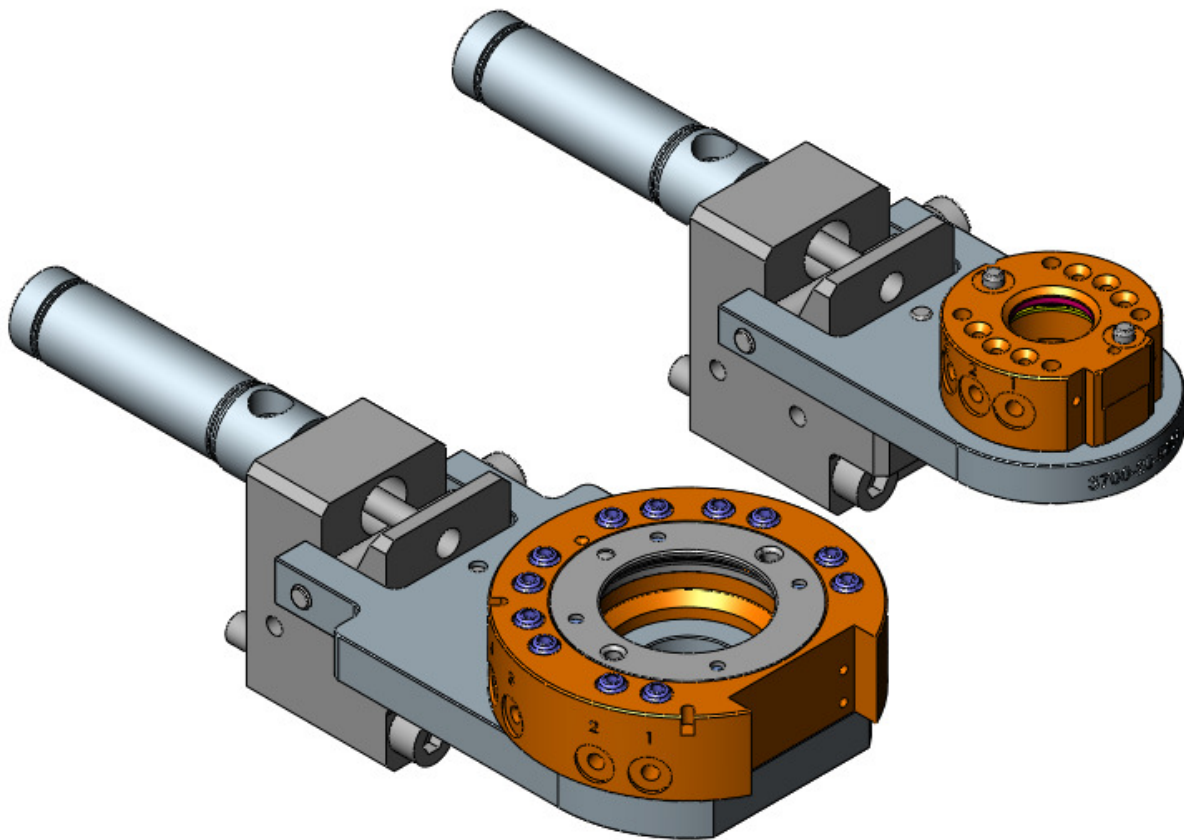




## TSS Locking Tool Stand

### Installation and Operation Manual



Document #: 9610-20-1306  
March 2012

**Engineered Products for Robotic Productivity**

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**CAUTION:** This manual describes the function, application and safety considerations of this product. This manual must be read and understood before any attempt is made to install or operate the product, otherwise damage to the product or unsafe conditions may occur.

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## Glossary of Terms

<b>Term</b>	<b>Definition</b>
End-Effector	A tool or other device attached to the robot arm in order to perform a task.
IP	An <b>Interface Plate</b> is used to adapt the Master Plate to the robot.
Master Plate	The half of the Tool Changer which is mounted to an IP, robot or End-Effector adjacent to the robot.
Modules	Optional components that can be added to the Master and Tool Plates to enhance the capabilities of the Tool Changer, e.g. Fluid/Air, Electrical, DeviceNet, Servo, High-Current.
Tool Plate	The half of the Tool Changer that is mounted to an EIP or customer-supplied tooling.
TSS Tool Stand	A fixture provided by ATI for holding of the Tool Plate when not in use.

# 1. Safety

## 1.1 General

The TSS Tool Stand is intended to be used in industrial applications for tool changing and storage and therefore requires the use of a Tool Changer.

Prior to purchase and installation, the customer should verify that the Tool Changer selected is rated for the maximum loads and moments expected during operation. Refer to Tool Changer manual Document# 9610-20-1000 or contact ATI for assistance.

The customer is responsible for ensuring that the area between the tool and the tool stand is clear of foreign objects during tool drop-off. Failure to do so may result in serious injury to personnel.

The customer is responsible for ensuring that the area between the Master and Tool sides is clear of foreign objects during mating and subsequent coupling. Failure to do so may result in serious injury to personnel.

The ATI TSS Tool Stand is intended for use with No-touch locking Tool Changers only, such as ATI changers QC-5 through QC-21.



**DANGER:** The gap between the Master and Tool sides is a pinch point. All personnel should be prevented from placing any part of their body or clothing in the gap, especially during actuation of the locking mechanism.



**CAUTION:** Damage will occur if contact is made between the TSS Rack and Alignment Pins PRIOR to tool drop-off.

For proper tool drop-off, ATI recommends 1mm maximum clearance between TSS mounting block contact surfaces and TSS alignment pins. See Figure 1.1 for reference.

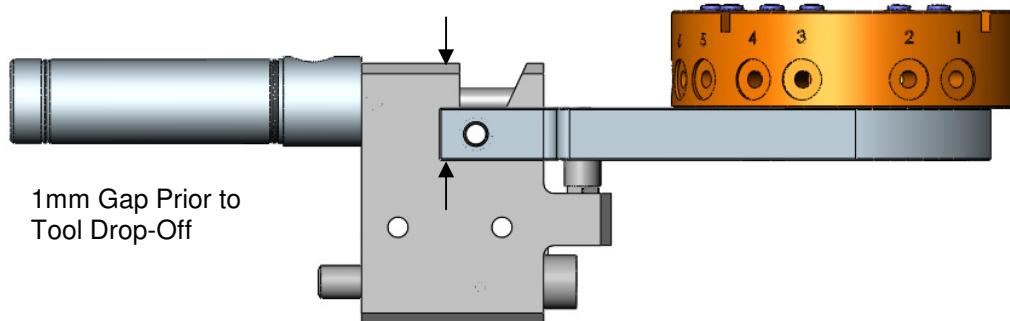


Figure 1.1—Maximum Clearance for Proper Tool Drop-off

All pneumatic fittings and tubing must be capable of withstanding the repetitive motions of the application without failing. The routing of electrical and pneumatic lines must minimize the possibility of stress pullout, kinking, rupture, etc. Failure of some critical electrical and/or pneumatic lines to function properly may result in injury to personnel and equipment.

All electrical power, pneumatic, and fluid circuits should be disconnected during servicing.

## 1.2 Explanation of Warnings

The warnings included here are specific to the product(s) covered by this manual. It is expected that the user heed all warnings from the robot manufacturer and/or the manufacturers of other components used in the installation.



**Danger** indicates that a situation could result in potentially serious injury or damage to equipment.



**Caution** indicates that a situation could result in damage to the product and/or the other system components.

## 1.3 Precautions



**DANGER:** During operation, the area between the Master and tool must be kept clear.



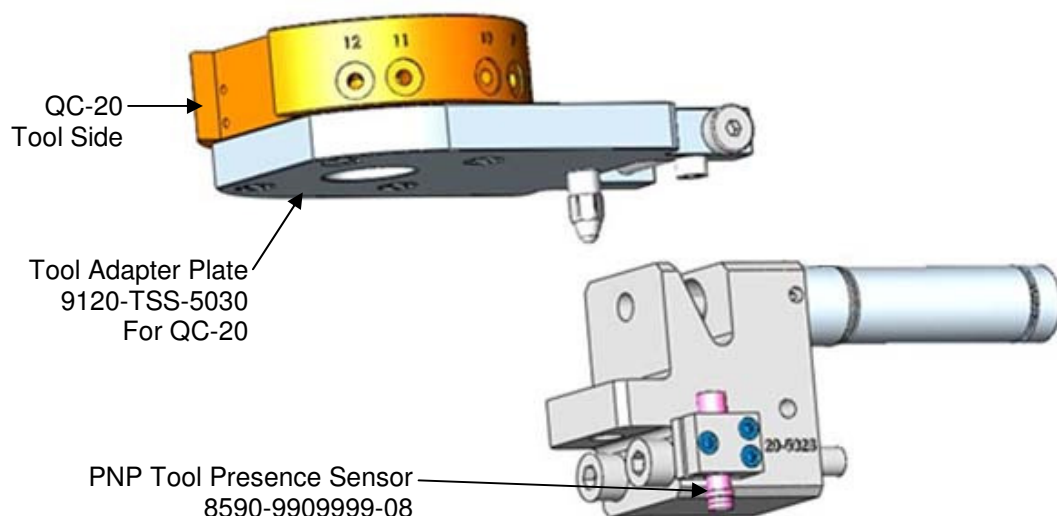
**DANGER:** Power and air should always be removed prior to maintenance or repair.



**CAUTION:** The TSS Tool Stand system is only to be used for intended applications and applications approved by the manufacturer.

## 2. Product Overview / Description

The ATI TSS Locking Tool Stand system is compatible with ATI Tool Changer sizes QC-5 through QC-21. The Stand is designed for maximum flexibility to fit most customers' applications. The modular system allows for you to essentially "build your own" tool storage rack based on the number of tools, desired positioning, and mounting arrangements. Refer to Section 7.3 of this manual, or ATI Product manual 9610-20-1068 for more information on rail components and non-locking tool stand racks.



**Figure 2.1—Complete TSS Locking Tool Stand System**

### 2.1 Mounting Block Assembly with Lock Cylinder

The TSM Mounting Block Assembly includes a rigid block with locating pins that interfaces with the customer's tooling. The assembly includes M8 SHCS mounting hardware, and is designed to mount to extruded rail components such as Bosch 45 x 45 series. The block can be mounted to any other surface that has the corresponding mounting features, or it can be welded directly in place on the customer's fixture. Supply air pressure to retract the lock, exhaust air, and the cylinder will spring the locking cylinder back in place. Lock cylinders for the mounting block are available with position sensors. The cylinder position sensors are shipped as separate line items. A Switch Track is also needed to mount the cylinder sensor to the cylinder. Refer to Section 6 for part numbers.

### 2.2 Interface Plate Assembly

The TSS Interface Plate Assembly simply provides an interface between your tool and the Tool Changer. The Interface Plates are sized specifically to correspond with the Tool Changer and Mounting Block. The TSS Interface Plate assembly also includes 2 stainless steel alignment pins that interface with the V-groove and through hole on the Mounting Block. The standard Interface Plates are sold blank to allow customers to machine their own tooling bolt patterns. ATI can provide specific tooling patterns upon request.

## 2.3 Proximity Sensors, Cables, and Holder

The TSS prox holder can accommodate any 8mm barrel-type sensor, threaded or unthreaded. Simply tighten the cap screw to clamp the sensor in place. ATI offers the following prox sensors and cables for tool presence.

8590-9909999-08	PNP 3-wire DC, normally open, 10–30 VDC
8590-9909999-09	NPN 3-wire DC, normally open, 10–30 VDC
8590-9909999-07	5 meter female
8590-9909999-12	2 meter female

**Table 2.1—Prox Sensors and Cables**

## 3. Installation

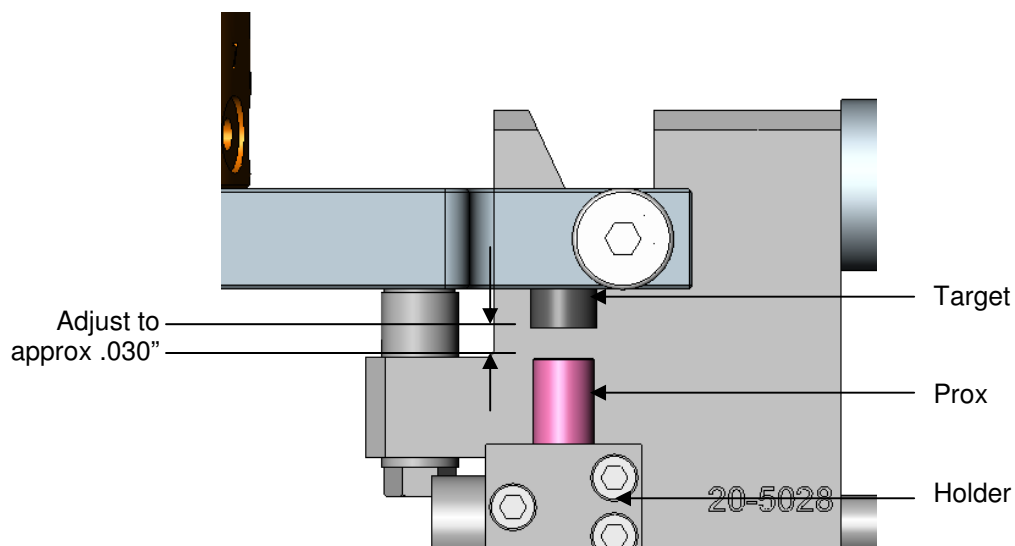
### 3.1 General

Determine the proper location and configuration of your tool stand.

Attach the TSS Mounting Block with Lock Cylinder to an extruded rail, or a smooth flat surface using the 2 M8 SHCS provided. In general, use Loctite 242, and tighten to approximately 150 to 200 in-lbs.

### 3.2 Prox Sensors

To ensure proper function of proximity sensor, first clamp sensor onto holder and lightly tighten. Push barrel up so that sensing cap screw target bolt head is .030” above the face of the sensor as shown in Figure 3.1. Tighten cap screw.



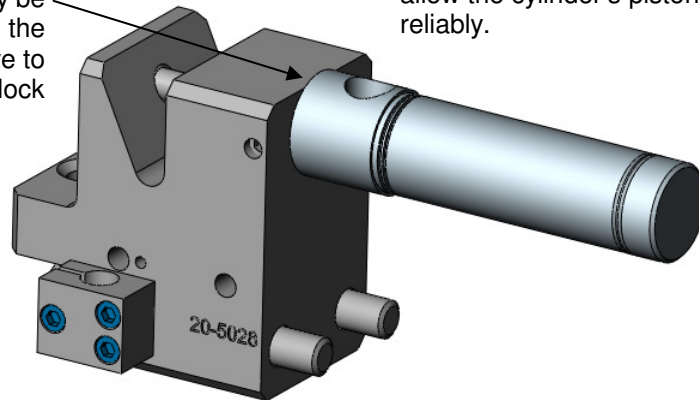
**Figure 3.1—Proximity Sensor Position**



### 3.3 Lock Cylinder Installation and Adjustment

The lock cylinder is shipped attached to the mounting block with Loctite 222. Some adjustment may be necessary, depending on the application. The cylinder threads into the back of the housing block. If needed, the cylinder can be rotated out of the housing less than 1 revolution, in order to orient the cylinder air supply port. It is recommended to appropriately exhaust the cylinder air in order to allow the cylinder piston to spring back. See Figure 3.2

Some adjustment may be necessary to position the cylinder air inlet relative to the mounting block



Appropriate air line exhaust is needed to allow the cylinder's piston to spring back reliably.

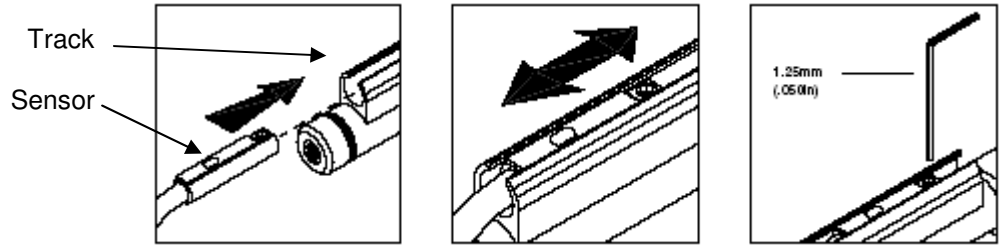
**Figure 3.2—Lock Cylinder Adjustment**

### 3.4 Lock Cylinder Sensor Installation

Lock cylinder sensors are available. Currently the cylinder sensors attach to the cylinder on a track. This track is also shipped separately and must be bonded onto the cylinder in the position desired by the customer.

Refer to figure 3.3. Track and Sensor Mounting is as follows:

- Clean the cylinder body with Acetone. Remove all oil from body surface.
- Locate edge of track as desired on the cylinder.
- Use a solid bead of glue for the entire length of the track used. Bead should fill the center channel of the track. Loctite U-05FL or similar adhesive is recommended.
- Adhere to the recommended glue times as specified by the glue manufacturer.
- To install the sensor, slide the sensor into the track.
- Extend and retract the cylinder while positioning the switch until the switch's operating window is correct.
- Secure the switch in the cylinder track by turning the set screw with a hex driver. Tighten to 1.5 in-lbs. Use Loctite 222. Do not over-tighten.
- Cycle the cylinder both extending and retracting a number of times to confirm the correct operation and adjust as required.



**Figure 3.3—Cylinder Sensor Installation and Adjustment**

## 4. Maintenance

It is recommended that the following areas must be checked at least once every 100,000 cycles. Earlier intervention may be necessary if a problem is identified prior to the scheduled maintenance checks.

- Inspect the Alignment Pins and Block Grooves for cracks and wear. Replace if necessary.
- Check the Alignment Pins for looseness. For the horizontal shoulder screw, re-apply Loctite 242, and tighten to 40 in-lbs. For the center vertical peg, re-apply Loctite 222 and tighten to 27 in-lbs.
- Check to verify that the TSS Mounting Block has not loosened. Apply Loctite 242 and tighten the M8 SHCS to 150 in-lbs if required.
- Check to verify that the TSS Lock Cylinder has not loosened. Tighten if required.
- Check to verify that the TSS Prox Holder has not loosened, and that the proximity sensor has not loosened. Tighten if required.
- Inspect sensor cables and all utility lines for wear.
- Inspect and wipe clean all sensor faces to ensure proper function.

## 5. Troubleshooting

Refer to the table below for trouble shooting information.

Symptom	Possible Cause / Correction
Tool drop-off location no longer repeatable	Tool Alignment Pin may be loose or missing. Tighten or replace if necessary.
Proximity Sensor fails	Check for debris build up and clean if necessary. Verify that the correct distance between sensing face and target is set. Adjust if necessary.
Tool/End-Effector malfunctioning	Inspect utility lines and cables for wear. Inspect all connections for damage. Inspect Lock Cylinder and Cylinder sensors. Verify correct position and operation. Verify Tool Changer for proper function.

## 6. Recommended Spare Parts

The following items are commonly used as spare parts for the TSS Tool Stand.

Other components are available upon request.

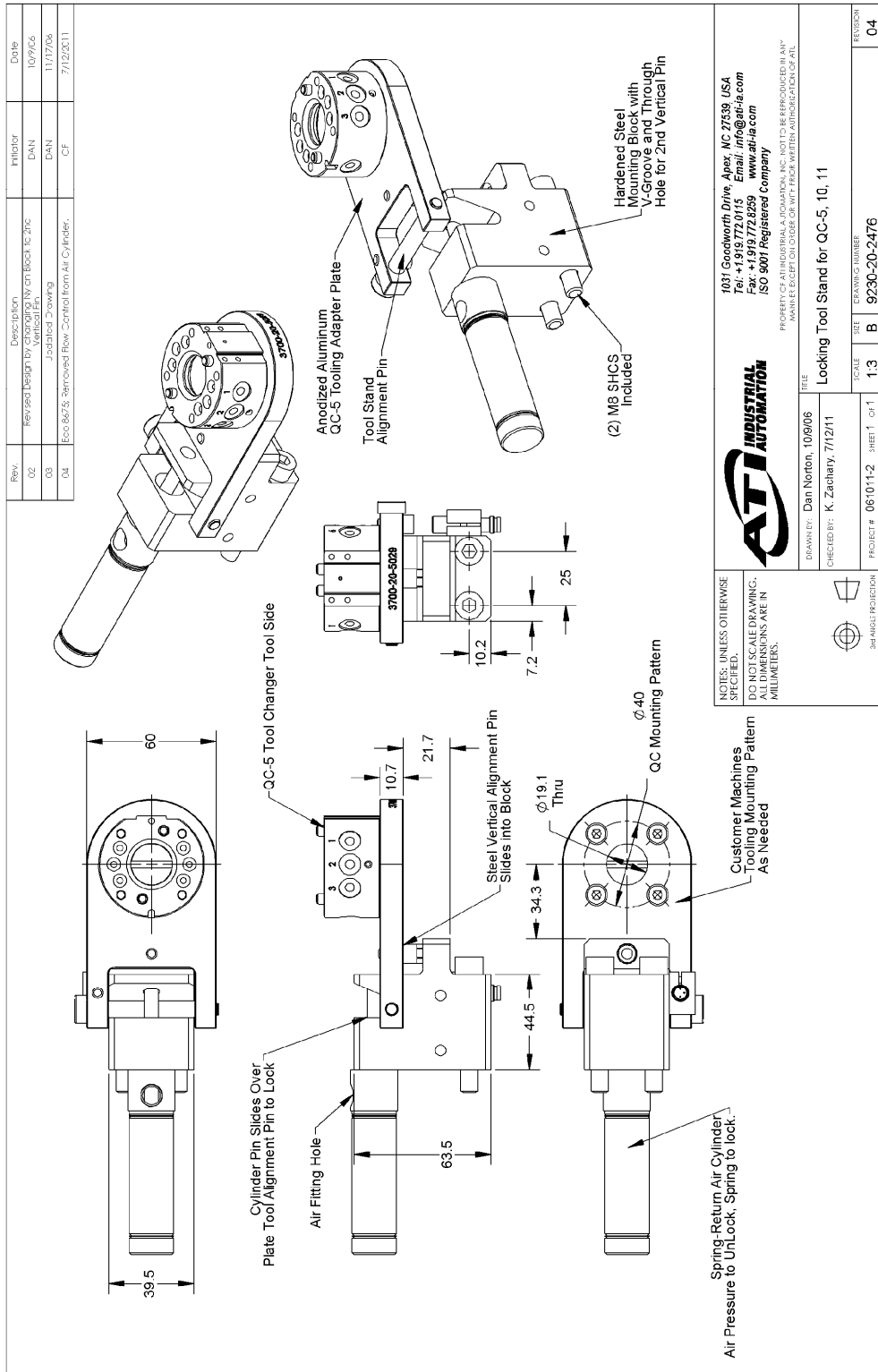
Part Number	Name	Used For
3700-20-5028	Mounting Block	Interface with TSS Plate
3415-1011005-01	Air Cylinder, reverse single acting	Lock Cylinder for Mounting Block
9120-TSS-3315	Prox Sensor Holder	Clamp used to hold 8mm barrel type prox sensor.
3500-2065050-11	Socket Cap Shoulder Screw, 8mm x 50mm, M6 Thread, Steel	Used as alignment Pin for Tooling Interface Plate
3700-20-5756	Alignment Pin	Used as alignment Pin for Tooling Interface Plate (Beta Units use 3700-20-5056 or 3700-20-3303).
3500-1064012-11	Prox Target	Mounts to tooling plate.
8590-9909999-75	TSS Lock Cylinder Sensor	To Detect Lock or Unlock Position (PNP 3-Wire DC, Normally Open, 10-30 VDC, comes with 2m cable)
3690-0000054-30	Switch Track	Used to mount Cylinder Sensor to Cylinder

## 7. Specifications

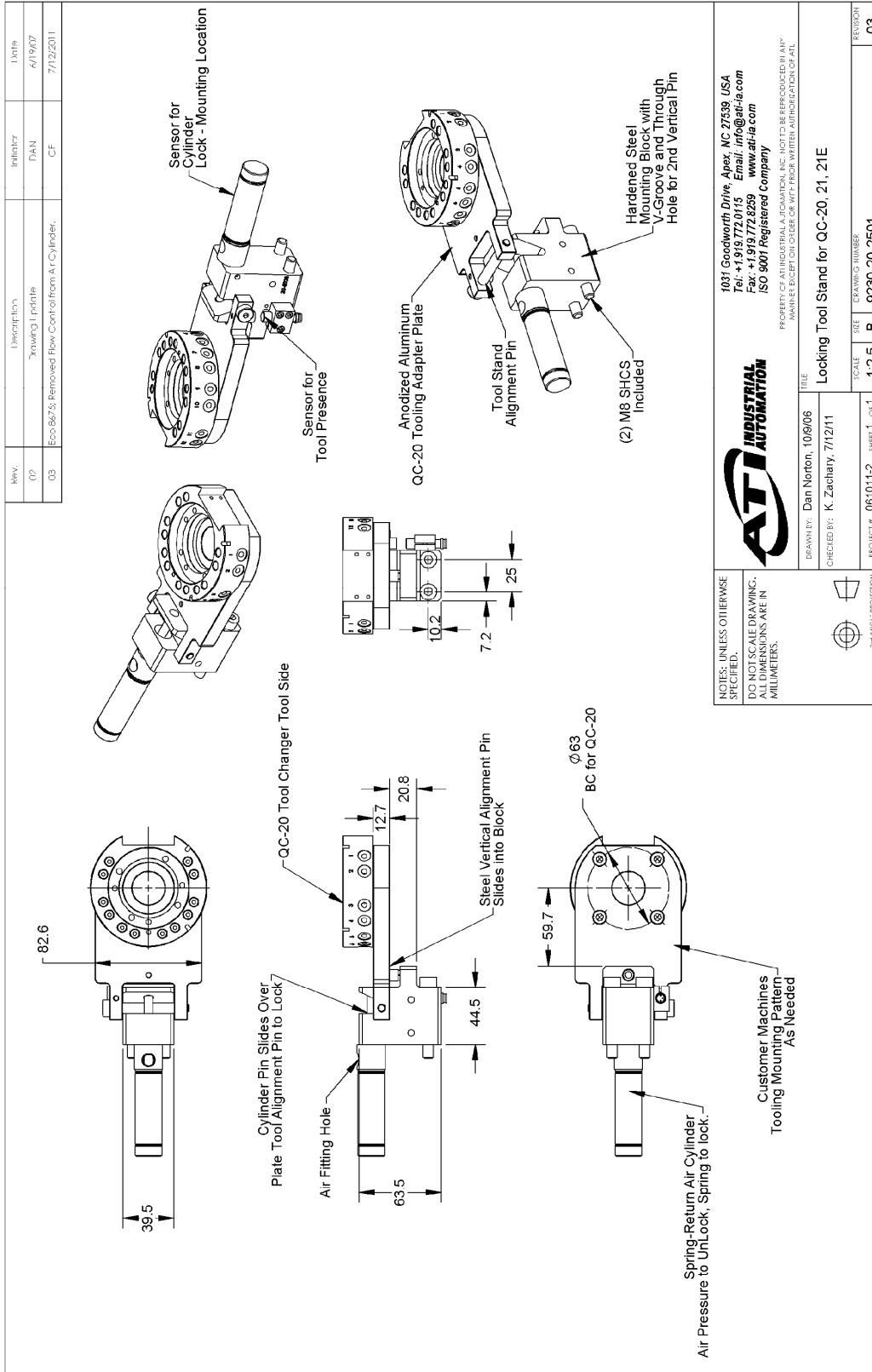
<u>Part Description</u>	<u>Material</u>	<u>Weight-Mass</u>
Alignment Pins	Stainless Steel	0.036 lbs.
TSS Mounting Block	Steel, Black Oxide	2 lbs.
TSS Interface Plate Assemblies	Anodized T-6 Aluminum	0.5–0.75 lbs.
TSS Prox Holder	Black Nylon	0.001 lbs.
TSS Lock Cylinder	Aluminum, Bimba Brand, Reverse Single Acting	0.5 lbs

# 8. Drawings

## 8.1 QC-5, 10, 11 Locking TSS Arrangement



## 8.2 QC-20, 21 Locking TSS Arrangement



### 8.3 Locking TSS with Post Arrangement

Rev.	01	Description Initial Drawing	Initiator DAN	Date 2/28/07
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ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	9120-TSS-3311	Small Tool Stand Base
2	1	9120-TSS-1020	Tool Stand Rail Assembly 610mm Long
3	1	9120-TSS-1030	Tool Stand Gusset Assembly
4	1	9120-TSM-HM-3323	TSM Horizontal Module, 18"
5	5	9120-TSS-5028	TSS Mounting Block with Lock Cylinder
6	5	9120-TSS-5029	TSS Tool Interface Blank For QC 5,10,11
7	5	9120-005T-000-000	

**NOTE:** UNLESS OTHERWISE SPECIFIED  
 DO NOT SCALE DRAWING. DRAWN IN SOLIDWORKS.  
 ALL DIMENSIONS ARE IN MILLIMETERS.

911 AND 1P-PK-31-28.3A

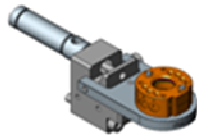
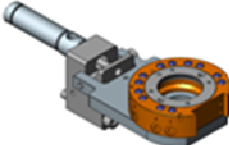
  




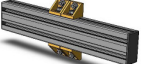
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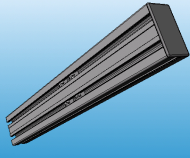


  

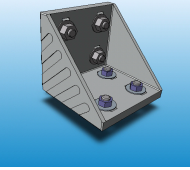
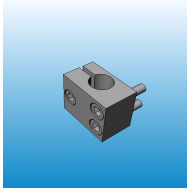
DRAWN BY: Dan Norton 2/28/07	TITLE: Locking TSS for QC-5, TSS Post, 5 Tools	SCALE: 1:6	DRAWING NUMBER: 9230-20-2562-01	SHEET 1 OF 1
CHECKED BY: .....	WEIGHT LBS: .....	SIZE: B	PRODUCT RELEASE #061011-2	DATE: .....
ASSEMBLY REF: .....				

### 8.4 Compatible Locking TSS Assemblies

QC Model	QC-5, 10, 11	QC-20, 21, 21E
Mounting Block	9120-TSS-5028	9120-TSS-5028
Interface Plate Assy	9120-TSS-5029	9120-TSS-5030
Notes	See Note 7	See Note 7
Prox Sensor	Yes	Yes
Customer Drawing	9230-20-2476	9230-20-2601
Manual Number: 9610-20-1306		

Module Name	Post Module 48"	Post Module 72"	Horiz. Module 36"	Horiz. Module 18"
Part Number	9120-TSM-PM-3318	9120-TSM-PM-3322	9120-TSM-HM-3317	9120-TSM-HM-3323
Notes	See Note 2	See Note 2	See Note 2	See Note 2
Customer Drawing	9230-20-1898	9230-20-1899	9230-20-1900	9230-20-1901
				

Module Name	Post Rail 610mm	Post Rail 914mm	Post Rail 1220mm
Part Number	9120-TSS-1020	9120-TSS-3324	9120-TSS-3325
Notes	See Note 1	See Note 1	See Note 1
Customer Drawing	9230-20-1675	9230-20-1912	9230-20-1913
Manual Number: 9610-20-1068			

Module Name	Gusset	Alignment Pins:	Prox Holder
Part Number	9120-TSS-1030		9120-TSS-3315
Notes		See Note 4	See Notes 2,6
Customer Drawing	9230-20-1675		9230-20-1675
Manual Number: 9610-20-1068		3700-20-3303 3700-20-3316 3700-20-3320	



## 9. Terms and Conditions of Sale

The following Terms and Conditions are a supplement to and include a portion of ATI's Standard Terms and Conditions, which are on file at ATI and available upon request.

ATI warrants to Purchaser that robotic Tool Changer products purchased hereunder will be free from defects in material and workmanship under normal use for a period of three (3) years from the date of shipment. This warranty does not cover components subject to wear and tear under normal usage or those requiring periodic replacement. ATI will have no liability under this warranty unless: (a) ATI is given written notice of the claimed defect and a description thereof within thirty (30) days after Purchaser discovers the defect and in any event not later than the last day of the warranty period; and (b) the defective item is received by ATI not later ten (10) days after the last day of the warranty period. ATI's entire liability and Purchaser's sole remedy under this warranty is limited to repair or replacement, at ATI's election, of the defective part or item or, at ATI's election, refund of the price paid for the item. The foregoing warranty does not apply to any defect or failure resulting from improper installation, operation, maintenance or repair by anyone other than ATI.

ATI will in no event be liable for incidental, consequential or special damages of any kind, even if ATI has been advised of the possibility of such damages. ATI's aggregate liability will in no event exceed the amount paid by purchaser for the item which is the subject of claim or dispute. ATI will have no liability of any kind for failure of any equipment or other items not supplied by ATI.

No action against ATI, regardless of form, arising out of or in any way connected with products or services supplied hereunder may be brought more than one (1) year after the cause of action accrued.

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