'85/'86 Maxim-X

Fork Seal Replacement

The Maxim-X fork seal replacement is easily accomplished by a single person except for the very first and very last step of the instructions. For those two steps you'll briefly need the help of a second person.

Necessary tools and equipment		
• Motorcycle ignition key	• 10mm socket	• 3/8" drive 6mm Allen socket
• (1) axle stand	• 12mm socket	• channel lock pliers
• short length of 4"x4"	• 17mm socket	• needle nose pliers
• (2) medium zip ties	• 3/8" drive ratchet	• slot screwdriver
• rag	• 3/8" drive 6" extension	• #2 Phillips screwdriver
• dental pick	• 12mm box-end wrench	• container for old fork oil
• special damper rod removal tool	• brass wire brush wheel	• Loctite Gel Super Glue
• box cutter	• steel wire brush wheel	• 220-grit aluminum oxide sand paper
• rotary tool	• 80-grit pleated sanding wheel	• New drain screw o-ring (122-23129-00)
• plastic brush wheel	• latex or nitrile gloves	• Permatex #242 Thread Locker

1) Have a friend put their weight on the back of the motorcycle to bring the rear wheel fully to the ground, then place an axle stand under centre of the front frame cross member between the #2 and #3 exhaust pipes.

2) Remove the four (4) 10mm fork brace/front fender bolts.

3) Carefully remove fender by rotating it forward around the wheel until it clears the forks and put the fender somewhere safe where it won't potentially be damaged by flying fork valve cap bolts.

4) Remove speedo cable by unscrewing the splined nut at the speedo drive unit counter clockwise either by hand or with channel lock pliers if necessary.

5) Remove the two (2) 12mm bolts securing the left brake calliper

6) Remove the left brake calliper.

7) Free the left lower brake line grommet from the guide loop.

8) Using a Zip Tie or string, tie the left brake calliper up and out of the way to either the #1 exhaust pipe or to the frame member adjacent to it.

9) Remove the two (2) 12mm bolts securing the right brake calliper.

10) Remove the right brake calliper.

11) Free the right lower brake line grommet from the guide loop.

12) Using a Zip Tie or string, tie the right brake calliper up and out of the way to either the #4 exhaust pipe or to the frame member adjacent to it.

13) Use the ignition key to unlatch and remove the seat/saddle.

14) Remove the 12mm bolt securing the rear of the fuel tank.

15) Prop up the rear of the fuel tank using a short length of 4"x4".

16) Unplug the white fuel sending unit connector located to the left of the battery.

17) Disconnect the fuel petcock vacuum hose from the #2 intake manifold (might require needle nose pliers to remove scissor-style hose clamp)

18) Disconnect fuel hose from rear of petcock (might require needle nose pliers to remove scissor-style hose clamp or slot screwdriver if standard gear clamp has been installed).

19) Loosen but don't remove the front axle pinch bolt using a 12mm socket on the bolt head and a 12mm wrench on the nut at the other end.

20) Loosen the front axle bolt using a 17mm socket until the threads are free of the opposite fork leg but don't pull the axle any further out yet.

21) While holding the front wheel up with one hand to take weight off the axle, pull the front axle out completely using your other hand, then lower the wheel and roll it forward until it clears the forks (NOTE - there is a spacer on the right side of the wheel between the right fork leg and the wheel bearing. Observe the orientation of the spacer in case it falls out and rolls away while removing the wheel.)

22) Remove the lower triple tree pinch bolt chrome caps by prying them out. It's not likely that the chrome caps will be easily removable so don't be afraid to damage them as they will almost certainly have to be replaced. (Refer to: **www.maxim-x.com/boltplugs.html**).

23) Unscrew and remove both chrome fork valve covers/caps.

24) Release all air pressure from both forks by depressing each fork valve with an appropriate tool. There may or may not be pressure to release so don't be surprised if none escapes when you depress the valve(s).

25) Loosen but don't remove both fork valve cap bolts using a 19mm socket. You'll need an extension to clear the handlebars, cables and wires. (CAUTION: The valve cap bolts are spring loaded. If you do anything more than simply loosen them, you might get to see them launched into the air and possibly land in an inopportune location. This is precisely why the fuel tank should be moved to safety before beginning.)

26) **Continue from this point by servicing only one fork at a time. After the first fork has been repaired, reassembled and reinstalled, then you can begin work on the second fork.**

27) On the right side lower triple tree clamp, loosen but don't remove the two (2) 6mm Allen pinch bolts.

28) On the right side upper triple tree clamp, loosen but don't remove the 10mm pinch bolt while holding the inner fork tube to prevent the fork from sliding out when the clamp is loosened.

29) Slide the right side fork tube down and free of the triple tree clamps while being very careful not to scratch the tube's surface on its way out.

30) With the fork assembly upright and resting on the ground, apply downward pressure against the fork valve cap bolt while using a 19mm socket to remove it. (NOTE: Applying downward pressure on the fork valve cap bolt is critical because it's spring-loaded and will shoot upward when freed from the threads if not restrained... and what goes up must come down.)

31) Leave the fork assembly upright as you remove and set aside the 5-7/8" long inner spacer tube which is visible inside the now-open fork tube.

32) Leave the fork assembly upright as you remove and set aside the spring seat which is visible atop the coil spring inside the now-open fork tube.

33) Leave the fork assembly upright as you remove and set aside the fork spring from inside the now-open fork tube. (NOTE: Note that the progressive spring is orientated such that the section of tighter windings is at the top.)

34) The fork assembly can now safely be turned on its side to pour out the old fork oil. Be patient - hold the forks upside down long enough to drain all that can be drained because what's left will be spilled on your work bench when the forks are further disassembled.

35) Using the special 22mm hex tool on the damper rod inside the fork assembly and an 8mm Allen socket on the damper rod securing bolt outside the fork assembly, loosen & remove the damper rod securing bolt. If you weren't able to fabricate a tool for this purpose, servicing the forks will be very difficult. Although a square 3/4" drive will fit the 12pt 22mm damper rod head, trying to use one under torque may damage the damper rod head. Square drives always have bevelled edges at the insertion end and since the damper rod head is only 3.4mL deep, roughly the depth of the bevel, applying torque causes the 4pt square drive to skip across the 12pt damper rod head, damaging the damper rod head in the process. So, if you have no other choice but to use a square drive, take the time to cut off the bevelled length with a cutting disk in an angle grinder or some other suitable method. That will allow the square drive to sink more reliably into the damper rod head.

36) If it's present and loose, remove the chrome dust seal cover by sliding it off the inner fork tube. The cover may not be present at all as a result of not being replaced during earlier service so there may not be a need to remove it. It's also possible that the chrome cover is firmly attached to the dust seal itself. If that's the case and the two are inseparable, just continue to the next step, treating the chrome cover and dust seal as a single unit (which is how the replacements are often sold).

37) Pry the neoprene dust seal out of the top of the outer fork tube with a suitable flat tool such as a box cutter. Remove the dust seal by sliding it off the inner fork tube and set it aside.

38) Pry the fork seal retaining circlip out of the retention groove in the top of the outer fork tube. This can be done with a slot screwdriver or something similar. Whatever you use, be careful not to damage the retention groove or the inner surface of the outer fork tube as damage there might effect the quality of the seal or your ability to reinstall the circlip later. Remove the circlip by sliding it off the inner fork tube and set it aside.

39) Separate the inner fork tube from the outer fork tube by repeatedly jerking the two in opposite directions with enough force to unseat the fork seal a little at a time - a sort of reverse jack hammering of the two pieces until the fork seal inevitably pops out of the top of the outer fork tube.

40) Remove the damper rod by turning the fork assembly upside down and allowing the damper rod to slide out.

41) It's not absolutely necessary to remove the spring from the damper rod but it might be useful just for cleaning of both parts.

42) Remove the fork oil seal by sliding it off the inner fork tube and set it aside. (NOTE: The groove in the oil seal faces downward and the lip of the oil seal faces upward.)

43) Remove the washer by sliding it off the inner fork tube and set it aside. (NOTE: The flatter surface of the washer faces downward.)

44) Remove the guide bushing by sliding it off the inner fork tube and set it aside. (NOTE: The slide, not guide, bushing remains attached to the bottom of the inner fork tube and won't be replaced.)

45) Remove the taper spindle from inside the bottom of the outer fork tube by tilting the fork tube on its side and allowing the taper spindle to slide out. Note the orientation of the taper spindle (larger opening faces upward). Also be prepared for residual fork oil to pour out along with the taper spindle.

46) Remove the #2 Phillips drain screw from the bottom of the outer fork tube and set it safely aside where it won't be lost.

47) Use a dental pick or similar tool to remove the old drain screw seal and safely set it aside where it won't be lost. If it's the original seal, it should be hard plastic with a lip on one surface. (NOTE: The orientation of the seal is such that the lip faces outward.)

48) Cleaning & reassembly starts here.

49) Clean the circlip groove at the top of the outer fork tube using a rotary tool with a plastic brush wheel.

50) If you ever considered polishing the outer aluminum surfaces of the forks, this is your best chance. While the forks are off the bike and separated, all nooks and crannies are fully accessible to the polishing tools of your choice.

51) There will likely be corrosion and pitting inside the inner fork tube in the area of the o-ring around the fork valve cap bolt. To prevent air leaks after reassembly, the corrosion and pitting have to be repaired. Begin by using a rotary tool with a small steel wire wheel to polish the o-ring mating surface. If necessary, use an 80-grit pleated sandpaper wheel in the same rotary tool to polish the inner surface of the fork tube more aggressively. If you're still unable to smooth away all the pitting, put on a latex or nitrile glove and use a finger to spread a thin layer of Loctite Gel Super Glue over the pitted area to fill the pits. Allow the glue to dry then sand it smooth by hand with 220-grit aluminum oxide sandpaper. If there's still pitting which might allow air leaks, try another application of Loctite Gel Super Glue and another iteration of sanding it smooth with 220-grit aluminum oxide sandpaper. If you do a good job, the o-ring mating surface should end up perfectly smooth.

52) Thoroughly clean the inside of the inner fork tube with a rag and mineral spirits and dry the inside with compressed air. There should be no residual fluids or debris of any kind left on the inner surface.

53) Thoroughly clean the inside of the outer fork tube with a rag and mineral spirits and dry the inside with compressed air. There should be no residual fluids or debris of any kind left on the inner surface.

54) Install the new o-ring drain screw seal (Part#:122-23129-00) to replace the original hard plastic seal. Unlike the original plastic seal which would allow the drain screw to be lightly torqued, the o-ring makes that impossible. Over-tightening the drain screw can squeeze the o-ring out of position and possibly effect the seal. Instead, you'll need to use a bit of medium strength #242 thread locker on the drain screw and then tighten the screw only enough to make a good seal against the o-ring - no more. Alternatively, you can continue to use the original plastic seal if it's still in good condition.

55) If it was removed earlier, reinstall the spring on the damper rod.

56) Reinstall damper rod by dropping it, narrow end first, into the bottom of the inner fork tube so that it sticks out the lower end of the inner fork tube.

57) Insert the special tool into the inner fork tube against the head of the damper rod in order to hold the damper rod in place, then turn the inner fork tube upside down so that the damper rod points upward and is supported on the special tool.

58) Drop the taper spindle on the exposed end of the upturned damper rod.

59) Drop the outer fork tube onto the upturned damper rod protruding from the inner fork tube.

60) Install the copper compression washer (Part# 509-23158-L0) on the damper rod securing bolt such that the flat side faces against the outer fork tube.

61) Using #242 thread locker, loosely install the damper rod securing bolt with its new compression washer through the outer fork tube into the damper rod.

62) With the special fork tool still inserted into the 22mm hex head of the damper rod and holding it stationary, use an 8mm Allen head socket to torque the damper rod securing bolt to 22ft•lbs (264in•lbs). (NOTE: You'll need a larger torque wrench because the smaller ones usually only reach a maximum of 250in•lbs (21ft•lbs).

63) Compare the new vs the old fork springs. If the old one being removed is original equipment from Yamaha, it will be 20" (508mm) long and will have 45 windings. If the replacement spring is ordered through Yamaha and supplied by

Progressive (Part# 11-1128, as was the case in 2008 and 2009), it will be 19¾" (502mm) long and will have 61 windings. The two springs are clearly different and should be compared volumetrically. By submerging each spring and measuring the displaced fluid volume, it was discovered that the original spring displaces 45mL of fluid while the new spring displaces 80mL, a difference of 35mL (exactly 9% of the 389mL fork oil specification). To compensate for the difference in spring size, the recommended fork oil volume should be adjusted by the recorded difference. In this case, rather than filling each fork with 389mL of fork oil, they should receive only 354mL of fork oil each. If this adjustment isn't made, it could lead to prematurely blown fork seals.

64) Turn the forks upright and remove the special fork tool before continuing reassembly.

65) Loosely install a new guide bushing (Part# 2YK-23125-00) over the inner fork tube. Not that it necessarily has an bearing on the assembly but it was noted that DUA over 5C was printed on the old guide bushing but DD3A over 7D was printed on the new guide bushing.

66) Reinstall the washer over the inner fork tube with the flat side down.

67) Using a PVC tube of 1-7/8" O.D. and 1.5" I.D. with a minimum length of 16", tap the washer and guide bushing firmly into place, making sure that the new guide bushing installs straight and bottoms out just below where the fork seal will rest.

68) Loosely install a new fork seal over the inner fork tube with the groove facing downward toward the washer.

69) Using a PVC tube of 1-7/8" O.D. and 1.5" I.D. with a minimum length of 16", tap the new fork seal firmly into place being careful to keep it squarely aligned as you do. You'll know that the fork seal has been pressed fully into place when the groove for the circlip becomes fully visible over the fork oil seal.

70) Insert a new circlip into the groove in the outer fork tube just above the fork oil seal. If you didn't need a new circlip, simply clean the original clip and insert it into the groove instead. Whether the circlip is new or old, inserting it may require some coaxing. Be patient and be careful not to break it.

71) Loosely install a new dust seal with chrome cover (Part# 42X-23144-01) over the inner fork tube. If the dust seal and chrome cover are a single unit, obviously the chrome side faces up. But if the dust seal is a separate piece, install it so that the tapered surface faces up.

72) Using a PVC tube of 1-7/8" O.D. and 1.5" I.D. with a minimum length of 16", tap the new dust seal with chrome cover (Part# 42X-23144-01) firmly into place. Make sure the new dust seal is in straight and bottoms out on the outer fork tube.

73) Drop the new fork spring into the inner fork tube with the tight end of the windings at the top.

74) Drop the spring seat onto the top of the fork spring inside the inner fork tube.

75) Drop the spacer tube into the inner fork tube around the fork spring. Beyond this point you should try to keep the assembled fork fully extended. It will easily compress but allowing that to happen will make the work awkward by way of exposing the upper half of the spring, the spacer tube and the spring seat during assembly. Keep the fork extended by holding it by the upper section (the inner fork tube) during the remainder of the assembly.

76) There may be oxidation on the triple tree clamps so it might be necessary to clean the clamps using a rotary tool with a brass wire brush wheel.

77) Don't grease the triple tree clamps or put any anti-seize or other protective coatings inside the triple tree clamps as that might impair the effectiveness of their grip.

78) Slide the fork assembly up through the triple tree clamps being careful not to scratch the surface in the process. Bring the inner fork tube up until it is flush with the top of the upper triple tree clamp and hold it there so it doesn't slide out and fall on the floor unexpectedly.

79) Using a 10mm hex socket, torque the upper triple tree clamp to 14ft•lbs (168in•lbs) in order to secure the inner fork tube so you can let go of it. (NOTE: Remember to hold the cable guide loop perpendicular to the forks as you tighten. If you don't, the guide loop will rotate out of position as the bolt is tightened.)

80) Using a 6mm Allen socket, torque the two lower triple tree clamp bolts to 17ft•lbs (204in•lbs).

81) Remove the old o-ring from the fork valve cap bolt.

82) It may be necessary to clean the o-ring groove in the fork valve cap bolt. To do so, use a rotary tool with a plastic or fine brass wire brush wheel so that the groove becomes clean without becoming scratched.

83) Install a new o-ring (Home Hardware Part# 3233708, 1.06x1.3x1/8, Type R3293 304-02) on the fork valve cap bolt with some clear silicone grease as a lubricant and sealant (ex. ignition di-electric grease or brake slider bolt grease).

84) Make sure that the outer fork tubes are extended fully downward and rotated such that they are parallel.

85) Fill a measured amount of fresh 10wt fork oil into a container before filling the recommended amount the fork tube using a long, narrow funnel. Remember to compensate for the difference in spring size, if any. In the case of replacement springs from Progressive (Part# 11-1128), rather than filling each fork with 389mL of fork oil, they should receive only 354mL of fork oil each. If this adjustment isn't made, it could lead to prematurely blown fork seals.

86) While applying sufficient pressure to overcome the force of the fork spring, partially thread the fork valve cap bolt back into the top of the inner fork tube. In addition to overcoming the force of the spring, you'll also have to overcome the resistance offered by the new o-ring as it becomes compressed upon entry into the fork tube. It will require more force than you expect so make sure you keep applying force until you're certain the fork valve cap bolt has caught a sufficient number of threads to make pulling them out unlikely. After the threads have taken hold through a number of revolutions, there should be no resistance when tightening further.

87) Using a 19mm hex socket and 6" extension, torque the fork valve cap bolt to 17ft•lbs (204in•lbs).

88) **Return to instruction item #26 to perform the same service on the second fork tube.**

89) Reinstall the front wheel with the spacer to the right and the speedo drive unit to the left. (NOTE: The narrow end of the spacer faces the bearing.)

90) While lifting the front wheel with one hand, insert the front axle bolt through to the other side using the other hand.

91) Using a 17mm hex socket and a large torque wrench, thread the front axle bolt into the left fork then tighten and torque the axle bolt to 75 ft•lbs.

92) Using a 12mm hex socket, torque the front axle pinch bolt to 14ft•lbs (168in•lbs) while holding the opposing pinch bolt nut with a 12mm box end wrench.

93) Take this opportunity to clean and lube the speedo drive cable.

94) Thread the speedo drive cable back into the speedo drive unit by hand, then tighten the knurled fitting with pliers. Don't over tighten.

95) Resecure the right side brake line grommet in its guide loop.

96) Replace the right side calliper and use a 12mm hex socket to torque the two bolts to 25ft•lbs (300in•lbs). Be very careful not to over torque these bolts because they often strip. I recommend a two-stage torque routine where you first torque to 80% then torque only to 90% of the torque specification (ie. first to 20ft•lbs, then to only 23ft•lbs and no more).

97) Resecure the left side brake line grommet in its guide loop.

98) Replace the left side calliper and use a 12mm hex socket to torgue the two bolts to 25ft•lbs (300in•lbs). Be very careful not to over torque these bolts because they often strip. I recommend a two-stage torque routine where you first torque to 80% then torque only to 90% of the torque specification (ie. first to 20ft•lbs, then to only 23ft•lbs and no more).

99) Using either a hand-operated or low-volume electric air pump, pressurize each fork to specifications (0 - 17 psi). Be very careful not to go over pressure because you may blow the fork seals by doing so. Remember that the fork air volume is minuscule. Just a brief puff of air increases pressure dramatically. Similarly, that tiny loss of air when testing the pressure also causes a dramatic loss of air pressure. When filling and testing air pressure, be quick about it and try to minimize connect/disconnect losses as much as possible. (NOTE: You can only use a push-on style connector to pressurize and test the fork air pressure. Thread or clip-on connectors will not work as too much pressure will be added/lost during the time it takes to make/break the connection.)

100) It's a good idea to spread a liberal amount of clear silicone grease (ie. di-electric grease) around the gaps between each fork valve cap bolt and corresponding inner fork tube. The grease will keep water from penetrating and potentially causing corrosion and pitting in the future.

101) Replace the chrome fork covers/caps by threading them back onto the fork valve caps bolts.

102) Carefully replace the fender from the front by rotating it backward over the tire into position.

103) Using a 10mm hex socket, replace the four fork brace/fender bolts and torque each of them to 6.5ft•lbs (78in•lbs).

104) Put the fuel tank back in place with the rear of the tank elevated using a piece of 4"x4" wood.

105) Reconnect the petcock vacuum hose.

106) Reconnect the fuel hose to the rear of the petcock.

107) Reconnect fuel sending unit connector to the left of the battery.

108) Lower the rear of the fuel tank and tighten the securing bolt using a 12mm hex socket.

109) Replace the seat.

110) Install new chrome bolt covers on the four triple tree Allen bolts.

111) Have a friend put their weight on the back of the motorcycle to hold the rear wheel fully to the ground, then remove the axle stand from under the front frame cross member and lower the front wheel to the ground to complete the job.