



**WEATHERIZING INSTRUCTIONS
FOR PNEUMATIC MASTS**

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Pneumatic Mast Warranty

Will-Burt warrants its pneumatic masts to be free from defects in material and workmanship for a period of five (5) years when used in commercial applications and two (2) years when used in military applications, with such time periods running from the date of shipment by Will-Burt. Will-Burt shall not be responsible for any damage resulting to or caused by its products by reason of failure to properly install, maintain or store the product; use of the product in a manner inconsistent with its design; unauthorized service, alteration of products, neglect, abuse, accident, or acts of God. This warranty does not extend to any component parts not manufactured by Will-Burt; provided, however, Will-Burt's warranty herein shall not limit any warranties by manufacturers of component parts which extend to the buyer.

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Document History

Document Numbers	Dates	Remarks
TP-4744301-00	January 2012	Initial Release
TP-4744301-A	December 2013	Updated warranty page.
TP-4744301-B	December 1, 2015	Restructured and updated to cover the Low Profile Pneumatic mast.
TP-4744301-C	February 27, 2017	Updated Section 1.2

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Section 1 Introduction

This manual describes how to prepare the following pneumatic masts for freezing conditions:

- Locking (Section 2)
 - Heavy-Duty
 - Super-Heavy-Duty
 - Ultra-Heavy-Duty
- Non-Locking (Section 2)
 - Standard-Duty
 - Heavy-Duty
 - Super-Heavy-Duty
- Low Profile (Section 3)

1.1 Safety Precautions

⚠ WARNING

When preparing the mast for freezing weather conditions, proper eye protection must be worn and a sufficient clearance from adjacent structures, vehicles, and people must be maintained. Some of the steps in this procedure cause water, antifreeze, or lubricant to be squirted out the mast weep holes and onto adjacent areas. A drain kit is available for the base tube to route the base tube water out a drain hose. However, water can still be released from the weep holes and collars on the upper tubes.

1.2 Pneumatic Mast Antifreeze Kit

This manual assumes the use of the optional Will-Burt non-toxic, Pneumatic Mast Antifreeze Kit (P/N: 4725801). This optional kit provides enhanced mast performance in extreme weather conditions.

The Will-Burt Non-toxic Pneumatic Mast Antifreeze Kit contains the following:

- (1) Flush Caution Label (P/N: 4770001)
- (1) Gallon Will-Burt Non-toxic Pneumatic Mast Antifreeze (P/N: 4735801)
- (1) Will-Burt Non-toxic Pneumatic Mast Antifreeze Application Bottle (P/N: 4726101)
- (1) Will-Burt Antifreeze MSDS (4746201)
- (1) Will-Burt Lubricant, MSDS, and Service Sheet (900600)
- These instructions (TP-4744301)

Use the Will-Burt Non-toxic Pneumatic Mast Antifreeze (P/N: 4735801) kit to prepare the mast for freezing weather conditions. Will-Burt antifreeze can be purchased in the kit or by the gallon (P/N: 4735801) then placed into the squirt bottle (Figure 1-1).



Figure 1-1 Fill the Squirt Bottle (sample bottle shown)

Section 2 Locking and Non-Locking

This section covers weatherizing for locking and non-locking pneumatic masts. For information on weatherizing low profile pneumatic masts, see Section 3.

2.1 Preparing for Freezing Weather Conditions

The steps in this section describe how to prepare the mast for freezing weather conditions.

In general, the procedure followed depends on the use of the mast during the freezing conditions:

- Always Nested: partially fill all laps with antifreeze
- Fully Extended on a Daily Basis: partially fill all laps with antifreeze
- Partially Extended: partially fill all extended laps and completely fill all non-extended laps

2.1.1 Always Nested Mast (Add to the Laps)

To prepare a mast that is going to be left nested during freezing conditions, it is best to nest the mast, add antifreeze, then cover the mast collars. Covering the mast prevents the antifreeze from being washed out during rains.

If a nested mast cannot be covered, rain can wash out the antifreeze from the mast while it is nested. Therefore on a regular basis it is best to add antifreeze to the laps, and then fully extend the mast.

If a mast is expected to be nested for more than (1) day in temperatures below freezing, follow these steps:

1. Nest the mast.
2. Remove (1) collar bolt and lock washer (Figure 2-1) from the bottom section collar (base tube).



Figure 2-1 Remove One Collar Bolt and Washer from Bottom Section Collar

3. Retain the collar bolt and lock washer to reattach later.
4. Using the kit squirt bottle, add antifreeze (Figure 2-2) according to the tube diameter listed below:

<u>Tube Outside Diameter</u>	<u>Approximate Amount of Antifreeze to Add</u>
3 ¾" < Diameter < 6"	2 ounces
6 ¾" < Diameter < 11 ¼"	5 ounces



Figure 2-2 Add Antifreeze

5. Place the collar bolt and lock washer removed back onto the collar.
6. Remove (1) collar bolt and lock washer from the next tube up and repeat steps 3, 4, 5 and 6 until all the tube laps have been treated with antifreeze.
7. If the mast is going to be left unattended for an extended period of time, open the drain cock(s).
8. If possible, cover the collars with the canvas cover provided with the mast or heavy-duty plastic. This protects the nested mast from rain washing out the antifreeze placed in the mast.

2.1.2 Mast that Cycles Fully Extended on a Daily Basis (Add to the Laps)

A mast that cycles daily can cause antifreeze to be released on a gradual basis. If a mast cycles daily in temperatures below freezing, follow these steps every (10) days:

1. Nest the mast.
2. Remove (1) collar bolt and lock washer (Figure 2-1) from the bottom section collar (base tube).
3. Retain the collar bolt and lock washer to reattach later.
4. Using the kit squirt bottle, add antifreeze (Figure 2-2) according to the tube diameter listed below:

<u>Tube Outside Diameter</u>	<u>Approximate Amount of Antifreeze to Add</u>
3 ¾" < Diameter < 6"	2 ounces
6 ¾" < Diameter < 11 ¼"	5 ounces

5. Place the collar bolt and lock washer removed back onto the collar.
6. Remove the collar bolt and lock washer from the next tube up and repeat steps 3, 4, 5, and 6 until all the tubes have been treated with antifreeze.
7. If possible, cover the collars with the canvas cover provided with the mast or heavy duty plastic. This protects the nested mast from rain washing out the antifreeze placed in the mast.
8. Every (10) days, go to step 1 and repeat this procedure to ensure that the antifreeze has not been washed out by rain.

2.1.3 Partially Extended Locking Mast (Completely Fill the Non-extended Laps)

If a locking mast is extended but not fully extended (one or more tubes not extended), the collar laps of the non-extended tube(s) must be completely filled with antifreeze and antifreeze must also be added to the extended collars.

NOTE

It is not recommended to nest the top tube during freezing weather conditions. Nesting the top tube requires too much antifreeze to fill the top tube lap which will create excessive weight in the top tube.

Follow these steps to winterize a partially extended locking mast:

1. While the mast is extended, make a note of the tubes that are not fully extended. These tube laps will have to be completely filled with antifreeze in a later step.
2. Nest the mast.

2.1.3.1 Completely Fill the Non-extended Lap(s)

3. Remove (1) collar bolt and lock washer from the collar just below the tube that is not extended.

4. Retain the collar bolt and lock washer to reattach later.
5. Extend the tube below the non-extended tube until the weep holes are visible (Figure 2-3).

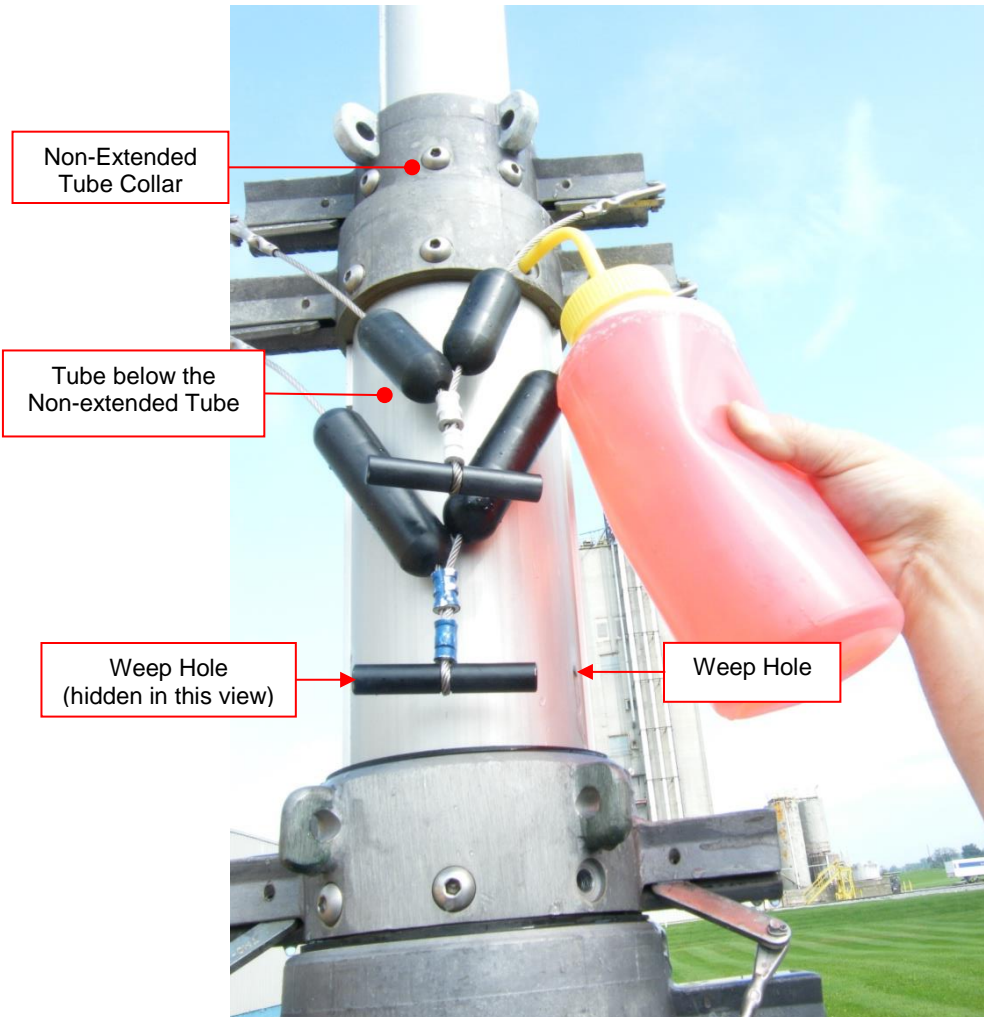


Figure 2-3 Weep Holes

6. Using the kit squirt bottle, add antifreeze to collar just below the non-extended tube until antifreeze comes out of the weep holes (Figure 2-4).

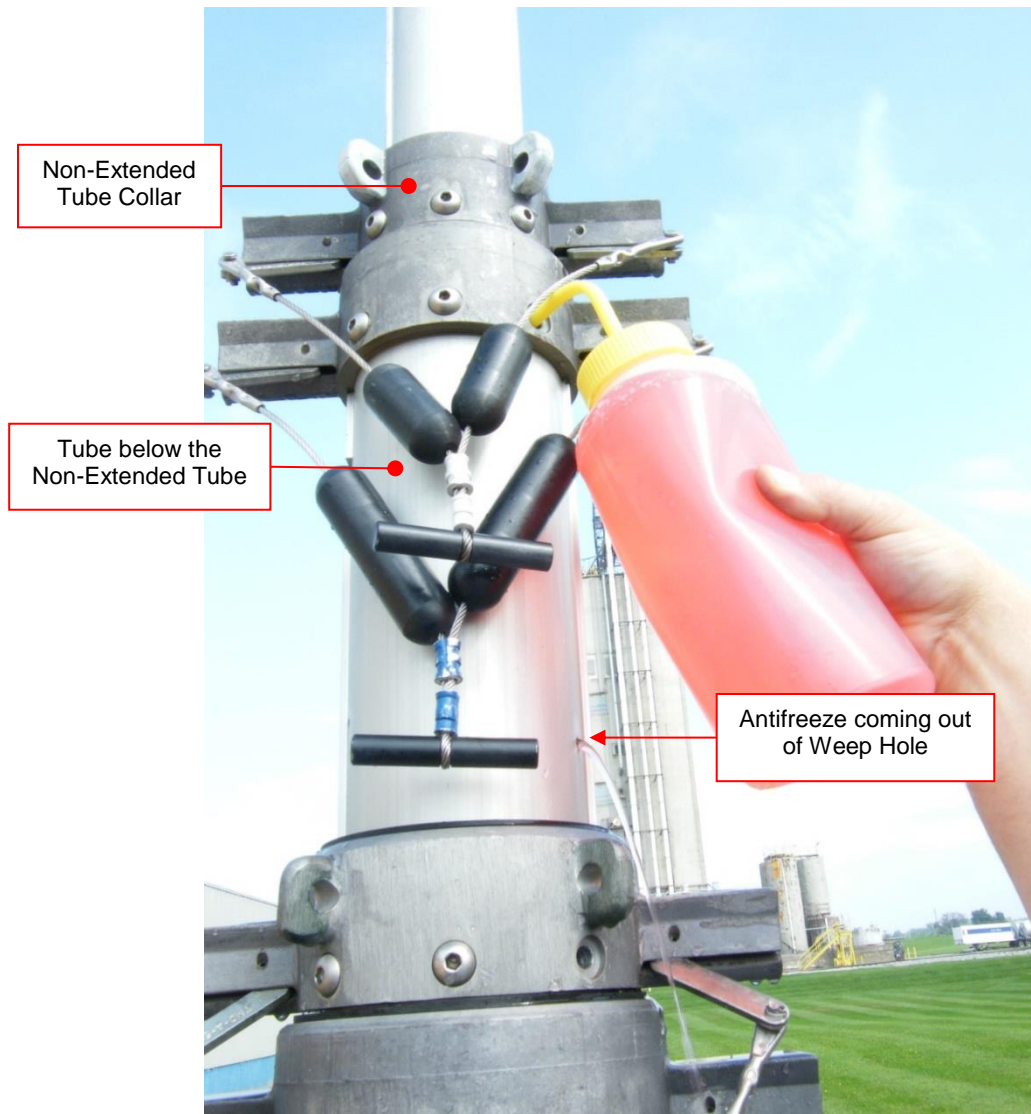


Figure 2-4 Antifreeze coming out of Weep Hole

7. Replace the collar bolt and lock washer removed in step 3.
8. Repeat steps 3 through 8 for any other tubes that are not fully extended.

2.1.3.2 Add to Lap of the Extended Tube(s)

9. Nest the mast.
10. Remove (1) collar bolt and lock washer (Figure 2-1) from the bottom mast section (base tube).
11. Retain the collar bolt and lock washer to reattach later.

12. Using the kit squirt bottle, add antifreeze (Figure 2-2) according to the tube diameter listed below:

<u>Tube Outside Diameter</u>	<u>Approximate Amount of Antifreeze to Add</u>
3 ¾" < Diameter < 6"	2 ounces
6 ¾" < Diameter < 11 ¼"	5 ounces

13. Place the collar bolt and lock washer removed back onto the collar.
14. Remove the collar bolt and lock washer from the next extended tube up and repeat steps 11 through 14 until all the extended tubes have been treated with antifreeze. There is no need to add antifreeze to the collar below the tube(s) that are not extended. These tubes were treated in steps 1 through 8.
15. Extend the mast to its original extended position.
16. If the mast is going to be left unattended for an extended period of time, open the drain cock(s).

2.1.4 Apply Flush Caution Label

The optional Will-Burt, non-toxic, Pneumatic Mast Antifreeze Kit (P/N: 4725801) contains a flush caution label (Figure 2-5). This label reminds the mast operators to flush the antifreeze out of the mast before adding lubricant.



Figure 2-5 Flush Caution Label (P/N: 4770001)

To apply the flush caution label to the mast, proceed as follows:

1. Using a rag and cleaning solution (if required), clean an area on the mast to adhere the mast.
2. Remove the backing off the back of the flush caution label.
3. Place the flush caution label onto the mast.
4. With a permanent marker, on "Date Applied" line, write in the date that the antifreeze was added.

2.1.5 Consider Winterizing the Air Inlet Assembly

You may want to winterize the air inlet assembly by doing the following:

- Place antifreeze into the air inlet valve
- As shown in Figure 2-6, remove the air inlet assembly (if nested or extended (locking mast) for long periods of time), then cover the area but still allow drainage.

NOTE

If raising the mast during freezing weather conditions, if moisture has collected and has frozen at the bottom of the mast, you may be able to use a screw driver to remove the frozen water at the air inlet.

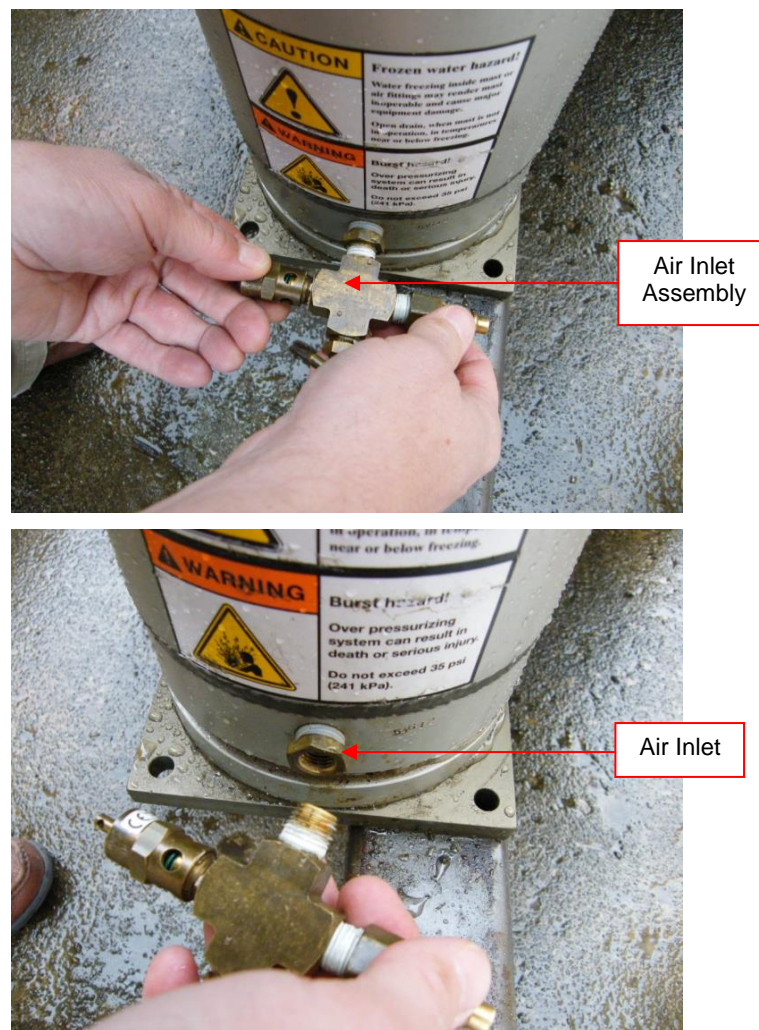


Figure 2-6 Removing the Air Inlet Assembly

2.2 Preparing for Warm Weather Conditions

⚠ WARNING

Before preparing the mast for warm weather conditions and lubricating the mast, the antifreeze in the mast must be flushed out of the mast. If the mast is not flushed before lubricating, the performance of the mast will be compromised.

Once the temperature is consistently above freezing, lubricant should be added to the mast. If the mast had antifreeze added during for freezing weather, the antifreeze must first be flushed from the mast before adding lubricant.

⚠ WARNING

When preparing the mast for warm weather conditions, proper eye protection must be worn and a sufficient clearance from adjacent structures, vehicles, and people must be maintained. Some of the steps in this procedure cause water, antifreeze, or lubricant to be squirted out the mast weep holes and onto adjacent areas. A drain kit is available for the base tube to route the base tube water out a drain hose. However, water can still be released from the weep holes and collars on the upper tubes.

2.2.1 Flushing the Mast

To flush the mast, water will be added to all the collars then the mast will be raised, flushing the antifreeze out of the mast. This process should be repeated until all the antifreeze has dissipated.

Proceed as follows to flush the mast:

1. If necessary, nest the mast.
2. Fully extend the mast (if a locking mast, raise from the top down) by applying air pressure to the mast. Be careful, if the mast has filled with water, the water will be forced out the collars or weep holes. If water comes out the collars or weep holes stop raising the mast, allow the water to be released, and then resume raising the mast. If water is not given time to be released, the mast may be over-pressured and the mast seals may be damaged.

3. Nest the mast and remove (1) collar bolt and lock washer from every collar (Figure 2-7). Retain the collar bolts and lock washers to reattach later.

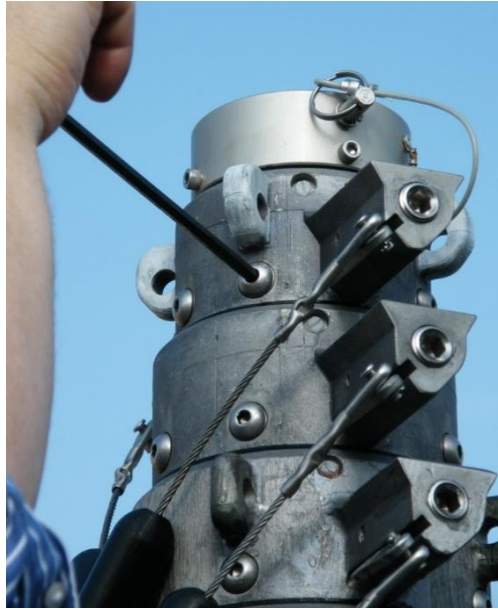


Figure 2-7 Remove One Collar Bolt from each Collar

4. Using the squeeze bottle, add 32 ounces of water to each collar (Figure 2-8).



Figure 2-8 Add 32 Ounces of Water to Each Collar

5. The mast is considered flushed when all of the antifreeze color (pink if Will-Burt antifreeze is used) is not visible in the water. Apply air pressure to fully extend the mast (if locking mast, raise from top down). Be careful, since the mast is filled with water, water will be released out the weep holes and collars (Figure 2-9). When water comes out the collars or weep holes, pause and wait until the water has been released. Do not apply too much air at one time because you could create a pressure buildup that could potentially blow out the tube seal. If possible, set the regulator air pressure to 10 psi for this operation.

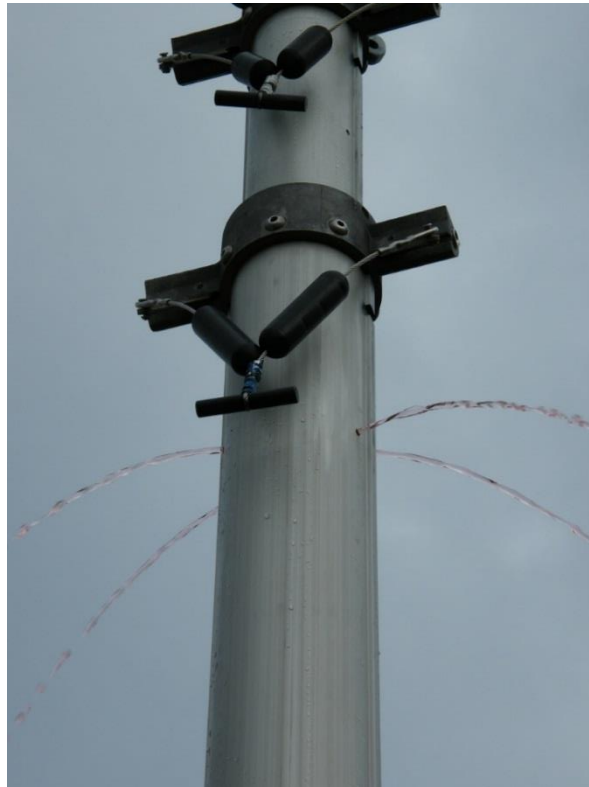


Figure 2-9 Water and Antifreeze Released out the Weep Holes

6. Nest the mast.
7. The mast is considered flushed when all of the antifreeze color (pink if Will-Burt antifreeze is used) is not visible in the water. If the antifreeze color is still present in the water as it came out the weep holes and collars, repeat step 5, 6, and 7. If the antifreeze color is not present, continue to step 8.
8. Re-install all the collar bolts and washers removed in step 4 and continue to step 9 and lubricate the mast.

2.2.2 Lubricate the Mast

Will-Burt pneumatic telescoping masts come from the factory pre-lubricated and require no scheduled maintenance under normal operating conditions. In extremely harsh environmental conditions, maintenance of the mast might be required. Signs that cleaning and lubrication are needed can be:

- A noticeable gritty film on the exterior surfaces of the mast sections
- Erratic extension or retraction of the mast
- Noisy operation of the mast
- Sticking of one or more mast sections when mast is extending or retracting

⚠ WARNING

Before preparing the mast for warm weather conditions and lubricating the mast, the antifreeze in the mast must be flushed out of the mast. If the mast is not flushed before lubricating, the performance of the mast will be compromised.

If necessary, lubricate the mast with Will-Burt Mast Lubricant (P/N: 900600) as follows:

9. Remove top load from the mast. This will allow the sections of a non-locking mast to more easily be extended from smallest to largest. On locking masts, the sequence of extension can be controlled by the locking collars.
10. When a regulator exists in the pneumatic system, reduce its pressure to between 5 and 10 PSIG.

NOTE: 10 PSIG should be sufficient pressure to extend all sections of the mast without a top load. If any section will not extend with 10 PSIG the mast may require overhaul. Consult the factory.

11. One person operating the air control valve should slowly pressurize the mast just enough to extend the top mast section. Another person may need to hold down the larger mast section collars to assure the proper sequence of extension. Close the air control valve as soon as the mast section is up.
12. Dampen a rag with a non-abrasive cleanser or solvent such as lacquer thinner to wipe down the extended mast section. Do not allow the cleaning fluid or solvent to run down inside the collar.
13. Repeat steps 11 and 12 for the next larger mast section.
14. Inject approximately ½ oz. of Mast Lubricant* or a lightweight machine oil into the weep hole (drain) of the exposed mast section. The weep holes are located between one and three feet below the collar on each tube except the top one.
15. Repeat steps 11, 12, and 14 for each of the remaining mast sections. The larger diameter sections should be injected with approximately 1 oz. of lubricant.

16. Lower the mast completely. Allow several minutes for the lubricant to settle and spread around the wear ring and seal at the bottom of each mast section.

⚠ WARNING

Pinch Point Hazard! Moving parts can crush and cut resulting in death or serious injury. Keep clear of moving parts while operating mast.

17. Extend the mast again (1) section at a time in the same sequence (smallest to largest). Wipe off any excess lubricant that flows out of the weep holes.

⚠ CAUTION

Do not lubricate the exterior of the mast. This will attract dust and contaminants from the air.

Section 3 Low Profile

This section covers weatherizing for low profile pneumatic masts. For information on weatherizing non-low profile pneumatic masts, see Section 2.

3.1 Preparing for Freezing Conditions

The steps in this section describe how to prepare the mast for freezing weather conditions.

In general, the procedure followed depends on the use of the mast during the freezing conditions:

- Always Nested: partially fill all laps with antifreeze
- Fully Extended on a Daily Basis: partially fill all laps with antifreeze

3.1.1 Always Nested Mast (Add to the Laps)

If a mast is expected to be nested for more than (1) day in temperatures below freezing, follow these steps:

1. Nest the mast ensuring the mast is depressurized.
2. Remove the fasteners holding the can lock wedges in place and remove the can lock wedges (Figure 3-1). Note orientation of wedges as they are not symmetrical (top to bottom). Retain the can lock wedges and fasteners to reattach later.

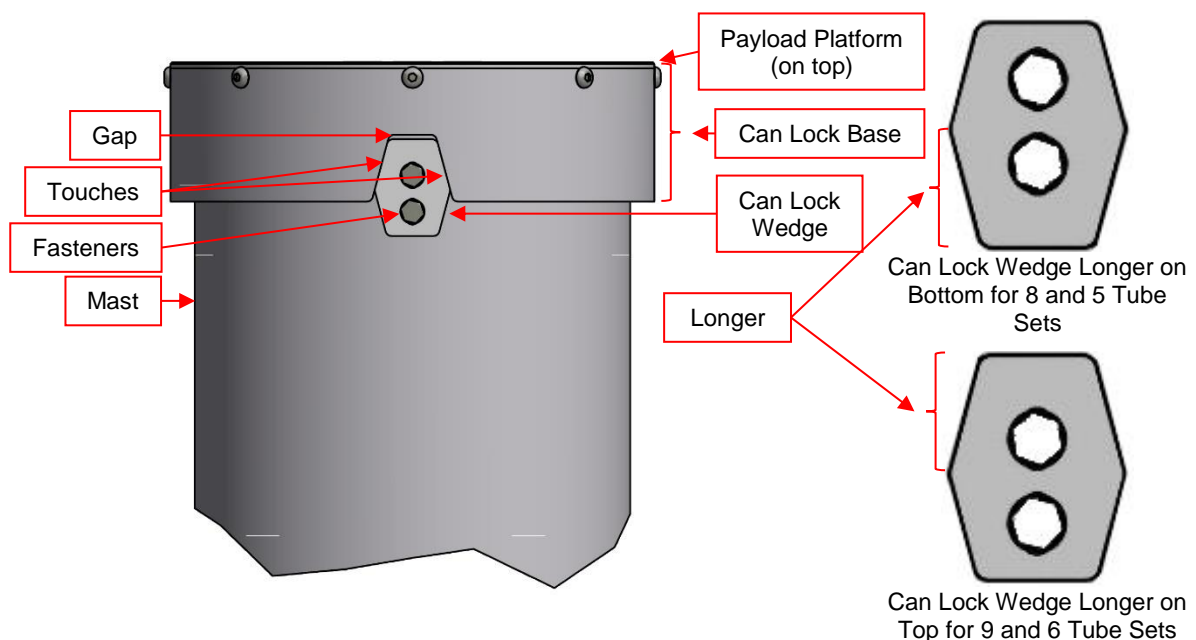


Figure 3-1 Can Lock Base and Can Lock Wedge

3. Remove the fasteners securing the can lock base to the payload platform and lower the can lock base. Retain the fasteners to reattach later.

- Using the kit squirt bottle, add antifreeze (Figure 2-2) into the top of the tubes according to the tube diameter listed below:

<u>Tube Outside Diameter</u>	<u>Approximate Amount of Antifreeze to Add</u>
3 ¾" < Diameter < 6"	2 ounces
6 ¾" < Diameter < 9"	5 ounces

- Reattach the can lock base to the payload platform. Use Loctite® 242/243 on the fasteners. Torque 62-70 in.-lb.
- Apply Loctite® 242/243 to the bolts and fasten the can lock wedges to the wedge spacer "finger tight". When attaching to the wedge spacer, ensure the can lock wedge orientation is correct (Figure 3-1).
- Slide the can lock wedges snug against the notch in the can lock base and tighten the fasteners. Torque 74-80 in.-lb. The wedges should touch each side of the notch in the can lock base (Figure 3-1). There will be a small gap between the top of the can lock wedge and the bottom of the notch in the can lock base.
- If the mast is going to be left unattended for an extended period of time, open the drain cock(s).

3.1.2 Mast that Cycles Fully Extended on a Daily Basis (Add to the Laps)

A mast that cycles daily can cause antifreeze to be released on a gradual basis. If a mast cycles daily in temperatures below freezing, follow these steps every (10) days:

- Nest the mast.
- Remove the fasteners holding the can lock wedges in place and remove the can lock wedges (Figure 3-1). Retain the can lock wedges and fasteners to reattach later.
- Remove the fasteners securing the can lock base to the payload platform and lower the can lock base. Retain the fasteners to reattach later.
- Using the kit squirt bottle, add antifreeze (Figure 2-2) into the top of the tubes according to the tube diameter listed below:

<u>Tube Outside Diameter</u>	<u>Approximate Amount of Antifreeze to Add</u>
3 ¾" < Diameter < 6"	2 ounces
6 ¾" < Diameter < 9"	5 ounces

- Reattach the can lock base to the payload platform. Use Loctite® 242/243 on the fasteners.
- Slide the can lock wedges up snugly against the can lock base. The can lock wedges should touch both sides. The top of the wedge will have a small gap.
- Secure the can lock wedges with the fasteners. Use Loctite® 242/243 on the fasteners.
- Every (10) days, go to step 1 and repeat this procedure to ensure that the antifreeze has not been washed out by rain.

3.1.3 Apply Flush Caution Label

The optional Will-Burt, non-toxic, Pneumatic Mast Antifreeze Kit (P/N: 4725801) contains a flush caution label (Figure 2-5). This label reminds the mast operators to flush the antifreeze out of the mast before adding lubricant.



Figure 3-2 Flush Caution Label (P/N: 4770001)

To apply the flush caution label to the mast, proceed as follows:

5. Using a rag and cleaning solution (if required), clean an area on the mast to adhere the mast.
6. Remove the backing off the back of the flush caution label.
7. Place the flush caution label onto the mast.
8. With a permanent marker, on "Date Applied" line, write in the date that the antifreeze was added.

3.1.4 Consider Winterizing the Air Inlet Assembly

You may want to winterize the air inlet assembly by doing the following:

- Place antifreeze into the air inlet valve
- As shown in Figure 2-6, remove the air inlet assembly (if nested or extended (locking mast) for long periods of time), then cover the area but still allow drainage.

NOTE

If raising the mast during freezing weather conditions, if moisture has collected and has frozen at the bottom of the mast, you may be able to use a screw driver to remove the frozen water at the air inlet.

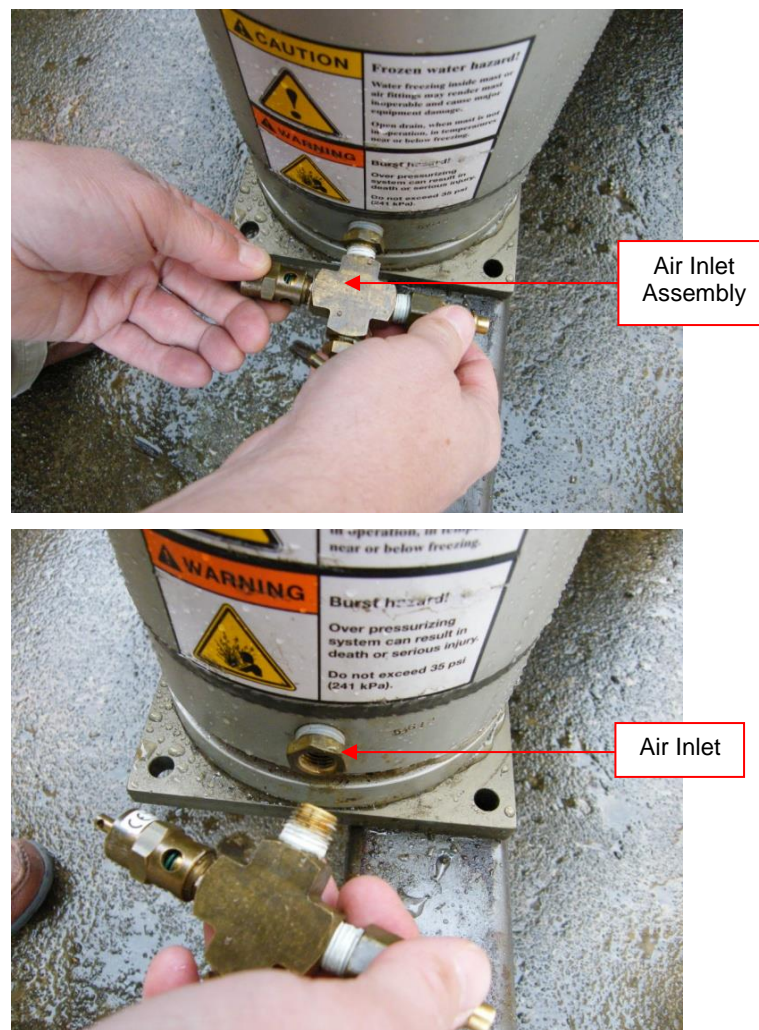


Figure 3-3 Removing the Air Inlet Assembly

3.2 Preparing for Warm Weather Conditions

⚠ WARNING

Before preparing the mast for warm weather conditions and lubricating the mast, the antifreeze in the mast must be flushed out of the mast. If the mast is not flushed before lubricating, the performance of the mast will be compromised.

Once the temperature is consistently above freezing, lubricant should be added to the mast. If the mast had antifreeze added during for freezing weather, the antifreeze must first be flushed from the mast before adding lubricant.

⚠ WARNING

When preparing the mast for warm weather conditions, proper eye protection must be worn and a sufficient clearance from adjacent structures, vehicles, and people must be maintained. Some of the steps in this procedure cause water, antifreeze, or lubricant to be squirted out the mast weep holes and onto adjacent areas. A drain kit is available for the base tube to route the base tube water out a drain hose. However, water can still be released from the weep holes and collars on the upper tubes.

3.2.1 Flush the Mast

To flush the mast, water will be added to all the collars then the mast will be raised, flushing the antifreeze out of the mast. This process should be repeated until all the antifreeze has dissipated.

Proceed as follows to flush the mast:

1. Nest the mast.
2. Fully extend the mast by applying air pressure to the mast. Be careful, if the mast has filled with water, the water will be forced out the collars or weep holes. If water comes out the collars or weep holes stop raising the mast, allow the water to be released, and then resume raising the mast. If water is not given time to be released, the mast may be over-pressured and the mast seals may be damaged.
3. Remove the fasteners holding the can lock wedges in place and remove the can lock wedges (Figure 3-1). Retain the can lock wedges and fasteners to reattach later.
4. Remove the fasteners securing the can lock base to the payload platform and lower the can lock base. Retain the fasteners to reattach later.
5. Using the squeeze bottle, add 32 ounces of water to each tube.
6. The mast is considered flushed when all of the antifreeze color (pink if Will-Burt antifreeze is used) is not visible in the water. Apply air pressure to fully extend the mast. Be careful, since the mast is filled with water, water will be released out the weep holes and collars. When water comes out the collars or weep holes, pause and wait until the water has been released. Do not apply too much air at one time because you could create a pressure buildup that could potentially blow out the tube seal. If possible, set the regulator air pressure to 10 psi for this operation.

7. Nest the mast.
8. The mast is considered flushed when all of the antifreeze color (pink if Will-Burt antifreeze is used) is not visible in the water. If the antifreeze color is still present in the water as it came out the weep holes and collars, repeat step 5, 6, and 7. If the antifreeze color is not present, continue to step 8.
9. Reattach the can lock base to the payload platform. Use Loctite® 242/243 on the fasteners.
10. Slide the can lock wedges up snugly against the can lock base. The can lock wedges should touch both sides. The top of the wedge will have a small gap.
11. Secure the can lock wedges with the fasteners. Use Loctite® 242/243 on the fasteners.