
TEARDOWN, INSPECTION, CLEANING AND REASSEMBLY OF JEEP VACUUM WIPER MOTORS

The vintage jeeps used various methods to power the wiper blades, including manual wipers. However, many were fitted with Trico S-Series vacuum wipers. These are driven off a vacuum line drawing vacuum from the intake manifold. While different models of jeep were fitted with different models of wiper, the basic principles remain the same and it is believed that this guide should serve as a rebuild guide for all Jeep vacuum wipers, regardless of the model number.

Written by Mike Udal

MODELS USED ON THE JEEPS

According to the information I have, the following Trico wiper models were fitted to the following jeeps:

SF 583-27: CJ2A. This model can be fitted to the left or right side and has a small chrome helper handle. The hose connection is straight.

SF 616-1 (left) and SF 616 (right): CJ3A, CJ3B, DJ3A open cab models. These were also fitted with small chrome helper handles. The SF 616-1 (left) model has a “U” shaped hose connection. The SF 616 (right) has a straight hose connection.

SF 634-1: CJ5, CJ6, DJ5, DJ6, DJ3A (RH Drive enclosed cab models only). Fits left and right side, no helper handle, and with a straight hose connection.

The rebuild kit I found and used is listed as the rebuild kit for the S-Type Trico models.



I have found that the parts fit my SF634-1 model, but I also believe that they would work on ALL S-Series motors listed above. Let me know if you find differently.

VACUUM MOTOR TEARDOWN

The motor I have is a Trico SF 634-1. Although it is not off a CJ2A I got it cheap, and it fits the CJ2A windshield, so I rebuilt it and will be using it. If you are rebuilding a different model it may not look exactly the same as the pictures show here. But the steps required to rebuild it should be similar enough that you can figure it out.

I always bag and tag as I go. I would recommend that even more so in this case where the parts are small and could easily get lost. Make sure you have a nice, clean, large work surface to work on. Trying to do this on a cluttered work bench is a sure way to lose small parts. I spread clean paper on the kitchen table and worked there!

1. Remove the nuts from the end of the wiper shaft and the long attaching screws from the windshield mounting bracket.



2. Remove the screws attaching each end of the mounting bracket to the wiper body. Slide the bracket off the shaft.



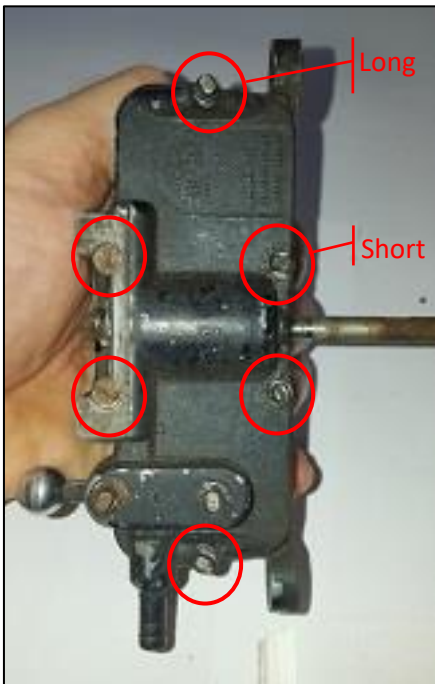
Remove the felt seal and then the metal washer off the shaft.



3. On the other side of the wiper body, remove the 2 small screws attaching the rocker brackets cover plate and remove the cover plate.



4. Remove the 4 special head screws holding the base to the semi-circular top. These are at the shaft and at the sides. Also remove the 2 slot head screws exposed when the cover plate was removed in Step 3. The longer special head screws go to the sides of the base, not at the shaft.



I have seen a special tool to fit the special head screws. Unless you are going to be doing lots of these, it's probably not worth buying it. You can turn the special head screws (if you are careful) with ordinary pliers.

5. Make a small hook in a piece of thin wire and use it to unhook the top of the spring hooked over the top of the rocker bracket.



Release the spring. Slide the bracket up, which will bring the brass plungers with it on each side. Unhook the bracket arms from the plungers on each side and slide the bracket forward and out.



6. Push the rocker reverse bracket down so that it releases from behind the lip on the

motor base. Swing it forward and to the side.



7. Carefully separate the motor base from the semi-circular top.



8. Lift out the paddle and shaft from the motor.



9. Remove the rocker reverse bracket and the spring.



10. Carefully remove the gaskets from the motor body. Yours may be reusable, so do this carefully. A small razor blade or exacto knife may help.



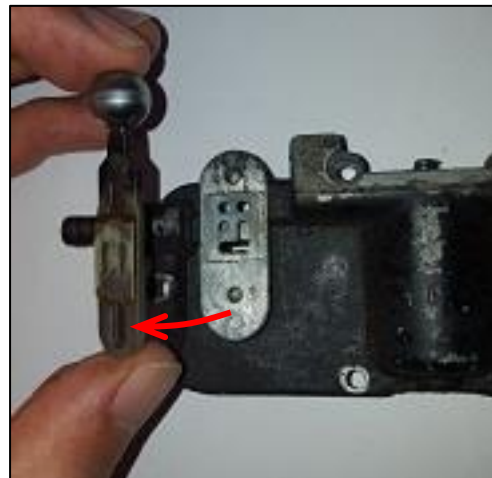
11. Remove the brass plungers from the guides by sliding them out from the top.



12. Remove the 2 special head screws holding the cover on the control knob and remove the cover.



Lift off the control knob.



HOW IT WORKS

To figure out why yours is not working, or how you need to fix it, it helps to know the basics of how these things work.

This is easier said than done! Both the top and the base have multitudes of tiny passages, that are at times connected to other passages, and

at other times not, depending on the positions of the control knob and the plungers. To make things worse, the gaskets cover some of the passages when installed, so what is an open passage on the bare body may not actually be open when the motor is assembled. And to make matters even worse than that, some passage to passage connections are only made when the two halves are together, which is not easily seen when the two halves are apart (nor easily seen when the two halves are together)!

I've spend a few hours mapping out what goes where and I mostly have it all figured out, but it's neither practical nor necessary for the purposes of this guide to draw 100 diagrams to explain it in detail. All that is really required is an understanding of the general principle.

Here it is: Vacuum is supplied from the intake manifold on the engine and carried through to the wiper inlet in a tube and hose. With the control knob in the "in" position (which is off), this vacuum is permanently applied to one side of the paddle only and air (at atmospheric pressure) is admitted to the other side through one of the brass plungers. This differential pressure applies a force to the paddle so that it is pulled to the vacuum side and parks there.

When the control switch is pulled out, the channels in the control lever connect different channels to each other in the motor body. Now, vacuum is applied to the opposite side of the paddle, and air is admitted to the side that previously had vacuum in the park position. The difference in pressure pulls the paddle and rotates the shaft, pulling the wiper blade across the windscreen. At the end of its stroke, the cross-bar on the end of the shaft knocks the spring-loaded reverse bracket to the other side, and this pushes one brass plunger down into its guide and lifts the opposing one up. All this does is reverse which side of the paddle sees the vacuum and which side admits air at

atmospheric pressure – the paddle will always move to the side exposed to the vacuum. At the end of each stroke, the plungers are triggered to reverse once again to change the vacuum to the other side of the paddle again.

This action of applying vacuum on one side and then on the other, alternating at the end of each completed stroke, continues as long as the control lever is pulled out. As soon as it is pushed in, the vacuum is applied to one side of the paddle only and the direction is NOT changed at the end of that stroke. The paddle, shaft and wiper blade will therefore park indefinitely.

This understanding explains why the wiper motor will slow down when you gas the engine up a long steep hill. Flooding the engine inlet manifold with air and fuel to maximise engine power up the hill decreases the vacuum in the manifold, and this is the same vacuum the wiper motor sees. Decreased vacuum = less differential pressure on the paddle, resulting in a smaller force acting on the paddle inside the motor.

INSPECTION

With this basic knowledge of how the wiper works, we can now consider what is important in the inspection and reassembly of these motors.

The paddle moves by the presence of vacuum on one side and admission of air at atmospheric pressure on the other. If there is a leak anywhere between the two halves of the motor, air will leak in and decrease the efficiency of the vacuum. It's exactly like a vacuum leak on your manifold which makes your engine run terribly, right? Any vacuum leak on your wiper motor will make it run

weakly or not at all. So, what are the potential sources of vacuum leaks?

- Check your gasket carefully that it is not torn or with missing pieces. It should completely cover each side of the motor, and up to the shaft. There should be no missing pieces that would allow air to leak into the motor body from the outside.
- Check where the shaft rides on the motor body. If this is horribly worn to the point that it will admit air your wiper will not work properly.
- Check the fit of the brass plungers on the brass guides. These are nothing other than a tight interference fit. If they are loose, and can be wobbled back and forth in the guides, they will be admitting air to the body when they should be sealing the vacuum. Check sideways movement of the new plungers in the new guides in your kit, and see if the fit is noticeably tighter than in your old ones.
- Check the condition of the sides of your paddle, and where these slide on the surfaces of the motor body. Are there bad scores or ridges on the motor body, or chunks missing from the paddle edges? These could let air from one side of the paddle to the other, which will decrease the stroke power and speed.

Also check for old congealed grease clogging up your paddle, the shaft or blocking the passageways. Remember that lubrication is necessary to keep everything sealed and moving, but the air admitted to the wiper is not filtered, so mixing dirty or dusty air with oil and grease will cause a mess inside your wiper in no time. If you only operate your wiper motor when it is actually raining, dust in the air should be minimised. But if you are following someone on a dusty road and decide to operate the wiper you will clog up the small passages and gum up the lubricant in no time.

You need to decide if you are going to change out the brass guides in the motor with the new ones in the kit, or just use the new valves in the old guides.

If you decide to change out the guides, you need to press out the old guides, and press in the new ones. I don't think it really matters whether its from top to bottom, or bottom to top. Bottom to top makes sense to me because the surface at the bottom is larger to press on and so there is less chance of damaging the guide.

The guides have ports or openings in the sides of them. **It is very important to check the orientation of the ports in the old guides as they come out, and to press the new ones in with the ports in the same orientation. These ports are what allow air into the correct passages in the motor body at certain times as the plungers move up and down. If you install these guides with the ports in the wrong orientation the wiper motor will not work!**



The kit comes with a new paddle. This should only be necessary to install on the shaft if the sides of your old paddle are worn to the point that they will not seal properly against the body of the motor. In my case, mine looked in good condition. I saw no need to replace the paddle, and I didn't want to mess with the rivets for no good reason, so I left the old paddle on the shaft.

CLEANING

I wire brushed the two brackets that control the plungers and the reverse mechanism with a light brass wheel. A dremel tool could also work well on these.

Carb cleaner or other heavy degreasers will probably be required to get into all the passages, and ensure they are clean and clear. Remove all old hard grease wherever you find it.

I had my motor casing glass bead blasted, except for the sliding surfaces of the control lever and where the paddle slides on the inside of the body. This gives a very nice clean finish without being as destructive as sand blasting. But this step is not strictly necessary if you want to keep your original paint, and can get everything clean using chemicals.

I chose not to smooth or dress the slight unevenness on the insides of the motor body where the paddle moves. To me any unevenness is a custom fit between the paddle and the motor body obtained through years of use, and is much like lapping your engine valves and valve seats to each other. Smoothing this over with sandpaper, no matter how fine, would destroy this custom fit and will only result in a worse seal between paddle and motor body, not better. In my opinion you should only smooth over any unevenness with sandpaper if you are putting in a new paddle. Your call.

REASSEMBLY

Reassembly is just the reverse of disassembly. (I hate it when the manuals say that. So here goes....)

1. You need to lightly grease and oil the paddle and wearing surfaces inside of the motor. Also the control knob sliding surfaces, and where the shaft rides against the motor body. The grease should not be so heavy or thick that it will impede the paddle movement. It should also not be applied so heavily that the first paddle wipe or lever activation will scrape the excess into the various passages and block them up. It should be a very, very light smear so as to only just "seal" up any tiny gaps around the sides of the paddle and reduce friction to a minimum. In my opinion, most of the actual lubrication should be achieved with light machine oil.

For this first greasing, I used a very light smear of John Deere cornhead grease on the paddle wiping surfaces, the same grease as is commonly used in the steering knuckles. It is the lightest grease I had, and it worked OK for me. I followed up with a few drops of light machine oil which is commonly used to lubricate sewing machines. Don't forget to grease the small semi-circle in the base where the top of the paddle rides.

I used a small smear of heavier grease in the case bores where the paddle shaft rides. This is a bearing surface and it is important that this is protected as far as possible. Here I

actually used a tiny spot of wheel bearing grease. Its important in this case that the grease stays in place and doesn't flow away too easily.

Insert the paddle carefully and wipe it through it's full range a few times to distribute the grease and oil. Wipe up any obvious excess.



2. Place your gaskets over the base.



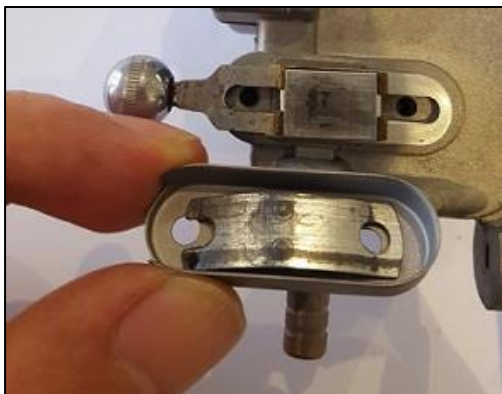
3. Carefully place the base onto the top and check the gaskets are all in place. The small flange on the shaft must also sit in the proper recess in the body.



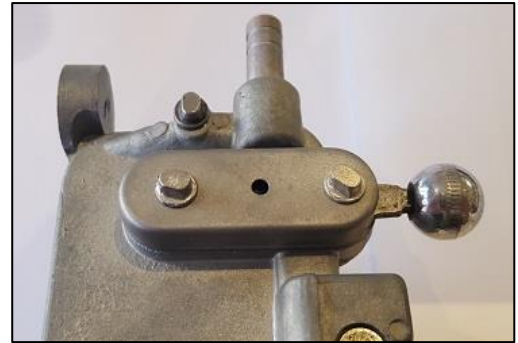
4. Screw in the 4 special head screws and 2 countersunk crews that hold the base to the top. Check for free movement of the paddle by sweeping it back and forth using the cross-shaft on the end.
5. Install the control lever. The surface with the two passages goes against the motor body. This is what makes the connection between different passages in the ON and OFF positions. This needs a very light greasing before being placed. Too much grease and you will start to clog up the passages with any excess!



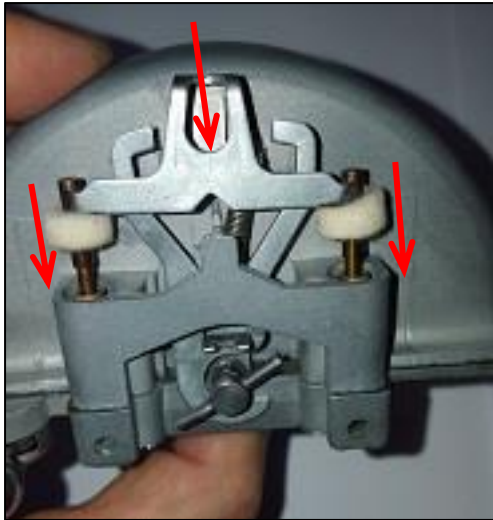
The spring in the cover pushes against the other side of the lever. This can get a slightly heavier grease that will provide more friction protection as there are no channels to block up. Again, I used a light smear of wheel bearing grease. The open end of the spring was originally on the handle side of the lever on mine. I put it back together this way.



Place the cover and spring in place and secure the screws.



6. Slide in the rocker reverse bracket from above and hook it under the tab on the motor body. Again, a tiny spot of wheel bearing grease goes behind the tab. It's a bit fiddly to get this in but it will go. Hook one end of the spring on the rocker reverse bracket.
7. Push the felt seals on each of the brass plungers from above. You should push them down just enough to expose the slot in each plunger to fit the arms of the rocker bracket. I added half a drop of light machine oil to each plunger stem. You now need to put one "arm" on each end of the rocker bracket in the slot on each brass plunger, and then slide the bracket into place from above while at the same time sliding the plungers into their guides from above. This can be a little tricky, but just takes a little patience. Once each valve is started in its guide and the bracket is in its slot, push the whole assembly down until it seats. Make sure you don't knock the loose spring off the rocker reverse bracket!



8. Use a thin wire with a small hook bent into the end to hook the free end of the spring and pull it up into position over the end of the rocker bracket.



9. At this point your wiper motor can be functionally tested. I was able to test mine just by sucking on the vacuum connection and the paddle swept through its full range and activated the reverse mechanism at the end of its stroke. Make sure the control knob is pulled out to the ON position!
10. Replace the back cover over the reverse brackets.



11. Slide the washers onto the shaft – metal washer first, then fibre.



12. Slide the mounting bracket over the shaft and secure with the two screws to the wiper body on either end.



You are basically done. The different models have different nuts for attaching the wiper arm to the end of the shaft. The SF583-27 models do look different to the SF634-1 model I have above.

Again, you should be able to test your motor by sucking on the vacuum connection. I was able to test full operation this way. The vacuum produced by the engine is far stronger than this and should operate your wiper both faster and stronger.

I have read varied suggestions about what to use for maintenance lubrication, including brake fluid. I can't comment on the use of brake fluid, but I'm just wary of what this might or might not do to the paddle edges. I plan to continue using light machine oil as and when necessary to keep the paddle lubricated.

You might find that a good cleaning of the motor, replacement of torn gaskets, and lubrication are all that is required to return your motor to working order. If you don't have a rebuild kit and simply need to replace your gaskets, I have produced drawings for these for you to download, print and cut your own. They are located on the "How to" section of the forum.

Send me some feedback on whether you have been able to breathe new life into your old wiper. I originally battled to find rebuild info out there on these old motors which is why I decided to produce this guide, for what it's worth. I hope it will help get a few more of these old motors back into good working order!

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