



BX-308

BAM-1020 SERVICE TOOL KIT MANUAL



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Overview:

This document describes the use of the tools and supplies included in the BX-308 Service Tool Kits for the Met One Instruments BAM-1020. These tools are provided for repairs and maintenance in the field or at a test bench. Basic BAM-1020 service and repairs may be performed by almost any technician. More complicated repairs should be performed by factory trained servicing distributors only. Certain items such as the beta source/detector system are only to be serviced by Met One technicians. In addition to this kit, the BX-344 Inlet Cleaning Kit is also highly recommended.

Technical Support:

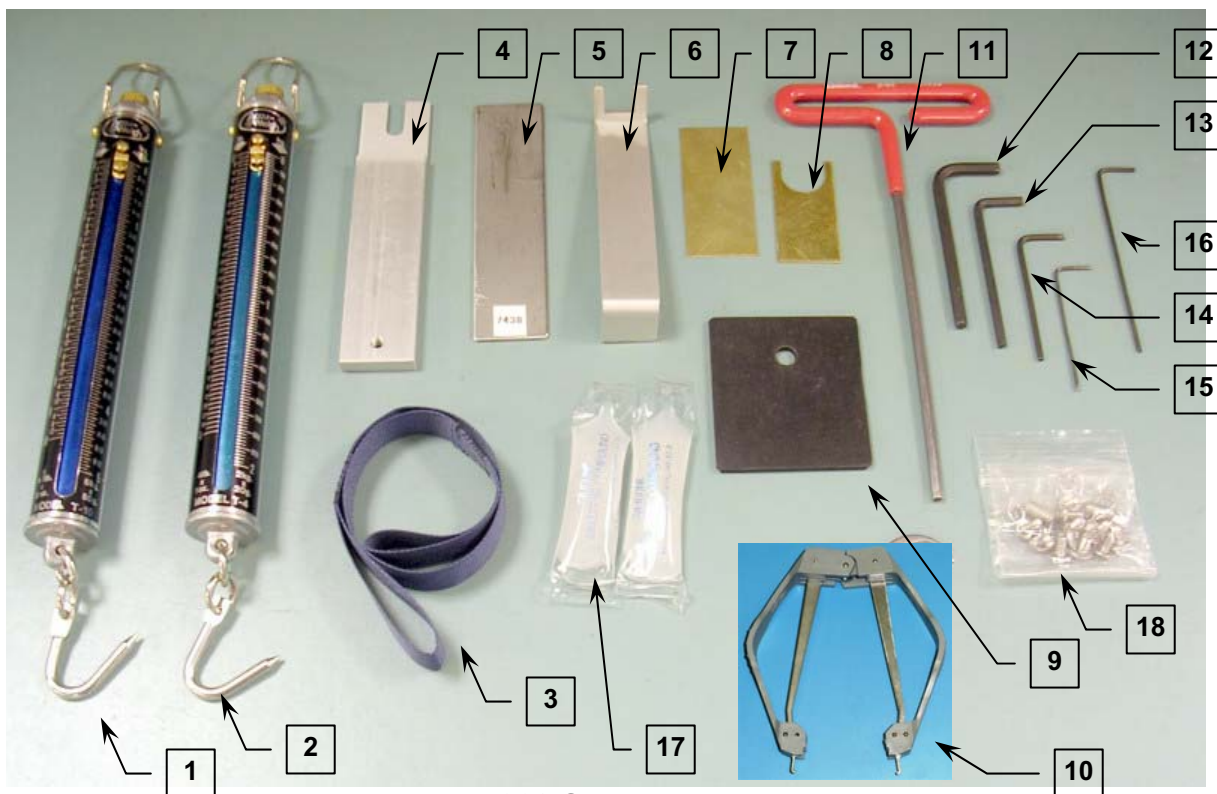
Should you still require support after consulting your printed documentation, we encourage you to contact one of our expert Technical Service representatives during normal business hours of 7:00 a.m. to 4:00 p.m. Pacific Standard Time, Monday through Friday. In addition, technical information and service bulletins are often posted on our website. Please contact us and obtain a Return Authorization (RA) number before sending any equipment back to the factory. This allows us to track and schedule service work and expedite customer service.

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BX-308 Items:

The following tools and supplied are included in the BX-308 Service Tool Kit. **Note:** The two spring scales are only included in the BX-308-1 version of the kit, for servicing distributors.

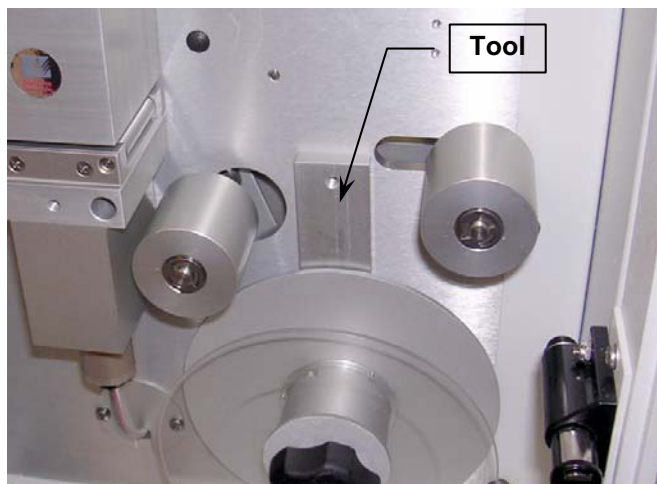


BX-308 Service Tools

Item	Part No.	Description	Function
1	935055	5 kg Spring Scale	Used to set the spring load of the filter tape pinch rollers assembly. Performed by servicing distributors only.
2	935052	2 kg Spring Scale	Used to set the spring load of the two filter tape tensioners. Performed by servicing distributors only.
3	9246	Cloth Band	Used to set spring load of the filter tape tensioners with item 2.
4	7437	Reel Spacer Tool	Used to set the spacing of tape reels from the transport plate.
5	7438	Dark Test Shim	Used to block the beta particles during dark count tests, and to check the spacing between the beta source and the filter tape.
6	9627	Pisco Fitting Removal Tool	Used to remove or replace the filter RH and filter temperature sensors located behind the nozzle block.
7	8235	Vane Shim	Used to set nozzle spring tension during nozzle reassembly.
8	8236	Collar Shim	Used to set nozzle spring tension during nozzle reassembly.
9	7440	Rubber Leak Test Seal	Used to isolate flow leaks above or below the filter tape nozzle interface for advanced troubleshooting.
10	993050	Chip Extractor	Used to remove socketed EEPROMS and processor chips.
11	993014	9/64" T-Handle Hex Wrench	Used to remove the upper nozzle adapter for nozzle o-ring replacement or nozzle removal.
12	993005	5/32" Hex Wrench	Used for outdoor cross-arm met sensor fittings.
13	993006	1/8" Hex Wrench	Used for the two inlet tube receiver set screws on top of the BAM-1020 unit.
14	993000	5/64" Hex Wrench	Used for nozzle removal and tape reel adjustment.
15	993001	.050" Hex Wrench	Used for tape roller disassembly and endplay adjustments.
16	993013	1.5mm Hex Wrench	Used for shuttle ball slide and PMT adjustments. Performed by factory-trained servicing distributors only.
17	995712	Silicone O-Ring Grease, 5g	General lubricant for the inlet tube, PM ₁₀ inlet, cyclone, and nozzle O-rings.
18	601485 602260	Replacement Case Screws	Replacement 6-32 truss-head BAM screws and #6 internal tooth washers for the main BAM-1020 case cover.

Tape Reel Adjustment:

The reel adjustment tool is used to set or check the spacing between the tape reels and the chassis plate. If the reels slip out of adjustment, the tape may not track accurately and measurement errors can be introduced. The slotted end of the tool should slip around the motor shaft, and just fit behind the back of the reel hub as shown.

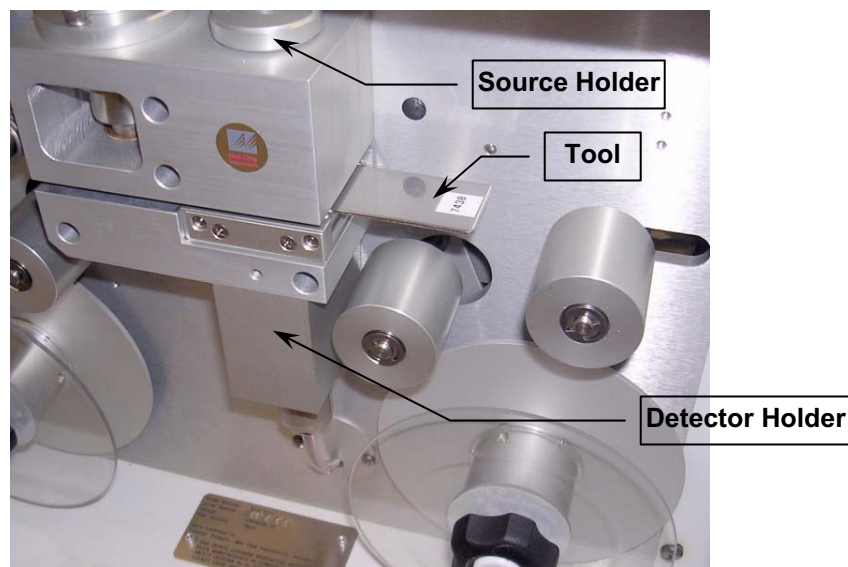


Reel Adjustment

Dark Count Test:

The Dark Test Shim is used to block the beta particles from entering the detector during a dark count test. See Section 7.9 of the BAM-1020 manual. Insert the shim as shown between the beta source and the detector, with or without filter tape installed. With the shim in place, there should be less than 50 counts registered by the detector during the four-minute test in the TEST > COUNT menu. If the count is too high, contact the Service department.

The shim can also be used to verify the spacing between the bottom of the beta source and the top of the two rollers at the top of the detector. This only applies to “close geometry” units (all BAM-1020 units built after March, 2007). Without the filter tape in place, the shim should just fit between as shown. Older units had more space. If the space is not correct or the beta source holder is found to be loose, contact the Service department immediately. Never attempt to remove or access the beta source.



Dark Test Shim Tool

Filter RH and Temperature Sensor Removal:

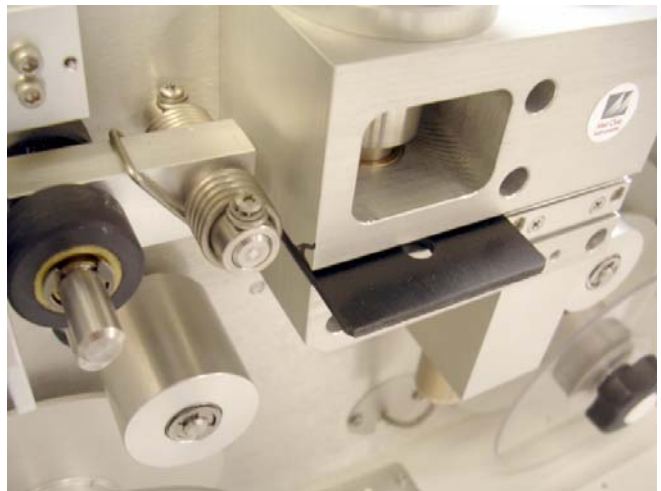
The Pisco Fitting Removal Tool is used to remove the trumpet-valve-shaped, 3-port manifold from the compression fitting in the back of the nozzle block. This manifold contains the filter RH and filter temperature sensors which are used for inlet heater and sample RH control. The sensors may need to be removed for replacement or testing purposes. The BAM-1020 case cover must be removed to access the fitting. Slide the forked end of the end of the tool around the end of the manifold where it enters the compression fitting. Push the tool to depress the ring on the end of the compression fitting while pulling the manifold out with your other hand.



Pisco Fitting Removal Tool (Fitting is inside BAM)

Rubber Leak Test seal:

The leak test seal is used to isolate a flow leak above or below the filter tape nozzle interface. See Section 5 of the BAM-1020 manual. If a leak cannot be resolved by the normal process described in the manual, then the seal method can be used. Remove the filter tape from the nozzle block. The nozzle can be forced up/down in the TEST > PUMP menu on the BAM. The hole in the seal can be placed under the nozzle to allow pump flow to occur without any leakage at the nozzle. The end of the seal without a hole can be placed below the nozzle to isolate a leak downstream of the nozzle. See Section 5.3 to 5.5 of the BAM manual. If the unit still shows a leak in the TEST > PUMP screen with the seal in place and a clean nozzle and vane, then there could be a leak inside the BAM, or the zero reading of the flow sensor could be out of spec. See Section 7.5 of the BAM manual.



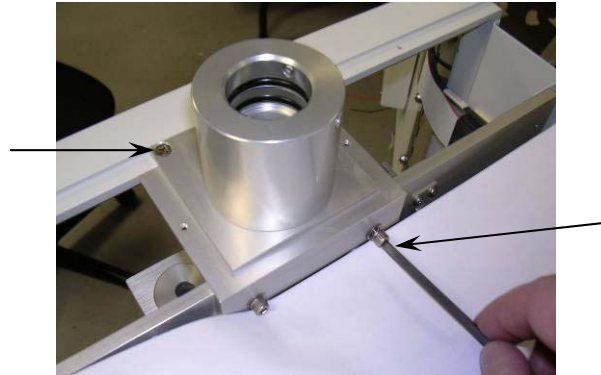
Leak Test Seal Use

Nozzle Removal and O-Ring Replacement:

The nozzle o-ring will need to be replaced about every two or three years of continuous operation, especially if the nozzle up/down motion feels gummy or sticky. The two brass shims are not required for o-ring replacement or lubrication. However, if the nozzle is removed from the unit for cleaning or replacement, then the two brass shims are required for setting the nozzle spring tension and collar spacing during reassembly.

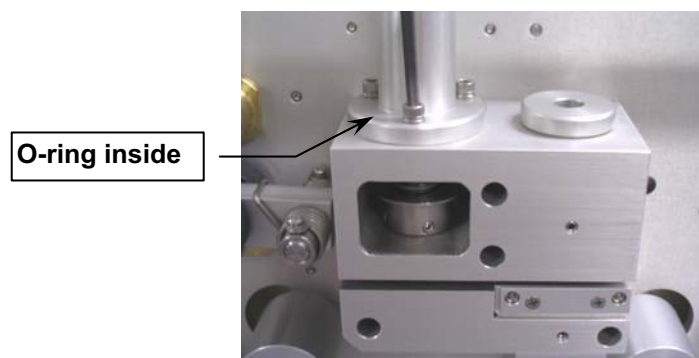
1. Remove the main BAM case cover. Remove the filter tape from the unit and set it aside.

2. If the nozzle is in the up position. It will need to be lowered for the rest of the process. Press the MOVE NOZZLE key in the TEST > PUMP screen to change the position of the nozzle.
3. Remove the two screws/nuts from the front of the inlet receiver mounting plate, and the two hex screws from the back of the plate. Remove the inlet assembly from the BAM and set it aside.



Inlet receiver disassembly

4. Remove the three hex screws from the flange of the nozzle adapter with the 9/64" T-handle hex wrench. Pull the adapter up to remove it from the nozzle, and set it aside.



Removing the nozzle adapter

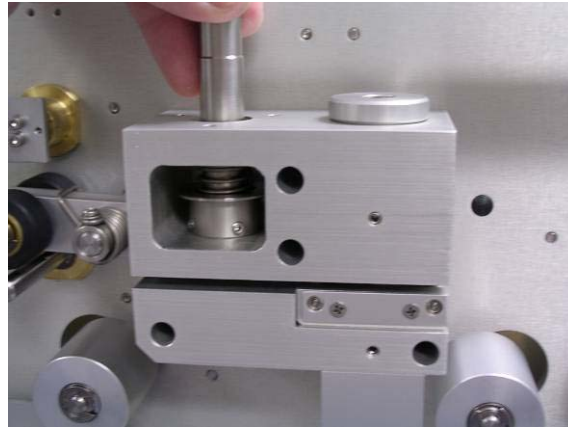
5. Turn over the nozzle adapter assembly and remove the o-ring. Thoroughly clean the o-ring groove. The o-ring part number is 720066. Install the new o-ring in the nozzle adapter, and lubricate it with silicone o-ring grease.



Replacing the nozzle o-ring

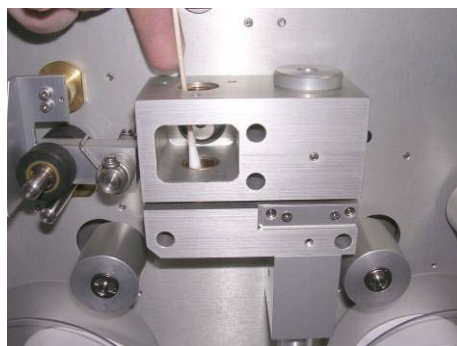
6. If the nozzle needs to be removed for cleaning or replacement, rotate it to access the two 5/64" hex head set screws in the spring collar. Loosen the two screws and the nozzle should be free to slide up out of its bushings. Thoroughly clean and inspect the

nozzle inside and out. Some slight wear on the finish of the nozzle is normal due to the sliding action against the bushings, but there should not be any roughness on the outside. Inspect the end of the nozzle where it contacts the filter tape. The edges must be crisp and clean with no nicks, burrs, or damage, otherwise the nozzle will leak. If damage or excessive wear is observed, the nozzle will need to be replaced. The Met One part number is 8009.



Removing the nozzle

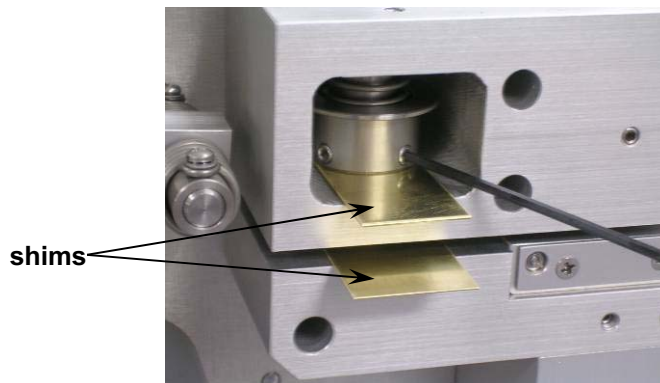
7. Carefully remove the spring, collar, and washer from unit by sliding it forward out of the hole in the aluminum block. The spring is under tension, so remove it carefully. Clean the parts and set them aside.
8. Use a cotton tipped applicator and alcohol to clean the two brass bushings that the nozzle travels in. **Do not use grease or graphite to lubricate these two bushings or the nozzle!** The bushings are oil-impregnated and are intended to operate dry. They must be perfectly clean and undamaged.



Cleaning the bushings

9. Now is a great time to thoroughly clean the cross-hair vane that supports the bottom of the filter tape during sampling. Inspect the vane through the nozzle bore with a flashlight, and clean it with alcohol and a cotton-tipped applicator. The vane must be perfect, with no bent elements or burrs. Contact Service if the vane is damaged.
10. Reinstall the spring and spring collar into the unit. Make sure the aluminum washer is positioned above the spring, and line the parts up with the bore of the brass bushings. The spring part number is 2998. Slide the nozzle down through the bushings and spring parts. It may be necessary to slightly adjust the position of the spring parts to allow the nozzle to slide all the way down.

11. Place the rectangular brass shim under the nozzle. Place the slotted shim around the nozzle body directly under the collar, so that it separates the bottom of the collar from the bottom brass bushing. With the nozzle pressed down firmly, tighten the two set screws in the spring housing.



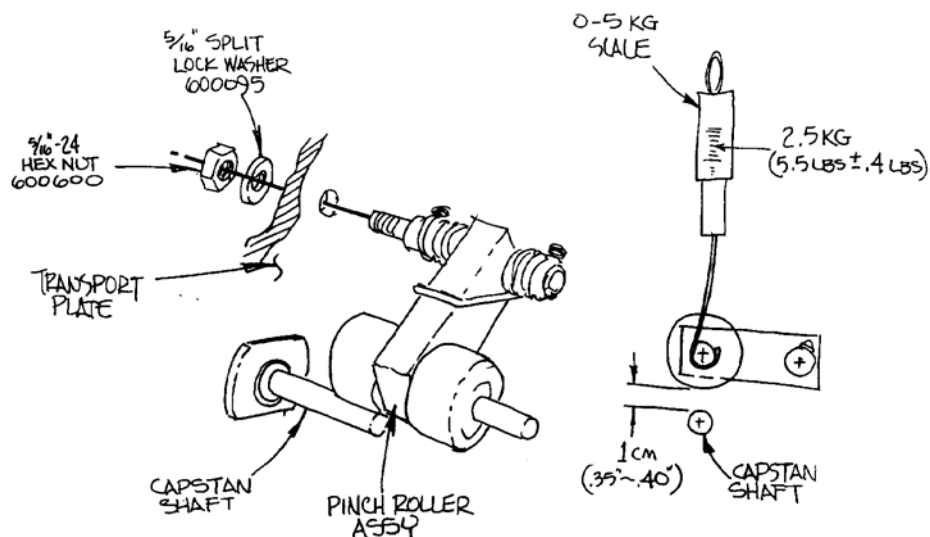
Adjusting the spring tension and nozzle

12. Remove the two shims, then raise and lower the nozzle with your fingers several times. Verify that the nozzle up/down action and rotation feels smooth, and that the nozzle face seats firmly against the vane.
13. Reinstall the nozzle adapter assembly over the top of the nozzle. Install the three hex screws, then make sure the nozzle still raises and lowers smoothly. If there is any resistance or binding, adjust the three screws and try the nozzle again.
14. Clean the inside of the inlet receiver assembly, especially the funnel. Reinstall it onto the unit with the four screws. Clean and re-lubricate the two large o-rings.
15. After the nozzle and all related parts are reinstalled, make sure the nozzle still moves up and down smoothly and easily. The nozzle must seat firmly down against the crosshair vane under its own spring tension.
16. Reinstall the filter tape and perform a normal leak check.

Pinch Roller Tension Setting:

The spring tension between the black rubber pinch rollers and the capstan shaft must be correct for accurate filter tape movement. This tension is very unlikely to change unless the pinch rollers are replaced. This is only done by factory-trained technicians. The spring scale is only included in the BX-308-1 kit for servicing distributors. Normal customers will probably never need to do this test.

Use the 5 kg spring scale to lift up on the shaft on the front of the pinch roller assembly. The tension must read $2.5 \text{ kg} \pm .25 \text{ kg}$ with 1 cm of space between the rollers and the capstan shaft as shown below. The pinch roller tension can only be adjusted by loosening the nut on the back of the transport plate and repositioning the entire assembly.



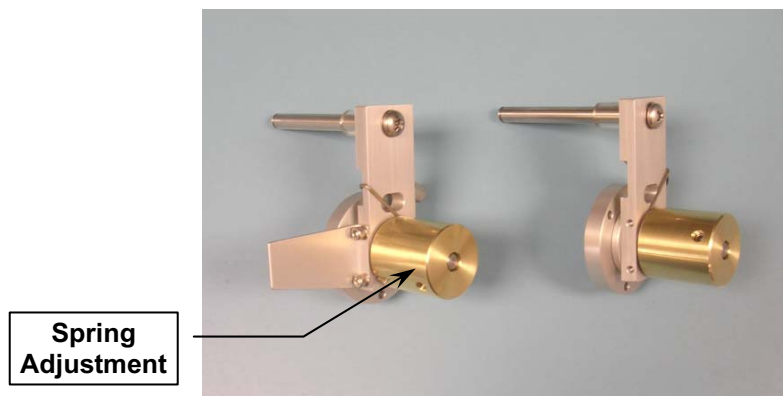
Adjusting the Pinch Rollers

Tape Tensioner Spring Adjustment:

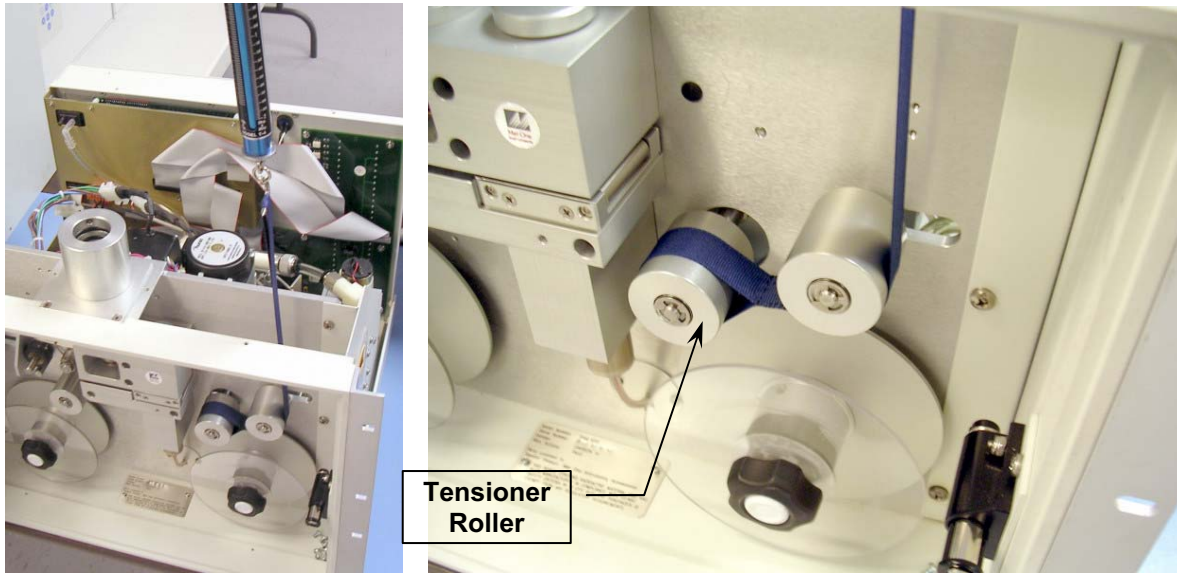
The two spring-loaded tensioners keep the filter tape at the correct tension during operation. The spring load can be checked with the 2 kg spring scale. This load is very unlikely to change unless the tensioners are replaced. This is only done by factory-trained technicians. The spring scale is only included in the BX-308-1 kit for servicing distributors. Normal customers will not need to do this test.

Loop the cloth band around the tensioner roller. Route the band past the shuttle roller and up to the spring scale as shown. With the tensioner centered in its travel, the tension should measure between 225 and 250 grams. The tension is adjusted by loosening the brass spring cap on the back of the tensioner assembly, and rotating the cap to tighten or loosen the spring. The brass cap must be tightened very securely!

Repeat the process for the left side tensioner assembly.



Tape Tensioners (back side)



Tensioner Spring Load Measurement

End Of Procedure.