

ADVANCE ADAPTERS, INC.

4320 Aerotech Center Way, Paso Robles, CA 93446

ASSEMBLY INSTRUCTION SHEET

Page Rev. Date: 08-09-2004

P/N 301499R

ATLAS SHORT TAILHOUSING ASSEMBLY

P/N: 301499R Rebuild unit upgrade

<u>Qty</u>	<u>Part No.</u>	<u>Description</u>
1	300125	SHORT TAILHOUSING OUTPUT SHAFT
1	300101	SHORT TAILHOUSING
1	300512	FRONT BEARING CUP
1	300513	BEARING
1	300514	BEARING CUP
1	300515	CAGED NEEDLE BEARING
1	300314	REAR BEARING OUTPUT CONE
2	300490	O-RING REAR HOUSING
1	300491	REAR YOKE END PLAY SHIM
1	300474	REAR YOKE SEAL WASHER
1	300476	REAR YOKE NUT
1	301400	ATLAS PAN GASKET
2	300358	O-RING CLUSTER PIN
2	300386	SET SCREW SHIFT FORK
11	723730	SHCS 3/8-16 X 1-1/4"
1	300502	REAR SEAL FOR CV STYLE YOKES
1	300473	REAR SEAL FOR NON CV STYLE YOKES

WARNING!

Please be aware that every part above must be used in your transfer case, excluding one of the two seals depending on the yoke you are using. The roller tapered bearing sets have been matched and set for endplay before we sent them out. Each piece is unique to this new assembly; old parts should never be substituted. Care must also be taken to put the unit together in the correct order. Use the following instructions and warnings in order. If at any point you need assistance, PLEASE call for help from an A.A. tech.

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ASSEMBLY INSTRUCTION SHEET

Page Rev. Date: 08-09-2004

P/N 301499R

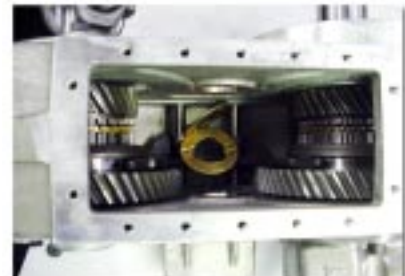
ATLAS SHORT TAILHOUSING ASSEMBLY

FORK INSTALLATION PROCEDURES:

1. Remove the transfer case from the vehicle.
2. Remove the drain plug and the drain oil.
3. Remove (14) torx head bolts and remove the inspection cover. Clean the surface of any debris.



4. Remove the cluster pin retaining bolts (must use a 3/8", 12 pt. socket in newer cases).
5. Remove the cluster pin from the unit (discard both cluster pin o-rings)
6. Remove the cluster gear (keep fingers away from the teeth, they can bite!) **Note:** Let the two thrust washers fall to the bottom of the case, but be very careful of the caged needle bearings inside the cluster; they have a tendency to slide out)



7. Remove the two thrust washers from inside the case.
8. You should now have access to the shift fork set screws which need to be removed.
9. Remove the three bolts from the shifter control located on the back of the case.



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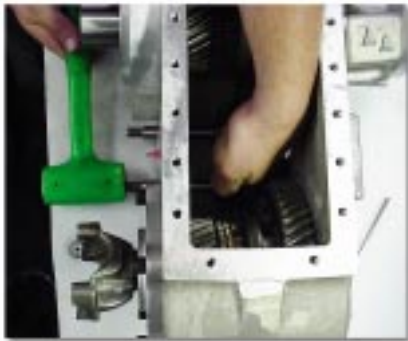
ASSEMBLY INSTRUCTION SHEET

Page Rev. Date: 08-09-2004

P/N 301499R

ATLAS SHORT TAILHOUSING ASSEMBLY

10. You now need to remove the shifter assembly by lightly tapping the threaded end of the rails with a dead blow hammer. You should be *lightly* tapping with one hand, and the other hand should be inside the case guiding the shift forks. It is easy to get them misaligned, so care must be taken to get them out. Once the shift control is removed, clean both the case and shifter control mating surfaces.



11. Remove the forks from the case. (Note: If you have Atlas case #1929 or earlier and have not upgraded your shifter forks, this is an ideal time to install new shift forks, P/N 301550).



12. Turn the case so that you are looking at the input ring. Remove the six bolts that hold it to the case and discard only the bolts (you will reuse the flat washers). Use your dead blow hammer to firmly hit the side of the transfer case while pulling on the input shaft. The tolerance on the input bore should be a snug fit and may take a little while to work loose. We do not recommend using any type of prying mechanism to get the input out; the aluminum is "softer" than a screwdriver or a pry bar and WILL get damaged and my cause problems down the road. Once removed, there will be one synchro ring that will become free. Remove it from the case, and place it in top of the synchro hub located on the input assembly you just removed.
13. Using your fingers, "pop" the synchro slider off the slider hub. When removed, three synchro dogs will become loose. They may simply "fall" out or even "spring" out. Please pay attention to where they go, and locate all three of them. Once out, put them in a safe location. There is also a spring located inside the synchro hub (on the end of the shaft still in the case). 90% of the time this spring will stay on the shaft when the slider is remove and the dogs fall out. Remove it at this time, and place it near the dogs (these items are reused later).
14. Remove the speedometer drive from the tail housing. If you have no speedometer drive but do have a freeze plug blocking the hole, disregard and go to the next step.
15. Using an 1-1/8" socket, remove the output shaft nut and discard it. Depending on the mileage of your unit, the rear yoke may be difficult to remove. You can use a puller if it is stubborn but most yokes can be removed with the use of a dead blow hammer. When the nut and yoke are off, the output shaft will become "loose" in the case. **DO NOT ATTEMPT TO REMOVE THE OUTPUT SHAFT FROM THE CASE YET!** There are a couple of parts which are still holding it into the case.
16. Remove the five bolts holding the tail housing on the case and discard them. You may need to tap the tail housing to get it loose from the case. Take the housing completely off the case and set it aside. Pay close attention when taking the housing off; there is a "shim" that will either fall out, stay on the shaft, or even stick to the bearing inside the tail housing. This shim must be located at this point. Once found, put it with your "old" parts. It looks identical to the new one we sent you, but is unique to your old parts.

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ASSEMBLY INSTRUCTION SHEET

Page Rev. Date: **08-09-2004**

P/N 301499R

ATLAS SHORT TAILHOUSING ASSEMBLY

17. Use a set of snap ring pliers to remove the first snap ring from the shaft. Next, remove the blue plastic drive gear from the shaft (may be a slightly snug fit). Remove the last snap ring and set those parts aside.
18. The last thing holding the shaft into place is the bearing on it. This bearing is another "light" press, and will require the use of the dead blow hammer. Use one hand to hit the tip of the shaft with the hammer and the other hand to support the large "pancake" gear inside the case. Visualize that you are driving the output shaft through the pancake gear and out the front of the case. When the bearing becomes loose, slide it completely off of the shaft. Place it into the "old" parts section. Pull the shaft fully from the front of the case. There is one more brass synchro slider, and one caged needle bearing set that are now free. Find both, and put in a safe spot. There is also one more synchro spring still on the output shaft. Find this spring and lay it with the other synchro parts. Remove the pancake gear from the case. There should not be any more parts loose inside the case. At this point it is wise to clean and inspect your case and parts for any debris. Also inspect the outside of the case and remove any silicon or sealing material.

At this time, please take a minute to separate all of the old parts and new parts on you work space. Keep all the new bearings separate so that none of the "old" ones are accidentally used!

19. Place the pancake gear on a flat surface with the synchro hub facing up. Take one of the brass synchro rings and place it over the hub. Press it down firmly so that it gets "stuck" and holds in place. Position the gear into the case. The synchro ring side should be facing the front of the T/C. With a small amount of oil, lubricate the appropriate caged needle bearing and slid it into the pancake gear.
20. Locate your new output shaft. Inspect the end of the shaft, which should have a caged needle bearing installed into the pocket. If there is no such bearing, check your parts and locate it. It needs to be pressed into the output shaft, flush with the surface of the shaft. (Call for tech help if you do not have the bearing or have questions about it's installation.) After locating the needle bearing, place the shaft on the bench with the slider hub facing down (thread area up). Place your synchro slider over the shaft and align the teeth so it sits all the way to the bench. Find your three synchro dogs. Place them into the slotted area of the shaft. They should be placed with the "dimpled" side towards the slider. Once all three are in, grab one of your green synchro springs and snap it into the assembly. Make sure that it contacts all three of the dogs below the retaining lip. Carefully flip this assembly over, keeping the slider from slipping off the shaft. You should now be able to get the second synchro spring into the three dogs, identical to the other side. Wiggle the slider very slightly on the shaft to make sure the three dogs are hitting their "dimples" inside the slider, which will hold them all on the shaft.

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4320 Aerotech Center Way, Paso Robles, CA 93446

ASSEMBLY INSTRUCTION SHEET

Page Rev. Date: 08-09-2004

P/N 301499R

ATLAS SHORT TAILHOUSING ASSEMBLY

21. Without disturbing the synchro assembly, guide the output shaft through the front of the case, and through the pancake gear. Pay attention to the caged needle bearing inside the pancake. It will get pushed out slightly, so you will need to take your other hand and guide it through. **THE FOLLOWING PORTION OF THIS STEP IS VERY IMPORTANT!** When guiding the shaft fully into the pancake, you must rotate the shaft until the notches of the brass synchro ring engage the three dogs. Remember from the previous steps that you "stuck" the brass ring to the pancake. As soon as the three dogs contact the notches, the shaft will seat a little further into the gear, and break the synchro ring loose. You can check the engagement by pulling the output shaft tight against the pancake and still be able to "jiggle" the brass synchro ring slightly. If it is tight, rotate the shaft some more until it does engage correctly. Repeat this step if necessary, but still be careful to not pull the synchro slider off (in which the spring/dog assembly must be repeated in step 20).

Assembly hint

Hold the output shaft in your hand, you want to have the three notches over you thumb and fore finger. Slip slider over the shaft and drop in the three synchro dogs. Roll the spring onto the two of the dogs and then snap it into the third and flip shaft over and repeat this step.



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ASSEMBLY INSTRUCTION SHEET

Page Rev. Date: 08-09-2004

P/N 301499R

ATLAS SHORT TAILHOUSING ASSEMBLY

22. Next to go on is the roller tapered bearing (the larger of the two new bearings). It needs to be pushed on by hand, preferably. Please put adequate pressure on the output shaft so it does not slip out of the synchro dog grooves. If it does slip out, stop and use step #20 to remedy. If it fits a bit tighter than what you can do by hand, you can take a drift or brass punch to tap it on. Please try to only tap on the inner race, the outer cage can get damaged very easily. When the bearing is fully seated, rotate the shaft one more time to check the dog alignment.
23. Locate the new output shim and slide it over the shaft; please put the shim on the shaft with the "heavy chamfer" side down. This shim is simply a piece of steel that has been machined to a specific thickness. This thickness determines the end-play of the shaft. Make sure the one you are putting on is not the old one you took out of the case.
24. Grab the new rear housing, and stretch the new square "o-ring" over it. We have included two new seals with your upgrade kit. Select the correct one that fits your yoke, but do not press it into the casting yet. Locate the smaller tapered roller bearing. Take this bearing and place it into the correct race (which is pressed into the casting). Make sure you have placed it with the rollers towards the race. Carefully press the seal into the casting until it is flush. Slide this assembly over the shaft and guide it until it centers into the case. When the housing has been placed up to the case, rotate until the holes are lined up. Use silicon on the 5 new bolts, and torque them to 25 ft./lbs. Try and use a star type pattern when you torque the bolts.
25. You should now have the tail housing secure to the back of the transfer case. The output shaft will be loose still, so be careful not to let the dogs become miss-aligned. You are ready for the yoke. Find the new plastic yoke spline washer and place it over the threaded portion of the shaft. Take the yoke and hold it with the "u-joint" side away from you. Place a small bead of silicon around the inside of the spline portion. Lubricate the seal with a small amount of oil, and start the yoke on shaft about 1/2 of an inch only. Start the new nut by hand a few turns. Use the nut to suck the assembly together (putting the yoke all the way on by hand will allow the spline washer to "pop" out of the front; which get the silicon all over, and this forces you to start over). It is very important to make sure that the entire output shaft assembly does not become locked up at any time during the nut tightening. If the assembly does lock up, STOP! Verify that the shim went on BEFORE the small roller bearing, and also that the brass synchro ring has not become miss-aligned with the dogs. The assembly will have a small amount of resistance when almost tight, which is normal; a full lockup does require your attention. Remedy the situation before continuing to torque (or call for tech assistance). If the assembly is still free to rotate, get the torque as close to 150 ft./lbs. as you can (final torque can be done when the case is installed into the vehicle).
26. Find your input assembly and place the brass synchro ring over the hub. As you did before, press firmly on it so it gets "stuck" on the hub. Replace the old square o-ring seal and guide the assembly into the case. When it has been pushed into the front of the case, you need to find the dog grooves just like before. Rotate the assembly until it pushes fully in and seats into the grooves. Use the six new bolts and reuse the six flat washers to attach it to the case. Use a small amount of Loctite 242 on the tip of the bolt, and a small bead of silicon about half way down the bolt (this seals the head of the bolt and also secures it from backing out). Torque in a star pattern to 25 ft. lbs. Check again to make sure that the input spins free of the output shaft. Locking up indicates the miss-alignment of the dog grooves.
27. Drop both of the forks into location inside the case. Use one of the pictures below to make sure they are facing the correct direction.

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ASSEMBLY INSTRUCTION SHEET

Page Rev. Date: 08-09-2004

P/N 301499R

ATLAS SHORT TAILHOUSING ASSEMBLY

28. Locate the old shifter control assembly. Run a small bead of Loctite 518 inside the perimeter of the casting (you MUST use the 518 Loctite; silicon or other products may miss-align the shifting mechanism). Insert the shift rails into the back side of the case and guide them through the shift forks inside the Atlas. Once installed, bolt the shifter control into position with the three bolts and torque to 25 ft./lbs. (use a small amount of Loctite 518 on the threads of the bolts to seal them).
29. Align the shifter set screw hole on the shifter fork with the matching hole on the shift rod. Install the set screw with Loctite 242 and torque to 15 ft./lbs.



30. Install the cluster gear, thrust bearings, and cluster pin. Trick: Have the cluster gear propped up and ready near by with the caged roll bearings and spacer in it. Also get a dead blow hammer within close proximity. Leave both of the o-rings off of the cluster pin for now. Start the cluster pin in one side of the case. Push it far enough to stick out only slightly inside the case. Use a heavy gear oil (grease should be used only sparingly if gear oil is not available) to stick one of the thrust washers to the inside of the case (make sure to line the tab on it with the notch in the case). The very end of the cluster pin should hold this thrust washer in place. Use the same oil to stick the other thrust washer on the opposite side. This one needs to be held in place by sticking your finger into the side of the case (only use the tip of your finger, if you drop the cluster in with your finger sticking through you will be severely injured!). Using your free hand, grab the cluster (which hopefully is propped up and ready to go!). Lower the cluster gear into the case until it looks lined up (keep fingers clear inside the case). Hold the cluster up and tap the end of the shaft with the dead blow. When the cluster pin starts about 2 inches, you can let go of the cluster gear. Look in the opposite hole and make sure the second thrust washer is lined up. Don't drive the shaft in yet! Put one of the o-rings on and lubricate it. Drive the pin in lightly and all the way in. Keep tapping past flush until you have just enough showing on the other side to install the second o-ring. Tap back again until flush. You should now have both of the o-rings on the cluster pin and it should be fully installed into the case.
31. Install the two cluster pin bolts and seal washers to retain the cluster pin in its proper location. Torque these bolts to 16 ft./lbs.
32. Install the new pan gasket and inspection cover. Torque (14) bolts to 10 ft./lbs.
33. Replace the drain plug, fill with oil, and reinstall the unit back into the vehicle.
34. If you haven't had a chance yet, torque the rear output yoke to 150 ft. lbs.

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ASSEMBLY INSTRUCTION SHEET

Page Rev. Date: 08-09-2004

P/N 301499R

ATLAS SHORT TAILHOUSING ASSEMBLY

Helpful hints for installing the Atlas cluster gear.

Grease the back sides of the thrust washers and set the washers into the case, ensure that the tabs of the thrust washers fit the slots of the Atlas case. The grease help hold the thrust washers in place while the cluster is installed.

Install the cluster pin on one side just enough to hold one on the thrust washers in place, the other washer once the cluster is installed slip your finger into the hole retaining the washer in place. If the washer falls down you will have to remove the gear and repeat the process. Many times the washer will fall half way down and prevent the cluster pin from going in. After you succeed in the installation do a visual check from the access pan to verify the washers are in place.



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