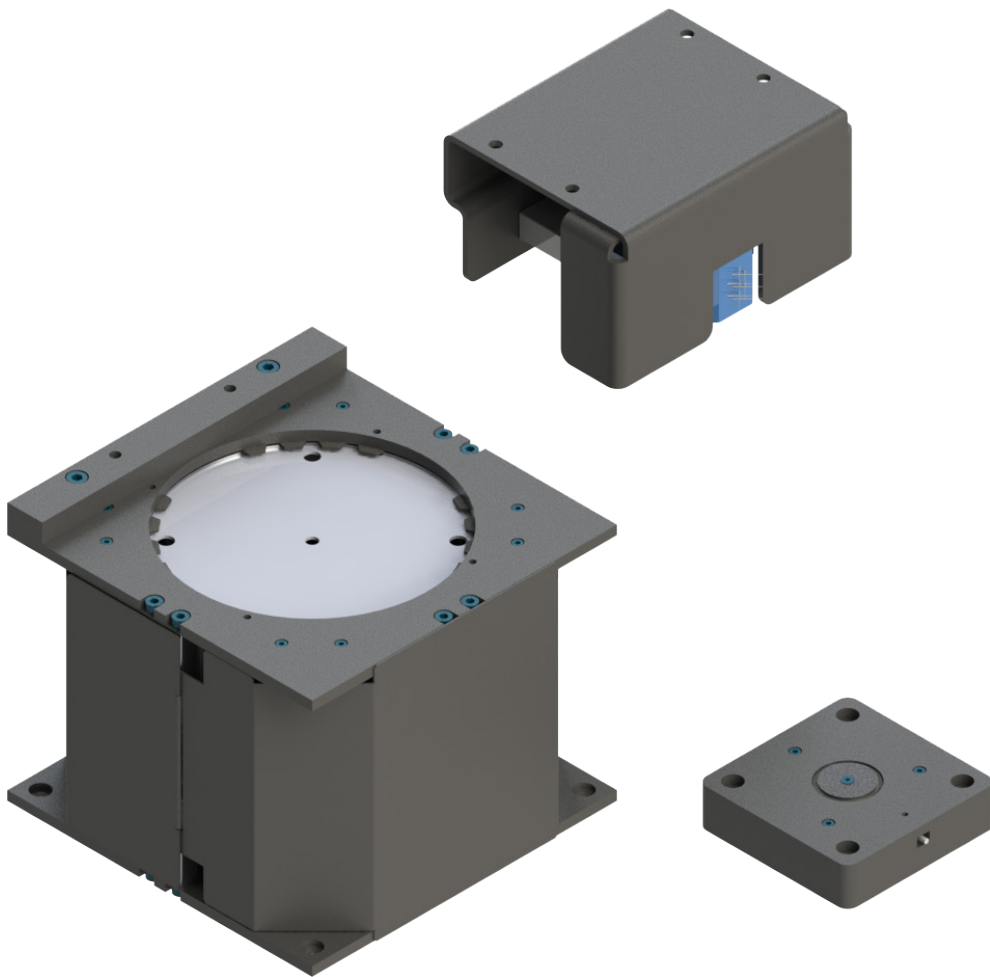




AOV Media Changer System

Product Manual



Document #: 9610-50-1046

Engineered Products for Robotic Productivity

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Table of Contents

1. Product Overview	3
1.1 Media Feeder	3
1.2 Media Remover	4
1.3 Media Checker	4
2. Installation of Components	5
2.1 Media Feeder Installation	6
2.2 Media Remover Installation	7
2.3 Media Checker Installation	8
2.4 Pneumatics	9
2.5 Electrical Connections	9
2.5.1 PNP Type Sensor	9
2.5.2 NPN Type Sensor	9
3. Operation	10
3.1 Recommended Sequence of Operations for AMC	11
3.1.1 Recommendations	11
3.1.2 Fetch Media	11
3.1.3 Check Media	15
3.1.4 Sand	17
3.1.5 Remove Media	17
3.2 Normal Operation	19
4. Troubleshooting and Service Procedures	20
4.1 Troubleshooting	20
4.2 Service Intervals	21
4.3 Service Procedures	22
4.3.1 Replacement of Retaining Gasket, Constant Force Springs, and Media Support Glides in Media Feeder	22
4.3.2 Replacement of Hook Disc on Media Checker	27
4.3.3 Replacement of Needles in Media Remover	27
5. Serviceable Parts	28

1. Product Overview

The AOV Media Changer (AMC) is an accessory to the AOV tools. The AMC works with standard industrial sanding disc and allow for adaptation to changing assembly lines and part requirements.

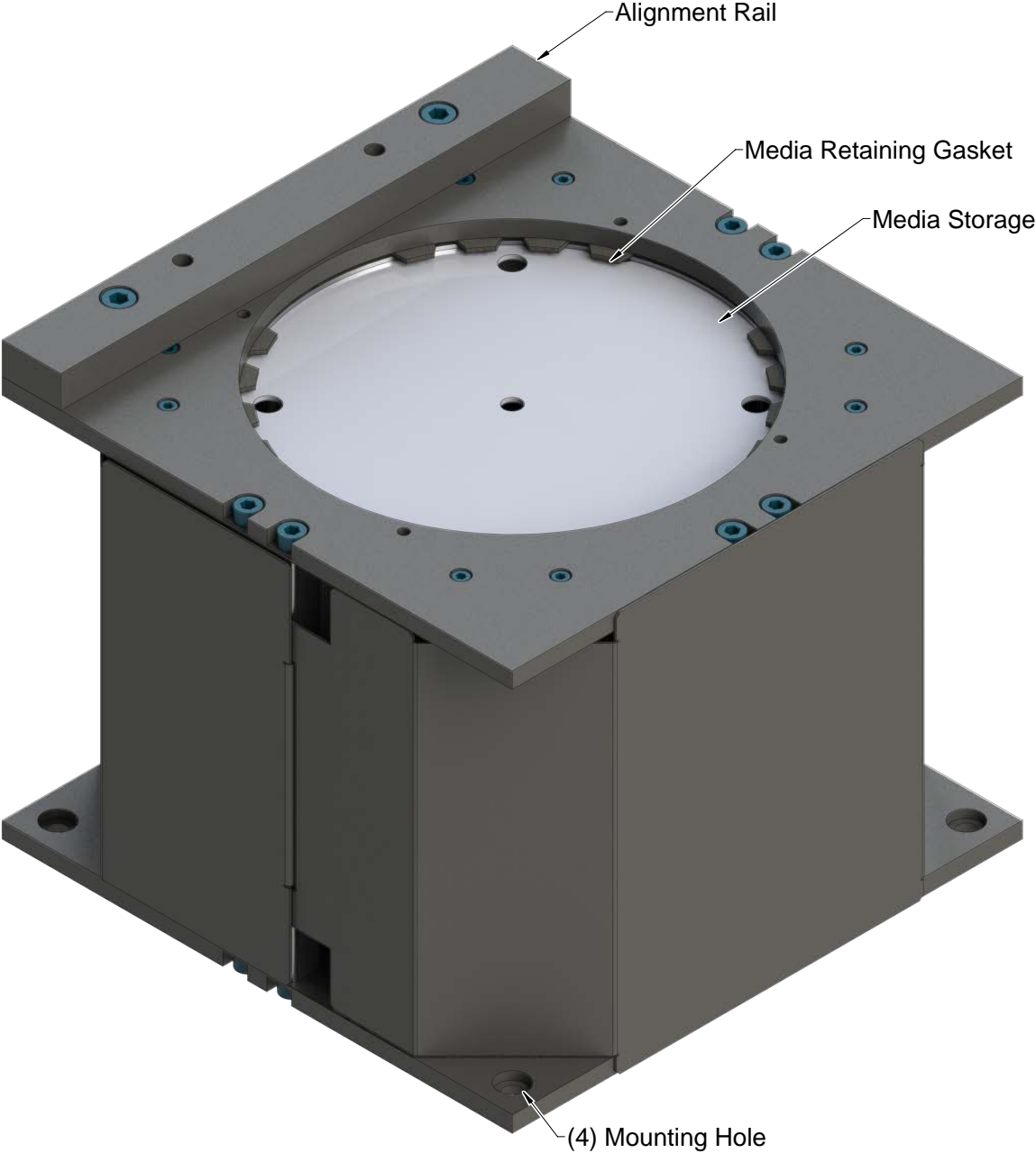
The AMC system allows the checking and changing of media without human interaction, once a program is in place.

For drawings and further details, refer to https://www.ati-ia.com/Products/deburr/deburring_home.aspx.

1.1 Media Feeder

The media feeder provides a storage location and dispenser for 5 inch or 6 inch sanding discs.

Figure 1.1—Media Feeder (6” Version Shown)



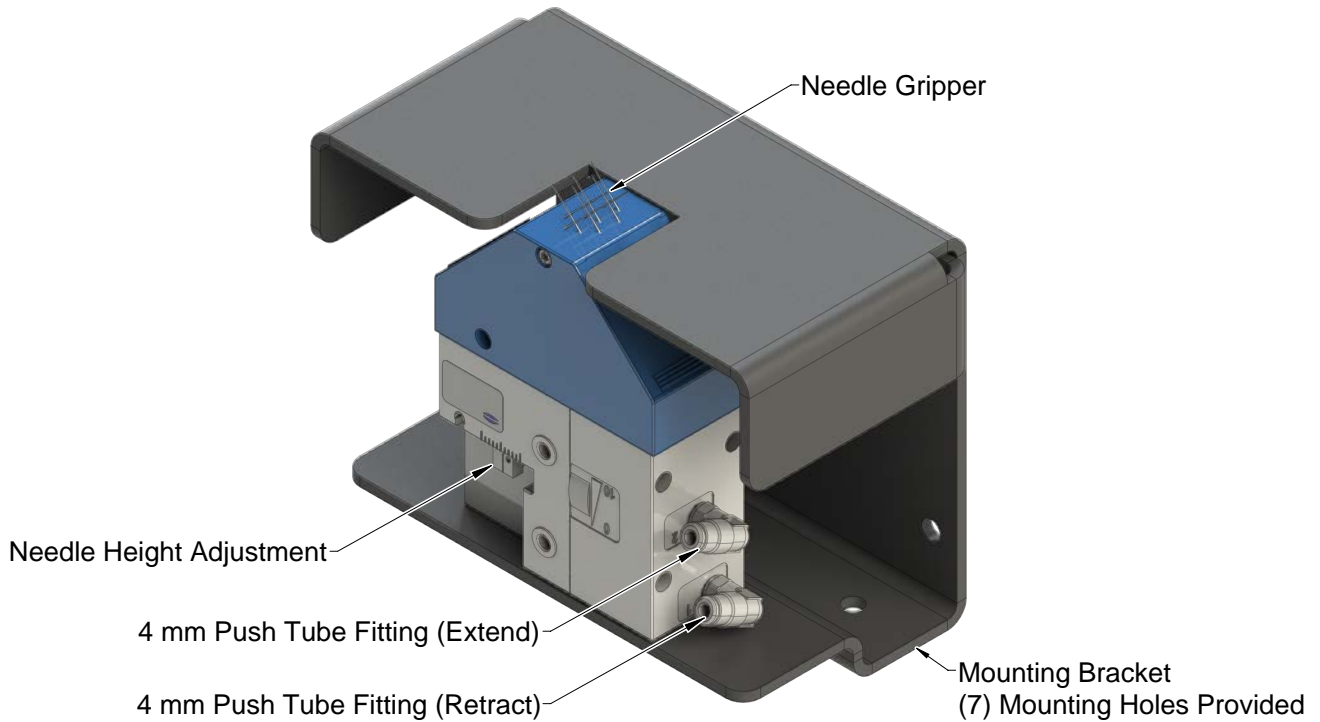
1.2 Media Remover



CAUTION: Needles can pinch or puncture clothing and skin avoid contact during setup, service, and operation of needle grippers causing injury to personnel and damage to equipment.

The media remover uses pneumatically actuated needles to remove media from AOV.

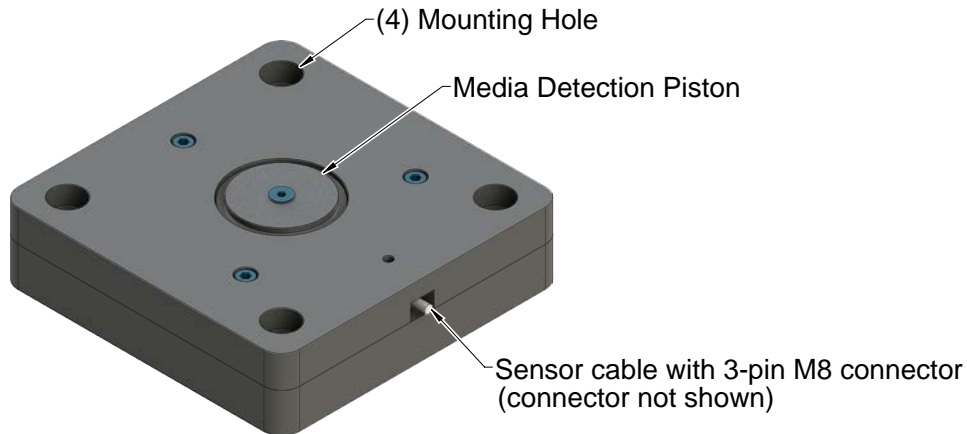
Figure 1.2—Media Remover (Not a Recommended Mounting Orientation)



1.3 Media Checker

The media checker detects the presence or absence of sanding media.

Figure 1.3—Media Checker



2. Installation of Components

Required Equipment:

The items listed in this section are the minimum requirements to operate the AMC.

1. (2) 4 mm air lines in for media remover. Each air line will supply air to the Media Remover and operate the needle drive mechanism.
 - One line is for needle extension.
 - One line is for needle retracting.
 - The lines will need to purge when switching over from extend to retract or vice versa. See following section for recommended equipment.
2. (1) 3-pin M8 connector for media detection. This cable will be used to connect the Media Checker to I/O on the robot.

Recommended Optional Equipment:

The items listed in the following section are only recommended equipment that can help refine the media change out process. These are not necessary to operate the AMC.

1. (2) Programmable regulator
 - One will be used to adjust the compliance pressure during the operation. Not necessary, but it makes fetching new media a little easier.
 - The other will be used in conjunction with a solenoid valve to control the needle gripper.
2. (1) 4 or 5 position solenoid valve
 - This solenoid is used to switch and purge the air between the extend and retract air ports in the Media Remover.

2.1 Media Feeder Installation

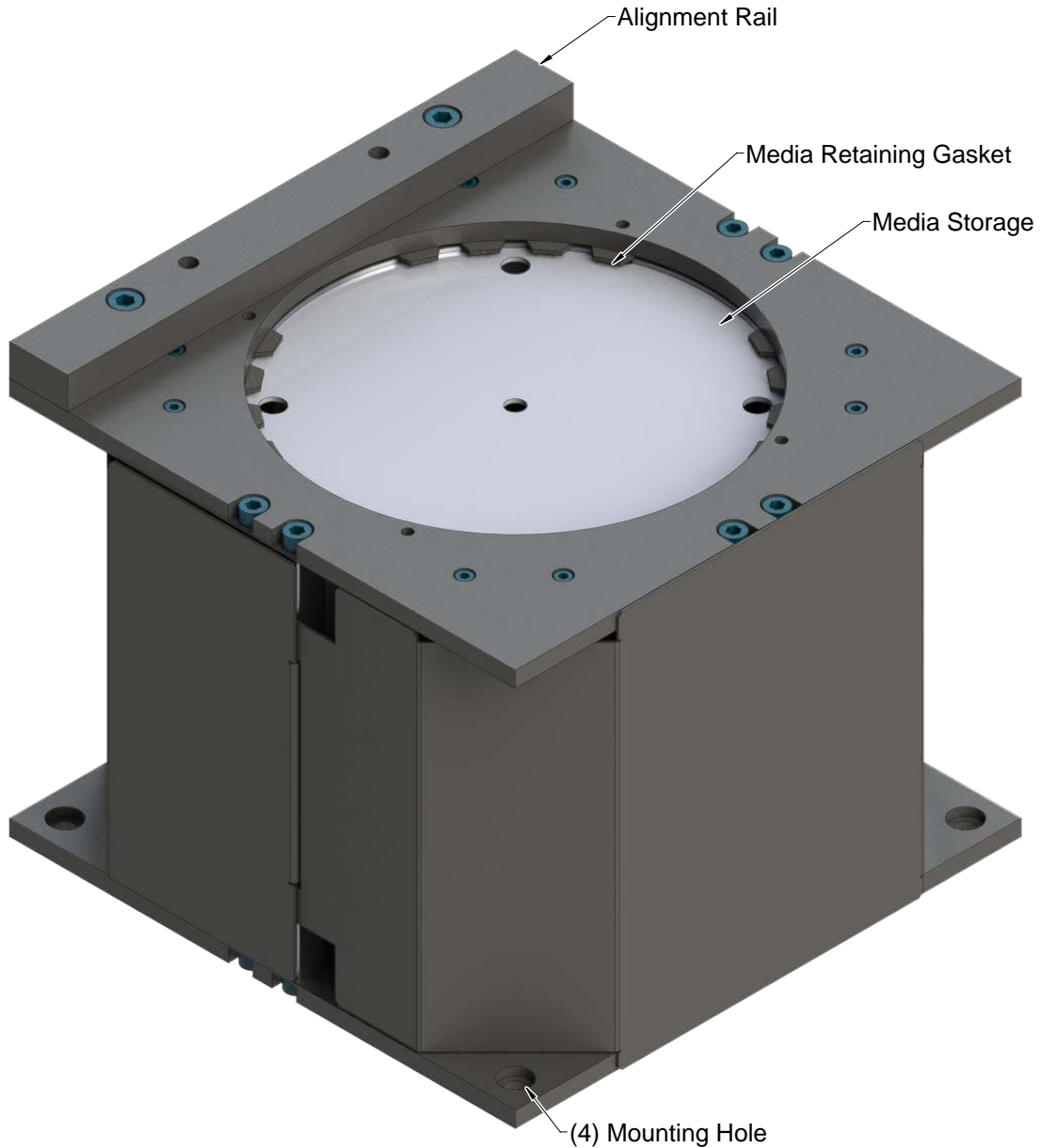
The media feeder can be installed at any an angle and in any orientation that allows the AOV sanding pad to contact the media in the feeder completely. To install the media feeder, complete the following procedure:

Tools required: Hex keys

Supplies required: (4) Customer supplied socket head cap screws

1. Mount the media feeder to a rigid surface using the (4) mounting holes in the bottom plate with customer supplied socket head cap screws.
2. Load the feeder by inserting small stacks (15-25 discs) of media into the storage opening with the hook and loop side facing outward.

Figure 2.1—Media Feeder



2.2 Media Remover Installation

The media remover can be installed at any an angle and in any orientation that allow the media to fall away from the media remover. *Figure 2.2* is shown only for information purpose and is not a recommended mounting orientation. Customer supplied waste receptacle is advised for removed media. The media remover can be installed by performing the following procedure:



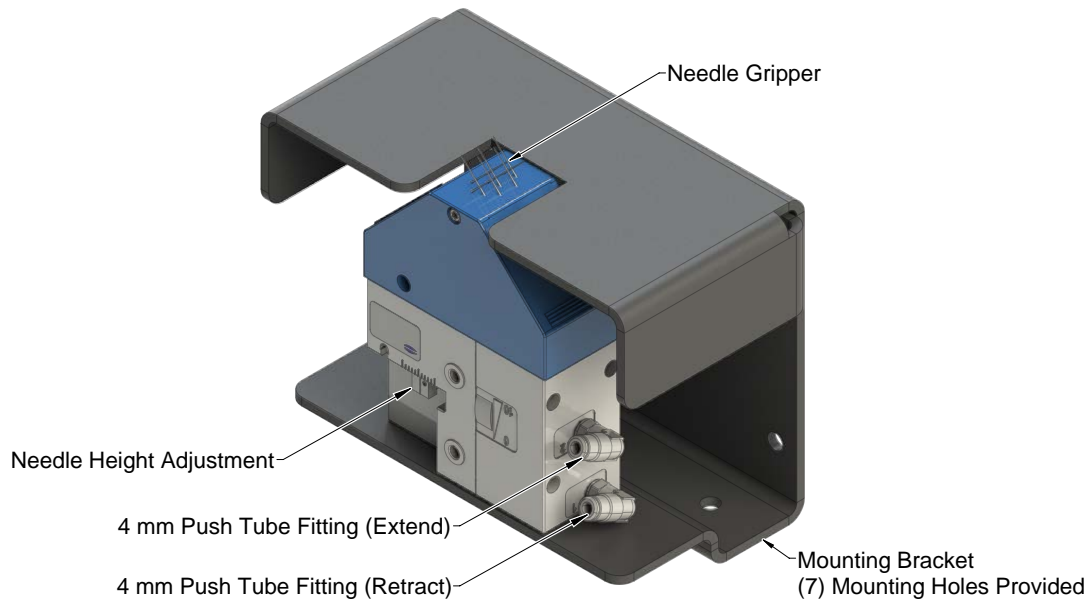
CAUTION: Needles can pinch or puncture clothing and skin avoid contact during setup, service, and operation of needle grippers causing injury to personnel and damage to equipment.

Tools required: Hex keys

Supplies required: (3 or 4) Customer supplied fasteners

1. Mount the media remover to a rigid surface using either of the mounting patterns on the bracket with customer supplied fasteners.
2. Connect air supply to the (2) push tube fittings.

Figure 2.2—Media Remover (Not a Recommended Mounting Orientation)



2.3 Media Checker Installation

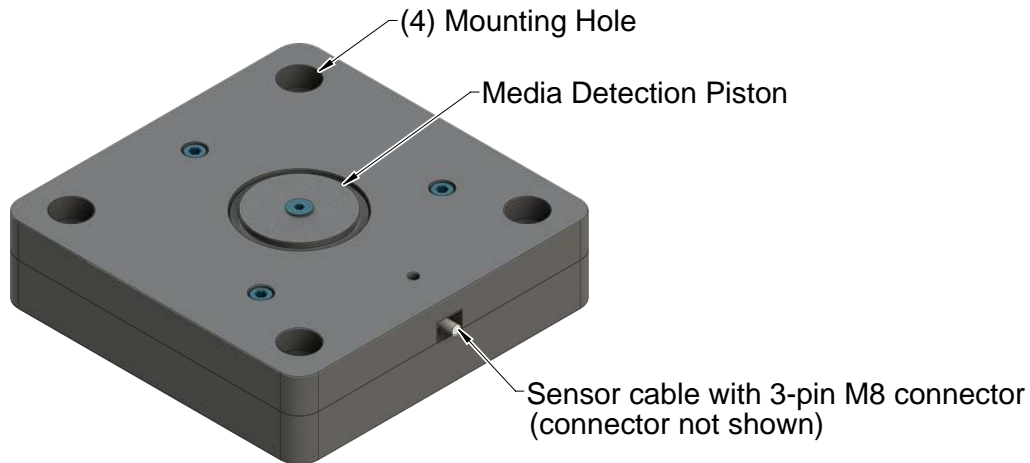
The media checker can be installed at any an angle and in any orientation that allow the sanding pad of the AOV to contact the piston in the checker completely. The media checker can be installed by performing the following procedure:

Tools required: Hex keys

Supplies required: (4) Customer supplied socket head cap screws

1. Mount the media checker to a rigid surface using the (4) mounting holes with customer supplied socket head cap screws. Tighten hand tight.
2. Attach the 3-pin M8 connector on the sensor cable to the customer supplied connection.

Figure 2.3—Media Checker



2.4 Pneumatics

The air supply should be dry, filtered, and free of oil. A coalescing filter (ATI Part # 9005-50-6160 or equivalent) with elements rated for 5 micron or better is required.

Customer supplied solenoid valves are actuated from the robot or program logic controller by means of a digital output signal. The extend/retract for the media remover must supply a regulated air supply pressure of 4.1 bar [60 psi].

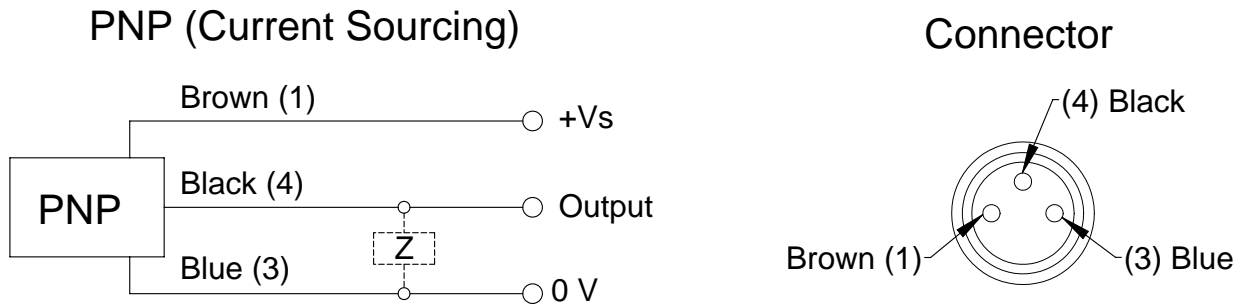
2.5 Electrical Connections

The media checker has an integrated sensor.

2.5.1 PNP Type Sensor

Table 2.1—PNP (Current Sourcing)	
Description	Value
Voltage Supply Range	10-30VDC
Output Circuit	PNP make function (NO)

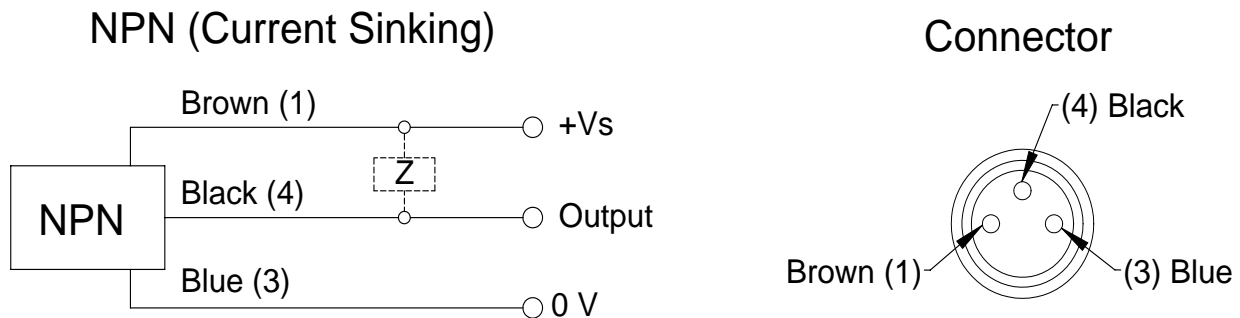
Figure 2.4—PNP Type Lock, Unlock and RTL Sensors



2.5.2 NPN Type Sensor

Table 2.2—NPN (Current Sinking)	
Description	Value
Voltage Supply Range	10-30VDC
Output Circuit	NPN make function (NO)

Figure 2.5—NPN Type Lock, Unlock and RTL Sensors



3. Operation

The media changer system uses (3) different components. The robot program must accommodate for any clearance needed. Refer to [Section 3.1—Recommended Sequence of Operations for AMC](#) for more details.



CAUTION: Do not use spare parts other than original ATI spare parts. Use of spare parts not supplied by ATI can damage equipment and void the warranty. Always use original ATI spare parts.

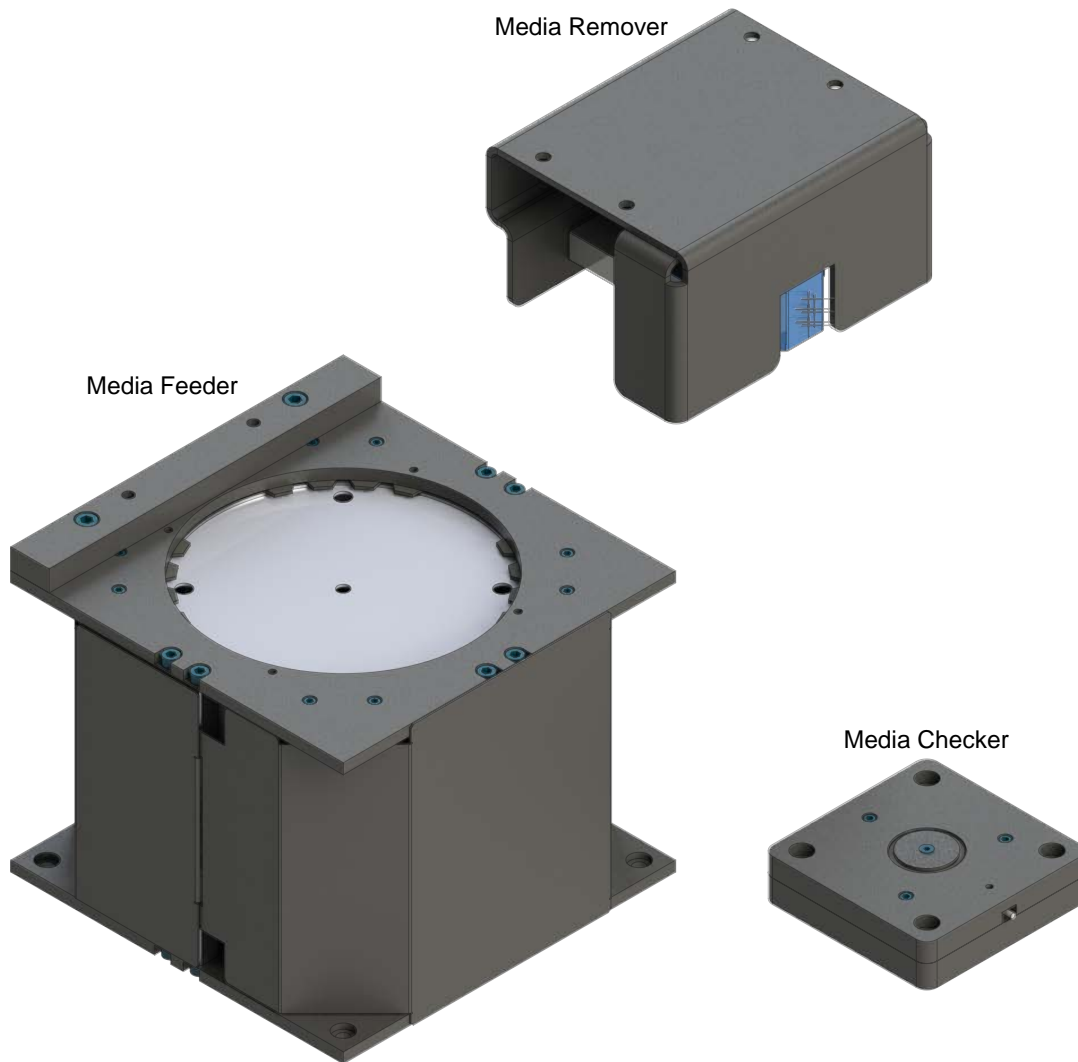


CAUTION: Never be present near the tool while it is in operation. Flying debris can cause injury. If it is necessary to approach the tool while in motion, stand behind appropriate Plexiglas windows. Provide a barrier to prohibit people from approaching the tool.



CAUTION: Needles can pinch or puncture clothing and skin avoid contact during setup, service, and operation of needle grippers causing injury to personnel and damage to equipment.

Figure 3.1—System



3.1 Recommended Sequence of Operations for AMC

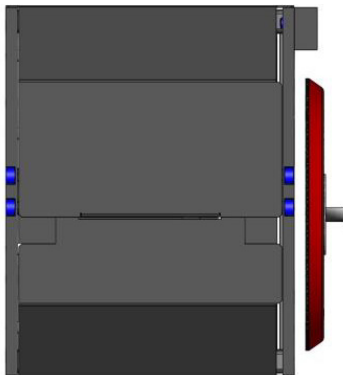
3.1.1 Recommendations

1. When teaching the motions, be sure that the AOV is positioned perpendicular to the working surfaces for each media change module.
2. Consider a method of discarding used discs removed by the Media Remover. A recommended option is to mount the Remover in a way so that the used discs will drop into a collection bin after the removal process.
3. Setting a common home position for each individual process is recommended to make transitioning between each process easier.
4. Prior to operating the Media Feeder, it is important to load new media in such a way to reduce the natural curl inherent in some media. When loading the Media Feeder, please consider the following:
 - a. Feed several small stacks of media (15-25 discs) at a time instead of all at once.
 - b. If there is significant curl in a disc, offset the rotation of each new stack about 10 to 20 degrees so that the curls on the discs do not stack on top of each other.
 - c. Gently bend the stack of discs by hand to reduce the intensity of the curl.

3.1.2 Fetch Media

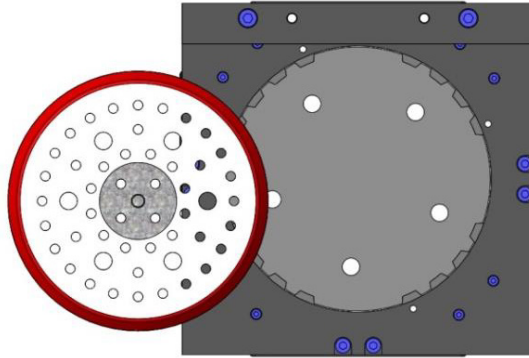
1. (Optional) Set compliance pressure to 60 PSI.
 - a. Increasing the compliance pressure during the fetch process can improve the likelihood of a fetch success.
 - b. Increasing the compliance pressure will reduce compliance travel. This will reduce the risk of the sander crashing into the feeder.
2. (Optional) Removing the debris shield prior to programming can aid in teaching the fetching program by providing a visual on the stack of discs (Refer to [Section 4.3.1—Replacement of Retaining Gasket, Constant Force Springs, and Media Support Glides in Media Feeder](#)) for debris shield removal and installation.
3. HOME: It is recommended setting a common home position for each individual process to make transitioning between each process easier.
4. AWAY: Move sander so the backing pad is in the position as shown in [Figure 3.2](#) and [Figure 3.3](#).
 - a. The backing pad's hook surface should be approximately ¼" away from the top surface of the Media Feeder (roughly half way up the alignment rail).

Figure 3.2—Away 1



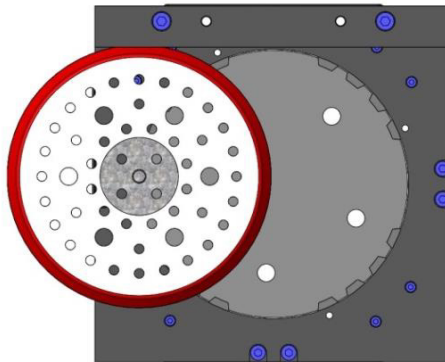
- b. The closest edge of the backing pad should be $\frac{1}{2}$ " to 1" away from the alignment rail.

Figure 3.3—Away 2



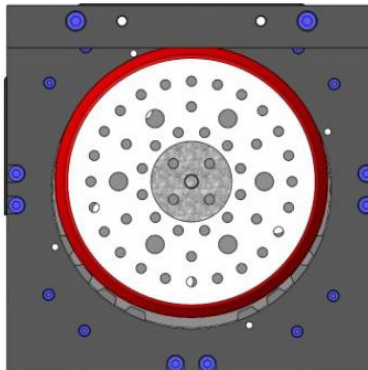
5. TOUCH: Move diagonally (from the "AWAY" position in step 4) so that the backing pad is lightly pressed against the rail, pushing the sander's orbital position away from the rail.
 - a. Doing this movement diagonally is important to avoid crashing. The sander's orbit should rotate into position.
 - b. A good test is to rotating the sanding pad by hand and there should be slight resistance felt due to the rubbing of the pad against the rail.

Figure 3.4—Touch



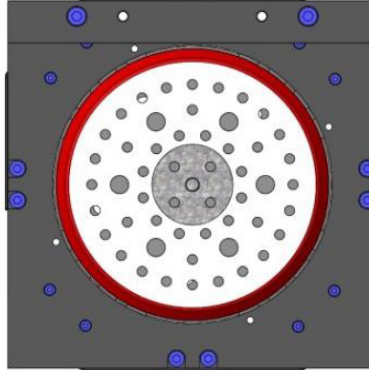
6. ROLL: Move linearly along the rail until aligned with the opening.
 - a. This process reliably forces the sander's orbit to the 6 o'clock position.
 - b. Having a known orbit position makes it possible to consistently align the sanding pad for media fetching.

Figure 3.5—Roll



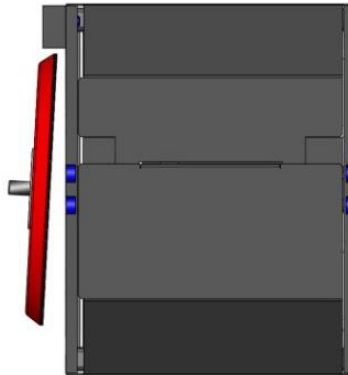
7. ALIGN: Align the sander with respect to the hole with the sanding discs.
 - a. Confirm that the orbit is set fully back (6 o'clock position) before saving this point.
 - b. Reliability can be improved for fetching by tilting the sander slightly (20 degrees) toward the alignment rail (refer to [Figure 3.7](#)).

Figure 3.6—Align



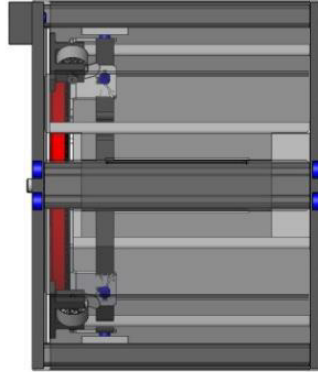
8. DROP: Move the sander into the feeder (approximate speed of 200 mm/s) until the backing pad clears the rubber gasket.
 - a. During this motion flatten the tilt of the sanding pad so that in the end position, the sanding pad is parallel with the stack of discs.
 - b. Pause shortly (<500ms) before moving moving to the next step.

Figure 3.7—Drop



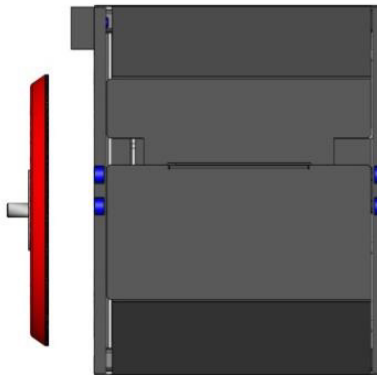
9. ALIGN and DROP: Pull the pad out of the feeder and return to the “ALIGN” position from step 6. Tilt the sanding pad and repeat step 7.
 - a. This step helps to ensure the disc is properly attached as well as keep the stack of new media held down for the next fetch command.

Figure 3.8—Align and Drop



10. LIFT: Lift the sanding pad away from the feeder.
 - a. If the compliance pressure was adjusted in step 1, return it to the original setting.

Figure 3.9—Lift



11. Return HOME.

3.1.3 Check Media

Teaching this process should be done without a sanding disc on the pad to test the hook and loop

1. Start at the HOME position.
2. ABOVE: Align the sanding pad above the Media Checker's loop pad.

Figure 3.10—Above 1

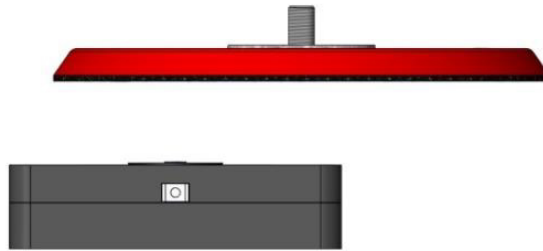
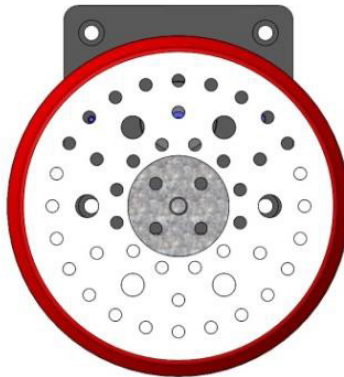
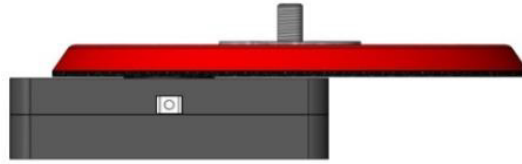


Figure 3.11—Above 2



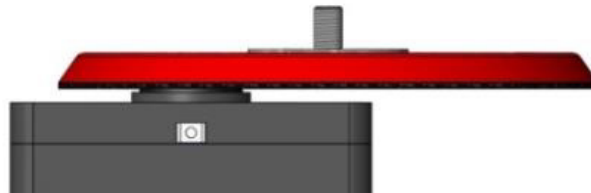
3. TOUCH: Lower the sander until the backing pad makes full contact with the hook and loop.

Figure 3.12—Touch



4. UP: Raise the sander until the Checker has reached its furthest extension.
 - a. An audible cue (sound of the hook and loop separating) can be used to determine the furthest extension.
 - b. The audible cue can be confirmed by ensuring that the illumination of the sensor connector's status LED connector is ON.

Figure 3.13—Up



- c. Wait up to one second so that the checker can register the signal.
5. Lift up separate the pad from the checker and return HOME.

3.1.4 Sand

- It is important to test the removal of a freshly used disc. The friction generated from normal sanding operation can cause the hook and loop to bind stronger than a manually applied sanding disc.
- It is recommended to perform sanding for at least 15 seconds.

3.1.5 Remove Media



CAUTION: Needles can pinch or puncture clothing and skin avoid contact during setup, service, and operation of needle grippers causing injury to personnel and damage to equipment.

Prior to teaching media removal, set the needle depth to 5 mm. This setting is a recommended starting point and should be adjusted if the following procedure are not working

1. Set the compliance pressure to 10 PSI.
 - a. Reducing the compliance pressure should lower the risk of breaking needles; especially during the teaching process.
 - b. In the vertical orientation, compliance pressure may not be needed. The weight of the motor may be sufficient.
2. HOME
3. ABOVE: Align the sander so that the side of the pad opposite to the side that was used for the Checker is slightly above the needle gripper contact point.
 - a. It is best practice to linearly align the center of the pad to the center of the needles. This reduces the chance that the pad will roll during media removal.

Figure 3.14—Above 1

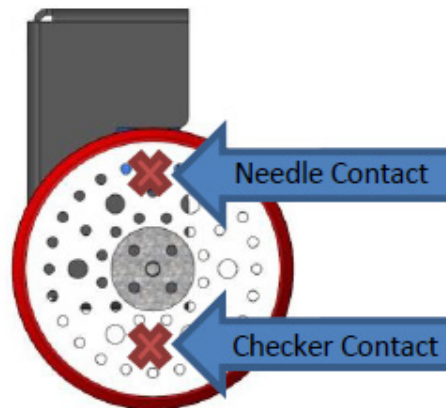
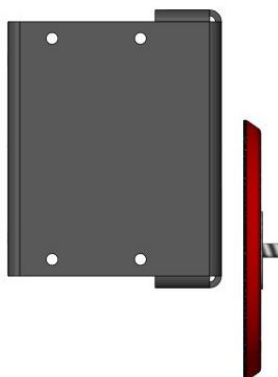
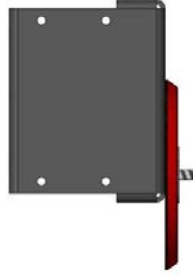


Figure 3.15—Above 2



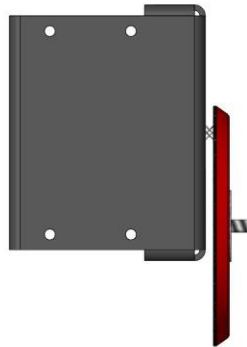
4. TOUCH: Move the sander to make firm contact with the top plate and extend the needles (90 PSI).
 - a. It is recommended to wait up to one second before the next motion command.

Figure 3.16—Touch



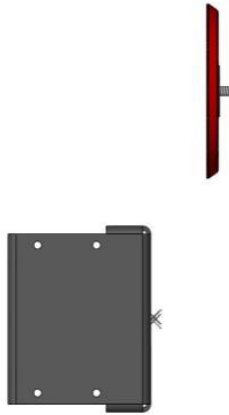
5. (Recommended, but optional) LIFT: Lift the sander a few millimeters off the plate so that the needles remain engaged in the sanding disc, wait one second before the next motion command.
 - a. This lift height may change depending on the disc and pad combination.

Figure 3.17—Lift



6. AWAY: Using [Figure 3.8](#) as a reference, move the sander up 12.0 inches and 9° travel to the right (approximately 1.9 inches of lateral travel).
 - a. Make sure to move far enough away from the needles so that the disc is completely removed (at least the distance of one and a half disc diameters).
 - b. Slowing down the motion during this step may help with teaching and makes analyzing the process easier.
 - c. The angle of travel may vary depending on media grit and backing material.
 - Heavier grits will require a larger roll radius, thus a larger angle of travel (approx. 20°)
 - Lighter grits can be shallower at 9°
 - Too shallow of a retreat angle can cause the needles to dig into the backing pad and may cause damage.

Figure 3.18—Away



7. Retract the needles, set compliance to the original setting and return HOME.

3.2 Normal Operation

The following sections describe the normal operating conditions for AMC.

3.2.1 Air Quality

The air supply should be dry, filtered, and free of oil. A coalescing filter with elements rated for 5 micron or better is required. The air must be supplied to the media remover at 4.1 bar (60 psi).

Particulate can impede airflow and operation. Any water in the system damages the AMC system.

4. Troubleshooting and Service Procedures

4.1 Troubleshooting

The following section provides troubleshooting information to help diagnose conditions with the product and resolve these conditions.



CAUTION: Thread locker applied to fasteners must not be used more than once. Fasteners might become loose and cause equipment damage. Always apply new thread locker when reusing fasteners.

Deburring and media changing process is an iterative, learning task. The following table is presented to assist in solving media changing problems.

Symptom	Possible Cause	Resolution
The stack of new discs is dispensing an extra partially and/or fully ejected discs after fetching media.	Improper loading can cause serious binding that cannot be corrected by the hopper's internal springs.	Repeat the pad insertion step twice to ensure that the stack of new discs is aligned for the next fetch process.
There are frequent check errors.	The I/O may not be receiving the signal from the sensor.	Check the wiring to the robot I/O and verify that there is: <ol style="list-style-type: none"> 1. No damage to the wire 2. The connections are secure 3. The wires are connected properly to the correct ports
	There is debris build up on the media checker.	Remove debris on the surface of the media checker.
The media removal stopped removing media.	The needles are damaged.	Check the needles and make sure they are still intact and replace any damaged needles.
	The needles have worn out over time causing the needles to not penetrate the sanding discs as deeply.	Adjust the needle depth on the remover and reevaluate the removal procedure as refinements may be required.
The needles are not extending or retracting.	Air is not being supplied to the media remover.	Check the air line and verify there are no leaks and that the tubing is securely inserted into the air fittings.
	The needle depth is set to zero mm and needs to be adjusted.	Adjust the needle depth setting on the media remover.

Table 4.1—Troubleshooting

Symptom	Possible Cause	Resolution
New media does not attach to the sanding pad. Press down on the stack of discs in the Media Feeder and verify that the feeding mechanism is not bound up.	The sanding pad may be worn and needs replacing.	Examine the condition of the sanding pad and replace the sanding pad if there is excessive wear.
	There is debris build up on the sanding pad preventing the hook and loop of attaching properly.	Examine the condition of the sanding pad to determine if there is excessive wear or debris build-up.
	There is excessive curl on the stack of sanding discs.	Offsetting the rotation of discs stacks about 10 to 20 degrees so that the curl on the discs does not stack up on top of each other. Gently bend the stack of discs to reduce the intensity of the curl.
New media is partially attaching after fetching.	The sanding pad may be worn and needs replacing.	Examine the condition of the sanding pad and replace the sanding pad if there is excessive wear.
	There is debris build up on the sanding pad preventing the hook and loop of attaching properly.	Examine the condition of the sanding pad to determine if there is excessive wear or debris build-up.
	Some individual sanding disc may only attach partially to the sanding pad.	Add in an intermediate step of pressing the new disc against a flat surface to increase the likelihood that there is full contact between the sanding disc and pad.
Used media is hanging to the edge of the pad after the removal process.	During the removal process, there may be some discs that may remain attached to the sanding pad by some fringe hooks.	Add an extra step to the process of swiping the sanding over a bar or edge to knock off any discs that may still be hanging after the removal process.

4.2 Service Intervals

Table 4.2—Service Intervals

Component	Parts	Interval
Media Feeder	Retaining gasket	Varies based on usage
	Constant force springs	Replace when media feeder is having trouble feeding the new stack of discs
	Media support glides	Replace when the disc feeder is continuously binding up even when the stack of disc is empty
Media Checker	Hook disc	Suggested replacement interval of 1 month but varies based on usage
Media Remover	Needles	While the media removal can still be successful without a full set of needles, it is recommended to replace the needles when any damage is visible.

4.3 Service Procedures

4.3.1 Replacement of Retaining Gasket, Constant Force Springs, and Media Support Glides in Media Feeder

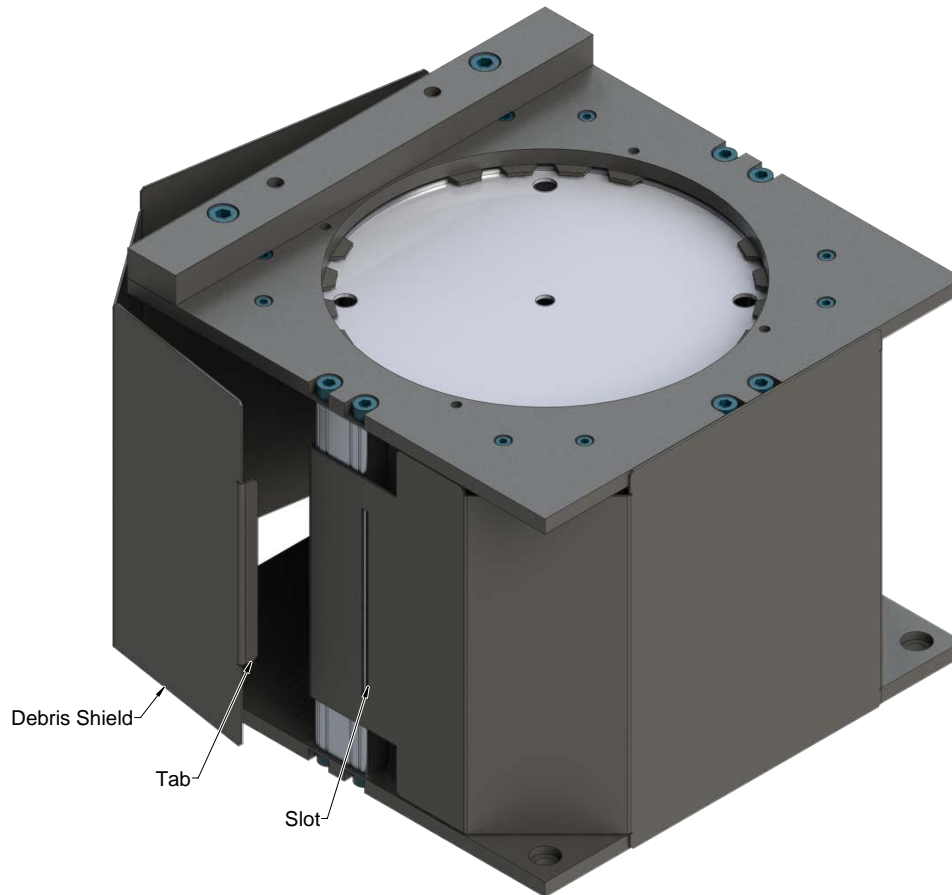
Parts required: Refer to [Section 5—Serviceable Parts](#)

Tools required: 2 mm, 2.5 mm, 4 mm, and 5 mm hex keys, 7/16 wrench, torque wrench

Supplies required: Loctite® 222

1. Remove the debris shield.
 - a. Lift the tabs on both sides of the debris shield out of the slots.
 - b. Remove the both half of the debris shield and set aside.

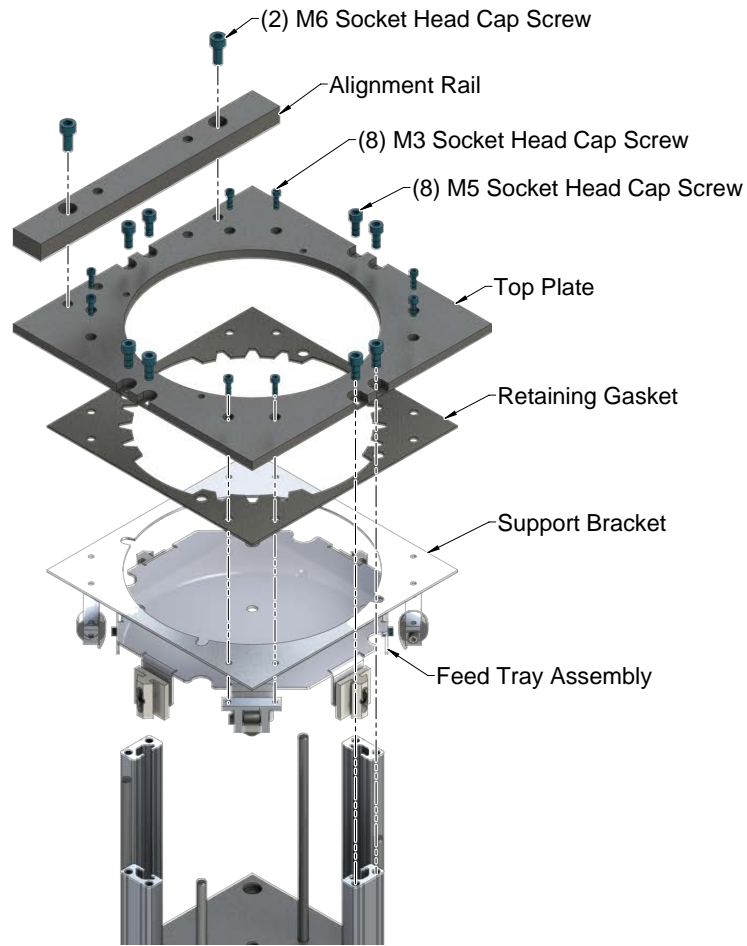
Figure 4.1—Debris Shield



2. Remove any media remaining in the media feeder.

3. Disassemble the media feeder:
 - a. Using a 5 mm hex key to remove the (2) M6 socket head cap screws from the alignment rail.

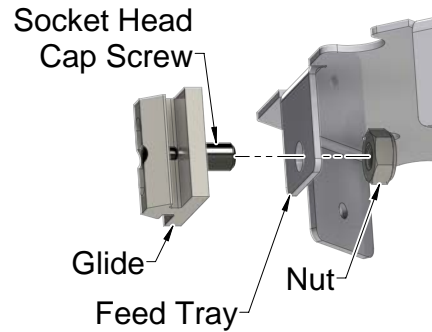
Figure 4.2—Media Feeder



- b. Using a 4 mm hex key to remove the (8) M5 socket head cap screws securing the top plate assembly and the feed tray assembly to the rest of the media feeder assembly.
 - c. Remove the top plate and feed tray assembly.
 - d. Using a 2.5 mm hex key to remove the (8) M3 socket head cap screws securing the top plate to feed tray assembly.
 - e. Remove the top plate from feed tray assembly.
4. If replacing the retaining gasket:
 - a. Remove the old retaining gasket and replace with a new retaining gasket.
 - b. Align the clearance hole in the retaining ring with the clearance hole on the support bracket.

5. If replacing the glides:
 - a. Using 4 mm hex key and 7/16 wrench to remove and a wrench to detach the spring assembly from the feed tray by removing the 1/4-20 socket head cap screw and nut.

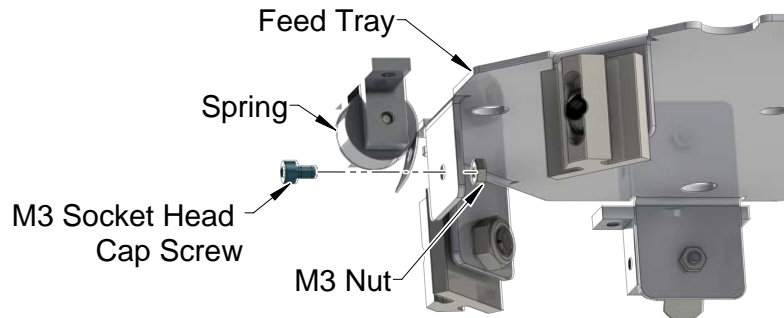
Figure 4.3—Replace Glide



- b. Replace the existing glide(s) with the new glide(s).
- c. Using 4 mm hex key and 7/16 wrench to secure the glide(s) to the feed tray using the 1/4-20 nut and bolt.
 - Replace the locknut if there are signs of damage to it.
 - Leave a gap between the glide and the feed tray. This may need to be adjusted during reassembly when inserting the glide into the rails.

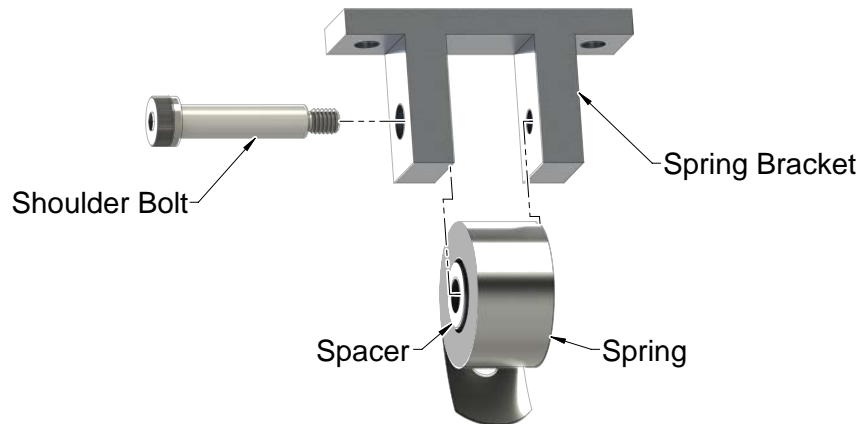
6. If replacing the springs:
 - a. Using a 2.5 mm hex key and 6 mm wrench to remove the M3 socket head cap screw and nut securing the spring assembly to the feed tray.

Figure 4.4—Spring



- b. Using a 2 mm hex key to remove the shoulder bolt from the assembly.
 - c. Remove the spring and spacer.

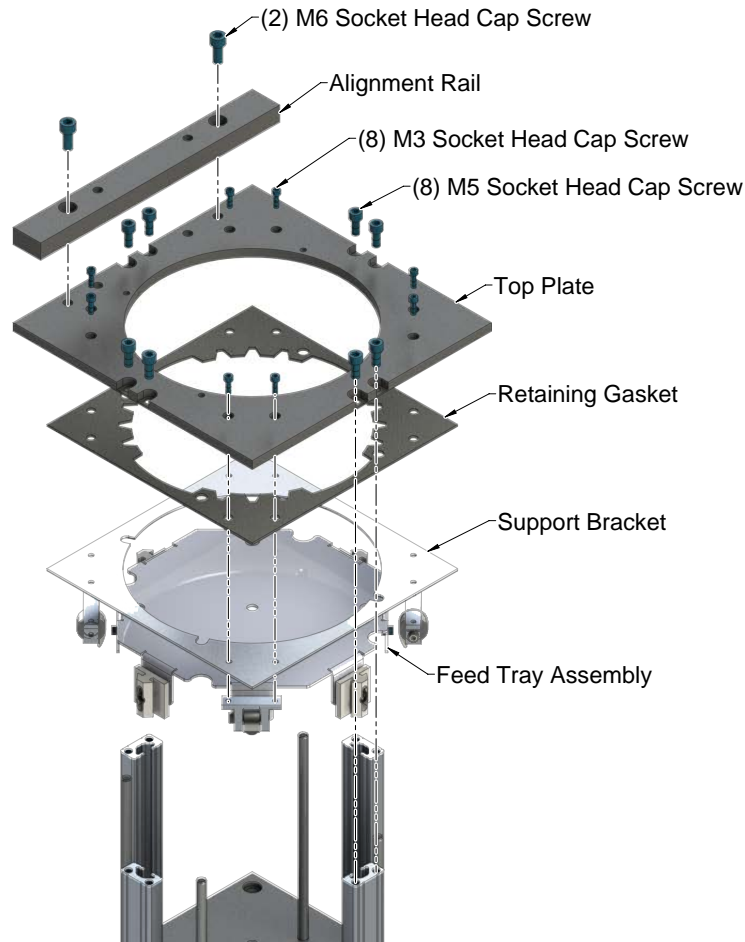
Figure 4.5—Replace Spring



- d. Insert spacer into the new spring and reassembly to the spring bracket using the shoulder bolt. Apply Loctite 222 and tighten to 12 in-lbs (1.356 Nm) using a 2 mm hex key.
 - e. Secure the coil spring to the to the feed tray using the M3 socket head cap screw and nut. Tighten to a 12 in-lbs (1.356 Nm) using a 2.5 mm hex key and 6 mm wrench.

7. Secure the feed tray assembly to the top plate assembly by applying Loctite 222 to the (8) M3 socket head cap screws. Tighten to 12 in-lbs (1.356 Nm) using a 4 mm hex key.

Figure 4.6—Media Feeder



8. Slide the 4 glides on the feed tray assembly into the slots in the rails.
 - Adjustment of the space between each glide and the feed tray if the glides are not sliding into the rails (the feed tray as it is not designed to be rigid).
9. Secure the top plate assembly to the rails with (8) M5 socket head cap screws. Apply Loctite 222 and tighten to 52 in-lbs (5.876 Nm).
10. Attach the rail with the (2) M6 socket head cap screws using a 5 mm hex key. Apply Loctite 222 and tighten to 89 in-lbs (10.057 Nm).
11. Install the debris shield:
 - a. Hook the slotted end onto the rail.
 - b. Insert the tabbed end into the opposite slot.

4.3.2 Replacement of Hook Disc on Media Checker

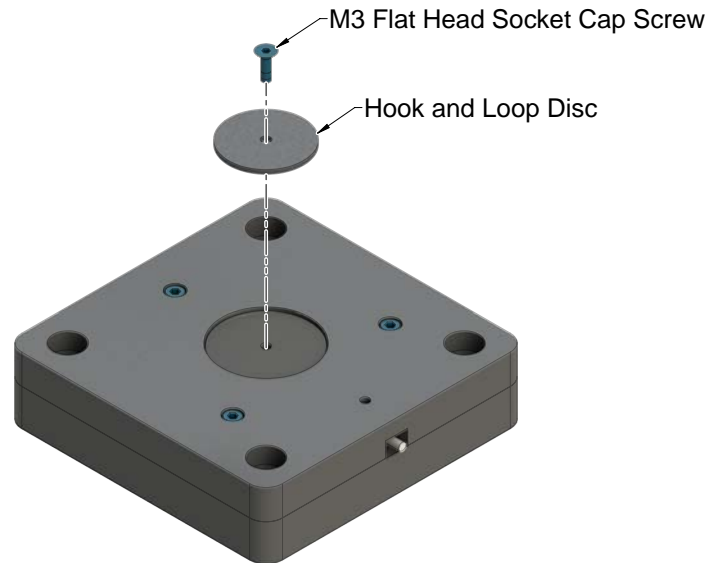
Parts required: Refer to [Section 5—Serviceable Parts](#)

Tools required: 2 mm hex key

Supplies required: Clean rag

1. Using a 2 mm hex key to remove the M3 flat head socket cap screw.
2. Remove worn out hook and loop disc.

Figure 4.7—Replace Disc



3. Wipe off any debris on the media checker with clean rag.
4. Thread the new hook and loop disc onto the M3 flat head socket cap screw until disc bottoms out using a 2 mm hex key.
5. Mount the disc onto the piston until the disc makes contact.

4.3.3 Replacement of Needles in Media Remover



CAUTION: Needles can pinch or puncture clothing and skin avoid contact during setup, service, and operation of needle grippers causing injury to personnel and damage to equipment.

Parts required: Refer to [Section 5—Serviceable Parts](#)

Tools required: 4 mm hex key

1. Shut off air from air and remove air lines connected to the media remover.
2. Dismount the media remover.
3. Remove the (2) M5 socket head cap screws, using 4 mm hex keys, that hold the needle gripper from the sheet metal bracket.
4. Follow instructions provided with needle kit.
5. Attach the needle gripper onto the mounting bracket using the (2) M5 socket head cap screws using a 4 mm hex key.
6. Mount the media remover, reconnect the air lines, and turn on air supply.

5. Serviceable Parts

Table 5.1—Media Changer	
Part Number	Description
3610-0601801-12	Compression Spring, .18 OD, .375 Lg, Music Wire, Zinc
3610-2000001-21	Coil Spring, Constant Force, .39 OD x 12" Lg, SS
3710-50-1525	Disc, Multipurpose Loop, 1-1/8" OD
3710-50-1526	Needle Gripper, 3 mm-10 mm Depth, M5 BSPP
3710-50-1528	Glide, 1/4-20, Polyethylene
3710-50-1540	Needle Replacement, 1.2 mm OD, 10 mm Lg
3700-50-9200	5" Retaining Gasket
3700-50-9192	6" Retaining Gasket