

LPX-1000

Small Bore Scanner

User's Manual

Revision A.0

ATCO

850-004134

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System Introduction

This manual outlines basic field usage and maintenance information. The sections are listed below with descriptions of their contents. It is recommended that each section of this document be read before deploying the LPX-1000 scanner system for field use.

Section 1 Introduction

Section 2 Scanner Components

This section describes some of the components of the LPX-1000 system. It is recommended that you read this section and familiarize yourself with the system.

Section 3 Scanner Field Use and Operation

This section describes important information about the field use of the system and should be read prior to use in the field.

Appendix A Control Cabling Pinouts and Connectors

Appendix B Transducer Mounting Plate Bolt Hole Dimensions

Appendix C Link Selection Table

System Components

This section describes the components that make up the LPX-1000 System. Reading this section will help you to become familiar with the parts of the system.

Scanner

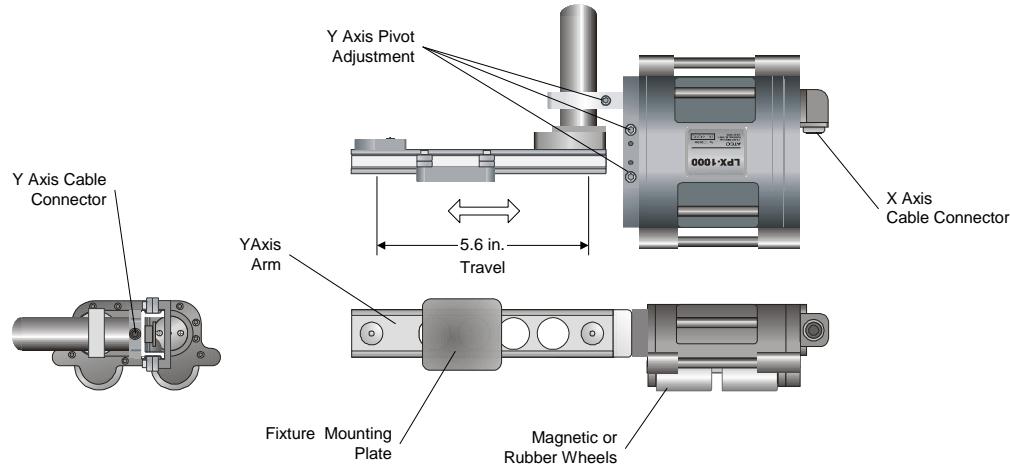


Figure 1 Parts of the Scanner

The LPX-1000 scanner system features a dual axis scanning configuration. The scanner can be controlled in both forward and reverse with the Y Axis arm (5.6 inches wide standard) running perpendicular to the scanner motion. This provides the ability to perform raster scans on equipment.

X Axis

The X Axis is the vehicle that drives the scanner around the surface. Magnetic or rubber wheels can be used depending upon your application. The magnets provide considerable holding force. Even though the magnets provide a strong bond to a metal surface, precautions must be taken to reduce the possibility of loss of adhesion and subsequent un-attachment of the scanner. Refer to Section 3 *Scanner Field Use and Operation* for more information. When using rubber wheels the chain mechanism is used to attach the X-Axis to the surface of the piping. Later in this section the chain mechanism will be discussed in more detail.

Y Axis

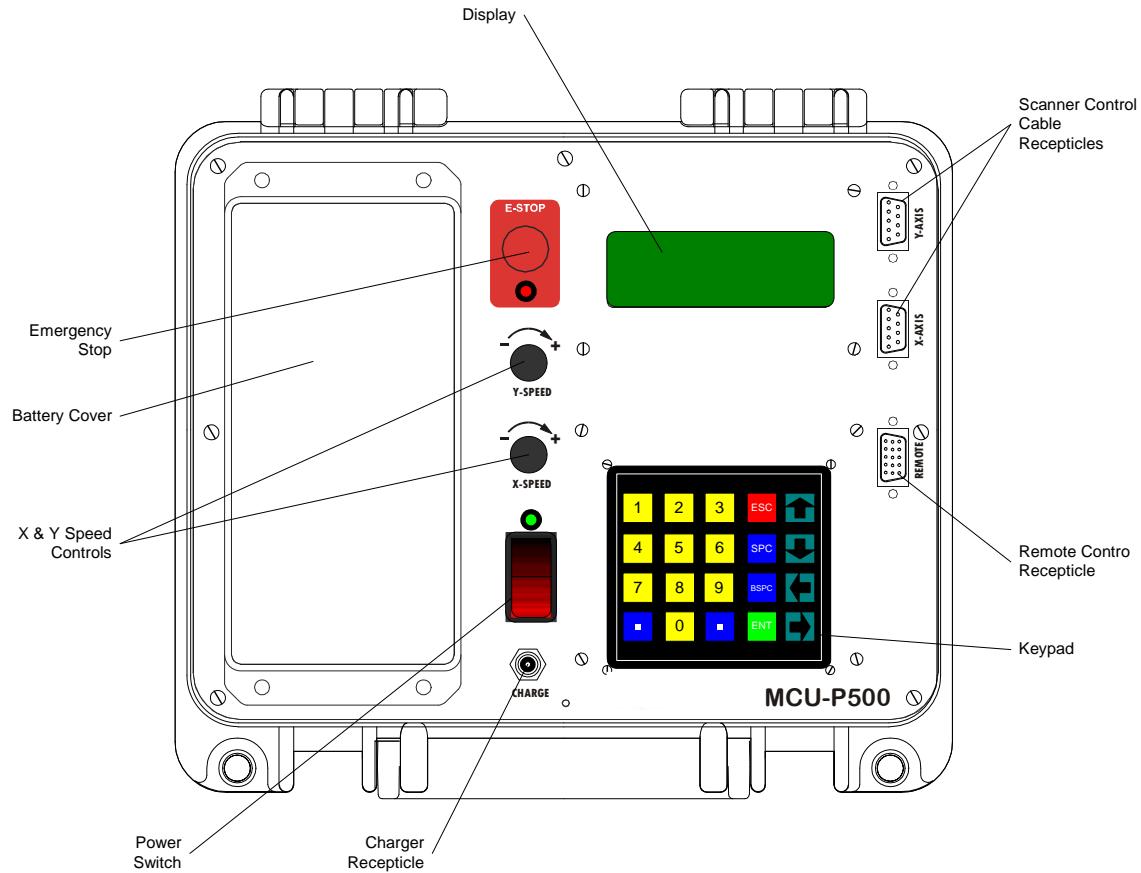
The Y Axis Arm allows travel of up to 5.6 inches. The articulation of the arm makes the scanner highly flexible and allows it to conform to a wide variety of surface geometries. There are three pivot adjustments that are easily rotated to make changing the configuration quick and simple.

Control Cable Connectors

The control cable from the motor control unit connects to the X and Y Axis' on the side of the scanner body and on the motor housing of the Y Axis. Refer to Section 5 *Maintenance and Storage* for maintenance instructions. **ALWAYS** keep this receptacle dry and free of debris.

MCU-P500 Motor Control Unit

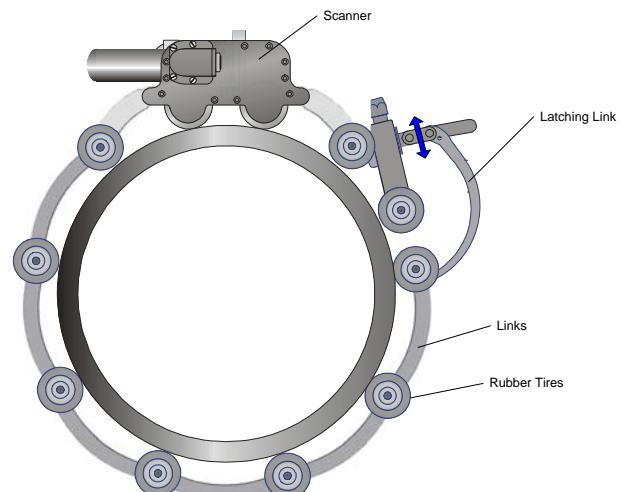
The MCU-P500 motor control unit is battery operated. A 110VAC power supply / charger is provided which can be used to power the unit. Refer to the MCU-500P Manual for more details.



Clamping Chain

The Clamping Chain can be used to hold the scanner in place for piping or similar applications that require it. The chain assembly is made up of a series of links and a latch hook. Adjust the number of links according to the diameter of the pipe being scanned. Combinations of links will accommodate virtually any diameter of pipe.

Use the table in Appendix C to determine the combination of links required for the diameter piping you are working with.



Scanner Field Use and Operation

This section describes some essential considerations and guidelines for using the LPX-1000 Scanner System in the field. It is recommended that you read this section thoroughly prior to using the scanner in the field.

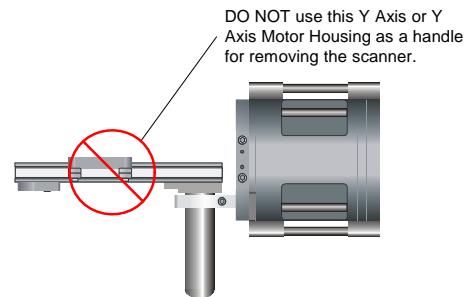
Safety Considerations

A safety line should be used when the scanner is used at any elevated position. This will minimize any damage to the scanner and more importantly reduce the possibility of injury to anyone on the ground.

Never allow work or activity underneath the scanner while in use.

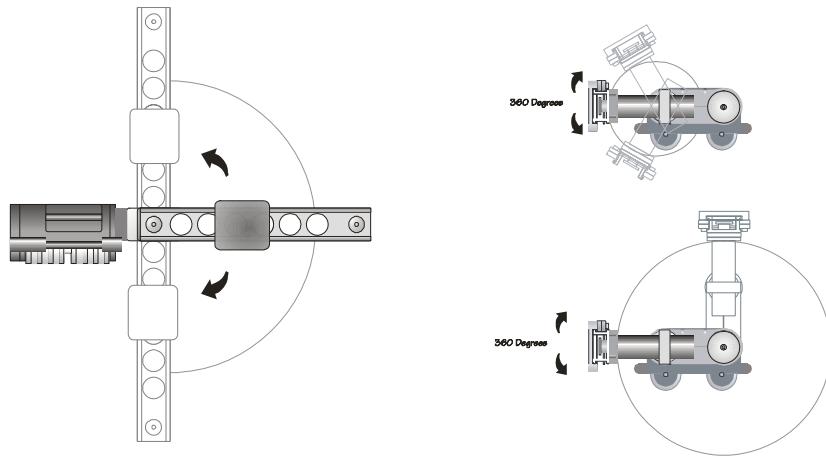
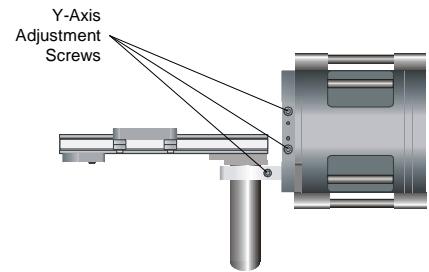
Handling the Scanner

Care must be exercised when handling the LPX-1000. The Y Axis or Y Axis motor housing (shown right) should never be used when manipulating the position of the scanner or removing the scanner from the surface.



Y Axis Adjustment

The Y Axis can be adjusted to conform to a wide variety of scanning arrangements. The figure to the right shows the screws used to adjust each pivot point of the arm. Figure 6 shows some of the adjustments that can be made to the Y Axis.

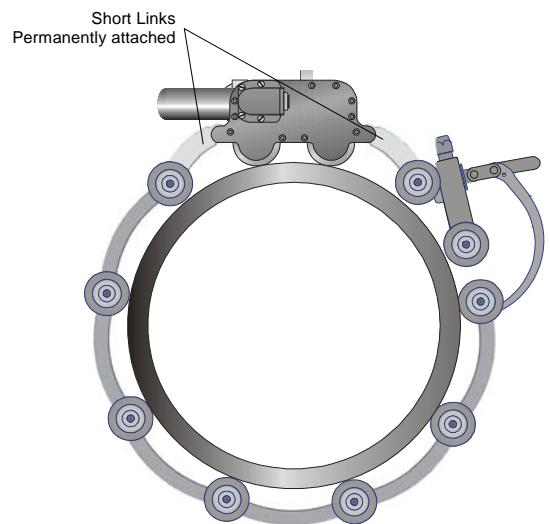


Tightening the Adjustment Screws

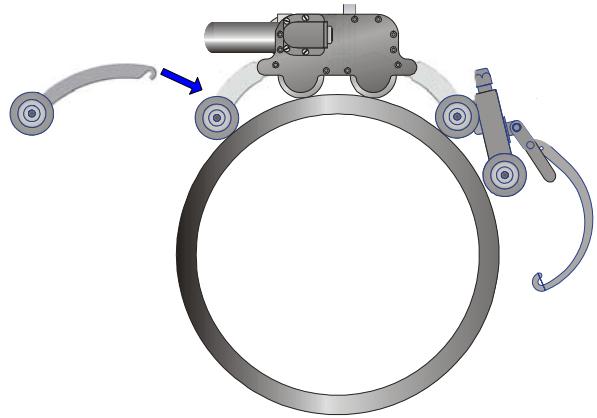
When adjusting the Y Axis positions, the screws require only minimal torque. Tighten the screws only to the point where there is no movement in the arm. Never over-tighten them.

Attaching the Scanner

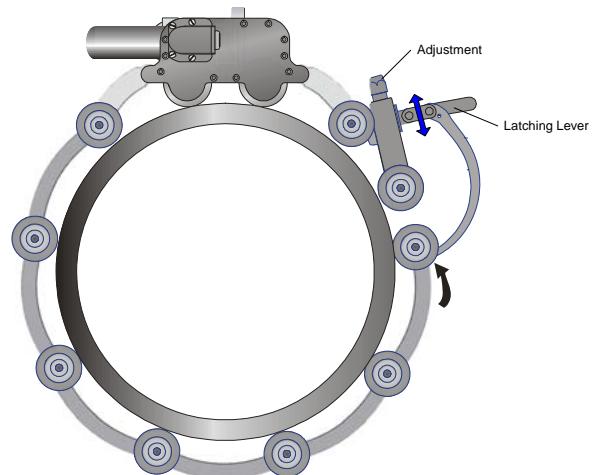
When using the chains to attach the scanner you must first determine the number of links required based upon diameter of the pipe. Using the table in Appendix C, determine the number of long and/or short links required as a starting point. The number of links specified in the table do not include the short links that are attached to each side of the LPX-1000 (shown right).



Once the number of long and/or short links has been determined, connect them all by hooking the ends of the links together (shown right).

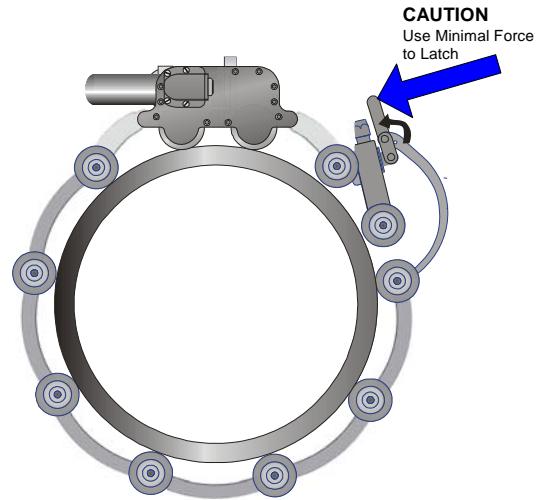


Once all links have been attached together, hook the last link with the latching link hook as shown to the right. With the Latching Lever in the position shown, adjust the travel (blue arrow) of the hook until it catches the hook on the last link.



Latch the link by rotating the Latching Lever back as shown right. The scanner requires a minimal amount of force to sufficiently hold the scanner in place.

CAUTION: It should only take a few pounds of force exerted on the Latching Lever. Be careful not to use too much force when clamping the scanner chain. Excessive force can damage the components of the system.

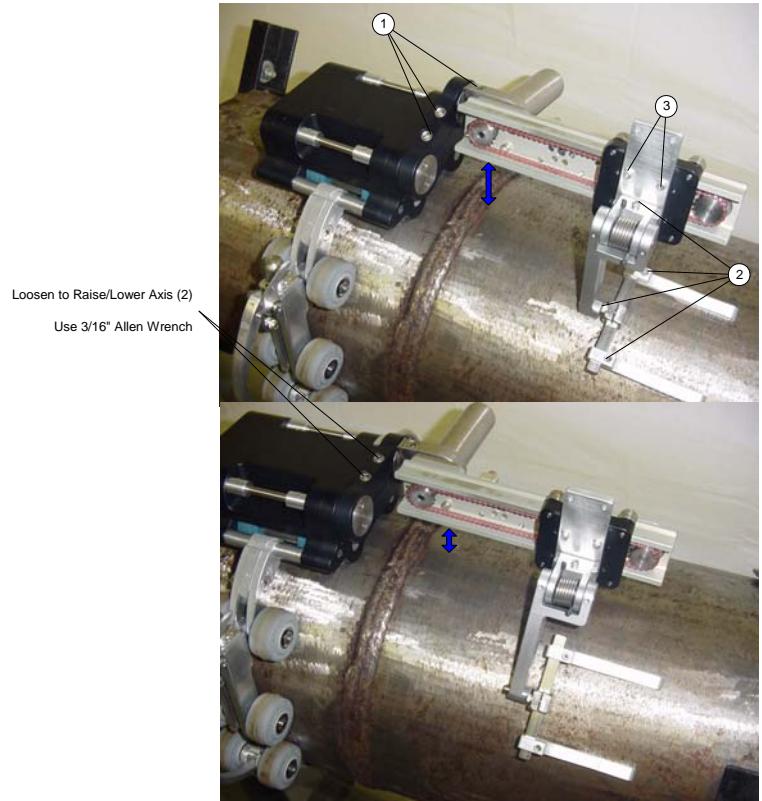


Adjusting the Y-Axis

The Y-Axis can be adjusted to support various configurations. The height of the Y-Axis can be changed by rotating the arm as shown right. Using a 3/16" allen wrench, loosen the two fasteners on the mounting arm (shown right) to adjust the arm.

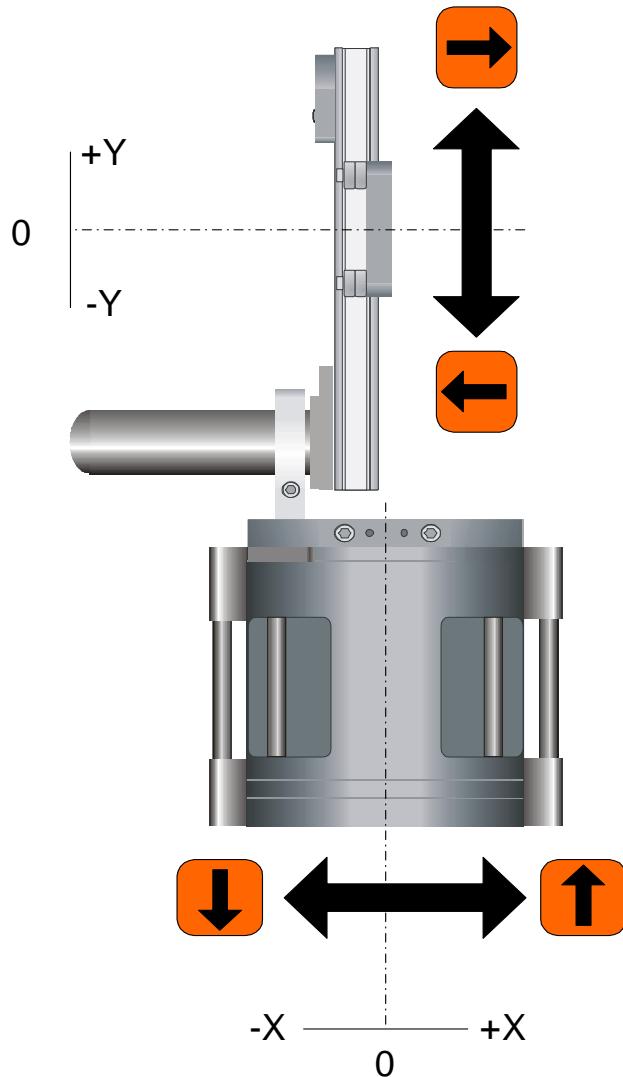
The fasteners used are listed below in case replacements are needed. They are listed by number according to the callout in the figure to the right.

- 1) 1/4-28 x 1 1/2" Socket Hd Screws
- 2) 6-32 x 1/2" Socket Hd Screws
- 3) 6-32 x 3/8" Socket Hd Screws



Scanner Movement

The scanner can be moved using the arrow keys on the MCU-P500 by using the A-JOG menu option. The orientation and movement direction for each arrow key is shown below.



Maintenance and Storage

This section covers some basic maintenance and storage tips.

NOTE: *No internal components should need to be accessed; therefore disassembly of the scanner should not be required and is not recommended.*

Y Axis Maintenance

Changing the Y Axis Drive Belt

Occasionally the Y Axis drive belt needs replacement. Follow the steps show below to ensure proper installation.

Step 1

The first step is to remove the existing belt. To do this, remove the two screws on the back side of the arm that hold the sprocket mounting plate (Figure 12).

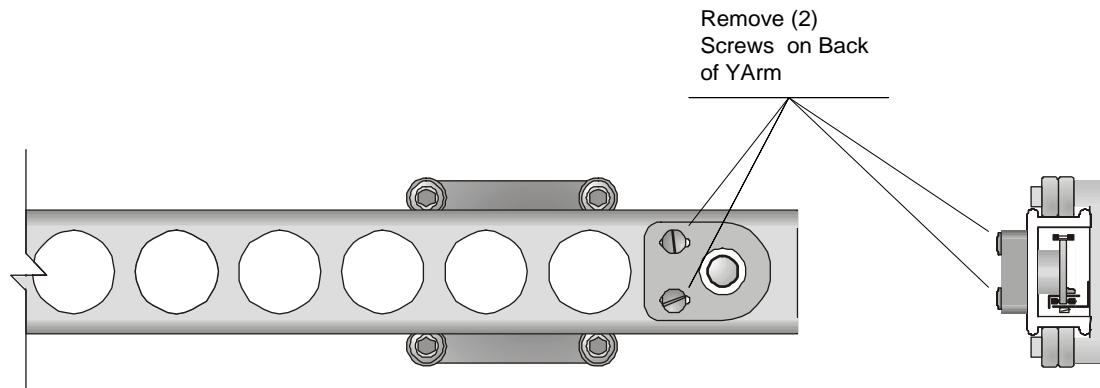


Figure 13

Step 2

The sprocket must be pulled back to allow the slide block to move past the sprocket (Figure 14). Without moving the sprocket, the belt mounting clip cannot move past it.

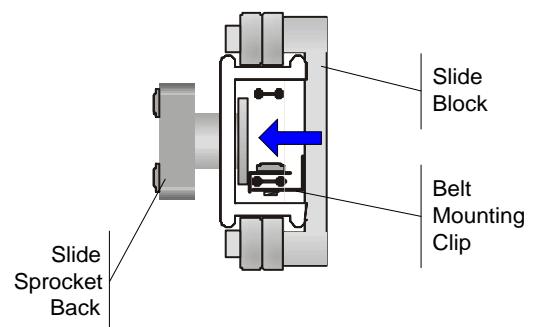


Figure 14

Step 3

Remove the slide block (Figure 14).

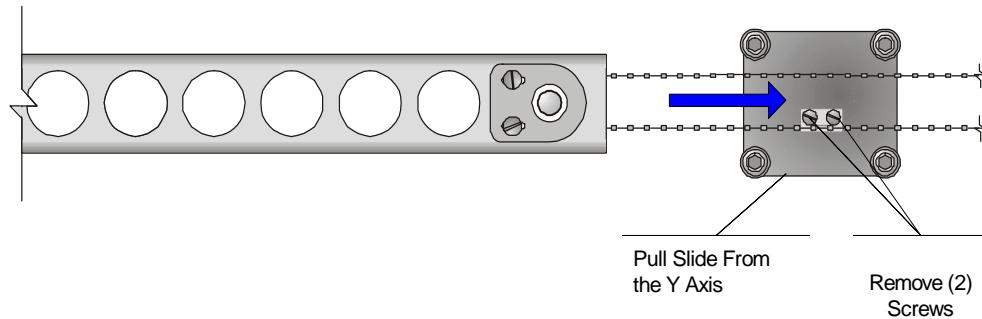


Figure 15 Removing the Slide Block

Step 4

Remove the screw that holds the belt to the clip, and remove the old belt. (Figure 15). Place the clip on the new belt and secure the screw.

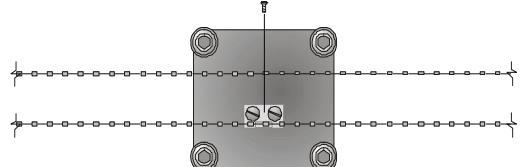


Figure 16 Remove Belt Clip Screw

Step 5

Fasten the belt clip on to the new belt. Be sure to fasten the clip to the appropriate location on the belt. There is a belt clip mounting point with the appropriate spacing for the screw (Figure 16).

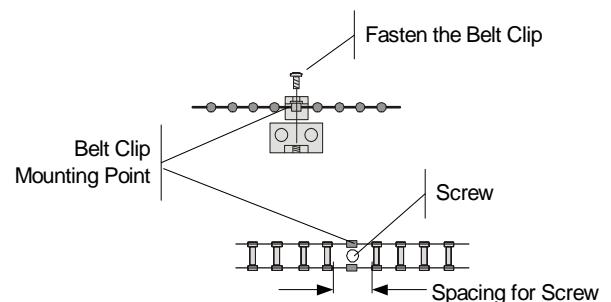
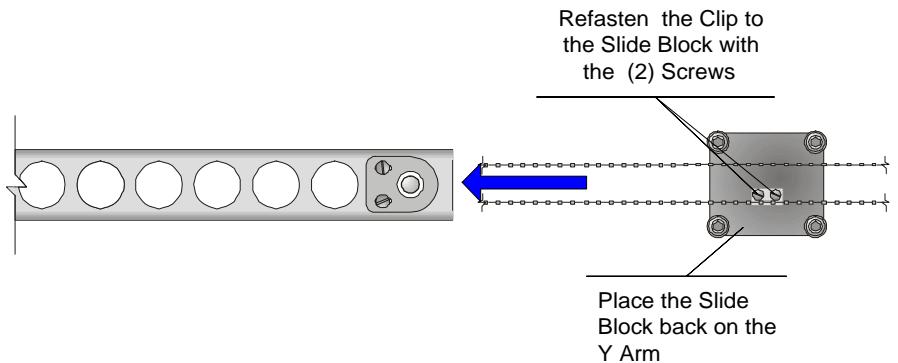


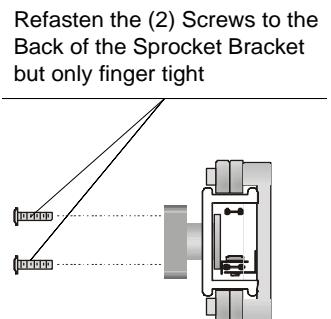
Figure 17 Fastening the Belt Clip

Step 6

Refasten the belt clip to the slide block and place the slide back on the Y Axis. (Figure 17) Be sure, once again, to move the sprocket back so the belt clip will clear it.

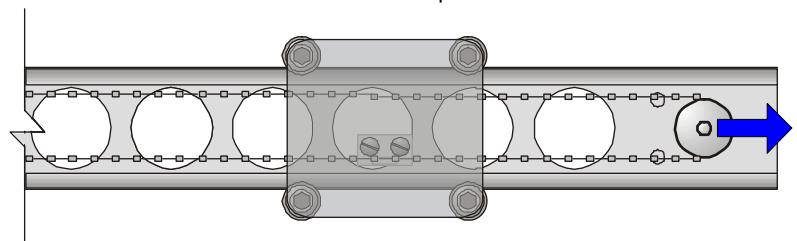
**Figure 18** Attaching the Slide Block to the Y Axis**Step 7**

Align the belt and place it on the two sprockets. Refasten the screws on the back side of the sprocket bracket. Do not tighten them at this point (Figure 18).

**Figure 19** Fastening the Sprocket Bracket**Final Step**

Tension the belt by pulling the sprocket outward. (Figure 19). Be careful not to overtension the belt. Secure the screws on the back side of the sprocket bracket.

Tension the Belt and Secure the Screws on the Sprocket Plate



DO NOT OVERTENSION THE BELT!

Figure 20 Tensioning the Belt

General Maintenance of the Y Axis

The Y Axis should be inspected prior to use. Inspect the rail where the slide bearings make contact with the arm (shown right) to remove any loose debris or dirt.

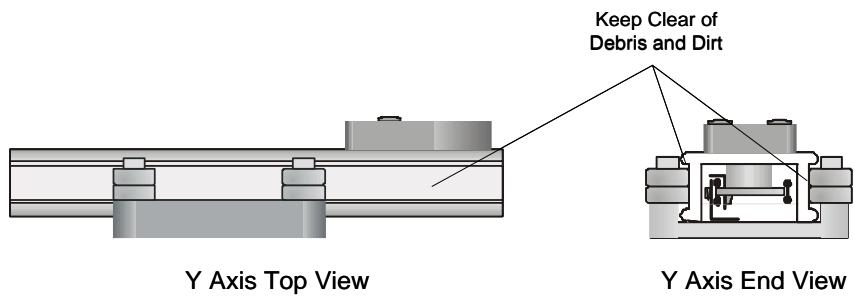


Figure 21 Y Axis

Y Axis Drive Belt Tension

The Y Axis drive belt must be secure, but not overtightened. There should be minimal play in the transducer slide block.

General Maintenance of the Y Axis

The Y Axis should be inspected prior to use. Inspect the rail where the slide bearings make contact with the arm (shown right) to remove any loose debris or dirt.

Y Axis Drive Belt Tension

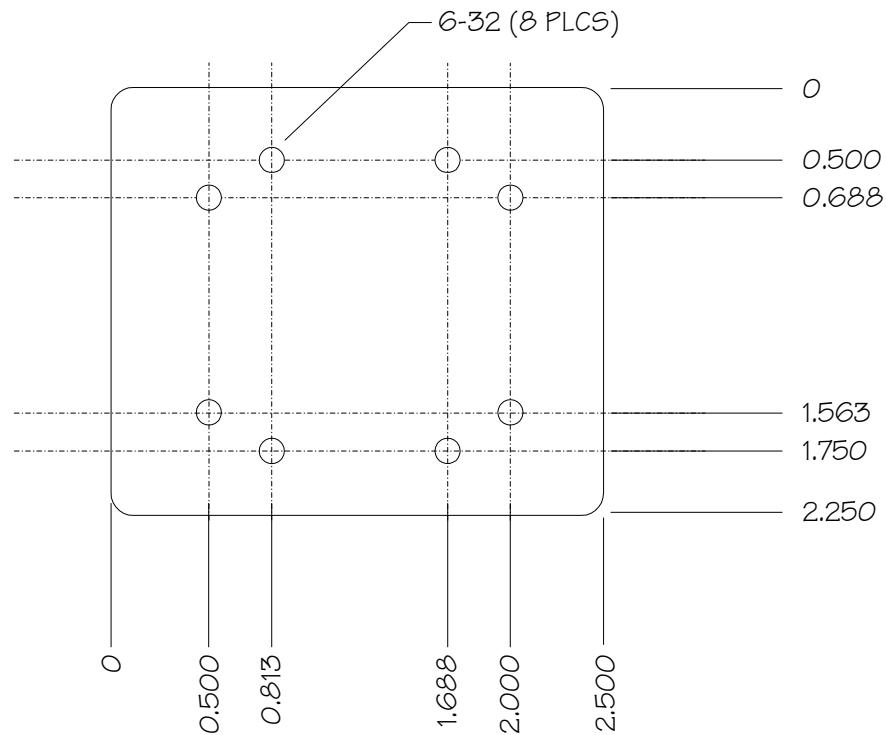
The Y Axis drive belt must be secure, but not over-tightened. There should be minimal play in the transducer slide block.

X Axis Maintenance

The X Axis should be inspected prior to use.

<i>X-Axis (DB9M)</i>	
<i>PIN #</i>	<i>Description</i>
1	<i>MTR +</i>
2	<i>MTR -</i>
3	<i>ENC A -</i>
4	<i>ENC A +</i>
5	<i>ENC B -</i>
6	<i>ENC B +</i>
7	<i>+5V</i>
8	<i>GND</i>
9	<i>NC</i>

<i>Y-Axis (DB9M)</i>	
<i>PIN #</i>	<i>Description</i>
1	<i>MTR -</i>
2	<i>MTR +</i>
3	<i>ENC A -</i>
4	<i>ENC A +</i>
5	<i>ENC B -</i>
6	<i>ENC B +</i>
7	<i>+5V</i>
8	<i>GND</i>
9	<i>NC</i>



Select the Diameter of the pipe in the column heading and use the number of long and/or short links required. The diameters start at 4 inches. The first column is 4" to 4.25" and column to the right of it, is for piping greater than 4.25" up to 5" and so on down the table.

Links	4 to 4.25	5	5.75	6.75	7.5	8.25	9
<i>Short</i>	1	2	3	4	5	6	7
<i>Long</i>	0	0	0	0	0	0	0
	9.75	10.75	11.375	12.25	13	13.75	14.5
<i>Short</i>	8	9	0	1	2	0	1
<i>Long</i>	0	0	3	3	3	4	4
	15.25	16.13	17	17.625	18.5	19.25	20
<i>Short</i>	2	0	1	2	0	1	2
<i>Long</i>	4	5	5	5	6	6	6
	20.875	21.625	22.375	23.25	24	24.75	25.5
<i>Short</i>	0	1	2	0	1	2	0
<i>Long</i>	7	7	7	8	8	8	9
	26.375	27.25	28	28.75	29.5	30.375	31.125
<i>Short</i>	1	2	0	1	2	0	1
<i>Long</i>	9	9	10	10	10	11	11
	32	32.75	33.5	34.25			
<i>Short</i>	2	0	1	2			
<i>Long</i>	11	12	12	12			