



## 4'x4' Extension Kit Assembly Manual

Rev. 0.7

# The KL744 4'x4' Extension Kit. The newest member of the BobsCNC Family.

Thank you for purchasing the 4'x4' Extension Kit for your KL744 CNC Router Kit from BobsCNC. This manual gives you step by step instructions to ensure your success in assembling the kit.

Before beginning the assembly, take the time to completely review the manual. It's good to be familiar with the entire assembly process before diving in. Make sure you have all the recommended tools you'll need for the assembly.

It's time to... Unleash Your Creativity!

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# Specifications for the 4'x4' Extension Kit with Optional Table

12mm Baltic Birch Frame Components.

Fully Engineered Frame.

Extended Bell Everman Belt Drive on X Axis

Accuracy .002 to .004 inch.

#### The assembled footprint:

Length: 113" (2870 mm)

Width: 70" (994 mm)

Height: 36.5" (530 mm)

Assembled Weight:

70 lbs.

#### **Increased Cutting Area:**

- X: 96" (2440 mm)
- Y: 48" (1220 mm)
- Z: 5" (127 mm) Z Travel

Safety is the First Priority. Always wear proper protective equipment and use "safety sense" when assembling and operating your KL744 Extension Kit.

## Information/Warning Boxes



## Safety Precautions and Warnings

KL7 Series CNC Routers have a 110-v. power supply and use bits that spin at 28,000 rpm with cutting edges that are sharp and hazardous. The operator must understand the potential hazards and is responsible to take appropriate safety precautions before operating the Router.

- Only use extension cords rated for 20 amps plugged into a dedicated outlet.
- Inspect the machine before every use for maintenance issues: loose fasteners, belts, etc.
- Do not operate the machine with dull or damaged router bits.
- Always unplug machine after each use and when cleaning the router or changing router bits.
- Remove rings, bracelets, watches, necklaces before using the machine.
- Wear snug fitting clothing and/or roll up long sleeves to prevent snagging.
- Use appropriate personal protective equipment (PPE) when operating machine including safety glasses and hearing protection.
- Keep hands, hair and clothing away from the moving parts of the machine.
- Do not operate the machine when under the influence of alcohol or prescription medications.
- Make certain the workpiece is clamped securely in place before starting the machine.
- Never leave the machine running unattended.
- Children must be supervised by adults when operating the machine.
- Do not operate the machine in the presence of flammable materials.
- Keep floors clean, dry, and free of debris to eliminate slip and/or trip hazards.
- Have a suitably rated fire extinguisher on hand when the machine is in operation.

## Getting Started

Required Tools:

#3 Phillips screwdriver to build the main components.

#2 Flat Blade screwdriver.

LOCTITE 242<sup>™</sup> Thread Lock (fingernail polish can be used as a substitute).

Set of Metric Sockets and SAE Wrenches.

Set of Metric and SAE Allen Wrenches.

Wood Glue and Clamps

## Assembly Recommendations:

Use a large, unobstructed, work area for assembling your KL744 Extension Kit.

All Screws (unless noted) should be installed snug, then rotated 1-2  $\frac{1}{2}$  turns.

Apply LOCTITE to all 5/16 Machine Screws that are used to secure plywood components.

Painting, or applying stain with a clear coat will provide extra protection to the wood components. Do not coat the pocket cuts for the EX6L, EX6S, and EX7

Try using strips of 1-inch blue painters' tape behind the T-Slots to help hold the Nuts in place during assembly.

Lock Nuts are never used to secure components that have T-Slots. They are only used to mount components where the Nut is not held in a T-Slot.

## Prepping the KL744 for the Extension Kit



**WARNING** When removing the required machine screws from the KL744, do not allow the nuts to rotate in the T-Slots. You can use the straight blade of a screwdriver as a wedge if needed.

**Step 1** Remove Existing Spoilboard.



- **Step 2** Remove the upper Bell Everman Belts.
  - 2a Loosen all four Machine Screws holding the Bell Everman Drive. Be careful not to remove them.



**2b** Carefully lift the Servo Motor to remove the Belts from mesh as shown.



After the Belts are out of mesh, re-tighten the Machine Screws to hold the assembly in the raised position.



**2c** Remove the four X9 Belt Holders (front and back) by loosening and removing the Machine Screws and Nuts.



2d Remove the upper(dynamic) Belt. (Save the upper belts, they can be used as replacements on the Y axis, if needed).



Step 3 Remove the right and left side X7 Belt Rest. Using the tip of a straight screwdriver as a wedge to secure the Nut to keep it from spinning the T-Slot. Use the same technique to remove the remaining Machine Screws and Nuts



**Step 4** Remove the X-5 Front End Panel as shown.



**Step 5** Remove both X7 Belt Rests and X6 Side Braces Front as shown and discard.



**Step 6** Remove both front X8 Corner Braces as shown. Do not discard.



KL-744 ready for Extension Kit

## Building Optional Table Extension

Part #	Wood parts	Quantity	
ET1	Side Panel	2	
ET2	Cross Support	1	
ET3	Spacer	2	
Т4	End Panel	2	
Т5	Side Leg Panel	2	
Т6	End Leg Panel	2	
Τ7	Mid Brace	2	
Т8	Corner Brace	4	

Part #	Hardware	Quantity	
H3	5/16 X 1 1/4" Screw	52	
H67	5/16 X 2 1/2" Screw	8	
H8	5/16 Fender Washers	16	0
H4	5/16 Nut	34	Q
H6	5/16" Lock Nut	26	Q

Step 1 Align the tabs and slots of the T5 and T6 Leg Assembly panels using three 5/16 x 1 ¼ Machine Screws and Nuts per Assembly as shown. NOTE: When assembled, the two Leg Assemblies will mirror each other as shown.



**Step 2** Align the slots in the ET2 Cross Supports and the T7 Mid Brace as shown. Secure with two 5/16 x 1 <sup>1</sup>/<sub>4</sub> Machine Screws and Nuts for each end.





#### Completed Mid Frame Support Assembly

**Step 3** Align the tabs in the T4 End Panel with the Slots in the Mid Brace Assembly and secure with four 5/16 x 1 <sup>1</sup>/<sub>4</sub> Machine Screws and Nuts Repeat for the other side.



IMPORTANT: The T4 End Panels have eight holes, four at each end and slots for the Mid Frame Support and the two ET1 Side Panels have four holes at one end (see below).



Tabs and Slots properly aligned.



Both T4 End Panels attached to the Mid Frame Assembly



**Step 4** Attach the four T8 Corner Braces to the End Panel Assembly using two 5/16 x 1 <sup>1</sup>/<sub>4</sub> Machine Screws and Nuts per corner as shown.



Step 5 Align the tab of the ET1 Side Panels and T8 Corner Braces with the slots in the End Panel Assembly and secure using four 5/16 x 1 ¼ Machine Screws and Nuts for each ET1 Side Panel as shown.





Both ET1 Side Panels attached to the Mid Frame Assembly

Step 6 Attach the two leg assemblies. Be sure to orient the elongated tab so that it passes through the slot in the Corner Support as shown. Secure each Assembly to the Table Side and End Panel with eight 5/16 X 1 ¼ Machine Screws and Lock Nuts. NOTE: For the photo below the Table Assembly was set on its side to ease installation.







Both Leg Assemblies attached.

#### **Step 7** Attaching Table Extension to the KL 744 Table.

**7a** Install the ET3 Spacer by removing the four 5/16 x 1 1/4 Machine Screws and Locknuts from the front end of the table as shown.





**7b** Thread the four  $5/16 \ge 2\frac{1}{2}$ " Machine Screws through the holes. The Screw threads must be accessible on the outside of the existing Table Assembly. Make sure to add 5/16 Fender Washer between the head of the Machine Screw and the inside of the existing corner as shown.



With the threads visible install the ET3 Spacer as shown. Repeat for both sides.



**7c** Align the holes in the ET3 Spacer to the Table Assembly with the Machine Screws and the ET3 Spacer.



7c Align the holes in the End Panel of the Extension Table Assembly with the Machine Screws protruding through the on the existing Table Leg and Spacer. Secure the Assembly to the Table with four Washers and 5/16 lock nuts. Make sure to add 5/16 Fender Washers between the screw head and the back of the existing table leg.





7d After attaching the Extension Table use a level or straight edge to make sure the Table and the Extension are aligned on a flat plane as shown. Loosen, shim under the legs, adjust, and re-tighten Machine Screws as needed.



## Assembling the Extension Kit



**CAUTION** This kit contains numerous small components that pose a choking risk for small children and pets. Keep kit pieces in a secure location out of the reach of small children and pets.

#### **Extension Kit Frame Wood Components**

Part #	12 mm Wood parts	Quantity	
EX1	Side Frame	2	
Х2	Mid Rail Support	4	
Х3	Rail Support	16	
EX4	Drag Chain Mount	1	
EX5	Drag Chain support	1	
EX6L	Long Belt Rest	2	
EX6S	Short Belt Rest	2	
EX7	Side Brace	4	· · · · · ·
EX8	Frame Support	1	

Part #	6 mm Wood parts	Quantity	
L1	Belt Rest Joint Support (6mm)	2	
L2	Side Brace Joint Support (6mm)	2	
L3	Side Joint Support (6mm)	2	

#### **Extension Hardware Components**

\*\*Kit includes extra Machine Screws and Nuts.

#### Assembly Instructions can be downloaded at BobsCNC.com

Part #	Hardware	Quantity	
H3	5/16 X 1 1/4" Screw**	122	
H4	5/16 Nut**	122	Q
H33	Timing Belt - T5 - 10 meters	2	C
H32	Double Sided Tape	1 roll	
SD3	Drag Chain	2	
H22	10-24 Insert	2	
H31	Large Zip Tie	50	

## Glue-Up of Side and Belt Supports



**WARNING** Each support assembly is made of two mirrored pieces of different lengths. Make sure the T-Slots are oriented in the same direction. Take time to ensure that the adjoining edges of the glue joints line up. Joints must be tight and flat.

We recommend gluing the joints on a flat surface. As a best practice use a <sup>3</sup>/<sub>4</sub>" piece of MDF as a splint to support both sides of the joint as the glue cures. We also used a piece of paper to act as a release between the glue joint and the splint. You will need four clamps to secure the joint during curing.

NOTE the side rail components for each contain a long and short rail with a dadoed end and a  $\frac{1}{4}$ " spline.





Step 1Thoroughly coat all the contact surfaces of the EX6S and EX6L<br/>Belt Rest, L1 Belt Rest Joint Support including the end of the<br/>joint pieces with wood glue as shown.



Step 2Carefully align the ends of the pockets and insert the L1 Belt<br/>Rest Joint Support.





Step 3 Use clamps to secure the joint. Once secure, clean away the excess wood glue and set the Assembly aside until the glue has cured. You will need two clamps for the Spline and two to hold the Assembly to the splint.





Step 4Repeat the steps to glue up the L2 Side Brace Joint Support and<br/>EX7 Side Brace. Note: The EX7 Parts are the same size.



Step 5 After curing, remove the clamps and release the paper. Use 220 grit sandpaper with a sanding block and lightly sand the joint to remove the release paper and to ensure it is smooth and flat.
 NOTE: Recoat the sanded surfaces with polyurethane.



### 4'x4' Extension X Frame Assembly

This photo was taken prior to the complete assembly of the extension kit and is only presented to illustrate how the back end of the Extension is oriented to the Front end of the existing KL744.



#### **Extension Kit**

**Existing KL744** 

Step 1 Attach the eight X3 Rail Supports per X Frame side. Align the tabs of the X3 Rail Supports to the slots of the EX1 Side Frames. Insert and secure with sixteen 5/16 x 1 1/4 Screws and Nuts as shown.

Note: The pocket holes on the EX1 Frame Side must be placed face-down when attaching the X3 Rail Supports.



Repeat to install the remaining eight X3 Rail Supports on the other Side Frame.



NOTE: The finished X Frame Side Assemblies are designed to mirror each other as shown. You will be able to see how the slots, pocket holes, and access holes line up.



#### **Step 2** Attach the EX5 Drag Chain Support to the X2 Mid Rail Supports.



2a Align the tabs of the EX5 Drag Chain Support with the slots in two X2 Mid Rail Supports on either side and secure with two 5/16 x 1 ¼ Machine Screws and Nuts. The slot in the Drag Chain Support is there to make room for the center Mid Rail Support.



**2b** Place a X2 Mid Rail Support in the slot between the two mounted supports.



Step 3 Align the slots in the X2 Mid Rail Supports with the slots in the Rail Assembly. Tilt the Rail Assembly until the tabs in the Frame Supports fit into the square holes at the end of the Rail Assembly. Tap until fully seated and secure with four 5/16 x 1 ¼ Machine Screws and Nuts.



Tilt the Rail Assembly until the tabs in the X2 Mid Rail Supports fit into the square holes at the end of the Rail Assembly. Tap until the tabs are fully seated, secure with four 5/16 1 <sup>1</sup>/<sub>4</sub> Machine Screws and Nuts. Repeat for the other side.





## Connecting the KL744 to the Extension Kit

Step 1Loosen the bottom SG25U Bearings on both sides of the Gantry.<br/>Remove the existing X Rails. Place blocking beneath the Gantry<br/>Assembly to keep it from dropping after the rails are removed as<br/>shown below.



**Step 2** Remove the Rails by removing the upper X Rails first. In the photo below we chucked the end of the Rail in a 3/8" drill and pulled it as it slowly turns. After removing the upper Rails do the same with lower Rails.



- **Step 3** Install the EX4 Drag Chain Mount.
  - Insert two H22 10x24 Threaded Inserts in the EX4 Drag Chain Mount as shown. Use the mounting holes in the front right corner as shown. NOTE: the flange of H22 Inserts are threaded from the underside of the Drag Chain Mount. The flanges should not be visible from the top.



**3b** Align the ends of the two X Frame Assemblies and insert the EX4 Drag Chain Mount. **NOTE: The notches on the inboard end of the Mount are circled in red below.** 





The notches are design to fit around the long Mounting tab on the top of the leg Assembly. **NOTE: This only applies to owners of the KL744 Table.**  Insert the tabs of the EX4 Drag Chain Mount into the square slots in the Mid Support Assembly and secure the Mounting Plate with two  $5/16 \times 1 \frac{1}{4}$  Machine Screws and Nuts as shown.



**Step 3a** With the other side of the X Frame Assembly and Extension Assembly aligned, insert the tabs of the EX8 Frame Support into the square slots of the Mid Rail Assembly and secure with two 5/16 x 1 <sup>1</sup>/<sub>4</sub> Machine Screws and Nuts.





**WARNING** The joint between the top edge of the KL744 and the Extension Table must be smooth. Take time to ensure that top edges are flush before tightening the clamps.

**Step 3b** Cover the outboard end surfaces of the X Frame and the Extension Assembles with wood glue as well as one side of the L3 Side Joint Support as shown.



**Step 3c** Slide the Glue Panel between the ends of the X Frame Assembly and the Extension Assembly as shown.



Attach a clamp to the End Rail Supports of the X Frame and Extension Assemblies and gently draw the ends together.



Keep the top of the Side Joint Support flush with the top edge of the Rail supports. Gently tap the proud edge down if needed.





### Installing the New Static Bell Everman Belt



The Bell Everman Drive system requires two belts on each axis, one Static the other Dynamic. The Static Belt is attached to the Belt Support. The Dynamic Belt is routed through the Bell Everman Drive. The teeth of the Dynamic Belt are meshed into the teeth of the Static Belt beneath the Idler Pulleys and driven by the Dynamic Belt as its teeth are engaged by the Timing Pulley.

**NOTE**: The 3M Double-Sided Tape supplied with the extension kit is specifically designed to adhere to a polyurethaned surface. Before proceeding, be sure to apply two coats of polyurethane to the completed Belt Support.

Step 1 Clean the Belt Support Assembly surface with denatured alcohol and a clean paper towel or link-free cloth as shown. NOTE: The side with the hex shaped holes at the ends of the Belt Supports must be facing down.



Step 2 Unroll 6 to 12 inches of 3M Double-Sided Tape. Beginning at one end of the Belt Support Assembly, carefully position the Double-Sided Tape. The edge of the Tape must be placed along the outside edge as shown. The Tape will be placed from one end to the other and cover the length of the Belt Support Assembly.





Step 3 After adhering the Tape, measure the Belt Support Assembly from short end of the notch to the other short end. (Photos below were taken prior to applying Double-Sided Tape to show the points to use for accurate measuring).



Subtract  $1\8''$  from the total length and cut the Belt to that length.

**Step 4** Carefully clean the smooth side of the Belt with denatured alcohol and a clean rag or paper towel.



Step 5 Peel back a few inches of the protective paper on the Tape.Beginning from that end, carefully position the edge of the Belt along the edge of the Belt Support Assembly as shown.







NOTE: Watch carefully as you remove the protective paper so that you don't inadvertently pull the adhesive away from the surface. If you notice this happening, stop, smooth the paper back over the Tape, and press the Tape into the wood surface. Then, gently begin removing the paper again.

Continue removing the protective paper a few inches at a time and setting the Belt in place. Use a laminate roller or a piece of smooth wood to press the Belt into the adhesive for maximum adhesion. Repeat for the other side.



#### **Step 6** Installing the Belt Support Assemblies.

Step 6a Add extra blocking as needed to lift the Gantry
Assembly with the upper SG25U Bearing above the Rail
Supports. This will allow the Belt Support to slide between the
Upper Bearing and the Rail Support. NOTE: Blocking has been
placed to support the Z Assembly and stabilize the Gantry.



**Step 6b** Slide the Belt Rest Assembly under the Bearings and align the notch at the end of the Belt Support with the square hole in the End Panel. Gently bow the Belt Rest Assembly as need to insert the notch as shown.





**Step 6c** Align the square holes in the Belt Support Assembly with the tabs on the Rail Supports and gently tap them into place and secure with seventeen  $5/16 \times 11/4$  Machine Screws and Nuts.



- Step 7Cut four 3/8" Stress Proof Steel Rails to 108". NOTE: TheseRails are not included with the kit.
- Step 8 Install the Upper Rails by carefully threading the Stress Proof Steel Rail into and through each of the upper Rail Supports as shown.





**NOTE:** To ease installation, we chucked one end of the Rail into a 3/8" variable speed drill and rotated the Rail into and through the Rail Supports.

Make sure the Rail slides under the upper SG25U Bearings as shown.



After the Rail is fully set in the stop in the End Panel, repeat the steps to install the upper Rail on the other side



**Step 9** With both upper Rails in place, carefully lower the Gantry so that it is suspended on the upper Rails.



Step 10Carefully insert the Lower Rails on both sides making sure the<br/>Rail slides over the lower SGU25 Bearing as shown below, right.





**Step 11** Retighten Lower SG25U Bearings per the KL744 manual.

Step 12 Install the Corner Supports by aligning the tabs on the Supports with the slots in each side and secure with two 5/16 x 1¼" Machine Screws and Nuts per side.





**Step 13** Align the tabs of the Corner Supports and X Frames Sides with the slots in the End Panel, tap into place and secure with fourteen 5/16 x 1 <sup>1</sup>/<sub>4</sub> Machine Screws.



**Step 14** Install four 5/16 x 1 <sup>1</sup>/<sub>4</sub> Machine Screws and Nuts to secure the Belt Rest and Side Brace on other end of the X Frame Assembly.



## Installing the Dynamic Bell Everman Belt

Step 1 At the back left of the X1 axis, align and mesh the ends of the remaining length of the Dynamic Belt with the Static Belt. Secure with a X9 Belt Holder and one 5/16 x 1 ¼ Machine Screw and Lock Nut as shown. NOTE: The locknut fits in the hex shaped pocket hole on the underside of the Belt Rest.



**Step 2** Side the Dynamic Belt beneath the two back Idler Pulleys.



**Step 3** Loop the Dynamic Belt over the Timing Pulley and then rout it beneath the two front Idler Pulleys.

Remove excess slack from the Belt Pulley and push the Bell Everman Assembly down to the Dynamic and Static belts are in mesh as shown. (For more information review the installation instruction in the KL744 Manual).





**Step 4** Trim the Dynamic Belt to length and secure with a X9 Belt Holder and one 5/16 x 1 <sup>1</sup>/<sub>4</sub> Machine Screw and Lock Nut.



## Installing the New Drag Chain



- **Step 1** Remove the existing Drag Chain.
  - Remove upper and lower Drag Chain tabs and to expose
     Wires as shown. In the photo below, we used a small
     adjustable wrench for leverage to gently remove the tabs.



**1b** Disconnect the Drag Chain from the top and bottom Mounting Plates as shown and discard the old Drag Chain.



1c Unspool the excess Wire that was bundled during the original assembly of the KL744 and gently route the Servo and Home Switch wires through the Gantry Side.





**Step 2** Begin assembling the new Drag Chain by laying out the two new lengths side by side. Notice the two different endcaps.



#### Inside the Link





This Endcap Fits Outside the link

2a Remove one outside and one inside end cap by removing the adjoining tab and then disconnecting the endcaps as shown. Once removed, discard the endcaps.



**2b** Align the ends of the Drag Chains as shown and snap the ends together, then reattach the tabs.







**2c** Remove the "Outside" Link at the end of the combined Drag Chain, flip it over and reconnect it as shown



Lower Attachment Clip

**Step 3** Measure from the Power Supply Box and use a zip tie every 6-8 inches to bundle 68" of the Home Switch Wires and Power Supply together.

NOTE: Starting the wire routing process from the Power Supply Box ensures that any excess Home Switch and Servo Wiring can still be easily segregated, bundled and attached to the back of the KL744.



Step 4 Lay out the Drag Chain on its back. Beginning with the end that will be connected to the X Frame Assembly, remove approximately ten of the tabs from the top of the Drag Chain. From the 68" measurement begin laying the wires into the

channel. As you progress, continue removing new tabs while replacing the tabs that secure the wire in place.





**Step 5** At the end of the Drag Chain that mounts to the side of the Gantry Assembly, remove the "Outside" mounting link, finish threading the Wire and reconnect the link.



Step 6 Attach the Drag Chain to the Mounts as shown. NOTE: The bottom drag chain is connected to the new EX4 Drag Mount as shown.





**Step 7** Gently pull the excess Servo Motor and Home Switch Wire through the Gantry. Take care to segregate the Home Switch and Servo Wires to minimize electrical interference. Spool and secure in place with Zip Ties.





Refer to the KL 744 manual for more details about Spoilboard construction and installation. The new baseboard and Spoilboard should measure at least 109" long x 48" wide. Sheet goods that are larger than 4'x 8' nominal sizes can sometimes be special ordered through home centers and lumber yards. Cabinet shops and hardwood wholesalers are also a good source for oversized sheet goods.

## Updating New Firmware Values

The firmware values will need to be updated to reflect the new longer X travel range. Please type the following commands in to the command textbox in the console window of UGS Platform and press the enter key.

\$130=2440

\$131=2440

Note: 2440 millimeters is approximately 96"

25.4 mm = 1 inch