need to be performed and the necessary schedule.

The *Schedules* on pages 7 through 18 are individual checklists to be used with the maintenance procedures on the following pages. The checklists provide a simple way to track when maintenance is performed and who performed it. Each block on the checklist indicates a maintenance routine must take place. A dated and initialed block indicates that the maintenance has been performed for that period. Questions regarding the structuring of your maintenance program can be directed to the Ohio Customer Support.

Schedule and Checklists

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Master PM Schedule

Period	Action	Item	Checklist Page	Procedure Page
Anytime	Clean	General cleaning of machine	—	7
Bi-Weekly	Replace	Vacuum Bag	8	23
Monthly	Replace	Engrave Head Air Filters	9	25
Monthly	Check	Cooling Fans	10	27
Monthly	Lubricate	Manual Chuck & Auto-Chuck	11	29
2x Yearly	Lubricate	Auto-Chuck Chain Drive	12	31
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Yearly	Lubricate	Head & Tailstock Drive Nut	12	35
Yearly	Lubricate	Head & Tailstock Rail Guides (Bearings)	13	37
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Every 2 Years	Clean	Embedded Computer (RAVE)	16	53
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Every 2 Years	Clean and inspect	Uninterruptible Power Supply (UPS)	17	57
Every 2 Years	Clean	Vital Proof Computer	18	59

List of Materials

The following items are required for one or more of the maintenance procedures:

- ❖ Vacuum Bag – D1475-0027*
- ❖ Kit, Air Filter, Engraving Head – D 803.900.042*
- ❖ Multi-purpose Grease – D1645-0024
- ❖ Spray Lubricant– Tirox Chain Wax (not supplied by OHIO)
- ❖ Grease Gun – D1650-0024
- ❖ Push-On Coupler – D1650-0025
- ❖ Needle tip Nozzle – D1650-0026
- ❖ Expandable Vacuum Hose – D817.400.103*
- ❖ Engrave Head Vacuum Hose
 - D830.100.051* for machine serial numbers 1047, and 1049 and later
or
 - D817.400.110 for machine serial numbers 1048, and 1046 and earlier
or for Large format engravers
 - D817.400.140

* Part of the yearly consumables kit.

CAUTION: Use of non-OHIO parts is strongly discouraged. OHIO warranty coverage requires the customer use of genuine OHIO parts. Failure to do so may limit warranty claims and introduce unexpected engraving results.

General Maintenance/Cleaning

Take pride in your equipment!

We encourage you to clean the machine as needed, not just when preventive maintenance calls for it. This includes:

- Vacuuming any excess copper chips that occur around the engraving head or on the carriage. Use an external vacuum for this clean-up.
- Cleaning up spills immediately that occur during cylinder preparation. This prevents damage to parts, bellows and paint where the liquid may fall.

Vacuum Bag

Replace the bag every two weeks

Instructions on page 23

January

Week 1		Week 3		
--------	--	--------	--	--

February

Week 1		Week 3		
--------	--	--------	--	--

March

Week 1		Week 3		
--------	--	--------	--	--

April

Week 1		Week 3		
--------	--	--------	--	--

May

Week 1		Week 3		
--------	--	--------	--	--

June

Week 1		Week 3		
--------	--	--------	--	--

July

Week 1		Week 3		
--------	--	--------	--	--

August

Week 1		Week 3		
--------	--	--------	--	--

September

Week 1		Week 3		
--------	--	--------	--	--

October

Week 1		Week 3		
--------	--	--------	--	--

November

Week 1		Week 3		
--------	--	--------	--	--

December

Week 1		Week 3		
--------	--	--------	--	--

Each block indicates required bi-weekly maintenance. Check and initial block when maintenance is completed.

Engrave Head Air Filters

Replace twice a month

Instructions on page 25

January

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

February

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

March

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

April

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

May

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

June

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

July

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

August

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

September

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

October

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

November

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

December

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

Each block indicates required monthly maintenance. Check and initial block when maintenance is completed.

Cooling Fans

Check and clean once a month

Instructions on page 27

January

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

February

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

March

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

April

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

May

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

June

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

July

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

August

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

September

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

October

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

November

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

December

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

Each block indicates required monthly maintenance. Check and initial block when maintenance is completed.

Manual Chuck & Auto-Chuck

Lubricate once a month

Instructions on page 29

January

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

February

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

March

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

April

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

May

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

June

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

July

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

August

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

September

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

October

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

November

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

December

Year 1	Year 2	Year 3	Year 4	Year 5
--------	--------	--------	--------	--------

Each block indicates required monthly maintenance. Check and initial block when maintenance is completed.

Auto-Chuck Drive Chain

Lubricate twice a year

Instructions on page 31

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Each block indicates required twice-yearly maintenance. Check and initial block when maintenance is completed.

Cylinder Supports

Lubricate twice a year

Instructions on page 33

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Year 20 ____

Year 1A	Year 1B
---------	---------

Each block indicates required twice-yearly maintenance. Check and initial block when maintenance is completed.

Head & Tailstock Drive Nut

Lubricate once a year

Instructions on page 35

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Each block indicates required yearly maintenance. Check and initial block when maintenance is completed.

Head & Tailstock Rail Guides (Bearings)

Lubricate once a year

Instructions on page 37

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Each block indicates required yearly maintenance. Check and initial block when maintenance is completed.

Carriage Rail Guides (Bearings)

Lubricate once a year

Instructions on page 39

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Each block indicates required yearly maintenance. Check and initial block when maintenance is completed.

Carriage Linear Drive Track

Clean and inspect once a year

Instructions on page 41

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Each block indicates required monthly maintenance. Check and initial block when maintenance is completed.

Engrave Head Drive Nut

Lubricate once a year

Instructions on page 43

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Each block indicates required monthly maintenance. Check and initial block when maintenance is completed.

Engrave Head Sub-Carriage Guides (Bearings)

Lubricate once a year

Instructions on page 45

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Each block indicates required monthly maintenance. Check and initial block when maintenance is completed.

Expandable Vacuum Hose

Replace twice a year

Instructions on page 49

Year 20 ____ A	Year 20 ____ A	Year 20 ____ A
B	B	B

Year 20 ____ A	Year 20 ____ A	Year 20 ____ A
B	B	B

Year 20 ____ A	Year 20 ____ A	Year 20 ____ A
B	B	B

Each block indicates required twice yearly maintenance. Check and initial block when maintenance is completed.

Engrave Head Vacuum Hose

Replace twice a year

Instructions on page 49

Year 20 ____ A	Year 20 ____ A	Year 20 ____ A
B	B	B

Year 20 ____ A	Year 20 ____ A	Year 20 ____ A
B	B	B

Year 20 ____ A	Year 20 ____ A	Year 20 ____ A
B	B	B

Each block indicates required yearly maintenance. Check and initial block when maintenance is completed.

Embedded Computer

Clean every two years

*Instructions on page 53 (RAVE)
or page 55 (Advantech)*

Year 20____	Year 20____	Year 20____
Year 20____	Year 20____	Year 20____
Year 20____	Year 20____	Year 20____
Year 20____	Year 20____	Year 20____

Each block indicates required bi-yearly maintenance. Check and initial block when maintenance is completed.

Uninterruptible Power Supply (UPS)

Clean every two years

Instructions on page 57

Year 20____	Year 20____	Year 20____
Year 20____	Year 20____	Year 20____
Year 20____	Year 20____	Year 20____
Year 20____	Year 20____	Year 20____

Each block indicates required bi-yearly maintenance. Check and initial when maintenance is completed.

Vital Proof Computer

Clean every two years

Instructions on page 59

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Year 20 ____	Year 20 ____	Year 20 ____
--------------	--------------	--------------

Each block indicates required bi-yearly maintenance. Check and initial when maintenance is completed.



Procedures

Preventive Maintenance Procedures

This section contains the various preventive maintenance procedures for the GS Spectrum engraving system. Information contained here includes procedures for standard equipment as well as optional equipment, auto-chucks and cylinder supports for example.

Photographs used in this section may differ slightly from your machine. This is due to on-going development with the Spectrum engraver. In some photographs, the machine is shown with the enclosures removed. This was done to provide a better view of the item being identified for maintenance. The maintenance instructions refer to the missing enclosures where appropriate.

Procedures

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Grease Gun Configurations

Grease Gun – D1645-0027

Push-On Coupler and Dispensing Tube – D1650-0025

Needle tip Nozzle – D1650-0026

The base grease gun requires some simple configuration changes to work for the two different types of grease fittings. There are two configurations required, as explained below.

Normal Grease Fitting Configuration

1. The basic grease gun has a pump assembly and a tube with press-fit grease coupling.
2. Remove the press-fit grease coupling from the tube. If necessary, install the tube onto the pump assembly.



D1645-0027

3. Locate the push-on coupler. This consists of two pieces, a lower push-on coupling and a dispensing tube.

Unscrew the dispensing tube from the push-on coupling.

The dispensing tube is used in step 4 and works with the majority of the grease fittings on the machine. This type of dispenser requires you to push the tube against the grease fitting.



D1650-0025



Disassembled

Dispensing tube on the right

4. Thread the dispenser tube onto the grease gun tube.

The grease gun is now ready to use.



Grease gun with push-on-tube installed

Flush Tip Grease Fitting Configuration

1. From the normal configuration, unscrew the dispensing tube from the longer tube of the grease gun.
2. Re-install the original press-fit coupling onto the grease gun tube, as shown to the right.
3. Locate the Needlepoint nozzle.
4. Insert the assembly into the press-fit coupling. If the needle tip assembly won't go in, loosen the press-fit coupling slightly, insert the assembly, and tighten the coupling to hold the flush-tip assembly.



D1650-0026

This configuration is used for lubricating the Chuck, on page Engrave Head 29 and the Sub-Carriage Guides on page 45.

To convert back to the Normal configuration, unscrew the entire press-fit coupling and flush tip assembly from the tube, then install the dispenser tube.

Vacuum Bag

Replace the bag every two weeks

Vacuum Bag: P/N D1475-0025

To replace the vacuum bag

5. Ensure the machine is not engraving.
6. Open the vacuum cover found on the rear of the machine.



3. Pull the existing bag off the exhaust nozzle.
4. Clean the exhaust nozzle at the top right of the cavity to remove excess copper chips and to promote a good seal. Also clean out any copper chips from inside the vacuum cavity.



A view of the exhaust nozzle (top)

5. Gently pull a new bag to open it slightly then place over the exhaust nozzle. Slide the bag back until a good seal is achieved over the large diameter of the exhaust nozzle. Make sure the bag is over the large diameter of the nozzle to prevent copper chips from escaping from the bag and filling the cavity.
6. Replace the vacuum cover.



Engrave Head Air Filters

Replace once a month

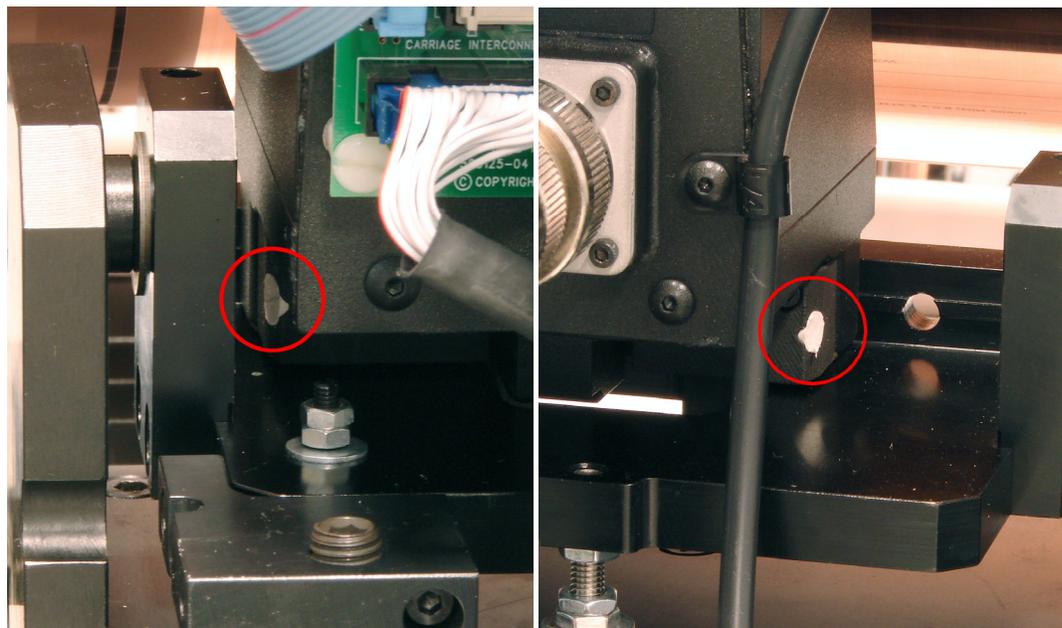
Engrave Head Air Filter: P/N D803.900.042

The Engrave Head Air Filters are located on the bottom of the engrave head. These filters clean the air entering the head to cool the head motor. It is important to replace these filters on a regular basis to prevent the filters from becoming blocked and also to prevent dirt from entering the engrave head.

Note: Dirt in the engrave head will affect the performance of the head and will require factory service to clean the head.

To access the Engrave Head Air Filters:

1. Remove the cylinder from the machine if necessary.
2. Position the head clear from the chucks or cones and lower the head until it stops.
3. Remove the two (2) screws holding the engrave head cover and slide the cover off the carriage.
4. Using a pair of needle-nose pliers, remove the air filters from the nozzles beneath the engrave head.



Left Air Filter

Right Air Filter

5. Using your fingers, insert a new air filter into each nozzle.

Note: If it is also time to perform the yearly lubrication on the Engrave Head Drive Nut, this is the perfect time to do it. See *Engrave Head Drive Nut* on page 41.

6. Re-install the head cover and secure using the two screws.
7. Retract the engrave head.

Cooling Fans

Check once a month, clean if necessary

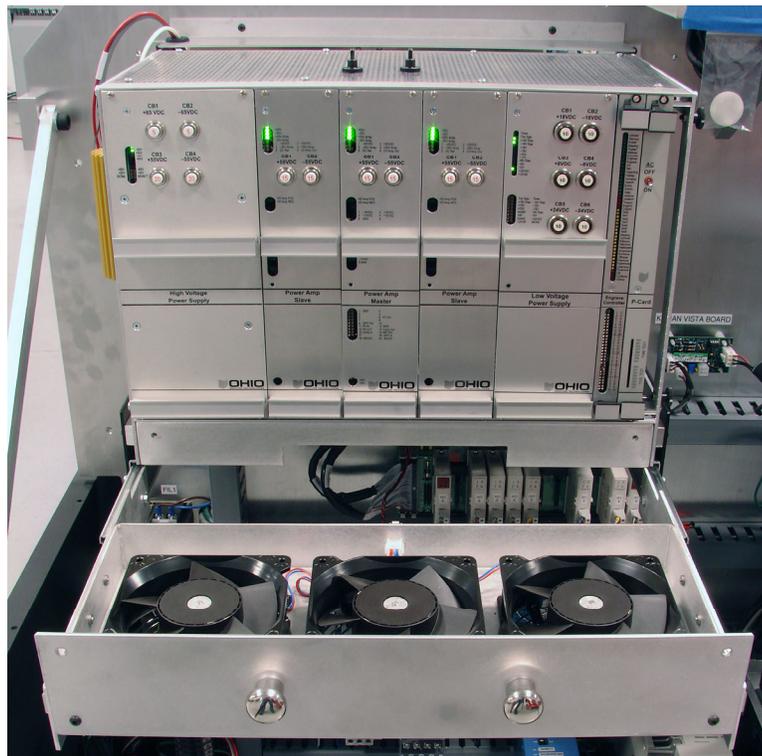
The fans on the electronics rack provide cooling air to the power supplies and engrave head amplifiers. Verify the fans are running and that they are clean from excessive dust and dirt.

To check the cooling fans:

1. Ensure the machine is not engraving but power is ON to the machine.
2. Remove the end panel from the electronics enclosure by turning six (6) quick release handles. The end panel will lift off the machine. Set it aside in a safe place.
3. Use a flashlight to look under the electronics rack at the fans beneath. Verify that all are three (3) fans are running.

DANGER: There is electricity running to the unit. Do not touch anything, simply look under the rack to verify the fans are running.

4. Turn OFF power to the machine. This stops the fans rotation.
5. The fans are mounted in a sliding tray. Remove the two (2) black thumbscrews, one from each side, holding the tray and slide the fan tray out from under the electronics rack.



6. Clean the fans if they are excessively dirty using a vacuum and soft brush.
NOTE: If the fans are extremely dirty, with one mm or more of dirt attached to the fan blades and housing, call Ohio GT or an authorized service organization. The power supplies and amplifiers in the electrical rack will need to be cleaned to prevent the possibility of serious electronic failures.
7. Slide the fan tray back under the electronics rack and secure with the two thumbscrews.
8. Re-install the end panel by sitting it in place and turning the six (6) quick release handles.

Manual Chuck & Auto-Chuck

Lubricate once a month

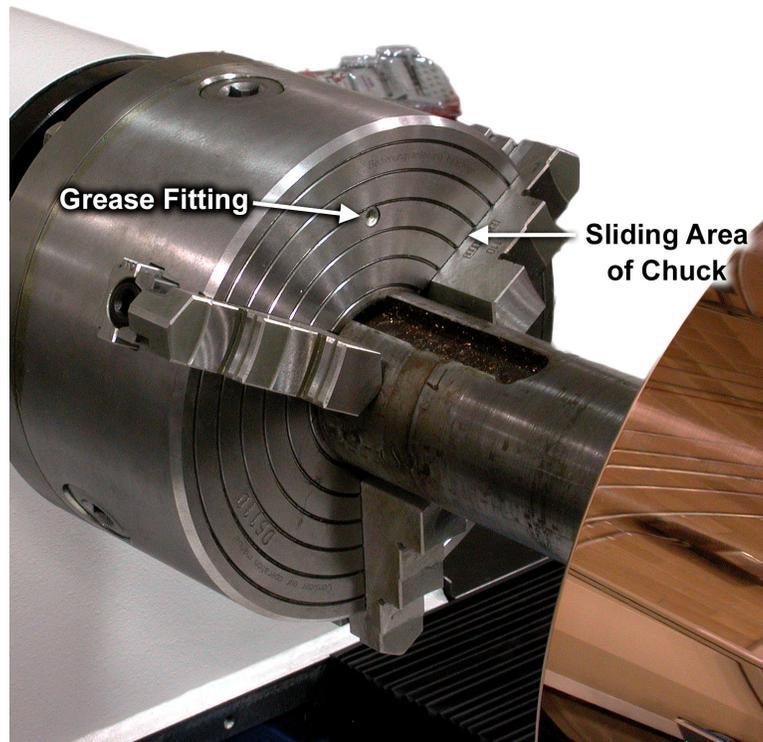
Lubricant: Multi-purpose grease, P/N D1645-0024

To lubricate the chuck:

1. Remove cylinder from the machine.
2. Change the grease gun to use the needle tip configuration.
3. Add two (2) pumps of grease in the button head grease fitting on the face of the chuck.
4. Open the chuck to expose the sliding surfaces of the jaws.

CAUTION: Do not remove the jaws from the chuck.

5. Place a small amount of grease on a piece of cloth or your finger and apply a light coating to the six (6) sliding areas of the jaws.
6. Move the jaws in and out to distribute the grease on the sliding areas.



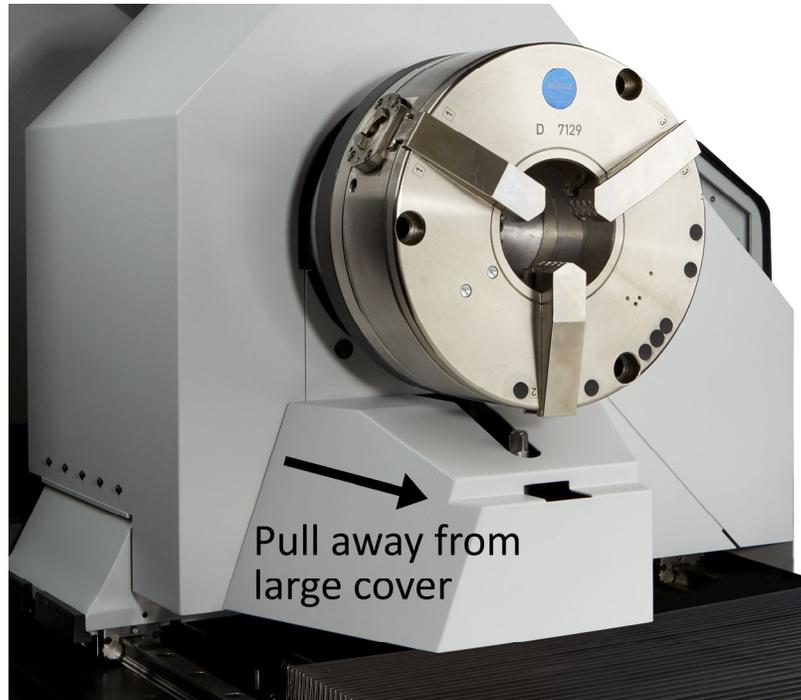
Auto-Chuck Chain Drive

Lubricate twice a year

Lubricant: Spray lubricant, Tirox Chain-Wax

To lubricate the chain drive:

1. Remove cylinder from the machine.
2. Remove the covers from the auto-chuck drive units by pulling the covers away from the headstock and tailstock. These covers are held on by magnets.



Tailstock Auto-Chuck shown

3. Isolate the chain area by placing paper behind and beneath the chain to prevent overspray of lubricant. Do this for both units.
4. Spray a light coating of lubricant over the chain on each unit. The correct amount will result in a virtually invisible coating on the chain after several minutes of drying. Too much will show droplets on the surfaces when the lubricant dries.
5. Remove the paper from each unit.
6. Re-install the covers onto each unit.

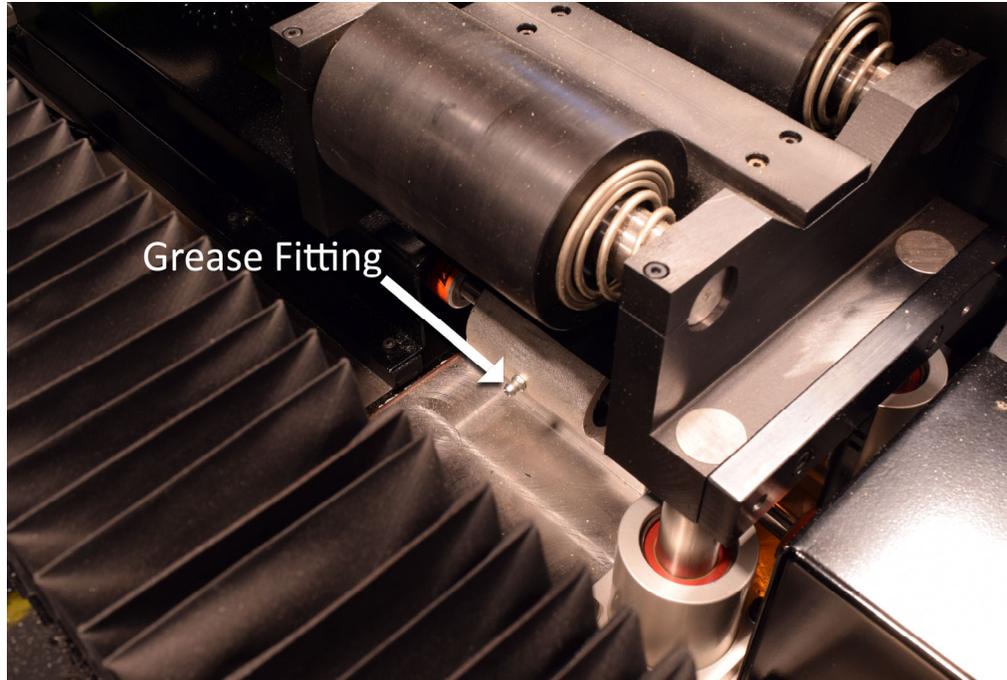
Cylinder Supports

Lubricate twice a year

Lubricant: Multi-purpose grease, P/N D1645-0024

To lubricate the cylinder supports:

1. Remove cylinder from the machine.
2. Add one pump of grease to each jackscrew grease fitting.



Headstock cylinder support shown

3. Cycle the cylinder supports up and down at least once to spread the grease through the jackscrew gearbox.

Head & Tailstock Drive Nut

Lubricate once a year

Lubricant: Multi-purpose grease, P/N D1645-0024

The tailstock is driven by a leadscrew on the top of the machine. The tailstock has a drive nut riding on the ballscrew.

To lubricate the tailstock leadscrew drive nut:

1. Turn OFF power to the machine.
2. Locate the carriage to the Home position.
3. Disconnect the bellows from the tailstock. Do this by pulling the bellows up off the locating screws.
4. Inspect the leadscrew for dirt and debris. If debris is present, use a clean soft-bristled brush to remove the dirt and debris. If necessary for inspection and cleaning, turn the leadscrew using the Stock In/Out controls on the rear control panel.



Tailstock Drive Nut shown with bellows removed

5. Unscrew the dispensing tube from the grease gun tube.
 6. Apply two (2) pumps of grease to the carriage side of the drive nut.
 7. Re-install the bellows by aligning the slots with the screw heads.
- Note:** Steps 5 through 9 are for Decorative Spectrums with a moving headstock.
8. Disconnect the bellows from the headstock by pulling the bellows up off the locating screws.
 9. Inspect the leadscrew for dirt and debris. If debris is present, use a clean soft-bristled brush to remove the dirt and debris. If necessary for inspection and cleaning, turn the leadscrew using the Stock In/Out controls on the rear control panel.
 10. Apply two (2) pumps of grease to the carriage side of the drive nut.

11. Re-install the dispensing tube onto the grease gun tube.
12. Re-install the bellows by aligning the slots with the screw heads.
13. Move the stock(s) towards the center of the machine to spread the grease over the leadscrew and through the drive nut.

Head & Tailstock Rail Guides (Bearings)

Lubricate once a year

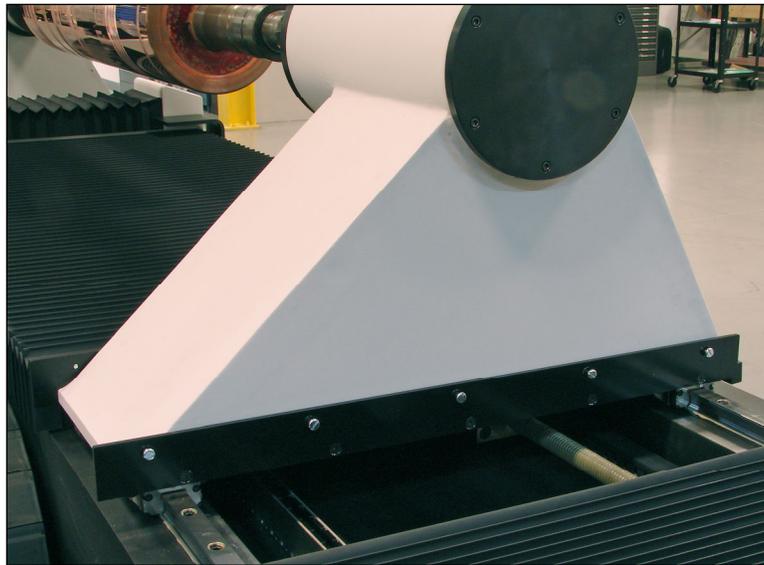
Lubricant: Multi-purpose grease, P/N D1645-0024

Rail guides (also called bearings) ride on the front and back linear rails of the engraver. There are either four or eight rail guides to lubricate:

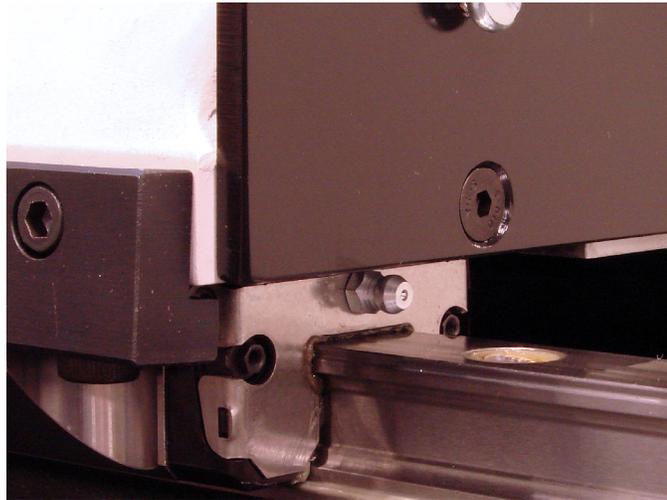
- For Packaging Spectrums, there are four (4) rail guides on the tailstock.
- For Decorative and Large Format Spectrums, there are eight (8) rail guides, four (4) each on the tailstock and headstock.

To lubricate the rail guides:

1. Remove the cylinder from the machine if a cylinder is loaded.
2. Turn OFF power to the machine.
3. Remove the bellows from both sides of the tailstock. Lift the bellows up over the locating screws. Do not remove the silver locating screws from the black bar.



4. Locate the four rail guides on the corners of the tailstock unit. The grease fittings are mounted on the rail guides, over the linear rails.



Grease fitting on rail guide.
Shown before black bar is removed in step 3.

5. Add two (2) pumps of grease into each fitting.
6. For machines with moveable headstocks, repeat steps 1 through 5 on the headstock rail guides.
7. Turn ON power to the machine and move the tailstock across the guide rails to distribute the grease through the rail guides and on the guide rails. This operation will also distribute the grease in the headstock of decorative and large format machines. Leave the tailstock at the furthest right position and move on to the next procedure, Carriage Rail Guides.

Carriage Rail Guides (Bearings)

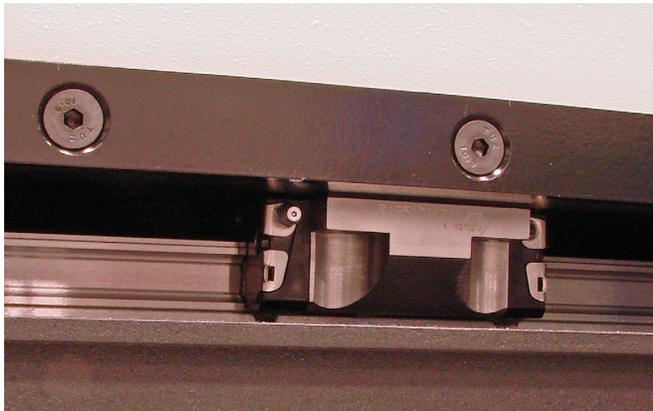
Lubricate once a year

Lubricant: Multi-purpose grease, P/N D1645-0024

The carriage has three (3) rail guides, also known as bearings. These guides ride on linear rails. Two (2) guides ride on the front linear rail, the third on the rear linear rail.

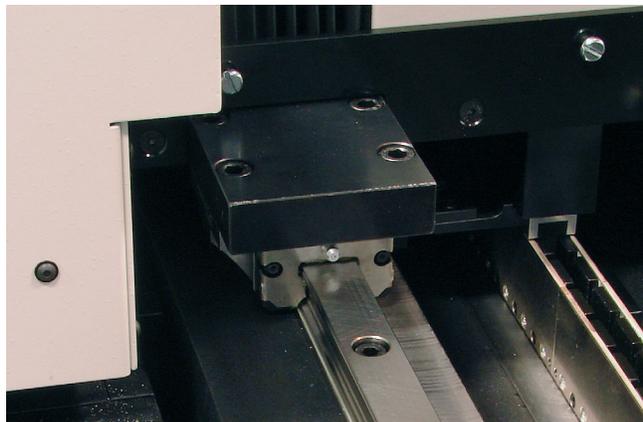
To lubricate the carriage rail guides:

1. Turn OFF the power to the machine.
2. Locate the rail guide on the back of the carriage, directly beneath the rear pod. The grease fitting is mounted on the rail guide facing out away from the machine.



Rear grease fitting on the carriage.

3. Add two (2) pumps of grease into the grease fitting.
4. Move to the operator side of the machine.
5. Release the bellows from each side of the carriage. Locate the grease fitting on each rail guide.
6. Add two (2) pumps of grease into each grease fitting.
7. Re-install the bellows to the carriage by aligning the slots with the locating screws.



View of the right front rail guide showing the grease fitting.

8. Turn ON power to the machine and move the carriage left and right over the length of the machine.

Carriage Linear Drive Track

Clean and inspect once a year

Items Required: Compressed air used for cleaning computer equipment

CAUTION: Do not use shop air due to likely contaminants.

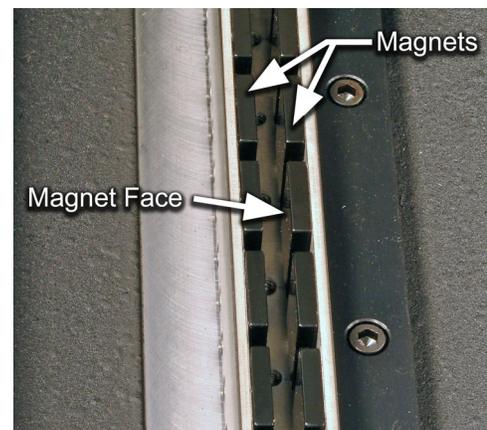
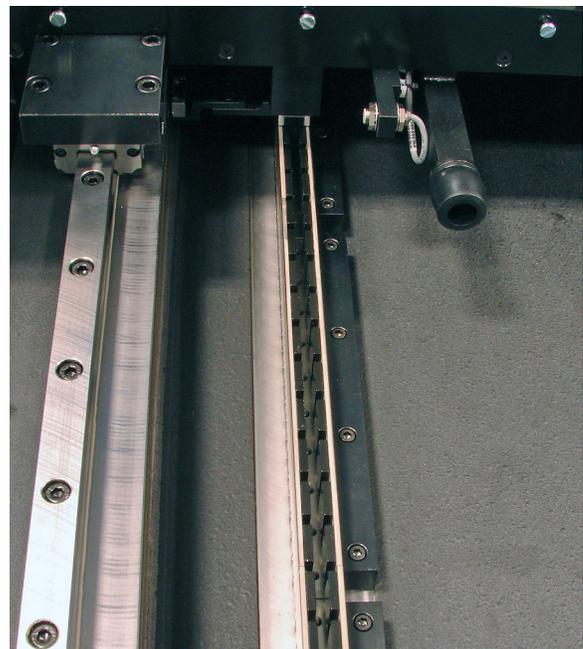
The carriage uses a linear drive to move the carriage horizontally across the machine. The linear drive consists of a motor unit attached to the carriage, and a long track of very powerful magnets. Dirt collecting in the magnet track and on the magnet faces may create problems with carriage movement. To clean and inspect the magnet track:

1. Home the carriage.
2. Lift the bellows up at the headstock and tailstock until they are clear of the panhead screws. These are the easiest places to free the bellows from their mounting points.

3. Locate the linear drive track running the length of the machine.

CAUTION: The track consists of a series of black magnets mounted in a row along the track frame. These magnets are extremely powerful. Do not place any items that will be attracted by the magnets near the track. Also, be cautious of wristwatches.

4. Inspect the bottom of the track for dirt and debris. If large pieces of dirt are seen, use compressed air to blow the dirt out of the track. Only use clean canned air, never shop air. A brush can also be used to move the dirt towards the end of the track and out.
5. Inspect the magnet faces for any dirt or metallic debris. With bellows in place, dirt should not fall onto these surfaces. If there is dirt and it is on the magnet face, it will take some effort to remove the dirt. Use plastic tweezers or other non-magnetic tools to remove dirt stuck to the face of the magnets.
6. Re-connect the bellows to the headstock and tailstock.



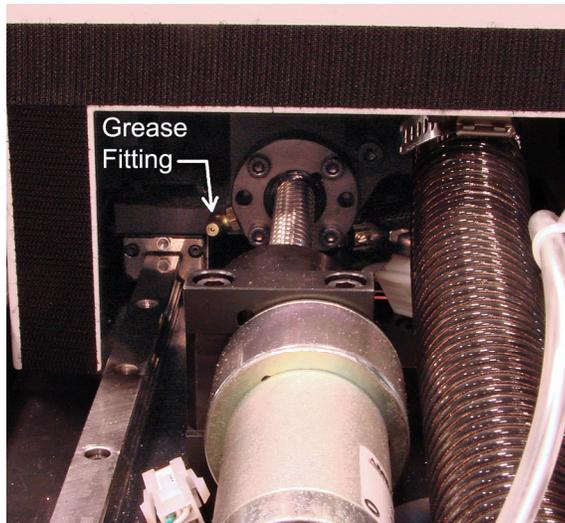
Engrave Head Drive Nut

Lubricate once a year

Lubricant: Multi-purpose grease, P/N D1645-0024

The engrave head is driven into and away from the cylinder by a small leadscrew. The drive nut is mounted on the moving base below the engrave head. To lubricate the drive nut:

1. Remove the cylinder from the machine if a cylinder is loaded.
2. Position the head away from the chucks or cones and lower the head until it stops.
3. Turn OFF power to the machine.
4. Remove the bellows from between the engrave head and operator side pod. The bellows are attached using Velcro so remove simply by pulling away from each end.
5. Add two (2) pumps of grease to the grease fitting on the drive nut. See the picture for location.
6. Perform the next procedure, *Engrave Head Sub-Carriage Guides (Bearings)*, on page 45.



Engrave Head Drive Nut

Engrave Head Sub-Carriage Guides (Bearings)

Lubricate once a year

Lubricant: Multi-purpose grease, P/N D1645-0024

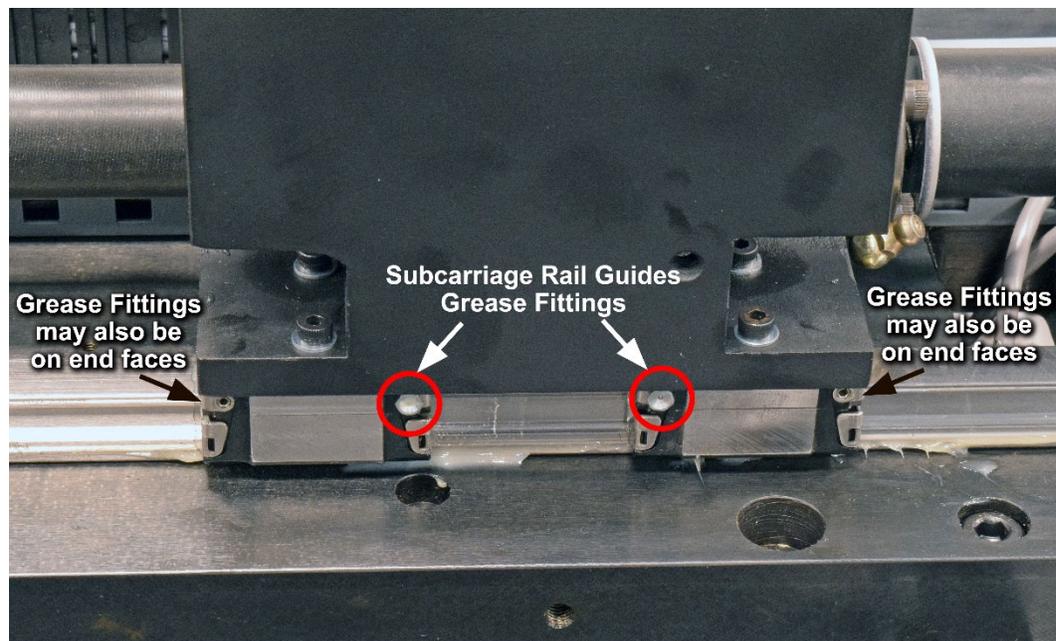
The engrave head moves into and away from the cylinder on rail guides that ride on two rails.

Note: There are two versions of instructions for lubricating these guides. The first set of instructions are for machines with serial numbers of 103? And higher. The second set of instructions are for machines 103? and earlier.

Instruction Set 1 for machine serial numbers 1036, 1037, and 1039 and higher

To lubricate bearings:

1. Remove the cylinder from the machine if a cylinder is loaded.
2. Turn ON power to the machine and lower the head fully.
3. Turn OFF power to the machine.
4. Remove the bellows covering the engraver bed from each side of the carriage by lifting the bellows and away from the locating screws. This exposes the bellows mounting bars secured on each side of the carriage.
5. Locate the two holes through each bellows mounting bar. These holes should line up with the grease fittings on the rail guides. The picture below shows the grease fittings with the bellows mounting bars removed.



6. Mount the needlepoint grease tube to the grease gun.



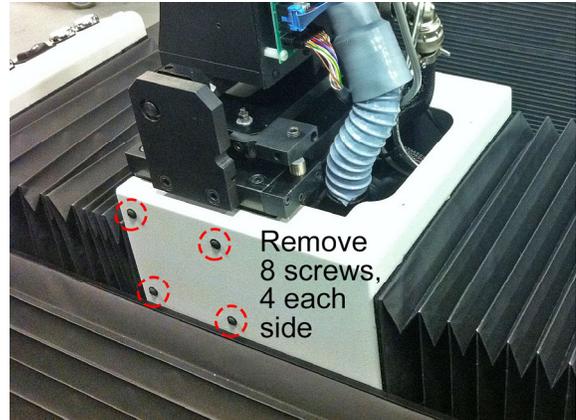
7. Press the needlepoint tube against the grease fittings and add one (1) pump of grease to the four (4) bearings, two (2) on each side of the subcarriage.
8. Re-attach the bellows to the carriage sides.
9. Turn ON power to the machine.
10. Cycle the head forward and backward using the head raise and lower controls.
11. Retract the head.

Instruction Set 2 for machine serial numbers 1038, and 1035 and lower

To lubricate bearings:

1. Remove the cylinder from the machine if a cylinder is loaded.
2. Turn ON power to the machine and lower the head fully.
3. Turn OFF power to the machine.

4. Remove the eight (8) screws that hold the cover to the sub-carriage. There are four (4) on each side of the head mount. Allow the cover to move backwards towards the operator pod and expose the four rail guides on the head mount.



Step 4 – Removing screws

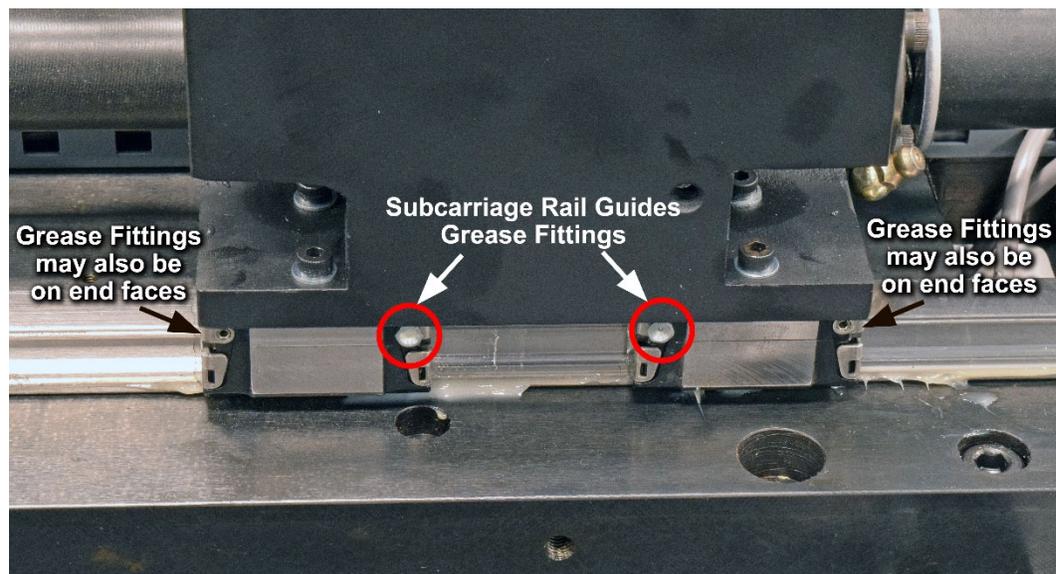
5. Remove the bellows covering the engraver bed from each side of the carriage by lifting the bellows and away from the locating screws.

6. Remove the bellows mounting bar from each holding each bar onto the carriage.

7. Mount the needlepoint grease tube to the g



8. Add one (1) pump of grease to the four (4) bearings. A grease fitting is found on each bearing guide. See the following picture for location information.



9. Re-attach the cover to the sub-carriage.
10. Turn ON power to the machine.
11. Cycle the head forward and backward using the head raise and lower controls.

12. Retract the head.

Replacing the Vacuum Hoses

Replace twice a year

Parts Required: 1) Expandable Vacuum Hose, P/N D817.400.103

2a) Engrave Head Vacuum Hose, P/N D830.100.051 (newer machines)
or

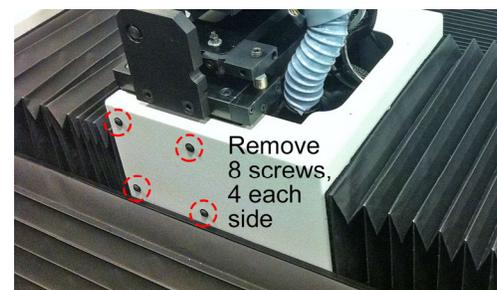
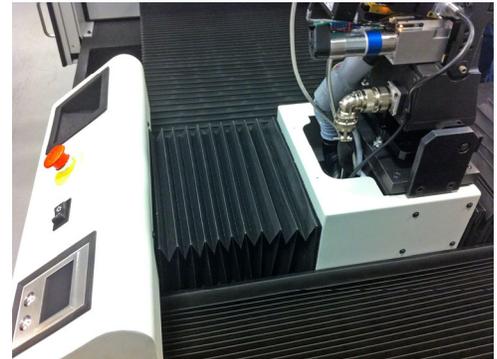
2b) Engrave Head Vacuum Hose, P/N D817.400.110 (older machines)
or

2c) Engrave Head Vacuum Hose, P/N 817.400.140 (Large Format machines)

CAUTION: Use of non-OHIO parts is strongly discouraged. OHIO warranty coverage requires the customer's use of genuine OHIO parts. Failure to do so may limit warranty claims and introduce unexpected engraving results.

The expandable vacuum hose connects the engrave head with the primary vacuum hose running the length of the machine. This hose stretches to accommodate the movement of the engrave head to different cylinder diameters. To replace the vacuum hose:

1. Remove the cylinder from the machine if a cylinder is loaded.
2. Turn ON power to the machine and lower the head fully until it stops.
3. Turn OFF power to the machine.
4. Remove the bellows from between the back of the engrave head and the operator pod.
5. If installed, remove the hood covering the engrave head. Two (2) screws hold this cover onto the lower sub-carriage cover. Place the screws in a safe place for reuse.
6. Remove the lower sub-carriage cover.
 - a. Remove the eight (8) screws holding the lower sub-carriage cover. Place the screws in a safe place for reuse.
 - b. Slide the lower sub-carriage cover towards the operator side and lift free.
7. Remove the operator pod from the front of the carriage.



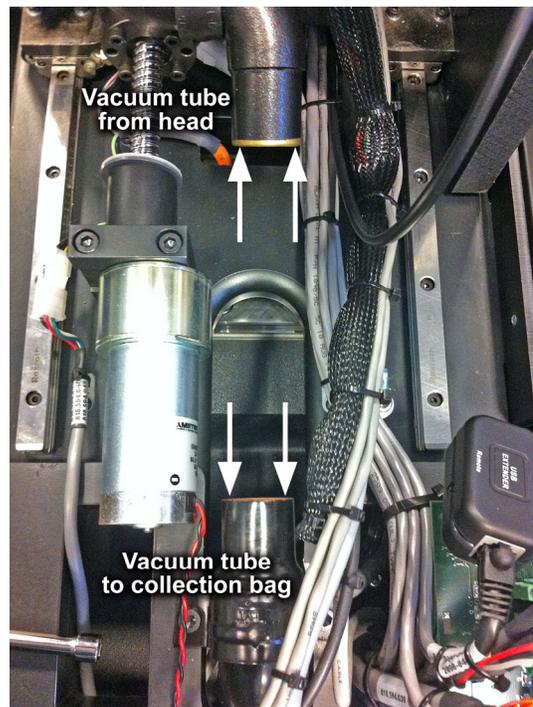
- a. Remove seven (7) screws and nylon washers securing the pod to the carriage. Remove the side screws first, then the front screws. Hold the pod to prevent it from dropping onto the Carriage Interface board underneath. Place the screws and washers in a safe place for reuse.
 - b. Carefully lift the pod up and disconnect two cables running to the pod. One is a USB cable for the touchpad and it disconnects from the USB repeater. The second cable is for the Emergency Stop loop / Carriage Direction and requires a small latch be released to separate the two connectors.
8. Replace the expanding vacuum hose. This hose runs along the carriage from below the engraving head to the front of the carriage.
- a. Release two hose clamps that secure the hose to the two metal tubes. An 8 mm nut driver or socket makes this an easy task.
 - b. Slide the hose off the inlet and exhaust tubes.
 - c. Separate the two hose clamps from the hose. Discard the hose.
 - d. Slide a hose clamp over each end of the new vacuum hose (item 1). Open the clamps as necessary to allow the hose to go through with minimal effort.



- e. Slide the new vacuum hose onto the metal tubes. Rotate the clamps to allow access to the locking screws on the hose clamps. At the same time, avoid putting the clamps where they will rub any cables.

Note: Be sure the hose clamp nearest the engrave head will not interfere with the head slide motor when the head is retracted.

- f. Tighten the two hose clamps. The clamps must be secure to prevent copper chips from escaping.
9. Re-install the operator pod.
- a. Connect the two cables as appropriate.



- b. Secure the pod using the seven (7) original screws and nylon washers. Start a screw in the right side first to hold the pod up for easier installation of the remaining screws.
10. Remove the light gray/blue hose running between the engrave head and brass tubing.



Engrave Head Vacuum Hose
P/N D830.100.051 (shown)

11. Install a new vacuum hose in this location.
12. Turn ON power to the machine. The engrave head should retract when powered up.
13. Turn ON the engrave head and listen for the vacuum. Check for air leaks around the hose clamps of the expandable hose (from step 8) and the smaller hose connected to the engrave head (step 11). Correct as necessary to eliminate leaks.
14. Lower the head against the inner stop and turn OFF power.
15. Re-install the lower sub-carriage cover using eight (8) screws and nylon washers.
CAUTION: If this engraver has the Kaman box relocated onto the sub-carriage, be sure to use the two (2) M5 screws on the right side of the cover in the back two holes. All other mounting screws (six total) are M4 screws.
16. Re-install the bellows between the pod and engrave head.
17. Re-install the engrave head hood and secure using two (2) of the original screws and nylon washers.
18. Turn ON power to the machine and check machine operation.

Embedded Computer – RAVE computer (Black tower case)

Clean every two years

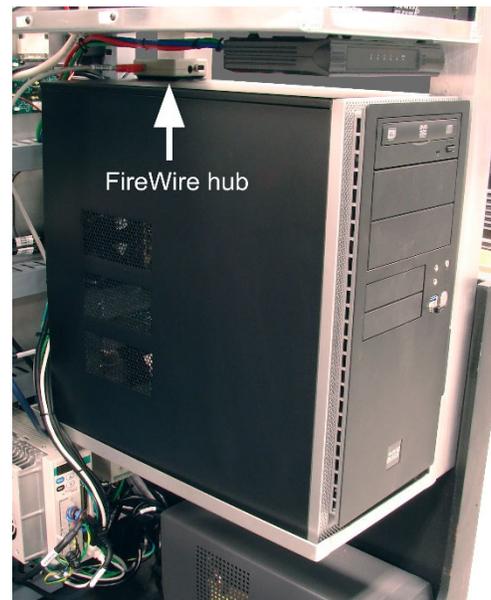
No Parts or Lubricant Required

For Advantech computers (tan case) see page 55.

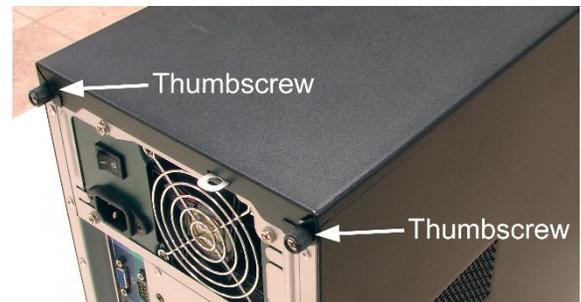
The embedded computer is in the electronics enclosure of the Spectrum. This computer should be checked for dirt and cleaned if necessary every two years. To clean the computer:

1. Turn OFF the computer. Do this using the Shutdown routine from the Spectrum application software.
2. Turn OFF the machine.
3. Remove the end panel from the electronics enclosure by turning six (6) quick release handles. The end panel will lift off the machine. Set it aside in a safe place.
4. Locate the embedded computer setting in the bottom of the bed cavity.

Note: There is a FireWire hub mounted on the top of the computer. Disconnect the cable going into the back of the hub to allow clearance for the top cover to be removed.



There are two black thumbscrews on the top rear of the embedded computer. Remove these two screws.

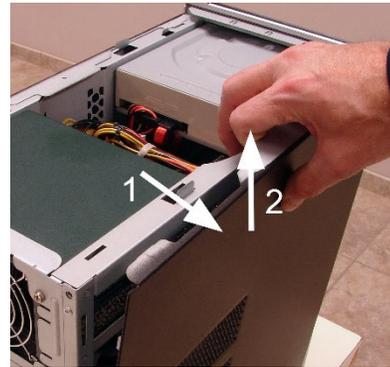


Slide the top cover back and then lift to remove from the computer case.

Carefully lay the top cover on the floor of the machine, being cautious of the FireWire hub on the top.



5. Pull the side panel away from the unit and then pull up to remove it from the computer.



6. Inspect the interior of the computer for dirt and dust. If necessary, clean the interior using a soft brush. Vacuum up the dust and dirt being careful not to put the hose too close to the parts inside. Using the brush while holding the vacuum hose is a good option.

Pay attention to the fans mounted in the computer and be sure they are clean.

7. Clean the vents leading into the power supply. The power supply is at the top of the computer.



Because of the power supply location, it may be difficult to get the vacuum to the vents. Another option is to use a can of clean compressed air.

Caution: Do not use shop air from a hose.

Place a damp paper towel over the fan at the rear of the power supply to catch dust when blowing out the power supply with air.

8. Re-install the side panel onto the computer.
9. Re-install the top cover onto the computer and secure with the two black thumbscrews. Also reconnect the FireWire cable to the rear port of the hub.
10. Turn ON the computer by pressing the power button on the front. After start-up, verify the monitor shows the Spectrum desktop and the "Waiting for Power" graphic.
11. Clean the Uninterruptible Power Supply. Go to the page **Error! Bookmark not defined..**



Embedded Computer – Advantech Computer (Tan case)

Clean every two years

No Parts or Lubricant Required – A shop vacuum and compressed canned air are recommended.

The embedded computer is located in the electronics enclosure of the Prism. This computer should be checked for dirt and cleaned if necessary every two years. To clean the computer:

1. Turn OFF the computer. Do this using the Shutdown routine from the Prism application software.
2. Gently tilt the computer to see the front of the computer. On the face is a ventilation grill that is held in place by two screws beneath it. Remove these screws and lift the grill free of the computer.



3. Remove the air filter from the grill and thoroughly clean or replace it.
4. Vacuum the screen on the computer behind the air filter.



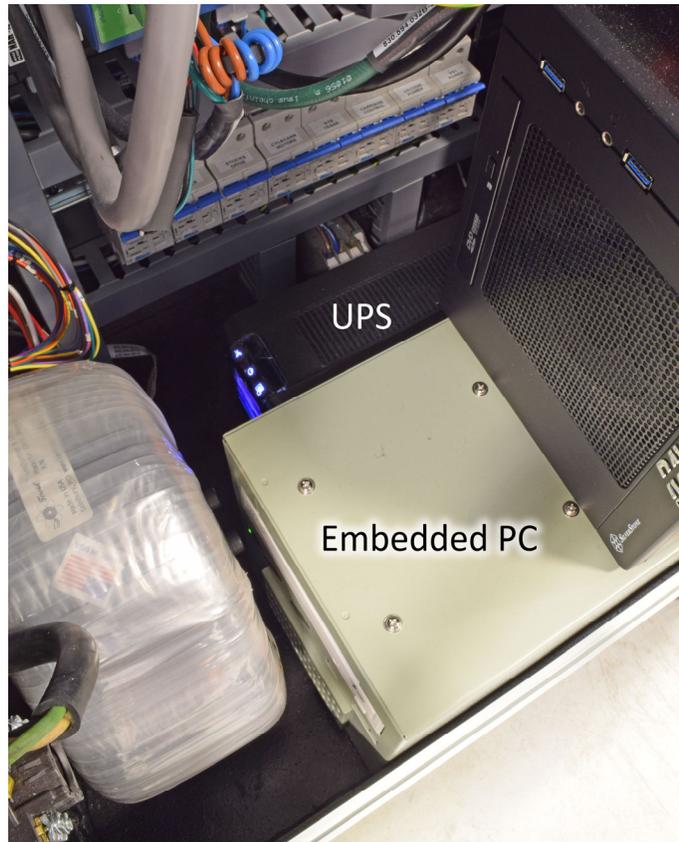
5. Re-install the air filter and grill.
6. Clean the Uninterruptible Power Supply. Go to the page 57.

Uninterruptible Power Supply (UPS)

Clean and inspect every two years

No Parts or Lubricant Required – A shop vacuum and compressed canned air are recommended.

The UPS is located in the electronics enclosure of the Spectrum. This UPS should be checked for dirt and cleaned if necessary every two years. Additionally, the battery condition should be evaluated to determine if the battery needs to be replaced.



UPS shown behind Embedded computer.
UPS display faces left.

To clean the UPS:

1. Disconnect the machine from the main input power.
2. Turn OFF the UPS. Press and hold the Power button until the unit beeps, indicating the unit is shutting off. The UPS is located on the floor of the engraver behind the Embedded PC.
3. Vacuum the UPS and the area around the UPS. The space is limited so be careful when vacuuming.
4. Turn ON the UPS and check the battery condition. The UPS will beep indicating that no input power is connected. Check the display of the UPS. There are two battery icons shown on the UPS display. If both icons are ON, then the UPS battery is in need of replacement.

The replacement battery part number is: APC RBC 110

(This is an APC part number. OHIO GT does not stock these batteries.)

5. Turn OFF the UPS.
6. Perform the preventive maintenance required for a Vital Proof computer (if installed). See the next page.

If no Vital Proof computer is installed, Preventive Maintenance is done.

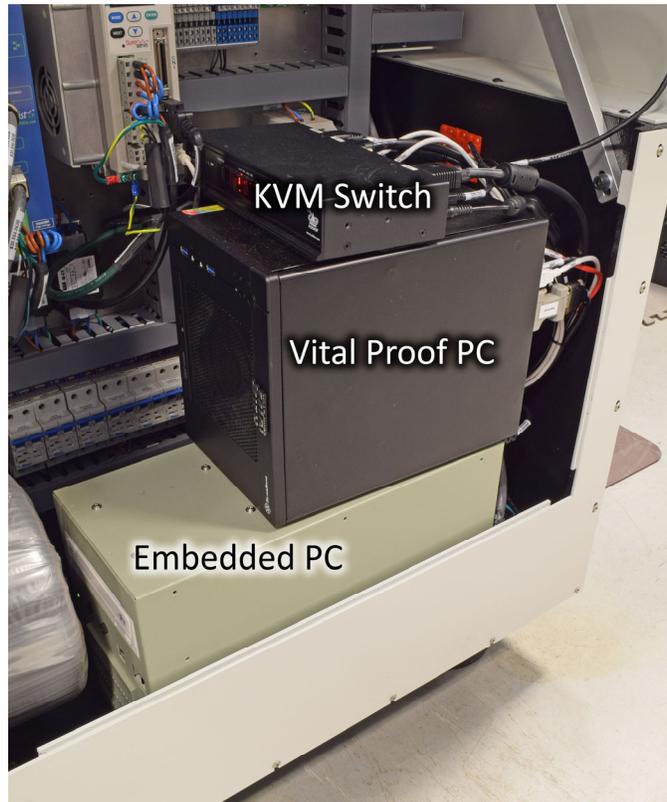
- Re-connect the main input power to the machine.
- Turn ON the UPS.
- Turn ON the machine.

Vital Proof Computer

Clean every two years

No Parts or Lubricant Required – A shop vacuum and compressed canned air are recommended.

The Vital Proof computer is located in the electronics enclosure of the Spectrum. The unit sits on top of the embedded computer. The Vital proof computer should be checked for dirt and cleaned if necessary every two years.



Vital Proof computer sits on top of
Embedded computer.

To clean the computer:

1. Vacuum the ventilation grill on the front of the Vital Proof computer.
2. Vacuum the ventilation grill on the top of the Vital Proof computer.
3. Carefully vacuum the fan at the back of the computer. There are many cables so this can be challenging. Use a small brush with the vacuum to help remove dirt.
4. Re-connect the main input power to the machine.
5. Turn ON the UPS.
6. Turn ON the machine.

