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Checking the Bellows:

The one part of note because of its expense is the bellows also called the motor. It is the large round bowl shaped object on the back of the clock. The current replacement cost that I charge is \$600.00 (if needed). A refill of your old bellows costs \$200.00 and can be done about 80% of the time and keeps the clock 100% original.

Many on the Internet have advised people to place the entire clock in a freezer for a few minutes. Please don't ever do this because that exposure will leave either water vapors or droplets on everything and will eventually rust all the moving steel parts.

The bellows winds the mainspring. Before you test the clock make sure that the clock has power by letting the clock be exposed to some temperature fluctuations (5 degrees Fahrenheit or more) over the next few days. This will wind the mainspring if all is okay.

The bellows have an upper and lower temperature limits and these are 86 degrees F and 46.4 degrees F respectively. If the temperature is constantly outside these limits, the bellows will not wind the mainspring.

These temperature changes will cause the bellows to expand and contract therefore winding the mainspring. The bellows power is passed on to the mainspring via the brass chain that you see at the roughly center of the movement. When the bellows is good it contains sufficient gas (ethylene chloride I was told) to exert pressure on the chain (indirectly).

The following check MUST be done at 68 degrees Fahrenheit. The chain comes out of the bellows chamber (the large round bowl like piece) and makes a left turn (as you face the clock) around a pulley. It continues to travel around to a second pulley. This second pulley is the one which is actually attached to the mainspring arbor and the chain end makes a counter-clockwise wrap around this second pulley. The result should be that the chain end is now underneath the second pulley. If the chain end is resting on top of that second pulley then the bellows is flat (or you live in a freezer) and therefore needs replacing.

Anywhere in between the bottom position (roughly 6 O'clock) to the top position (roughly 12 O'clock), the bellows has lost some gas and it MAY have enough gas to continue the wind the mainspring. The closer the chain end is to the bottom position the better.

The best way to see if the bellows is good is to take the bellows chamber off the clock. The chamber is held in usually by two or four brass nuts. I use a 5/16 closed end wrench to remove these nuts and they are actually 8mm but either will work fine. A word of warning here because the above mentioned chain is attached to a fairly strong spring and that spring will push the bellows chamber away from the movement as you remove these nuts. On the caliber (model) # 540 the bellows chamber is removed by exerting a counter-clockwise (bayonet fitting) turning pressure with your hands and be sure to turn the inner part of the drum. In other words turn as close to the frame as possible.

Once the bellows chamber is removed you measure the depth from the top lip of the bellows chamber opening down to the top of the actual bellows. This will be obvious once you have the bellows chamber off the movement. Do NOT remove the bellows itself for this measurement.

At room temperature the depth should be between 22 to 26mm, if the depth is 26 to 32mm then the bellows is questionable but should still provide years of service. Anything over 32mm the bellows must be replaced because that means that there is no gas contained within the bellows.

The "real" check is how many winds on the mainspring. If the mainspring has 4 or more turns then the bellows are doing their job regardless of their depth.

For the caliber 540, the depth should be between 20 to 24mm, and 24 to 30 for a questionable bellows. Anything over 30mm should be replaced.

Again the check, for the 540, is at disassembly and the turns on the winding wheel or ratchet wheel (both turn at the same rate) and not the mainspring, in the case of the 540. The winding wheel should have at least 3 turns, which translates into 9 turns on the watch like mainspring inside the barrel.

As a final check to make sure the bellows is indeed okay, you can place the entire bellows chamber in the freezer for about three to five minutes. If the bellows is good it will collapse to almost flat

which would give you a measurement of about 40 to 44mm. Or you can place a piece of ice on top of the bellows and it should begin collapsing within about 15 seconds.

In either case above do NOT allow the bellows to be exposed to the cold any longer than five minutes because you can damage this very expensive piece.

Replacement:

The bellows or "motor" contains the following:

- 1) Motor knobs (either two or four nuts); Part # 3519.
- 2) Motor protection plate; Part # 3546.
- 3) Coil spring (70mm); Part # 3547
- 4) Metal (brass) drum; Part # 3580
- 5) Bellows; Part # 3581
- 6) Drum cover; Part # 3582

In order to replace the old bellows for a new one you first remove the entire "motor" or bellows chamber (see above). There are either two or four brass nuts which hold the motor to the back of the frame plate. I use a 5/16" closed end wrench to remove these nuts. A word of warning here because the above mentioned chain is attached to a fairly strong spring and that spring will "push" the bellows chamber away from the movement as you remove these nuts. On the caliber (model) # 540 the bellows chamber is removed by exerting a counter-clockwise (bayonet fitting) turning pressure with your hands and be sure to turn the "inner" part of the drum. In other words turn as close to the frame as possible.

To remove the old bellows you must make sure it is fully compressed. An old bellows with all of its gas leaked away will measure about 40 mm from the top of the metal drum to the top of the compressed bellows. Most usually have some gas (ethylene chloride) remaining. Therefore you must compress the bellows yourself. Some place the chamber into the refrigerator but I like to use ice cubes. Usually one ice cube is enough to fully compress the bellows in about a minute. Once it is compressed, push down on the drum cover (part # 3582) to loosen any bonds that may have formed on that cover and the coil spring (part # 3547).

On the caliber 540, once the bellows chamber is removed from the frame, the bellows casing has a bayonet fitting in which

both halves must be turned in opposite directions, with the back of the drum moving counter-clockwise. Use an ice cube to collapse the bellows when both removing and installing.

Once satisfied that the coil spring is "flexible" then push down on the drum cover and turn it in either direction until the four (4) tabs are fully exposed from under the four (4) tabs which are located on the metal drum. Caution should be used because of the tension in the coil spring. This tension will make the drum and the cover separate rapidly unless you supply the "containing" force so they do not spring apart quickly.

The rest should be common sense and you do exactly the opposite in order to place the new bellows inside the motor starting with the ice cube.

Suppliers of Atmos Parts

The following is a list of material and parts suppliers that carry Atmos parts.

Mike's Clock Clinic
1600 Maryland Ave.
Myrtle Point, OR 97458-1508
E-mail addresses: mike@atmos-man.com
Mike sells Atmos parts at the following Web address.
<http://www.atmosman.com/parts.html>

Manual Winding:

There are several ways to manually wind the Atmos. By far the best way is to remove the metal drum (part # 3580) which contains the bellows (part # 3581). Once it is removed you will see a coil spring (part # 3494) with a brass chain (part # 3491) running through the middle and attached to the end of the chain with a brass cap called the spring guide (part # 3493). This is all held together by a bent steel straight pin called the chain stopper (part # 3492).

In order to wind the mainspring properly you simply become the bellows. Push the coil spring in toward the movement until it will not compress any more. Then remove your hand and the coil spring will try to go back to its original position. This going back to the original position is the actually winding taking place.

By pushing in the coil spring, the clock "prepares" for the

eventually going back or winding. This is similar to a pocket watch where one direction actually winds the watch and the opposite direction allows you to go back to the previous position to wind it again.

The reason I like to use the above method is because the combination of the coil spring and the bridled mainspring does NOT allow for over winding. So once you have compressed the coil spring and it does not "recoil" back to the original position, the clock is fully wound.

A fully wound clock should run for about 14 months, with about 7 or 8 of those months having enough power to run accurately. After that the time keeping tends to deteriorate.

If the Atmos still does not run after manual winding, please be sure to tell the person you are going to hire to overhaul the clock. The reason is that a marginal bellows will probably not be replaced if the repair person counts a "healthy" wind on the mainspring.

If wound properly, either by the bellows or by hand (removing the bellows and pushing the coil spring), which was described above, then the amount of running time totally depends on the caliber.

All of these will vary by as much as 4 months but a caliber 540 will run anywhere from 10 months to 14 months. A caliber 528/526 will run anywhere from 14 to 16 months and a caliber 519 and the Atmos II will run anywhere from 15 months to 2 years.

All of this has to do with the quality and length of the mainspring. And of course the actual condition of the movement and frame will change these numbers.

Some choose to wind by turning the chain and spring pulley (part # 3486). That method is not controllable and you can wind it too little or too much.

Too little will not hurt anything but too much and then the clock can have too much power and the balance may overswing causing the clock to run fast because the roller will hit the fork on the opposite side and that will limit the "natural" swing. The general clock terms this is called overswing.

Another danger of winding this way is that the "stopping pin" that secures the chain to the "chain stopper", which is the cap of the coil spring, may become dislodged and the chain will eventually lose its tension and if the bellows still has some gas left, then there is no way it will wind the clock.

So please don't be lazy and try to wind by pushing the chain and spring pulley.

Refilling Atmos Bellows:

If you want the bellows refilled as a stand alone service, then the cost is \$310.00. That includes return shipping and you will have to remove the spent bellows and sent it to me and reinstall the refilled bellows.

If you do not have the old bellows, then I can supply a bellows usually manufactured within a year of your serial #. That adds \$50.00 to the \$310.00 mentioned above.

You can also order a "spent" bellows that will date within a year of your original bellows. For just an old bellows without refilling, the charge is \$60.00 including shipping.

You must be aware that there is a 20% failure on refilling used bellows. Therefore, I cannot guarantee that your bellows refill will be successful. I can, however, have one of my old stock bellows refilled in case of failure and that adds \$50.00 to the refilling charge.

If the procedure fails, then I'll return your original bellows at no charge, assuming that you sent just the bellows for refilling. If you sent the entire clock as part of an overhaul, then I will install new bellows at an extra cost of \$250.00.

I will NOT and do NOT sell "NEW" bellows to anyone and will only install new bellows as a part of a complete overhaul.

Soldered Bellows:

Many of the older Atmos' with a serial # below 50,000 have soldered bellows. This presents a whole new set of problems in order to replace worn out bellows because the bellows are actually soldered onto the bellows canister and plate.

I have a procedure for removing a "dead" bellows from the old soldered bellows cover found on the older Atmos' and it's located at "<ftp://atmosman.com/pdf/bellows2.pdf>"

If you would like for me to do the same procedure, which keeps the original bellows completely original, except the "dead" bellows, I charge \$1,400.00, which includes the new bellows. This price assumes it would be part of a complete overhaul. The actual original bellows is replaced with a new one.

The procedure is very time consuming. After I have the bellows cut and the retaining washer made, I first have to extract the old bellows. This involves cutting and separating the bellows. Since the bellows indicator and the original back plate are one unit, I have to painstakingly cut and remove all of the old bellows from both pieces.

This saves the original back plate and bellows indicator. The bellows indicator has the date of production on it. Then placing the retaining washer is a difficult procedure which can take hour.

The result is all the original parts are reused and the only change is the new bellows.

I do offer this procedure as a stand-alone service and the cost will be \$1,400. That includes return shipping (in the US) and you will have to remove the entire bellows (cover and motor included) and sent it to me and reinstall the completed bellows. The \$1,400.00 must be pre paid and the service can take as long as 3 months because of slowness in the ordering process for the new bellows.

A service from, E-mail address: Mike@atmos-man.com
Mike Murray Founder of Clocksmiths

A specialist in Atmos and 400-day clock repair.
Also, I overhaul most plug in electric clocks.
In continuous horological service since 04/01/1982.

Mike's Clock Clinic Membership: NAWCC

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My main Web site is located at "<http://www.atmosman.com/>"

Main FTP site is located at:

"<http://home.earthlink.net/~atmosman/earthftp.html>"

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