

Instruction 51-1207  
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## S&S 106" Stroker Hot Set Up Kit® For Victory® Freedom® Engines

**VICTORY WARRANTY POLICY:** The S&S Hot Setup Kit is intended for competition use only. Purchase and installation of an S&S Hot Setup Kit voids portions of the Victory Standard Limited Warranty. Dealers must call Victory for prior authorization before initiating any warranty repair.

**REGULATORY NOTIFICATION:** Not legal for sale or use on non-competition pollution controlled vehicles in the U.S. and California. Tampering with emission-related parts can lead to substantial regulatory penalties. Non-competition street use may violate federal noise limits.

### DISCLAIMER:

S&S parts are designed for high performance, off road, racing applications and are intended for the very experienced rider only. The installation of S&S parts may void or adversely effect your factory warranty. In addition such installation and use may violate certain federal, state, and local laws, rules and ordinances as well as other laws when used on motor vehicles used on public highways, especially in states where pollution laws may apply. Always check federal, state, and local laws before modifying your motorcycle. It is the sole and exclusive responsibility of the user to determine the suitability of the product for his or her use, and the user shall assume all legal, personal injury risk and liability and all other obligations, duties, and risks associated therewith.

The words Victory®, Victory Freedom®, and all Victory part numbers and model designations are used for reference only.

### SAFE INSTALLATION AND OPERATION RULES:

Before installing your new S&S part it is your responsibility to read and follow the installation and maintenance procedures in these instructions and follow the basic rules below for your personal safety.

- Gasoline is extremely flammable and explosive under certain conditions and toxic when inhaled. Do not smoke. Perform installation in a well ventilated area away from open flames or sparks.
- If motorcycle has been running, wait until engine and exhaust pipes have cooled down to avoid getting burned before performing any installation steps.
- Before performing any installation steps disconnect battery to eliminate potential sparks and inadvertent engagement of starter while working on electrical components.
- Read instructions thoroughly and carefully so all procedures are completely understood before performing any installation steps. Contact S&S with any questions you may have if any steps are unclear or any abnormalities occur during installation or operation of motorcycle with a S&S part on it.
- Consult an appropriate authorized Victory service manual for correct disassembly and reassembly procedures for any parts that need to be removed to facilitate installation.
- Use good judgement when performing installation and operating motorcycle. Good judgement begins with a clear head. Don't let alcohol, drugs or fatigue impair your judgement. Start installation when you are fresh.
- Be sure all federal, state and local laws are obeyed with the installation.
- For optimum performance and safety and to minimize potential damage to carb or other components, use all mounting hardware that is provided and follow all installation instructions.
- Motorcycle exhaust fumes are toxic and poisonous and must not be inhaled. Run motorcycle in a well ventilated area where fumes can dissipate.

### IMPORTANT NOTICE:

Statements in this instruction sheet preceded by the following words are of special significance.



**WARNING**

Means there is the possibility of injury to yourself or others.



**CAUTION**

Means there is the possibility of damage to the part or motorcycle.

### NOTE

*Other information of particular importance has been placed in italic type.*

**S&S recommends you take special notice of these items.**

### WARRANTY:

All S&S parts are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of twelve (12) months from the date of purchase. Merchandise that fails to conform to these conditions will be repaired or replaced at S&S's option if the parts are returned to us by the purchaser within the 12 month warranty period or within 10 days thereafter.

In the event warranty service is required, the original purchaser must call or write S&S immediately with the problem. Some problems can be rectified by a telephone call and need no further course of action.

A part that is suspect of being defective must not be replaced by a Dealer without prior authorization from S&S. If it is deemed necessary for S&S to make an evaluation to determine whether the part was defective, a return authorization number must be obtained from S&S. The parts must be packaged properly so as to not cause further damage and be returned prepaid to S&S with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem, how the part was used and the circumstances at the time of failure. If after an evaluation has been made by S&S and the part was found to be defective, repair, replacement or refund will be granted.

### ADDITIONAL WARRANTY PROVISIONS:

- (1) S&S shall have no obligation in the event an S&S part is modified by any other person or organization.
- (2) S&S shall have no obligation if an S&S part becomes defective in whole or in part as a result of improper installation, improper maintenance, improper use, abnormal operation, or any other misuse or mistreatment of the S&S part.
- (3) S&S shall not be liable for any consequential or incidental damages resulting from the failure of an S&S part, the breach of any warranties, the failure to deliver, delay in delivery, delivery in non-conforming condition, or for any other breach of contract or duty between S&S and a customer.
- (4) These S&S parts are designed exclusively for use in Victory motorcycles. S&S shall have no warranty or liability obligation if an S&S part is used in any other application.

# S&S® STROKER HOT SET UP KIT® INFORMATION

2003-2005 Models except Hammer® and Touring Cruiser Roller cam chain sprocket.....	45-0901
2005 Hammer and All 2006-2007 Models except Touring Cruiser Silent cam chain sprocket .....	45-0903

## 106" STROKER ENGINE SPECIFICATIONS

Displacement .....	1731cc (105.6")
Bore .....	101mm (3.976")
Stroke .....	108mm (4.252")
Compression Ratio .....	10.2:1
Fuel System .....	Stock Victory® EFI loaded with S&S calibration file, using S&S Freedom® Performance Tuner

## KIT CONTENTS

- S&S stroker crankshaft
- S&S connecting rods and lower rod bearings
- Rear piston clearance template
- S&S .495" lift high performance cams
- S&S high lift valve spring kit, complete with top collars and valve keepers
- Authorization code for S&S calibration file for Victory fuel injection system

## REPLACEMENT PARTS FOR 106" HOT SET UP KIT

Stroker Crankshaft, 54mm – Roller Chain Sprocket .....	45-0121
Stroker Crankshaft, 54mm – Silent Chain Sprocket.....	45-0120
Connecting Rod Assembly, 175.5mm .....	45-0101
Camshaft Set Victory (.495" Lift).....	49-0100
Valve Spring Kit, Victory (.495" Lift).....	49-0115

## FUEL INJECTION CALIBRATION FILE

Calibrations are listed on the S&S website. The Victory technician should go to the S&S website to see what calibrations are available. The S&S website will be updated with new calibrations when they come available. Go to [www.sscycle.com](http://www.sscycle.com) and then to the Techincal tab and click on Victory Calibrations.

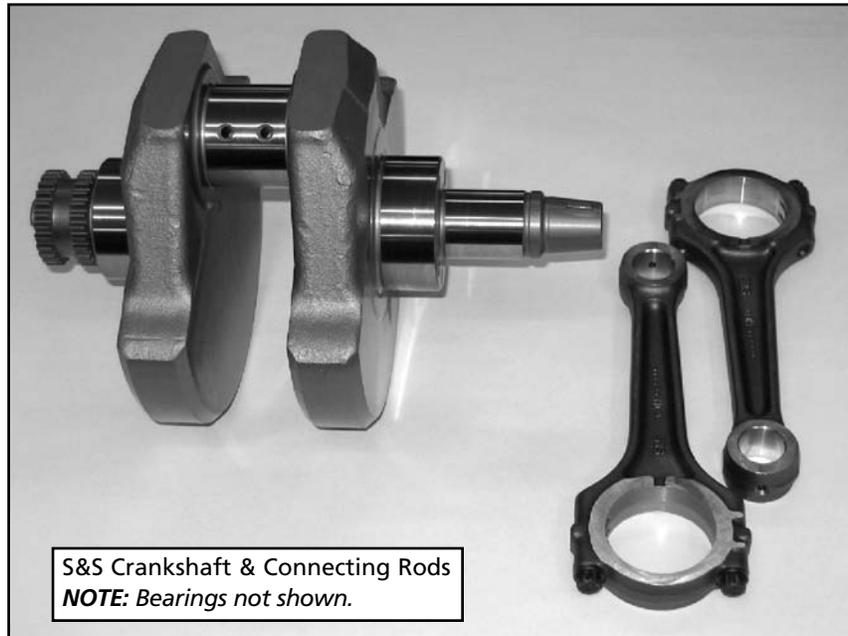
Reprogramming the Engine Control Module (ECM) must be done by an authorized S&S/Victory dealer using S&S Freedom Performance tuner which is available to authorized S&S/Victory dealers only. The S&S Freedom Performance Tuner comes complete with instructions for ECM reprogramming.

This kit is intended for installation in 2003-2007 chassis models including: Vegas®, Kingpin®, Hammer®, Eightball®, Jackpot®.

It is extremely important to carefully read and follow all of the instruction sheets included in this kit. You will also need a Victory Service Manual for the year and model of the bike you will be performing the work on. You will be instructed to perform some of the work per your Victory Service Manual.

The S&S Hot Set Up Kit is designed for 2003 to 2007 Victory Motorcycles (except Touring Cruiser). Installation of the 106" stroker Hot Set Up Kit in a 92" engine requires that a STG II 100" Big Bore Kit be installed. Installation of the heavier clutch spring included in the STG II Kit is required when upgrading from the 92" to the 106" stroker kit. The stock 100" engine 2005 Hammer, 2006-2007 All (except Touring Cruiser) clutch spring is adequate to handle the additional power of the 106" stroker kit.





Picture 1

## CRANKSHAFT & RODS

### WARNING

Be sure to disconnect the battery of your motorcycle before starting on this procedure. Accidental starting of the motorcycle could cause injury to you or others around you during the installation.

- 1- Follow the **Transmission & Crankshaft** section of your Victory motorcycle service manual for disassembling your Victory engine.
- 2- Your new S&S crankshaft and connecting rods will require assembly. S&S connecting rods are machined to use the Orange Victory® rod bearings that are included in the kit (Bearing P/N 3514390-159). Perform rod bearing clearance inspection as follows:
  - A- Wash or clean all of the following components: crankshaft crankpin, rods and rod bores, bearing inserts.
  - B- Place a strip of Plastigauge® across the width of the crankpin.
 

*NOTE: Green Plastigauge (.001-.003") is commonly used for this procedure, it can be purchased at the local automotive parts store. Do not place Plastigauge across oil holes. Be careful not to allow the rods to move during the rest of the inspection procedure.*
  - C- Mark the rod and cap at the separation line with a Sharpie®, Dykem®, or permanent marker to prevent rod caps from getting swapped from their original rod during the inspection and assembly process. **See Picture 2.**



Picture 2

- D- Install connecting rods and bearing caps in the same order they were received.
- E- Torque rod bolts to 5 ft-lbs to seat caps. Then final torque bolts to 40 ft-lbs.
- F- Remove bearing caps carefully to prevent disturbing the Plastigauge®.
- G- Measure the widest part of the crushed Plastigauge to determine the rod bearing clearance. Do so by using the bands provided on the Plastigauge label. See **Picture 3**.



**Picture 3**

- H- Specification for oil clearance is: .00091"-.00279"
  - If the resultant clearance is less than this specification, the bearings will need to be replaced with the thinner black color coded bearings, not available through S&S (Victory® P/N 3514390-067).
  - If the resultant clearance is greater than the specification, the bearings will need to be replaced with the thicker blue color coded bearings, not available through S&S (Victory P/N 3514390-027).
  - If clearance is not within specification, clean old Plastigauge off components and reassemble rods to crankpin with a new strip of Plastigauge and the thinner or thicker bearings as determined above.

**NOTE:** S&S rods are not sorted into highlow groups. They are machined to a tighter bore tolerance of 2.00175" - 2.00205". This tighter tolerance yields .00091"-.00279" when used with the supplied orange bearing and the supplied highlow group crankshaft with journal OD measuring 1.888" - 1.8891".

- 3- Once connecting rod bearing clearance has been determined within specification, remove all traces of Plastigauge from bearing and crankshaft with lacquer thinner and a clean rag.
- 4- Install bearing inserts into rods and caps. Place bearing tab in groove then press the rest of the bearing into place.
- 5- Assemble connecting rods to crankshaft using moly assembly paste (Victory P/N 2871460) on the crankpin and bearing inserts.

**NOTE:** Assemble rods with the "OUT" facing left for the left connecting rod and facing right for the right connecting rod. The left connecting rod is the rear cylinder rod and the right connecting rod is the front cylinder connecting rod. Be sure to keep the rod caps organized with the appropriate rod using the marks that were generated in step 2C on page 3.

- 6- Torque rod bolts to 5 ft-lbs to seat caps. Then final torque bolts to 40 ft-lbs.
- 7- Check that rods rotate freely on crankpin journal.
- 8- Check rod side clearance to .0087"-.0165" specification with a feeler gauge. This can be done with crankshaft assembly on the bench. If rod sideplay is out of specification, call S&S technical service. See **Picture 5**.



**Picture 5**

- 9- Before the crankshaft and transmission are final installed it is recommended that you perform the rear piston clearance as instructed below.

## REAR PISTON CLEARANCE

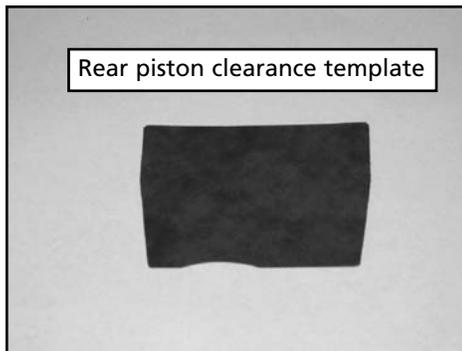
- 1- The rear piston must have a clearance cut in the bottom of its' front skirt to ensure that the front and rear pistons do not contact at Bottom Dead Center (BDC). Using the S&S® supplied template for piston clearance cut, hold the template on the front skirt of the rear piston as shown in **Picture 7**, and scribe a line on the piston skirt. Dykem® can be used on the piston to increase visibility of the scribed line. Once the piston is marked, it can be cleared by holding a die grinder at a 25 degree angle to the piston skirt face. Piston clearance should look like the piston that is shown in **Picture 8**.

### ⚠ CAUTION

Failure to clearance rear piston skirt will result in piston to piston contact. Small metal chips and pieces can damage machined surfaces and block passageways. Be sure to thoroughly clean all metal chips and pieces to prevent premature failure.

### ⚠ WARNING

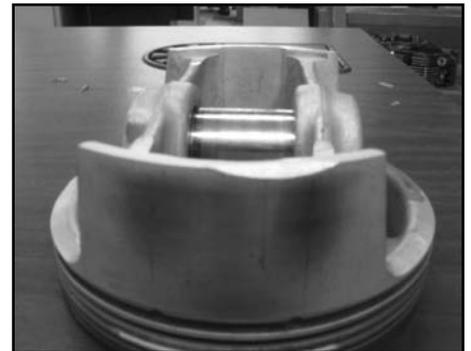
Always wear eye protection while grinding and cleaning the components.



Picture 6



Picture 7



Picture 8

- 2- After rear piston is cut and cleaned it is highly recommended to assemble the crank, connecting rods, pistons, base gaskets and cylinders into the primary side of the engine case and snug cylinders down using the two studs on the primary side of the case. Now roll the engine to BDC or where the front and rear piston are closest together. Use a feeler gauge to measure the clearance between the front and rear piston skirts as shown in **Picture 9**. You should have a minimum of .065" clearance between the two piston skirts.



Picture 9

## ASSEMBLE CRANKCASE

Once you have completed the assembly of S&S crankshaft and connecting rods, and performed the rear piston clearance section of these instructions you can now refer to the Transmission & Crankshaft and Cylinder & Piston section of your Victory motorcycle service manual for final assembly of the crankcase, pistons, and cylinders. Do not install the heads until the S&S valve springs have been properly installed.

## VALVE SPRING INSTALLATION

S&S® valve spring and collar kit allows cam lifts up to .495". This kit is designed for use with stock length 7 mm diameter valves and accepts stock style valve guides and valve guide seals. Installation of the 49-0115 spring kit does not usually require modification for OEM heads. Kit 49-0115 spring pressures are as follows at 1.550" Installed Height: Closed valve - 75 lbf; .495" lift - 175 lbf.

### ⚠ CAUTION

Mixing of valves, springs or collars between Stock Victory® and S&S high-lift kit can cause extensive engine damage not covered under warranty.

- 1- If cylinder heads/valves are to be reconditioned, proceed at this time according to standard procedure. Refer to Victory service manual as necessary.
- 2- Using following procedure, determine installed spring height and clearance between top collar and valve guide seal.
  - A- Lubricate valve stem and install valve in guide.
  - B- Install stock bottom collar w/integral valve seal, S&S top collar, and S&S valve keepers. Pull top collar tightly against keepers to seat keepers in collar.
  - C- While holding valve firmly against seat in closed position, measure installed spring height (distance between lower valve spring seating surface and outside step of top collar). See Figure A, Dimension A. Record measurement.
  - D- Measure distance between top collar keepers and top of valve seal (if applicable). See Figure A, Dimension B. Distance must be at least .030" greater than valve lift of cam to be used.

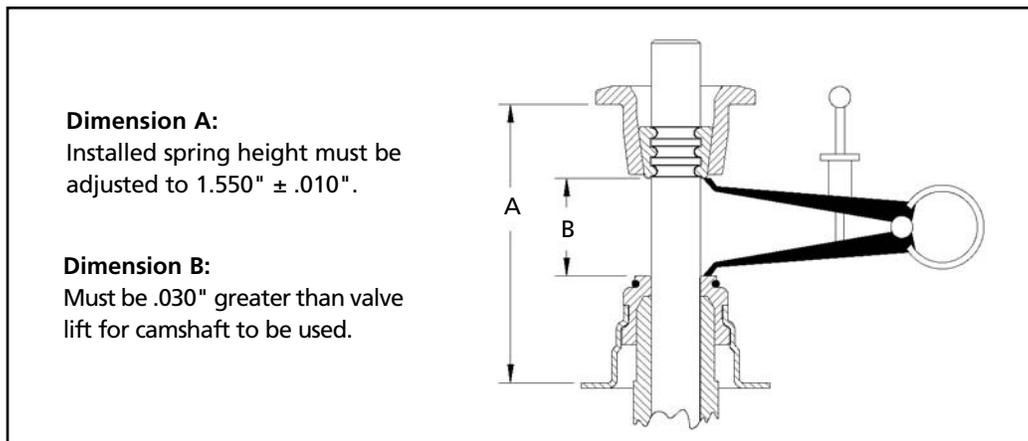


Figure A

- E- Repeat Steps A-D for remaining valves and record all measurements. Be sure to keep track of all parts during assembly and disassembly to assure they are installed in same location and with same valves clearances in which they were measured.

**NOTE:** For race and similar applications, experienced engine builders may elect to shim valve spring assembly to installed height less than 1.550" if cam with less than .495" valve lift is used. In such cases, installed height should not be less than 1.055" + valve lift  $\pm$  .010." For example, with .400 lift cam, installed height could be shimmed to 1.055" + .400", or 1.455"  $\pm$  .010". In such cases, spring pressure and valvetrain wear will increase significantly. Engine builder assumes all responsibility for installing springs at height other than 1.550"  $\pm$  .010".

### ⚠ CAUTION

- Installing springs at height less than recommended dimension will cause rapid spring fatigue resulting in possible engine damage. Engine should be frequently disassembled for spring tension measurement.
- Installing springs at height above recommended dimension will decrease spring tension resulting in possible valve float and engine damage.
- Failure to establish required clearances may cause valve seal failure and other, more extensive engine damage not covered under warranty.

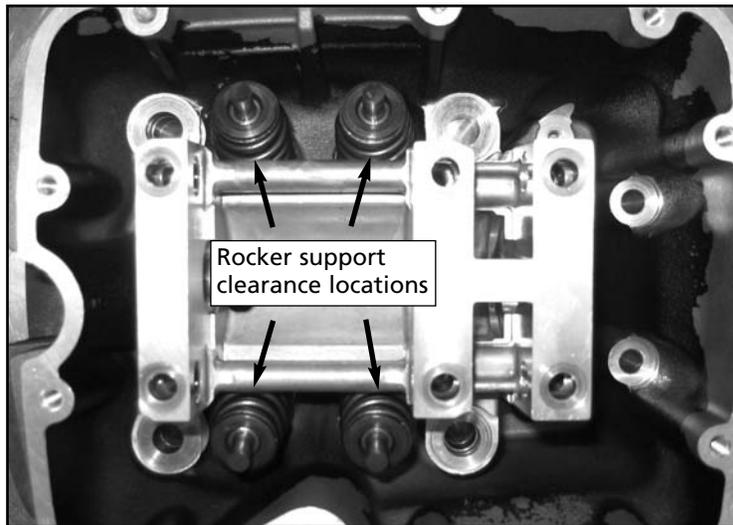
### ⚠ WARNING

Valve spring assembly is under considerable tension when compressed and is potentially dangerous. Wear eye protection and take due caution when checking for coil bind and during installation. After assembly, carefully strike tip of valve stem with plastic hammer to insure that keepers are seated. Direct spring assembly away from face and body during this procedure.

- 3- Observing previous warning, check for a minimum of .050" travel to coil bind as follows:
  - A- Place spring in a vise with soft jaws or spring checking device and carefully compress to coil bind and record spring height.
  - B- Determine distance to coil bind by subtracting coil bind height from installed height. If coil bind was .990", for example, and installed height is 1.550, then 1.550" - .990" yields .560" travel to coil bind. Subtracting .050" from the .560" travel will allow a .510" lift cam to be installed with acceptable clearance to coil bind.
  - C- Repeat procedure for each spring assembly.
- 4- Install valves and valve springs in heads. Be sure valve guide seals are in place. Install all S&S beehive springs with smaller OD toward top collar. Install each spring followed by top collar and keepers.

**NOTE:** Installed height should be the same for each spring assembly.

- 5- Confirm valve spring to rocker support clearance.
  - A- Mock install rocker supports without cam or rocker arms. Note that valve spring-to-rocker support clearancing will be required in four locations. Clearance can be checked using feeler gauges or lead solder. Minimum spring to rocker support clearance to be .060". See **Picture 10**.



Picture 10

### ⚠ CAUTION

Small metal chips and pieces can damage machined surfaces and block passageways. Thoroughly clean all metal chips and pieces from components.

### ⚠ WARNING

Always wear eye protection while grinding and cleaning surfaces.

- B- Determine and mark each location for clearance operation with a permanent marker, remove the rocker support and perform clearance operation with a die grinder.
- C- Recheck spring to rocker support clearance to achieve a minimum of .060" clearance. Repeat step B if necessary.

**NOTE:** Remove minimum amount of material needed to obtain .060" clearance. Care must be taken not to break through rocker supports or affect heat treatment by overheating while grinding. Oil is supplied to Victory® top end through rocker support, so it is also important not to disturb oil passages.

- 6- Assemble heads to engine according to **Cylinder Head and Valvetrain** section of appropriate Victory service manual. Do not install camshafts at this time.

## CAMSHAFT CLEARANCING ON EXHAUST ROCKER ARM

- 1- Front and rear exhaust rocker arms must be clearanced on the bottom side to accommodate the S&S® .495" cams. Follow **Rocker Arm Removal** section of your Victory® Service Manual to remove exhaust rocker arms.
- 2- When grinding on the rocker arms it is recommended to cover or tape up hydraulic lifters, oil holes, bearing roller that rides on the cam lobe, and each end of the rocker arm where shaft runs through to keep debris out of these areas.
- 3- Remove excess casting material on the bottom side of the rocker arms with a file or belt sander. You should only need to remove a maximum of .040". See **Picture 11**.

### ⚠ CAUTION

Failure to clearance exhaust rocker arms will result in intake lobes contacting rocker arms.

### ⚠ CAUTION

Small metal chips and pieces can damage machined surfaces and block passageways. Be sure to thoroughly clean all metal chips and pieces out to prevent premature failures.

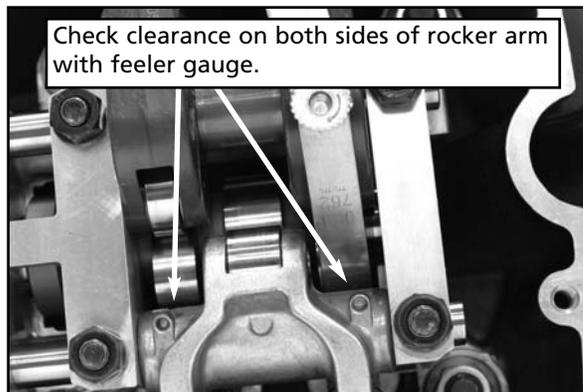
### ⚠ WARNING

Always wear eye protection while grinding and cleaning surfaces.

- 4- Once both front and rear exhaust rocker arms are clearanced, wash them clean, and install valve train in motor with S&S .495" cams. Follow the **Camshaft & Rocker Arm Installation** procedure in your Victory service manual to install the S&S .495" lift cams. Rotate the motor in the direction of operation to ensure intake lobes on the cams clear the exhaust rocker arms. Using a feeler gauge, verify that there is no less than .035" clearance to the tip of the intake lobe. See **Picture 12**.



Picture 11



Picture 12

- 5- Finish assemble the engine and install in chassis per Victory service manual. Refer to S&S instruction 51-1204 to install S&S air cleaner kit 41-0021. These instructions are enclosed in the air cleaner kit packaging. The calibration authorization card is also enclosed in the S&S air cleaner kit.

## S&S CAMSHAFT SPECIFICATIONS

### NOTE:

- When installing S&S .495" cams, it is required that you install S&S valve spring kit PN 49-0115.
- Valve timing is measured at .050" valve lift.

S&S® CAM SPECIFICATIONS FOR .050" VALVE LIFT									
Cam Name	Valve Timing Open/Close		Valve Duration		Valve Lift	Centerline		Lift @ TDC	
	Intake	Exhaust	Intake	Exhaust		Intake	Exhaust	Intake	Exhaust
S&S 495	17°/47°	44°/12°	244°	236°	0.495"	105°	106.5°	.115"	.087"



S&S .495" Lift Cams PN 49-0100