

Bed Extension Kit 14 Instructions

To install the LittleMachineShop.com Bed Extension Kit 14 you disassemble your lathe and reassemble it with the new parts. You drill and tap nine holes in the new bed way casting as you reassemble the lathe.

The Bed Extension Kit cannot be sold as a bolt-together kit because the mounting holes for the lead screw, the change gear adjuster (or banjo), and the rack vary in position from lathe to lathe. These holes are drilled and threaded at the factory during assembly of the lathe.

The Bed Extension Kit 14 includes the following parts:

- Bed way (14")
- Lead screw (14")
- Rack (14")
- Chip tray (14")
- Motor mount
- Two chip tray braces
- One M8x25 hex head cap screw (for the headstock)
- Two M6x8 flat head machine screws (to mount the motor)
- Two M10x35 dog point set screws (for the motor mount)
- Two M10 nuts (for the motor mount)
- One M5x10 hex head cap screw (for the belt tensioner)
- One M6x16 hex head cap screw (for the belt tensioner)
- Four M5 nuts (for the chip tray braces)
- One M6 nut (for the belt tensioner)
- Four M5x16 pan head Phillips machine screws (for the chip tray braces)
- Four M8x20 socket head cap screws (for the chip tray braces)
- One M3x10 socket head cap screw (for the rack)

A few of these parts will be redundant if you have a 7x12 lathe.

You will need the following tools:

- The hex (Allen) wrenches that came with your lathe (3, 4, 5, and 6 mm)
- The end wrenches that came with your lathe (8, 10, 14, and 17 mm)
- A 2.5-mm Allen wrench
- A #2 Phillips screw driver
- Two 2½” or larger C-clamps
- An M3x0.5 metric tap and tap drill (2.5 mm or #40)
- An M6x1 metric tap and tap drill (5.0 mm or #9)
- An M8x1.25 metric tap and tap drill (6.8 mm, letter H, or 17/64”)
- An electric hand drill

Expect to spend between two and four hours on this project.

If you do not understand what a part is that is referenced in these instructions, see the manufacturer’s parts diagram or go to www.LittleMachineShop.com and use the product search to find that part and look at the photograph.

Paint

If you want to paint your new bed ways to match your lathe, we have identified the following paint colors.

Color	Paint	Used On
Red	Rust-Oleum American Accents #7925 Colonial Red Satin Sears Tool Box Red 3066348	All red machines from Harbor Freight, Micro-Mark, Homier
Green	Hammerite RustCap Hammered Metal Finish Mid Green	All machines from Grizzly
Blue	Plasti-Koat Ford Blue Engine Paint #224	Late model mini lathes from Homier

Teardown

Follow this procedure to disassemble your lathe.

In the following procedure, left, right, front, and back are always related to the operator’s position at the lathe. Thus, left means the headstock end and right means the tailstock end.

Preliminary

1. Unplug the power cord.
2. Remove the tailstock.
3. Remove the rear splashguard. There are four Phillips head machine screws, three in the ways and one in the headstock.
4. Remove the change gear cover. There are two socket head cap screws.

Electrical

1. Detach (but don't disconnect) the control box. There are four Phillips head machine screws, two on top and two on the bottom.
2. Make a note or draw a picture of the wiring connections so that you will be able to reconnect the four wires that go into the control box. The wires from the motor connect to the forward / off / reverse switch. The power cord connects to the illuminated power switch.

Note that the power cord has three wires, while the cord from the motor has two wires.

On my lathe, the connections are as follows. (Mark up this table to reflect the connections on your lathe.)

Black motor lead	Outboard connection on center of F/O/R switch
White motor lead	Inboard connection on center of F/O/R switch
Black power cord lead	Far connection on illuminated power switch
White power cord lead	Near connection on illuminated power switch.

3. Disconnect the three ground wires on the front of the headstock by removing the three Phillips head machine screws.
4. Disconnect the four wires that go to the control box by pulling off the slip-on connectors. Two of the wires are from the motor and two from the power cord.
5. Remove the black plastic protector from the area that was covered by the control box. There are two Phillips head machine screws.
6. Remove the motor cover from the back of lathe. There are two Phillips head machine screws.

Lead Screw

1. Remove the gear, bushing and key from the left end of the lead screw. There is one socket head cap screw.
2. Remove the right lead screw mounting bracket (pillow block). There are two socket head cap screws.

3. Be sure the half nuts are disengaged (handle up) and carefully pull the lead screw out toward the tailstock end of the lathe. If necessary, tap with a soft-faced hammer.
4. Remove the apron. There are two socket head cap screws near the front of the carriage.
5. Slide the carriage off the right end of the ways. You might need to loosen the adjusting screws to get the carriage off the ends of the ways.

Motor

1. Remove the two larger nuts and washers from the motor-mounting studs on the front of the lathe. Remove the motor from the back of the lathe.
2. Remove the two motor adjusting studs and nuts adjacent to the motor mounting stud slots.

Change Gears

1. Remove the M8 nut and washer from the change gear adjuster.
2. Remove the left lead screw mounting bracket and change gear adjustment assembly.
3. Slide the change gear adjustment assembly off the left lead screw mounting bracket.
4. Unscrew the change gear adjusting stud from the bed.

Headstock and Miscellaneous

1. Remove the headstock. There are three socket head cap screws under the ways; two in the front and one in the back.
2. Remove the chip tray and rubber feet, if attached. There are four socket head cap screws.
3. Remove the rack. There are three socket head cap screws.

Reassembly

Follow this procedure to reassemble your lathe.

In the following procedure, left, right, front and back are always related to the operator's position at the lathe. Thus, left means the headstock end and right means the tailstock end.

Rack

1. Position the left end of the new rack 1¾" from the right edge of the right-front headstock mounting hole.
2. Use a small C-clamp to hold the rack in position.
3. Using either a transfer punch or the largest drill bit that will fit through the rack mounting screw holes, mark the locations of the four rack mounting screw holes. To mark with the drill, simply start to drill the hole, but stop as soon as a dimple is made.
4. Remove the rack.
5. Use a 2.5 mm or #40 (0.098") drill bit to drill the four holes through.
6. Use an M3x0.5 tap to thread the holes. Take care when tapping these holes. The end of the tap may be in contact with the casting on only one side.
7. Install the rack. Use four M3x10 socket head cap screws (there is one furnished in the kit if you lathe didn't have 4 to start with).

Carriage

1. Loosen the six adjusting socket head cap screws on the bottom of the carriage.
2. Loosen the four adjusting setscrews and nuts. Back off the setscrews.
3. Slide the carriage onto the ways. Keep it near the right end of the ways.
4. Turn the lathe over and set it down so the right 8" of the ways are hanging off the edge of the workbench. This allows you to move the carriage back and forth with the lathe upside down.



5. Snug up the six adjusting socket head cap screws to remove play, but allow the carriage to move freely.

Note: In a very few cases, the thickness of the new ways is smaller than the range of adjustment on the saddle retainer adjustment. If this occurs you will not be able to get all the play out of this adjustment. The quick fix is to place a plastic cable tie between the ways and the saddle retainer. Once things are adjusted, cinch the cable tie around the saddle retainer lengthwise. The cable tie provides a good bearing surface.

There are a couple of long-term solutions. You can mill a slot in the top of the saddle retainer for a section of cable tie. Don't mill the slot clear to the ends of the saddle retainer or the cable tie will slide out the end. Make the depth of the slot about half the thickness of a cable tie.

Another long-term solution is to mill a step in the saddle retainer. Mill the area that bolts to the carriage so the part that runs on the bottom of the ways extends up past the surface of the carriage. If you don't have the facilities to do this, LittelMachineShop.com will do it for you.

6. Snug up the four setscrews and tighten the four lock nuts.
7. Turn the lathe upright.
8. Install the apron using two M8x20 socket head cap screws. Leave the mounting screws loose.

Position Lead Screw

1. Ensure that the half nuts are disengaged (handle up).
2. Move the carriage to the center of its range of travel.
3. Slip the new lead screw through the half nuts so it is in approximately the correct position. The end with the keyway goes to the left.
4. Slip the left lead screw mounting bracket over the left end of the lead screw. Make sure the oil hole is on top.

5. Slip the right lead screw mounting bracket over the right end of the lead screw. Make sure the oil hole is on top.



6. Use a 2½” C-clamp to hold the right lead screw mounting bracket so the lead screw is approximately horizontal. The position is not critical at this time.
7. Move the carriage as far to the left as it will go. Engage the half nuts (handle down).
8. Position the left lead screw mounting bracket so that the left edge of its base is flush with the left end of the way casting. Use a small C-clamp on the top ear of the bracket to hold it in position.



9. Snug the apron mounting bolts.
10. Release the half nuts and move the carriage as far to the right as it will go. Loosen the C-clamp holding the right lead screw mounting bracket as you move the carriage toward it.
11. Engage the half nuts (handle down), and re-tighten the C-clamp to lock the right lead screw mounting bracket in the correct position.

12. Move the carriage back and forth, engaging the half nuts at each end and adjusting the position of the lead screw mounting brackets until you are satisfied with the position of the lead screw and the mounting brackets.

Left Lead Screw Bracket

1. Using either a transfer punch or the largest drill bit that will fit through the lead screw mounting bracket screw hole, mark the location for the bottom mounting screw in the left bracket. To mark with the drill, simply start to drill the hole, but stop as soon as a dimple is made.
2. Remove the C-Clamp holding the left lead screw mounting bracket and remove the left lead screw mounting bracket.
3. Use a 5.0 mm or #9 (0.196") drill bit to drill the bottom mounting hole through.
4. Use an M6x1 tap to thread the hole.
5. Install the left lead screw mounting bracket using one M6x20 socket head cap screw.
6. Move the carriage back and forth, engaging the half nuts at each end and adjusting the position of the lead screw mounting brackets until you are satisfied with the position of the lead screw and the mounting brackets.
7. Using the same method as for the bottom mounting screw, mark the location for the top mounting screw in the left bracket.
8. Remove the left lead screw mounting bracket.
9. Use a #9 (0.196") drill bit to drill the top mounting hole through.
10. Use an M6x1 tap to thread the hole.
11. Install the left lead screw mounting bracket using two M6x20 socket head cap screws.

Right Lead Screw Bracket

1. Move the carriage back and forth, engaging the half nuts at each end until you are satisfied with the position of the lead screw. Adjust the right lead screw mounting bracket as required.
2. Use a 0.005" feeler gauge between the right lead screw mounting bracket and the threaded portion of the lead screw to make sure there is some play between the brackets.
3. Using the same method as for the left bracket, mark the location for the bottom mounting screw in the right bracket.
4. Remove the C-clamp holding the right lead screw mounting bracket and remove the right lead screw mounting bracket.
5. Use a #9 (0.196") drill bit to drill the bottom mounting hole through.

6. Use an M6x1 tap to thread the hole.
7. Install the right lead screw mounting bracket using one M6x20 socket head cap screw.
8. Using the same method as for the bottom mounting screw hole, mark the location for the top mounting screw in the right bracket.
9. Remove the right lead screw mounting bracket.
10. Use a #9 (0.196") drill bit to drill the top mounting hole through.
11. Use an M6x1 tap to thread the hole.
12. Install the right lead screw mounting bracket using two M6x20 socket head cap screws.

Adjust Lead Screw

1. Loosen the four socket head cap screws in the two lead screw mounting brackets.
2. Loosen the two socket head cap screws that secure the apron to the carriage.
3. Move the carriage as far left as it will go and engage the half nuts (handle down).
4. Snug, but don't tighten, the two socket head cap screws in the left lead screw mounting bracket.
5. Snug but don't tighten, the two socket head cap screws that secure the apron to the carriage.
6. Move the carriage as far right as it will go and engage the half nuts (handle down).
7. Snug, but don't tighten, the two socket head cap screws in the right lead screw mounting bracket.
8. Check that the lead screw turns without binding. Tap the lead screw mounting brackets with a soft-faced hammer or mallet until the lead screw turns without binding.
9. Tighten the four socket head cap screws in the two lead screw mounting brackets.
10. Tighten the two socket head cap screws that secure the apron to the carriage.
11. Check that the lead screw turns without binding. Repeat the adjustments as necessary.

Change Gear Adjusting Stud

1. Scribe a vertical line $5/8$ " back from the front edge on the left end of the bed way casting.

Note: On your original bed way casting, measure the distance from the front edge to the center of the hole for the change gear adjusting stud. If it is over $21/32$ " or less than $19/32$ ", use the dimension you measured instead of $5/8$ " in the step above.

2. Slide the change gear adjuster onto the lead screw mounting bracket.
3. Using either a transfer punch or the largest drill bit that will fit through the curved slot in the change gear adjuster, mark the location of the intersection of the arc and the line you scribed. To mark with the drill, simply start to drill the hole, but stop as soon as a dimple is made.
4. Remove the change gear adjuster.
5. Use a 6.8 mm, letter H (0.266"), or $17/64$ " drill bit to drill the stud mounting hole.
6. Use an M8x1.25 tap to thread the hole.
7. Install the change gear adjusting stud. The short end threads into the casting.
8. Slide the change gear adjuster onto the lead screw mounting bracket and over the change gear adjusting stud.
9. Install the M8 washer and M8 nut on the change gear adjusting stud. Leave it loose.

Headstock

1. Install the headstock using two M8x25 socket head cap screws in the front holes and one M8x25 hex head cap screw in the rear hole.

Motor

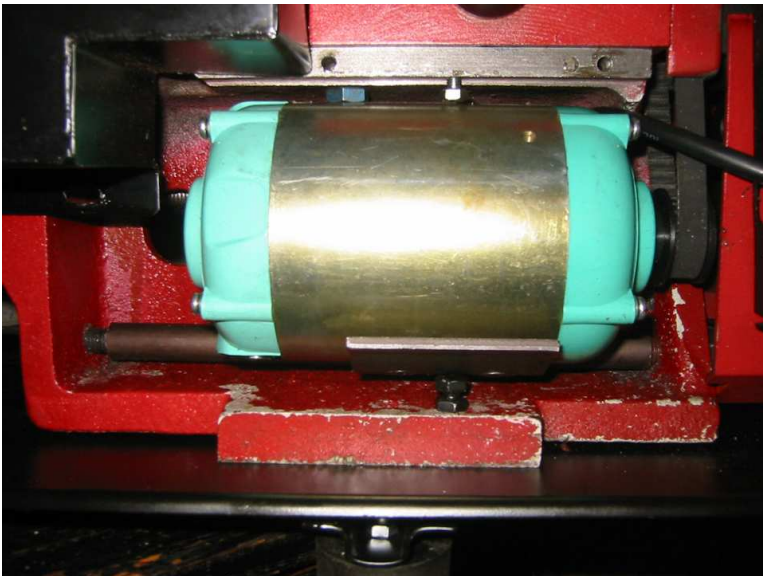
1. Remove the two mounting studs from the side of the motor.
2. Mount the motor on the new motor mount using two M6x8 flat head screws. The motor shaft points to the short end of the motor mount rod.
3. Start an M10x35 dog point set screw in each of the holes at the front and back of the motor space in the bed way casting. These holes sometimes have filler in them. Run an M10 x 1.5 into the holes if you have one. Otherwise use something like a dental pick to clear the filler from the threads.
4. Start an M10 nut on each of the two M10x35 set screws.

5. Run the M6 nut most of the way on the M6x16 hex head cap screws and put the cap screw into the hole in the bottom of the motor space in the bed way casting. See the photo below.
6. Run the M5x10 hex head cap screw most of the way into the threaded hole in the top of the motor space in the bed way casting. See the photo below.

Electrical & Motor

1. Route the motor wires through the hole in the bed way casting.
2. Route the power cord through the hole in the bed way casting.
3. Place the drive belt over the motor pulley, and place the motor into the motor space in the bed way casting.
4. Mount the motor by screwing the two M10x35 dog point set screws into the ends of the motor mount rod. Leave the nuts loose until the motor is positioned correctly.

It can be difficult to get the motor into the correct position. Start by engaging the M10x35 dog point set screw that is farthest from the tailstock. Then work the motor into position and engage the other M10x35 dog point set screw. At first it might seem that it is impossible, but it will finally go into position.



5. Move the motor forward and backward using the two M10x35 dog point set screws until the belt is aligned correctly. It should not ride on either side of the pulley.
6. Tighten the two M10 nuts on the M10x35 dog point set screws to lock the motor position.
7. Unscrew the top M5x10 hex head cap screw until it presses down on the motor and tightens the drive belt.

Note: Do not over tighten the belt. It is very easy to put too much tension on it. It is a toothed belt and does not depend on tension to prevent slipping. You should be able to deflect the belt about ½”.

8. Unscrew the bottom M6x16 hex head cap screw until it locks the motor in position lock it in place with the nut.
9. Reconnect the three ground wires (including the one from the control box) to the headstock casting. Use three M5x10 Phillips head machine screws, three M5 lock washers and three M5 star washers. The lock washers go on the screws first, then the terminals, with the star washers between the terminal and the casting.
10. Reconnect the wires in the control box. Refer to the notes you made during disassembly.
11. Plug in the power cord.
12. Run the motor and adjust the belt tension and motor position, if required.
13. Unplug the power cord.
14. Install the black plastic guard over the lead screw using two M5x10 round head Phillips machine screws.
15. Mount the control box using two M5x10 round head Phillips machine screws in the top mounting holes.
16. Optionally, drill and thread the bottom control box mounting holes using a #19 (0.166”) drill and an M5x0.8 tap.

Change Gears

1. Install the key, bushing, and 80-tooth gear on the left end of the lead screw. Secure with an M6 flat washer and M6x8 socket head cap screw.
2. Adjust the change gears and tighten the M8 adjusting nut.

Covers

1. Install the motor cover using two M5x10 Phillips head machine screws. Slide the motor cover as far as it will go to the left so that it doesn't rub on the motor pulley.
2. Install the change gear cover using two M5x45 socket head cap screws.
3. Mount the rubber feet to the holes in the ends of the hat-section chip tray braces using four M5x16 Phillips head machine screws and M5 nuts.
4. Mount the chip tray and braces using four M8x20 socket head cap screws.
5. Install the rear splashguard using three M5x10 Phillips head machine screws. Note that one hole in the splashguard is left empty.