

CNC MODEL 2006

R-2

CONSTRUCTION ASSEMBLY **AND** **HARDWARE LISTING**

Hardware List

(58) 1/4"x1-1/2" bolts

(32) 1/4"x2" bolts

(16) 1/4"x2-1/2" bolts

(92) 1/4" washers

(56) 1/4" lock washers

(46) 1/4" nuts

(2) 1/4" wing nuts

(8) 5/16"x1" bolts

(16) 5/16"x1-1/2" bolts

(4) 5/16"x2" bolts

(4) 5/16"x2-1/2" bolts

(8) 5/16" washers

(32) 5/16" lock washers

(88) 5/16" nuts

(8) 5/16" lock nuts

(4) 5/16" x 2" x 4-1/2" U-Bolts

(8) 7/16"OD x 5/16"ID x 2-3/4" Vinyl Hose (clear)

(12) 10-24x1" screws

(6) 1/4"x9-1/12" threaded rods

(4) 1/4"x38" threaded rods

(4) 1/4"x63" threaded rods

I have tried to include in the list every piece used on the machine, please double check with the instructions to make sure everything is accounted for.

I am also providing an example of each and a source where to buy from.

(2) 1/2"-10 Acme Lead screw 6' lengths (www.Use-Enco.com)

MADE IN USA



1/2-10 6'LENGTH ACME THREADED ROD
Thread Size: 1/2-10
Rotation: Right Hand
Length (Feet):6
Material: Oil Finish Steel

Model #408-0220 [Master Catalog Page 596 \(PDF\)](#)
Low Price:~~\$11.35 ea~~ **\$6.99 ea**
Availability: In Stock
Quantity **ADD TO CART**

(20) 1/2"-10 Acme Nuts (www.Use-Enco.com)

MADE IN USA



1/2-10 ACME NUTS
Thread Size: 1/2-10
Hex Size (Inch):7/8
Height (Inch): 31/64
Rotation: Right Hand

Model #407-2200 [Master Catalog Page 599 \(PDF\)](#)
Low Price:~~\$1.41 ea~~ **\$0.99 ea**
Availability: In Stock
Quantity **ADD TO CART**

(1) 3/4"x 36" Drill Rod (www.Use-Enco.com)

[DRILL ROD](#) ▶ [AIR, OIL & WATER HARDENING](#)

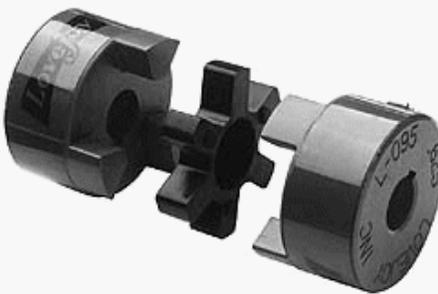
MADE IN USA



3/4 WATER HARDENING DRILL ROD
Diameter (Inch): 3/4
Tempering Medium: Water Hardening
Length (Inch): 36

Model #409-0045 [Master Catalog Page 634 \(PDF\)](#)
Low Price:~~\$12.28 ea~~ **\$8.19 ea**
Availability: In Stock
Quantity **ADD TO CART**

(3) 1/4" Bore LoveJoy Coupler (www.Use-Enco.com)



Lovejoy

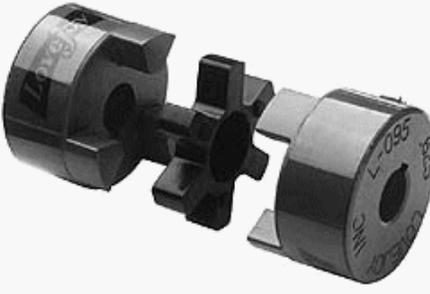
1/4 BORE NO KW LOVEJOY L050 JAW COUPLING HUB

Type:	Three Piece Jaw Coupling
Style:	Coupling Hub
Maximum Bore Diameter (Inch):	1/4
Outside Diameter (Decimal Inch):	1.0800"
Overall Length (Decimal Inch):	1.7200"
Material:	Plastic
Manufacturer Part Number:	68514410206

Model #990-4044
Low Price:\$1.97 ea
Availability: In Stock
Quantity **ADD TO CART**

[Master Catalog Page 821 \(PDF\)](#)

(3) Keyway Spiders (www.Use-Enco.com)



Lovejoy

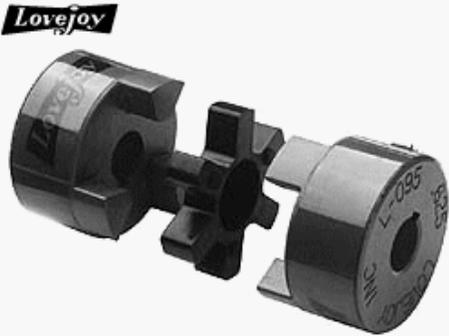
BUNA-N SPIDER/L050 HUB L050 JAW SPIDER COUPLING

Type:	Three Piece Jaw Coupling
Style:	Spider
Outside Diameter (Decimal Inch):	1.0800"
Overall Length (Decimal Inch):	1.7200"
Torque (In./Lbs.) (Pounds):	26.3
Material:	Plastic
Manufacturer Part Number:	68514410194

Model #990-4042
Low Price:\$1.30 ea
Availability: In Stock
Quantity **ADD TO CART**

[Master Catalog Page 821 \(PDF\)](#)

(3) 1/2" Bore LoveJoy Coupler (www.Use-Enco.com)



Lovejoy

1/2 BORE NO KW LOVEJOY L050 JAW COUPLING HUB

Type:	Three Piece Jaw Coupling
Style:	Coupling Hub
Maximum Bore Diameter (Inch):	1/2
Outside Diameter (Decimal Inch):	1.0800"
Overall Length (Decimal Inch):	1.7200"
Material:	Plastic
Manufacturer Part Number:	68514410210

Model #990-4046
Low Price:\$1.97 ea
Availability: In Stock
Quantity **ADD TO CART**

[Master Catalog Page 821 \(PDF\)](#)

(36) 8mm x 22mm x 7mm Skate Bearings (www.vxb.com) (used with 5/16" bolts for bearing slides)

[VXB Bearing Home](#) > [Metric Miniature Bearings](#) > [8mm inner diameter](#) > [100 Skateboard Inline Skate Roller Blade Roller Hockey Bearings](#)

100 Skateboard Inline Skate Roller Blade Roller Hockey Bearings



Quantity in Basket: none
Code: 100Skate
Price:\$29.95

Shipping Weight: 3.00 pounds

Width (mm): 7
Outer Diameter (mm): 22
inner Diameter (mm): 8 Rating: Not yet rated

Promotion Code:

Quantity: **add to basket**

(6) 1/2"x1-1/8"x5/16" Bearings (www.vxb.com)

[VXB Bearing Home](#) > [Inch \(English\) Sizes Bearing](#) > [1/2" inner diameter = 0.500 inch](#) > **10 Ball Bearings R8 ZZ 1/2" x 1 1/8" x 5/16" Chrome Steel - Metal Shields**

10 Ball Bearings R8 ZZ 1/2" x 1 1/8" x 5/16" Chrome Steel - Metal Shields



Quantity in Basket: *none*

Code: **R8ZZ**

Price: **\$14.95**

Shipping Weight: **0.80** pounds

Rating: *Not yet rated*

Promotion

Code:

Quantity:

[add to basket](#)

1-1/4"x1-1/4"x1/8" Aluminum (4 - 8", 2 - 7.5", 2 - 6") (used for bearing slides)

Bearing Slide List of assembly (parts are included in the list above)

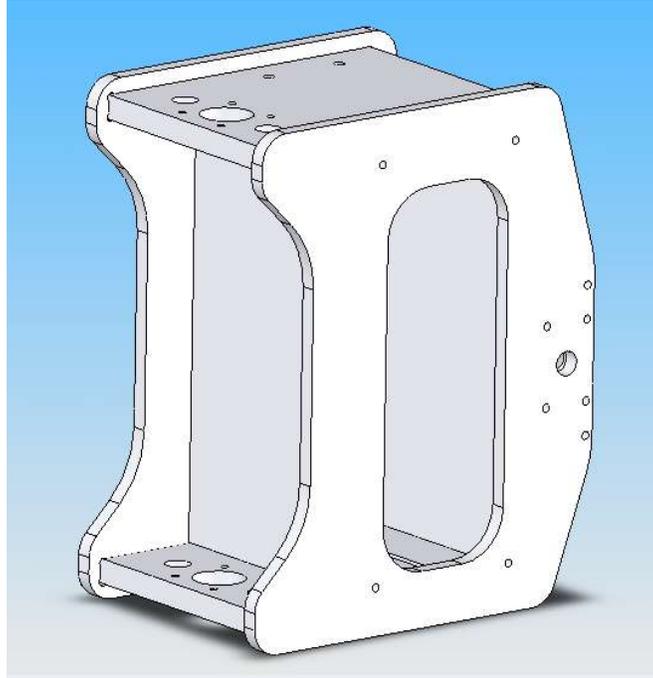
Each 8" bearing slides uses (4) 5/16"x1-1/2" bolts, (12) 5/16" nuts and (4) 5/16" lock washers (two nuts between the bearing and angle alumn.)

Each 7-1/2" bearing slides uses (4) 5/16"x1" bolts, (8) 5/16" nuts and (8) 5/16" lock washers (one nut and one lock washer between the bearing and angle alumn.)

Each 6" bearing slides uses (4) 5/16"x1" bolts, (4) 5/16" nuts and (4) 5/16" lock washers (one nut between the bearing and angle alumn.)

ASSEMBLY INSTRUCTIONS

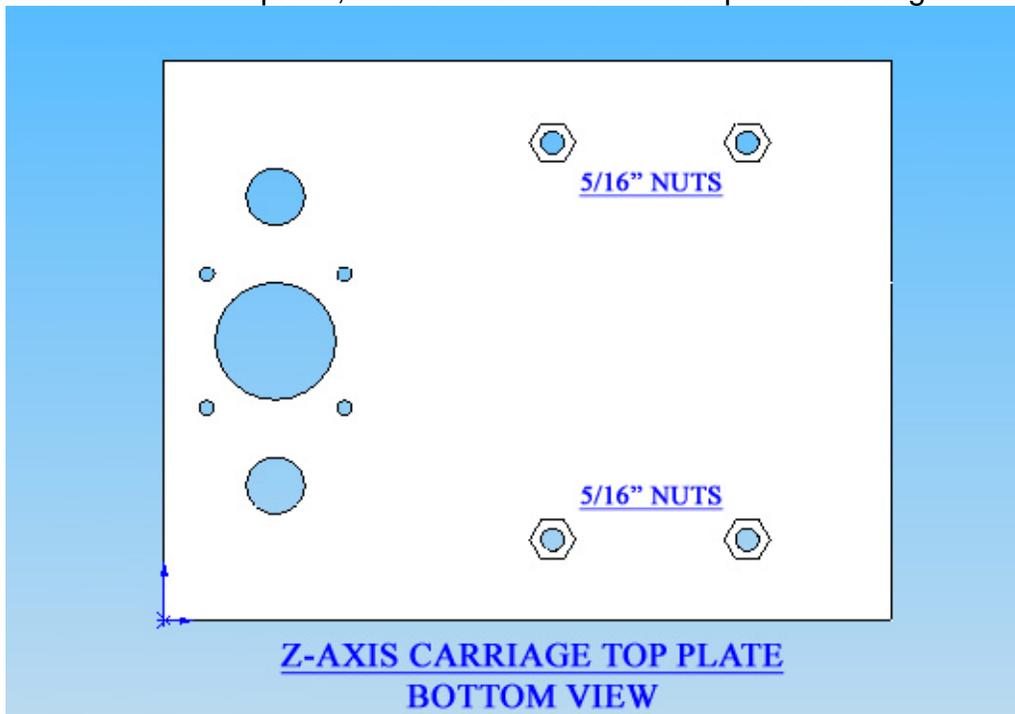
Z-Axis Carriage



Top Plate

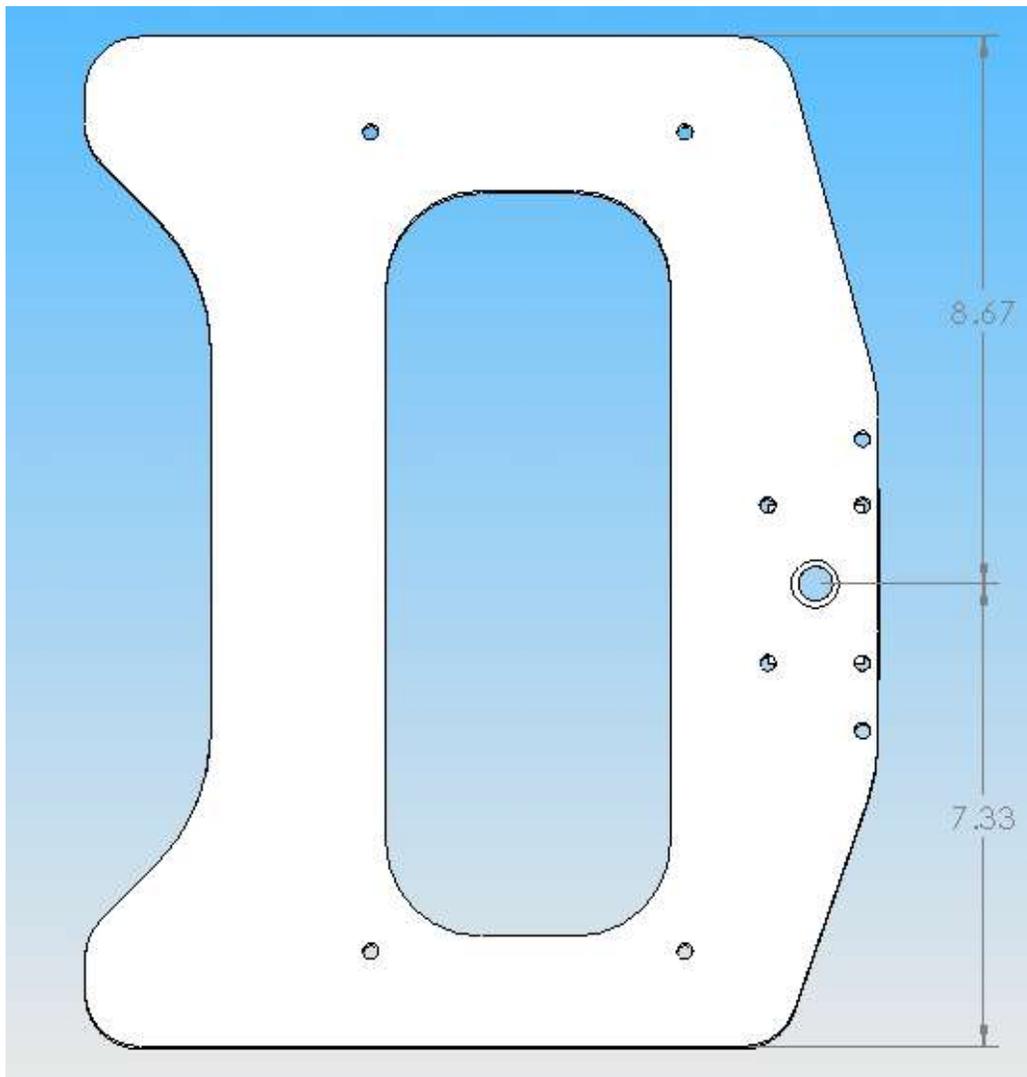
(4) 5/16" nuts

Before assembly of the z-axis carriage place the nuts in the top plate 4 nut recessed holes and tap with hammer to set the nuts into place, this will lock them and keep from moving.

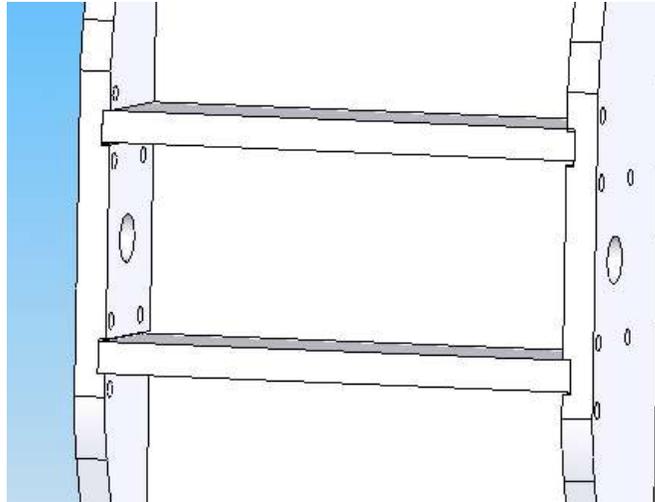


Glue the top, bottom, front and back pieces to the left and right side pieces, while keeping as square as possible being sure the rear Lead screw Holes has a distance to the top larger than the distance to the bottom (this is because of the space at the top for bearing adjustment) there are 6 holes total which allow for the carriage to be bolted together with:

- (6) 1/4"x9.5" threaded rods (it is better to keep a little longer and you can cut off excess)
- (12) 1/4" nuts
- (12) 1/4" washers
- (12) 1/4" lock washers



You can either place the two rear braces in now or when the assembly dries.

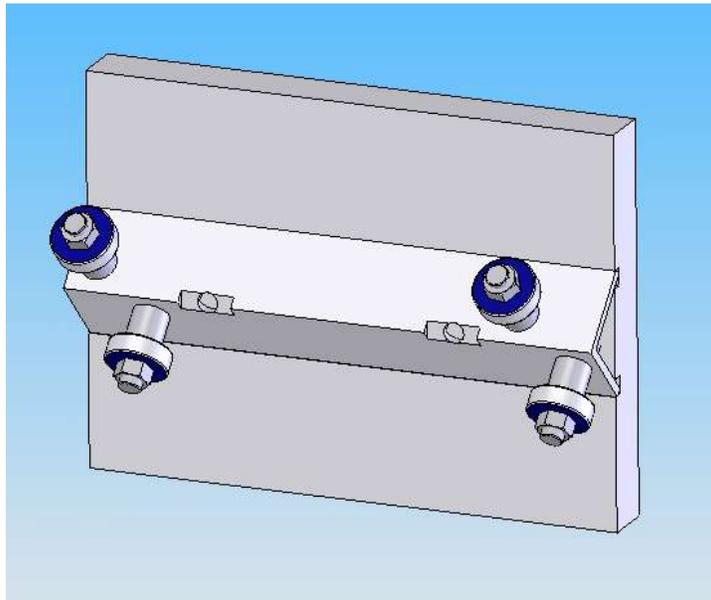


Now is the time to place the y-axis bearing slides (7.5" long) inside the Carriage slide. One is placed on the bottom plate in the two slots provided and bolted down with:

- (2) 1/4"x2" bolts**
- (2) 1/4" washers**
- (2) 1/4" lock washers**
- (2) 1/4" nuts**

Screw the other bearing slide into the Y Axis bearing block (HDPE) with:

- (2) 1/4"x1.5" bolt**

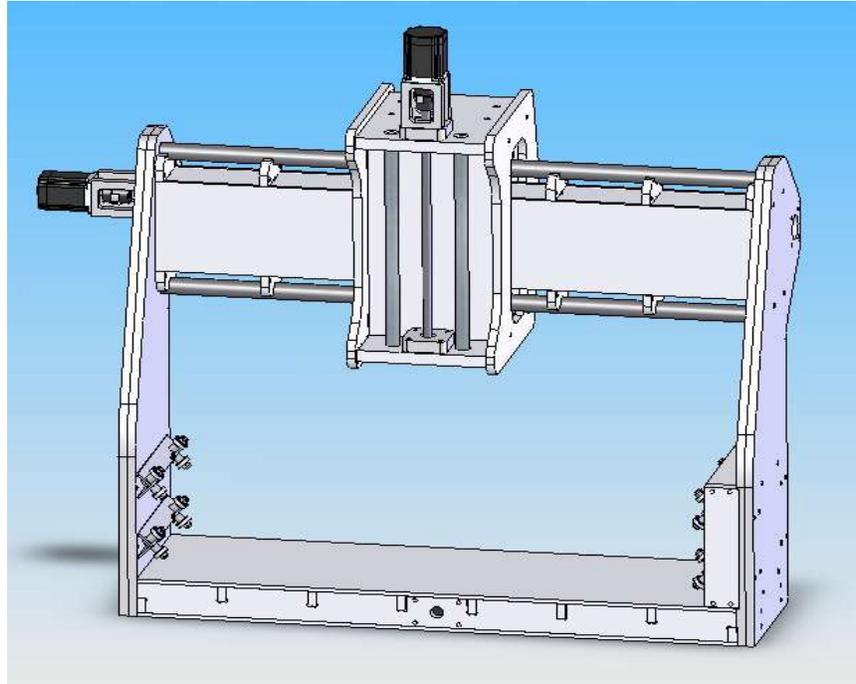


Place the assembled bearing slide in the carriage at an angle and tap lightly to force the bearing slide parallel to the bottom bearing. Screw the tension bolts through the top of the carriage slide so they start pushing downward on the top bearing slide.

(4) 5/16"x2" bolts



GANTRY ASSEMBLY



The first thing to do is place the nuts on the inside of the right gantry and tap into place the same as what was done on the top plate of the carriage slide, Then bolt the x-axis bearing slide box to the inside of the gantry right side. Tap the pieces into the cut recessed slots, drill and tap (1/4" tap which comes with the appropriate drill bit in a set) the HDPE from the outside and tighten down with:

- (4) 1/4"x2" bolts**
- (4) 1/4" washers**

Bolt two of the 8" bearing slides to the HDPE x-axis bearing block with:

- (4) 1/4"x1.5" bolts**

Place the bearing assembly into the bearing slide box and tap down until it bottoms out. At this time you will drill and tap the 8 holes on the sides of the box and bolt together with:

- (4) 1/4"x1.5" bolts**
- (4) 1/4" washers**

Then place the adjustment bolts in the 4 holes which match the interior nuts for the bearing slide adjusters.

- (4) 5/16"x2.5" bolts**

Bolt the other two 8" bearing slides to the inside of the left gantry side piece with:

- (4) 1/4"x2.5" bolts**
- (4) 1/4" washers**
- (4) 1/4" lock washers**

Place 2-36" Gas Pipes on the top and bottom of the upper torsion box with an overhang of 3/4" on both ends. Slide the Z-Axis Carriage on and tighten down the y-axis bearing adjustment bolts, this will hold the pipes in place, temporarily bolt the gantry sides to the upper torsion box using:

- (8) 1/4"x2" bolts**
- (8) 1/4" Washers**
- (8) 1/4" Lock Washers**
- (8) 1/4" nuts**

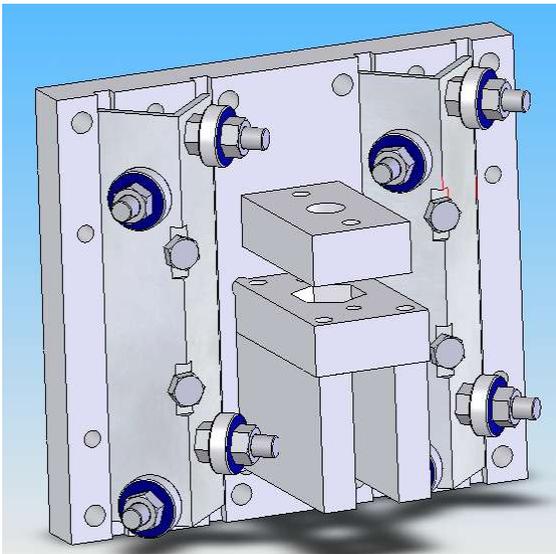
Bolt the bottom Torsion Box to the gantry sides with:

- (8) 1/4"x2" bolts**
- (16) 1/4" Washers**
- (8) 1/4" Lock Washers**
- (8) 1/4" nuts**

Once the sides and the two torsion boxes are bolted together, you can start to replace the upper bolt assembly of the gantry side to the top torsion box one at a time with:

- (4) 1/4"x38" threaded rods** (it is better to keep a little longer and you can cut off excess)

Z-AXIS ASSEMBLY



Place the bottom larger piece of the z-axis anti-backlash nut (this one is slightly different from the other axis with the bolt pattern) on top of the two z-axis anti-backlash nut support walls (1/2" thick HDPE) both ends should be flush, then drill and tap the walls and bolt bottom of anti-backlash nut to them with:

(4) 1/4"x1-1/2" bolts

Put the assembly into the machined "U" slot with the side which has the drill holes furthest from the edge of the anti-backlash nut, and drill and tap the upper two holes and the bottom two holes and bolt with:

(4) 1/4"x1-1/2" bolts

Install the two bearing slides (6" long) in the slots of the z-axis bearing block and bolt with:

(4) 1/4"x1-1/2" bolts

Next is to install the U-bolts which will hold the tension bearing for the slide, I used:

(8) 7/16" OD x 5/16" ID x 2-3/4" Vinyl Hose

(4) 5/16" x 2" x 4-1/2" U-Bolts

(8) 5/16" Washers

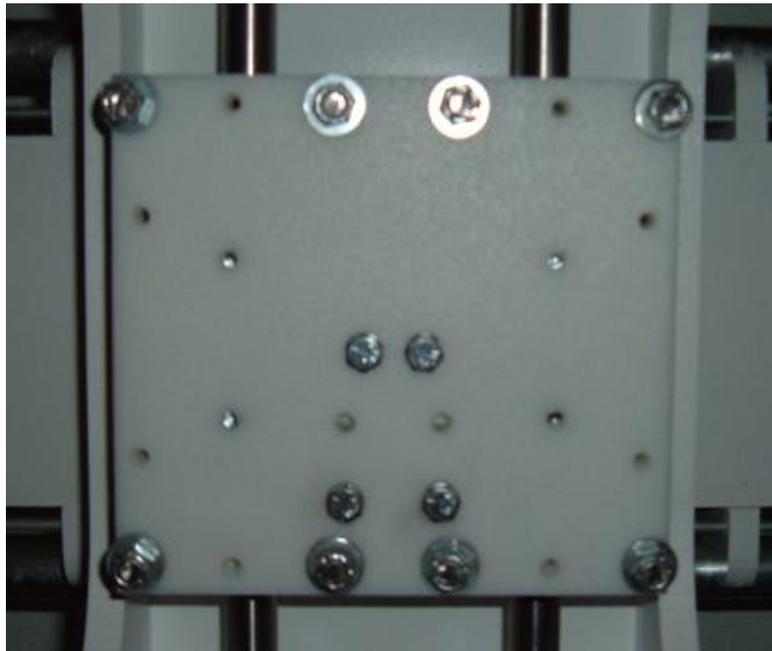
(8) 5/16" Lock Nuts

You will have to squeeze the bolts together, by hand if fine, to make them 4-1/4" to fit into the holes provided because the 4-1/2" u-bolts are easier to find than a 4-1/4". Place bearing on and the two pieces of hose (only used to hold bearing into place) install and the lock washers, tighten just enough to allow the 3/4" drill rod to fit through, do that on all 4.



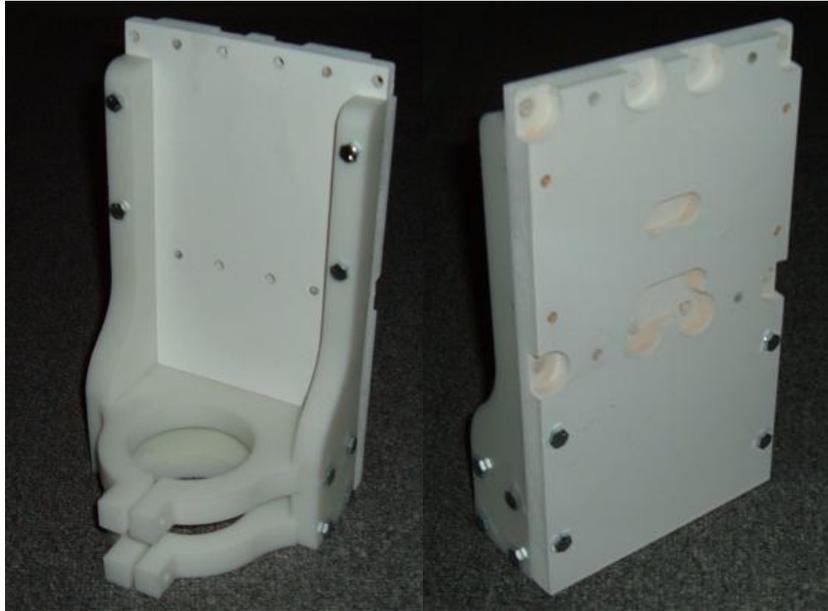
Cut the Drill rod into (2) 14-3/4" lengths and install while sliding through the bearing slides. The drill rod will fit nice and tight so you will have to tap it slightly into place (I did not have to add anything to the drill rods because they are tight, but you could add a cap of some sort screwed to the top to make sure they do not rise up, but like I said I have never had to do this)

Now tighten the (8) lock nuts to pull the bearing tensioner up to the 3/4" drill rod but still allowing it to slide, you can see how snug it is and feel no play in the z-axis, then just simple dremel or cut the excess bolt off.



Next you will need to install the Router holder, motor mounts and lead screw bearings and remaining misc. parts for the Gantry.

Router Mount and Miscellaneous parts



For the Router mount assembly and the two router clamps you will need:

(16) 1/4"x 1-1/2" bolts

Router Clamps

(2) 1/4"x2" bolts

(2) 1/4" washers

(2) 1/4" lock washers

(2) 1/4" wing nuts

Place the upper and lower router clamps in the machined grooves of the side pieces and drill and tap the sides of the router clamps and bolt together, after bolted stand in an upright position and place the router holder rear plate behind it and make 8 marks (4 on each side) on the side plates where the 8 bolts are (shown in above pictures 4 on the rear at the bottom and 4 in the front at the top). Drill and tap the bottom 4 with 1/4" tap to allow the bolts to go through the router mounting rear plate and screw into the side plates. Then drill all the way through the top 4 of the side plates to allow the bolts to go through and be screwed into the router mounting rear plate. Next drill 1/4" holes all the way through the front of the Router Clamps to allow for the 1/4"x2" bolts, washers and wing nuts.

Then bolt the router mount assembly to the z-axis slide with:

(4) 1/4"x1-1/2" bolts

(4) 1/4" washers

(4) 1/4" lock washers

Install the motor mounts and the Lead screw bearing blocks. (All Axis are installed the same way)



You will notice that the Motor mount walls will be taped on one end with 1 /4" threads and the other with 10-24 screw threads. And three of the bearing holders will have 1/4" Holes drilled in them and three will have 1/4" tap threads (one of each for the all axis). To install the bearing holder and motor mount use:

(4) 1/4"x2-1/2" bolts
(x3 for each axis)

Place the bolts through the gantry side and through the bearing holder and bolt into the 1/4" threads provided on one end of the Motor mount walls. The other end is where the motor will be screwed to using:

(4) 10-24x1" screws
(x3 for each axis)

On the other side of the Axis you will place the lead screw Bearing block which will have the 1 /4" taped threads, attach the block with:

(4) 1/4"x1-1/2" bolts
(x3 for each axis)

Placement of the bearings will be outward on all axis to allow for double nut locking of the lead screw to the bearing:

(4) 1/2"-10 acme nuts
(x3 for each axis)

You can go ahead and place the Anti-backlash nuts to the bottom of the gantry, and the rear of the y-axis with:

(4) 1/4"x1-1/2" bolts
(4) 1/4" washers
(x2 for each axis)

The remaining portion of the machine is fairly simple, when you have the bottom torsion box together with the top skins using either 1/4" MDF or 1/2" MDF (your choice) place the cnc router rear end piece on with:

(8) 1/4"x2" bolts
(16) 1/4" washers
(8) 1/4" lock washers
(8) 1/4" nuts
(x2 each end)

You will need to drill a 1/4" hole in the 4 inner holes through the ends of the torsion box to be able to bolt it together.

Place the (4) 1" gas pipes in the holes of the rear end piece you may have to turn by hand to thread it into the holes a little easier. (you may need to use clamps or some type of twine/rope to help hold the pipes into place) Then while the pipe rest in the torsion box cut rail slots slide the Gantry on the pipes and tighten the (4) 5/16" x-axis bearing adjustment tensioner screws on the right side of the gantry to pull the bearings up to the pipe rails.

Then you can place the cnc front end piece on the same way the rear end piece was installed you may have to tap it into place. (As an option you can then remove the outer 4 bolts one at a time and replace with):

(4) 1/4"x63" threaded rod (it is better to keep a little longer and you can cut off excess)

Go ahead and install the motor mount and the lead screw bearing holders the same was as installed earlier on the other axis.

The last step is to install the Lead Screws, acme double nuts, Lovejoy couplers with spiders, and the motors.

I hope this Helps with your assembly of this CNC Model 2006 R-2 and will have as much fun as I have doing the project.

Thanks, Joe