AZ-100 SERIES ROBOT

INSTALLATION AND MAINTENANCE MANUAL

MODEL: _____

SERIAL#: _____

S#: _____

REVISION 8
SEPTEMBER 1997

TABLE OF CONTENTS

This manual provides the operational, maintenance, and safety instructions for the AAC **AZ-100 Series** Robots.

The model number, serial number, and the date of manufacture are located on the name plate located on the side of the traverse beam of the robot.

Please refer to the 5 digit "S" number (S-#####) when contacting Automated Assemblies Corporation. This number is located on the name plate on the control cabinet.

For service or information please contact:

Automated Assemblies Corporation
25 School Street
Clinton, MA 01510
(978) 368-8914

1.0 SAFETY

1.1 Robot Workcell Safety

Automated Assemblies Corporation provides the following safety program to assist its users in the safe and proper operation of its robotic workcells and the employer required training.

1.2 What Are You Responsible For

It is important to understand the "users" or "employer" of the robotic workcell is the company that purchased the robotic equipment. Further, the "user" or "employer" is responsible for safe-guarding the cell and assuring all those people whom interact with it are properly trained in its operation. This means that the user must provide the physical barrier guards that protect people from inadvertently walking into the work envelope of the robot. If you have not purchased guarding from AAC you are required by law to provide a safeguard, this is covered by the OSHA document CFR-1900, this document is a
Federal requirement that if not followed, can lead to significant fines.

Paragraph 6 of ANSI/RIA 15.06 provides a good reference explaining the responsibility of
the user. The following is a quotation from paragraph 6.1:

> *"The user of a robot shall ensure that safeguards are provided and used in accordance with clauses 6, 7, & 8 of this standard. The means and degree of safeguarding including the reliability of the designated safeguarding, shall correspond directly to the assessed risk consistent with the robot application. Safeguarding may include but not be limited to presents sensing safeguarding devices, barriers, awareness barriers, awareness signal, designated procedures and training." ANSI/RIA 15.06, Paragraph 6.1*

1.3 What Does a Robot Guard Look Like

Figure 1.1 shows an example of a physical barrier. Several features that are required and worth noting are:

1. Full physical barrier guard, a minimum of 7' tall.
2. The entrance is wired to a "safety switch", when opened, turns all drive power off.
3. Appropriate signs are mounted to the fencing.
4. A conveyor transfers the parts from the robot envelope to outside of the fencing.

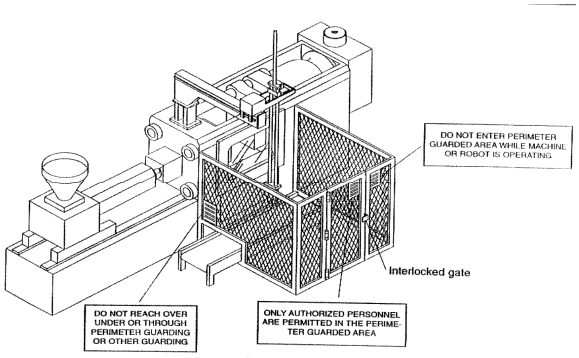

Figure 1.1

1.4 What Specifications Am I Required to Follow

For a comprehensive understanding of exactly what is required of the "users" purchasing, the following specifications are strongly recommended:

ANSI/RIA 15.06	This covers the safety requirements for all industrial robots
ANSI/SPI 151-27	This covers robots used on horizontal molding machines
OSHA CFR-1900	This is OSHA's General Duty Clause which covers all industries

The user should provide time to review these documents and perform internal training directed and adjusted to the level of use each employee has with the workcell. For example, a gate operator who's responsibility is strictly for starting and stopping the work cell, would not receive the same in-depth training that a programmer of the robot would. However, at all levels the safety procedures must be covered, it is useful to document that the training has been both given and understood. Paragraph nine of ANSI/RIA 15.06 provides a good reference on the required training, below is the opening sentence of paragraph nine.

> *The user shall ensure that any person who programs, teaches, operates, maintains or repairs robots or robot systems is trained and demonstrates competence to perform the assigned task safety." ANSI/RIA 15.06 Paragraph 9.1*

1.5 Are All Robots Created Equal?

You are responsible for safeguarding all take out devices regardless of drive or style. Sprue Pickers, pneumatic rectilinear robots and servo rectilinear robots all must be safeguarded.

1.6 Other Considerations

One item worth noting, you must safeguard all personnel, for example, if a robot discharges its parts to the operators side of the molding machine, the process engineer or technician must be safeguarded at start up. Therefore, a structural tunnel or equivalent guard must be in place to protect the person at the controls of the molding machine and not allow that person in the robot work envelope.

The following page offers a contact reference for safety devices, signs and standards compiled for your convenience.

1.7 Safety Procedures

The following section outlines safety procedures designed to assist the user and set up personnel to assure proper and safe operation.

1. Prior to installation and operation read the entire robot manual.

2. Rigging and set up is outlined in section 3.0 of this manual. Lifting must only be performed by qualified trained riggers, to assure safe and proper installation.

3. The robot must be secured using grade 8 socket head cap screws or equivalent tightened to the specified torque in section 3.0.

4. The robot must be fully guarded. The unit must have its entire work envelope enclosed via a physical barrier; all entrances, exits or other penetrations must be electrically interlocked with the systems controller. Reference SPI's recommended guideline for safety requirements for integration, care and use of robots on horizontal injection molding machine.

5. Safety interlocks for the Injection Molding Machine interface must be in place.

6. All guards, signs, interlocks and disconnects must be in place prior to **any operation.**

7. Robot/IMM interface should only be completed by an injection molding machine factory authorized technician to assure safe and proper operation.

8. Use proper lockout/tag out procedure when performing maintenance, set up, or trouble shooting. (Reference Section 1.9).

9. Never make any adjustments with the robot in operation or with power on, unless instructed to do so by this manual.

10. Never enter the physical barrier guard while power is on.

11. All software and / or software alterations must be approved by Automated Assemblies Corporation prior to use.

12. When starting or stopping the robot be sure the proper procedures are followed.

13. During operation keep all control boxes and electrical enclosures closed.

14. Keep all water and liquid from electrical components.

15. Operational safety procedure

    a. All AAC machines are equipped with an emergency button. It is a red mushroom shaped push button located on the operating pendant.

    b. All operators are to wear safety glasses when operating or adjusting equipment.

    c. **DO NOT** operate equipment unless all guards are in place.

    d. Obey all safety signs.

    e. Before powering up the equipment, clean all areas of foreign materials and jammed parts.

    f. Never use hands or fingers to move parts along tracks or conveyors or to dislodge parts.

    g. Never touch any moving part when robot is operating.

    h. When performing maintenance or repairs always:

        Stop the robot
        Shut off the electrical power
        Shut air off at the main supply

1.8 Safe Guarding References

SAFE GUARDING REFERENCES	
Company	**Product & Service**
All Phase Bob Rudzinski 632 Cambridge St. Worcester, MA 01610 (508) 757-2761 Fax: (508) 795-0258	Electrical Distributors Sells for STI
Action Automation John Galvin 10 Larsen Way P.O. Box 2540 North Attleboro, MA 02763 (508) 699-7411 Fax: (508) 699-2060	Value Added Resale for Frame World Aluminum Extrusions Lexan and Wire Mesh
ANSI Publications 11 East 42nd St. New York, NY 10036 (212) 642-4900 Fax: (212) 302-1286	Sells ANSI Specs ANSI / RIA 15.06 ANSI / SPI 151.27
OSHA Superintendent of Documents P.O. Box 371954 Pittsburgh, PA 15250-7954 Questions: (202) 219-8151 Publications: (202) 512-1800	CFR part 1910 Labor 29
Scientific Technologies Inc. Dennis O'Shea 6550 Dunbarton Circle Fremont, CA 94555-3611 USA (510) 608-3400 Fax: (510) 744-1442	Centurion Switches* Trojan Switches* Elf. Sprite Switches* Safebook 2 (Free Guide Book) Safety Interlock Switches *Review your application with an STI representative
Seton 20 Thompson Rd. Branford, CT 06405-0819 1-800-243-6624 Fax: 1-800-345-7819	Safety signs and labels
Global Industries Equipment 22 Harbor Park Drive Dept. J Port Washington, NY 11050 1-800-645-1232 Fax. 1-800-336-3818	Prefab wire mesh panels and doors
Schmersal 5 West Cross St. Hawthorne, NY 10532 (914) 769-5006 (914) 769-3641	AZ 15/16 Safety Switch Tamper Resistant Interlock Switch Manual Machine Safeguarding Handbook (Free Guide Book)

1.9 Lockout/Tagout Procedure

Purpose
This procedure establishes the minimum requirements for lockout of energy sources that could cause injury to personnel. All employees shall comply with the procedure.

Responsibility
The responsibility for seeing that this procedure is followed is binding upon all employees.
All employees shall be instructed in the safety significance of the lockout procedure by (designate individual). Each new or transferred affected employee shall be instructed by (designate individuals) in the purpose and use of the lockout procedure.

Preparation for Lockout
Employees authorized to perform lockout shall be certain as to which switch, valve or other energy isolating devices apply to the equipment being locked out. More than one energy source (electrical, mechanical, or others) may be involved. Any questionable identification of sources shall be cleared by the employees with their supervisors. Before lockout commences, job authorization should be obtained.

Sequence of Lockout Procedure
(1) Notify all affected employees that a lockout is required and the reason therefore.
(2) If the equipment is operating, shut it down by the normal stopping procedure (depress stop button, open toggle switch, etc.).
(3) Operate the switch, valve, or other energy isolating device so that the energy source(s) (electrical, mechanical, hydraulic, etc.) is disconnected or isolated from the equipment. Stored energy, such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc., must be dissipated or restrained by methods such as grounding, re-positioning, blocking, bleeding-down, etc.
(4) Lockout the energy isolating devices with an assigned individual lock.
(5) After ensuring that no personnel are exposed and as a check on having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate. CAUTION: Return operating controls to neutral position after the test
(6) The equipment is now locked out.

Restoring Equipment to Service
(1) When the job is complete and equipment is ready for testing or normal service, check the equipment area to see that no one is exposed.
(2) When equipment is all clear, remove all locks. The energy isolating devices may be operated to restore energy to equipment.

Procedure Involving More Than One Person
In the preceding steps, if more than one individual is required to lock out equipment, each shall place his own personal lock on the energy isolating device(s). One designated individual of a work crew or a supervisor, with the knowledge of the crew, may lock out equipment for the whole crew. In such cases, it shall be the responsibility of the individual
to carry out all steps of the lockout procedure and inform the crew when it is safe to work on the equipment. Additionally, the designated individual shall not remove a crew lock until it has been verified that all individuals are clear.

Rules for Using Lockout Procedure
All equipment shall be locked out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Do not attempt to operate any switch, valve, or other energy isolating device bearing a lock.

2.0 ROBOT SPECIFICATIONS

2.1 AZ Series Nomenclature

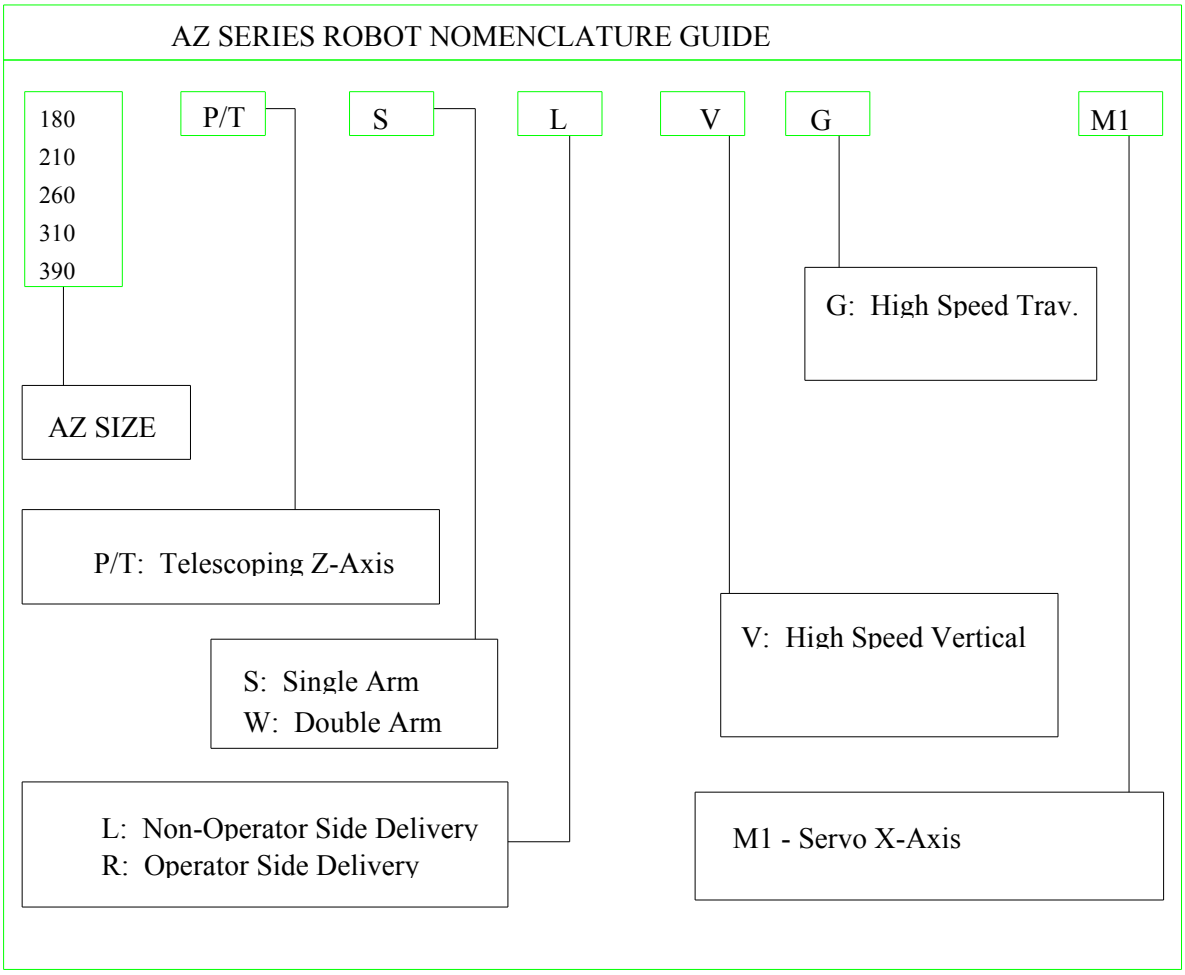

Figure 2.1 - AZ 100 Nomenclature

2.2 Machine Specifications

2.2.1 AZ-210 through AZ-390

All specification, dimensions, and design characteristics listed below are subject to change without notice. Reference Figure 2.2.1.

TECHNICAL SPECIFICATIONS†				
ROBOT	**AZ-210**	**AZ-250**	**AZ-310**	**AZ-390**
PRESS SIZE (tons) *	100-150	150-250	250-350	350-500
X-AXIS STROKE **B**	47.2” / 55.1” / 63.0” / 70.8” / 78.7” / 86.6” / 84,4”			
Z-AXIS STROKE **F**	21.6”	25.5”	31.5”	39.4”
Y-AXIS STROKE **E**	3.9” / 5.9” / 9.8”			
CYCLE TIME**	7.0 sec.	8.0 sec.	9.0 sec.	10.0 sec.
TAKE OUT TIME**	1.3 sec.	1.6 sec.	1.8 sec.	2.0 sec.
PAYLOAD**	29.0 lbs.	29.0 lbs.	29.0 lbs.	29.0 lbs.
ROBOT HEIGHT **C**§	81.7” minus **H dim.**	89.5” minus **H dim.**	101.4” minus **H dim.**	117.1” minus **H dim.**
BASE HEIGHT **J**§§	**C dim.** minus 48.9”	**C dim.** minus 52.8”	**C dim** minus 60.7”**.**	**C dim.** minus 68.6”

*GENERAL MACHINE SIZE - Platen size to determine actual model.
**Specification is dependent on final robot configuration and actual application.
†Automated Assemblies Corporation reserves the right to modify these specifications without notice.
§ Assumes 13.6” standard A2 chuck turn unit.
§§ Subtract 2” from calculated base height when using traverse strokes of 70.8” or more.

PHYSICAL SPECIFICATIONS	
WEIGHT	600 lbs. - 950 lbs.

X-AXIS	**47.2”**	**55.1”**	**63.0”**	**70.8”**	**78.7”**	**86.6”**	**94.4”**
	OPERATOR DELIVERY						
BEAM LENGTH (OUT) **A**	67.8”	76.0”	83.9”	91.7”	99.6”	107.5”	115.3”
BEAM LENGTH (IN) **D**	33.7”	20.9”	20.9”	20.9”	20.9”	20.9”	20.9”
	NON-OPERATOR DELIVERY						
BEAM LENGTH (OUT) **A**	82.0”	80.6”	88.5”	96.3”	104.2”	112.1”	119.9”
BEAM LENGTH (IN) **D**	19.5”	25.5”	25.5”	25.5”	25.5”	25.5”	25.5”

Y-AXIS	**3.9”**	**5.9”**	**9.8”**
MAX REACH **I** (min.)	18.8” (3.3”)	23.6” (3.3”)	32.2” (3.3”)
FRONT CLEARANCE **G**	27.7”	32.8”	38.7”
REAR CLEARANCE **K**	18.0”	18.0”	18.0”

OPERATIONAL SPECIFICATIONS	
POWER SUPPLY	
AZ100 SERIES 3 AXIS PNEUMATIC	115 VAC ± 10%, 1 phase, 50/60 Hz, 5 amps
AZ100 SERIES M1 Option	230 VAC ± 10%, 3 phase, 50/60 Hz, 20 amps
CONTROLLER	Programmable Microprocessor
CONTROL VOLTAGE	24 vdc
INTERFACE	SPI Standard
DRIVE SYSTEMS	All axes pneumatically driven
AIR PRESSURE	90 psi constant
AIR CONSUMPTION	0.25 ft.^{3}/cycle

OPTIONS	
RUNNER CHUCK	For basic sprue picking operations.
90°/180° WRIST ROLL	For increased part positioning.
CONTROLLER UPGRADE	For increased flexibility.
TRAVERSE MID-POINT DROP	For increased part separation capability.
SPI INTERFACE ADAPTER	For presses not equipped with the standard SPI interface
Z-AXIS HIGH SPEED CIRCUIT	For faster take-out times.
TELESCOPING Z-AXIS	For limited overhead applications
DOUBLE ARM	For use with three plate molds and stack molds.
ELECTRIC / SERVO X-AXIS	For multiple stop positions.
"T" STYLE CONFIGURATION	For mold loading clearance.

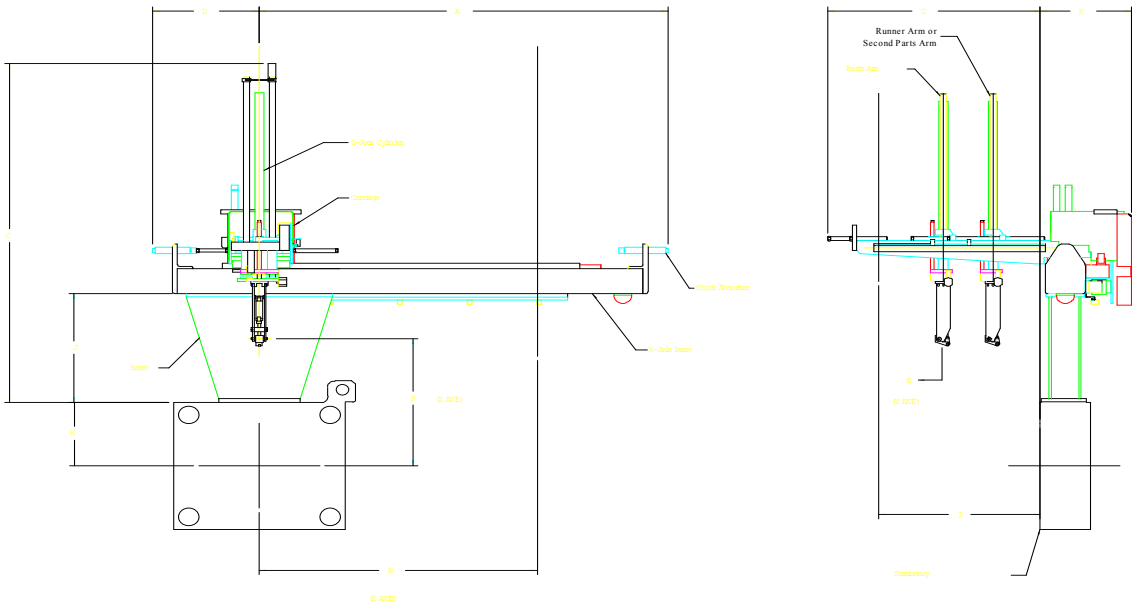

Figure 2.2.1
AZ-100 Series Robot

2.2.2 Pneumatic and Power Requirements

All specifications, dimensions, and design characteristics listed below are subject to change without notice.

PNEUMATIC/POWER REQUIREMENTS					
	Working Air	Air Flowrate (CF/cycle)		Power	
AZ-Series	Pressure	Single Arm	Double Arm	Pneum.	Servo
AZ-210	75 PSI constant			115VAC	230VAC
AZ-250		1.9	2.3	1 PHASE	3 PHASE
AZ-310		2.3	2.7	60 Hz	60 Hz
AZ-390		2.7	3.4	5 AMPS	20 AMPS

2.3 Robot Motions

The follow table and figure summarize the robot motions relative to the molding machine.

1	Z Axis Down Into Mold	7	Chuck Rotate Horizontal
2	Y Axis Forward	8	Z Axis Down for Part Release
3	Chucking (Grip Parts)	9	Part Release (Vacuum Off, Grippers Open)
4	Y Axis Back	10	Z Axis Up
5	Z Axis Up	11	Chuck Rotate Vertical
6	X Axis Traverse Out	12	X Axis Traverse Over Mold

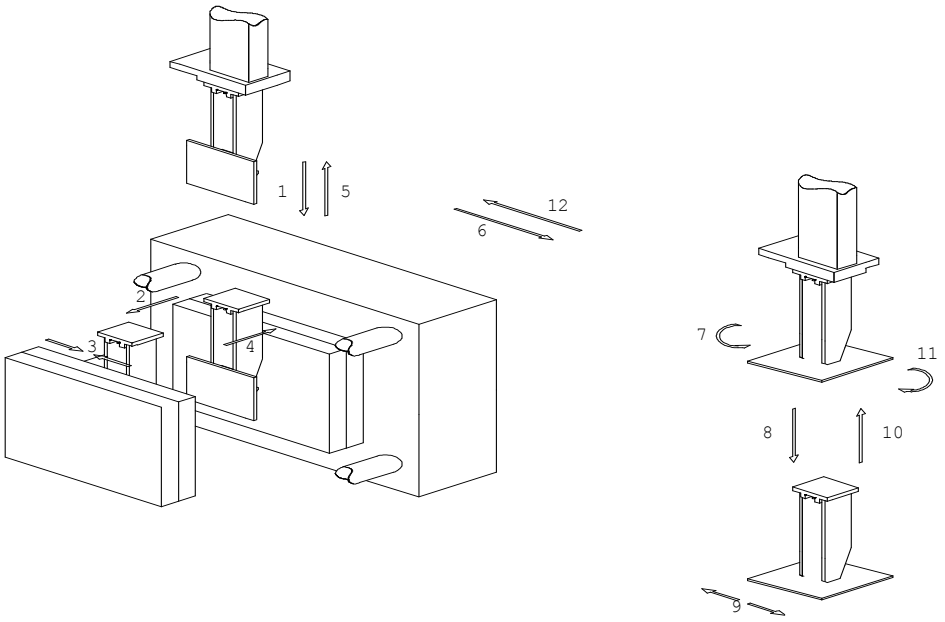

Figure 2.3 Robot Motions

3.0 INSTALLATION

3.1 Electrical Interface

An electrical interface diagram is prepared for each AZ robot and molding machine by Automated Assemblies Corporation in accordance to the Society of Plastics Industry (SPI). The robot should be wired to the molding machine in accordance with the provided
electrical schematic by a factory authorized injection molding machine technician.

Follow the instructions in the Controller Section, to prepare for the robot operation.

- The robot controller has control of the molding machine cycle.
- The clamp will open or close only when the robot is in a safe position (up or traversed out).
- Ejectors will operate only when allowed by the robot controller.
- To operate the molding machine without use of the robot, the controller must be switched to manual.

3.2 Installation for Model AZ-210 through AZ-390

The following steps must be followed to insure proper AZ-Series robot installation.

1. Inspect the AZ-Series carefully for shipping damage, loose screws, etc.

2. Clean the molding machine stationary platen of dirt and protrusions.

3. Drill and tap the mounting holes for the AZ-Series in the stationary platen. Refer to Figures 3.2.1 and 3.2.2 Mounting Hole Location Drawing. Before you drill and tap platen, confirm the base to be mounted. If the pattern cannot be drilled to the specified drawing, contact AAC.

4. **NOTE:** The carriage must be secured to prevent sliding along the bearing. Fasten C Clamps to the cam rail on each side of the carriage to prevent sliding.

5. Lift the AZ-Series onto the stationary platen using a crane or hoist with a cable rated not less than 1 ton (908 Kg) minimum. Lift at the three points shown in Figure 3.2.3 with the cables looped through the hoist rings at points A and B and around the front of the carriage, point C. Carefully locate the balance point

of the robot by positioning the Y axis carriage and clamping it in a secure position on the X axis as shown in Figure 3.2.3.

6. Secure the AZ-Series to the stationary platen using the mounting fasteners supplied and listed below. **Use lock washers and loctite with all bolts.**

Standard Base	QTY	Bolt Size	Torque
D36064	5	1/2-13 x 1 3/4 UNC, Grade 8	75 Ft. lb. min.
D35259	7	5/8-11 x 2 UNC , Grade 8	100 Ft. lb. min.

7. The AZ-Series must be supplied with compressed air. The service pressure should be set at 75 PSI. The user is responsible for supplying the hose and a female connector, listed below, to connect the AZ-series to the air supply.

AZ-Series	User Supplied Hardware	Single Arm	Double Arm
210-390	Hose ID Female Conn.	1/2 1/4 PT	1/2 or 3/4 1/2 PT

A hose smaller than the required inside diameter may result in an inadequate supply of compressed air to the AZ-Series and adversely affect the unit's operation.

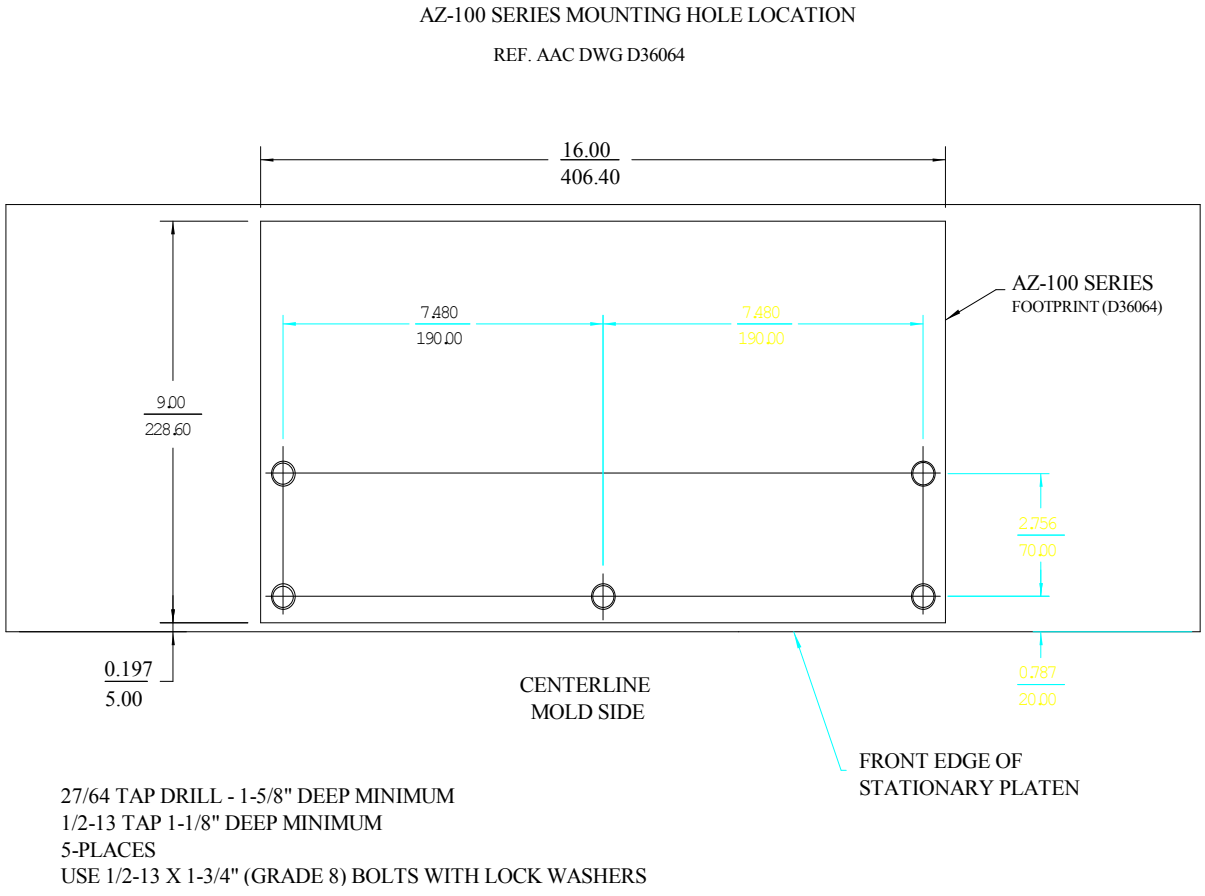

Figure 3.2.1 - AZ-210-310 Mounting Hole Location

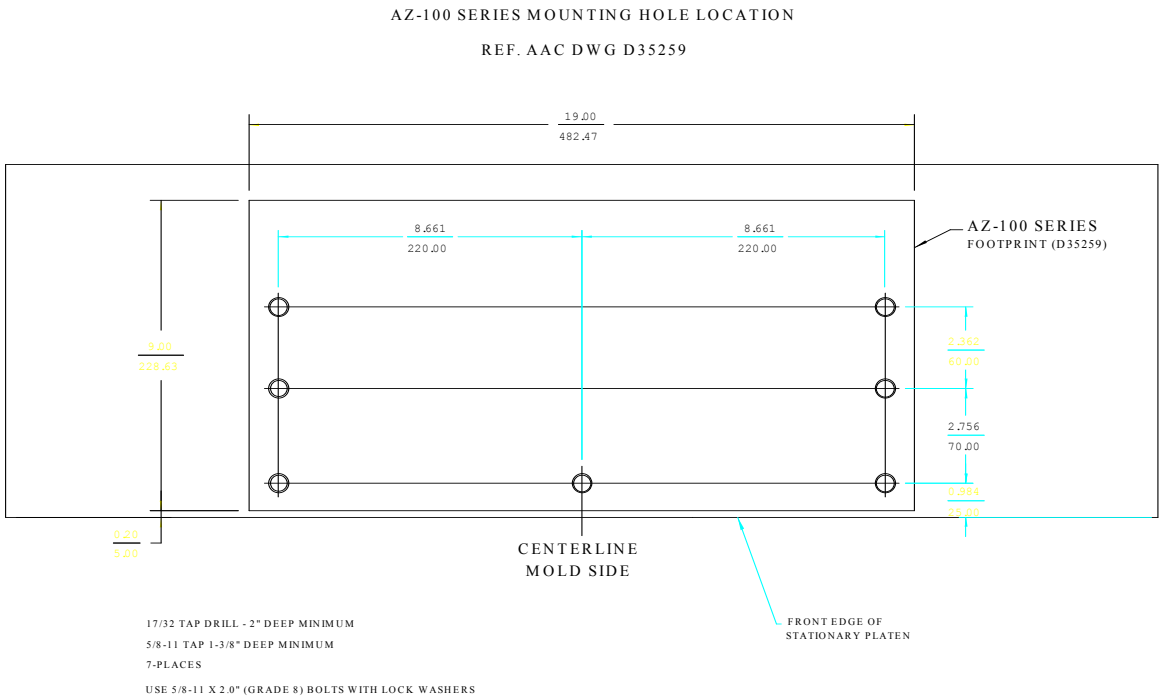

Figure 3.2.2 - AZ-390 Mounting Hole Location

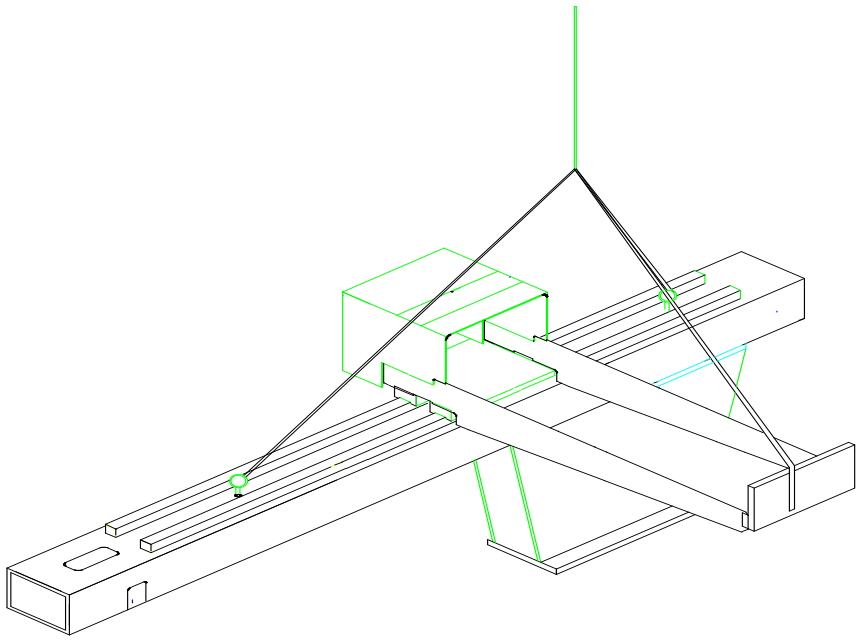

Figure 3.2.3
Lifting Diagram for AZ-210 through AZ-390

4.0 ADJUSTMENTS

4.0 ADJUSTMENTS

Note: All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures should be in place.

4.1 Pneumatic Adjustments

Upon completion of adjustment(s), the proximity limit switches may require adjustment. Refer to Section 4.2.1.

4.1.1 Vertical Position Adjustment

1. Loosen the jam nut on the adjusting screw.
2. Loosen the (2) clamp bolts.
3. Rotate the adjusting screw to raise or lower the vertical arm assembly to the desired position (insure that the end-of-arm tooling is at the mold centerline).
4. Tighten the (2) clamp bolts.
5. Tighten the jam nut.

NOTE: The z-axis cylinder stroke is not adjustable. The adjustment described above is only for alignment of the end-of-arm tooling. **DO NOT** attempt to limit the z-axis stroke by using the proximity switch actuators clamp; this will damage the guide tubes and stroke cushioning.

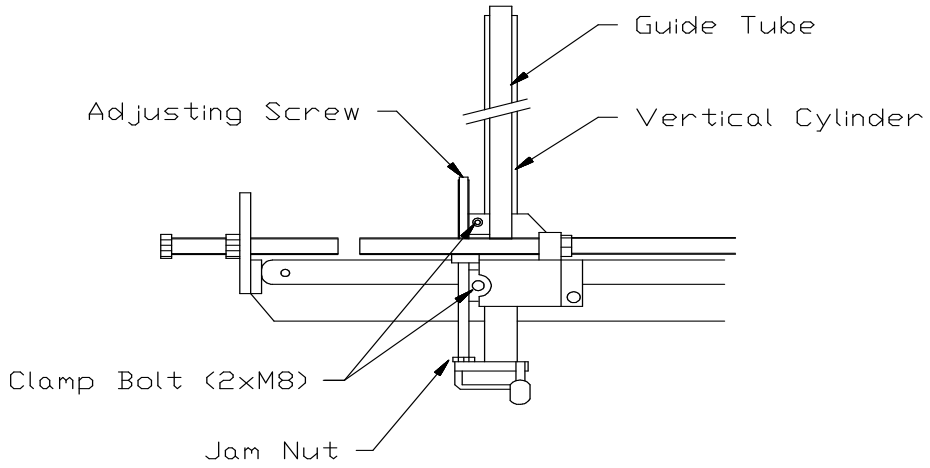

Figure 4.1.1
Z-Axis Adjustment

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

4.1.2 Horizontal Adjustment

Y-Axis Position Adjustment -Manual Back Position

1. Release lock nut (1).
2. Rotate adjusting screw to move arm assembly forward or back.
3. Tighten lock nut (1).
4. Adjust proximity limit switch (Reference Section 4.2.1).

Y-Axis Stroke Adjustment - Manual Forward Position

1. Release lock Nut (2).
2. Adjust horizontal stop bolt to desired position.
3. Tighten lock nut (2).
4. Adjust proximity switch (Reference Section 4.2.1).

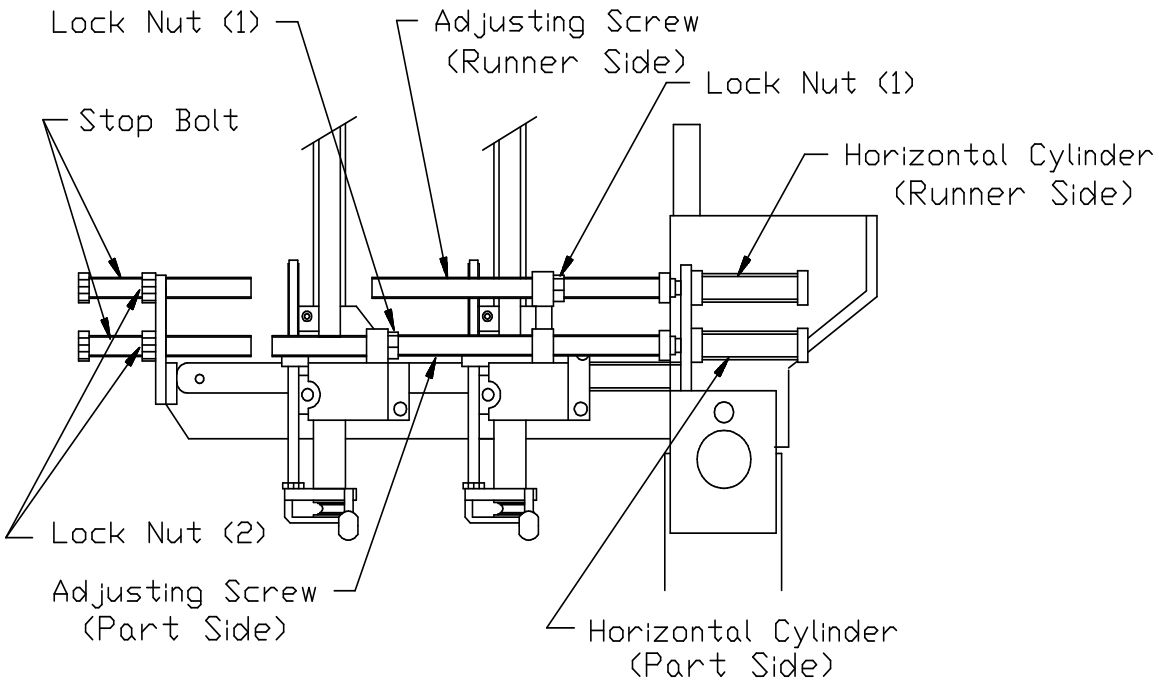

Figure 4.1.2

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

4.1.3 X-Axis Adjustment

X-Axis Shock Position

1. Release lock nut.
2. Adjust the shock absorber to place the arm assembly in proper position. (Centerline of mold).
3. Tighten lock nut.
4. Adjust proximity switch (Reference Section 4.2.1).

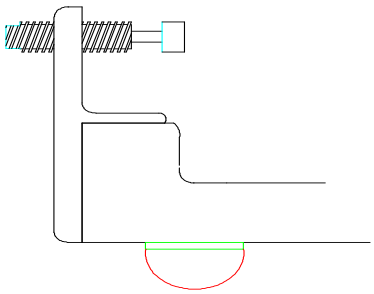

Figure 4.1.3.1
Traverse In/Out Shock Position Adjustment

X-Axis Stroke Out Adjustment

1. Release lock nut.
2. Rotate adjusting screw to desired stroke
3. Tighten lock nut.
4. Adjust proximity switch (Reference Section 4.2.1).

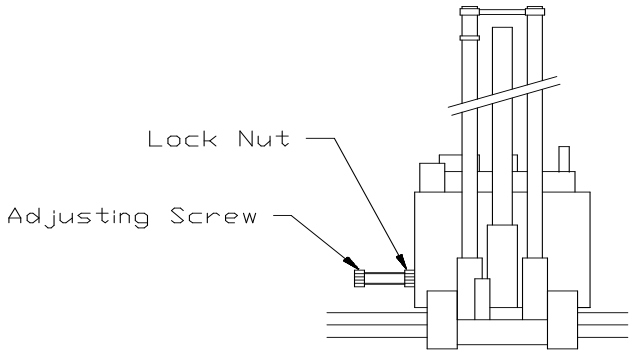

Figure 4.1.3.2
Traverse Stroke Out Adjustment

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

4.1.4 High Speed X-Axis Pneumatic Circuit (Optional Equipment)

The circuit below is a dual pressure deceleration circuit. It allows high speed traverse at full line pressure between the two decel proximity sensors. The traversing speed can be increased by reducing the impact at the traverse out.

Figure 4.1.4
Pressure Deceleration Circuit

1. Set the "Decel" proximity sensors 10" to 12" from each end of the stroke proximity sensor. This distance may be changed to provide smooth performance.
2. Set the pneumatic pressure on the high speed control between 1.5 and 2.5 kg/cm^2. Too high a pressure will cause slamming; too low a pressure will result in bouncing.
3. Stand away from the robot. Keep hands and clothing clear.
4. In Manual Mode, check the traverse out and traverse return operation.
    a. Turn the knob on the traverse out/traverse return solenoid counterclockwise to increase speed.
    b. Set the pressure to minimize bouncing and slamming.

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

Troubleshooting - High Speed X-Axis Circuit.

Problem	Cause	Action
Speed drops significantly during traversing/ traversing return.	Excessive reduction of traversing speed.	Open the knob of the traversing solenoid valve to increase speed.
Carriage does not traverse to the end.	Reduction in the traverse pneumatic pressure. Carriage cannot push through shock absorber.	Increase the pressure.
The speed is not increasing	The limit switch(s) are not turning on because the pneumatic pressure is too low.	Increase the pneumatic pressure. Check each limit switch
Speed cannot be increased sufficiently because of impact.	Pneumatic pressure is too high.	Reduce the pneumatic pressure
LED on the Limit Switch does not light.	Limit switch cannot be switched on.	Check the limit switch.

4.1.5 M1 Servo X-Axis Option

The schematic below represents a M1 servo x-axis option. It allows multipostioning for greater flexibility and control. The circuit is regulated by the sensors shown in figure 4.1.5.

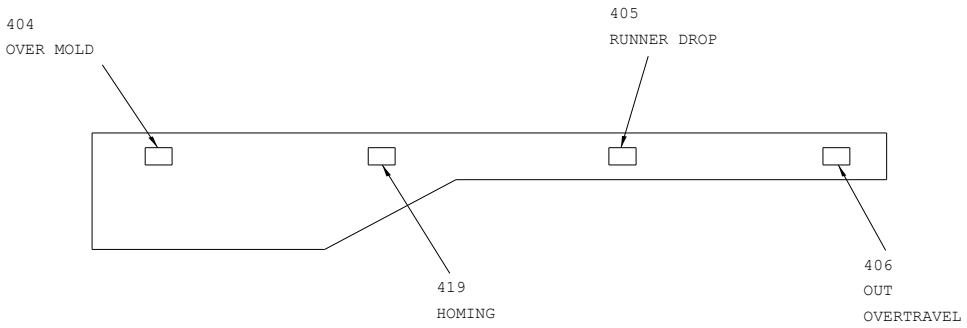

Figure 4.1.5.
Proximity Switches for M1 Option

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

In order to ensure efficient operation of the M1 option the belt should be maintained periodically in the following manner:

1. **Monthly Preventative Maintenance**
   Check tension and condition of timing belt. Belt should deflect 1" at center of span, do not over tension as this will shorten belt life.

2. **Annual Preventive Maintenance**
   The timing belt is a consumable item with a finite life. It is recommended that it be replaced annually to ensure maximum machine performance.

If failure does occur in the belt the following procedure should be used to replace it.

1. Shut down the power and manually move the carriage to mold position.
2. Remove the belt cover from the motor bracket.
3. Release the belt take-up, and take the belt off the take-up pulley.
4. Feed the belt around the drive pulley to move the carriage to a point that access to the belt clamp is convenient
5. Mark the position of the belt clamp on the drive bracket, and the position of the belt on the belt clamp.
6. Remove the belt clamp from the drive bracket, and unclamp the belt from the belt bracket.
7. Clamp the new belt in the same position as the original, and fasten the belt clamp to the drive bracket in position as before.
8. Move the carriage to the inner bumper, feeding the belt around the drive pulley.
9. Take up slack in the belt until the belt sags approximately 1/8". Tighten take up bolt to 100 in-lbs.
   CAUTION: Tightening the belt beyond this point will reduce gearhead life.
10. Replace the belt cover on the motor bracket.
11. Power up and home as described in section 2.0 the controller manual.

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4.2 General Robot Adjustments

4.2.1 Proximity Switch Adjustment

Proximity switches must be adjusted after any change in position adjustment.

1. Retract the cylinder.
2. Loosen the proximity switch mount screws
3. Slide the proximity switch under it's actuator, the LED indicator light will light, indicating the switch is on.
4. Tighten the mount screws.

Repeat the procedure with the cylinder extended.

NOTE: The actuator should travel past the center line of the proximity switch. The actuator should be .24 in. (6 mm) or less from the sensing surface of the switch.

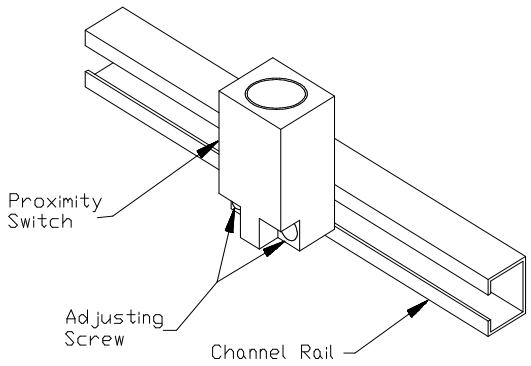

Figure 4.2.1
Proximity Switch Adjustment

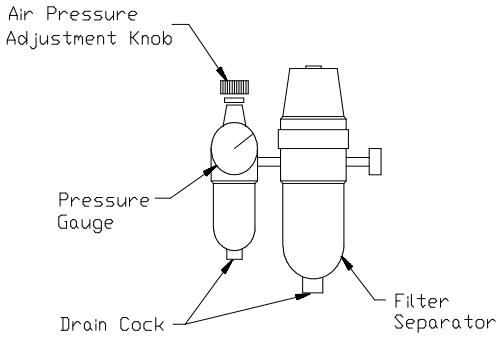

Figure 4.2.2
Air Unit Adjustment

4.2.2 Air Unit Adjustment

The air pressure must be between 75 PSI. A pressure below 71 PSI may cause malfunctions of the operation. At 50 PSI (3.5 kg/cm^2) the vertical arm auto latch mechanism will be activated. To adjust the air pressure:

Turn the regulator knob clockwise to increase the pressure.
Turn the regulator knob counterclockwise to decrease the pressure.

NOTE:

1. Do not wipe the air unit casing with paint thinner or other organic solvents.
2. If the air pressure drops by 28 PSI (2 kg/cm^2). or more while the take out robot is in operation, check the following to remove the cause.
    a. A clogged air filter element.
    b. Insufficient capacity of compressor.
    c. Excessively small and/or long connecting hoses.

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4.2.3 Flow Controls Adjustment (SMC Valve Stack)

The speed of each movement is regulated by flow controls provided on each solenoid valve. Turning the flow control clockwise or counterclockwise decreases or increases the speed respectively (Reference Figure 4.2.3).

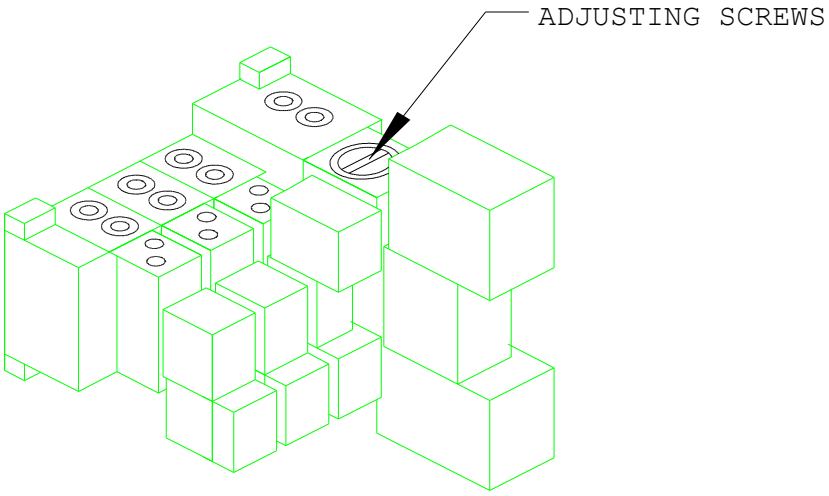

Figure 4.2.3
Flow Control Adjustment

4.2.4 Pneumatic X-Axis & Telescoping Z-Axis Shock Absorber Adjustment

The cushioning of the telescoping z-axis or x-axis cylinder is done by a shock absorber. The firmness of the cushion is increases as the number on the adjusting screw becomes greater (reference Figure 4.2.4).

Figure 4.2.4
Pneumatic X-Axis & Telescoping Z-Axis Shock Absorber Adjustment

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never

attempt to make adjustments “on the fly” with the robot in motion or in automatic mode. If in doubt, simply call AAC’s Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

4.2.5 Cylinder Cushion Adjustment

The y-axis cylinder(s) has an air cushion for the retraction stroke for protection from impact. The standard z-axis cylinder(s) has an air cushion and a bypass cushion at each end for protection from impact. The bypass valve is a preliminary cushion.

If the cushion is set too light, the cylinder rod will slam at impact. If the cushion is set too firm, the rod will bounce.

Standard Z-Axis Cylinder Cushion (Reference Figure 4.2.5.1)

a) To increase cushion and/or bypass, rotate corresponding adjusting screw(s) clockwise.
b) To decrease cushion and/or bypass, rotate corresponding adjusting screw counterclockwise.

The cushions are pre-set as follows:

From the closed position; the bypass adjusting screw is backed out (3) turns, and the cushion adjusting screw is backed out (1-1/2) turns.

Y-Axis Cushion Adjustment (Reference Figure 4.2.5.2)

1. Loosen lock nut.
2. Adjust cushion:
   To increase cushion, turn adjusting screw clockwise.
   To decrease cushion, turn adjusting screw counterclockwise.
3. Tighten lock nut.

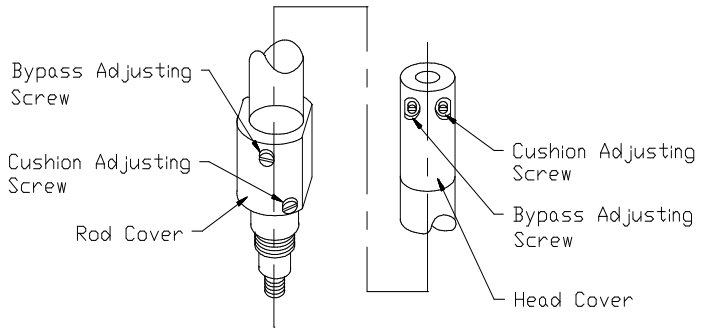

Figure 4.2.5.1
Standard Z-Axis Adjustment Components

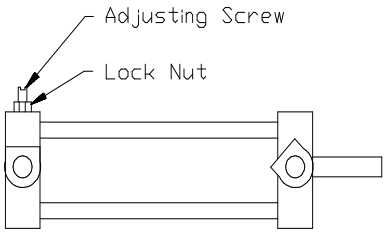

Figure 4.2.5.2
Y-Axis AdjustmentComponents

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

4.2.6 Z-Axis Speed Feature-Mechanical Bypass Valve

The AZ model is provided with a two speed z-axis pneumatic circuit. The z-axis speed will be at "low speed" when the carriage in the traversed out position and at

"high speed" when the carriage is in the traversed in position.

1. To adjust the flow control shown below for the "Low Speed Z-Axis", the carriage must be in the traversed out position.

NOTE: The flow control shown in Figure 4.2.5 has no effect on speed when the carriage is in the traversed in position (over the mold).

This figure shows the mechanical valve for the model AZ-100WL robot and is for non-operator discharge, double arm.

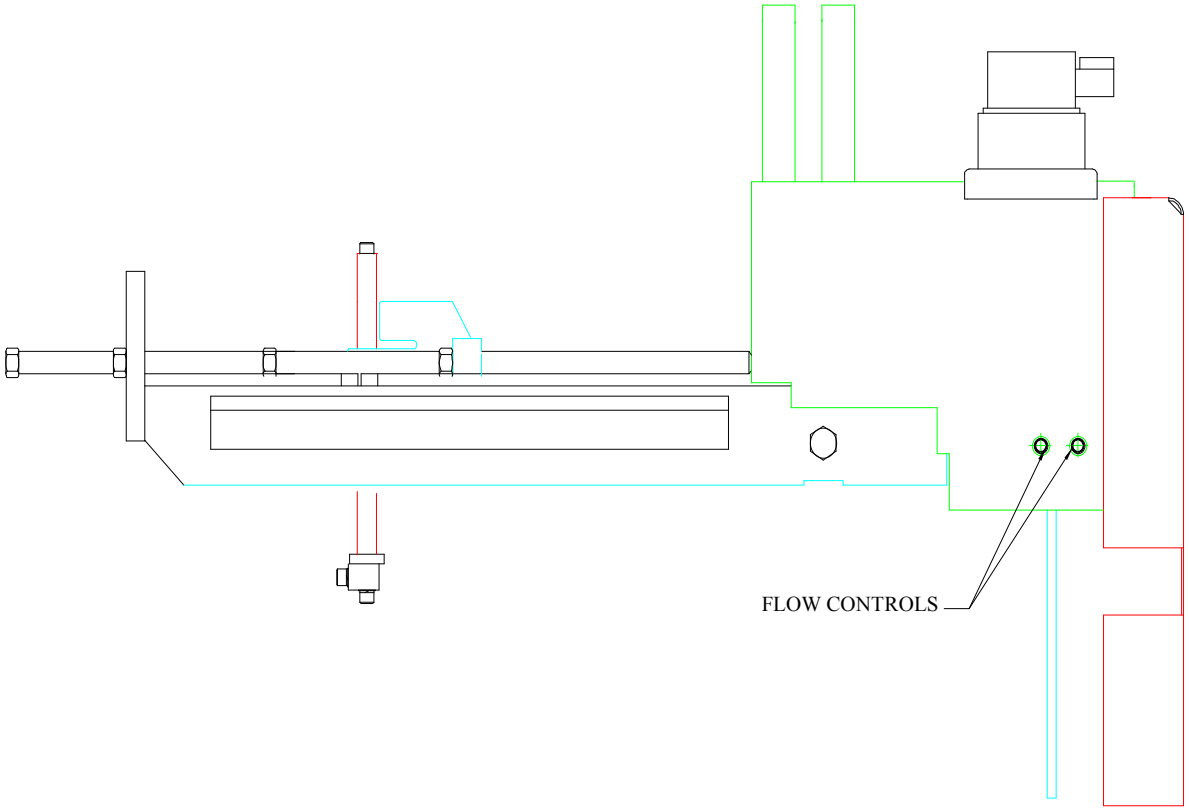

Figure 4.2.6 - Low Speed Flow Controls

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never

attempt to make adjustments “on the fly” with the robot in motion or in automatic mode. If in doubt, simply call AAC’s Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

4.2.7 Vacuum Switch Adjustment

Vacuum is supplied to the vacuum grip by a Venturi type vacuum generator (Figure 4.2.7.1). The generator supplies approximately 76 cm Hg at a pressure of 7 Kg/cm2.

The vacuum switch detects the presence of parts on the gripper. The solid state vacuum switch (Figure 4.2.7.2) is standard equipment and can be used only with sinking I/0.

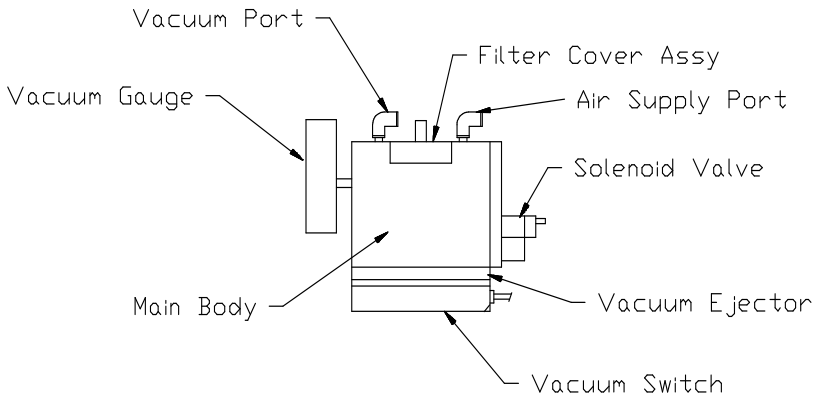

Figure 4.2.7.1
Vacuum Switch and Vacuum Generator

The switch is factory adjusted, however, parts with a rough finish may not create enough vacuum to activate the vacuum switch. In this case, the vacuum switch must be adjusted to be "ON" at a lower vacuum. The Solid State vacuum switch is

adjusted by the following procedure (See Figure 4.2.7.2).

Note: Special care must be taken as this adjustment must be made with power on the robot.

1. Only make the adjustment with the robot in the full outboard position. i.e., full traverse out, full vertical down and the molding machine in manual mode.

2. Keep hands clear of robot motion. Keep jewelry and clothing clear of motion.

3. Place the operators pendant in an area accessible to you. Assure no one can start the robot or the molding machine except you and use all appropriate tag out procedures. **Do not attempt this procedure in any mode other than manual mode.**

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never

attempt to make adjustments “on the fly” with the robot in motion or in automatic mode. If in doubt, simply call AAC’s Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

Setting the switch:

1. Grip the parts by vacuum
2. Turn the “set” adjusting screw until the vacuum switch is “ON” (LED is lit).
3. Release vacuum on one vacuum cup.
4. Turn the screw clockwise until the switch LED goes off.
5. Replace switch cover.

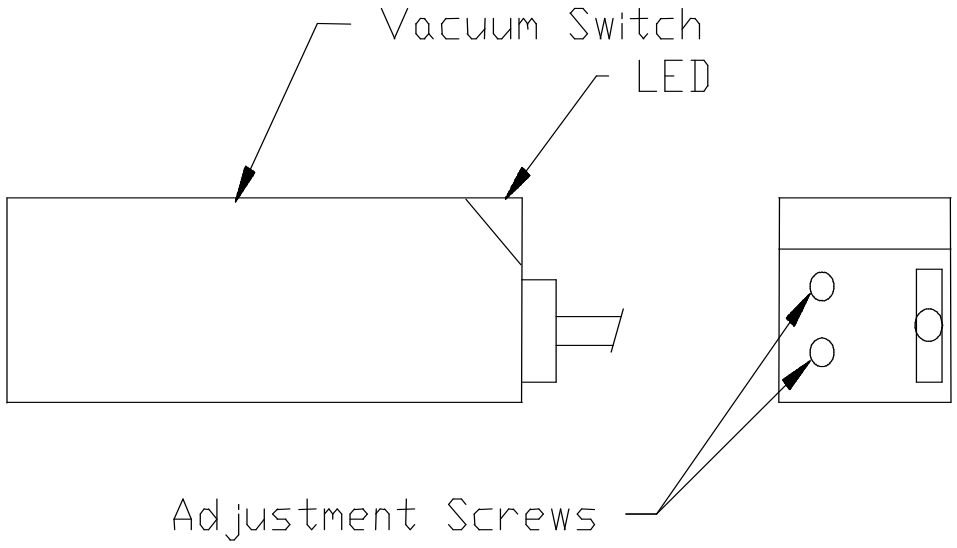

Figure 4.2.7.2
Solid State Vacuum Switch

NOTE: If the "SET" adjusting screw is turned past the stops, the vacuum switch will no longer be adjustable and must be replaced.

4.2.8 Timing Belt Adjustment

Proper adjustment of all timing belts on the robot consists of two operations: tracking and tensioning. Tracking is necessary to align the belt along the idler and drive pulleys, while tensioning is necessary to remove any excess slack in the belt. Incorrect adjustment of timing belts may result in decreased performance and/or premature belt failure.

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Tracking
(Reference Figure 4.2.8.1, 4.2.8.2, 4.2.8.3)

Each of the timing belts are trackable. If the belt is not riding on the center of the pulley or is creeping up the side flange the belt is not properly tracked and requires adjustment.

1. Power down the robot.

2. Adjust the belt to be tight to the feel.

3. Move the axis by hand with the power off. Observe the belt's motion. The belt will ride towards the looser side.

4. Stop the robot and tighten the looser side 1/4-1/2 turn at a time.

5. Repeat until the belt maintains travel in the center of the pulley.

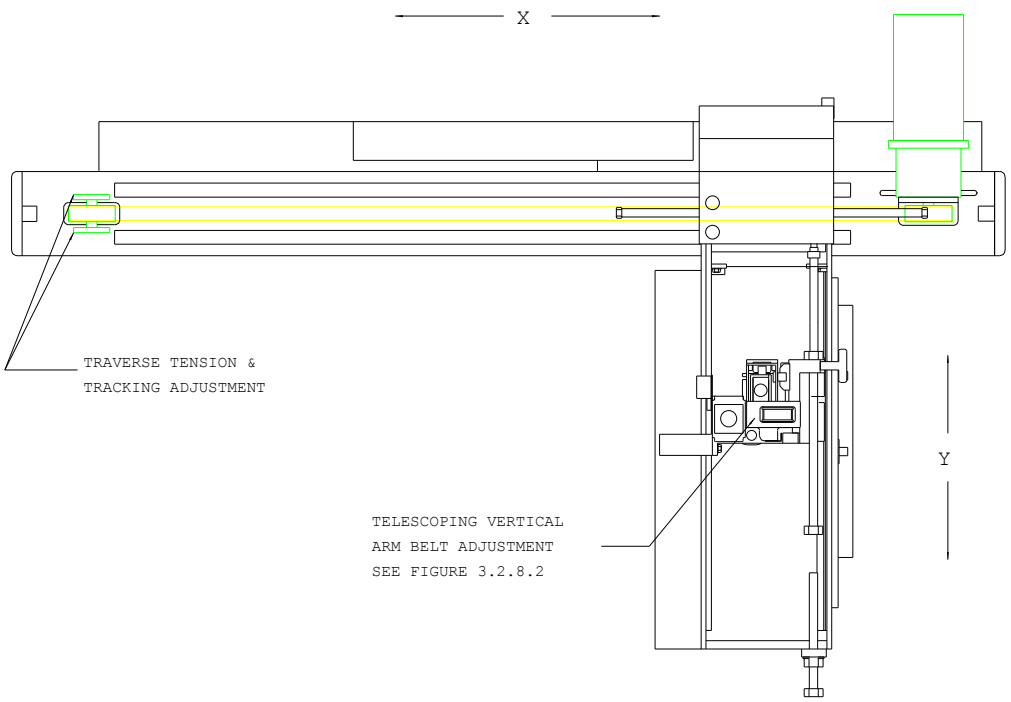


FIGURE 4.2.8.1

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

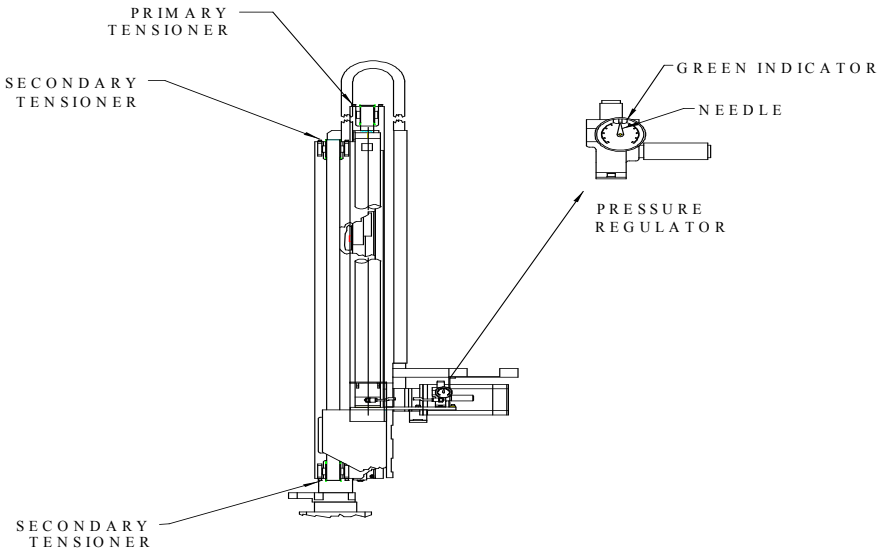


Figure 4.2.8.2
Telescoping Vertical Timing Belt Adjustment

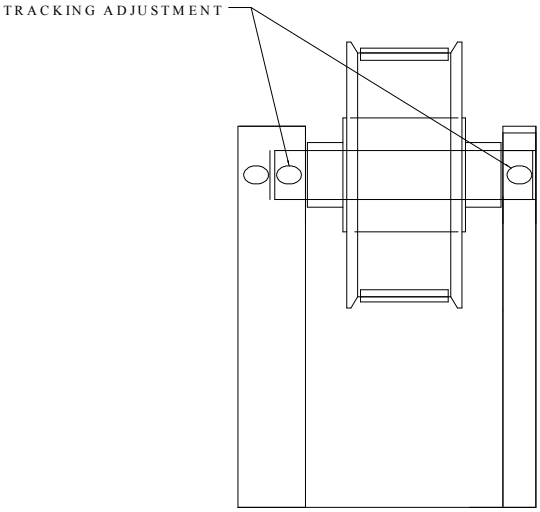


Figure 4.2.8.3
Tracking Adjustment

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

Tensioning
(Reference Figure 4.2.8.4)

The pre-tension is determined by the maximum operating force. The purpose of pretension is to allow both sides of the belt between the pulleys to run without sagging. It is important to recognize the difference between the loaded (tight) and unloaded (slack) side of a drive as when power is applied, the tension increases in the loaded (tight) side and decreases proportionately in the slack side.

6. Power up robot

7. Switch controller to auto mode. This will allow for each axis to be moved separately.

8. Move axis of robot connected to the belt away from the drive pulley and observe the tension in the belt. Reference Figure 4.2.8.4.

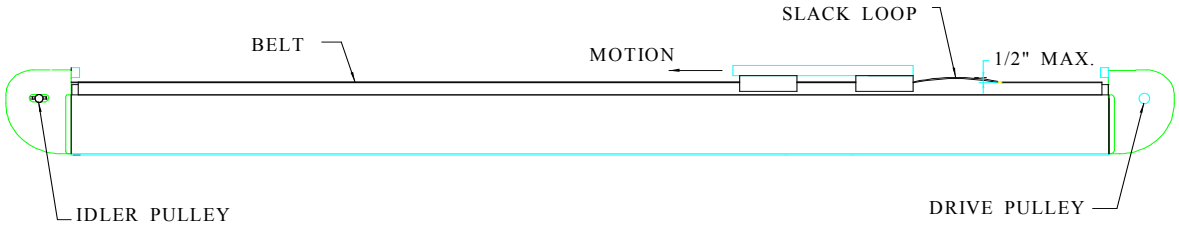


Figure 4.2.8.4

9. Increase the tension in the belt if the radius of the "slack loop" that forms behind the part of robot connected to the belt is greater than ½". (The ½" does not have to be precise and may be determined by visual inspection). The belt tension may be increased by torquing the tracking screws such that the idler shaft is moved away from the drive shaft. Decrease the tension of the belt if there is no "slack loop" present. The belt tension may be decreased by torquing the tracking screws such that the idler shaft is moved toward the drive shaft.

10. Repeat steps 3-4 until the radius of the "slack loop" is less than ½" and greater than 0".

11. Once the belt is properly tensioned repeat the tracking adjustment procedure (steps 1-5) to ensure that the belt is still riding on the center of the pulley.

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never

attempt to make adjustments “on the fly” with the robot in motion or in automatic mode. If in doubt, simply call AAC’s Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

NOTE: To ensure optimum performance, all timing belts must be properly tensioned *and* tracked. Because, both the alignment and tension in are highly sensitive to any adjustments made to the belt, the tracking and tensioning procedures mentioned above may have to be repeated several times before the belt is properly adjusted.

12. Re-install covers (if applicable).

4.3 Changing Robot Delivery

(Reference Figure 4.3)

The AZ-100 Series Robot is able to traverse to the operator or non-operator side of the molding machine. Changing the delivery requires the following steps:

This should only be completed by trained authorized riggers.

1. Shut all power and air off. Disconnect all electrical and air lines

2. Remove end caps. Clamp both carriages and rig robot for lifting (See Figure 3.2.2). Be sure to locate the proper balance point.

3. Rig robot for lifting, without base, clamp Y axis carriage as shown in Figure 3.2.4. Be sure the balance point of the Y axis carriage is found and it is securely clamped to the X axis. If the Y axis is not clamped securely, the robot may tilt to an awkward position.

4. With light upward pressure on robot, remove M16 Socket Head Cap. Screw, and the nut plate inside the X axis traverse beam, and verify the balance point has been found.

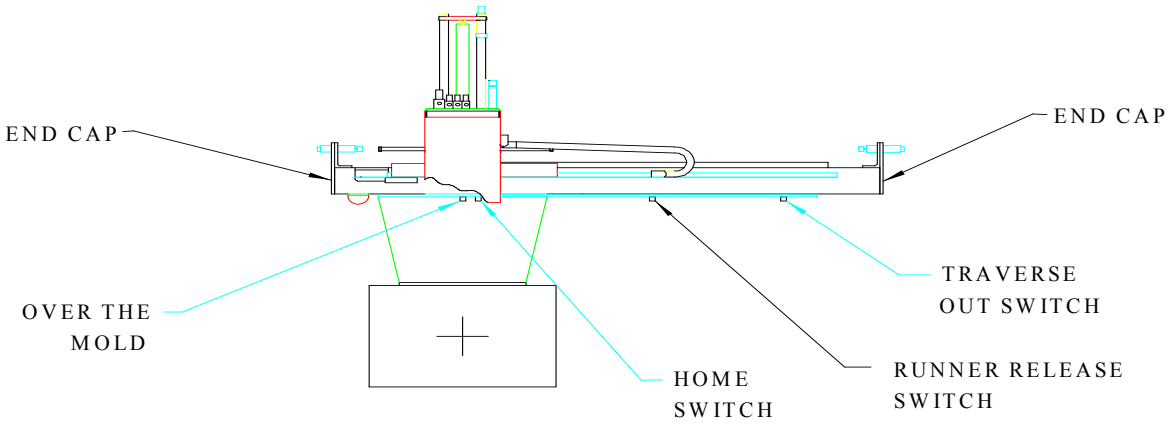
5. Remount robot at opposite end of beam. Torque the M16 Socket Head Cap Screw to 155 ft/lbs. with washers and loctite.

6. Install end caps with original hardware and loctite.

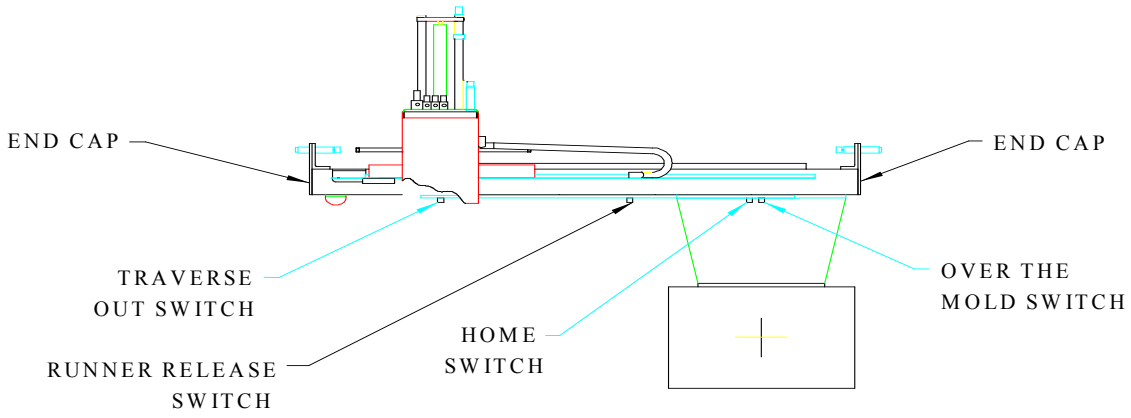
7. Relocate proximity switches as shown in Figure 4.3. Extension cords are required for this operation. See spare parts list for part numbers.

8. Connect all electrical and pneumatic lines.

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.



NON-OPERATOR DELIVERY



OPERATOR DELIVERY

Figure 4.3

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments "on the fly" with the robot in motion or in automatic mode. If in doubt, simply call AAC's Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

4.3.1. Changing Robot Delivery - M1 Option

1. Remove power from robot control cabinet.

2. Follow section 4.3 in manual for mechanical reconfiguration.

3. On the X-Axis beam swap the Home and Runner Drop proximity switches.

4. Position carriage bearing block approximately 1/4” from end of bearing rail as shown in Figure 4.3.1. Adjust mechanical stop bolt on carriage up against hard stop and secure.

5. While the carriage is located at the hard stop, position the Home switch 3.0” away from the hard stop end as shown in Figure 4.3.1.

6. Power up control cabinet.

7. On pendant: scroll down past first screen to password protected set up message. Enter password, change direction of operation.

8. Follow homing procedure in section 2.0 of controller manual.

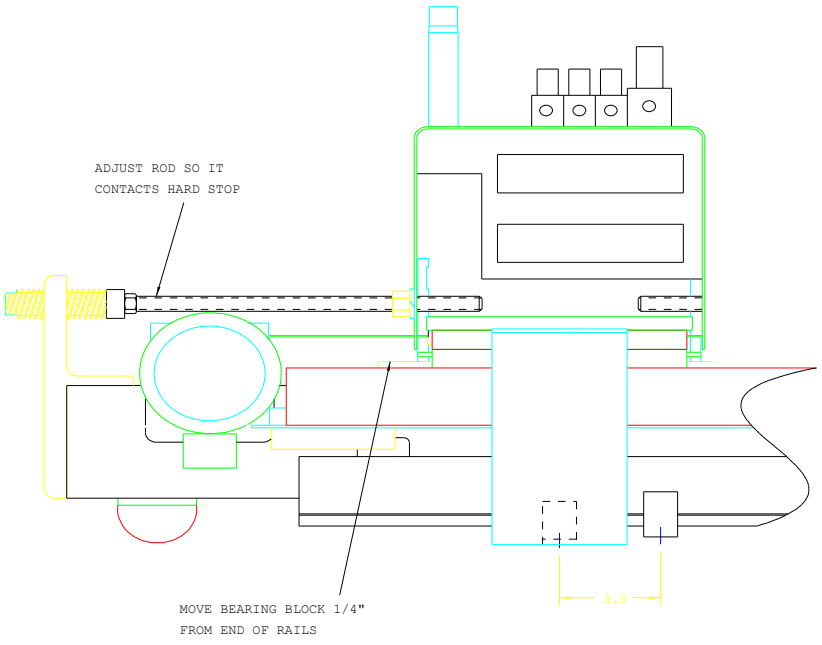


Figure 4.3.1.

Safety Note: Safety comes first in the use of your AAC robot. All adjustments should be made without air pressure or electrical power on the robot and all lockout/tagout procedures must be followed. Never attempt to make adjustments “on the fly” with the robot in motion or in automatic mode. If in doubt, simply call AAC’s Technical Service Department at (508) 368-8914 x508, they will be happy to assist.

5.0 SCHEDULED MAINTENANCE

5.1 Maintenance

Prior to any hands on work performed on the controller or robot, be sure to follow proper Lockout/Tagout procedures, as referenced in the safety information in Section 1. The following preventive maintenance program should be followed as recommended for the best service from your AAC AZ 100 Series Robot.

NOTE: ALWAYS TURN THE POWER OFF BEFORE REPLACING ANY PARTS IN THE CONTROL BOX OR SERVICING THE ROBOT.

DAILY PREVENTIVE MAINTENANCE	
Drain Filter Unit	Clean the mist separator and moisture filter
Robot Performance	Observe the following: 1. X-Axis beam deceleration through shock absorbers. Adjust if necessary 2. Z-Axis arm's deceleration through cushions. Adjust if required. 3. Y-Axis stroke cylinder retract motion. Adjust if necessary. 4. Listen for abnormal sounds like metal on metal contact or hammering.
Visual Inspection	Perform an overall inspection and look for: 1. Loose Components 2. Pinched Air Lines, Vacuum Hoses 3. Damaged Electrical Lines
WEEKLY PREVENTIVE MAINTENANCE	
Tighten Components	Tighten the following components: 1. Y-Axis Stop Bolts 2. Z-Axis Stop Bolts 3. X-Axis Stop Bolts 4. X-Axis Shock Absorbers 5. Z-Axis Shock Absorbers (Telescoping Vert. Only)
Vacuum Filter	Check for Particulate contamination
Component Cleaning	Using a machine oil[1] dampened cloth, Clean: a. Cam Rail b. Linear bearings c. Cylinder rods
Vacuum Cup Cleaning	Using an alcohol dampened cloth, Clean the Vacuum Cups.
Lubrication	Follow charts 5.2, 5.3
General Robot Cleaning	Clean dust excessive oil and grease from the robot body.
Lubrication Reservoir (Rodless Cylinder Application Only)	Refill the lubricator at the base of robot with Shell Turbo Oil T32 or equivalent.

1 #10 Oil or Equivalent

WEEKLY PREVENTIVE MAINTENANCE (CONTINUED)	
Clean and Inspect the coalescing muffler	Clean the bowl and inspect the filter for oil saturation - replace if necessary.
MONTHLY PREVENTIVE MAINTENANCE	
Mounting Platen	Check the tension on the socket head cap bolts securing the platen to the base and the base to the robot.
Cam Follower Lubrication	Grease every 6 months using Kendall L-427 Super BLU 567-7867 grease. Refer to Figure 5.4.1.
ANNUAL PREVENTIVE MAINTENANCE	
Relays	The relays are consumable supplies with a limited life. It is recommended that these parts be periodically replaced to ensure maximum performance of the machine. **NOTE: Always turn the power off before replacing any parts in the control box.**
Programmable Controller Battery	Follow the manufacturer's specification for replacement of the battery. This maintains the program in memory with the controller power "off".

5.2 Lubrication

Z-Axis Guide Tube

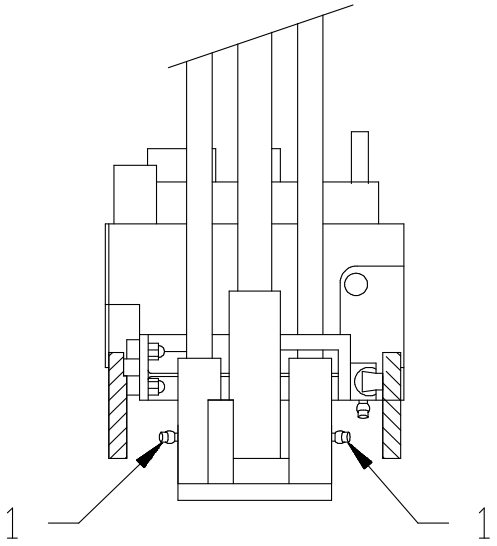


Figure 5.2

Grease:	Kendall L-427 Super BLU 567-7867 Grease
Amount:	2.4-3.6 Cubic Centimeters
Molding Cycle Seconds*	Lubrication Frequency (Weeks)
10	Twice every week
20	Once every week
30	Once every 2 weeks
40	Once every 2 weeks
50	Once every 3 weeks
60	Once every 4 weeks
70	Once every 4 weeks
80	Once every 5 weeks
90	Once every 6 weeks
100	Once every 6 weeks
110	Once every 7 weeks
120	Once every 8 weeks
130	Once every 8 weeks
140	Once every 9 weeks
150	Once every 9 weeks
***Based on 24 hour service per day. Actual lubrication should occur every 330,000 linear feet of travel, a minimum of once a year.**	

Z-Axis Bearings (Telescoping Z-Axis Option)

Grease - Mobilith AW1			
Amount - 0.6 cc every 330,000 ft.			
Cycle Time (seconds)	**Lubrication frequency in days**		
	26" Stroke	*36" Stroke*	*46" Stroke*
6	5	4	-
8	7	5	4
10	9	6	5
12	11	8	6
14	12	9	7
16	14	10	8
20	18	13	10
24	21	15	12
30	26	19	15

Y-Axis Bearings

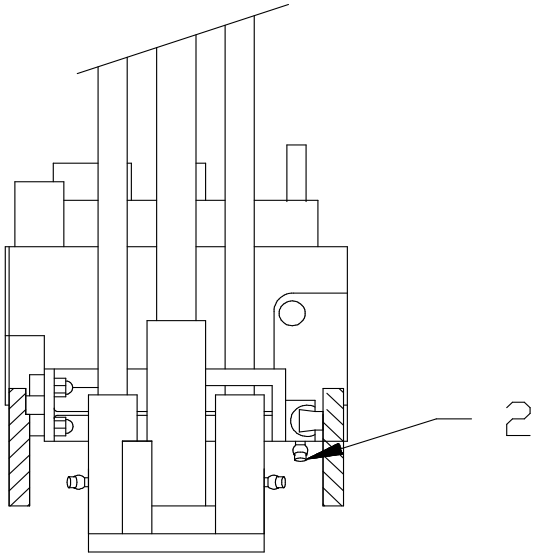


Figure 5.3

Grease:	Kendall L-427 Super BLU 567-7867 Grease
Amount:	2.4-3.6 Cubic Centimeters
Molding Cycle Seconds*	Lubrication Frequency (Weeks)
10	Once every 5 weeks
20	Once every 11 weeks
30	Once every 16 weeks
40	Once every 22 weeks
50	Once every 28 weeks
60	Once every 33 weeks
70	Once every 39 weeks
80	Once every 44 weeks
90	Once every 50 weeks
100	Once every 55 weeks
110	Once every 61 weeks
120	Once every 66 weeks
130	Once every 72 weeks
140	Once every 72 weeks
150	Once every 78 weeks
***Based on 24 hour service per day. Actual lubrication should occur every 330,000 linear feet of travel, a minimum of once a year.**	

Y-Axis Cam Followers

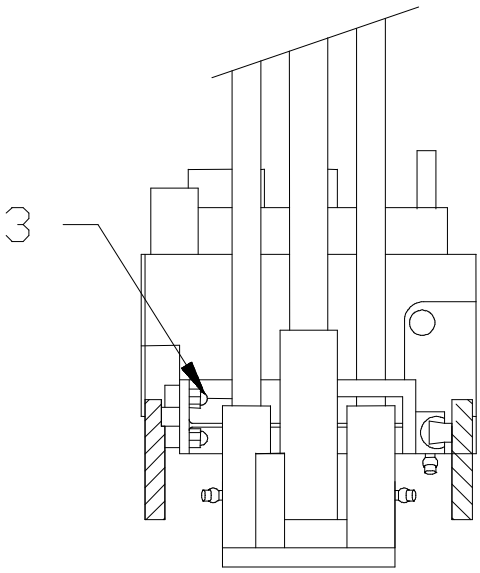


Figure 5.4
Y-Axis Cam Followers

Grease:	Kendall L-427 Super BLU 567-7867 Grease
Amount:	.01-.03 Cubic Centimeters
Molding Cycle Seconds*	Lubrication Frequency (Weeks)
10	Once every 3 weeks
20	Once every 6 weeks
30	Once every 8 weeks
40	Once every 12 weeks
50	Once every 14 weeks
60	Once every 16 weeks
70	Once every 18 weeks
80	Once every 20 weeks
90	Once every 24weeks
100	Once every 26 weeks
110	Once every 28 weeks
120	Once every 32 weeks
130	Once every 34 weeks
140	Once every 38 weeks
150	Once every 40 weeks
***Based on 24 hour service per day. Actual lubrication should occur every 165,000 linear feet of travel, a minimum of once a year.**	

X-Axis Bearings

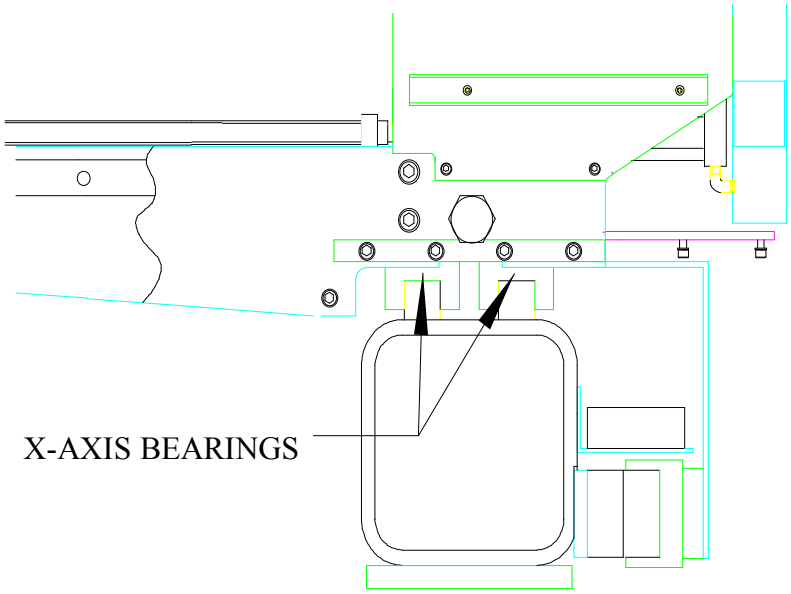


Figure 5.5 - X-Axis Bearing Rails

Grease-Mobilith AW1								
Amount-2.6 cc every 328,000 ft.								
Cycle Time (seconds)	**Lubrication frequency in days**							
	39”	*47”*	*55”*	*63”*	*71”*	*79”*	*87”*	*94”*
6	4	3	3	2	2	2	2	2
8	5	4	3	3	3	2	2	2
10	6	5	4	4	3	3	3	2
12	7	6	5	4	4	4	3	3
14	8	7	6	5	5	4	4	3
16	9	8	7	6	5	5	4	4
20	12	10	8	7	6	5	5	5
24	14	12	10	9	8	7	6	6
30	18	15	12	11	10	9	8	7

5.3 Changing the Mold

When changing the mold, the Part Arm must be moved to the furthest point of traverse. Perform this operation in manual mode by toggling the traverse switch on the pendant. Stand away from the robot. Keep hands and clothing clear.

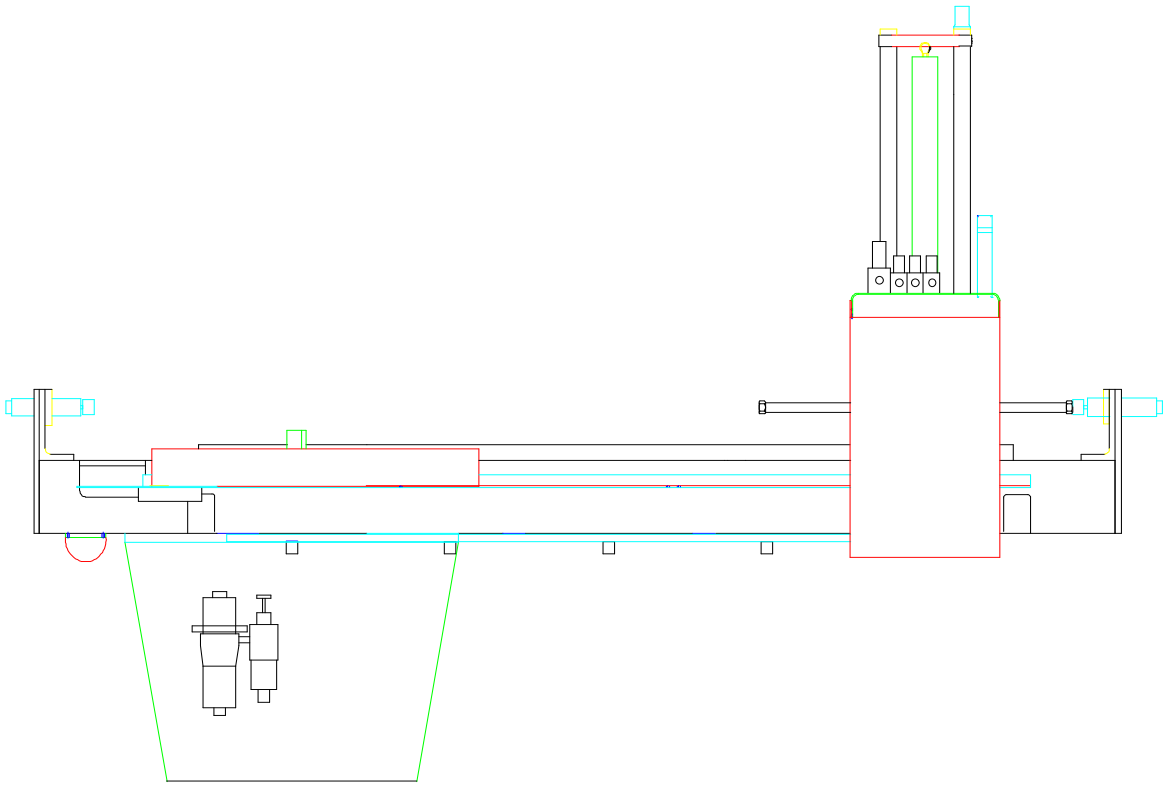


Figure 5.6

CAUTION: Never release the compressed air to manually move the carriage out. The replenishment of air will cause the robot to return abruptly.

5.4 Troubleshooting

The controller features LED indicators which show the status of each proximity switch, push button, solenoid, etc., in the system. These indicator lights are to be used as a troubleshooting aid should problems occur. The electrical schematics list the function of each Input/Output point of the controller.

COMMON PROBLEMS:

1. Loss of Vacuum/Dropped Parts
   a. Missing or split vacuum cup.
   b. Misalignment to mold.
   c. Vacuum line or gripper--dirty, kinked, or split.
   d. Low air pressure - Defective regulator or inadequate supply line.
   e. Vacuum switch not closing - dirty contacts.
   f. Runner switch not closing - loose wiring.
   g. Short shots - cavity not filled.
   h. If the air pressure drops by 28 PSI (2 kg/cm^2) or more while the unit is in operation check the following:
      1. A clogged air filter element.
      2. Insufficient air supply.
      3. Excessively small diameter of long connecting pneumatic lines.
   i. Check to ensure that the vacuum switch works properly. This can easily be accomplished by looking at the "Parts Sensed" indicator lamp on the remote operator's pendant. Stand away from the robot. Keep hands and clothing clear. In the manual mode, toggle the Vacuum switch on the remote operator's panel. When the parts are sensed the PARTS SENSED lamp will illuminate. Next, reduce the air supply pressure so that the vacuum gauge drops below the set value for the VACUUM SWITCH OFF. Now check to see if the PARTS SENSED lamp goes OFF.
   j. If the vacuum is below 45 cm hg, remove the muffler from the vacuum generator. If the pressure then rises above 45 cm hg, the muffler is clogged and should be replaced. If the vacuum remains below 45 cm hg after the muffler is removed, the Venturi is clogged.

2. System will not cycle:
   a. Power Off - Check fuse and door interlock.
   b. Controller in Program Mode.
   c. Robot out of position or not making a proximity switch - check input indicator.
   d. Mold open or gate closed inputs not received from molding machine -check input indicators and interface relays. Refer to I/O listing.

3. System stops in Mid-Cycle
   a. Failure to make proximity switch - check input indicators. Refer to I/O listing.
   b. Solenoid malfunction.
   c. Mechanical bind or kinked air line. Refer to I/O listing.

4. Worn Packing in Pneumatic Cylinder. A worn packing can be identified from the following symptoms:
   a. Piston Packing
      1. Reduced speed of pneumatic cylinder.
      2. The cylinder occasionally becomes inoperative to stops.
      3. Air leaks from the muffler of the solenoid valve while the machine is stopped.
   b. Rod Packing
      1. Air leaks from the rod cover with the rod pulled in.
      2. Speed controls malfunction.

c. Packing Replacement
   1. Z-Axis and Y-Axis Cylinders.
      *Disconnect the joint from the rod tip.
      *Remove the tie rod nut.
      *Replace the worn packing. Remember to coat the moving part
      with grease (Mobil Lux EP2).
   2. X-Axis Cylinder (see following pages)

6.0 SPARE PARTS

6.1 Recommended Spare Parts

Automated Assemblies Corporation can usually ship out replacement parts within 24 hours. AAC recommends purchasing the following spare parts to reduce the risk of downtime, to a matter of minutes.

AZ 100 Series - Spare Parts

General Robot

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	NVFS2210-5DZ	Double Solenoid Valve	1
2	NVFS2110-5DZ	Single Solenoid Valve	1
3	RZ-123-PK-HC	Y-Axis Cylinder Packing Kit	1
4	NBB7-F10-E0-B407	Proximity Switch	4
5	4mm Tube	4mm Nylon Tube	10 ft
6	6mm Tube	6mm Nylon Tube	15 ft
7	B36934	Extension cord	2

Pneumatic X-Axis

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	0515-9065	X-Axis Cylinder Packing Kit	1
2	10mm Tube	10mm Nylon Tube	10 ft
3	EFM-20-50-3C	Shock Absorber	1

Servo X-Axis (M1 Option)

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	MPM1142FRMM-AM	CMS Servo 3 HP Motor	1
2	34-509-850-4448	NEMA AZ 10:1 Gear Head	1
3	25.4 T 1/2	X-Axis Drive Belt	22 ft

Z-Axis (Standard)

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	NVFS3210-5DZ	Double Solenoid Valve	1
*2	NVS-3135-03520	Single Solenoid Valve (High Speed)	1
3	RZ-123-PK-VC	Z-Axis Cylinder Packing Kit	1
4	12mm Tube	12mm Nylon Tube	15 ft

* NVS3135-03520 single solenoid valve is only required for the high speed option.

Telescoping Z-Axis (Option)

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	NVFS3210-5DZ	Double Solenoid Valve	1
*2	NVS-3135-03520	Single Solenoid Valve (High Speed)	1
3	CLA50-PS	Z-Axis Cylinder Packing Kit	1
4	EFM 1140-6C	Shock Absorber	1
5	12mm Tube	12mm Nylon Tube	15 ft

* NVS3135-03520 single solenoid valve is only required for the high speed option.

6.2 Pneumatic Cylinder Packing Kits

The packing kits contain all the necessary parts to repair a cylinder, i.e. wipers, rod packing, cylinder gaskets, wear rings, and o-rings. Refer to section 5.1, items 14 and 12 for the appropriate packing number kits.

6.3 Warranty

AAC Warranty Information

AUTOMATED ASSEMBLIES CORPORATION MANUFACTURED PARTS GUARANTEE:

Manufactured parts supplied on a new machine carry a defective material or workmanship
warranty good for one full year from date of delivery as indicated by the terms and conditions of sale. If any manufactured part fails in the warranty period, obtain a return goods authorization (RGA) and return the defective parts prepaid. AAC will determine the cause of failure (material, workmanship, improper maintenance, adjustment, etc.). Parts failing because of defective material or workmanship will be replaced or repaired at no charge. F.O.B. Clinton, MA. Replacement parts carry a material or workmanship warranty extending to the end of the initial warranty period.

PURCHASED PARTS GUARANTEE:

Parts purchased from outside suppliers are guaranteed as specified by suppliers. Defective
purchased parts, returned at the buyers expense, will be repaired or replaced F.O.B. Clinton, MA or F.O.B. point of manufacture.