P217Q1

* **Wrenches**. Any mechanic needs a good set of combination **wrenches**, which can be purchased at the local hardware store. ...
* **Socket Set**. A good **socket set** can be a godsend when trying to reach hard-to-reach bolts. ...
* **Allen** and Torx Bits. ...
* Assortment of **Pliers**. ...
* **Screwdrivers**. ...
* Torque **Wrench**. ...
* Diagnostic Equipment. ...
* Specialty Tools.

[More items...](http://www.autos.com/auto-repair/engine-tools-tool-list-requirements-for-common-engine-repairs)

1.slot cleaning brush

2.enamel remover - if it's not available, knife or butane torch can be used.

3.hammer - to push the winding wires inside the slot and to shape the extended portion of the wires.

4.winding machine ( not mandatory, you can do it by yourself )

5. Multimeter to check continuity

6. Cutting pliers

7. Winding clips / tapes

8. Winding varnish

P217Q2

* 1. Maintain high insulation resistance at all time and measure the insulation resistance by megger regularly.
  2. Keep the bearings lubricated properly and change the bearings at the recommended intervals.
  3. Maintain a uniform air gap.
  4. Keep the motor clean and dry always. Protect it from moisture.

If these simple rules are followed, your motor will run indefinitely and never give you any trouble. For the motors, cleaning is the most important maintenance that can be done. Regular cleaning must be done both on the outside and the inside of the motor. The winding should be cleaned with chemical agents like electro-solve and dried. In case insulation readings are low, then the windings can be dried by heating with an electric heater or by supplying an small intensity current through the windings, then followed by varnishing the windings.

In case compressed air is used for blowing the dust away, make sure that it is dry and has been passed through the dehumidifier. However prudent engineers do not use compressed air as the pressure of the air forced the dust and the contaminants inside the windings. It is better to use a long handle dog leg brush for the cleaning. Alternatively a vacuum cleaned can be used.

The motors become dirty from the outside in industries and then the overzealous staff paint them bright before the inspections. However it must be remembered that each additional layer of paint is reducing the heat transfer of the motor casing and fins. Years of painting lead to the overheating and the failure of the insulation and eventual burning of the motor. In case you find that the motor have become dirty it is a better option to clean them with a heavy duty cleaner than re painting.

In case you find that a motor is very hot when all the other parameters including the current drawn are normal, then a simple procedure of removing all the old layers of paint by a scraper will bring immediate relief.

Contamination of the windings due to the grease escaping from the ball bearings also contaminates the windings. In the bearings where a bearing covers are not available sealed ZZ type of bearings should be used. In the sealed bearings optimum quantity of grease is put and the same grease melts, lubricates and again gels.

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[Tattoo Fails: Try Not To Laugh HardHorizonTimes](http://www.horizontimes.com/worldwide/tattoo-fails?utm_medium=outbrain&utm_source=outbrainjk&utm_campaign=ht-tattoo-fails-des-aus-0305&utm_term=$origpubname$&obOrigUrl=true" \t "_blank)

[[Gallery] Sam Elliott: "She Was The Love Of My Life"Herald Weekly](http://www.heraldweekly.com/the-unbelievable-life-story-of-sam-elliott/?utm_medium=outbrain&utm_source=248&utm_campaign=201807090838571x0_009dbeebf24de40a8b07e60a9273afc785&utm_term=$origpubname$_$origsrcname$_$section_id$&utm_content=%5BGallery%5D+Sam+Elliott%3A+%22She+Was+The+Love+Of+My+Life%22&obOrigUrl=true" \t "_blank)

[The Aussie hotel that's built to encourage no stressAustralian Traveller](https://www.australiantraveller.com/qld/tropical-north/port-douglas/the-aussie-hotel-designed-to-let-you-check-in-and-chill-out/?obOrigUrl=true" \t "_blank)

[Air China suspends direct Brisbane to Beijing serviceSkyNews.com.au](https://www.skynews.com.au/details/_5812403780001?utm_source=Outbrain&utm_medium=Discovery&utm_campaign=audience-mobile&utm_content=Air+China+suspends+direct+Brisbane+to+Beijing+service&utm_term=$section_name$&obOrigUrl=true" \t "_blank)

[Coles demerger will ‘clear up’ grocery marketSkyNews.com.au](https://www.skynews.com.au/details/_5812570600001?utm_source=Outbrain&utm_medium=Discovery&utm_campaign=audience-mobile&utm_content=Coles+demerger+will+%E2%80%98clear+up%E2%80%99+grocery+market&utm_term=$section_name$&obOrigUrl=true" \t "_blank)

[Recommended by](https://www.outbrain.com/what-is/default/en)

Some engineers remove the shielding of the ZZ type of bearings to put additional grease. This action does uncountable damage to the bearings as well as the windings. In case there is evidence that the winding has been subjected to the onslaught of grease and oils, the same should be washed with cleaning agents like electrosolve and electraclean, etc.

* slide 2 of 3

**Inspections**

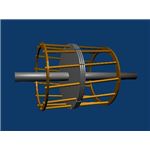
When a motor is opened up for overhaul it should be thoroughly inspected so that the faults can be diagnosed before the breakdown takes place.

The stator can be damaged if the rotor is not properly inserted as the clearances are low. It is damaged on numerous cases and the motor left to run and no body informed. Look at the stator windings for any damages, overheating, rubbing signs, etc.

The rubbing marks can be caused by a worn bearing or due to misalignment. In case the bearing is due for replacement or if you find some fault it should be replaced right away. The insertion of bearing must be by heating in an oil bath as it is very gentle to the bearings.

In case the bearings are due and you find that the motor is running properly, the condition of the bearing can be done by condition monitoring equipment like Shock Pulse Measurement. The other method is to monitor the temperature around the bearing area by infra-red remote thermometer.

When replacing the bearings the correct amount of grease must be used. If you use less then you can damage the bearing as it can run dry. In case excess grease has been put it will cause churning and friction which results in overheating.

In case the bearings are to be reused they should be cleaned by inserting and washing in solvents like kerosene. After the bearings are washed they must be dried by compressed air. However care should be taken to not let the bearing rotate on air jet as it can damage the battery.[[](https://img.bhs4.com/03/0/030d01caaa146d45f955ef5331bd427265107ffe_large.jpg)](https://img.bhs4.com/03/0/030d01caaa146d45f955ef5331bd427265107ffe_large.jpg)

* slide 3 of 3

**Flooding of Motors**

In coastal areas and marine applications it is often that the motors get flooded with water. If it is fresh water the danger is not so great as the salt quantity to cause conduction and shorting of the motor and subsequent burn out is less. But if the motor has been flooded by salt water then they can be brought back to life by the following process:

* 1. Wash the motor with distilled water to remove all the salt and the minerals.
  2. Any grease and oil deposits must be removed by a suitable electric grade solvent like electrosolve.
  3. Dry the stator windings with low power source or lamps.
  4. The repair must be done in an open space or with extractor fans to remove the water vapors.
  5. With the windings clean and dry re varnish the windings thoroughly.
  6. Dry the windings and check the insulation resistance.

Squirrel cage motors are very sturdy and hardly give trouble. They have to be monitored for performance and their maintenance done from time to time which is also simple. Few precautions as discussed above give them long life and ensure their trouble free operation.[[](https://img.bhs4.com/92/6/926371f5dc0b22d8c89fdcab8c6299e61c3d3c32_large.jpg)](https://img.bhs4.com/92/6/926371f5dc0b22d8c89fdcab8c6299e61c3d3c32_large.jpg)

[◄●●●►](https://www.brighthubengineering.com/consumer-appliances-electronics/67780-care-and-maintenance-of-electric-motors/)

P217Q3

# Steps for Disassembling and Reassembling Parts with Ease

**[[](http://www.dummies.com/store/product/Auto-Repair-For-Dummies-2nd-Edition.productCd-1118054725.html)](http://www.dummies.com/store/product/Auto-Repair-For-Dummies-2nd-Edition.productCd-1118054725.html" \t "_blank)**

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## [Auto Repair For Dummies, 2nd Edition](http://www.dummies.com/store/product/Auto-Repair-For-Dummies-2nd-Edition.productCd-1118054725.html" \t "_blank)

By [Deanna Sclar](https://www.dummies.com/?s=&a=deanna-sclar)

When you perform repairs, you need a procedure that helps you take things apart and get them back together. The procedure here works for repairs that require you to take something apart and put back together again — flat tires, toasters, bicycles, you name it.

Allow yourself plenty of time. If things get rough, have some water or a cup of coffee. You may get a whole new perspective when you go back to work. Limit distractions: Turn on your answering machine or take the phone off the hook, keep the kids and the dog away, and relax. If you hit a snag, sit quietly and think about it — don’t panic. If the parts fit together before, they’ll fit together again.

Follow these instructions, breathing slowly and deeply:

1. Lay a *clean,* lint-free rag down on a flat surface, near enough to reach without having to get up or walk to it.

You’ll lay each part on this rag as you remove it. Consequently, the rag shouldn’t be in an area where oil or dust or anything else can fall on it and foul up the parts. If you plan to use something that blasts air for cleaning purposes, leave enough of the rag uncluttered to fold it over the parts resting on it.

1. As you remove each part, note (on paper, so you won’t forget) where the part came from, how it was attached, and how tightly it was fastened or screwed down.

Most amateurs put things back very tightly, in hopes that the part won’t fly off. But some things, like bolts that hold gaskets in place, shouldn’t be tightened too securely because, for example, the bolt threads could be stripped or the gasket could be squeezed out of shape, allowing whatever it’s holding in to get out. It’s helpful to make notes about how hard each thing was to remove. “Don’t over-tighten” or “Be sure it’s secure.”

1. As you remove each part, lay it down on the rag in clockwise order, with each part pointing in the direction it was in before you removed it.

This is the key to the whole system. When you’re ready to reassemble things, the placement and direction of each part tells you when to put it back and how it was oriented.

1. If you’re making notes, assign each part a number indicating the order in which you removed it — Part #1, Part #2, and so on.

You can even put numbers on the parts with masking tape if you’re afraid that the rag may be moved accidentally. Also, note what each part was attached to; for example, “Part #6: Hook at end of arm on left hooks onto knob to right of Part #7.” Add a sketch if it helps.

If you work systematically and understand the function of each part, you won’t be left with what seem to be extra nuts and bolts at the end of the job.

1. When you’re ready to reassemble everything, begin with the last part you removed, and proceed counterclockwise through the parts on the rag.

If you’ve numbered the parts, they should go on in reverse order.

P217Q4

What is axial clearance?

Bearing internal **clearance** (fig. 1) is defined as the total distance through which one bearing ring can be moved relative to the other in the radial direction (radial internal **clearance**) or in the **axial** direction (**axial** internal **clearance**).

[Selecting internal clearance or preload - SKF.com](http://www.skf.com/us/products/bearings-units-housings/principles/bearing-selection-process/bearing-execution/internal-clearance-preload/index.html)

*www.skf.com/us/products/bearings-units-housings/principles/bearing.../index.html*

Search for: [What is axial clearance?](https://www.google.com/search?q=What+is+axial+clearance%3F&sa=X&ved=2ahUKEwjW7KTNt7ncAhXKlZQKHdMnCRMQzmd6BAgKEAk)

What is meant by axial play?

**Axial play**, or end **play**, is the maximum relative displacement, in a direction parallel to the bearing axis, between the two rings of an unmounted ball bearing. Since radial **play** and **axial play** are both consequences of the same degree of looseness between the components, they bear a mutual dependence.

[Miniature Bearings Radial & Axial Play - National Precision](https://www.nationalprecision.com/miniature-bearings/technical-data/radial_and_axial_play.php)

*https://www.nationalprecision.com/miniature-bearings/.../radial\_and\_axial\_play.php*

Search for: [What is meant by axial play?](https://www.google.com/search?q=What+is+meant+by+axial+play%3F&sa=X&ved=2ahUKEwjW7KTNt7ncAhXKlZQKHdMnCRMQzmd6BAgKEBE)

What is meant by end float?

**End float** is the amount by which a shaft can move lengthwise. The lubricated grooves allow the hubs to shift if shafts are misaligned or subject to **end float**.

[End float definition and meaning | Collins English Dictionary](https://www.collinsdictionary.com/dictionary/english/end-float)

*https://www.collinsdictionary.com/dictionary/english/end-float*

Search for: [What is meant by end float?](https://www.google.com/search?q=What+is+meant+by+end+float%3F&sa=X&ved=2ahUKEwjW7KTNt7ncAhXKlZQKHdMnCRMQzmd6BAgKEBk)

What is end float on a shaft?

**End play** is the total distance the **shaft** can move between the two thrust bearings and is sometimes called **float**, thrust bearing clearance or axial clearance.

[End Play (Axial Clearance) on a Thrust Bearing: Kingsbury](https://www.kingsbury.com/end-play-blog)

*https://www.kingsbury.com/end-play-blog*

Search for: [What is end float on a shaft?](https://www.google.com/search?q=What+is+end+float+on+a+shaft%3F&sa=X&ved=2ahUKEwjW7KTNt7ncAhXKlZQKHdMnCRMQzmd6BAgKECE)

What is axial end play?

Definition of **Axial Play** in a Ball Bearing. **Axial**, or **end play**, is the maximum relative **axial** movement of the inner ring with respect to the outer ring. The **end play** is directly related to the radial **play** of the ball bearing.

[Radial Play - Bearing Internal Clearance | AST Bearings](https://www.astbearings.com/ball-bearings-radial-play.html)

*https://www.astbearings.com/ball-bearings-radial-play.html*

Search for: [What is axial end play?](https://www.google.com/search?q=What+is+axial+end+play%3F&sa=X&ved=2ahUKEwiP1czft7ncAhVBKpQKHa21D8kQzmd6BAgBEAc)

What does c3 Clearance mean?

posted 09-09-2000 01:42 PM **C3** bearings have a greater than normal internal **clearance** but normal is hard to define. A C4 bearing is used for higher temperatures and has a greater **clearance** than **C3**.Sep 4, 2000

[C3 Clearance bearings vs Normal clearance - Reliability Magazine ...](http://www.vtab.se/PHP-NBoard/html/images/materiali/Forum2/HTML/000398.html)

*www.vtab.se/PHP-NBoard/html/images/materiali/Forum2/HTML/000398.html*

Search for: [What does c3 Clearance mean?](https://www.google.com/search?q=What+does+c3+Clearance+mean%3F&sa=X&ved=2ahUKEwiP1czft7ncAhVBKpQKHa21D8kQzmd6BAgBEBA)

What controls crankshaft end play?

The best way to check endplay is with a **dial indicator** installed with its plunger parallel to the crankshaft axis. On a newly assembled engine, before tightening down the main cap for the thrust bearing, first seat the bearing by smacking the crank snout and flywheel flange with a soft-headed mallet.Jun 4, 2013

[How Much Crankshaft Endplay Is Normal? - Hot Rod Network](http://www.hotrod.com/articles/how-much-crankshaft-endplay-is-normal/)

*www.hotrod.com/articles/how-much-crankshaft-endplay-is-normal/*

Search for: [What controls crankshaft end play?](https://www.google.com/search?q=What+controls+crankshaft+end+play%3F&sa=X&ved=2ahUKEwj-suXgt7ncAhUHX5QKHRA-CPgQzmd6BAgBEAg)

What is end play in motor?

**End play** in an electric **motor** is the amount of axial movement allowed by the **motor's** construction. This **end play** is limited by the **motor's** bearing design. The bearing's primary purpose is to locate the shaft radially so it can be aligned to the driven equipment shaft and efficiently transmit torque to the load.

[Understanding end play and its impact on axial alignment | EASA](https://www.easa.com/resources/article/understanding-end-play-and-its-impact-axial-alignment)

*https://www.easa.com/resources/.../understanding-end-play-and-its-impact-axial-alignme...*

Search for: [What is end play in motor?](https://www.google.com/search?q=What+is+end+play+in+motor%3F&sa=X&ved=2ahUKEwj-suXgt7ncAhUHX5QKHRA-CPgQzmd6BAgBEBA)

What is meant by bearing preload?

**Bearing Preload** is an axial or thrust load applied to a **bearing** that removes excess play. There are many ways to apply **preload**, as well as many benefits and potential problems with **preload**. This article will provide an overview of **bearing preloading** in common radial and angular contact ball **bearing** applications.

[Bearing Preload - National Precision Bearing](https://www.nationalprecision.com/library/articles/bearing-preload.php)

*https://www.nationalprecision.com/library/articles/bearing-preload.php*

Search for: [What is meant by bearing preload?](https://www.google.com/search?q=What+is+meant+by+bearing+preload%3F&sa=X&ved=2ahUKEwjYsqrht7ncAhVBjZQKHQ8ABoIQzmd6BAgBEAc)

What is bearing radial clearance?

**Radial clearance** is the play between the ball and raceway perpendicular to the **bearing** axis. Axial **clearance** is the play parallel to the **bearing** axis and is typically at least 10 times greater than the **radial clearance**. Generally, internal **radial clearance** will be reduced 80% of the interference fit amount.

[Radial Internal Clearance - Bearing Works](https://www.bearingworks.com/technical-data/internal-clearance.php)

*https://www.bearingworks.com/technical-data/internal-clearance.php*

Search for: [What is bearing radial clearance?](https://www.google.com/search?q=What+is+bearing+radial+clearance%3F&sa=X&ved=2ahUKEwjYsqrht7ncAhVBjZQKHQ8ABoIQzmd6BAgBEA8)

What is internal clearance in bearing?

Selecting **internal clearance** or preload. **Bearing internal clearance** (fig. 1) is defined as the total distance through which one **bearing** ring can be moved relative to the other in the **radial** direction (**radial internal clearance**) or in the axial direction (axial **internal clearance**).

