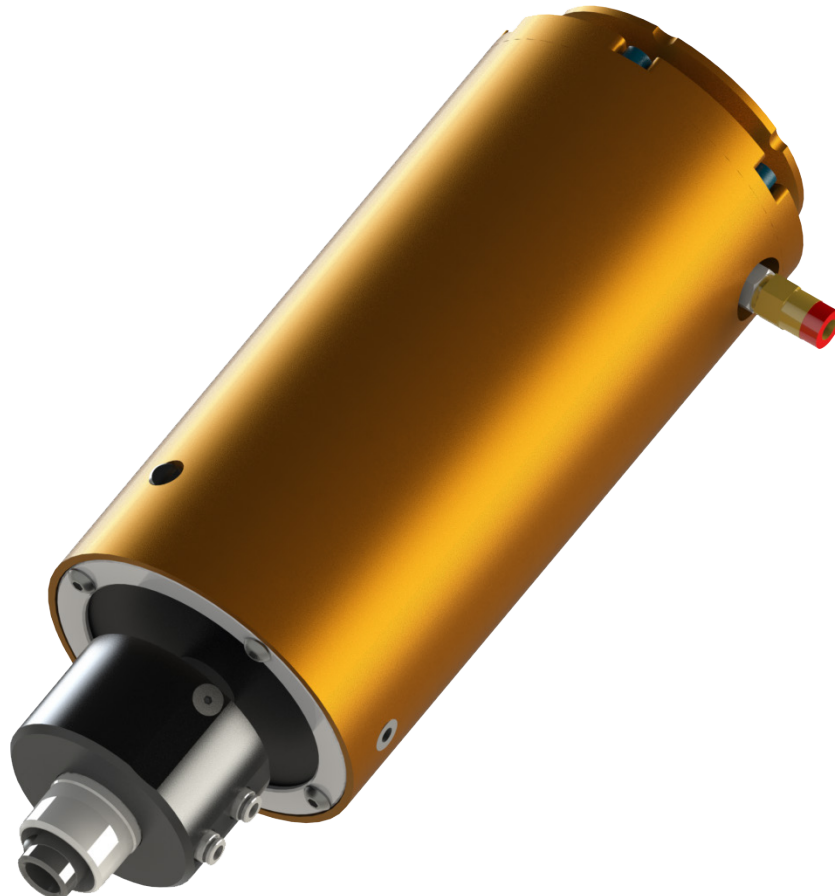




## Tool Changer Kits for ATI Compliant Deburring Blade

(Kits: 9005-50-6052 and 9005-50-6056)

Product Manual



Document #: 9610-50-1034

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## 1. Product Overview

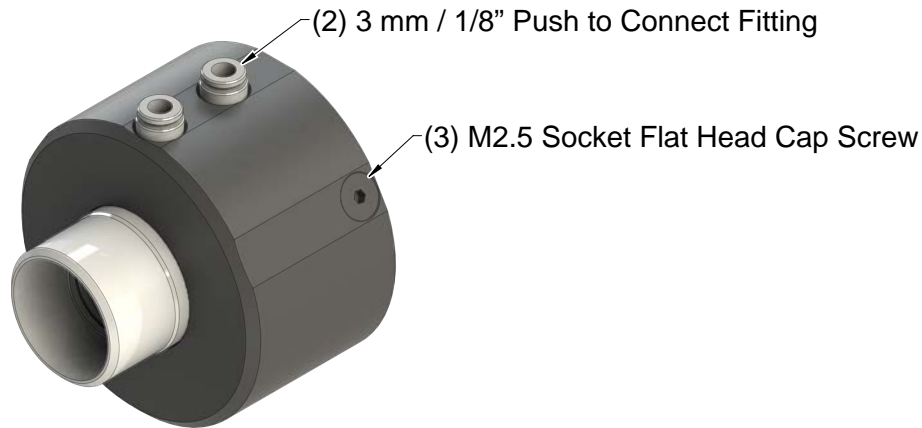
The Automatic Tool Changer (ATC) is an accessory to the Compliant Deburring Blade tool (CDB). The ATC automates tool change and allows a storage location for tools used during the automated deburring program. The ATC works with standard industrial blades that allow for adaptation to changing assembly lines and part requirements.

The ATC's pneumatically controlled collet system allows the tool holder to be locked and unlocked to the CDB without human interaction, once a program is in place. The ATC's pneumatically controlled tool stand allows the tool holder to be locked and unlocked to the storage location. The ATC requires no oil.

### 1.1 Collet System (Kit: 9005-50-6052)

The ATC collet system replaces the stock CDB collet system.

**Figure 1.1—Collet System**



### 1.2 Tool Stand (Kit: 9005-50-6056)

A tool stand is the storage location for tool holders.

**Figure 1.2—Tool Stand**



## 2. Installation of ATC Kits

Optional equipment such as mounting plates and additional customer supplied tool holders are sold separate.

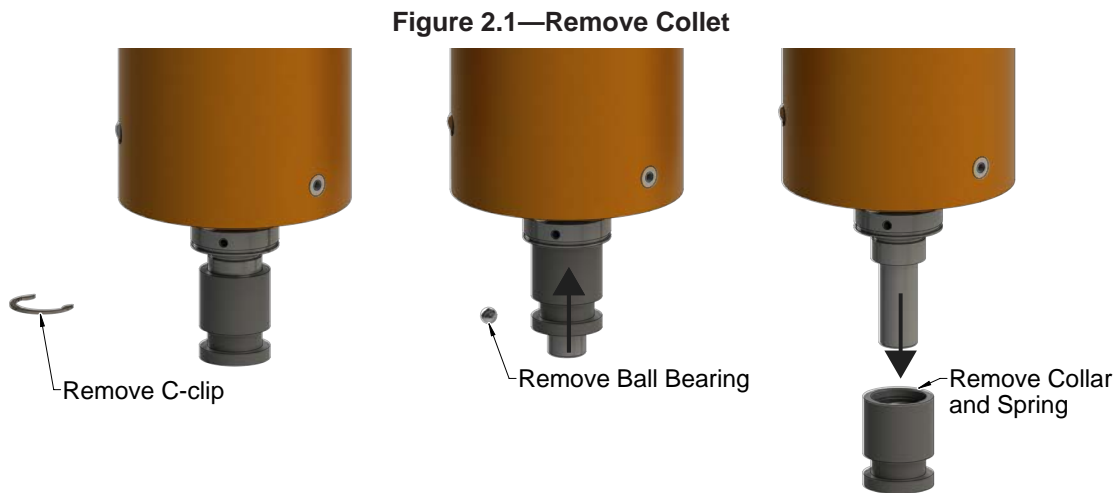
### 2.1 Collet System (Kit: 9005-50-6052)

The ATC requires the original collet system to be replaced with the ATC collet system by performing the following steps:

**Parts required:** Refer to [https://www.ati-ia.com/app\\_content/Documents/9630-50-CDB-8-11-ATC.auto.pdf](https://www.ati-ia.com/app_content/Documents/9630-50-CDB-8-11-ATC.auto.pdf)

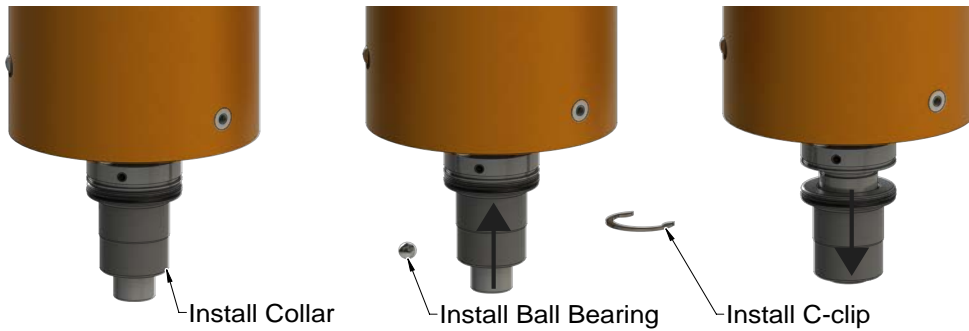
**Tools required:** pliers, 1.5 mm hex key

1. Lock-out and remove the air supply (de-energize all energized circuits such as: air and power).
2. If there is a tool holder in the CDB, remove it.
3. Remove the original collet system:
  - a. Remove the C-clip using pliers.
  - b. Slide the collet toward the CDB body to access the ball bearing.
  - c. Remove the ball bearing and set aside.
  - d. Remove the collar and spring from the shaft.
  - e. Store collar and spring in tool case.



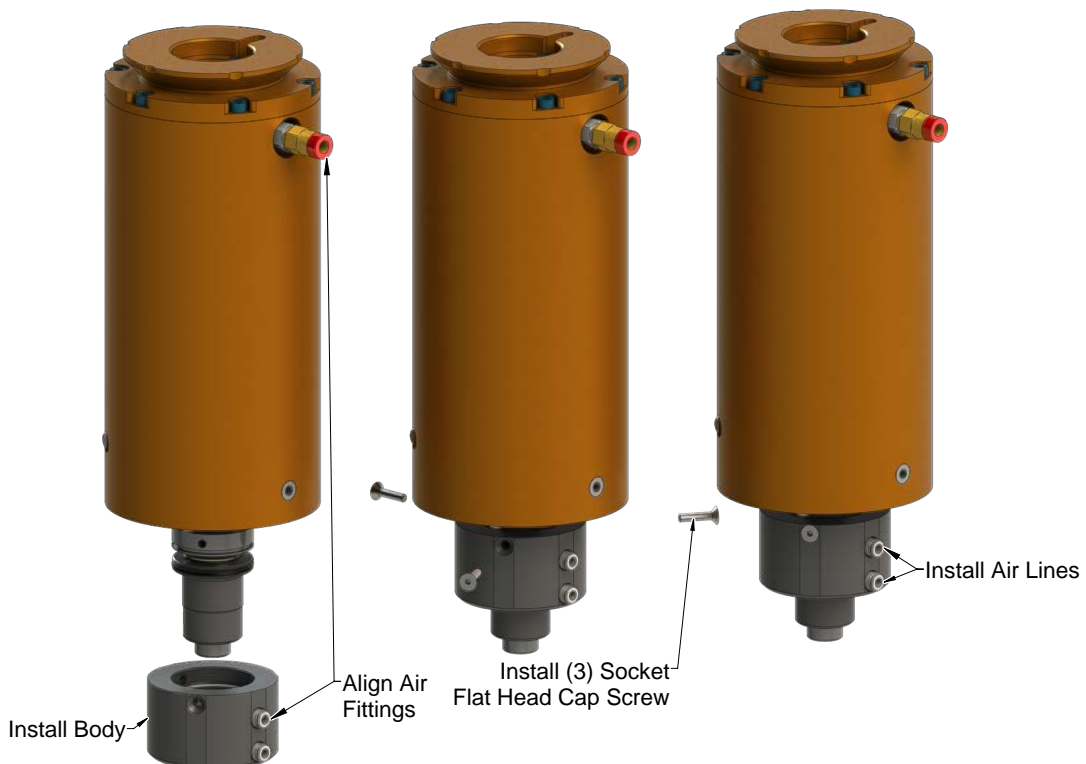
4. Install the ATC collet system:
  - a. Slide the ATC collar onto the shaft.
  - b. Install the ball bearing into the shaft.
  - c. Pull the collar away from the CDB body.
  - d. Install the C-clip onto the shaft.
  - e. Release the collar.

**Figure 2.2—Install ATC Collar**



- f. Install the ATC body over the collar.
- g. Align the ATC body, so the air fittings line up with the air fitting on the CDB body
- h. Install the (3) M2.5 socket flat head cap screws.
- i. Using a 1.5 mm hex key, tighten the (3) M2.5 socket flat head cap screws to 6 in-oz (0.042 Nm).
- j. Install the (2) 3 mm push-to-connect air lines to the ATC body.

**Figure 2.3—Install ATC Body**



## 2.2 Tool Stand (Kit: 9005-50-6056)

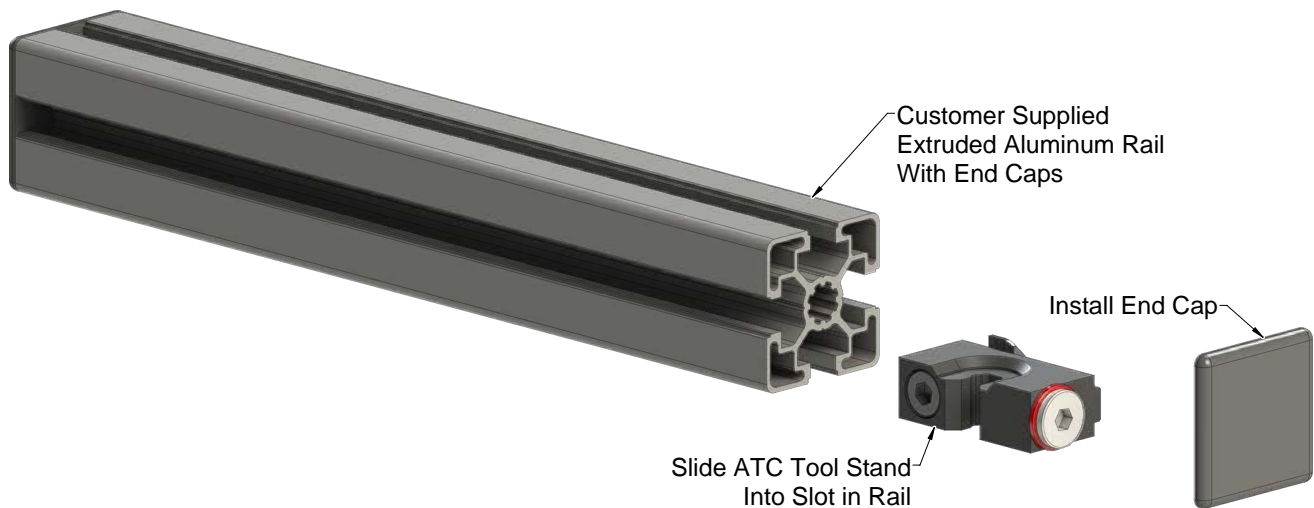
The ATC tool stand is designed to attach to a customer supplied extruded aluminum rail.

**Parts required:** Refer to [https://www.ati-ia.com/app\\_content/Documents/9630-50-CDB-8-11-ATC.auto.pdf](https://www.ati-ia.com/app_content/Documents/9630-50-CDB-8-11-ATC.auto.pdf)

**Tools required:** 6 mm hex key

1. Install the ATC tool stand system:
  - a. Remove the end cap from the customer supplied extruded aluminum rail.
  - b. Slide the ATC tool stand into the slot on the rail.
  - c. Using a 6 mm hex key, tighten the M8 socket head cap screw in the ATC tool stand to 89 in-lbs (10 Nm).
  - d. Install end cap onto the customer supplied extruded aluminum rail.
  - e. Install the (2) 3 mm push-to-connect air lines to the ATC tool stand.

**Figure 2.4—Axial Installation**



## 2.3 Pneumatics

Connect the ATC as shown in [Section 6.1—9630-50-CDB-PNEUMATIC](#).



**WARNING:** All pneumatic fittings and tubing must be capable of withstanding the repetitive motions of the application without failing. The routing of pneumatic lines must minimize the possibility of over stressing, pullout, or kinking the lines. Failure to do so can cause some critical pneumatic lines not to function properly and may result in damage to equipment.

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.

A self-relieving regulator (ATI Part # 9005-50-6164, or equivalent) is used to supply the compliance (centering) mechanism. This pressure corresponds to the side force on the blade. Because very little air flow is required for the compliance mechanism, a smaller valve can be used (consult the valve and regulator supplier's literature when selecting these components).

Solenoid valves are actuated from the robot or program logic controller by means of a digital output signal. The lock/unlock for the tool stand must a regulated air supply pressure of 4.1 bar [60 psi].

Use flexible plastic tubing for the air supply.

The compliance force, air supply pressure regulator should have a 1-4.1 bar [15–60 psi] range. When testing for the proper contact force, start with about 1 bar [15 psi] of pressure and increase the pressure slowly until the desired cut is achieved.

### 3. Operation

The tool stand component of the ATC system uses divots in the tool holder shaft for securing the tool to the tool stand. Due to this the tool holder has to extend further out of the ATC collet. The robot program must accommodate for this clearance between the tool stand and collet.

When adding additional ATC tool stands, a minimum of 25 mm (1") is required between tool stands. Refer to [https://www.ati-ia.com/app\\_content/Documents/9630-50-CDB-8-11-ATC.auto.pdf](https://www.ati-ia.com/app_content/Documents/9630-50-CDB-8-11-ATC.auto.pdf)

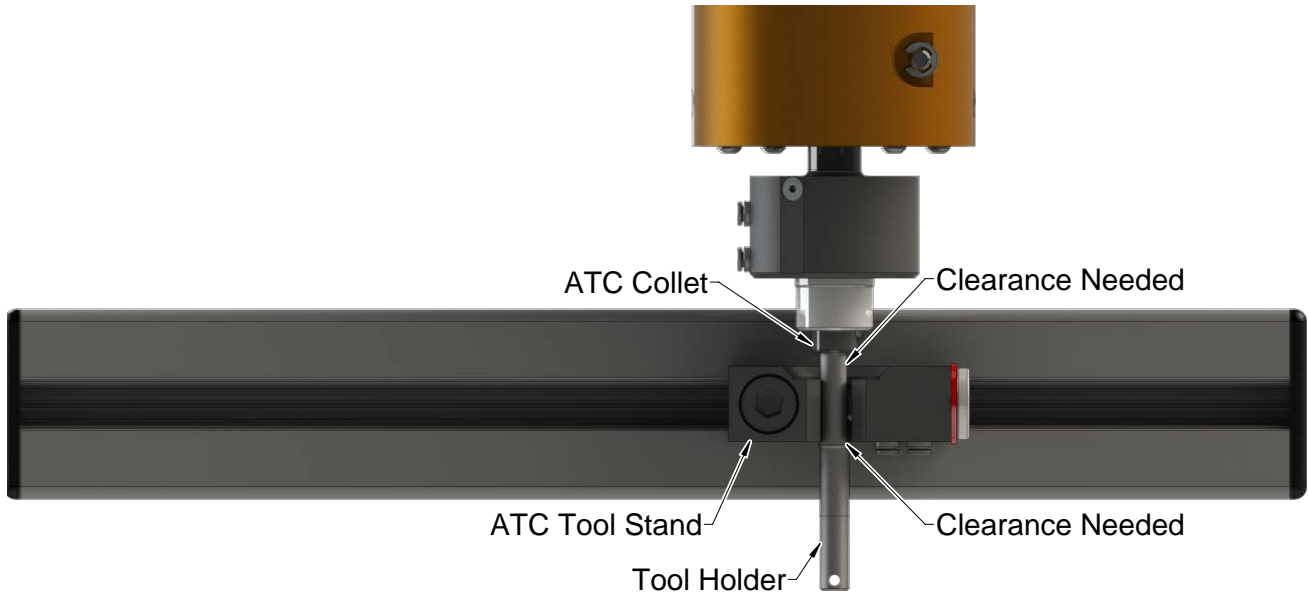


**CAUTION:** Do not use spare parts other than original ATI spare parts. Use of spare parts not supplied by ATI can damage equipment and void the warranty. Always use original ATI spare parts.



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

Figure 3.1—Programming Changes





### 3.1 Programming for ATC Tool Stand

**NOTICE:** The customer must have familiarity with how to actuate each ATC station in order to manually place each blade. If plant regulations require all pressurized air is released prior to operator's entrance into a robot cell, the ATC station can be used in conjunction with a swivel table to rotate ATC stations out of the cell. This ensures that the operators remain in a safe environment while the station is energized. If ATCs are maintained within the robot cell, operators must be able to control them through a 4-way valve or solenoid, so that the ATC can actuate open, the blade(s) can be replaced, and the ATC is actuated closed. Air lines will need to have check valves installed to ensure the ATC station remains locked, if customer supplied air pressure is lost.

1. Always use personal protective equipment (PPE) when in robot cell.
2. Use teach mode on the robot pendant to safely manipulate the robot while inside the cell.
3. Manually actuate air to unlock the ATC station.
4. Manually place the blade holder inside the ATC collet and hold it at the desired depth such that there are at least 3 divots available for the ATC tool stand to grip. This blade holder height should allow the user to access and deburr all necessary features.
5. Lock the CDB ATC tool changer.
6. Manually unlock air at ATC station 1 tool stand.
7. Place additional cutting media holder in ATC tool stand.
8. Manually actuate air to lock the ATC station.
9. Repeat steps 5-8 for each additional ATC station in robot cell, maintaining one empty ATC tool stand station for the blade holder currently in use by the robot.
10. Exit the robot cell.
11. Follow standard power up procedure.

### 3.2 Normal Operation

The following sections describe the normal operating conditions for ATC.

#### 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 ATC collet at between 1-4.1 bar (15-60 psi) and to the ATC tool stand at 4.1 bar (60 psi).

Particulate can block airflow or impede compliance motion. If deburring tools do not receive proper air pressure, tool may not re-center properly. Any water in the system damages the housing and blades.

#### 3.2.2 No Lubrication

The compliance device cannot have any oil in the air supply. Oil can clog compliance device and limit compliance range.

## 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 process development is an iterative, learning task. The following table is presented to assist in solving deburring problems.

Symptom	Cause	Resolution
Blade wear	Hard work material	Use better grade blade material add coating
	Too heavy a cut	Decrease width of cut/make multiple passes.
	Feed rate is too slow	Increase feed rate.
Blade breakage	Too heavy a cut	Decrease width of cut/make multiple passes.
	Impacting the part	Decrease feed rate at contact/ enter part at an angle.
	Bottoming out compliance	Offset blade from surface of part to reduce necessary compliance travel
Inconsistent compliance	Pneumatic connections damaged	Contact ATI
	The regulator is defective	Replace the regulator.
Poor finish on work piece	Feed rate incorrect	Adjust feed rate to improve finish
	Blade is worn	Inspect blade; if worn, replace.
Blade is chattering during cut	The feed rate is too fast	Reduce the feed rate.
	Lack of rigidity	Increase radial compliance pressure.
	Too heavy a cut	Decrease width of cut/make multiple passes.
	Improper blade selection	Choose blade designed for work material.
	Blade is worn	Inspect blade; if worn, replace.
Secondary burrs are created on the work piece after a cut	Incorrect feed rate	Reduce the feed rate.
	Too heavy a cut	Decrease width of cut/make multiple passes.
	Improper blade selection	Choose a blade that is designed for the work material.
	Blade is worn	Inspect blade; if worn, replace.
Piston not actuating	Damaged O-rings	Replace seals
	Debris in air	Filter air
	Debris on piston	Clean piston
Blade not being retained	Debris in retention area	Clean retention areas
	Air leak	Replace seals

## 4.2 Service Procedures

### 4.2.1 Replacement of Bit Holders in ATC Tool Stand

**NOTICE:** The customer must have familiarity with how to actuate each ATC station in order to manually replace each blade. If plant regulations require all pressurized air is released prior to operator's entrance into a robot cell, the ATC station can be used in conjunction with a swivel table to rotate ATC stations out of the cell. This ensures that the operators remain in a safe environment while the station is energized. If ATCs are maintained within the robot cell, operators must be able to control them through a 4-way valve or solenoid, so that the ATC can actuate open, the blade(s) can be replaced, and the ATC is actuated closed. Air lines will need to have check valves installed to ensure the ATC station remains locked, if customer supplied air pressure is lost.

1. Turn off and de-energize all energized circuits (for example: electrical, air, water, etc.) to robot.  
Note: Air must continue to be supplied to the ATC during this procedure.
2. Lock out robot and enter robot cell safely.  
Note: If you are only changing the blade but not the holder, you don't need to manually actuate air to unlock.
3. Manually actuate air to unlock the ATC station.
4. Taking note of the bit holder's orientation and position in the ATC station, remove bit holder.
5. Replace holder in the orientation and position noted in step 4.
6. Manually actuate air to lock the ATC station.
7. Repeat steps 3-6 for each additional ATC station in robot cell.
8. Exit the robot cell.
9. Follow standard power up procedure.

## 5. Serviceable Parts

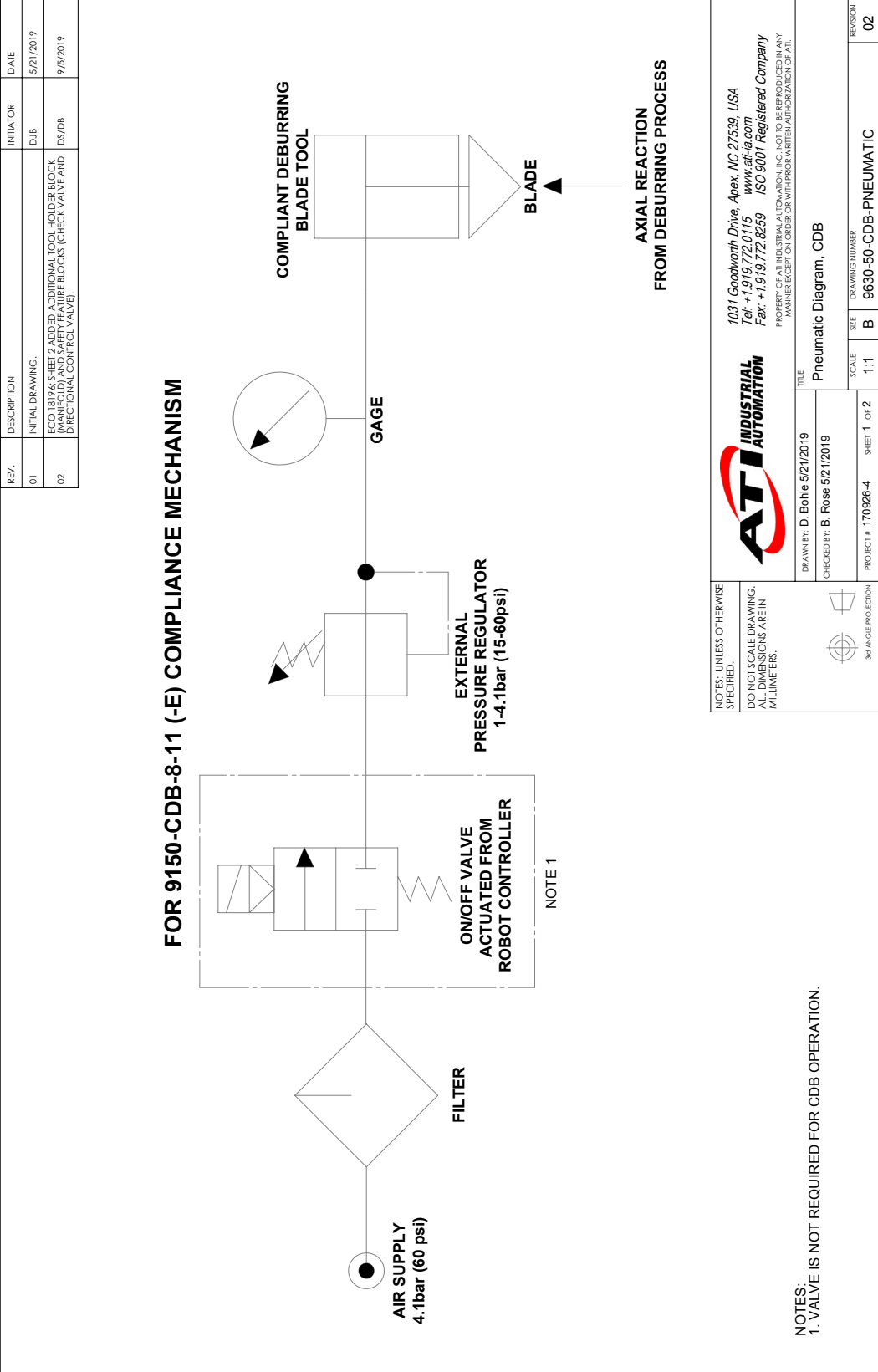
Refer to [https://www.ati-ia.com/app\\_content/Documents/9630-50-CDB-8-11-ATC.auto.pdf](https://www.ati-ia.com/app_content/Documents/9630-50-CDB-8-11-ATC.auto.pdf) for exploded drawings showing all the user replaceable components of the ATC tool. All other repairs must be performed by ATI.

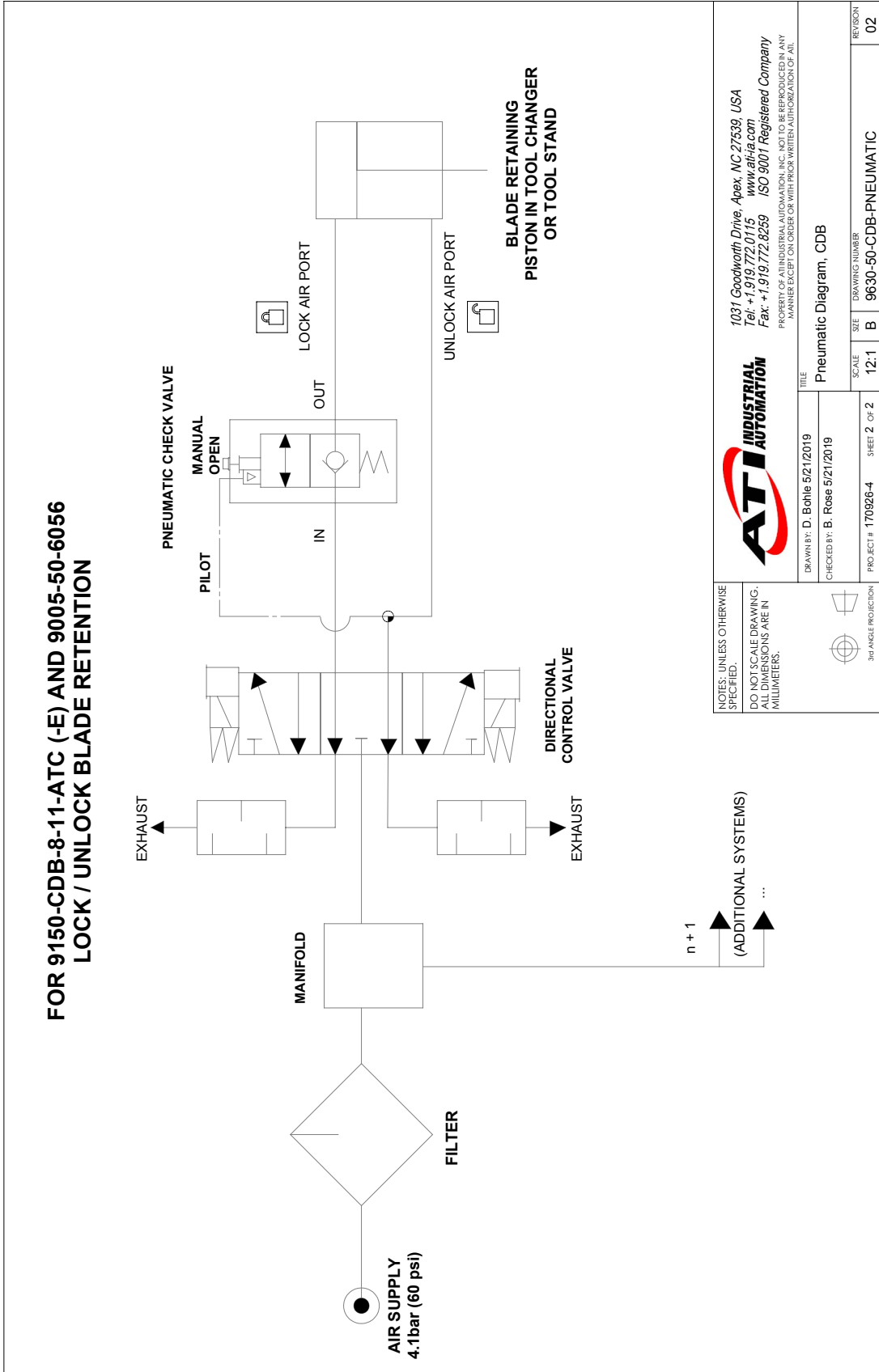
<b>Table 5.1—Tool Changer Collet (Sheet 3 of drawing)</b>			
<b>Item No.</b>	<b>Qty</b>	<b>Part Number</b>	<b>Description</b>
39	1	3700-50-9024	CDB Collet Cam, with Auto Tool Change Interface
40	1	3410-0001502-01	X-Ring, AS568-013, Buna N, 70A Duro
41	1	3410-0001503-01	X-Ring, AS568-018, Buna N, 70A Duro
42	1	3410-0001504-01	X-Ring, AS568-020, Buna N, 70A Duro
45	1	3410-0001505-01	O Ring, 24 mm ID x 1 mm W, Buna N, 70A Duro

<b>Table 5.2—Tool Stand (Sheet 4 of drawing)</b>			
<b>Item No.</b>	<b>Qty</b>	<b>Part Number</b>	<b>Description</b>
2	1	3410-0001507-01	O-Ring, 7.5 mm ID x 1 mm W, Buna N, 70A Duro
3	1	3410-0001508-01	O-Ring, 9.5 mm ID x 1 mm W, Buna N, 70A Duro
4	1	3490-0001041-01	1/4 BSPP Plug, Nickel Plated Brass (McM 4860K126)
6	1	3500-1068030-21	M8-1.25 x 30 mm Socket Head Cap Screw, SS
7	1	3505-9968001-21	T-Nut, 10 mm, M8, SS
9	1	3700-50-9026	CDB Tool Holder Piston

6. Drawings

6.1 9630-50-CDB-PNEUMATIC





**NOTES: UNLESS OTHERWISE SPECIFIED, DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS.**

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PROJECT # 170826-4 SHEET 2 OF 2

DRAWN BY: D. Bohle 5/21/2019  
 CHECKED BY: B. Rose 5/21/2019

TITLE: Pneumatic Diagram, CDB

SCALE	SIZE	DRAWING NUMBER	REVISION
12:1	B	9630-50-CDB-PNEUMATIC	02