

# CANNONDALE® SYSTEM INTEGRATION™ CRANK OWNER'S MANUAL SUPPLEMENT

Congratulations and thanks for your purchase of a Cannondale bicycle featuring the System Integration (SI) crank and bottom bracket. You have invested in a frame which uses an integrated bottom bracket shell, bearings, bottom bracket spindle, and crank set that is considerably lighter and stiffer than a conventional bottom bracket and crank combination.

This supplement contains important and useful information regarding the proper operation, care, and maintenance of your SI crank system. Please read it carefully and follow its instructions for miles of safe, high performance riding. If you have any questions about your fork or the contents of this manual, don't hesitate to contact us. See the back page for phone numbers and E-mail contacts.

**WARNING: The drivetrain systems are very important to the safety of any bicycle and Cannondale strongly recommends that any work be performed by an authorized Cannondale dealer. The following instructions are provided for persons who have a good knowledge of bicycle specific mechanical procedures and who are equipped with the proper tools and equipment. Incorrect installation or service may reduce bicycle performance, and could lead to injury or death. If you have any doubts about your ability to perform the following procedures, contact your local authorized Cannondale dealer.**

## **REQUIRED TOOLS:**

Metric hex wrench set

Good quality bicycle bearing grease

Headset cup press, such as Park HHP-1

Cannondale SI bottom bracket bearing installation tools (supplied with bike)

Cannondale SI crank arm extraction tools (supplied with bike)

15mm open-ended wrench

Punch or drift tool

Torque wrench

## **PREPARATION OF THE FRAME**

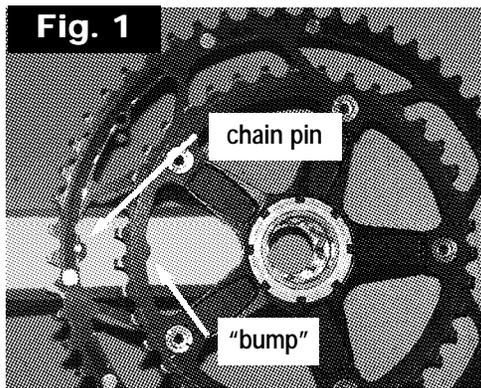
***CAUTION: Do not ream, mill, or "face" the frame's bottom bracket shell! You will damage the frame and possibly render it unusable for the SI crank!***

Cannondale has prepared the frame at our factory during its manufacture. There is no need to ream, mill, or "face" the bottom bracket shell because it has been properly machined to exact tolerances to accommodate the SI bearings and bottom bracket.

## **CHAINRING INSTALLATION**

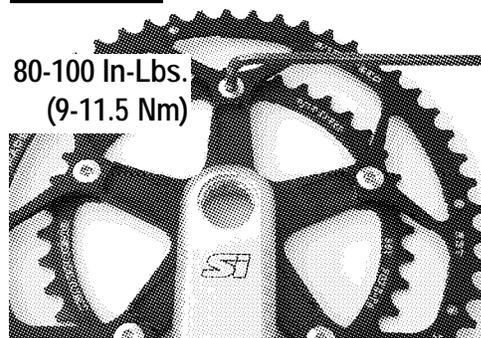
The chainrings must be installed with the correct orientation to provide the best possible shifting. Each ring has a counter-sunk bolt hole for the five chainring bolts, and the counter-sunk side of each must face away from the five tabs on the spider to which the rings are bolted. This will allow the chainring bolts and nuts to sit into the recesses on each ring.

1. The large chainring has a pin on the outside that needs to be aligned with the right crank arm to prevent a derailed chain from



jamming between the crank arm and the large chainring. Also, the middle chainring has a "bump" which also needs to be aligned with the right crank arm to provide the best possible shifting. See Fig. 1.

**Fig. 2**



2. Once you are certain of the proper alignment of the chainrings, grease the threads of the chainring bolts. Install each of the chainring bolts through the outer chainring, the crank spider, and through the inner ring. Thread the bolts into the chainring nuts and tighten each to **80-100 In-Lbs (9-11.5 Nm)**. See Fig. 2.

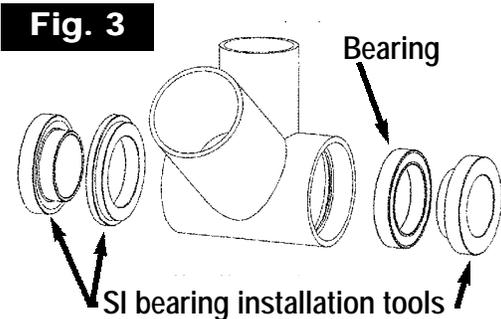
2. Once you are certain of the proper alignment of the chainrings, grease the threads of the chainring bolts. Install each of the

## BOTTOM BRACKET INSTALLATION

Lightly grease and install one circlip into the groove in each side of the bottom bracket shell. Start by fitting the square end of the circlip into the groove in the bottom bracket shell. Start at the top (12 o'clock) position, then curl the rest of the circlip into the groove. Then grease the inside of each end of the bottom bracket shell, where the bearings will sit.

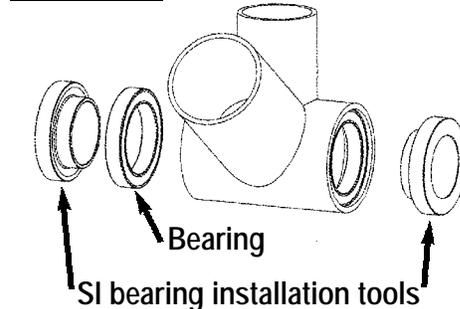
**CAUTION: The end of the circlips may be sharp and could cut your fingers while applying grease if care is not used!**

1. Using a headset cup press with its 1 inch adapters and the SI bearing installation tools, install the left (non-drive side) bearing. See Fig. 3.



**Important!** Only one bearing may be installed at a time!

**Fig. 4**

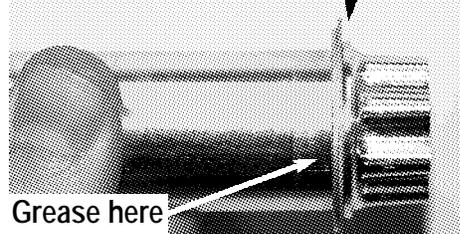


2. Repeat the above step to install the right (drive side) bearing. See Fig. 4.

3. Apply a light coat of good quality bicycle grease to the outside faces and inside race surfaces of the bearings, to provide corrosion protection. See Fig. 5.



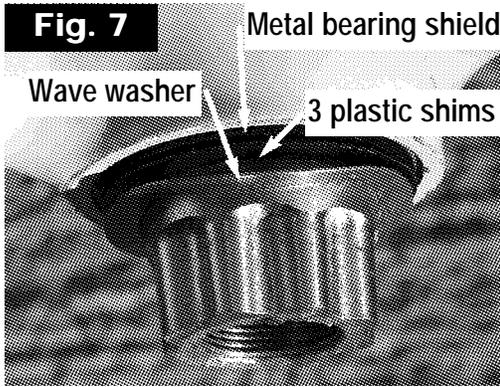
**Fig. 6**



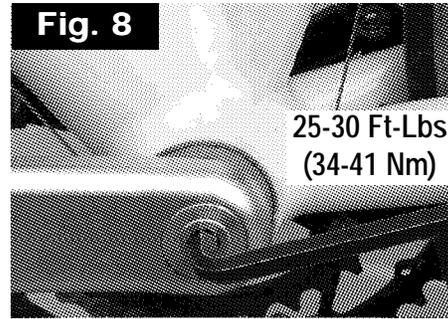
4. Place one metal bearing shield on the axle up to the shoulder with the flat side of the bearing shield facing outward. Then apply grease to the bearing seat on the bottom bracket spindle. See Fig. 6. Carefully align the bottom bracket spindle and insert it through the bearings from the left (non-drive) side.

## CRANK ARM INSTALLATION

1. Place the metal bearing shield on the right (drive) side of the bottom bracket spindle with the



flat side facing out. Then install three 0.5mm plastic shims and the lightly greased wave washer onto the drive side of the spindle. See Fig. 7.



2. Grease the splines on the spindle and install the right (drive side) crank arm onto the spindle. Then grease the threads of

the crank arm bolt, the underside of the bolt head, and the steel washer that goes under the head of the bolt. Install the crank bolt through the steel washer and into the spindle. Using an 8mm hex wrench, torque the bolt to 25-30 Ft-Lbs (34-41 Nm). See Fig. 8.

3. With the crank arm tightened to the correct torque, measure the distance that the wave washer has left to compress by seeing how many plastic 0.5mm shims will fit between the wave washer and the right crank arm.

4. If additional shims can be fit between the crank arm and the wave washer, remove the right crank arm following the instructions in the **CRANK ARM REMOVAL** section below. Then add the shims and reinstall the right crank arm according to the instructions above.

5. Check that the wave washer is nearly but not completely compressed. You should be able to see the waves of the wave washer when you rotate the cranks. This means that the bearings are preloaded by the wave washer alone without being overloaded by the force of the crank bolt. It is better to use too few shims than too many shims.

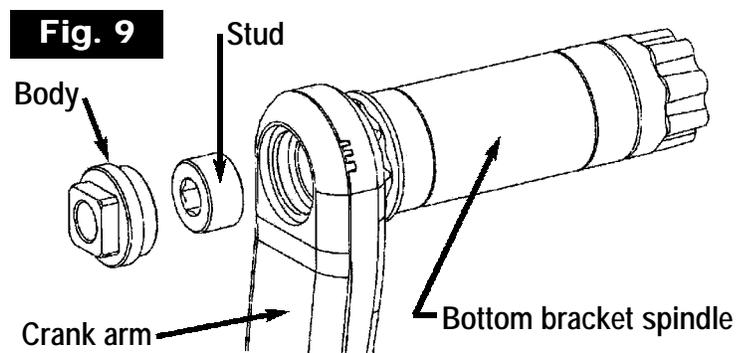
6. Grease the left (non-drive) side bottom bracket splines, install the left crank opposed 180 degrees (opposite) the right arm, and grease the bolt threads, the underside of the bolt head, and the steel washer.

7. Install the crank bolt through the steel washer and into the spindle. Torque the bolt to 25-30 Ft-Lbs (34-41 Nm). See Fig. 8.

## CRANK ARM REMOVAL

1. Loosen and remove the crank arm bolt using an 8mm hex wrench. Take care not to lose the steel washer that goes under the bolt head.

2. Thread the stud of the crank arm removal tools through the crank arm and into the bottom bracket spindle until it is flush with the face of the spindle. Then thread the body of the crank arm removal tools into the crank arm and tighten with a 15mm wrench. See Fig. 9.

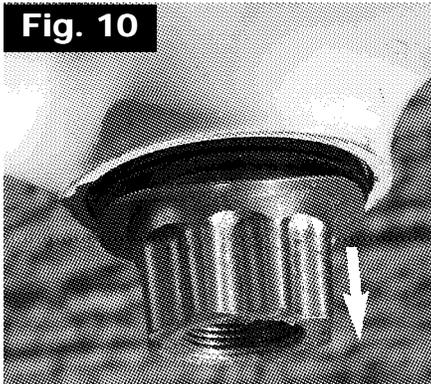


3. Insert the 8mm hex wrench through the hole in the tool body and into the stud and then turn the stud counter-clockwise. This will pull the crank arm off of the bottom bracket spindle.

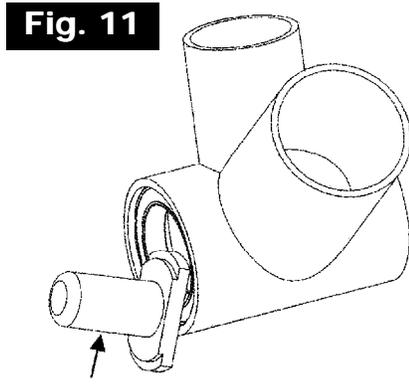
4. Repeat the above process for the other crank arm if necessary.

## BEARING REMOVAL AND REPLACEMENT

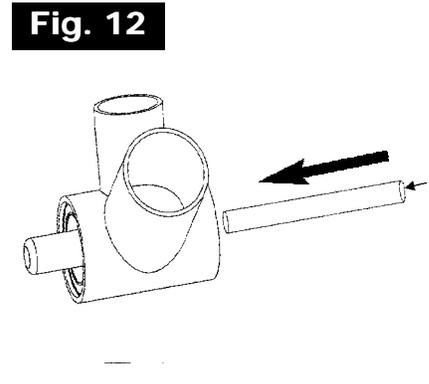
1. Remove only the right (drive side) crank arm. It is not necessary to remove the left (non-drive side) crank arm to remove or replace the bottom bracket bearings.



2. Remove the wave washer, the plastic shims, and the metal bearing shield from the drive side of the bottom bracket spindle. See **Fig. 10**. Then push the bottom bracket spindle out of the frame from the right (drive) side.



3. The bearings can now be removed using the supplied bearing removal tool. Insert the flange of the tool through one bearing while holding the cylindrical end. See **Fig. 11**.



4. Insert a punch or drift from the opposite side of the bottom bracket shell, and use a hammer to tap the bearing out. See **Fig. 12**. Repeat for the other bearing.

The two circlips in the bottom bracket shell can be left in place. Should they need to be removed, use a flat blade screwdriver and starting at the hooked end, lift the circlip out of the internal groove in the bottom bracket shell.

**Please note** that this manual is meant to supplement, not replace, your bicycle owner's manual. The bicycle owner's manual contains valuable information regarding safe operation, adjustment, and maintenance of your bicycle, as well as more complete warranty information. Please read the bicycle owner's manual thoroughly before riding your bicycle, and keep it and this booklet for future reference.

For warranty related questions or for more information about this or any Cannondale product, please feel free to contact us.

USA and Canada: (800) BIKE-USA  
Europe (EC): (31) 541-573580  
Japan: (81) 722-99-9399  
Australia: (61) 2-9979-5851

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### APPENDIX: List of service tools and SI crank replacement parts kits:

KT013/ SI crank arm extractor tools  
KT012/ SI crank spider lockring tool  
KT011/ SI bottom bracket bearing removal tool  
KT010/ SI bottom bracket bearing installation tools  
QC604/ Alloy chainring bolts and nuts, pack of 5  
QC612/ SI bottom bracket spindle  
QC618/ SI bottom bracket wave washer  
KB6180/ SI bottom bracket bearings, pack of 2

QC614/ SI crank arm bolts, pack of 2  
QC616/ SI bottom bracket shell circlips, pack of 2  
QC615/ SI bearing shields, pack of 2  
QC617/ SI 0.5mm plastic shims, pack of 5

