

WARRANTY DISCLAIMER

The Humpback Ball Return System is warranted against manufacturing defects in material and workmanship for a ten-year period beginning on the date of purchase. Within this period, Lifelong Engineering will replace the defective part with a comparable one. Unless within the first year of the warranty, customer will be responsible for shipping defective part back to the manufacturer after the replacement has been received. The metal parts contained within the kit are also warranted against breakage for a ten-year period from date of purchase. These parts do not include any screws, nuts, bolts, or any other hardware. The humpback belt is covered by a 10 year prorated warranty. Any defective belt will be replaced free of charge during the first year after date of purchase. Each year thereafter, customer will be responsible for a specified dollar amount determined by the manufacturer (these amounts can be acquired from the manufacturer by calling the number on the front of the installation guide). In order to make a claim; your Humpback Kit must first be properly registered. The registration process is listed in detail below.

This warranty does not cover damage or failure caused by or attributable to acts of nature, abuse, misuse, improper or abnormal usage, faulty installation, improper maintenance or use outside of manufacturers' specifications. The warranty on the humpback belt does not cover the V portion of the belt, nor does it cover normal wear and tear associated with regular use. Any urethane products contained in the kit are not covered by this warranty. Lifelong Engineering and Development is not responsible or liable for indirect, special, or consequential damages arising out of or in connection with the use or performance of the product or other damages with respect to loss of property, loss of revenues or profit, or costs of removal, installation or reinstallation. Except as provided herein, Lifelong Engineering and Development makes no express or implied warranties.

WARRANTY REGISTRATION

Please read carefully so as to make sure your humpback unit will be properly registered, and your warranty completely valid. **Failure to register your Humpback Ball Return System with the manufacturer within 30 days of purchase will make stated warranty null and void.** Your registration number is stamped on the belt itself, the front of the installation guide, and on the warranty registration card. When making a warranty claim, have this number readily available.

If you have purchased your product directly from the manufacturer, then you need only to fill out the registration card and return it to the address on the front cover of the installation guide within 30 days of purchase. If you have purchased your Humpback Kit through a distributor, then you need to fill out the registration card and return it along with a receipt of purchase within a 30-day period.

If a problem arises with any of the parts covered under the warranty. The manufacturer must be informed within a reasonable time period. Do not make a claim to your distributor, only the manufacturer can honor the warranty. Any questions regarding the warranty should be directed to the manufacturer. We thank you for your purchase, and are confident that our product will provide your center with years of worry free operation. If you have any difficulties or questions, please do not hesitate to call the toll free number on the front of the installation guide.

CONVERTING FROM PBL's

If you are converting from PBL's to the Humpback, you first need to remove:

1. Ball Guides
2. Lift Arm
3. Door Weldments
4. Ratchet Drive

Removing the ratchet drive belt tensioner from the ball lift when changing your ball lift belt to a humpback belt.

Skip pages 4 through 7 and begin following installation instructions beginning with page 8 after completing the removal of the items above.



PLEASE TAKE THE TIME TO READ THESE DIRECTIONS THOROUGHLY BEFORE YOU BEGIN. IT DOES NOT TAKE LONG AND WILL MAKE YOUR INSTALLATION EASIER AND QUICKER. WE HAVE BEEN TOLD BY MECHANICS, THAT HAVE INSTALLED A VARIETY OF SYSTEMS, THAT THE HUMPBACK 300 IS THE EASIEST TO INSTALL. IF YOU DO RUN INTO ANY DIFFICULTIES OR IF THE SYSTEM IS NOT RETURNING EVERY BALL ONCE IT IS INSTALLED, CALL OUR TOLL FREE NUMBER (1-877-BELT-300) FOR ASSISTANCE. A SMALL ADJUSTMENT MADE WITH THE HELP OF ONE OF OUR TECHNICIANS CAN GET THE SYSTEM OPERATING TO YOUR COMPLETE SATISFACTION.



TOLL FREE 1-877-235-8300
www.bowlingproducts.com

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figure 1

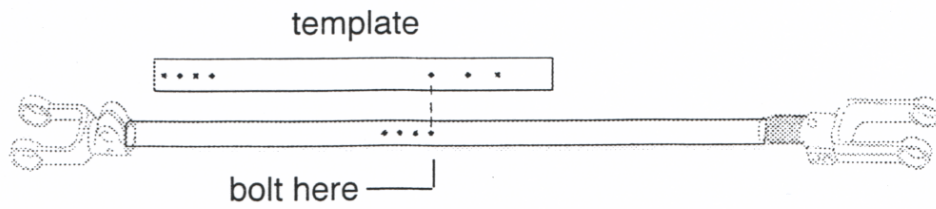
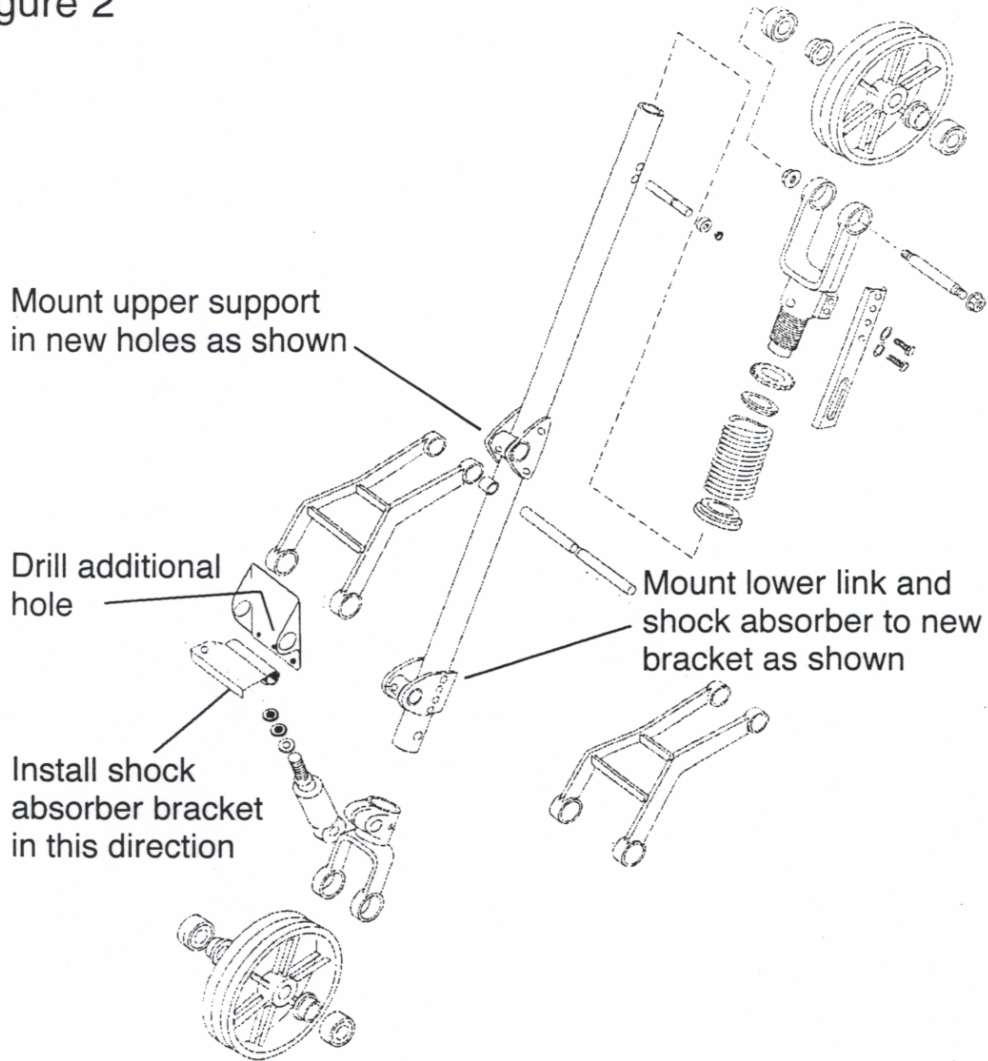


figure 2



PREPARE YOUR SPARE BALL LIFT

1. Remove belt and both upper and lower links from unit.
2. Remove upper support (AMF part # 000-024-606).
3. Place drilling template over tube (AMF part # 000-024-607) as shown in figure 1. Be sure to use alignment bolt and clamp to secure template as shown.
4. Place ball lift on floor (not in vise) and place a 2X4 under the lower pulley to raise clutches off floor and to stabilize ball lift for drilling.
5. Use a new cobalt 1/4" drill bit to drill out the 6 holes. Leaning onto the drill with this type drill bit will form the hole in a matter of seconds.
6. Remove clamp and flip ball lift over to drill the 6 holes on the other side (clamp before drilling).
7. Remove template and bolt on both the upper and lower supports as shown in figure 2 (see next page for specific details on this procedure).
8. If needed, flip SHOCK ABSORBER BRACKET (AMF part # 070-001-289) so that its angle is up instead of down, shock will be on the even side of the ball lift (see figure 2). When mounting the shock absorber, the top nut should be about 1/4" from the top of the threads. Secure the bottom with a nut or spacers.
9. Flip the off set shafts around to the opposite side that the shock is on.
10. Drill a 1/4" hole in the bottom center area of the SPRING HOLDER (AMF part # 000-024-715). This hole will support an "S" hook tension chain.

INFORMATION AND TIPS

Ref: Removing Allen screws

- a. To get to the Allen screw that's below the bounce plate, cut or grind an Allen wrench so that the short end is just a stub. Be sure to leave enough to go fully into the screw. Flex back the bounce plate from the kick back with a pry bar or crowbar and slip in the Allen wrench. The bounce plate will firmly hold the Allen in place when you release the pry bar. Use the ratchet with an extension and 1/2" socket to unscrew the nut. Insert a second Allen wrench in the lower open hole from which the rear segment was removed. This will hold back and prevent your stubby Allen from turning when you unscrew the nut.
- b. Always break screws loose from the nut end to prevent stripping out the Allen screws.
- c. If you do come across a stripped Allen, cut a slit down the center of it with a Dremel type tool with two cutting discs on it. This will produce a wider slit. Take a punch and hammer to the outer most section of the screw to break it loose. Once loose try an Allen again or a large straight bladed screw driver.

OUT WITH THE OLD

FOLLOW THIS ORDER:

1. Remove ball lift and belt tension pulleys.
2. Remove kicker assembly and belts.
3. Remove rear filler pad.
4. Remove front filler pad.
5. Remove rear segments.
6. Remove starter pad.
 - a. Unscrew the rail bracket bolt on the odd machine first.
Then unscrew the rail bracket bolt on the even machine.
 - b. Unscrew starter pad bracket from the machine supports and remove starter pad.
7. Remove front segments.

Rear Filler Pad
(000-029-959)



Front filler Pad
(000-024-678)



Rear Segments
(000-024-623+4)



Front Segments
(000-024-625+6)

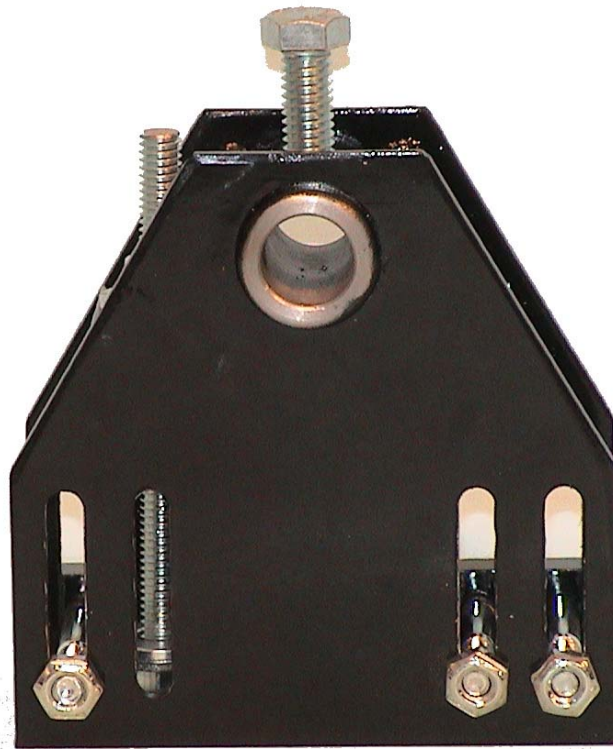


INFORMATION AND TIPS

Ref: SUPPORT LOWER –(LL300-002)

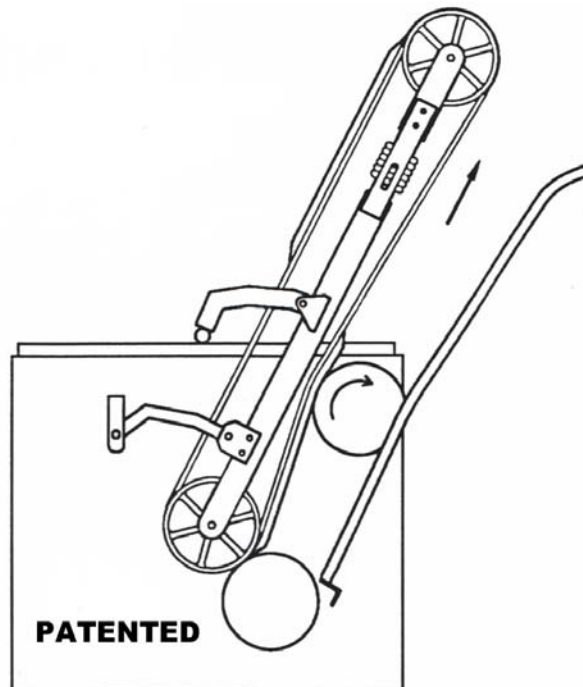
We have found alignment variances from machine to machine and from bowling center to bowling center. Ball lifts in different machines often sit in a different area in respect to the ball exit opening. You may find the ball lift is more forward in relationship to the ball exit opening from one machine to the next. This variance has prompted us to redesign the lower support so that these differences can be accommodated.

Our LOWER SUPPORT (LL300-002) is designed to give additional adjustability to the angle of the ball lift. Follow the directions for installation and adjustment located on your adjustable lower support insert page.



INSTALLING “HUMPBACK BELT”

1. Put on the “HUMPBACK BELT” so that it runs with the longer sloped section of the belt going toward the ball.
2. Tighten tension spring (AMF part # 000-024-603) to at least 4 ¼” and no more than 4”
3. Mount links with shock absorber back on lift.
4. If needed, flip SHOCK ABSORBER BRACKET (AMF part # 070-001-289) so that its angle is up instead of down, shock will be on the even side of the ball lift (see figure 2). When mounting the shock absorber, the top nut should be about ¼” from the top of the threads. Secure the bottom with a nut or spacers.

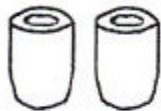


INFORMATON AND TIPS

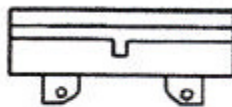
Ref: RAIL BRACKET (LL 300-004)

Sometimes when installing the up rails to the RAIL BRACKET the rails will be riding on the wood of the kick back, making it difficult to line up the bolt holes. If you're in a tight situation it's helpful to only screw the bolts that secure the RAIL BRACKET to the machine braces in a turn or two, leaving the RAIL BRACKET very loose until the up-rails are attached. Loosening the top bolts of the up-rails where they meet the down sweep will relieve tension. If real tight, get a hatchet and chop the wood away in the area that is causing the restriction.

RAIL COVER ENDS
(LL 300-022)



RAIL BRACKET
(LL 300-004)



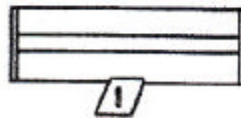
SHOCK SPACERS
(LL 300-007)



DOOR WELDMENTS
(LL 300-005+6)



REAR SUPPORT
(LL 300-008)



LIFT ASSEMBLY
(LL 300-003)



PLEASE NOTE: It is important to follow the steps on page 11 exactly and in the proper order to achieve the best alignment where lower section of the lift assembly meets the rear support.

FOLLOW THESE STEPS

1. Cut off the bottom portion of your existing uprail covers and replace them with the ones provided in your kit (LL 300-022). Mount RAIL BRACKET (LL300-004) to both the machine and lift rails.
2. Mount DOOR WELDMENTS (LL300-005 + LL300-006) to the machine using the four screws per side that are provided. Take note that there are three 1" screws and one ¾" screw per side. The short screw must be put on the upper front hole to prevent scratched balls. Bolt on the REAR FILLER BRACKET (LL300-009) to secure them together.
3. Mount REAR SUPPORT BRACKET (LL300-008) to the DOOR WELDMENTS (LL300-005 + LL300-006). When mounting, place SHOCK SPACER (LL300-007) on first, then REAR SUPPORT BRACKET, washer and nut. IMPORTANT - Leave the nuts very loose so that the REAR SUPPORT BRACKET can be slid back and forth and moved up and down.
4. Insert LIFT ASSEMBLY (LL300-003) into place using the spacer at the top along with 2 washers, and the same number of washer shims at the bottom that came with the assembled unit. Screw lower nut on only a turn or two leaving it very loose at this time. Leave off upper nut at this time.
5. Slide REAR SUPPORT BRACKET (LL300-008) and RAIL BRACKET (LL300-004) to center LIFT ASSEMBLY (LL300-003).
6. Tighten RAIL BRACKET bolts securely to machine. Be sure it does not move off center when tightening.
7. Tighten the 2 inner most nuts on the REAR SUPPORT BRACKET (LL 300-008) at this time, making sure the LIFT ASSEMBLY (LL 300-003) stays centered. Check to make sure everything is centered, then tighten the 2 outer nuts.
8. Tighten the lower nut on the LIFT ASSEMBLY (LL 300-003). As you tighten the nut, the lower section of the LIFT ASSEMBLY should be even with the rings at the bottom. Tighten top nut, securely locking the adjustment in place. If it's still a little off, readjust or add or remove shims.



INFORMATION AND TIPS

Ref: LIFT ASSEMBLY (LL 300-003)

A disadvantage of factory made parts is that they are designed to fit into perfectly aligned machines. Unfortunately, many machines don't meet this criteria, some are higher on one side, some are more set back on one side than the other. The variations are numerous. These differences can affect the fit of the RAIL BRACKET and LIFT ASSEMBLY. A major benefit of our system is that the LIFT ASSEMBLY is designed so that a field adjustment can be made to allow for these variances. If this simple adjustment is necessary, it is made on site during installation allowing a perfect contour to each machine regardless of variations.

LIFT ASSEMBLY (LL 300-003)



ADJUSTING LIFT ASSEMBLY

1. The LIFT ASSEMBLY should be even with the radius of the DOOR WELDMENTS on each machine.
2. If it's low on the bottom, add washers to shim. If too high, remove washers.
3. If the LIFT ASSEMBLY is protruding higher than the DOOR WELDMENTS going up the front slope of the ring, then your LIFT RAIL BRACKET is further back in that pair of machines than our factory set assembly jig. A simple bend in the "right place" will get it to fit near perfect.
4. To get an even fit, unscrew the lower nut of the LIFT ASSEMBLY and remove the unit. You will need to **slightly** bend the unit to close in the radius. Do this by placing the curved section of the unit just below where it straightens out on your knee and give it a **slight** bend inward. Do this without affecting the bend of the straight angle. Every 1/16" you curve the radius in at this point will lower the section that was high nearly a 1/4" closer to the DOOR WELDMENT.
5. Put the unit back in and see where you're at. If it's close but not perfect, before going any further, first check to make sure a bowling ball will roll up the rubber pad while still clearing the urethane rail cover ends (LL 300-022). If the ball doesn't clear the rail cover ends, add a shim and bend it a little more. Repeat these steps as needed until the unit is perfectly aligned.
6. If you reach a point where it's not quite perfect but very close, you can take a drum sander that attaches to a drill and take down the high sections of the rubber until it is. Or you may remove the unit and tap it on a grinder. Mark areas with a pen first.
7. Screw down and tighten the top nut on LIFT ASSEMBLY.
8. Place a ball in exit and roll up by hand. Be sure the ball is clearing the rail cover ends (LL 300-022).

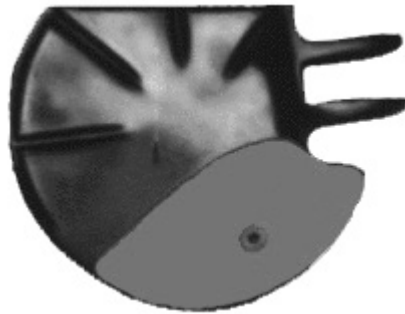


INFORMATION AND TIPS

Ref: THE RED WING PADDLE

Your humpback conversion kit come equipped with the most innovative paddle on the market today, the Red Wing Paddle. This Paddle is designed to be used in both wide and narrow machined, offering more flexibility than any other developed.

Installation is easy. If your machines are wider than 10" from kickback to kickback, simply install the paddle as you would normally. If your machines are narrower than 10" from kickback to kickback, just remove the red filler wings by unscrewing the barrel nut and install



INSTALLING THE PADDLE

1. **There are three types of rudder arms that we've come across. Depending on the model machines you have, follow the instructions appropriate to your rudder style. Your current type most likely calls for an installation plug that secures the paddle to the rudder arm creating a tight fit. The replacement paddle has a bolt that goes through the paddle and rudder arm secured by a nut at the bottom.**

Rudder arm type A: If your rudder arm has one slit on the top with a solid bottom, remove the rudder arm support (070-004-630) from the machine, leaving the rudder arm attached. Drill a 3/8" hole through the lower section of the rudder arm so that the paddle bolt will go straight through. Reinstall the support and follow step 2.

Rudder arm type B: If your rudder arm has two slits in it, top and bottom, you will need to drill a 3/8" hole in your existing plug (000-024-622). Slip the paddle bolt through the paddle and plug and slide the unit onto the rudder arm. Tighten the bolt and nut until the rudder arm tightens around the plug securing the paddle firmly to it. If you fail to insert the plug in this manner the rudder arm will continue to collapse in as you try to tighten it, never obtaining a tight enough fit to keep it on securely.

Rudder arm type C: If your rudder arm has a slit on the top and a hole on the bottom, slide on the paddle, insert bolt and tighten.

2. **Move rudder arm back and forth. Make sure it hits the rubber bumper and not the metal rings. This prevents any clanging sounds. If you don't have rubber bumpers, take a cushion rivet and cut it on both sides of the small knot on the stem. Insert into the holes made for the rubber bumpers with the flat side of the knot going into the machine. Once inserted, trim to the appropriate length.**

NOTE: Be sure plug No. 000-024-622 is installed on every type of rudder arm, or damage to paddle will result!

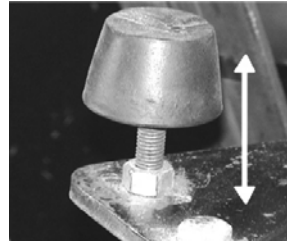


INFORMATION AND TIPS

REF: FINE TUNING BALL LIFT HEIGHT

If your jam nut is on the bottom of the plate, take it off and put it on top of the plate. This will allow you to adjust the height without reaching into the ball return system. It is a good idea to then test a six-pound ball since they sometimes have a slightly larger diameter.

Distance should be 1 ¼" or lower from the top of the rubber bumper to the plate underneath. If your bumper is brand new, cut off the top half



The threads should be about midway up after final adjustment as shown in the diagram above. If they are too high, you may not get enough pressure on the uprails and this could result in spinning. If they are too low, the humps on the belt will not grab the ball as well as they come around the pulley. If you have the height adjusted here and find that your threads are too high or low, you can adjust the lower support so that when you make this adjustment your threads will be midway up. See page 2A. This will give you optimum results.

Ref: Lift Rail Condition

If when you're completed with the installation you notice the ball slipping as it's going up the track, the problem will be slippery lift rails. It's a good idea to sand the rails with 36 grit sand paper to rough them up some while the ball lift is still out of the machine. As the rubber on the rails gets old it will harden and get polished off, this will create a slick surface causing slippage.

INSTALLING BALL LIFT

Install your ball lift as you would normally. Be sure it's centered and clamped down with all belts in place. Adjust height so that the ball falls under lift with about 1/8" clearance between belt and ball. The ball should fall under the lift with as little deflection off of the pulley as possible; refer to page 6 if needed. To fine tune ball lift height see page 16.

INFORMATION AND TIPS

Ref: SPRING TENSION AND CARPET DRIVE BELTS

The sizes of your carpet drive belts that are currently on your machines are most likely 112” belts. Even though these belts are usable they will most likely be tight on this new system. The correct belt size is the same as it would be for a PBL system, which is 114”. If your shorter belts are new they will be very tight because they will not yet be stretched out. A very tight belt will have the tendency to prevent the ball lift from lowering all the way once it raises from a ball going up. Take note of this. If the lift tries to stay up or is too slow coming down again, you will need to add more spring tension or replace the short belts with longer ones.

ADJUSTING SPRING TENSION

In your hardware package you'll find a chain and S-Hook assembly. The purpose of this chain is to supply downward pressure on the ball lift at all times.

- A. Installing the tension assembly to an 82-70 machine is done by first bolting the two oval links provided to the back end of each machine. Remove the two existing 5/16" bolts from each side of the pair of machines. These existing bolts are about 3 feet high. After bolting on the links attach the S-Hook to the spring tension bracket of the ball lift and use the two oval links you just bolted on. Bring the chain to the rear of the machine and attach two kicker springs to it. Hook the kicker springs into the newly drilled holes.

- B. Installing the tension assembly to an 82-30 machine is done by drilling a 1/4" hole in the lip of the back end frame on each machine. You will most likely still have the old trouble light system attached to the machine. Drill your 1/4" hole about an inch or so above the top of the trouble system box in the frame of the machine. Do so at the same height on the opposite machine. Attach the S-Hook through the drilled out hole on the ball lift spring tension bracket. Bring the chain to the rear of the machine and attach two kicker springs to it. Hook the kicker springs into the newly drilled holes.

INFORMATION AND TIPS

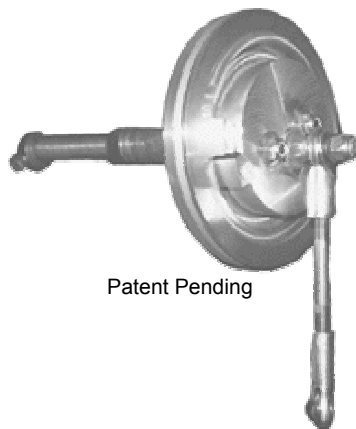
FINAL ADJUSTMENTS

1. **HEIGHT ADJUSTMENT:** Adjust the ball lift height as you would a PBL. The ball should fall straight in with about 1/8" clearance between the belt and the ball. Check this adjustment on the long narrow section of the belt. As the hump comes around a wedge effect will start the ball rolling up.
2. **LIFT RAILS:** If, when you've completed the installation, you notice the ball slipping as it's going up the track, the problem will be slippery lift rails. It's a good idea to sand the rails with 36 grit sand paper to rough them up some while the ball lift is still out of the machine. As the rubber on the rails gets old it will harden and get polished off, creating a slick surface causing slippage.
3. **BELT SPRING TENSION:** Be sure the belt tension spring is adjusted to between 4" and 4 1/4". If too loose, the belt will slacken up and concave too much as the ball is going up the lift. This will reduce the effectiveness of the humps, creating slippage under oily conditions. Do not over tighten or damage to the belt may occur. Adjust it to specks and it will work fine.
4. **TAKING CARE OF THE BELT:** The Humpback belt requires little attention. DO NOT use harsh chemical cleaners, sanders or files on it. You should only have to occasionally wipe it down with a dry rag. If however, dirt accumulates on the belt, use only a mild detergent diluted with water. Keep your pulleys maintained to prevent damage to the V. Humpback belts have shallow narrow V's and should only be run on shallow narrow ball lift pulleys.



PADDLE DRIVE SYSTEMS

1. You cannot use the hydraulic paddle drive links with this system. They are not strong enough to keep pins out of the door because of the downward slope of the exit opening. You have three options that will work.
 - A. A.M.F.'s light ball sensors will work but they are expensive, complicated, prone to breakage and expensive to repair.
 - B. You can use a spring shock to keep the pins out and a speed reduction pulley to help give the needed time to let light balls through. This system works pretty well, but it slows down the ball return as the ball needs to wait for the paddle to go by.
 - C. Your best option is our Light Ball Clutch used with a speed reduction pulley. This system will let balls of all weights go directly up the lift with no restrictions or hesitations dramatically speeding up the ball return. This system was specifically designed to work with the Humpback 300, works better than A.M.F.'s light ball sensor, is inexpensive and is simple with only one moving part. It works so well and fast, your leagues will finish faster than with any other system.



LL 300-201 – Replaces spring or hydraulic shocks on kickers, Humpbacks or Mini-PBL's

LL 300-202 – Replaces the Light Ball Sensor

Light Ball Clutch

SPRING SHOCKS AND REDUCTION PULLEYS

PINS IN THE DOOR

Hydraulic shocks work well enough in keeping pins out of the exit when used with ball exits (kickers). When a kicker unit is converted to either a HUMPBACK 300 or PBL system the ball is gravity fed down to the ball lift belt. It takes more paddle pressure to push a stuck ball or pin out of the exit due to the upward slope coming back out. Spring shocks will keep stuck pins out of the exit if adjusted properly and used in conjunction with a paddle speed reduction pulley.

REDUCTION PULLEY

The pulley that should be replaced is the double pulley that is used as the belt tensioner. Replacing this pulley with a speed reduction pulley will slow down the paddle speed enough to allow light balls to enter the exit easily. It will also synchronize the paddle speed with the rotating HUMPBACK 300 belt, allowing balls of all weights to enter more quickly.

ADJUSTING SPRING SHOCK

Install the spring shock as you would a hydraulic one. With the machines off and before putting on the belts, loosen the two nuts on the crank plate. Slide the eccentric adjustment in the direction so that the paddle would move back and forth the least possible distance between machines and lightly snug down the nuts on the crank plate. As you move the pulley back and forth or around by hand check to see if the rudder arm (paddle) is moving equal distances from one machine to the other. The spring shocks end fitting that attaches to the crank arm is adjustable. Screwing it in will allow the paddle to travel more towards the odd machine. Adjust the end fitting so that the paddle travels equal distances between machines. Now, loosen the nuts on the crank plate and adjust it so that the paddle would move its greatest possible distance. Hook up the belts and test it under power. The paddle will move at a slower speed and as it makes contact with each machine the paddle should hover still for two to three seconds at each machine without jamming or belts slipping. On very narrow machines you may need to back off the crank plate adjustment a little. There are different size ball lift drive belt pulleys. Keep in mind that small ball lift clutch pulleys will rotate the shaft it is on faster, and that your paddle drive belt is hooked to that shaft. The smaller your clutch pulleys the faster your paddle, the larger the pulley the slower your paddle.

HUMPBAC TROUBLESHOOTING GUIDE

NOTE: The humpback belt warranty is pro rated over a 10- year period against any factory defects, check the warranty section in the instruction book for details. Split humps/and/of a worn "V" is not covered, as there are reasons other than a defective belt that can cause these issues. In the past, we have covered these issues under warranty on the first belt and have furnished information on how to prevent them from continuing. We do this to provide a suitable service to our customers and we understand that there are many variables in the machines from center to center. If a variable does occur, the units in your center have to be tweaked to compensate for this variable; Your Humpback unit is designed to do so. It is up to each individual center to make the adjustments necessary to prevent further issues. Your Humpback was designed to work 100% providing installation was preformed correctly, and machine variables are compensated for. If you have ball calls or issues of any type with your humpback, follow the troubleshooting guide first. If any issues continue call lifelong and we will isolate the problem with you to get it running 100%

THINGS AND ADJUSTMENTS TO CHECK IF YOU GOT A SLIT IN THE HUMP OF YOUR BELT

The only way the hump on your belt can crack is if the ball at sometime or another had trouble centering on the way up. There are only a few things to check to ensure you don't have a continuing issue. Providing the installation instructions were followed and all parts are installed correctly the most common thing that can cause a cracked hump is the ball lift sitting too high (vertical) for that particular machine. There may be a variable on the machines in your center that may need to be compensated for from the installation guide. If this is the case the adjustments are simple but **will** need to be made to prevent further issues.

When the ball enters the opening of the exit, there are times when the ball isn't completely centered before the hump comes around and makes contact with the ball. This in itself isn't a problem - one of two things will happen. Either the ball will center on the way up or the ball will drop down a couple inches and the next hump will catch it. Providing things are adjusted correctly one of these two things will occur with no adverse consequences or damage to the belt.

THINGS TO CHECK SO THE BALL CENTERS EASILY

1. Be sure the rubber lift arm is shimmed enough (LL 300-003). The end of the bolt that is welded onto the steel section of the rubber lift arm should be even with the top of the nut that tightens the rubber lift arm to the up-rail bracket. Be sure there are enough shim washers placed between the lift arm and the rail bracket to achieve this.
2. Be sure the hard urethane up rail ends (LL 300-022) are on the bottom of your up rails. These items should be on all Humpbacks regardless of what type of up rail covers you're using. Using these parts and making sure your lift arm is shimmed properly will help center the ball allowing it to go up quickly and easily.

NOTE: If the lift arm isn't shimmed enough or the rail ends (LL 300-022) are not installed, the ball could get caught up on the lower section of the up rails preventing the ball from centering and stressing the rubber of the hump, creating a slit across the hump.

WHAT TO CHECK TO AVOID A SLIT HUMP IF THE BALL DOESN'T CENTER

There will be times when the ball just can't center fast enough for the first hump to catch it. This in itself is no issue unless the ball lift is sitting too high in the machine. It's always better to use the larger ball lift clutches on your lift with the Humpback. The timing of the humps is better with a slower rotating belt.

If the ball can't center in time for the first hump to catch it, the hump should pass the ball by and the next hump will catch it. The angle of the ball lift is important to avoid belt issues and is the reason we include an adjustable lower support (LL 300-002).

If the lift is sitting too high (vertical) in the machine, that means the top pulley is further from the uprails than it should be. It also means the bottom pulley is too close to the up rails. If the bottom pulley is too close to the uprails and the ball doesn't center, the first hump can't freely pass the ball by. The hump will still be in contact with the lower pulley when it contacts the ball and the hump can crack.

If the ball lift is angled so that the lower pulley is further back in the machine the hump will go past the pulley allowing it to concave out of the way of the ball preventing belt damage - again the purpose of the adjustable lower support.

ADJUSTING THE ANGLE OF THE BALL LIFT

1. Keep in mind that the machines can vary from center to center. The original machine installation and the machines themselves can have variances that don't allow a magical angle for the ball lift - but you can figure it pretty close. The angle of the uprails can vary so much from center to center, we can't just say set your lift so many inches from the rails and that's it.
2. The best way to help determine the angle of the lift is by using the rubber bumpers that you would adjust to raise and lower the ball lift. Most centers already have their rubber bumpers cut in half, which is good. When all is said and done the bottom of the shaft that sits on the rubber adjusting bumpers should be around 1-1/4 inches from the plate the bumper screws into. That measurement is a general guide - when you adjust your lower support and then adjust the height of your lift to get 1/8 clearance over the ball, providing the rubber bumper is close to that measurement, leave it.
3. There are two types of adjustable lower supports in the field. The original one is a type that adjusts by removing or adding washers. The ball lift will need to be removed to do so. (Our [NEW adjustable support](#) is a type that can be adjusted in the machine without the need to remove the ball lift.) If you have the type with washers, take the time to make the needed adjustments to tweak it out. In general the same amount of washers needed in the first support you tweak out will be the same amount needed to tweak out the remainder of the lifts in your center. If you're in a center where at one time machines were added on after the original installation the tweaking may vary somewhat on that section because of differences in installations and machine lot numbers.
4. When the angle is correct the ball should roll freely under the lift with about a 1/8 inch gap between the ball and the flat section of the belt. See also important note below.
5. Once you have the height adjusted properly, a ball will be blocked and will hover at the exit if a hump is passing by. After the hump passes by, the ball will drop in and the next hump will catch it. The ball lift belt should only rotate an inch or so before the incline of the hump blocks off the window of opportunity preventing the ball from entering. If the lift is too high the ball could go in further than it should and you can get a clunking and possible belt damage.

IMPORTANT NOTE: When you adjust the gap between the ball and the belt take notice if you can rock the ball forward before it begins its upward climb. Any forward movement of the ball needs to be compensated for in the height adjustment. A good way to know you're low enough is to lower the rubber height bumpers until the ball has trouble going in - then raise it a little at a time from there.

PREVENTING THE “V” SECTION OF THE BELT FROM WEARING

1. Our newest Humpback belt is a one section completely molded belt. There are inserts molded within the “V” to help prevent premature wear. We have recently created an insert that is more wear resistant than the original inserts in case the belt runs off the pulley and rides on the side of it. The belt “V” is impregnated with a lubricant at the factory to make it slippery and to prevent wear. When you install the belt for the first time apply petroleum jelly to your finger and transfer it to the belt “V” and underside of the belt while rotating it by hand. Doing so will do two things - it will eliminate the possibility of any belt shedding or “V” wear and it will also help prevent the belt coming off the pulley providing the belt is aligned properly.

We decided to manufacture a rubber backed belt for two reasons: it prevents the pulleys from wearing and the type of material used is much more aggressive in picking up the ball. Rubber backed belts will climb out of the pulley more readily than a canvas backed one if it's not aligned properly. Applying petroleum jelly to the “V” section will prevent the belt from climbing out of the pulley while you tweak out the alignment of the lift and lubricate it preventing wear. Reapplying the petroleum jelly occasionally as needed will totally eliminate the possibility of “V” wear. Regularly clean the belt with a dry rag only and take note of the “V” section while doing so.

ALIGNING YOUR BALL LIFT PROPERLY

1. Most centers have offset shafts in their ball lift links. “DO NOT” rotate the shaft to move the lift from side to side. Offset shafts were designed to allow for variances in the height or front and back differences in the machine alignment. If you rotate the shaft to center your lift you're not actually centering it, you're flexing the links and changing the angles of the pulleys. Doing this will wear the pulleys, drive you crazy with belts popping off and will wear and ruin the “V” of any ball lift belt over time.

2. Before installing the lift, loosen the nuts on the offset shaft and drop the lift in place. Rotate the longer section of the shaft until the short section drops into the “U” mount. Slide in the clamping studs and slide the lift to center it. The long shaft should be level to the floor and squared off to the kickback of the machine before the nuts are tightened back down again. It's easier to do this if you put each offset shaft in the links from opposite directions. The upper shaft should come in from the opposite side of the shock absorber so you have room to tighten the nuts. If you have narrow machines you'll need to put both shafts in from the same direction to allow enough sideways adjustment room.

3. No ball lift belt will pop off unless it first begins to twist. Stand on top of the machine while balls are coming up the lift and take note of any belt twisting. Slide the lift one way or the other until the belt stays centered.

4. If you still have belts coming off check the side to side movement of the lift - something's moving or the belt is not squared off to the up rails for some reason.

COMMON SERVICE CALLS

THE BALL GOES PART WAY UP AND STOPS:

If the ball is spinning when it stops, it's slipping on the uprails. If it is more or less hovering there, the belt is slipping on the ball.

BALL SPINNING

1. Up rail covers are slick and need to be replaced.
2. Up rail covers are oil soaked and need to be cleaned.

3. If Lifelong Rocket Rails are being used, they are not activated enough and aren't soaking the oil up fast enough. Clean with acetone and/or reactivate them. Activating the Rocket Rails is essential. They have particles molded in them that soak up the oil keeping them dry. To expose the particles they need to be scraped before installation. The more they're scraped the more particles will show and the more oil they will soak up. To activate them enough place each section in a vise and use a paint scraper or expose the particles with a wire wheel on the bench grinder.
4. Insufficient downward pressure on the ball lift. Check spring tension.
5. Bad shock absorber. The shock could be too stiff coming down which will counter-act the downward spring tension not allowing enough pressure against the ball.
6. Too tight carpet drive belt. The replacement carpet drive belt for the Humpback is a PBL sized one (114"). If a new carpet drive belt is used that is sized for kickers (112"), until it stretches it will pull up on the clutches preventing the lift from lowering with enough pressure.
7. Insufficient spring tension on the upper pulley spring. Tighten to between 4 and 4 ¼ inches.

BALL HOVERING

1. Check items 4-7 in the ball spinning section

I CAN'T GET MY 1/8 INCH CLEARANCE OVER THE BALL

1. If need be cut the rubber bumper enough to lower the lift more. Cut it enough so that you have some thread adjustment left. A new bumper cut halfway is about right if the lower support is adjusted properly.
2. If the ball will not drop in under the lift unless the clearance between the ball and belt is more than 1/8 inch, the rubber lift arm may be shimmed too low. The rubber should be even with the edge of the ring. If it's too low the ball will drop down onto it from the door ring and prevent you from lowering the lift enough while still allowing the ball to enter the exit.
3. Check the shock absorber shaft. If the shaft is screwed too far up into the plate the shock will open to its fullest length before the lift can lower enough.

THE BELT SKIPS OVER THE BALL WITHOUT PICKING IT UP

1. Check the height of the ball lift and check the clearance between the ball and the belt. Refer to the section "adjusting the angle of your ball lift".
2. Improper downward spring tension. Use the associated hardware that came with the Humpback kit. Needing more tension than what is described in the install manual is an indication of something else wrong.
3. Ball may not be centering all the way
4. The bolt on the rear of the lift arm or the front tab is broken and the lift arm is flexing.
5. The shock absorber is sticking, counter-acting the downward spring tension.
6. The shock absorber is too stiff and the lift doesn't come down with enough pressure to pick up the next ball.
7. The carpet drive belts are too tight counter-acting the downward spring tension.