# **Chapter 3** Periodic maintenance items

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# 1. Weekly inspection

This section mainly describes weekly inspection and cleaning.

## 1.1 Checking and cleaning the nozzles

If buffing action (spring action) is poor, component pickup errors may occur. To prevent such problems, periodically check and clean each nozzle.

## 1.1.1 Checking and cleaning the spring-action parts

#### Checking the spring action

Check the spring action of the nozzles. Press on a nozzle and if it returns normally there is no problem. However, if the return action is poor (sluggish) then pickup errors and recognition errors will occur.



53300-L5-00

#### Cleaning the slide section

#### **step1** Remove the nozzle from the head.

Always first press the emergency stop button and then remove the nozzle from the head. The machine must be in emergency stop to ensure safety during work.

#### 

#### Do not take apart the removed nozzle.

#### **step2** Clean the slide section.

Apply IPA (isoprophyl alcohol) or ethanol to the slide section. Push the nozzle tip several times to repeat the buffing action (spring action) to clean the slide section. After cleaning, blow sufficient air to remove IPA or ethanol.

#### **step3** Lubricate the slide section.

Using a precision screwdriver or similar tool with a pointed tip, apply a small amount of turbine oil (just enough so that it sinks in) to the slide section.

53303-L5-00

# **step4** Check the buffing action (spring action).

Push the nozzle tip several times to repeat the buffing action and spread turbine oil. Use a lint-free cleaning cloth to wipe away excess oil from around the nozzle.

53304-L5-00

# step **5** Remove excess oil remaining in the nozzle.

Using an Air blow tool, blow air for about 5 seconds from the nozzle tip, and for about 5 seconds from the nozzle attachment side. Repeat this process a few times to remove excess turbine oil remaining in the nozzle.

#### step 6 Check that the oil was removed.

Blow air through the nozzle again while placing commercially-available oil blotting paper over the opposite end of the nozzle, and check for residual oil in the nozzle.

Performing step 5 is usually sufficient to remove oil remaining in the nozzle. However, if oil still remains then blow air through the nozzle once again.

53302-L5-00

#### step 7 Reinstall the nozzle.

After checking one more time that there is no oil remaining in the nozzle, reinstall the nozzle back onto the head (when the machine is not equipped with a nozzle station).



When the machine is equipped with a nozzle station, return the nozzles to the nozzle station after cleaning.

#### Step 3 Lubricating the slide section



Nozzle
Precision screwdriver
(with a small amount of turbine oil applied)

**Step 4** Checking the spring action



Spring action at nozzle tip

#### Step 6 Checking for residual oil

Oil blotting paper



## 1.1.2 Checking the nozzle leaf springs

If nozzle leaf springs cannot hold a nozzle securely, this adversely affects pickup, recognition and mounting operations. Periodically check the leaf springs for nozzle holding status.

#### Leaf spring inspection points

Check the following points by removing the nozzle and reattaching it to the nozzle holder.

- The leaf spring has enough gripping force.
- There is no gap between the leaf springs and the nozzle.
- The leaf spring is not warped or deformed.
- The gripping part of the leaf spring is not frayed.

#### Checking the leaf spring condition



## 

If any of the above points is found to be a problem, remove the nozzle and replace the leaf springs as a pair, by referring section 1, "Nozzle leaf springs" in Chapter 4.

#### CAUTION

NOTE

When the machine is equipped with a nozzle station, return the removed nozzles to the nozzle station.

## 1.1.3 Cleaning the nozzle top end

Clean the contamination of the nozzle top end with a nozzle top end cleaning tape supplied with the machine.



An ultrasonic cleaning unit (option) is effective to remove the contamination of the nozzle which has not been removed with the nozzle top end cleaning tape.

#### Cleaning procedure

Stick the adhesive surface of the nozzle top end cleaning tape to the nozzle top end and peel it off to remove the contamination.

## 1.2 Checking the conveyor sensor condition and operation

This machine uses a transmission mode fiber sensor as the conveyor sensor. Check whether the sensor operates correctly even when the conveyor rail width is changed.

#### Checking the conveyor sensor condition and operation



#### **step1 Open the** [Unit] – [Conveyor] tab.

# **step2 Press the [Width] button to change the conveyor width.**

In the "Conveyor Width" dialog box that appears, enter a conveyor width and press (OK).

The conveyor is changed to the width that was just entered.

# step**3** Check whether an error has occurred.

The conveyor sensor is operating properly unless an error message appears when the conveyor width is changed. No further check is necessary.

If an error message appears, then adjust the sensor with the procedure below.

54301-L5-00

#### Adjusting the conveyor sensor

If an error occurred when the conveyor width was changed, check the output status of the conveyor sensor.

- 1. Open the [Unit] [I/O] tab.
- 2. From the "Output" drop-down list, select "CONVEYOR".
- 3. Select "CONV SENSOR TUNING" (T01000E0) in the output I/O list.
- 4. Press the [ON/OFF] button to switch the I/O status from "0" (OFF)  $\rightarrow$  "1" (ON)  $\rightarrow$  "0" (OFF) to perform auto tuning.
- 5. On the [Unit] [Conveyor] tab, press the [Axis] button again and change the conveyor width. The sensor is operating properly unless an error message appears.

54302-L5-00

#### Step 1-3 Checking the conveyor sensor



53353-L5-00

#### Conveyor sensor tuning



## 1.3 Checking the board clamp condition and operation

#### 1.3.1 Checking the board clamp condition

Check the following points to see the board clamp condition.

- 1. The board is clamped without play when the board clamp is raised.
- 2. There is no clearance between the board and the board hold plate when the board clamp is raised.
- 3. The board is flush with the upper surface of the conveyor rails when the board clamp is raised.
- 4. The board clamp unit moves smoothly.

53301-L5-00

#### Checking the clamp condition



Check that there is no clearance between the board and board hold plate and also that the board is flush with the conveyor rails.

Clamp and unclamp the board to check the movement.

#### 1.3.2 Checking the board clamp operation

#### step **1** Open the [Unit] – [Conveyor] tab.

**step2 Press the [Width] button to set the conveyor width.** 

In the "Target Width" box in the "Conveyor Width" dialog box that appears, enter the board width and press (OK). The conveyor is changed to the width that was just entered.

# step3 Press the [Push Up] button to enter the board thickness.

In the dialog box that appears, enter the board thickness and press (OK).

## **step4 Press the [Board Clamp] button to clamp the board.**

# step **5** Press the [Board Clamp] button again to unclamp the board.

54309-L5-00

Repeat steps 4 and 5 to clamp and unclamp the board to make sure the clamp unit operates smoothly.

#### Step 2-5 Checking the clamp operation



# 2. Monthly or bimonthly inspection

This section mainly explains the cleaning and lubrication procedures after inspection.

## 2.1 Cleaning the nozzle air path



## step **1** Remove the nozzle from the head.

Always first press the emergency stop button and then remove the nozzle from the head. The machine must be in emergency stop to ensure safety during work.



NOTE

CAUTION — When the machine is equipped with a nozzle station

(option), make sure that the nozzles are returned to the nozzle station after cleaning.

#### step**2** Blow air through the nozzle.

Using an Air blow tool, blow air through the nozzle from the nozzle tip and then from the other end.

53310-L5-00



If there are dust deposits in the nozzle, perform steps 3 and 4.

#### step**3** Clean the nozzle hole.

Pass the nozzle cleaning wire through the nozzle hole and clean the nozzle hole. While holding both ends of the wire with fingers as shown or using a custom handle (option), gently move the nozzle back and forth.

53311-L5-00

#### **Step4Blow air onto the nozzle tip again.** After removing the cleaning wire, blow air through the nozzle with the Air blow tool, just as in step 2.

53312-L5-00

Following the nozzle cleaning above, check and clean the spring-action parts. (See 1.1.1, "Checking and cleaning the spring-action parts" described earlier in this chapter.)



Step 4 Air blow



Air blow gun (option) Nozzle

## 2.2 Inspecting ball screws and guides of each axis

Inspect the ball screws and the guides on the X, Y and W axes. Checkpoints are listed below. A grease spattering prevention cover is installed to the X and Y axes. Remove these covers when inspecting the ball screw and guide.

TIP

For instructions on how to detach or attach the grease spattering prevention covers, refer to sections 2.3.1 and 2.3.2 described later on.

#### Checkpoints

1. Any foreign matter adhering to the ball screws and guides?

Check if any fallen chips have adhered to the X and Y axis ball screws and/or X, Y and W axis guides.

2. Do the ball screws and guides have the correct amount of grease?

Check if grease has flowed off or splattered in the air failing to adhere. Also check if grease has discolored or hardened.

#### 3. Any abnormal sounds from the ball screws?

Press the emergency stop button. Then check for any abnormal sounds while pressing the head assembly or conveyor table by hand along the X-axis or Y-axis back and forth.

#### Countermeasures

- 1. Ball screws and guides may be damaged when chips and other material bite into them. If chips are adhering, wipe them off along with the grease or remove with tweezers, etc.
- 2. Apply grease while referring section 2.3, "Cleaning and greasing the X, Y and W axes" explained in this chapter.
- 3. Consult your YAMAHA sales office or representative when abnormal sounds occur even after trying the countermeasures in the above steps 1 and 2.

#### Cleaning and greasing the X, Y and W axes 2.3

To clean and grease the ball screws and guides of the X, Y and W axes, follow the steps below. Prepare a grease gun and specified grease (NSL).



#### CAUTION

When handling grease or lubricant, read and follow the precautions listed in section 2.2.2, "Lubricating tools and grease" in Chapter 1.

#### CAUTION

If abnormal noise is emitted from the X, Y or W axis ball screw or guide, then contact our sales representative for assistance. Disassembly and cleaning of the ball screw or guide by the user will void the warranty.

#### 2.3.1 Cleaning and greasing the X, Y and W axis ball screws



**step1 Press the emergency stop button.** The machine must be in emergency stop to ensure safety during work.

step **2** Remove the ball screw covers. Remove the X-axis and Y-axis ball screw covers used for preventing grease

spattering.

#### X-axis

- 1. Use a Phillips screwdriver to remove the screws securing the left side of the grease spattering prevention cover.
- 2. Move the head all the way to the left side and remove the screws securing the right side of the grease spattering prevention cover.
- 3. Remove the grease spattering prevention cover by pulling it to the right.

53305-L5-00

TIP

TIP

When reattaching the X-axis grease spattering prevention cover, use the reverse order of the above procedure.

#### Y1 and Y2 axes

- 1. Use the hex wrench to remove the screws securing the rear side of the grease spattering prevention cover.
- 2. Move the head all the way to the rear side and remove the screws securing the front side of the grease spattering prevention cover.
- 3. Remove the grease spattering prevention cover by pulling it to the front.

53306-L5-00

When reattaching the Y-axis grease spattering prevention covers, use the reverse order of the above procedure.

Step 2 Removing the X-axis grease spattering prevention cover







Y-axis ball screw cover cover mounting bolt

Y-axis motor

# Periodic maintenance items

#### step3 Clean the ball screws.

CAUTION -

remains in the lead groove.

- Using the handle, move the head to one end of each axis.
- 2. Wipe away the old grease and dirt from the ball screw with a lint-free cloth or paper towel (for clean room use).
- Move the head to the opposite end of each axis (X, Y and W axes) and wipe the ball screw clean.

Wipe away the old grease and dirt in the lead groove

of the ball screw. Also check that no debris or residue

53307-L5-00

#### Step 3 Cleaning the ball screws

X-axis 🖒



Wipe with cleaning cloth, etc.



W-axis

Wipe with cleaning cloth, etc.



3-9

- 1. X-axis, Y-axis
  - Use the grease gun to supply the specified grease (NSL) to the grease nipples.

Then move the head back and forth by hand along each axis and wipe away excess grease.

2. W-axis

Apply the specified grease (NSL) by hand uniformly over the surface and lead groove of the ball screw.

53315-L5-00

#### step 5 Reattach the covers.

Reattach the grease spattering prevention covers in the reverse order of the removal procedures.

#### Step 4 Greasing the ball screws



Grease nipple for X-axis ball screw

Y-axis Grease nipple (left) for Y-axis ball screw Y-axis



Grease nipple (right) for Y-axis ball screw

W-axis



W-axis ball screw

#### Grease list

For ball screws

No.	Axis	Grease name	Grease type	How to grease
1	X and Y axes	NSL	Lithium-based grease	Use a grease gun.
2	W axis	NSL	Lithium-based grease	Apply grease by hand.

## 2.3.2 Cleaning and greasing the X, Y and W axes guides



**step1 Press the emergency stop button.** 

The machine must be in emergency stop to ensure safety during work.

#### **step2** Clean the guides.

- Move the head (or conveyor rails) to one end of its axis, and wipe away the old grease and dirt from the guides with a lint-free cloth or paper towel.
- Move the head (or conveyor rails) to the opposite side of its axis and wipe the guides. (X, Y and W axes)

53313-L5-00



CAUTION -

Wipe away thoroughly the old grease in the grooves of the guide rails.

Step 2 Cleaning the guides



Guide rail Wipe with cleaning cloth or paper towel.

X UXIS

Use the grease gun to supply the specified grease (NSL) to the X-axis guide grease nipples.

The grease nipples are located behind the head assembly, two each on the right and left at the positions (heights) of the upper and lower guides (total of 4 places).

53314-L5-00

2. Y1 and Y2 axes

Use the grease gun to supply the specified grease (NSL) to the Y-axis guide grease nipples. The grease nipples are located on the front and back sides of the slider on each Y-axis guide (total of 4 places).

Attach the grease gun nozzle to the grease gun so that the grease gun nozzle can be aligned with the angle of the grease nipples.

53329-L5-00

When injecting grease from the bent type grease nipples on the front and back sides of the Y-axis, align the grease gun nozzle with the angle of the grease nipple. If not aligned, the grease nipple may be damaged or may come loose and fall off. Carefully align the grease gun with the grease nipple.

> W axis Apply grease (NSL) by hand uniformly over the surface and groove of the guide rails.

> > 53330-L5-00

#### step4 Remove excess grease.

After moving the head (or conveyor rails) back and forth a few times along their axes, wipe away excess grease.

#### Step 3-1 Greasing the X-axis guide



Grease nipple (small)



Grease nipple (large: located on head holder)

#### **Step 3-2** Greasing the Y-axis guide



Grease nipple for Y-axis guide

Total of 4 places

#### **Step 3-3** Greasing the W-axis guide



Grease list

#### For guides

No.	Axis	Grease name	Grease type	How to grease
1	X and Y axes	NSL	Lithium-based grease	Use a grease gun.
2	W axis	NSL	Lithium-based grease	Apply grease by hand.

#### Inspecting, cleaning and greasing the push-up shaft 2.4

The push-up shaft is designed to prevent flexing or warping of the board during clamping and is important because it prevents depressing of the board during component mounting.

The push-up shaft also prevents deviations in the component mounting accuracy due to the board depressing during component mounting, so it is important to regularly clean and inspect the push-up shaft to ensure it operates correctly.



#### CAUTION ·

If trouble occurs with the push-up shaft, then contact our sales representative for assistance. Disassembly and cleaning of the push-up shaft by the user will void the warranty.



#### step 1 Set the conveyor width to maximum.

Press the (Width) button to display the "Conveyor Width" dialog. Enter the maximum conveyor width from the specifications and press (OK). The conveyor is changed to the width that was just entered.

54310-L5-00



#### **step2** Remove the push-up plate. Press the emergency stop button and then

remove the push-up plate using a hex wrench.



CAUTION · The push-up plate is heavy so use plenty of caution during handling.

#### **step3** Raise the push-up unit.

Cancel emergency stop and raise the push-up unit manually.



#### **step4** Remove the old grease by hand.

After pressing the emergency stop button, thoroughly remove the old grease from the two ball screws and the two ball guides by hand.

#### step 5 Apply the new grease by hand. **Ball screw**

Apply as much as 2 cm of new grease to your finger, and rub it evenly into the ball screw grooves.

#### Ball guide

Apply as much as 2 cm of new grease to your finger, and coat it evenly on the ball guides.

53331-L5-00

#### Step 1 Setting the conveyor width



#### Step 5 Applying the grease

RU-axis ball guides (2 places)



Ball guides (2 places)

# step 6 Raise and lower the push-up unit manually.

After cancel emergency stop, raise and lower the push-up unit several times manually to spread the grease evenly. After the grease is well spread, raise the push-up unit and leave it in that state.



#### **step7** Wipe away excess grease by hand.

After pressing the emergency stop button, wipe away excess grease by hand. Again raise and lower the push-up unit several times manually and if there is no problem then lower the push-up unit.

## **step8** Reinstall the pushup plate to its original position.

Reinstall in the reverse procedure of step 2.

CAUTION \_\_\_\_\_\_ The push-up plate is heavy so use plenty of caution during handling.

5

Periodic maintenance items

#### Inspecting the board conveyor unit 2.5

#### 2.5.1 Inspecting and cleaning the conveyor belt

As the belt wears away, slippages may occur that prevent securely conveying the boards. It is therefore necessary to make periodic checks for wear of the conveyor belt.

Belt wear may also cause trouble such as erroneous detection of the conveyor sensor due to dust from belt wear accumulating on the sensor surface, or dust from belt wear accumulating in the belt guide grooves may cause the belt to stick, etc.

#### step **1** Change the conveyor width to a convenient width for maintenance work.

- 1. Press the (Width) button to display the "Conveyor Width" dialog.
- 2. In the "Target Width" box, enter a width large enough for maintenance work (about 200mm) and press (OK). The conveyor is changed to the width that was just entered.

54304-L5-00



#### step **2** Loosen the tension on the conveyor belt.

Press the emergency stop button and then use a 4mm and 5mm hex wrenches to loosen the belt tension.

53332-L5-00

#### **Step3** Remove the conveyor belt.

Remove the conveyor belt from the pulley and the belt groove of the board guide.

**step4** Check for wear on the board conveying side of the conveyor belt. After removing the belt in step 3, check for wear on the board conveying side of that conveyor belt.

TIP

About half (3 to 4 mm) the belt width is used for board conveying. If the board conveying side of the conveyor belt is worn, then you can still reuse the belt by switching the used side with the opposite side. However, this will cause errors after long-term use, so early belt replacement is recommended.

#### **step5** Clean the pulley and the belt groove on the board guide.

Using a vacuum cleaner or similar device, suction up the belt wear dust deposited in the belt groove or on the sensor surface. Also use a vacuum cleaner while brushing debris away with the brush supplied with the machine.

Also clean the pulley and other parts for the conveyor belt.



CAUTION

Though it rarely occurs, dust from belt wear might sometimes adhere to and darken the outer circumference of the pulley. If that happens, then remove it with a metallic spatula, etc.





Tensioner bolt



Step 1

Loosening the tension on the belt

# 3. Three-month inspection

## 3.1 Cleaning and replacing the ejector filter

Although depending on the air supply conditions and operating time, ejectors should be inspected once every 3 months. Use an Air blow tool to remove dust buildups when small. We recommend replacing the air filter if heavy dust deposits are found.

# **Step1** Move the head all the way to the front end of the Y axis.

On the (Unit)-(Head) tab (or (conveyor) tab) screen, press the (Axis) button to open the "Move Axis" screen. Then move the head assembly all the way to the front of the Y axis (front of machine).

TIP

The ejector unit is located at the front of the head assembly. It is easier to inspect the ejector filters when the head assembly is positioned to the front side of the Y axis. (Inspect the ejector filters from the front of the machine.)



#### **step2** Press the emergency stop button.

The machine should be in emergency stop to ensure safety during work.

#### step**3** Remove the filter cap.

Loosen and remove the filter cap with a slotted screwdriver.

53340-L5-00

#### step4 Clean the filter.

Use tweezers to take the filter out of the ejector. When there is only a little dust in the filter, use an Air blow tool to blow it away and return the filter back to the original position.

53316-L5-00

If there are heavy dust deposits in the filter or the filter has discolored, replace it with a new filter (K46-M8527-C0X). As a general guide, filters should be replaced once every 3 months, although this depends on the actual operating time.

#### step 5 Reattach the filter cap.

- 1. Fit the filter into the filter cap and insert it into the ejector.
- 2. Turn the filter cap to the right until it locks and clicks.

When attaching the filter, be careful to make sure the O-ring does not come out from between the manifold and the filter cap.

#### **Step 4** Removing the filter cap



Ejector unit

Ejector filter O-ring Filter cap

#### Step 5 Cleaning the filter



#### 3.1.1 Checking the ejector vacuum pressure

Check the vacuum level of each ejector of the ejector unit to see if it is working correctly.



#### **Step 1** Press the emergency stop button.

The machine should be in emergency stop to ensure safety during work.

Step 2 Disconnect the air hose from the air joint under each ejector. Disconnect all air hoses from the air joints (air couplings).

53333-L5-00

54305-L5-00

#### step3 Check the ejector vacuum level.

- 1. Open the (Unit)-(Head) tab.
- 2. Press the (Vacuum) button while blocking each air joint with your finger.
- Make a note of the "Max" reading of each head while the air joint is blocked, and check that the reading is higher than the criterion value below. Make the same check for all heads.

The exhaust air blow might strike your face, so be sure to wear safety goggles.

#### Criterion of ejector vacuum level

When air joint is blocked: 190 or more

TIP

If the vacuum level of any head does not reach the criterion value, then check the air path in the head (interior of the spline shaft or air hose between the ejector and spline shaft). Clean or replace it if necessary.





Ejector unit

Curre

Air joint Transparent air hose







(with air joint blocked).

## 3.1.2 Checking the blow valve operation (each head)

Check the blow level of each ejector of the ejector unit to see if it is working correctly.

## **step1** Check that the blow air is being exhausted correctly.

To check if the blow air is being uniformly exhausted from each air joint on the lower part of the ejector unit, open the (Unit)-(Head) tab and press the (Blow) button for each head.

54307-L5-00



Press the [Blow] button for each head.

## 3.1.3 Checking the cleaning blow valve operation (for all heads)

#### **step1** Remove the nozzles from all heads.



A strong air flow is exhausted during the cleaning blow. Always remove all nozzles attached to the heads before starting the cleaning blow. Starting the cleaning blow while the nozzles are still attached may blow the nozzles away from the heads causing the nozzles to break or become lost.

#### step2 Operate the cleaning blow valves.

- 1. Open the (Unit)-(I/O) tab.
- Select (Head) from the Output dropdown list and select the address for the head shaft blow (T003C400).
- 3. Press the (ON/OFF) button to operate the cleaning valves of all heads.

54313-L5-00

# step**3** Check the exhaust blow air of each head.

Open the (Unit)-(Head) tab. Press the (Blow) button of each head to check the exhaust blow air from each head.

54308-L5-10

#### step4 Turn OFF the cleaning blow valves.

The cleaning air blow or exhaust air blow might strike your face, so be sure to wear safety goggles.

Select a head.

Operating the cleaning blow valves.



Press the [ON/OFF] button.

Step 2

Select an address.

#### **Step 3** Checking the blow air



Press the [Blow] button for each head.

#### Cleaning and lubricating the inside of the spline shaft 3.2

Dust or grime may adhere to the air path of spline shafts and cause component pickup or mounting errors. Although depending on the air supply condition and operating time, the inside of each spline shaft should be cleaned once every 3 months.



#### CAUTION

If spline shaft movement becomes unstable or abnormal noise is emitted from a spline shaft, then contact our sales representative for assistance. Disassembly and cleaning of the spline shaft by the user will void the warranty.

#### 3.2.1 Cleaning the inside of the spline shaft



**step1 Press the emergency stop button.** The machine should be in emergency stop to ensure safety during work.

#### step **2** Move the head to a convenient position for maintenance work.

NOTE Move the scan camera to the right or left away from the head assembly so that the scan camera will not get dirtv

#### **step3** Remove the nozzles from all heads. Remove all nozzles by hand.

TIP

When the machine is equipped with a nozzle station (option), place the nozzles removed from the heads back to the nozzle station.

#### step4 Disconnect the air hose from each spline shaft.

Disconnect the air hose inserted into the upper part of each spline shaft.

53318-L5-00

#### step 5 Remove the ejector unit stay.

Use the hex wrench or T-handle hex wrench to remove the four bolts that secure the ejector unit stay.

53309-L5-00

#### step 6 Prepare the cleaning kit (KHN-M8860-00X).

- 1. Pour IPA (isopropyl alcohol) into the container of the cleaning kit.
- 2. Place a shop cloth or rag under the spline shaft to be cleaned.

53319-L5-00



CAUTION -Never use solvent other than IPA (isopropyl alcohol).



Air hose

Spline shaft

Step 5 Removing the ejector unit stay

Ejector unit stay



Eiector valve

Hex wrench or T-handle hex wrench

Step 6 **Cleaning kit** 



Nozzle

Periodic maintenance items

## **step7** Remove the spring suspending the spline shaft.

Unhook the spring from the hook pin by hand.

53320-L5-00

# **step8** Remove the cap bolt for spline shaft cleaning.

Use the precision wrench (supplied) to remove the cap bolt (hex head bolt).

53321-L5-10

A washer packing is fitted to the cap bolt. Be careful not to drop it.

#### step9 Clean the inside of the spline shaft.

- 1. Insert the nozzle of the cleaning kit into the cleaning hole of the spline shaft.
- 2. Pour alcohol (IPA) into the spline shaft air path to clean away dust and grime.

53322-L5-00

#### Step 7 Unhooking the spring

Spring



Spring hook pin Spline shaft

#### **Step 8** Removing the cap bolt

- Precision wrench (option)



Upper block of spline shaft Cap bolt

#### **Step 9** Cleaning the spline shaft

Nozzle of cleaning kit



Spline shaft

Pump of cleaning kit

5

# Periodic maintenance items

#### step **10** Blow air into the spline air path.

- Prepare an Air blow tool (available as option) and connect it to an air connector on a nearby machine. Then insert the Air blow tool nozzle into the air joint of the spline shaft.
- 2. Place a shop cloth under the lower end of the spline shaft, and blow air through the spline shaft while blocking the cleaning hole with your finger.
- Repeat the above procedure (steps 9 and 10) until the IPA flowing out from the spline shaft becomes clean. Make sure that after blowing air, smear no longer appears on the shop cloth placed under the lower end of the spline shaft, and then reattach the cap bolt.

53334-L5-00

CAUTION · The exhau

NOTE

The exhaust air blow might strike your face, so be sure to wear safety goggles.

A washer packing is fitted to the cap bolt. Be careful not to drop it.

If the packing is damaged, replace it with a new one.

step **11** Reattach the spring to suspend the spline shaft.

Hook the spring to the hook pin by hand.

Clean the inside of all spline shafts using the same procedure in steps 7 to 11.

## step **12** Reinstall the ejector unit stay back to its original position.

Tighten the four bolts to secure the ejector unit stay, using the hex wrench or T-handle hex.

# step **13** Reconnect the air hoses back to their original positions.

Step 10 Air blow into spline shaft

- Nozzle of air blow tool



Block the cleaning hole with your finger. Air blow switch

#### Checking the negative pressure 3.2.2

After cleaning the spline shafts, check the negative pressure (vacuum level) generated in each head.

#### **step 1** After assembly, check the vacuum levels.

- 1. Leave nozzles detached from the heads.
- 2. Open the (Unit)-(Head) tab screen and press the (Vacuum) button to generate a negative pressure. Read the "Max" values shown on the screen and determine whether the vacuum levels are appropriate by referring to the criteria below.

54311-L5-00

#### **step2** Reattach the nozzles.

Attach the nozzles by hand back to the heads.

#### ■ Vacuum level criteria in spline air path

When nozzle is open : 70 or less

When nozzle is sealed : 190 or more

## NOTE -

The vacuum level in the spline shaft air path might sometimes differ slightly depending on the air source and operating conditions. Use the above criteria for reference during maintenance.



#### Checking the spline shaft movement and lubricating the slide section 3.3

After cleaning the spline shafts, check the spline shaft movement and lubricate the slide section.

CAUTION

If the up/down movement of a spline shaft is unstable or a spline shaft does not move, then contact our sales representative for assistance. Disassembly and cleaning of the spline shaft by the user will void the warranty.

**step1 Turn** off the machine power switch. Quit the software and turn off the machine power switch.

**step2** Move each spline shaft by hand to check for abnormal movement. Move each spline shaft up and down by hand and make sure that all spline shafts move smoothly without hanging up and unusual noise.



If the machine is operated while movement of any spline shaft is awkward, this may cause serious trouble. Do not operate the machine and contact us for assistance.

step**3** Clean the outside of each spline shaft.

Use a lint-free cleaning wiper or cotton swab to wipe the outside of each spline shaft.

#### **step4** Apply grease to the outside of each spline shaft.

Apply a thin, uniform coat of grease by hand to the outside of each spline shaft.

53335-L.5-00



#### **step5** Wipe away excess grease.

Move each spline shaft by hand several times and wipe away excess grease.

Step 4 Applying grease to spline shaft

- Z-axis spline shaft

## 3.4 Checking the SC-axis flex cable

The SC-axis flex cable is a flat multi-cable designed for rigidity to prevent the harness from drooping as it moves along with the scan camera. However, the cable may eventually droop due to warping or weakening from long-term use. If cable drooping occurs, then the cable may come in contact with moving parts and cause trouble. We recommend making periodic checks and replacing the cable if drooping becomes obvious.

#### Checking the SC-axis flex cable condition



- SC-axis unit

53351-L5-00

3

## 3.5 Inspecting and cleaning the air/mist filters

Air/mist filters are used to prevent oil, mist and other impurities in the air compressor from penetrating into the machine. These filters should be inspected and cleaned periodically as instructed below. (The filter closer to the air coupler is the air filter and the other one is the mist filter.)

#### Cleaning the filter cup

**Step Check the inside of the filer cup.** Check for oil or water deposits in the filter cup through the window. If the window is dirty, follow the steps below to clean the filter cup.

TIP

The drain cock at the bottom of the filter cup is an auto-drain type. It automatically drains the oil or water when deposited in the cup. We recommend connecting a hose to this drain cock.

# **step2** Disconnect the air hose from the air coupler.



When disconnecting the air hose, be careful not to allow oil, water or impurities to splash outwards.

#### step**3** Remove the filter cup.

While pressing the button on the side of the filter cup, turn it clockwise, and pull the filter cup downwards.

53325-L5-00

#### **step4** Clean the inside of the filter cup.

- 1. Lightly clean the filter cup with water.
- Then, pour water-diluted neutral detergent into the filter cup and clean the inside while shaking it.
- Air blow the filter cup and wipe away any moisture with clean cloth or paper.

53326-L5-00

#### step 5 Reattach the filter cup.

- Align the button on the side of the cup with the attach/detach position and push the cup upwards.
- 2. Turn the cup counterclockwise until you hear a click.



Leave the filter cup removed to clean the air filter as explained in the next procedure.

step 6 Reconnect the air hose to the air coupler. After connecting the air hose, check that no

After connecting the air hose, check that no air is leaking.

Step 3 Removing the filter cup



Filter cup

Button

Step 4 Cleaning

Cleaning the filter cup



Filter cup

Water-diluted neutral detergent

#### ■ Cleaning the air filter

#### **step1** Remove the filter cup.

See the previous procedure in "Cleaning the filter cup".

#### step **2** Remove the air filter.

Rotate the white disk clockwise as viewed from the top and take out the air filter.

53327-L5-00

#### step**3** Clean the air filter.

Use an Air blow tool to blow away dust and impurities trapped by the air filter. If the filter is excessively dirty and cannot be cleaned, replace it with a new filter.

#### **step4** Reattach the air filter.

Screw the white disk back in to attach the air filter to the original position.

53328-L5-00

#### **step5** Reattach the filter cup.

NOTE — When cleaning the mist filter, use the same procedure.

#### **Step 2** Removing the air filter



Loosen and remove the white disk.

#### Step 4 Reattaching the air filter



Air filter

3

## 4. Six-month or one-year inspection

## 4.1 Cleaning the camera lighting unit (6-month inspection)

The lighting unit may become dirty due to dust and dirt. We recommend periodic cleaning as explained below. To ensure safety, make sure that the machine power switch is off or the emergency button is pressed before starting work.



## CAUTION

Do not apply strong force or shock to the camera unit and lighting unit during cleaning. Optical axis adjustment might become unreliable.

## 

If trouble occurs with the lighting unit, then contact our sales representative for assistance. Disassembly and cleaning of the lighting unit by the user will void the warranty.

#### Fiducial mark recognition camera

The fiducial mark recognition camera is mounted on the right (or left as an option) of the head assembly. Clean the lighting unit for this camera as explained below.

#### • Cleaning method

Apply a few drops of lens cleaner to a lint-free cleaning cloth and wipe the diffuser plate on the bottom of the lighting unit.

53337-L5-00

#### Wipe with cleaning cloth.



Lighting unit for fiducial mark camera -

## 4.2 Checking the R-axis spline belt (1 year)

There are four R-axis spline belts. Check the condition of each belt.

#### R-axis spline belt checkpoints

- Is the belt becoming frayed due to cracks and belt wear?
- Is the belt splitting due to cracks or deterioration?
- Is the belt tension too loose? Is the belt itself loose?

#### 

If trouble occurs with an R-axis spline belt, then contact our sales representative for assistance. Disassembly and cleaning of the spline belt by the user will void the warranty.



53345-L5-00

#### Cleaning and replacing the blow station filter (1 year) 4.3

To clean or replace the blow station filter, follow the steps below.

CAUTION

If trouble occurs with the blow station, then contact our sales representative for assistance. Disassembly and cleaning of the blow station by the user will void the warranty.

#### **step1** Turn off the air supply and the power to the machine.

- 1. Quit the software and turn off the machine power switch.
- 2. Turn the air supply/shutoff valve inside the machine lower left panel to the right, to stop the air supply.

53346-L5-00

#### **step2** Cut the cable ties on the filter. Using a wire cutter or similar tool, cut the

cable ties that hold the filter unit inside the blow station stand.

53347-L5-00

#### step3 Disconnect the air hose from one end of the filter unit and take out the filter.

- 1. Disconnect the air hose from one end of the in-line filter unit.
- 2. Remove the filter joint caps on both sides of the filter by rotating them 90 degrees.
- 3. Pull the transparent case to remove it and take out the filter.

53348-L5-00

#### step4 Clean the filter.

Use an Air blow tool to blow air through the filter from the inside and from the outside. If the filter is excessively dirty and cannot be cleaned, replace it with a new filter.

#### Step 1 Shutting off the air supply



Periodic maintenance items



Cable tie



Wire cutter In-line filter unit

#### Step 3 Taking out the filter







## 4.4 Checking the nozzle station sensor condition (1 year) ... option

When the machine is equipped with a nozzle station (option), check the nozzle station sensors to see if they are working correctly.



#### CAUTION

If a nozzle station sensor fails to detect a nozzle, the nozzle change cannot be performed correctly and the machine operation may be interrupted due to a nozzle detection error.



## step **1** Press the emergency stop button.

The machine should be in emergency stop to ensure safety during work.

#### step **2** Open the nozzle station shutter.

- 1. Open the (Unit)-(Head) tab.
- 2. Press the (Nozzle Stn Shutter) button to open the nozzle station shutter.

54303-L5-00

# **step3** Check the detection status of the nozzle station sensors.

Check to see if the nozzle station sensors detect the presence or absence of nozzles.

- 1. Open the (Unit)-(I/O) tab.
- From the "Input" drop-down list, select "NZL STATION".
- 3. While extracting a nozzle from the nozzle station and returning it to the same position, check whether the corresponding sensor detects the nozzle correctly.

The detection status on the screen should read "1" when the nozzle is extracted from the nozzle station, and should read "0" when the nozzle is in the nozzle station.

54306-L5-00

#### TIP

The nozzle station position No. where a nozzle was extracted or inserted is displayed on the lower part of the "Input" status screen.

#### **step4** Close the nozzle station shutter.

On the (Unit)-(Head) tab, press the (Nozzle Stn Shutter) button to close the nozzle station shutter.



#### CAUTION ·

If the detection status of a nozzle station sensor is unstable or a senor fails to detect a nozzle, then contact our sales representative for assistance. Disassembly and cleaning of the nozzle station sensors by the user will void the warranty.

#### Step 2 Opening the shutter



Checking the nozzle detection status

Step 3

Select "NZL STATION".



Nozzle station position No. is displayed here.

Shows the presence or absence of nozzles detected by sensors.

## 4.5 Cleaning the scan camera lighting unit (6-month inspection)

The light diffuser plate and prism for the scan camera are attached to the opening at the left end of the camera. These diffuser plate and prism may become dirty due to dust and dirt. Periodic cleaning is recommended.



CAUTION

NOTE

Do not apply strong force to the camera parts during cleaning. Doing so may damage the glass components used in the camera unit.

#### **step1** Return all nozzles to the nozzle station.

- Press the (Unit) button and open the (Head) tab. Then press the (Nozzle Change) button.
- 2. In the "Nozzle Change" dialog that appears, select "ALL" from the "Head Number" drop-down list and select "Store Nozzle" from the "Nozzle Type" drop-down list.
- 3. Press the (OK) button to return all nozzles to the nozzle station.

54312-L5-00

If the machine does not have a nozzle station, press the emergency stop button and then detach the nozzles by hand.

#### **step2** Move the head unit.

Press the emergency stop button and then move the head unit to a position where cleaning can be carried out easily.

#### step**3** Move the scan camera.

- Move all heads (nozzle holder sections) by hand to their upper ends.
- Move the scan camera to the right side of the R-axis motor. At this point, do not apply excessive force to the scan camera.



moving the scan camera to the left end will make cleaning easier.

#### **step4** Wipe the diffuser plate and prism.

- Use a cotton swab to remove dust and dirt on the upper surface of the main light diffuser plate and on the prism surface. Since the prism surface is narrow, twist the end of the cotton swab into a pointed tip and use it to wipe the prism surface lightly.
- 2. Wipe the side-view light diffuser plate and prism using a cotton swab. Use a hand mirror when wiping the prism surface since it cannot be seen from the front.

53360-L5-00 53361-L5-00

Do not use solvent. Solvent may cause the surface finish of the prism to peel or flake and the diffuser plate to discolor.



Step 4

Cleaning the light diffuser plate and prism



Prism

#### Cleaning points of light diffuser plate and prism

