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H. Other Modules

UA—Stud Welding (Utility) Modules

1. Product Overview

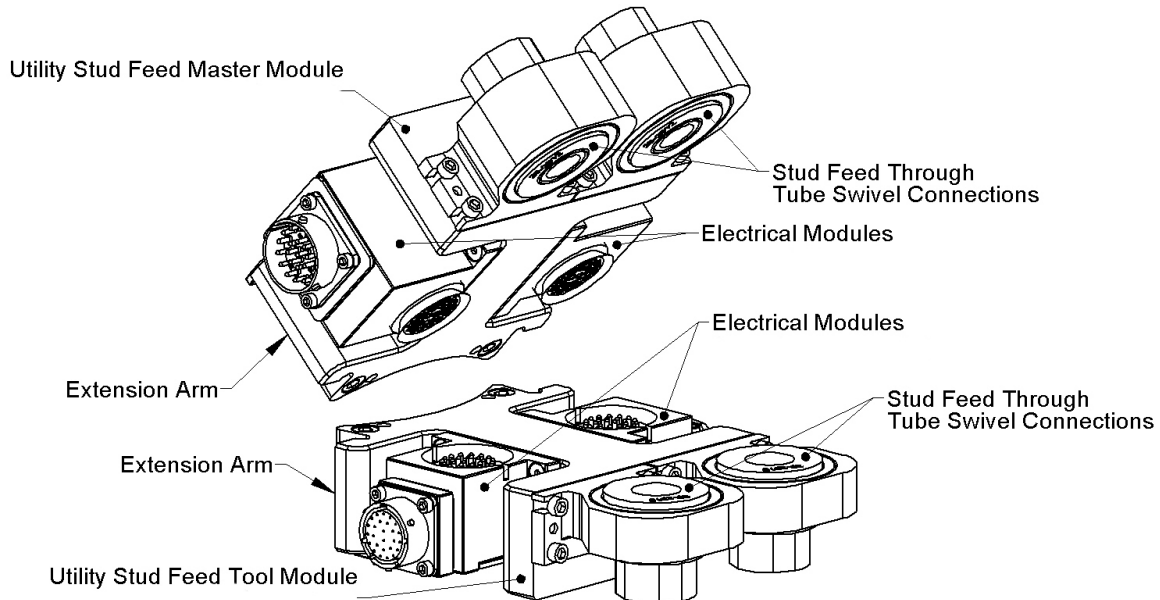
The utility module described here is used in robotic applications where blow fed fasteners or studs are welded to panels. Modules on the tool changer allow the transfer of fasteners, weld power, electric signal circuits, and blow fed fasteners between the two halves. By incorporating such a tool change system, the same robot arm can be used with various guns required for different stud sizes. The tool changer itself is pneumatically driven into coupled or uncoupled positions and the various utilities for the gun are attached to the modules on it.

Electrical Modules can attach to the Utility Module Extension Arm. Refer to [Section 1.1—Electrical Module](#) for further detail.

Table 1.1—Utility Module Interface Details			
Model	Feed Tube Connection	I.D.	Electrical Modules
UA8	1/4-Turn Feed Connection	.573 Short chamfer	RB26-M/R26R180-T
UA11	1/4-Turn Feed Connection	.313 Short chamfer	RB26-M/R26R180-T

Additional UA Modules are available. See [Section 8—Drawings](#) and contact ATI if further details are required.

Figure 1.1—Utility Stud Feed Modules



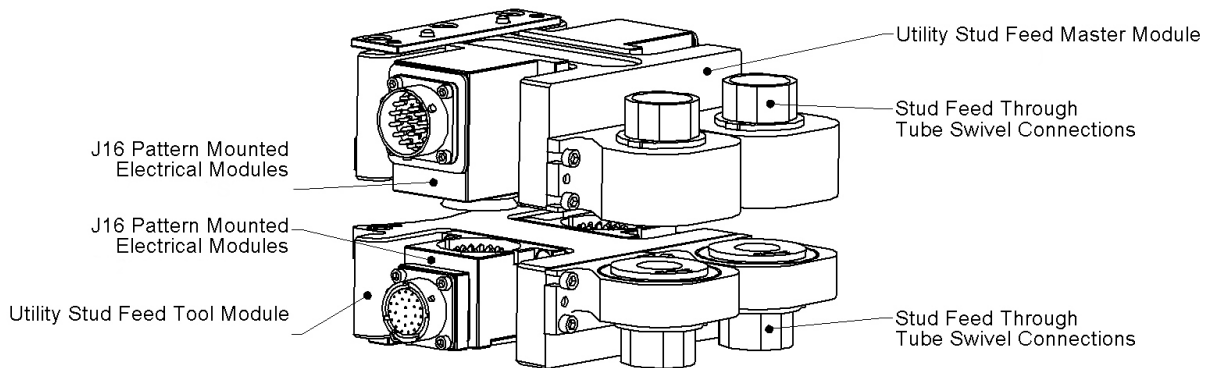
1.1 Electrical Modules

Utility modules provide J16 pattern, rail, and ledge mountings for electrical modules. Refer to [Table 1.1](#) for the option electrical module available for a specific utility module.

1.1.1 J16 Pattern mounted electrical modules

Some utility modules provide J16 pattern mounting for the RB26-M R26R180-T Electrical modules, for more details on this electrical module refer to the 9620-20-E-RB26-M R26R180-T section of your manual.

Figure 1.2—J16 Pattern Mounted Electrical Modules



2. Installation

The UA modules have one or two pneumatic stud feed tube connections. Threaded adapters and electrical modules may be specified at the time of order to support customer-supplied tubes and signal requirements. The module can be removed from the tool changer for ease of tube attachment.



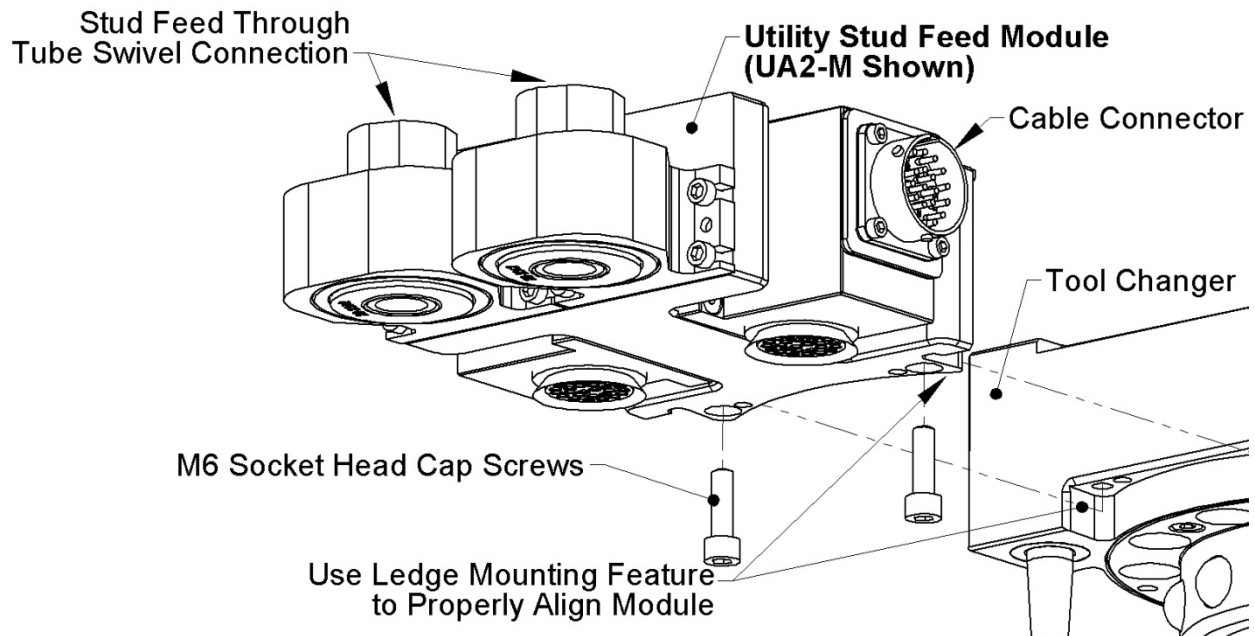
WARNING: Do not perform maintenance or repair on Tool Changer or modules unless the tool is safely supported or docked in the tool stand and all energized circuits (e.g. electrical, air, water, etc.) have been turned off. Injury or equipment damage can occur with tool not docked and energized circuits on. Dock the tool safely in the tool stand and turn off all energized circuits before performing maintenance or repair on Tool Changer or modules.

The Utility Stud Feed Tube modules are typically installed by ATI prior to shipment. The steps below outline field installation or removal as required.

2.1 Module Installation

1. It may be necessary to clean the mounting surface on the tool changer prior to installing the module in order to remove any debris that may be present.
2. Using the ledge feature as a guide place the module into the appropriate location on the Tool Changer body. Align the module with the Tool Changer using the dowels in the bottom of the ledge feature. Refer to [Figure 2.1](#).
3. If fasteners do not have pre-applied adhesive, apply Loctite 242[®] to the supplied M6 SHCS fasteners. Install the two (2) M6 socket head screws securing the module to the Tool Changer and tighten to 40–70 in-lbs.
4. Cables can be connected to the module after attaching the module to the Tool Changer body. Ensure that the connectors are cleaned prior to being secured as appropriate
5. Connect customer stud feed tubes to the module.

Figure 2.1—Module Installation



2.2 Module Removal



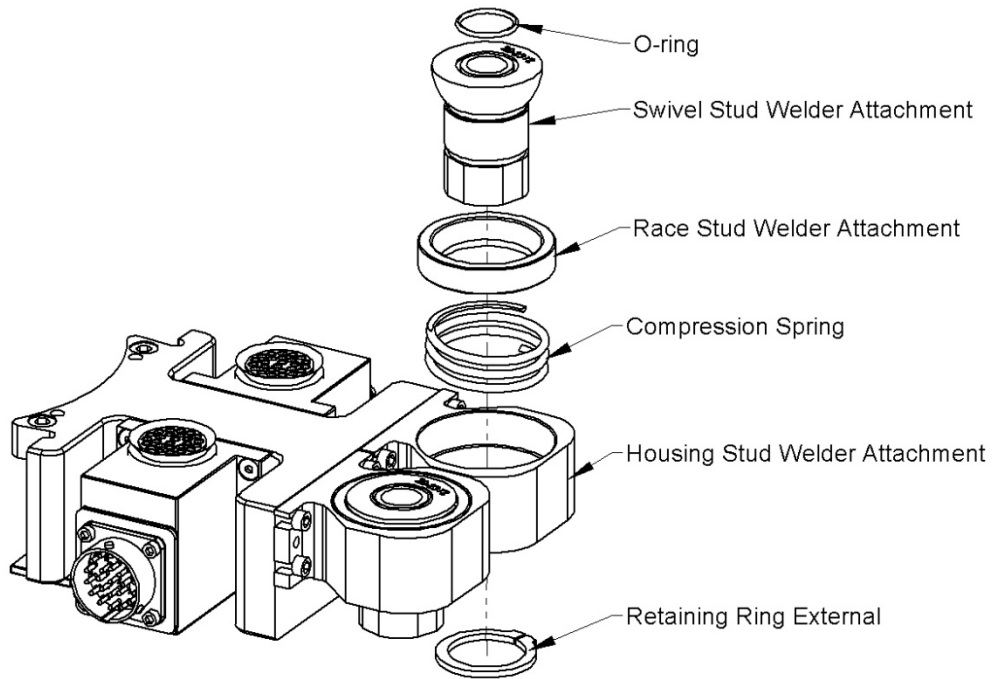
DANGER: For electrical modules using > 60VDC or 42VAC, NO contact should be attempted before removing power. This includes attaching and disconnecting cables to mating connectors or any contact with the Tool Changer or its components. Arcing and damage will occur if this is not observed. Remove power before attaching, disconnecting any cables or attempting any maintenance of Tool Changer.

1. Prior to removing the module use a marker pen to scribe a line or indication between the Tool Changer and module body as a reminder where the module is to be re-installed.
2. All customer tube connections to the module need to be purged and disconnected.
3. Depending upon the service or repair being done cable connections up to the module may or may not need to be disconnected.
4. Remove the socket head cap screws and remove the module from the Tool Changer. Refer to [Figure 2.1](#).

2.3 Master Module Swivel Installation

1. Make sure housing is clean of debris, insert compression spring into housing.
2. Insert the race into housing so that the spherical inner contour that mates with the swivel faces outward. Note: the race should slide up and down (when compressing the spring) freely.
3. Apply a thin coat of *MobilGrease® XHP222 Special* grease on the spherical inner contour of the race.
4. Insert the swivel into the race, apply pressure to compress the spring and secure from opposite side with the retaining ring. Note: If retaining ring is a snap type ring use snap ring pliers to install the retaining ring.
5. Insert the O-ring into the groove in the face of the Swivel and lightly lubricate.

Figure 2.2—Master Module Swivel Installation



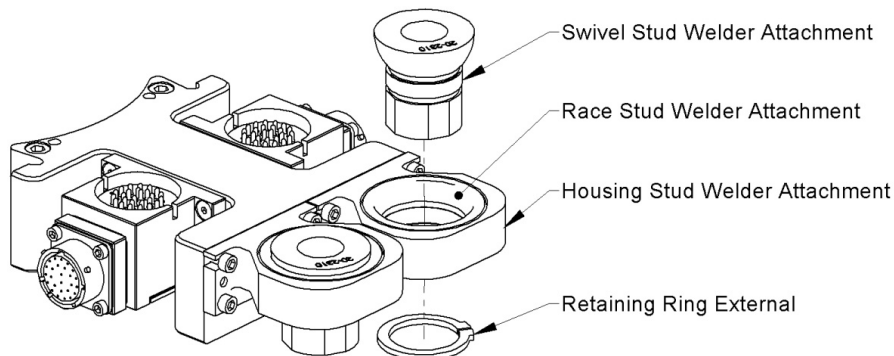
2.4 Master Module Swivel Removal

1. Apply pressure to the swivel to compress the spring and remove the retaining ring from the back of the swivel. Refer to [Figure 2.2](#). Note: If retaining ring is a snap type ring use snap ring pliers to remove the retaining ring.
2. Remove the swivel from the housing.
3. Pull the race out of the housing.
4. Remove the compression spring from the housing.

2.5 Tool Module Swivel Installation

1. Make sure housing is clean of debris.
2. Apply a thin coat of *MobilGrease® XHP222 Special* grease on the spherical inner contour of the race.
3. Insert the swivel into the race and secure from opposite side with the retaining ring. Note: If retaining ring is a snap type ring use snap ring pliers to install the retaining ring.

Figure 2.3—Tool Module Swivel Installation



2.6 Tool Module Swivel Removal

1. Remove the retaining ring from the swivel. Note: If retaining ring is a snap type ring use snap ring pliers to remove the retaining ring.
2. Remove the swivel from the housing.

3. Operation

The Utility Stud Feed modules are designed to pass studs/air from the Master to the Tool for use by the customer's tooling. A unique, patented stud feed-through mechanism has been developed by ATI for this application. A spring-loaded ball joint mechanism is used to transfer solid studs between the mating halves. This produces self-alignment between the Master and Tool sides, while simultaneously allowing axial and rotational degrees of freedom to the feed tube. Traditionally, the feed tube loses its flexibility at the joint to the tool changer and therefore this location is prone to premature failure from excessive strain. Using a large tube bend radius at this joint only somewhat alleviates the problem. ATI's method allows the joint to maintain its flexibility and therefore completely eliminates any strain on the tube. After passing through the tool changer, the Master and Tool halves of the tube behave as one integral unit.

To provide a large bend radius to the tube, the feed-through attachment is offset from the center of the tool changer, thereby providing ample clearance from the robot wrist. Extension arms of various lengths are available from ATI to provide this offset.

Electrical Modules can attach to the Utility Module Extension Arm. Refer to the corresponding specific electrical module section of the modular manual for further detail.

4. Maintenance

Once installed, the operation of the Utility Stud Feed modules is generally trouble-free. Periodically, the condition of the spherical joints should be checked. Replace any damaged or degraded components as necessary.

Electrical Modules can attach to the Utility Module Extension Arm. Refer to the corresponding specific electrical maintenance instructions for further detail.



DANGER: For electrical modules using > 60VDC or 42VAC, NO contact should be attempted before removing power. This includes attaching and disconnecting cables or any contact with the Tool Changer or its components. Arcing and damage will occur if this is not observed. Remove power before attaching, disconnecting any cables or attempting any maintenance of Tool Changer.



WARNING: Do not perform maintenance or repair on Tool Changer or modules unless the tool is safely supported or docked in the tool stand and all energized circuits (e.g. electrical, air, water, etc.) have been turned off. Injury or equipment damage can occur with tool not docked and energized circuits on. Dock the tool safely in the tool stand and turn off all energized circuits before performing maintenance or repair on Tool Changer or modules.

Under normal conditions, no special maintenance is necessary, however it is recommended that periodic inspections be performed to assure long-lasting performance and to assure that unexpected damage has not occurred. Perform the following visual inspection monthly:

Inspect mounting fasteners to verify they are tight and if loose, then tighten to the proper torque.

Cable connections should be inspected during maintenance periods to ensure they are secure. Loose connections should be cleaned and re-tightened as appropriate. Inspect cable sheathing for damage, repair or replace damaged cabling. Loose connections or damaged cabling are not expected and may indicate improper routing and/or strain relieving.

Inspect the O-ring seal on the swivel for wear or damage. If worn or damaged, replace. Refer to Section 4.1—O-Ring Seal Replacement.

Inspect stud feed swivel joints for proper movement and lubrication. Refer to *Section 4.2—Swivel Joint Inspection, cleaning, lubrication and Replacement*.

Inspect the compression spring for proper operation. Refer to *Section 4.3—Compression Spring Inspection, cleaning, and Replacement*.

Inspect the Master and Tool pin blocks for any pin damage, debris or darkened pins. Refer to *Section 4.4—Electrical module Pin Block Inspection and Cleaning*.

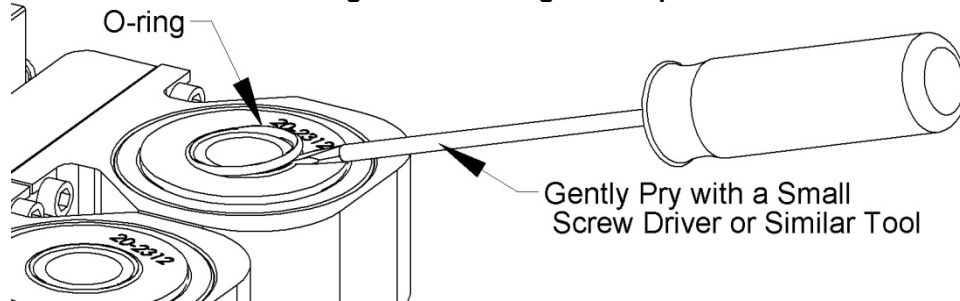
Inspect V-Ring seals for wear, abrasion, and cuts. If worn or damaged, replace. Refer to *Section 4.5—Electrical Module Seal Replacement*.

The modules may be field serviced as needed. The following section describes how to perform various operations.

4.1 O-Ring Seal Replacement

1. To replace the o-ring seals, use a small screwdriver or similar tool to gently pry the seal away from the swivel block on the Master side, and then pull the o-ring off the swivel.
2. To install a new seal, stretch it around the groove in the block and use a small screwdriver to push the ring down fully against the recess in the insulator block.
3. Lightly lubricate the o-ring.

Figure 2.4—O-ring Seal Replacement



4.2 Swivel Joint Inspection, cleaning, lubrication and Replacement

Inspect both the Master and Tool swivel joint components, make sure swivels rotate freely. If not remove swivel, clean and lubricate components and reinstall. If components are worn or damaged replace.

4.2.1 Master Swivel removal and installation

To remove the existing Master swivel use the procedure in [Section 2.4—Master Module Swivel Removal](#).

To install the new Master swivel use the procedure in [Section 2.3—Master Module Swivel Installation](#).

4.2.2 Tool Swivel removal and installation

To remove the existing Tool swivel use the procedure in [Section 2.6—Tool Module Swivel Removal](#).

To install the new Tool swivel use the procedure in [Section 2.5—Tool Module Swivel Installation](#).

4.3 Compression Spring Inspection, cleaning, and Replacement

The Master side swivel joints provide axial compliance using compression springs.

Inspect master swivel joint, press on the swivel to make sure the swivel and race move up and down freely in the housing. If not remove the Swivel, race, and spring and clean the components and housing, then reinstall.

The spring should maintain pressure on the race and swivel so that the retaining ring on the back is held tight against the housing. If not, the compression spring should be replaced.

4.3.1 Compression Spring removal and installation

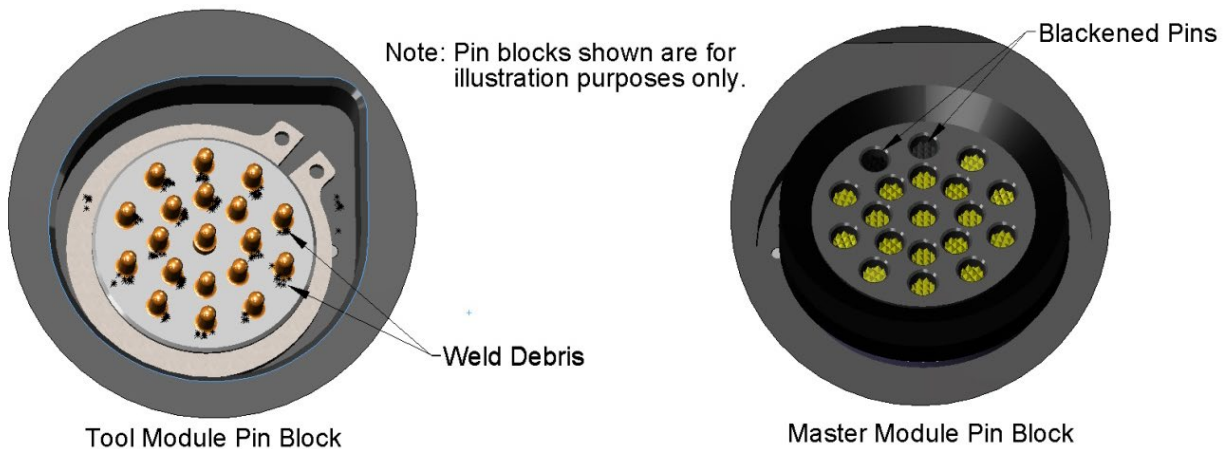
To remove the existing compression spring use the procedure in [Section 2.4—Master Module Swivel Removal](#).

To install the new compression spring use the procedure in [Section 2.3—Master Module Swivel Installation](#).

4.4 Electrical module Pin Block Inspection and Cleaning

Inspect the Master and Tool pin blocks for any debris or darkened pins.

Figure 4.1—Inspect Master and Tool Pin Blocks

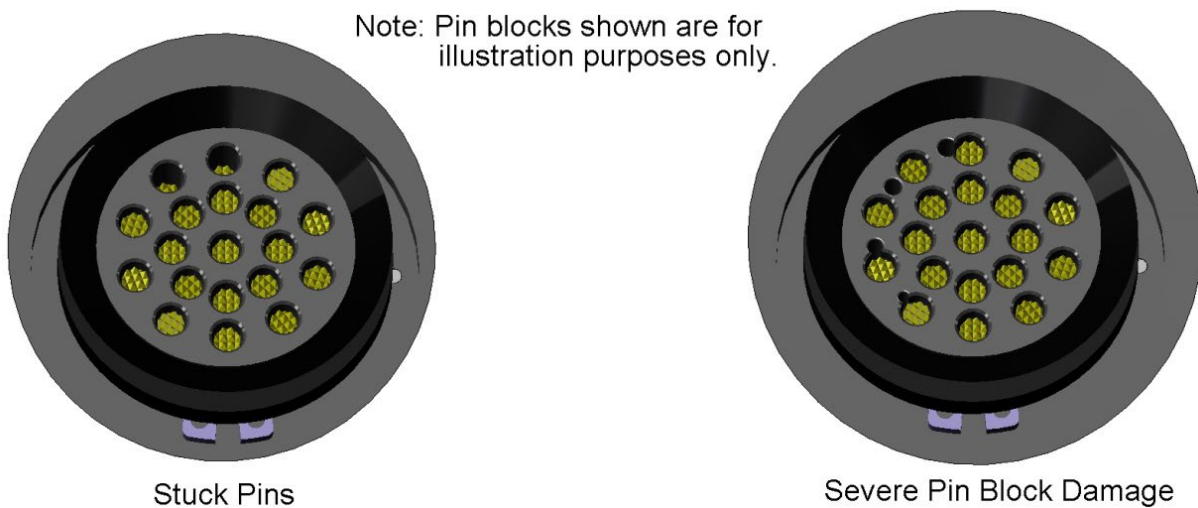


If debris or darkened pins exist, remove debris using a vacuum, and clean using a nylon brush (ATI part number 3690-0000064-60).

NOTICE: Do not use an abrasive media, cleaners, or solvents to clean the contact pins. Using abrasive media, cleaners, or solvents will cause erosion to the contact surface. Clean contact surfaces with a vacuum or non-abrasive media such as a nylon brush (ATI part number 3690-0000064-60).

Inspect the Master and Tool pin blocks for stuck pins or severe pin block damage.

Figure 4.2—Stuck Pin and Pin Block Damage



If stuck pins or severe pin block damage exists, contact ATI for possible pin replacement procedures or module replacement.

4.5 Electrical Module Seal Replacement

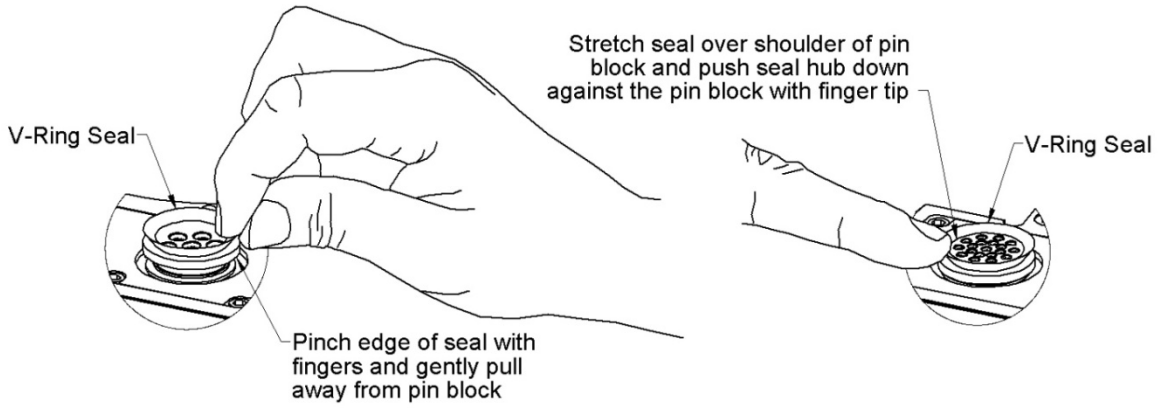
Replace the V-Ring seal:

To remove the existing seal, pinch edge of seal with fingers and gently pull the seal away from the pin block on the Master.

Pull the seal off the pin block.

To install a new seal, stretch the new seal over the shoulder of the pin block.
Push the seal's hub down against the pin block using finger tip.

Figure 4.3—V-Ring seal Replacement



5. Troubleshooting

The Utility Stud Feed modules provide a separable joint in the tube connection between various stud feed supply sources.

Symptom	Possible Cause	Correction
Stud feed fails to operate	Pinched, torn, or fatigued stud feed tube	Inspect stud feed tubes and replace tubes as needed
	Air leaking – Object trapped between modules	Remove object, then re-attempt coupling.
	Air leaking – Swivel Joint O-ring seals worn, damaged, or debris between	Clean in and around swivel joint components. Ensure air stream is free of large particulates, filter as necessary.
		Inspect O-ring seals if worn or damaged, replace O-rings, refer to Section 4.1—O-Ring Seal Replacement .
	Air leaking – Swivel Joint components worn, not moving freely, or damaged	Inspect swivel joint components, make sure swivel rotates freely, if not remove swivel clean and lubricate components and reinstall. If components are worn or damaged replace. Refer to Section 4.2—Swivel Joint Inspection, cleaning, lubrication and Replacement .
Air leaking – Swivel Joint compression spring not maintaining tight pressure between modules	Inspect master swivel joint, press on the swivel to make sure the swivel and race move up and down freely in the housing. If not remove the Swivel, race, and spring and clean the components and housing, refer to Section 2.4—Master Module Swivel Removal . Replace and lubricate components, refer to Section 2.3—Master Module Swivel Installation .	
	The compression spring provides axial compliance. The spring should maintain pressure on the race and swivel so that the retaining ring on the back is held tight against the housing. If not, the compression spring should be replaced, refer to Section 4.3—Compression Spring .	
Loss of Communication or Servo Motor intermittently functioning or not functioning at all	Electrical/Servo Module Contact Pin Contamination or damaged	Ensure that the spring pins on the Master-side can move freely and are not bound by debris. Clean the spring pins. Clean Tool-side module contacts refer to Section 4.4—Electrical module Pin Block Inspection and Cleaning . Inspect seal, replace if damaged refer to Section 4.5—Electrical Module Seal Replacement .
	Contact Pin Separation due to air supply to Tool Changer	Ensure that the Tool Changer has proper pneumatic connections and air is supplied to proper specification. Refer to Tool changer section of this manual for air supply requirements.
	Coupling/Uncoupling Tool Changer under load.	Revise operating procedures to only couple/uncouple with power disconnected and discharged. Field replacement of module contacts is not possible.
	Cable Damage: Pinched, torn, or fatigued cables	Examine cables for damage, perform a continuity test on cables and replace any bad cables.
	Servo Module damaged	Refer to Servo module manual troubleshooting section.
	Drive or Motor damaged	Refer to Servo module manual troubleshooting section.

6. Recommended Spare Parts

For your specific module refer to Section 8—Drawings.

7. Specifications

Utility Stud Feed Module		UA Modules
Weights (Weights include the Electrical or Servo modules)	3.53 lbs. (1.6 kg.) 2.33 lbs. (1.1 kg.)	UA8-M UA8-T
	5.06 lbs. (2.30 kg.) 3.75 lbs. (1.70 kg.)	UA11-M UA11-T
Materials of Construction	Various	Hardened stainless steel swivel joints and adapters, T6 aluminum extension arm and swivel housings
Tube Sizes Supported	3/4 BSP (Others, Contact ATI)	Threaded adapters can be used to attach the feed tubes to the pass-through ports.
	1/4-Turn Feed Connection	1/4 –Turn feed adapters can be used to attach the feed tubes to the pass-through ports.
Stud Size	13 mm max. diameter	Stud feed-through up to 16mm maximum head diameter and smaller is stocked. Contact ATI for other sizes.
Tube Flexibility	5° Off Normal 360° Rotation	The tube retains its flexibility to move with robots motions, so experience no strain at the joint.

8. Drawings

8.1 UA8 Utility Stud Feed Module, Service Parts Drawing

REV.	DESCRIPTION	INITIALS	DATE
01	Final design release - v11.1 - final revision	CLP	11/26/2010
02	Eco 10352, Replaces added callouts for Pin A	—JF	11/27/2012

Item No	Qty	Part Number	Description
1	2	3410-0001051-01	O-ring AS-568A-018
2	2	3610-1807501-21	SS Compression Spring
3	4	3690-2700001-11	E-Ring, 1.1875, Black Phosphate
4	2	3700-20-2309	Stud Welder Attachment Race
5	2	3700-20-6221	Master Swivel, Quarter-Turn, Dia 14.5, Small Chamfer
6	2	3700-20-6222	Tool Swivel, Quarter-Turn, Dia 14.5, Small Chamfer
7	1	3700-20-6224	Tool Swivel, Quarter-Turn, Plug
8	1	9005-20-1198	Master Cleat
9	1	9005-20-1199	Tool Cleat
10	2	9120-RB26-M	RB26 Master module
11	2	9120-R26R180-T	R26R180 Tool Module

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

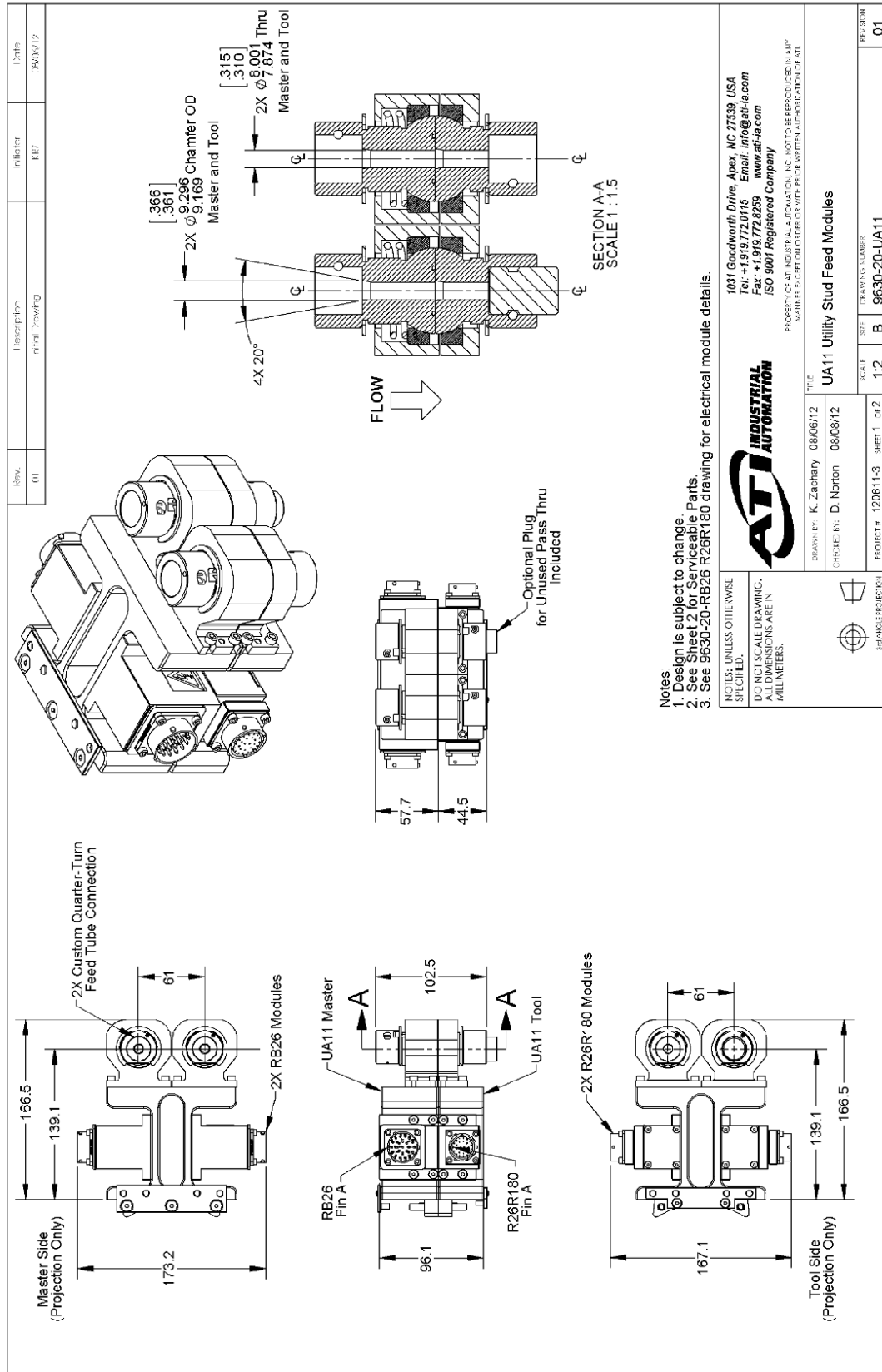
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1031 Goodworth Drive, Apex, NC 27539, USA
 Tel: +1 919 772 0115 Email: info@ati-ia.com
 Fax: +1 919 772 8259 www.ati-ia.com
 ISO 9001 Registered Company

DATE: 11/13/10
 DRAWN BY: Ken Poole
 CHECKED BY: D Newton
 WORK FILE: 542
 APPROVED BY:

TITLE: UA8 Utility Stud Feed Modules
 DRAWING NUMBER: 9630-20-UA8
 SCALE: 1:3
 SHEET: B
 PROJECT RELEASE #: SHIRT 1 OF 1

8.2 UA11 Master and Tool Utility Module Drawings



REV.	DESCRIPTION See Sheet(s)	PART NO.	DATE
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Master Side

Tool Side

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	2	3410-0001051-01	O-Ring AS-568A-018
2	2	3700-20-7769	Master UA Swivel, Quarter Turn, M6 Stud
3	2	3700-20-2309	Stud Welder Attachment Housing Race
4	2	3610-1807501-21	SS Compression Spring
5	2	3690-2700001-11	E-Ring, 1.1875, Black Phosphate
6	1	9005-20-1198	Master Cleat Sub-Assembly
7	2	9120-RB26-M	RB26-M Master Module Assembly

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	2	3700-20-7770	Tool UA Swivel, Quarter Turn, M6 Stud
2	2	3690-2700001-11	E-Ring, 1.1875, Black Phosphate
3	1	3700-20-6224	Plug, Tool Swivel, Quarter-Turn
4	1	9005-20-1199	Tool Cleat Sub-Assembly
5	2	9120-R26R180-T	R26 Tool Electrical Module Assembly, Conn Rotated 180

NOTES: UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS.

DO NOT SCALE DRAWING.

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1031 Goodworth Drive, Apex, NC 27539, USA
 Tel: +1 919 772 0115 Email: info@ati-ia.com
 Fax: +1 919 772 8259 www.ati-ia.com
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CHECKED BY: D. Norton 08/08/12	PROJECT # 120611-3	PROJECT NAME: UA11 Utility Stud Feed Modules	