

# **SkillsUSA 2015 Contest Projects**

## **Marine Service Technology**

Click the “Print this Section” button above to automatically print the specifications for this contest. Make sure your printer is turned on before pressing the button.

**SkillsUSA**  
**2015 Motorcycle Service Technology**  
**Street XG two hour task**

**Objective Information Sheet**

350 Points  
Time Limit 120 Minutes

**OBJECTIVE:**

Given the tools and workstation instructions, participants will correctly perform a valve adjustment on the front and rear head. Contestants will also Remove, inspect and install the clutch assembly. Both tasks will be performed on the Street XG engine.

**SPECIFIC SKILLS:**

The contestant will:

1. Follow the instructions outlined in the station test materials to correctly perform the stated objective.
2. Use the tools and equipment properly and safely.
3. Clean and organize the work area.

The judge must re-set the station for the next participant.

**SkillsUSA**  
**2015 Motorcycle Service Technology**  
**Street XG two hour task**

**Judge's Score sheet**

Time Limit 120 Minutes

Contestant # \_\_\_\_\_

Judge's Initials: \_\_\_\_\_

Start  
Time: \_\_\_\_\_  
Stop  
Time: \_\_\_\_\_

Scoring Directions: The performance of each task should be either "0" or full points, i.e. "25" or "50".

Use the following criteria listed below: "0" indicates the contestant *could not or did not* correctly perform this task. "50" or "100", indicates the contestant **did perform or demonstrate** the skill correctly.

The judge should monitor the participant's progress to ensure safe use of the equipment.

- **PERFORMANCE:** Grade the student's performance and record the score below.

- **VALVE ADJUSTMNT**

- |  |                     |
|--|---------------------|
| 1) Correctly disassembled the front and rear valve covers, remove alternator access. | <b>(0,25)</b> _____ |
| 2) Correctly adjust valves ( front cylinder head ).                                  | <b>(0,50)</b> _____ |
| 3) Correctly adjust valves ( rear cylinder head ).                                   | <b>(0,50)</b> _____ |
| 4) Correctly assemble valve covers and access cover.                                 | <b>(0,50)</b> _____ |

- **CLUTCH REMOVAL , INSPECTION, INSTALLATION**

- |  |                     |
|--|---------------------|
| 1) Correctly remove primary cover and install crank lock.        | <b>(0,25)</b> _____ |
| 2) Correctly remove clutch assembly measure and inspect clutch.  | <b>(0,50)</b> _____ |
| 3) Correct assembly of clutch assembly in clutch hub and basket. | <b>(0,50)</b> _____ |
| 4) Correct installation of clutch and primary cover.             | <b>(0,50)</b> _____ |

**Total Possible Score 350 points**

**Total point** \_\_\_\_\_

# SkillsUSA

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## Harley-Davidson Street Engine two hour task

In this two hour section you will be working on the Harley-Davidson Street engine. The engines are mounted on shop work stands. When loosening and torquing tight fasteners you may need your facilitator to steady the stand to avoid it tipping over. All fasteners you will be working with have been pre loosened and set to half torque. During the tasks in this station you will be following an amended shop manual and all torque values will be listed, set torque to the values listed in this manual (**note these values are not correct for a running engine and are not actual specifications.**) Procedures have also been amended to suit this task. Always follow the correct service manual when working on a running motorcycle.

There will be two tasks in this section:

### Valve Lash Adjustment

Perform a valve lash adjustment on the front and rear cylinders. Follow the procedure in this manual, during the task there will be critical points to **STOP** and have the facilitator grade your work.

### Clutch Removal and Inspection

Perform a clutch removal , inspection and installation. Follow procedures in this manual, there will be measurements and critical points to **STOP** and have the facilitator grade your work.



# Valve Lash Adjustment

## Preparation

1. Remove spark plugs
  - a. Remove (9) & (8) alternator access cover and fasteners. Make sure to collect sealing O-ring (7). [Figure 4-33](#)
  - b. Remove valve covers. [Figure 4-9](#)
  - c. Using a socket rotate the engine counterclockwise from the removed alternator access cover.

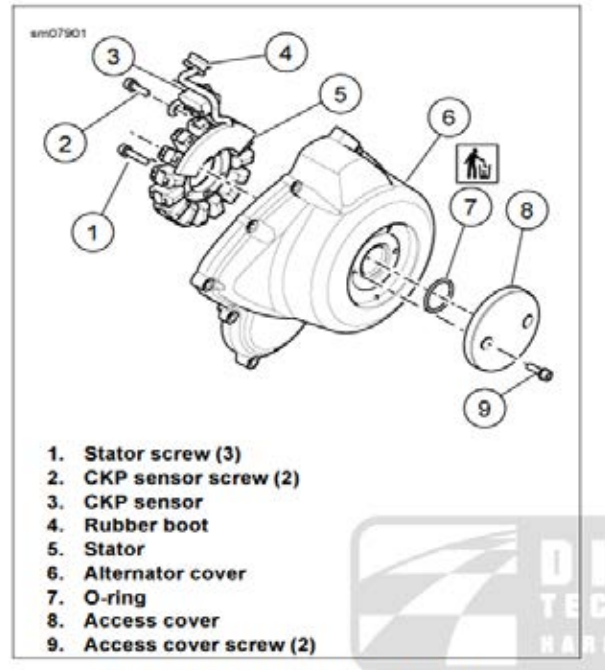
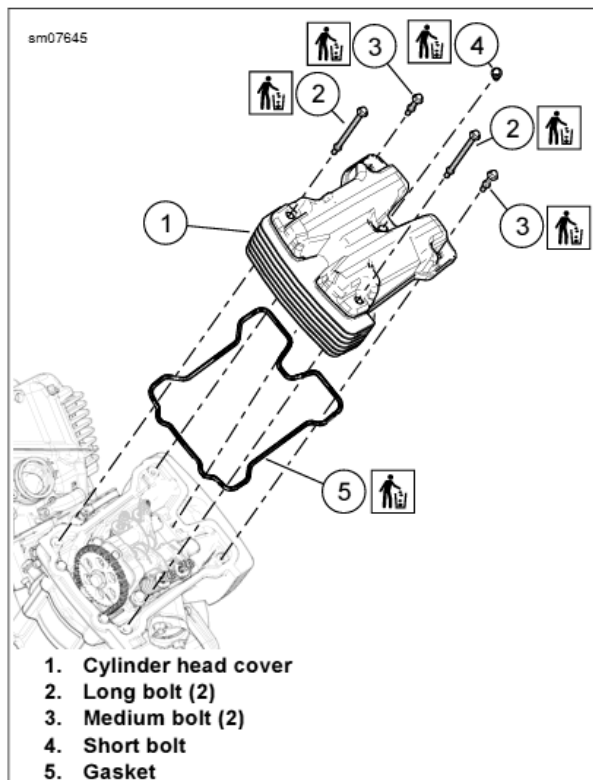


Figure 4-33. Alternator Cover Assembly

Figure 4-9 valve cover



06322

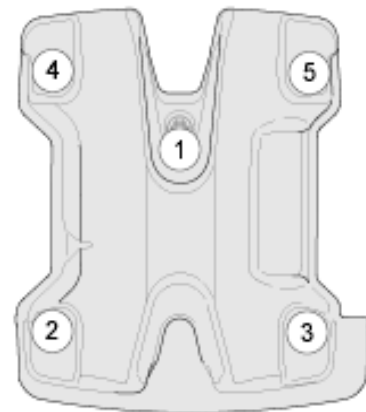


Figure 4-10. Cylinder Head Cover

Tightening Sequence

## INSPECT AND ADJUST VALVE LASH

1. See [figure 2-30](#). rotate engine so that the cylinder to be adjusted is on TDC. Top Dead Center.
2. Refer to cam timing marks (1),(2)
3. See [figure 2-31](#). loosen jamnut (2) back off adjuster (1) do not remove jamnut or adjuster , only loosen.

Repeat the process for all four valves.

4. **STOP** have facilitator check valves out of adjustment.
5. Adjust the valves using TAPPET WRENCH HD-51502 and feeler gauges. [Figure 2-31](#)

Turn valve adjuster (1) clockwise to reduce valve lash. Turn counterclockwise to increase valve lash.

Measure valve lash (3) adjust to specification.

### VALVE LASH SPECIFACATIONS

Intake      0.005-0.007 in

Exhaust      0.007-0.009 in

### VALVE ADJUSTER JAMNUT TORQUE VALUE

45 in-lbs

5. Torque all jamnuts and check the clearance again.

**Fill out work sheet for this section.**

6. **STOP** have facilitator check clearances and work sheet.
7. Repeat the process for the other cylinder.
8. Install Valve covers, install Alternator access cover. Follow [Figure 4-10](#) for valve cover tightening sequence.

### TORQUE VALUES

Alternator access cover screws      45 in-lbs      Spark Plugs      9 ft. lbs

Valve cover bolts      45 in-lbs

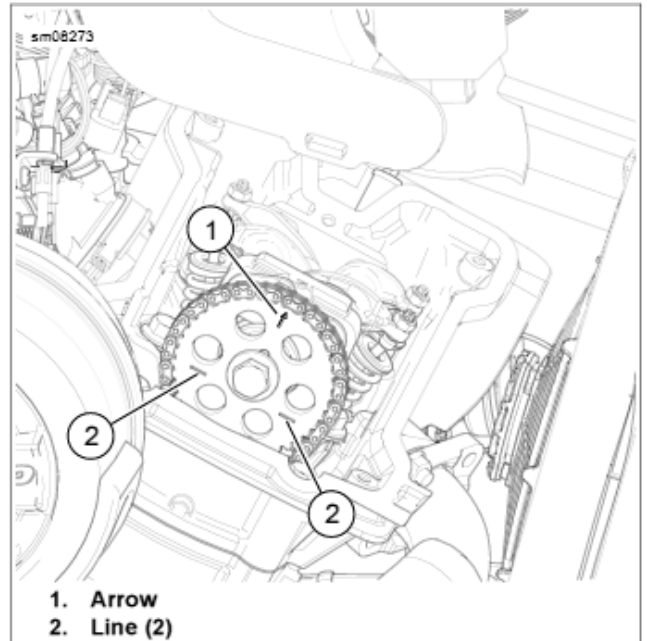


Figure 2-30. Cam Timing Marks

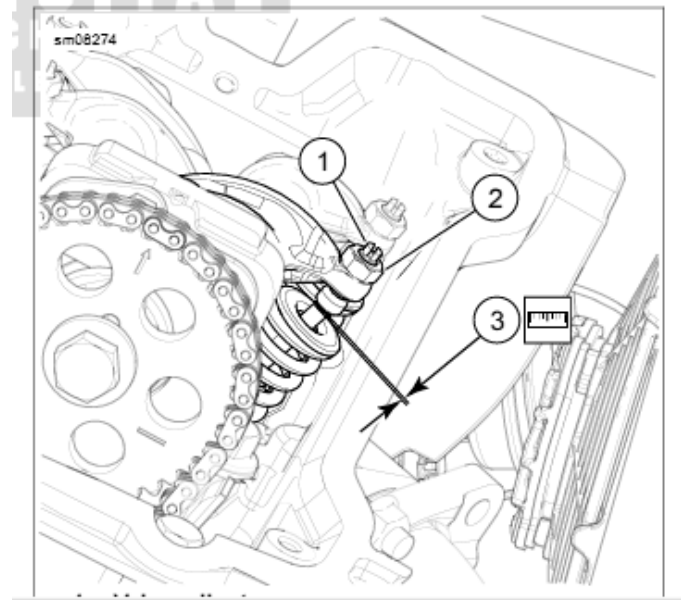


Figure 2-31 Valve adjuster

## Clutch Inspection, Installation

1. Remove primary cover [Figure 4-34](#) (2)
2. Collect clutch actuator with cover [Figure 4-36](#)
3. In this exercise reuse the primary gasket, if damaged or ripped your facilitator can provide a replacement. Always replace with new on a running motorcycle.
4. Install CRANKSHAFT LOCKING TOOL HD-51281 [Figure 4-37](#)

CRANKSHAFT LOCKING TOOL HD-51281



Figure 4-37 CRANKSHAFT LOCK HD-51281 installed

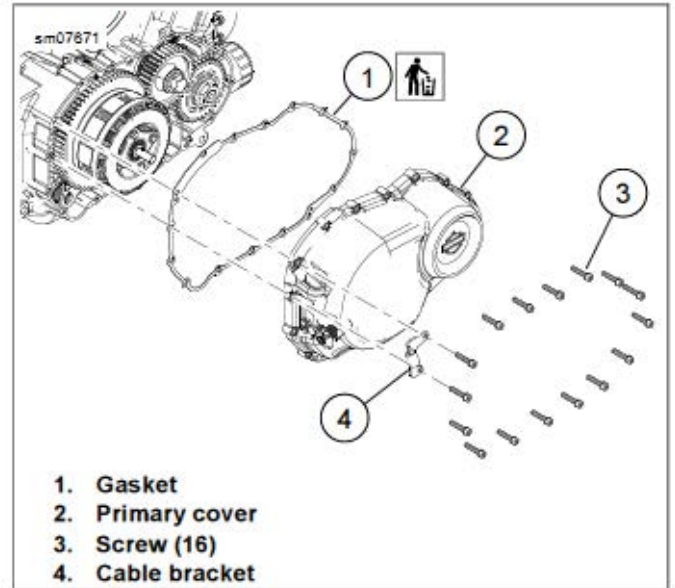


Figure 4-34. Primary Cover

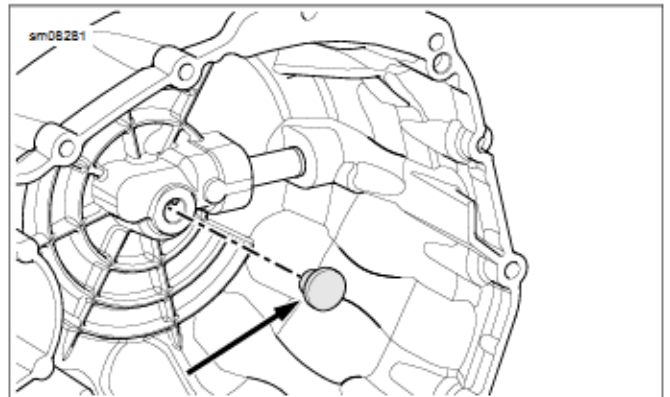


Figure 4-36. Clutch Actuator



5. Remove clutch lifter plate (2) [Figure 5-10](#)
6. Collect clutch springs.
7. Install CLUTCH LOCKING TOOL HD-51505 [Figure 5-9](#)
8. Remove clutch [Figure 5-10](#)
  - a. Remove clutch nut (3)
  - b. Remove cup washer (4)
  - c. Remove clutch (5)
  - d. Remove thrust washer (6)
9. Remove clutch plates from basket, note order and direction. Inner most friction plate has more oil grooves than the other plates. Outer most friction plate is narrower to accommodate the damper spring and seat. [Figure 5-11](#), [Figure 5-12](#), [Figure 5-13](#)
10. Check friction plates:
  - a. Look for worn or damaged fiber surface material.
  - b. Measure thickness of each plate with a dial caliper or micrometer. **Record measurements on the task sheet.**
11. Check steel plates
  - a. Lay each plate on a precision flat surface.
  - b. Insert feeler gauge between plate and flat surface in several places.
  - c. Max plate warp is more than (.006 in) **Follow task sheet to record measurements.**

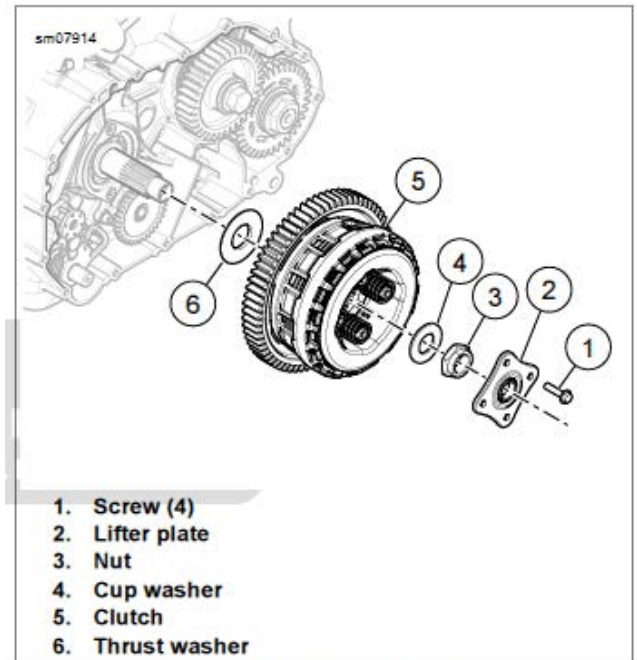


Figure 5-10. Clutch Assembly



Figure 5-9. CLUTCH LOCKING TOOL

H-D 51505



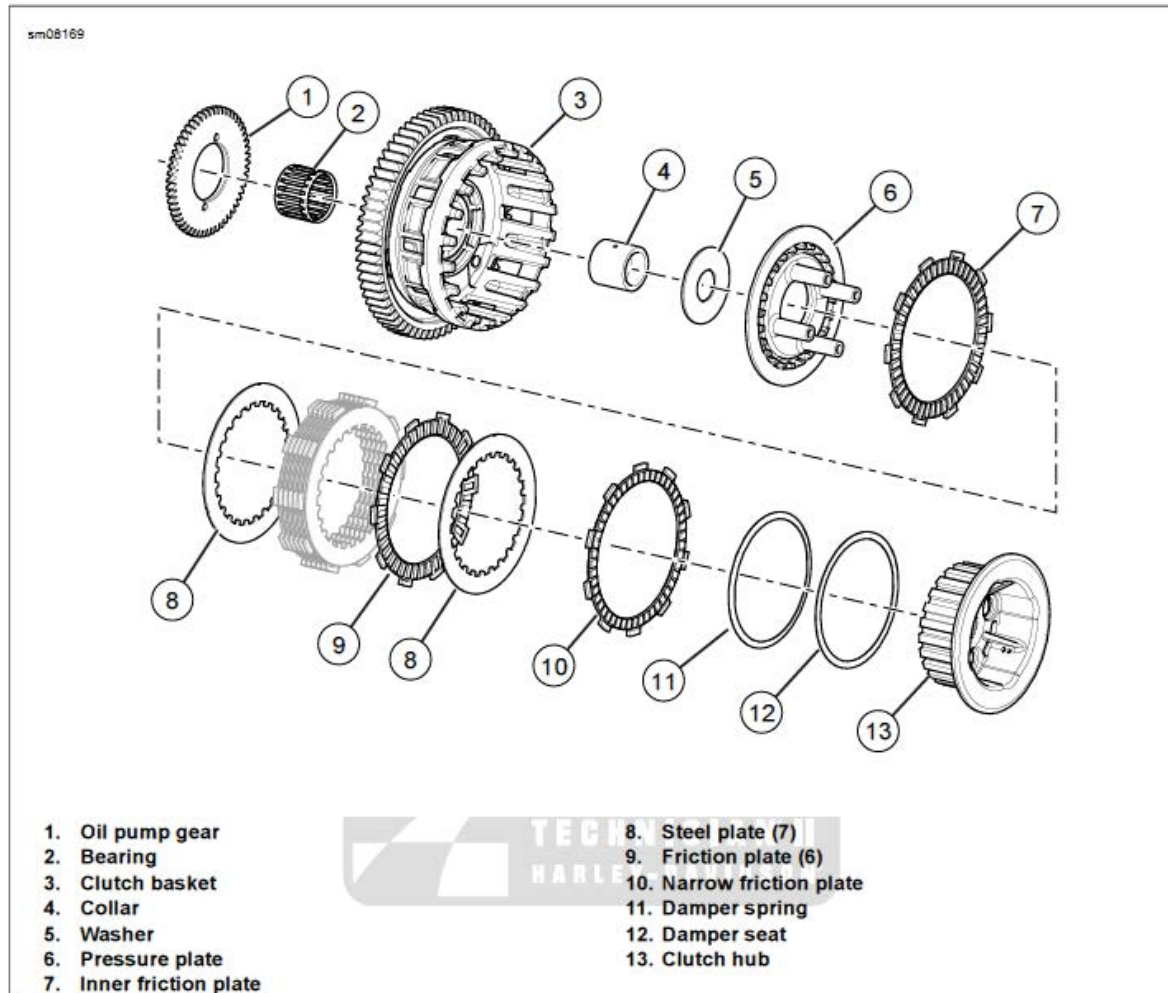


Figure 5-11. Clutch Assembly

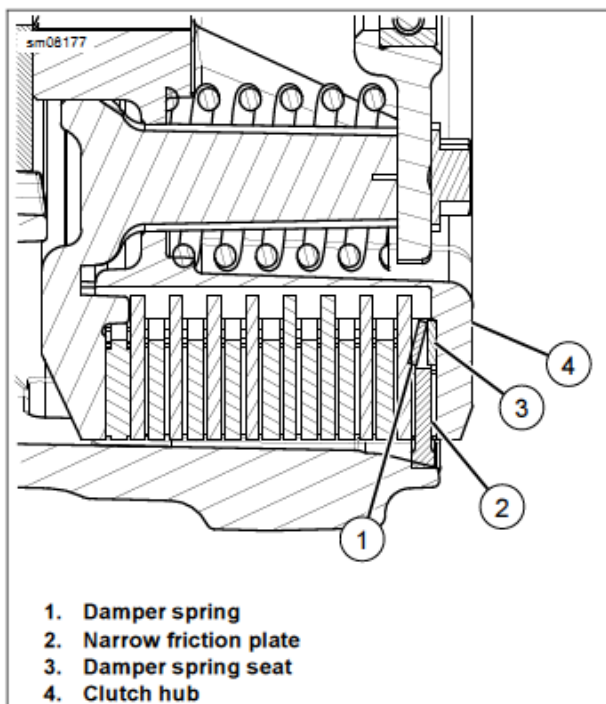


Figure 5-12. Damper Spring and Seat

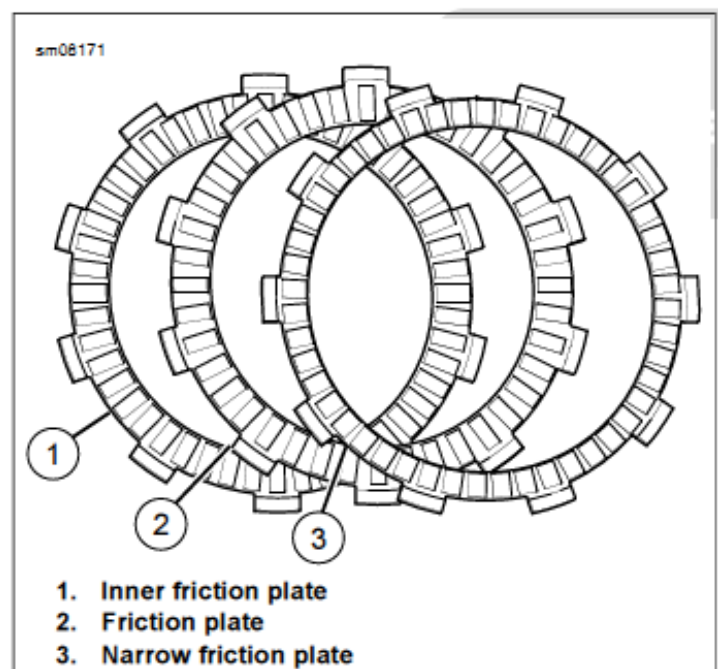


Figure 5-13. Friction Plates

## CLUTCH ASSEMBLY

1. Using Figures 5-11, 5-12, 5-13 assemble the fiber and steel plates in proper order on the clutch hub. **STOP** have the facilitator check the assembly.
2. Use Figure 5-11
  - a. Install bearing (2), if removed.
  - b. Install oil pump gear (1).
  - c. Install collar (4).
  - d. Install washer (5).
3. Assemble pressure plate and hub assembly.
  - a. See Figure 5-12. Install damper spring seat (3) and damper spring (1) on clutch hub (4).
  - b. Install narrow friction plate (2).
  - c. See Figure 5-11. Install steel plates (8) and friction plates (9).
  - d. Install pressure plate (6).

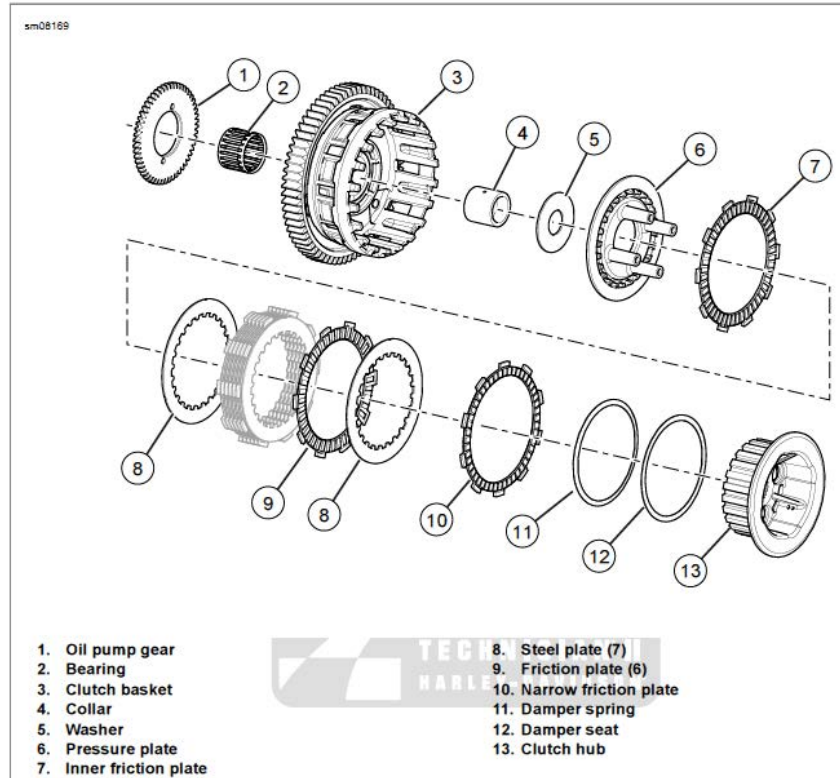


Figure 5-11. Clutch Assembly

6. See Figure 5-14. Install pressure plate and hub assembly into clutch basket.
  - a. Align tabs of inner friction plate and friction plates (1).
  - b. Align tabs of narrow friction plate (2).

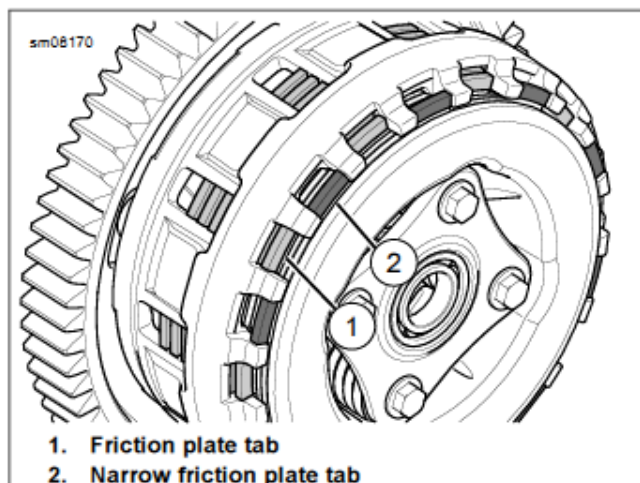


Figure 5-14. Friction Plate Tab Locations

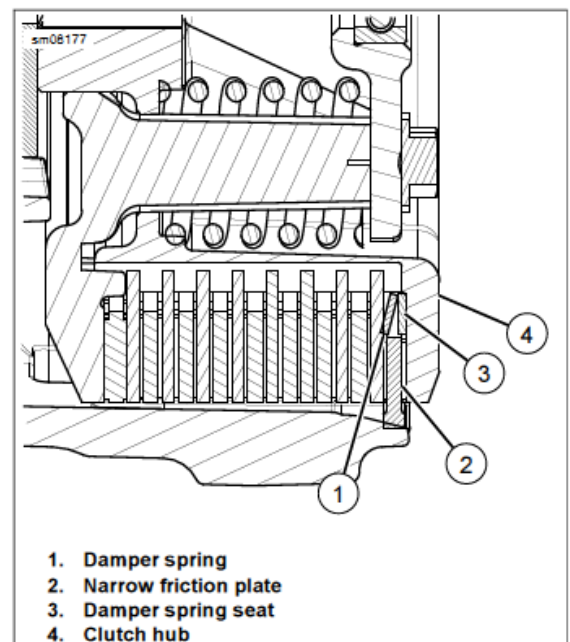


Figure 5-12. Damper Spring and Seat

## CLUTCH INSTALL

1. See [figure 5-10](#). Install thrust washer (6) with beveled side toward the engine.
2. Install Crankshaft Locking Tool. (HD-51281).
3. Install clutch (5).
4. Install CLUTCH LOCKING TOOL (HD-51505).
  - a. Install cup washer (4) with concave side facing clutch.
  - b. Install nut (3). Tighten to **45 ft-lbs.**
  - c. Remove clutch locking tool.
5. Install lifter plate (2).
  - a. Install screws (1). Tighten to **35 in-lbs.**
  - b. Remove crank locking tool.
  - c. Fill out task sheet for this section.

**STOP** have facilitator check installation.

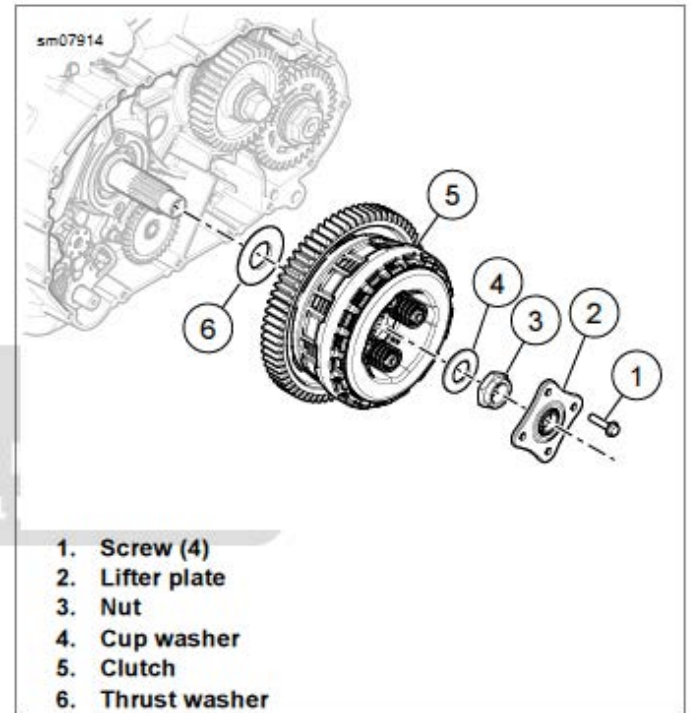


Figure 5-10. Clutch Assembly

## PRIMARY COVER INSTALL

1. See [figure 4-34](#). Install primary gasket (1).
2. See [figure 4-36](#). Confirm installation and operation of clutch actuator.
3. See [figure 4-34](#). install primary cover (2).
  - a. See [figure 4-35](#). Follow tightening sequence.
  - b. Fill out task sheet and give to facilitator.

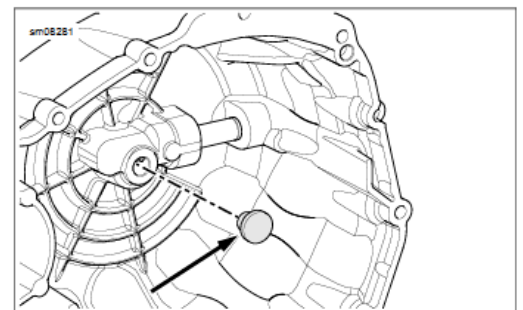


Figure 4-36. Clutch Actuator

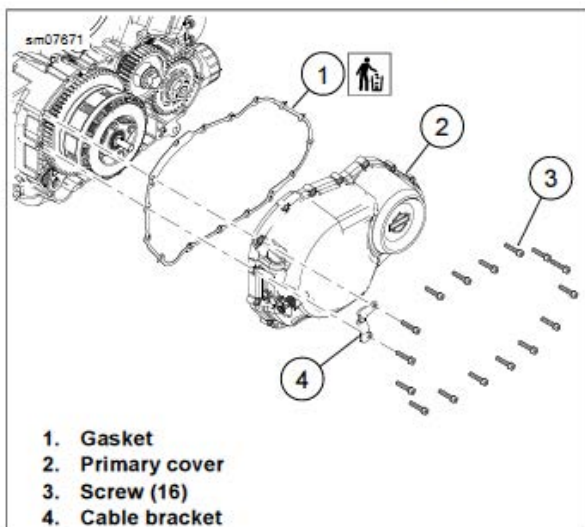


Figure 4-34. Primary Cover

CONGRADULATIONS  
YOU HAVE COMPLETED  
THIS TASK.

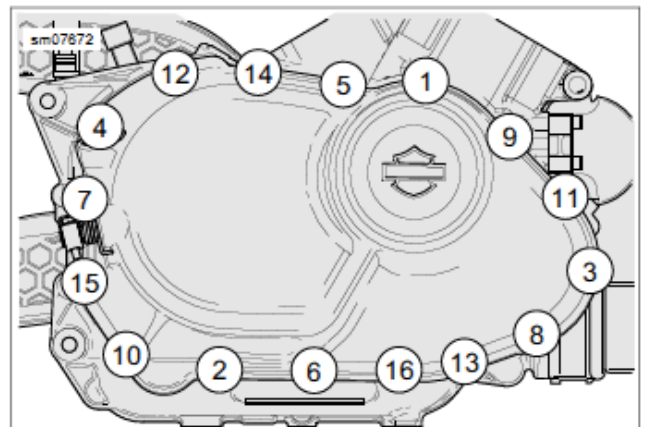


Figure 4-35. Tightening Sequence



**SkillsUSA**  
**2015 Motorcycle Service Technology**  
**Street XG two hour task**

**Objective Information Sheet**

350 Points  
Time Limit 120 Minutes

**OBJECTIVE:**

Given the tools and workstation instructions, participants will correctly perform a valve adjustment on the front and rear head. Contestants will also remove, inspect and install the clutch assembly. Both tasks will be performed on the Street XG engine.

**SPECIFIC SKILLS:**

The contestant will:

1. Follow the instructions outlined in the station test materials to correctly perform the stated objective.
2. Use the tools and equipment properly and safely.
3. Clean and organize the work area.

The judge must re-set the station for the next participant.

**SkillsUSA**  
**2015 Motorcycle Service Technology**  
**Street XG two hour task**

**Judge's Score sheet**

Time Limit 120 Minutes

Contestant #: \_\_\_\_\_

Judge's Initials: \_\_\_\_\_

Start  
Time: \_\_\_\_\_  
Stop  
Time: \_\_\_\_\_

Scoring Directions: The performance of each task should be either "0" or full points, i.e. "25" or "50".

Use the following criteria listed below: "0" indicates the contestant *could not or did not* correctly perform this task.

"25" or "50", indicates the contestant **did perform or demonstrate** the skill correctly.

The judge should monitor the participant's progress to ensure safe use of the equipment.

- **PERFORMANCE:** Grade the student's performance and record the score below.

- **VALVE ADJUSTMENT**

- |  |              |
|--|--------------|
| 1) Correctly disassembled the front and rear valve covers, remove alternator access. | (0,25) _____ |
| 2) Correctly adjust valves ( front cylinder head ).                                  | (0,50) _____ |
| 3) Correctly adjust valves ( rear cylinder head ).                                   | (0,50) _____ |
| 4) Correctly assemble valve covers and access cover.                                 | (0,50) _____ |

- **CLUTCH REMOVAL , INSPECTION, INSTALLATION**

- |  |              |
|--|--------------|
| 1) Correctly remove primary cover and install crank lock.        | (0,25) _____ |
| 2) Correctly remove clutch assembly measure and inspect clutch.  | (0,50) _____ |
| 3) Correct assembly of clutch assembly in clutch hub and basket. | (0,50) _____ |
| 4) Correct installation of clutch and primary cover.             | (0,50) _____ |

**Total Possible Score 350 points**

**Total points** \_\_\_\_\_



Valve Measurement can be performed by loosening both valves on Intake and Exhaust. Insert the feeler gauge from the camshaft drive side of the head through both adjusters. Adjust the valve furthest from the camshaft drive first ( see picture below)

Adjust this valve First.



Slide the Feeler gauge back towards the camshaft drive side of the head and adjust the other valve. ( see picture below)

Adjust this Valve second.





**SkillsUSA**  
**2015 Motorcycle Service Technology**  
**Street XG Front Fork Disassembly / Reassembly**

**Objective Information Sheet**

100 Points  
Time Limit 30 Minutes

**OBJECTIVE:**

Given the tools, Street XG front fork assembly, and workstation instructions, participants will correctly disassemble and reassemble the front fork.

**SPECIFIC SKILLS:**

The contestant will:

1. Follow the instructions outlined in the station test materials to correctly perform the stated objective.
2. Use the tools and equipment properly and safely.
3. Clean and organize the work area.

The judge must re-set the station for the next participant.

**SkillsUSA**  
**2015 Motorcycle Service Technology**  
**Street XG Front Fork Disassembly / Reassembly**

**Judge's Score sheet**

Time Limit 30 Minutes

Contestant # \_\_\_\_\_

Start  
Time: \_\_\_\_\_

Judge's Initials: \_\_\_\_\_

Stop  
Time: \_\_\_\_\_

Scoring Directions: The performance of each task should be either “0” or full points “25”.

Use the following criteria listed below: “0” indicates the contestant *could not or did not* correctly perform this task.

“25” indicates the contestant **did perform or demonstrate** the skill correctly.

The judge should monitor the participant's progress to ensure safe use of the equipment.

• **PERFORMANCE:** Grade the student's performance and record the score below.

- |  |              |
|--|--------------|
| 1) Correctly disassembled the front fork.                            | (0,25) _____ |
| 2) Correctly installed fork bushings, seals and circlip.             | (0,25) _____ |
| 3) Correctly installed fork springs and internal damping components. | (0,25) _____ |
| 4) Completed fork reassembly.  | (0,25) _____ |

**Total Possible Score 100**

**Total Points** \_\_\_\_\_



# 2015 SkillsUSA

## Street XG Front Fork Disassembly / Reassembly

### Workstation Reference Materials

#### **DO NOT REMOVE FROM WORKSTATION**

#### **CONTESTANT INSTRUCTIONS**

**Follow the instructions and procedural steps that follow to complete this workstation.**

**Important note:** Fork assemblies have been drained of all fluids for the competition. Fork components will not require fastening torques on reassembly.

#### Fork Disassembly

See [Figure 3-39](#) on page #2.

1. Remove dust seal (14).
2. Remove internal circle clip (15).
3. Remove screw (23) and washer (22) from bottom of slider (20).

**Δ: Caution:** Use Caution when performing step #4.

Apply downward pressure while removing the fork tube cap. The fork tube cap is under a small amount of spring preload.

4. Remove fork tube cap (4).
5. Remove spring collar (6), spring washer (7), and spring (8) from slider tube (11).
6. Withdraw slider tube (11) from slider. Use the slider (20) as a slide hammer by using quick continuous strokes extending and compressing the slider (back and forth) to drive the slider upper bushing (18) out until the slider is pulled free of the slider tube (11).
7. Remove sleeve (19) from slider.
8. Remove fork seal (16), spacer (17) and upper bushing (18) from slider tube.
9. Remove damper tube (9) and rebound spring (10) from slider tube.
10. Inspect fork components for wear and damage.

**STOP:** Have the instructor check your work prior to reassembly.

A replacement seal will be provided by the instructor.



# 2015 SkillsUSA

## Street XG Front Fork Disassembly / Reassembly

### Workstation Reference Materials

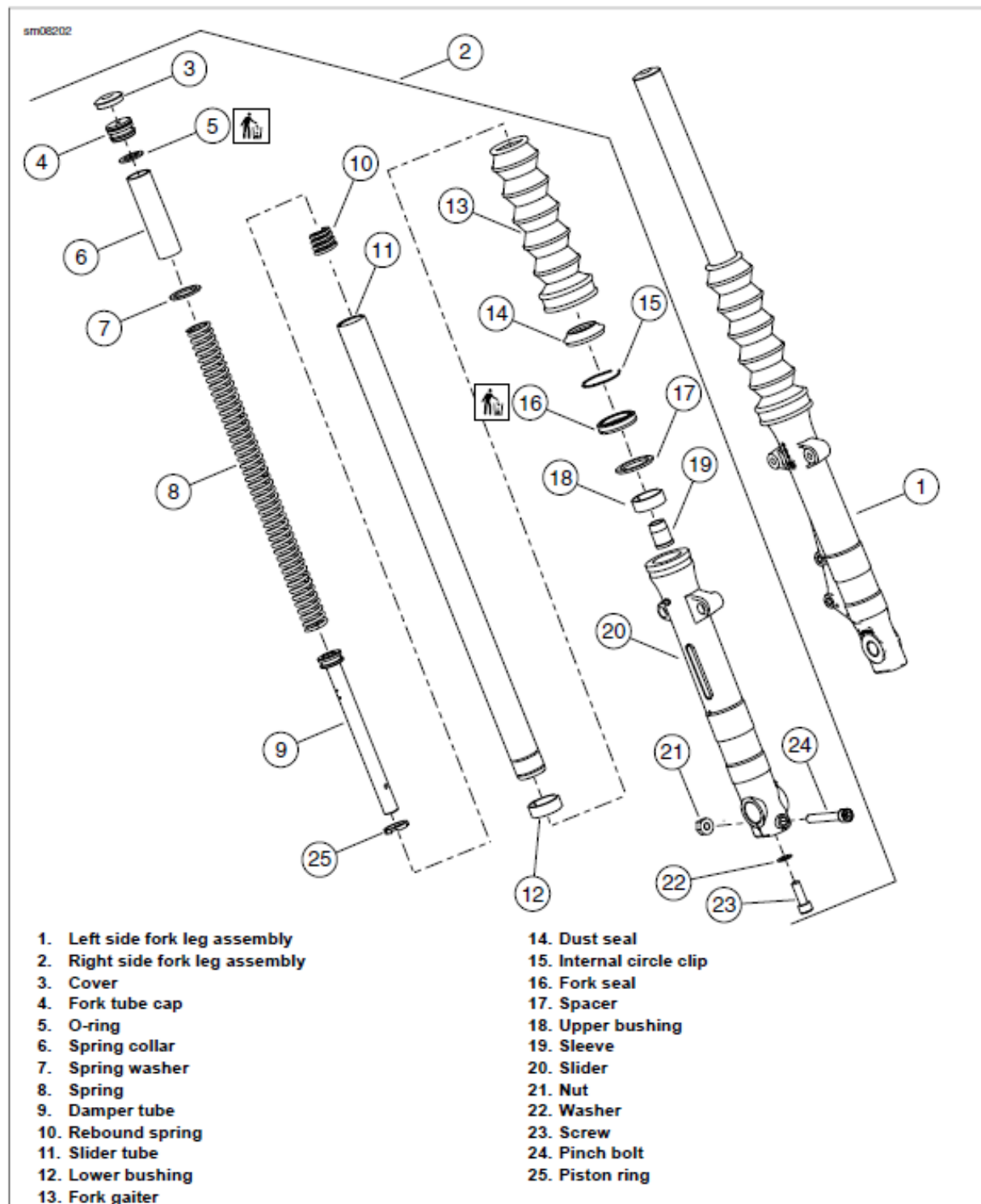


Figure 3-39. Front Fork Assembly



## 2015 SkillsUSA

# Street XG Front Fork Disassembly / Reassembly

### Workstation Reference Materials

#### Fork Reassembly

See [Figure 3-39](#).

1. Install rebound spring (10) with tapered coils facing up on the damper tube (9).
2. Install damper tube with rebound spring into slider tube (11).
3. Insert spring (8) with tight windings down into the slider tube. Make sure to guide the damper tube through the opening at the bottom of the slider tube (11) while installing the spring (8).
4. Install sleeve (19) into damper tube (9).
5. Install slider tube into slider (20). Install screw (23) through washer (22) and into bottom of slider. Hand-tighten only.
6. Move slider tube through its full range of travel several times to verify proper component alignment.
7. Remove spring.

**Refer to the “FORK SEAL AND BUSHING INSTALLATION TOOL” instruction sheet provided at the workstation.**

1. Follow the bushing and seal installation steps listed in the instruction sheet.

**STOP:** Have the instructor check your work.

**Refer back to [Figure 3-39](#).**

1. Apply HARLEY-DAVIDSON SEAL GREASE to O-ring (5) on fork tube cap (4).
2. Extend the slider tube (11) and install spring (8), spring washer (7) and spring collar (6).
3. Install fork tube cap (4) into slider tube (11).
4. Hand tighten fork tube cap.

**STOP:** Have the instructor check your work.

Congratulations, you have now completed the workstation.



# Service Tool Instructions



**BOSCH**

**Bosch Automotive  
Service Solutions**

655 Eisenhower Drive  
Owatonna, MN 55060  
Phone 800-345-2233  
Fax 586-578-7375

REV. 03-30-2014

Instruction Sheet ID: -J06008

## HD-51462 FORK SEAL AND BUSHING INSTALLATION TOOL

### General

See Figure 1. The FORK SEAL AND BUSHING INSTALLATION TOOL (HD-51462) is used to install the upper bushing, fork, and dust seals. This tool will work on all Street models.

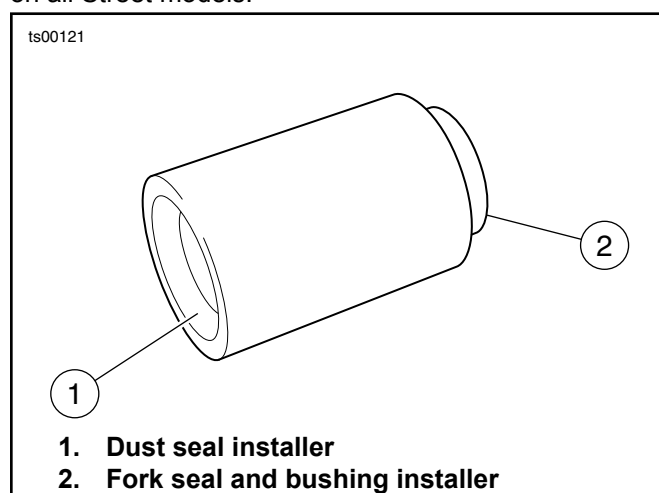


Figure 1.

### Procedure

1. See Figure 2. Install the upper bushing and spacer onto the slider tube.

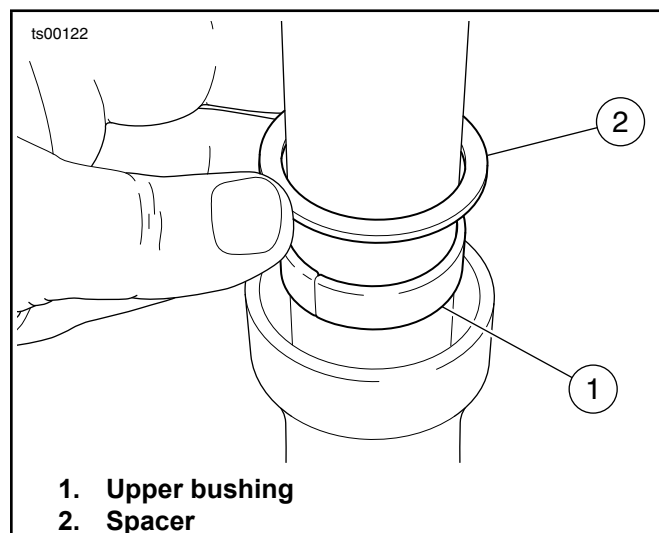


Figure 2.

2. See Figure 3. Place FORK SEAL AND BUSHING INSTALLATION TOOL (Part No. HD-51462) over slider tube with the fork seal and bushing installer side downward. Tap on spacer until bushing is fully seated.

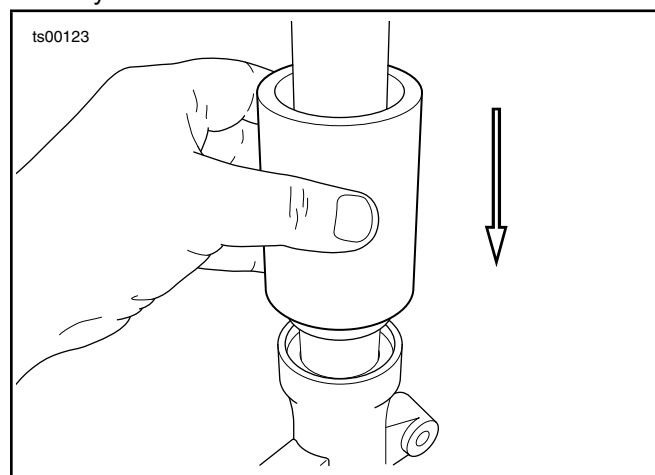


Figure 3.

3. Remove installer from slider tube.
4. See Figure 4. Coat inner diameter of new fork seal with HARLEY-DAVIDSON SEAL GREASE and install fork seal (lettering side up) over slider tube and slide it down to meet the slider.

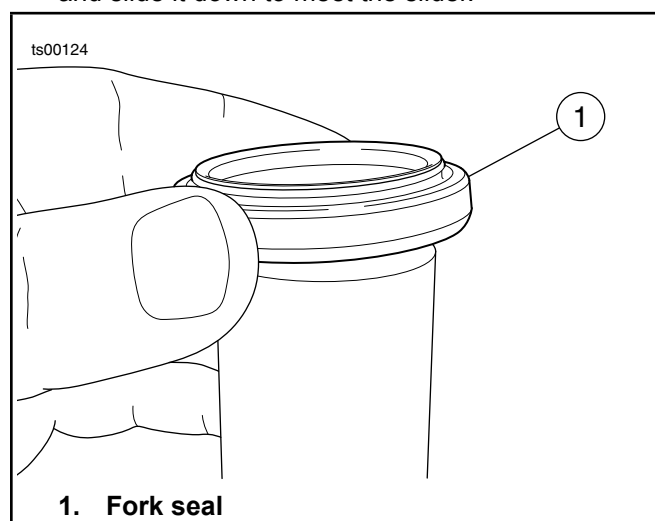
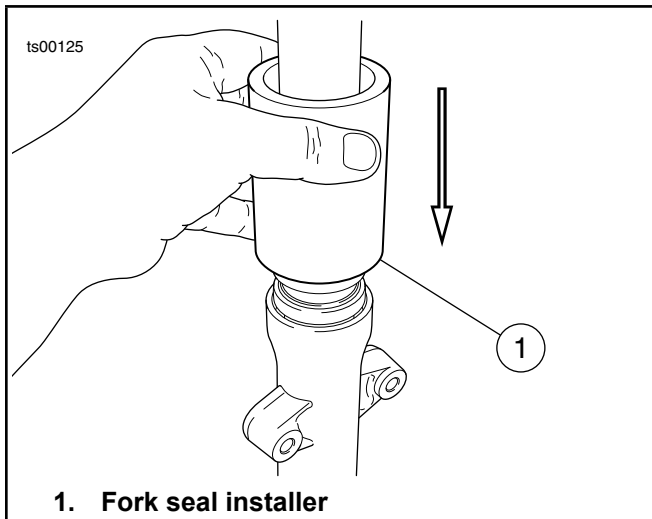


Figure 4.

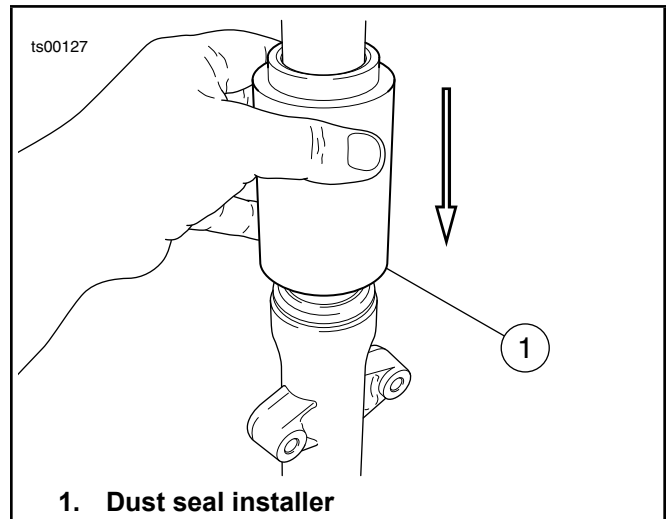
Form # HD-51462-5

5. See Figure 5. Place installation tool over slider tube with the fork seal and bushing installer side down. Tap on fork seal until the seal is fully seated.



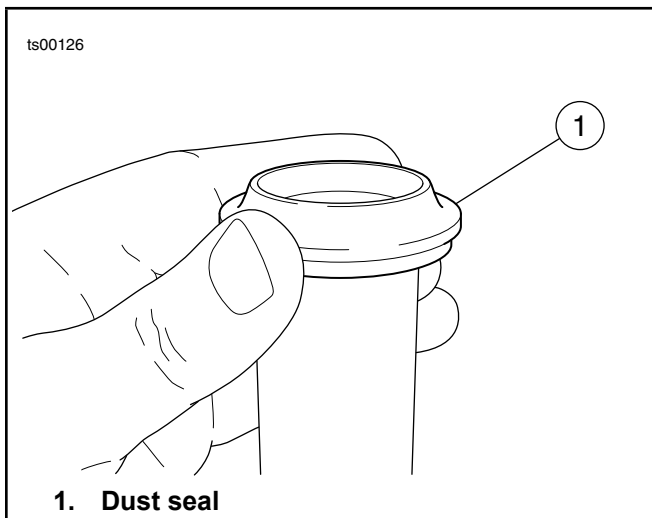
**Figure 5.**

9. See Figure 7. Place installation tool over slider tube with the dust seal installer side down. Tap on dust seal until the seal is fully seated.



**Figure 7.**

6. Remove installer from slider tube.
7. Install internal circle clip into groove in top of slider bore.
8. See Figure 6. Install dust seal over slider tube and slide it down to meet the slider.



**Figure 6.**



**SkillsUSA - 2015 Motorcycle Service Technology**  
**Street XG Front Fork Workstation Set-up Instructions**

**Set-Up:**

1. The following workstation materials and tools should be organized at each station.

**Inventory per Workstation (five workstations):**

<b><u>Qty.</u></b>	<b><u>Description</u></b>	<b><u>Part Number</u></b>	<b><u>Furnished by</u></b>
1	XG Fork Assembly		H-D
1	3/8" drive ratchet		H-D
1	6mm (long) Allen Socket 3/8" dr.		H-D
1	14mm Allen Socket 3/8" dr.		H-D
1	Slot head screwdriver		H-D
1	Pick		H-D
1	HD-51462 Fork Seal Driver		H-D
1	Tube of HD Seal Grease		H-D
1	Fork Seal (replacement – reuse seals per student)		H-D
1	Box of wipealls		H-D

2. Station lay-out as shown below.



# HARLEY-DAVIDSON CLUTCH CABLE REPLACEMENT PROCEDURE

( ½ HOUR )

Today your task is to remove and reinstall a Harley-Davidson clutch cable. You will then perform the factory clutch cable adjustment procedure. Refer to the accompanying illustrations to aid you with this project.

**REMINDER: Read each numbered instruction thoroughly as you progress through this exercise.**

## Clutch Lever and Upper Cable Removal

1. (See Figure 1) Remove clips securing clutch cable to frame downtube. (Note the exact routing of the clutch cable for later reinstallation.)
2. (See Figure 2) Slide rubber boot (1) on clutch cable adjuster (2) upward. Loosen jam nut (3) on adjuster.
3. Turn cable adjuster to **shorten** cable to **minimum** length to produce a large amount of free play at clutch lever.
4. (See Figure 3.) Remove retaining ring circlip (8) and pivot pin (7). **Discard** retaining ring circlip.
5. Remove clutch lever (2) from clutch lever bracket.
6. Remove **clutch cable pin** (5). Disconnect clutch cable.
7. (See Figure 4.) Turn adjusting screw (2) **clockwise** to remove (see Figure 5) the **nut** (4).
8. (See Figure 5.) Pull ramp assembly (5) and coupling (6) away from clutch.
9. Disassemble coupling (6) from ramp assembly. Remove clutch cable end (11) from slot in coupling.
10. Unthread the clutch cable from the primary cover by using the appropriate wrench while simultaneously turning (twisting) the **entire** clutch cable.
11. Remove the existing o-ring from the cable and discard. Install a supplied new o-ring.

## Install Clutch Cable and Adjust

1. Install clutch cable into primary housing. Do not over tighten. *(It is sometimes challenging to start the threaded cable into the primary housing without cross threading. **Exercise patience** to ensure the cable is threading smoothly. The aluminum threads in the housing are easily damaged.)*
2. Attach Coupling (6) (See Figure 5) onto end of clutch cable with the “flat button” portion facing **outward**. (See Figure 4 for a more detailed view.)
3. (See Figure 5) Attach Ramp Assembly (5) to coupling (6) and install in clutch assembly.
4. Install Nut onto Adjusting Screw (8). Turn Adjusting Screw **counter clockwise** to complete the installation. Continue turning screw **counter clockwise** to take up all the slack until it **lightly** seats and back off (clockwise) **1/8 to ¼ turn**.
5. (See Figure 3) Attach **upper** cable end (6) to the clutch lever (2) and install cable and lever into the clutch lever bracket (2).
6. (See Figure 3) Install Pivot Pin (7) and install new Retaining Ring. (8)
7. Turn Cable Adjuster (2) (See Figure 2) to lengthen cable to adjust clutch cable free play to **1/16 to 1/8 inch**. (See figure 6). Grasp cable and tug cable away from the clutch lever housing to observe the amount of free play (gap) between the end of the cable and the clutch lever bracket.
8. (See Figure 2) Snug jam nut (3) on cable adjuster and torque jam nut to **120 inch pounds** (10.3 – 13.6 Nm) and slide rubber boot (1) over adjuster.
9. Install clips (6) to affix cable to frame down tube. (See Figure 1)
10. Answer the questions on your answer Sheet and then notify your judge when you are finished with this task and he or she will note your finishing time.

# SkillsUSA

## 2015 Motorcycle Service Technology

### XL Sportster Clutch Cable Answer Sheet

Time Limit 1/2 hr.

Contestant # \_\_\_\_\_

Judge's Initials: \_\_\_\_\_

Start  
Time: \_\_\_\_\_

Stop  
Time: \_\_\_\_\_

Answer the questions below:

**5 points per question**

**(Please write or print legibly)**

The points from this sheet will be combined with your activity points.

1. The Clutch **lever** free play specification is: \_\_\_\_\_

2. Clutch lever free play cable adjuster jam nut torque is: \_\_\_\_\_

3. After lightly seating adjuster screw, back off screw how far? \_\_\_\_\_

4. What could be the result of adjusting the clutch cable with:

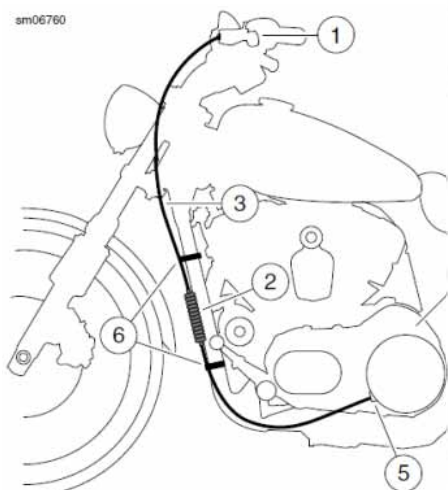
(A) **Too much** lever free play? (B) **Too little** lever free play?

(A) \_\_\_\_\_

(B) \_\_\_\_\_

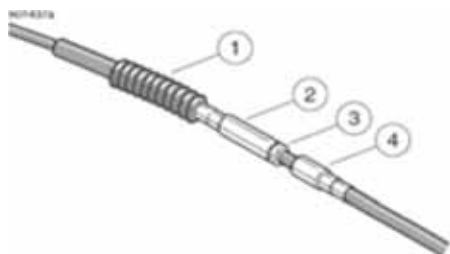
**Total points for above answers** \_\_\_\_\_

sm06760



1. Clutch lever
2. Cable adjuster boot
3. Clutch cable
4. Primary cover
5. Cable end fitting
6. Clip (2)

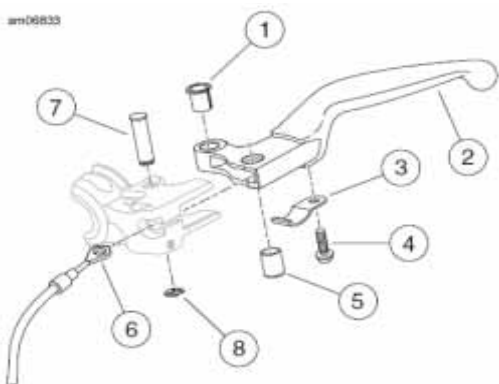
Figure 1



1. Rubber boot
2. Cable adjuster
3. Jamnut
4. Cable end

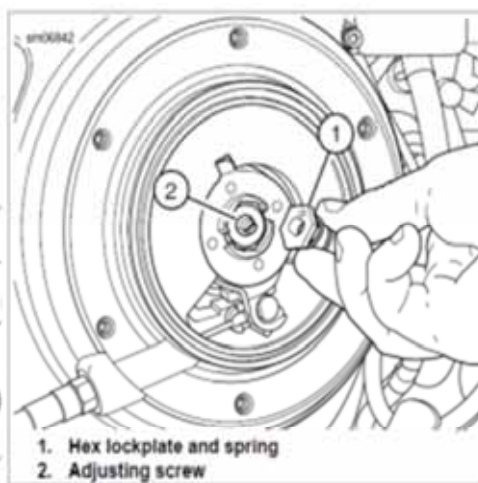
Figure 2

sm06833



1. Bushing
2. Lever
3. Anti-rattle spring
4. Screw
5. Clutch cable pin
6. Clutch cable
7. Pivot pin
8. Retaining ring

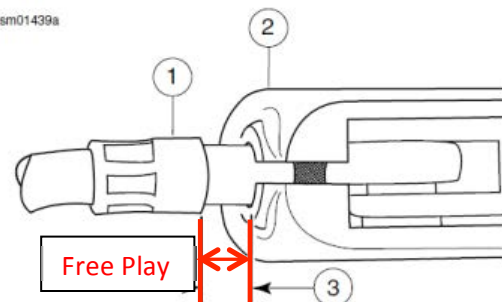
Figure 3



1. Hex lockplate and spring
2. Adjusting screw

Figure 4

sm01439a

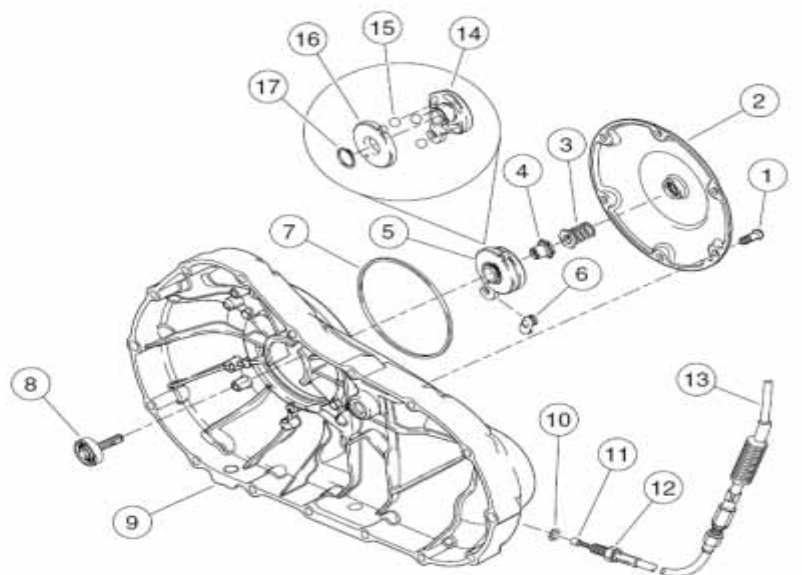


1. Clutch cable
2. Cable ferrule
3. Clutch lever bracket
4. 1/16-1/8 in (1.6-3.2 mm) free play

Figure 6

FREE PLAY	in	mm
Measurement	1/16-1/8	1.6-3.2

sm01830



1. Screw (6)
2. Clutch inspection cover
3. Hex lockplate and spring
4. Nut
5. Ramp assembly (see items 14-17)
6. Coupling
7. Quad ring
8. Clutch adjusting screw assembly
9. Primary cover
10. O-ring
11. Clutch cable end
12. Cable end fitting
13. Clutch cable
14. Outer ramp
15. Ball (3)
16. Inner ramp
17. Retaining ring

Figure 5

# SkillsUSA

## 2015 Motorcycle Service Technology

### XL Sportster Clutch Cable Judge Score Sheet

Time Limit 30 Minutes

100 points

Contestant #: \_\_\_\_\_

Judge's Initials: \_\_\_\_\_

Start  
Time: \_\_\_\_\_

Stop  
Time: \_\_\_\_\_

Scoring Directions: The performance of each task should be either "0" or full points, i.e. "5", "10" or "20".

Use the scoring criteria listed below: "0" indicates the contestant **could not or did not** correctly perform this task.

"5,10 or 20" indicates the contestant **did perform** the entire task or answered the question correctly.

**PERFORMANCE:** Grade the student's performance and record their score below.

1. Clutch **lever** free play is: 1/16 – 1/8 inch (1.6-3.2mm) (0,5) pts \_\_\_\_\_
2. Clutch lever free play adjuster jam nut torque is: **120 inch/lb. (13.6 Nm)** (0,5) pts \_\_\_\_\_
3. After lightly seating adjuster screw, back off screw how far? **1/8 to 1/4 turn** (0,5) pts \_\_\_\_\_
4. What could be the result of adjusting the clutch cable with (A) too much free play? (B) Too little free play? (Please write or print legibly)

(A) shifting problems and/or creeping, dragging or can't find neutral (0,5)pts \_\_\_\_\_

(B) clutch slipping and/or possible clutch failure (0,5)pts \_\_\_\_\_

Contestant removed clutch cable (0,10) pts \_\_\_\_\_

Contestant installed clutch cable (0,20) pts \_\_\_\_\_

Contestant installed new o-ring (0,5) pts \_\_\_\_\_

Contestant routed and secured clutch cable properly with clips (0,5) pts \_\_\_\_\_

Contestant adjusted clutch lever free play correctly (0,10) pts \_\_\_\_\_

Contestant adjusted clutch adjustment screw correctly (0,10) pts \_\_\_\_\_

Contestant torqued adjuster jamnut properly (0,5) pts \_\_\_\_\_

Contestant secured clutch handle circlip securely and without distortion. (0,5) pts \_\_\_\_\_

Contestant backed off torque wrench adjustment when finished. (0,5) pts \_\_\_\_\_

**Total Points** \_\_\_\_\_

# SkillsUSA

## 2015 Motorcycle Service Technology

### XL Sportster Clutch Cable Judge Score Sheet

Time Limit 1/2 hr.

100 points

Contestant # \_\_\_\_\_

Judge's Initials: \_\_\_\_\_

Start  
Time: \_\_\_\_\_

Stop  
Time: \_\_\_\_\_

#### Scoring Directions:

Use the scoring criteria listed below:

**"5,10 or 20 "** indicates the contestant **did perform** the entire task or answered the question correctly.

**PERFORMANCE:** Grade the student's performance and record their score below.

1. Clutch **lever** free play is: 1/16 – 1/8 inch (1.6-3.2mm) (5) pts \_\_\_\_\_
2. Clutch lever free play adjuster jam nut torque is: **120 inch/lb. (13.6 Nm)** (5) pts \_\_\_\_\_
3. After lightly seating adjuster screw, back off screw how far? 1/8 to 1/4 turn (5) pts \_\_\_\_\_
4. What could be the result of adjusting the clutch cable with (A) too much free play? (B) Too little free play? (Please write or print legibly)

(A) shifting problems and/or creeping, dragging or can't find neutral (5)pts \_\_\_\_\_

(B) clutch slipping and/or possible clutch failure (5)pts \_\_\_\_\_

Contestant removed clutch cable (10) pts \_\_\_\_\_

Contestant installed clutch cable (20) pts \_\_\_\_\_

Contestant installed new o-ring (5) pts \_\_\_\_\_

Contestant routed and secured clutch cable properly with clips (5) pts \_\_\_\_\_

Contestant adjusted clutch lever free play correctly (10) pts \_\_\_\_\_

Contestant adjusted clutch adjustment screw correctly (10) pts \_\_\_\_\_

Contestant torqued adjuster jamnut properly (5) pts \_\_\_\_\_

Contestant secured clutch handle circlip securely and without distortion. (5) pts \_\_\_\_\_

Contestant backed off torque wrench adjustment when finished. (5) pts \_\_\_\_\_

**Total Points** \_\_\_\_\_

**SkillsUSA**

**2015 Motorcycle Service Technology**

**XL Sportster Clutch Cable Removal and Reassembly**

Time Limit ½ Hour

Objective:

R&R clutch cable : Given the tools, a Sportster® motorcycle, and workstation instructions, participants will correctly demonstrate the removal, installation, and adjustment of a Sportster® clutch cable



**SkillsUSA**  
**2015 Motorcycle Service Technology**  
**Measurement Workstation**

Time Limit 1/2 hr.

**OBJECTIVE:**

Given the tools and reference material participants will correctly perform the measurement of the component(s) and interpret the results to answer the questions for each section.

**SPECIFIC SKILLS:**

The contestant will:

1. Reference the station materials to correctly perform the assigned task.
2. Use the tools and equipment properly and safely.
3. Follow the instructions to correctly take the measurement.
4. Interpret the results and respond to the questions
5. Clean and organize the work area.

# SkillsUSA

## 2015 Motorcycle Service Technology

### **Measurement Workstation Introduction**

**(Read this page carefully before continuing)**

An essential skill needed when performing service is correctly making measurements and interpreting the results. This work station will require that you accurately take specific measurements on several components and then interpret your results using the information provided in service literature.

There are four (4) stations at this workstation. Each section will require you to make specific measurements using the provided measuring tools. Each section has related service instructions to guide you on making the measurement and the related specification needed to evaluate the results.

#### STATION 1

##### Piston Ring Inspection and Installation:

You will measure the ring end gap of a top and second compression ring in a sample cylinder and record your results. Based on your results you will determine ring condition.

After measuring the rings you will install them onto a piston and position the end gaps following manual directions.

#### STATION 2

You will measure a piston using a micrometer and record the results. Based on the measurement and the clearance specifications, you will calculate the corresponding cylinder size requirements.

#### STATION 3

##### Valve Spring Pressure measurement and Valve Free Travel Inspection

You will use a Spring Force Tester to measure valve spring tension. You will measure at the installed height and then calculate the height at maximum valve lift and test this pressure.

You will measure the valve free travel distance on a sample cylinder head and then use the specifications provided to determine if a specific camshaft can be used.

#### STATION 4

##### Bolt ID and measurements

Identify the diameter, threads per inch, length and head size of sample bolts.

# Section 1 - Piston Ring Measurements and Alignment

## 30 -Points

This section has two parts:

In part 1 you will be measuring the piston ring end gap.

In Part 2 you will be installing the piston rings and positioning them correctly for assembly.

### Part 1 – 15 Points

Following the directions on the provided Instruction Sheet – Checking Piston Ring Gap, identify the ring, measure the piston ring end gaps and record your measurements.

Your measurements: Top Compression Ring . \_\_\_\_\_

Second Compression Ring . \_\_\_\_\_

Using the specifications for new components as indicated on the provided Instruction Sheet, the ring gap in the cylinder on the engine must be;

No smaller than; Top Compression Ring . \_\_\_\_\_ Second Compression Ring . \_\_\_\_\_

No larger than; Top Compression Ring . \_\_\_\_\_ Second Compression Ring . \_\_\_\_\_

Are any of your rings worn beyond replacement specifications? Yes No

### Part 2 – 15 Points

Following the directions on the provided Instruction Sheet – Installing Piston Rings, correctly install and position the gaps of the provided piston rings.

You will be scored on these three points:

- Rings in the correct groove:
- Rings installed in the correct direction:
- Ring gaps positioned in the correct locations:

## Section 2 – Piston Measurements 30 – Points

THE MICROMETER HAS BEEN ZEROED – NO NEED TO RECALIBRATE FOR THIS STATION

Following the directions on the provided Instruction Sheet –J01322, measure the piston and record you measurement to the fourth decimal place.

Your measurement: \_\_\_\_\_ . \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

Using the specifications for new components as indicated on the provided Instruction Sheet – J01322, calculate the diameter cylinder on the engine. The cylinder must be;

No smaller than \_\_\_\_\_ . \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

No larger than \_\_\_\_\_ . \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

The cylinder / piston combination would be considered worn out if the cylinder measures larger than

\_\_\_\_\_ . \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

## Section 3 - Valve Spring Inspection 30 - Points

This section has two parts:

In part 1 you will be measuring the spring force of a valve spring set. Based on your results you will determine if the installation of the spring set will be within specifications.

In Part 2 you will measure the clearance available for valve movement. This is known as free travel. Based on your measurement you will determine if the clearance is sufficient for the installation of a specific camshaft.

### PART 1 – 15 Points

Following the directions on the provided Instruction Sheet for the Performance Valve Spring - J01991, measure the spring force and evaluate the results.

Spring pressure at installed height. \_\_\_\_\_

Recommended Maximum lift spring length. \_\_\_\_\_

Spring pressure at recommended maximum lift. \_\_\_\_\_

### PART 2 – 15 Points

Following the directions on the provided Instruction Sheet -J02739, measure the valve free travel as described in step 3 and evaluate the results.

What is the Free Travel Measurement? (#4 on the instruction sheet) \_\_\_\_\_

Based on the lift specified on the instruction sheet;

What is the clearance when the valve is at maximum lift? \_\_\_\_\_

Is the clearance measured on the cylinder head acceptable if the camshaft is used? Y / N

## Section 4 – Bolt Specifications 10-Points

Record the specifications in **fractional** format for each of the provided bolts.

Bolt A

What thread diameter is the bolt? \_\_\_\_\_

What is the thread specification (Threads Per Inch) for the bolt? \_\_\_\_\_

What would the length specification for the bolt be listed as? \_\_\_\_\_

What size wrench is used with the bolt? \_\_\_\_\_

Bolt B

What thread diameter is the bolt? \_\_\_\_\_

What is the thread specification (Threads Per Inch) for the bolt? \_\_\_\_\_

What would the length specification for the bolt be listed as? \_\_\_\_\_

What size wrench is used with the bolt? \_\_\_\_\_

# SkillsUSA

## 2015 Motorcycle Service Technology

### Measurement Workstation Introduction

**(Read this page carefully before continuing)**

An essential skill needed when performing service is correctly making measurements and interpreting the results. This work station will require that you accurately take specific measurements on several components and then interpret your results using the information provided in service literature.

There are four (4) stations at this workstation. Each section will require you to make specific measurements using the provided measuring tools. Each section has related service instructions to guide you on making the measurement and the related specification needed to evaluate the results.

#### STATION 1

##### Piston Ring Inspection and Installation:

You will measure the ring end gap of a top and second compression ring in a sample cylinder and record your results. Based on your results you will determine ring condition.

After measuring the rings you will install them onto a piston and position the end gaps following manual directions.

#### STATION 2

You will measure a piston using a micrometer and record the results. Based on the measurement and the clearance specifications, you will calculate the corresponding cylinder size requirements.

#### STATION 3

##### Valve Spring Pressure measurement and Valve Free Travel Inspection

You will use a Spring Force Tester to measure valve spring tension. You will measure at the installed height and then calculate the height at maximum valve lift and test this pressure.

You will measure the valve free travel distance on a sample cylinder head and then use the specifications provided to determine if a specific camshaft can be used.

#### STATION 4

##### Bolt ID and measurements

Identify the diameter, threads per inch, length and head size of two sample bolts.



Contestant # \_\_\_\_\_

Judge's Initials: \_\_\_\_\_

Start  
Time: \_\_\_\_\_

Stop  
Time: \_\_\_\_\_

## SkillsUSA

### 2015 Motorcycle Service Technology

## Measurement Workstation Score Sheet

Time Limit 1/2 hr.

Scoring Directions:

Use the scoring criteria listed below:

**"0"** indicates the contestant **could not or did not** correctly perform the task.

**"1" "2" "5" or "10"** indicates the contestant **did perform** the entire task correctly.

**PERFORMANCE:** Grade the student's performance and record their score below.

## Section 1 - Piston Ring Measurements and Alignment

To be considered correct both the measurement and the position at which the measurement was taken must be correct.

Was the Measurement of the Top Compression Ring correct? 0 5

Was the Measurement of the Second Compression Ring correct? 0 5

Standard minimum specifications correct? 0 2

Standard Maximum specifications correct? 0 2

Correct decision on wear limits made? 0 1

Rings in correct groove? 0 5

Rings installed in correct direction? 0 5

Ring Gaps positioned in the correct locations? 0 5

Score \_\_\_\_\_ (30 pts possible)

## Section 2 – Piston Measurements

To be considered correct both the measurement and the position at which the measurement was taken must be correct.

Was the Measurement of the Piston correct?	0	10
Standard minimum specifications correct?	0	5
Standard Maximum specifications correct?	0	5
Was the calculation for the cylinder size correct?	0	10
Score	_____	(30 pts possible)

## Section 3 - Valve Spring Inspection

To be correct the pressure must be measured at 1.800"

Was the spring pressure at installed height correct?	0	5
Was the correct maximum spring length calculated?	0	5
Was the spring pressure at maximum lift correct?	0	5
Was the valve free travel measurement correct?	0	5
Was the clearance calculated correctly?	0	5
Was the correct decision on use of camshaft made?	0	5
Score	_____	(30 pts possible)

## Section 4 – Bolt Specifications

To be correct all four questions must be correct.

Bolt A	0	5
What thread diameter is the bolt?	Y / N	
What is the thread specification (Threads Per Inch) for the bolt?	Y / N	
What would the length specification for the bolt be listed as?	Y / N	
What size wrench is used with the bolt?	Y / N	

Bolt B	0	5
What thread diameter is the bolt?	Y / N	
What is the thread specification (Threads Per Inch) for the bolt?	Y / N	
What would the length specification for the bolt be listed as?	Y / N	
What size wrench is used with the bolt?	Y / N	

Score	_____	(10 pts possible)
-------	-------	-------------------

Total Score	_____	(100 pts possible)
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# INSTRUCTIONS

-J01322

REV. 2008-10-20

## SCREAMIN' EAGLE 1550 TWIN CAM STROKER FORGED PISTON KIT

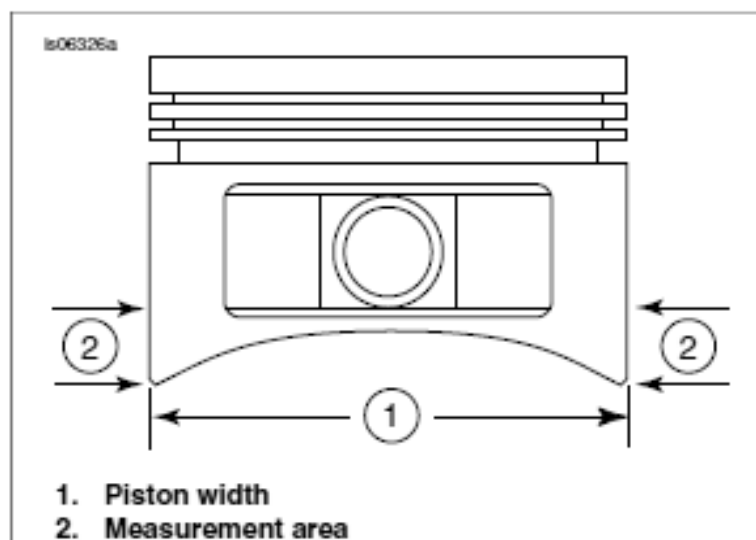


Figure 1. Piston Measurements

5. See Figure 1. Measure the piston width (1), 90 degrees horizontally from both sides of the piston pin hole and at **0.500 in.** above (2), the lowest portion of the skirt. See Table 2 for piston-to-cylinder fit at this location.

Table 2. Piston Manufacturing Tolerances

Piston:	Tolerance (in.)
Fit in cylinder	0.0015-0.0025
Compression ring gap	
Top	0.009-0.015
Second	0.019-0.029
Oil control rail gap	0.010-0.030

Table 3. Piston Service Wear Limits

Piston:	Wear Limit (in.)
Fit in cylinder	0.005
Compression ring gap	
Top	0.025
Second	0.039
Oil control rail gap	0.030

# Checking Piston Ring Gap

1. See Figure 3-62. Check ring end gap of each ring before placing on the piston. Insert the ring into the cylinder and square it in the bore 1.5 to 2 inches from the top of the bore using the top of the piston. Measure the ring end gap with a feeler gauge. Refer to Table 3-37.

## NOTE

The Second Compression Ring has a DOT or (Punch Mark) near the gap the Top Compression Ring does not have any markings.

**Table 3-37. Piston Ring End Gap**

PISTON RING		IN	MM
Twin Cam 103	Top compression	0.012-0.022	0.305-0.559
	2nd compression	0.015-0.025	0.381-0.635
PISTON RING		REPLACE IF WEAR EXCEEDS	
		IN	MM
Ring end gap	Top compression	0.030	0.762
	2nd compression	0.034	0.864



**Figure 3-62. Measuring Ring Gap**

Installing Rings On Back of this page

# Installing Piston Rings

1. Identify the position of the piston using the marks on the top. See Figure 3-64 and 3-63.
2. Install expansion ring (4) into third ring groove. The ends at the gap must face UP.
3. Spiral bottom oil rail (5) into space below expansion ring.
4. Spiral top oil rail (3) into space above expansion ring.

## NOTES

Use the piston ring spreader to prevent excessive ring twist. Over expansion may cause the ring to crack.

Installing the second compression ring upside down will cause oil to be scraped up into combustion chamber.

5. Using PISTON RING EXPANDER (Snap-on PRS8), carefully install the second compression ring. Make sure the dot (punch mark) near the ring gap faces the piston crown.
6. Install the top compression ring. There is no directional marking on this ring and it can be installed with either side facing up.
7. Rotate the three piston rings in their grooves. A pick can be used to rotate the rings.
8. See figure 3-64. Based on the piston location and direction, position the ring gaps as indicated.

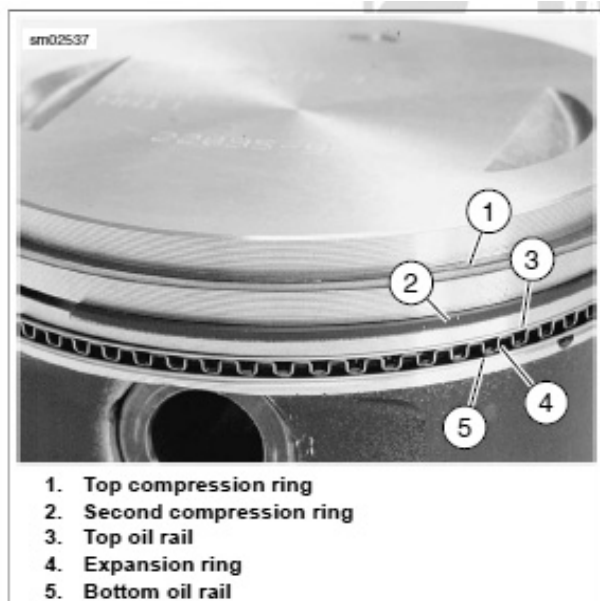


Figure 3-63. Piston Rings

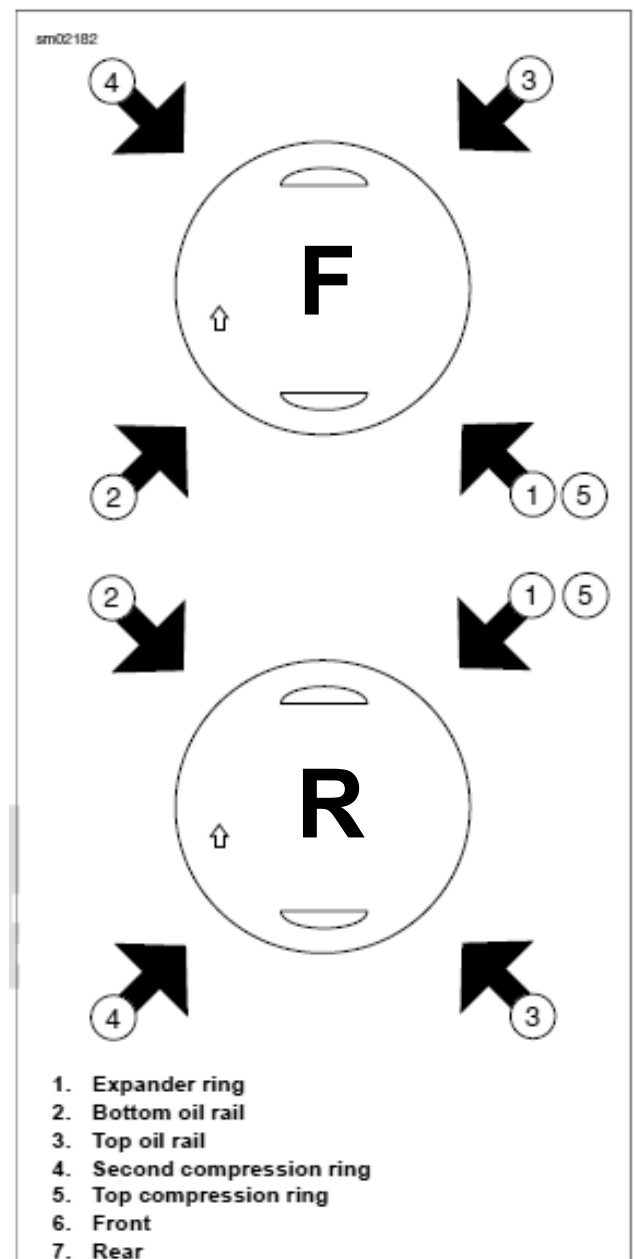
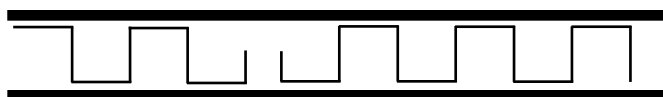


Figure 3-64. Piston Ring Gap Alignment



# INSTRUCTIONS

-J01991

REV. 6-14-01

Kit Number 18273-00

## SCREAMIN' EAGLE PERFORMANCE VALVE SPRING KIT

Valve spring tension is critical for correct valve sealing. It is important that the spring passes inspection at two points; when the valve is closed and at maximum lift.

1. Position the valve spring set in the fixture as shown below. All springs used in the set are tested at the same time. Position the flats on the jaws as shown.



2. Compress the spring in the fixture until the spring is compressed to the installed height. Use a dial caliper to measure between the jaws as shown below.



3. Compare the reading on the gage to the specification for the spring set. Check at installed height and compressed to maximum lift. Subtract the lift specification from the installed height. Spring pressures must be at or above the specification.

Spring Kit (Valve Stem Dia.)	Force at 1.800" Installed Height	Recommended Max Lift	Spring Force at Max Lift	RPM Range	Spring Type
<b>18273-00</b> (5/16")	174	.585	448	0-6500	Double wound with dampener

TWIN CAM PERFORMANCE CYLINDER HEADS

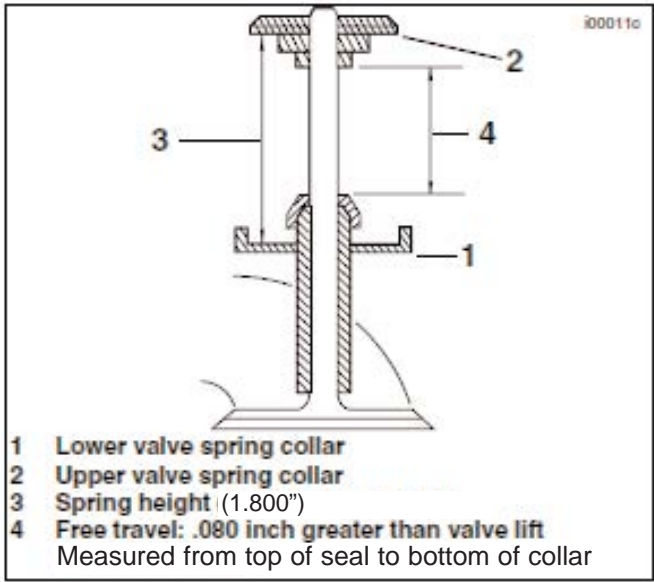
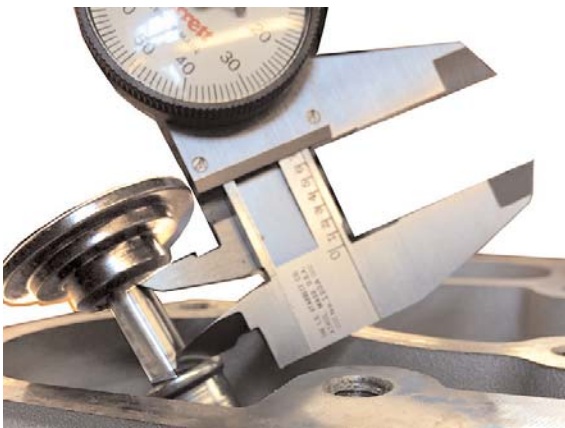
When installing performance valve train components it is important to verify that components have adiqute clearance to allow for movement. The clearance between the bottom of the valve spring collar and the top of the valve guide seal is critical for engine operation. To determine this clearance:

Measure the distance from the bottom of the spring collar to the top of the valve seal using a dial caliper.

1. Remove the valve spring.
2. Install the upper valve spring collar and the keepers as shown below.
3. Hold the valve closed and measure the distance with the caliper.
4. Compare this measurment to the lift at valve specification. It is recomended that this distance be 0.080" larger than the lift of the camshaft being used.

CAM SPECIFICATIONS

Description	Part Number	Popularity	Lift @ Valve Intake/Exhaust	Duration @ .053 Intake/Exhaust	Timing @ .053 Lift Open/Close	TDC Lift @ Valve Intake/Exhaust
SE-204 Midrange TQ	25464-06	**	.508"/.508"	236°/240°	Intake: 22° BTDC/34° ABDC Exhaust: 52° BBDC/08° ATDC	0.208"/.129"







# **SkillsUSA**

## **2015 Motorcycle Service Technology**

### **Loctite® Threadlockers: Why, When, Where & How**

#### **100 Possible Points**

Time Limit 30 Minutes.

#### **OBJECTIVE:**

Given reference material the participants will correctly mark the answers to the Loctite® product questions with a highlighter.

#### **SPECIFIC SKILLS:**

The contestant will:

1. Reference the station materials to correctly perform the assigned task.
2. Use the provided highlighter to mark the correct answers to the questions.
3. Clean and organize the work area when complete.



## **Loctite® Threadlockers: Why, When, Where & How**

**Highlight the letter of the correct answer for each question.**

1. Threadlockers are available in all forms except:
  - a. Liquid
  - b. Solid
  - c. Gas
  - d. Both A and B
  - e. None of the above
2. Using the Transverse Vibration Tester, which mechanical fastener holds the percent of clamp load best?
  - a. Nylon Nut
  - b. Bolt with Saw-Toothed Flange
  - c. Toothed Lockwasher
  - d. Split Ring Washer
  - e. Loctite® Threadlocker
3. The lockwasher was invented in:
  - a. 1903
  - b. 1953
  - c. 1900
  - d. 1901
  - e. 1899
4. Loctite® products are designed for \_\_\_\_\_ applications.
  - a. Metal to metal
  - b. Plastic to metal
  - c. Plastic to plastic
  - d. Both A and C
  - e. All of the above
5. Loctite® Threadlocker is to be used on:
  - a. The head of the fastener
  - b. The threads of the fastener
  - c. The material joint
  - d. The fastener and nut need the application
  - e. Both B & D

6. Semisolid formulas of Loctite® products are designed for:
- a. Overhead applications
  - b. Overhead, underwater, and high pressure applications
  - c. Every day, overhead, and underwater applications
  - d. Underwater applications
  - e. All of the above
7. ODC is an abbreviation for:
- a. Oil deficient compound
  - b. Ozone depleting compound
  - c. Only dry compound
  - d. Oil degreased clamp load
  - e. Oil debris cleaner
8. When heat is applied:
- a. The fastener will contract allowing the nut to loosen easily
  - b. The fastener will apply more force to the fastener
  - c. The fastener will expand releasing clamp load
  - d. The fastener will not expand or contract but the Loctite® will break down
  - e. None of the above
9. Loctite® Threadlocker products are designed for:
- a. Metal to metal
  - b. Plastic to metal
  - c. Plastic to plastic
  - d. Ceramic to plastic
  - e. All of the above
10. Loctite® Threadlocker is designed to bond material:
- a. With pressure from the fasteners
  - b. With the absence of air
  - c. With pressure and force
  - d. Both A and B
  - e. None of the above
11. Loctite® Threadlockers are designed to control five major variables including:
- a. Adhesion, Flexibility, Shear, Viscosity, and Cracking
  - b. Flexibility, Temperature Resistance, Adhesion, Viscosity, and Cracking
  - c. Adhesion, Flexibility, Shear, Viscosity, and Temperature Resistance
  - d. Viscosity, Adhesion, Flexibility, Temperature Resistance, and Strength
  - e. Flexibility, Adhesion, Temperature Adaption, Viscosity, and Cracking

12. When using a mechanical locking device the technician has to be aware of the shortcomings of the fastener. Which is not a shortcoming?
- a. Mechanical locks do not seal the threads
  - b. Vibration
  - c. Heat
  - d. Increases inventory
  - e. All above are shortcomings
13. Loctite® was created in:
- a. 1956
  - b. A basement
  - c. A laboratory
  - d. All of the above
  - e. None of the above
14. Loctite® Assure™ products are designed for:
- a. Metal to metal
  - b. Plastic to metal
  - c. Plastic to plastic
  - d. Both A and C
  - e. Both B and C
15. Loctite® product is used to:
- a. Seal threads in blind holes
  - b. Retain through bolts mechanically
  - c. Provide lubricity
  - d. Eliminate vibration
  - e. None of the above
16. Loctite® makes products to:
- a. Activate inactive surfaces
  - b. Penetrate corroded parts
  - c. Electronically remove fasteners
  - d. Both A & C
  - e. Both A & B
17. Loctite® products are rated to hold clamp load:
- a. At 100% up to temperatures greater than 550 degrees F
  - b. At over 90% up to temperatures above 550 degrees F
  - c. At 100% up to temperatures of 550 degrees F
  - d. At over 90% up to temperatures of 550 degrees F
  - e. At any temperature

Judges Initials:\_\_\_\_\_

Score:\_\_\_\_\_

Contestant Number: \_\_\_\_\_

18. Which fastener is not intended to have Loctite® product applied to?
- a. Fine thread Fasteners
  - b. Course thread fasteners
  - c. Metric fasteners
  - d. British fasteners
  - e. None of the above
19. Loctite® threadlocker:
- a. Protects against galling
  - b. Is an anaerobic sealant
  - c. Has wicking abilities
  - d. Is variable in viscosity
  - e. All of the above
20. Early Harley-Davidson Motorcycles had \_\_\_\_\_ to change if the rider wanted to ride at highway speeds.
- a. belts
  - b. pulleys
  - c. tires
  - d. wheels
  - e. None of the above



## **Loctite® Threadlockers: Why, When, Where & How**

**Highlight the letter of the correct answer for each question.**

1. Threadlockers are available in all forms except:
  - a. Liquid
  - b. Solid
  - c. Gas
  - d. Both A and B
  - e. None of the above
2. Using the Transverse Vibration Tester, which mechanical fastener holds the percent of clamp load best?
  - a. Nylon Nut
  - b. Bolt with Saw-Toothed Flange
  - c. Toothed Lockwasher
  - d. Split Ring Washer
  - e. Loctite® Threadlocker
3. The lockwasher was invented in:
  - a. 1903
  - b. 1953
  - c. 1900
  - d. 1901
  - e. 1899
4. Loctite® products are designed for \_\_\_\_\_ applications.
  - a. Metal to metal
  - b. Plastic to metal
  - c. Plastic to plastic
  - d. Both A and C
  - e. All of the above
5. Loctite® Threadlocker is to be used on:
  - a. The head of the fastener
  - b. The threads of the fastener
  - c. The material joint
  - d. The fastener and nut need the application
  - e. Both B & D

6. Semisolid formulas of Loctite® products are designed for:
  - a. Overhead applications
  - b. Overhead, underwater, and high pressure applications
  - c. Every day, overhead, and underwater applications
  - d. Underwater applications
  - e. All of the above
7. ODC is an abbreviation for:
  - a. Oil deficient compound
  - b. Ozone depleting compound
  - c. Only dry compound
  - d. Oil degreased clamp load
  - e. Oil debris cleaner
8. When heat is applied:
  - a. The fastener will contract allowing the nut to loosen easily
  - b. The fastener will apply more force to the fastener
  - c. The fastener will expand releasing clamp load
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  - a. Adhesion, Flexibility, Shear, Viscosity, and Cracking
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  - d. Viscosity, Adhesion, Flexibility, Temperature Resistance, and Strength
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  - c. Heat
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  - c. Provide lubricity
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  - c. Electronically remove fasteners
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  - e. Both A & B
17. Loctite® products are rated to hold clamp load:
- a. At 100% up to temperatures greater than 550 degrees F
  - b. At over 90% up to temperatures above 550 degrees F
  - c. At 100% up to temperatures of 550 degrees F
  - d. At over 90% up to temperatures of 550 degrees F
  - e. At any temperature



Judges Initials:\_\_\_\_\_

Score:\_\_\_\_\_

Contestant Number: \_\_\_\_\_

18. Which fastener is not intended to have Loctite® product applied to?
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  - d. British fasteners
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- a. Protects against galling
  - b. Is an anaerobic sealant
  - c. Has wicking abilities
  - d. Is variable in viscosity
  - e. All of the above
20. Early Harley-Davidson Motorcycles had \_\_\_\_\_ to change if the rider wanted to ride at highway speeds.
- a. belts
  - b. pulleys
  - c. tires
  - d. wheels
  - e. None of the above



## 2015 SkillsUSA Electrical Diagnostics

Contestant Number \_\_\_\_\_ Judges Initials \_\_\_\_\_ Start Time \_\_\_\_\_ End Time \_\_\_\_\_

### CKP CRANKING TEST (DYNA) using the Break Out Box (B.O.B.)

Mark with an "X" the bank number used on the (B.O.B.) 78-1 X, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

List the (B.O.B.) pin locations for the Red meter lead 16, and the Black lead 18

Now crank motor 3 seconds recording the reading. 3.25 – 5.25 VAC, (list unit of measure)

(0,10) \_\_\_\_\_  
(Score)

### REAR INJECTOR DRIVER TEST CRANKING TEST (DYNA) using the Break Out Box (B.O.B.)

Mark with an "X" the bank number used on the (B.O.B.) for the Red lead of the pig tail 78-1 \_\_\_\_\_, 78-2 X, 78-3 \_\_\_\_\_

List the (B.O.B.) pin locations for the Red lead of the pig tail 16,

Mark with an "X" the bank number used on the (B.O.B.) 78-1 X, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

List the (B.O.B.) pin locations for the Black lead of the pig tail Black lead 6

Now crank motor 3 seconds. Did the light bulb flash? Yes X, No \_\_\_\_\_

(0,10) \_\_\_\_\_  
(Score)

### FRONT COIL DRIVER TEST CRANKING TEST (DYNA) using the Break Out Box (B.O.B.)

Mark with an "X" the bank number used on the (B.O.B.) for the Red lead of the pig tail 78-1 \_\_\_\_\_, 78-2 X, 78-3 \_\_\_\_\_

List the (B.O.B.) pin locations for the Red lead of the pig tail 16,

Mark with an "X" the bank number used on the (B.O.B.) 78-1 X, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

List the (B.O.B.) pin locations for the Black lead of the pig tail Black lead 2

Now crank motor 3 seconds. Did the light bulb flash? Yes X, No \_\_\_\_\_

(0,10) \_\_\_\_\_  
(Score)

### VOLTAGE DROP OF VOLTAGE REGULATOR HARNESS USING HARNESS JUMPER (RED WIRE)

List placement of the Red meter lead Red wire on jumper / Bat +

List placement of the Black meter lead Bat + / Red wire on jumper (either connection yields same result)

Now crank motor 3 seconds recording the reading. .2-.5 VDC, (list unit of measure)

(0,10) \_\_\_\_\_  
(Score)

(40 points possible this page)

TOTAL \_\_\_\_\_

TURN OVER PAGE



### VOLTAGE DROP OF VOLTAGE REGULATOR HARNESS USING HARNESS JUMPER (BLACK WIRE)

List placement of the Red meter lead Black wire on jumper / Bat -

List placement of the Black meter lead Bat - / Black wire on jumper

Now crank motor 3 seconds recording the reading. .05 - .2 VDC, (list unit of measure) (0,10) \_\_\_\_\_  
(Score)

### VOLTAGE DROP OF BATTERY POSITIVE CABLE

List placement of the Red meter lead End of battery RED cable / Bat + (either connection produces a good reading)

List placement of the Black meter lead Bat + / End Red Cable

Now crank motor 3 seconds recording the reading. .1-.5 VDC, (list unit of measure) (0,10) \_\_\_\_\_  
(Score)

### VOLTAGE DROP OF BATTERY NEGATIVE CABLE

List placement of the Red meter lead Black Bat - Cable / Bat - (either connection produces a good reading)

List placement of the Black meter lead Bat - / Black Bat - Cable

Now crank motor 3 seconds recording the reading. .1-.4 VDC, (list unit of measure) (0,10) \_\_\_\_\_  
(Score)

### DISCONNECT IGNITION COIL AND USE GRAY SOCKET PROBES & DVOM-IGNITION COIL TESTING

Rear coil primary resistance specification 0.3-1.5 Ohm, Red lead (placement) Pin A, Black lead (placement) Pin C,  
Primary resistance 0.3-1.5 Ohm, (list unit of measure) (0,5) \_\_\_\_\_ (Score)

Front coil primary resistance specification 0.3-1.5 Ohm, Red lead (placement) Pin A, Black lead (placement) Pin D,  
Primary resistance 0.3-1.5 Ohm, (list unit of measure) (0,5) \_\_\_\_\_ (Score)

ION Sense to front coil resistance spec 2500-3500 Ohms, Red lead (placement) Pin B, Black lead (placement) Front Output Tower,  
ION Sense coil resistance 2500-3500 Ohms, (list unit of measure) (0,5) \_\_\_\_\_ (Score)

Secondary coil resistance specification 5500-7500 Ohms, Red lead Front Output Tower Black lead Rear Output Tower,  
Secondary resistance 5500-7500 Ohms, (list unit of measure) (0,5) \_\_\_\_\_ (Score)

Coil Internal Short test Red meter lead (placement) Pin A, Black meter lead (placement) Pin B,  
List meter reading OL = good coil, (list unit of measure) Did coil pass the internal short test? Yes (0,2) \_\_\_\_\_ (Score)

### CONNECT IGNITION COIL AND USE B.O.B.

Mark with an "X" the bank number used on the (B.O.B.) 78-1 X, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

Rear Coil Short to ground test (B.O.B.) Red meter lead (placement) 1, Black meter lead (placement) BAT-,  
List meter reading OL = good coil, (list unit of measure) Did coil pass the internal short test? Yes (0,4) \_\_\_\_\_ (Score)

Mark with an "X" the bank number used on the (B.O.B.) 78-1 X, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

Front Coil Short to ground test (B.O.B.) Red meter lead (placement) 2, Black meter lead (placement) BAT-,  
List meter reading OL = good coil, (list unit of measure) Did coil pass the internal short test? Yes (0,4) \_\_\_\_\_ (Score)

(60 points possible this page)  
(100 points possible)

TOTAL \_\_\_\_\_  
TOTAL \_\_\_\_\_



## 2015 SkillsUSA Electrical Diagnostics

Contestant Number \_\_\_\_\_ Judges Initials \_\_\_\_\_ Start Time \_\_\_\_\_ End Time \_\_\_\_\_

### CKP CRANKING TEST (DYNA) using the Break Out Box (B.O.B.)

Mark with an "X" the bank number used on the (B.O.B.) 78-1 \_\_\_\_\_, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

List the (B.O.B.) pin locations for the Red meter lead \_\_\_\_\_, and the Black lead \_\_\_\_\_

Now crank motor 3 seconds recording the reading. \_\_\_\_\_, (list unit of measure)

(0,10) \_\_\_\_\_  
(Score)

### REAR INJECTOR DRIVER TEST CRANKING TEST (DYNA) using the Break Out Box (B.O.B.)

Mark with an "X" the bank number used on the (B.O.B.) for the Red lead of the pig tail 78-1 \_\_\_\_\_, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

List the (B.O.B.) pin location for the Red lead of the pig tail \_\_\_\_\_,

Mark with an "X" the bank number used on the (B.O.B.) 78-1 \_\_\_\_\_, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

List the (B.O.B.) pin location for the Black lead of the pig tail Black lead \_\_\_\_\_

Now crank motor 3 seconds. Did the light bulb flash? Yes \_\_\_\_\_, No \_\_\_\_\_

(0,10) \_\_\_\_\_  
(Score)

### FRONT COIL DRIVER TEST CRANKING TEST (DYNA) using the Break Out Box (B.O.B.)

Mark with an "X" the bank number used on the (B.O.B.) for the Red lead of the pig tail 78-1 \_\_\_\_\_, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

List the (B.O.B.) pin location for the Red lead of the pig tail \_\_\_\_\_,

Mark with an "X" the bank number used on the (B.O.B.) 78-1 \_\_\_\_\_, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_

List the (B.O.B.) pin location for the Black lead of the pig tail Black lead \_\_\_\_\_

Now crank motor 3 seconds. Did the light bulb flash? Yes \_\_\_\_\_, No \_\_\_\_\_

(0,10) \_\_\_\_\_  
(Score)

### VOLTAGE DROP OF VOLTAGE REGULATOR HARNESS USING HARNESS JUMPER (RED WIRE)

List placement of the Red meter lead \_\_\_\_\_

List placement of the Black meter lead \_\_\_\_\_

Now crank motor 3 seconds recording the reading. \_\_\_\_\_, (list unit of measure)

(0,10) \_\_\_\_\_  
(Score)

(40 points possible this page)

TOTAL \_\_\_\_\_

TURN OVER PAGE



### VOLTAGE DROP OF VOLTAGE REGULATOR HARNESS USING HARNESS JUMPER (BLACK WIRE)

List placement of the Red meter lead \_\_\_\_\_

List placement of the Black meter lead \_\_\_\_\_

Now crank motor 3 seconds recording the reading. \_\_\_\_\_, (list unit of measure) (0,10) \_\_\_\_\_  
(Score)

### VOLTAGE DROP OF BATTERY POSITIVE CABLE

List placement of the Red meter lead \_\_\_\_\_

List placement of the Black meter lead \_\_\_\_\_

Now crank motor 3 seconds recording the reading. \_\_\_\_\_, (list unit of measure) (0,10) \_\_\_\_\_  
(Score)

### VOLTAGE DROP OF BATTERY NEGATIVE CABLE

List placement of the Red meter lead \_\_\_\_\_

List placement of the Black meter lead \_\_\_\_\_

Now crank motor 3 seconds recording the reading. \_\_\_\_\_, (list unit of measure) (0,10) \_\_\_\_\_  
(Score)

### DISCONNECT IGNITION COIL AND USE GRAY SOCKET PROBES & DVOM-IGNITION COIL TESTING

Rear coil primary resistance specification \_\_\_\_\_, Red lead (placement) \_\_\_\_\_, Black lead (placement) \_\_\_\_\_,  
Primary resistance \_\_\_\_\_, (list unit of measure) (0,5) \_\_\_\_\_ (Score)

Front coil primary resistance specification \_\_\_\_\_, Red lead (placement) \_\_\_\_\_, Black lead (placement) \_\_\_\_\_,  
Primary resistance \_\_\_\_\_, (list unit of measure) (0,5) \_\_\_\_\_ (Score)

ION Sense to front coil resistance specification \_\_\_\_\_, Red lead (placement) \_\_\_\_\_, Black lead (placement) \_\_\_\_\_,  
ION Sense coil resistance \_\_\_\_\_, (list unit of measure) (0,5) \_\_\_\_\_ (Score)

Secondary coil resistance specification \_\_\_\_\_, Red lead (placement) \_\_\_\_\_, Black lead (placement) \_\_\_\_\_,  
Secondary resistance \_\_\_\_\_, (list unit of measure) (0,5) \_\_\_\_\_ (Score)

Coil Internal Short test Red meter lead (placement) \_\_\_\_\_, Black meter lead (placement) \_\_\_\_\_,  
List meter reading \_\_\_\_\_, (list unit of measure) Did coil pass the internal short test? \_\_\_\_\_ (0,2) \_\_\_\_\_ (Score)

### CONNECT IGNITION COIL AND USE B.O.B.

Mark with an "X" the bank number used on the (B.O.B.) 78-1 \_\_\_\_\_, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_  
Rear Coil Short to ground test (B.O.B.) Red meter lead (placement) \_\_\_\_\_, Black meter lead (placement) \_\_\_\_\_,  
List meter reading \_\_\_\_\_, (list unit of measure) Did coil pass the internal short test? \_\_\_\_\_ (0,4) \_\_\_\_\_ (Score)  
Yes / No

Mark with an "X" the bank number used on the (B.O.B.) 78-1 \_\_\_\_\_, 78-2 \_\_\_\_\_, 78-3 \_\_\_\_\_  
Front Coil Short to ground test (B.O.B.) Red meter lead (placement) \_\_\_\_\_, Black meter lead (placement) \_\_\_\_\_,  
List meter reading \_\_\_\_\_, (list unit of measure) Did coil pass the internal short test? \_\_\_\_\_ (0,4) \_\_\_\_\_ (Score)  
Yes / No

(60 points possible this page)  
(100 points possible)

TOTAL \_\_\_\_\_  
TOTAL \_\_\_\_\_



From the Wiring Diagram below use the DVOM perform a cranking CKP output test.

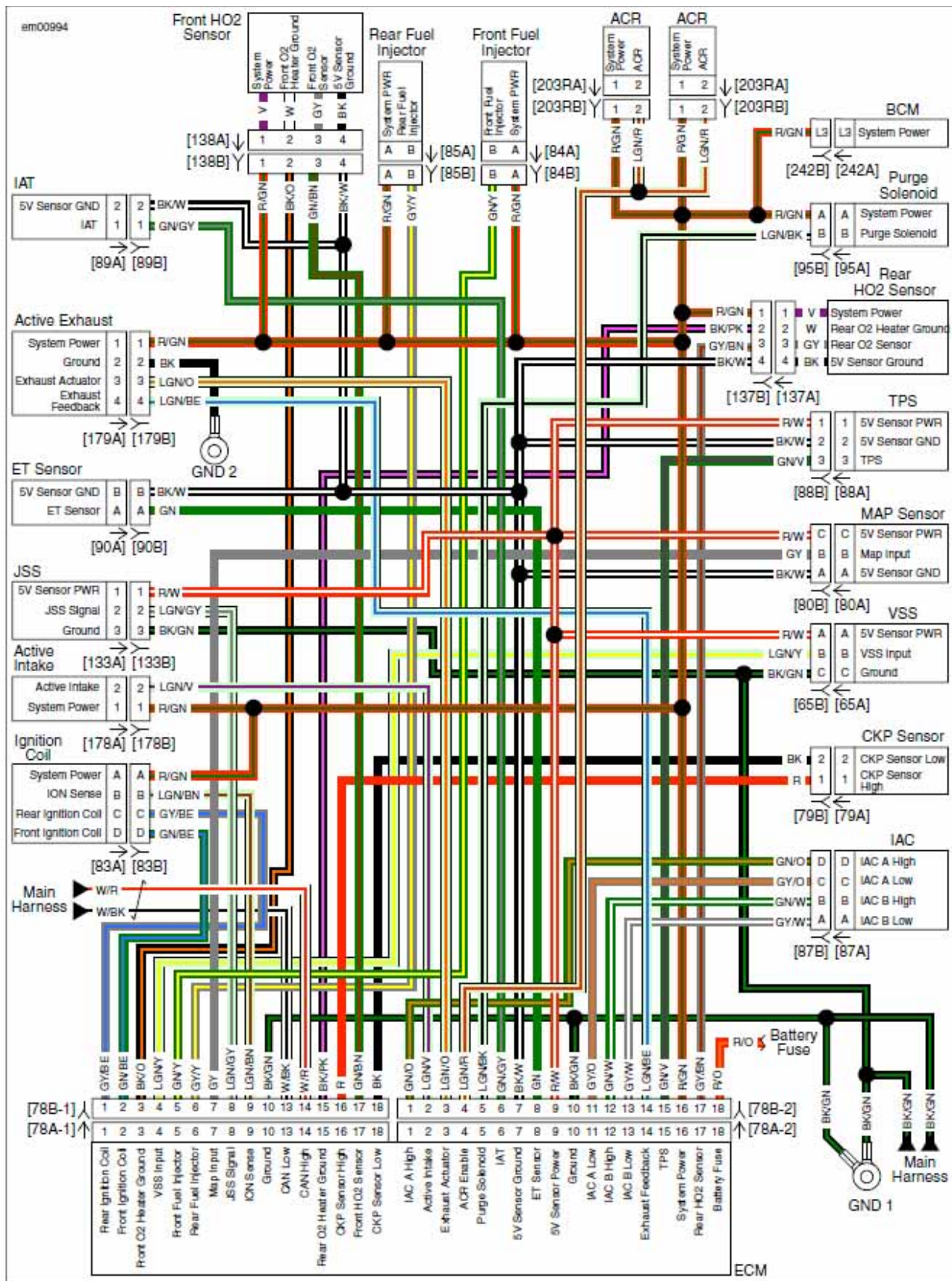


Figure 6-1. EFI Simplified Schematic

## Break Out Box (B.O.B.)

We use this box between a module and its connector on the wiring harness. As the name **Professional** Harley-Davidson (PHD) implies, we don't take risks damaging socket terminals in the connectors that feed modules because we know the sockets are fragile. We don't want pin probes going into those socket terminals directly because of the high risk of damage that can occur.

I had a student from West Virginia describe this best telling the class one day .... "yeah, you don't want to waller them sockets out!" We all laughed with him at first, but then I got to thinking how great of a word is the word "waller". It communicates! It communicates a huge electrical principle, that being the importance of good connections! Its vital!



We use the Break Out Box (B.O.B.) to probe the various wires to check for continuity, voltage, and function. The B.O.B.'s that we will be using utilize the banana jack meter leads directly-no pin probe needed. Older B.O.B.'s needed the pink pin probe from our pin probe kit HD-41404D. With the B.O.B. between the module and the connector a technician can start and run the motorcycle.

using the B.O.B. Crank Position Sensor (CKP) output testing is easy. Simply match up the Red and Black meter leads for the CKP sensor high and CKP sensor low. Set the Digital Volt Ohms Meter (DVOM) to AC Volts for this test. The CKP has a magnet with a North and South Pole inside the sensor. When the flywheel teeth pass each pole of the magnet AC voltage is generated. This is called induction. The ECM needs to see this voltage prior to allowing spark and fuel to flow. Good CKP output on a big twin Harley-Davidson motor is also very dependent on cranking speed. As you should have concluded, cranking speed is dependent on a healthy battery. With a good battery, a good CKP output on a big twin (Dynas, Softails and Touring motorcycles) should generate between 3.25-5.25 (Alternating Current Voltage) ACV. See the 'book procedure' for the CKP output test listed to the left. Cross check this by looking at the ECM wiring diagram. Remember, magnets do show fatigue over time so to know what a good reading looks like is imperative.

Test AC voltage between BOB [78-1] terminals 16 and 18.

Crank engine for 5 seconds while observing multimeter.

Is AC voltage greater than 2V?

- Yes.** See diagnostic tips. If MAP and IAT sensors are good, replace the ECM.
- No.** Replace CKP sensor.





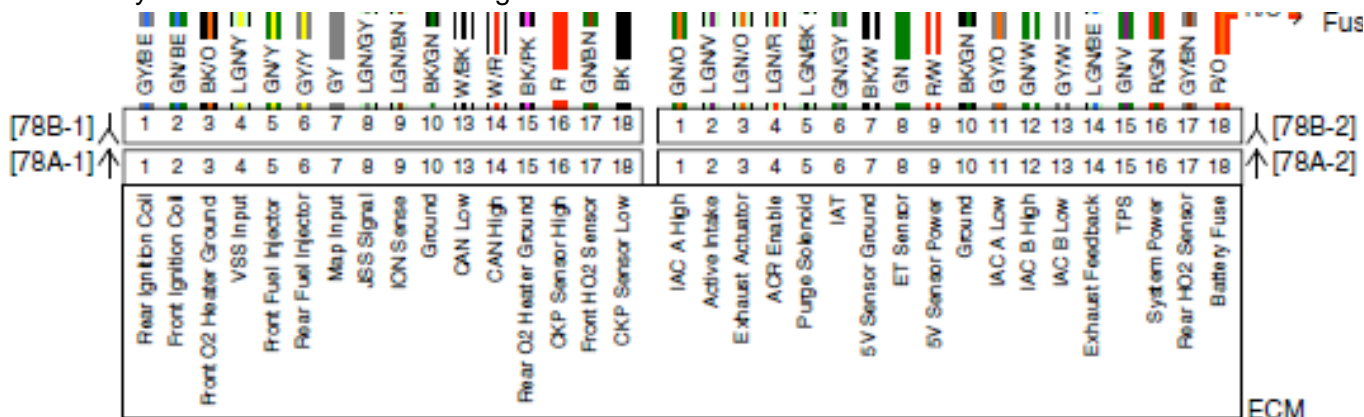
## Coil Operation

When the CKP provides an AC voltage signal to the ECM, the ECM detects the slowing down of the flywheels on each compression stroke. The ECM completes the circuit (coil driver) and energizes the primary windings of the coil for the front coil. Then the ECM opens the circuit approximately 15 degrees before front cylinder top dead center (TDC) compression. This magnetic field collapse goes over the primary windings and into the secondary windings. The primary voltage is amplified as it collapses over the secondary windings. Because the cylinder is under compression it takes about 20 to 30,000 Volts to jump the gap of the spark plug.

## Driver testing (Ignition coil drivers and Injector drivers)

The coil driver and injector driver function is internal to the ECM not the ignition coil nor the injectors.

For the coil, the ECM opens and closes the circuit to pin C (Coil Rear) and pin D (Coil Front) and the ground takes place at each separate spark plug. This function of the ECM is the coil driver. A coil driver test is done at the B.O.B. using the injector test light (pig tail) and coil circuit test adapter light. Connect **POSITIVE** meter lead to system power and the **NEGATIVE** meter lead on each coil and injector wire (front and rear) in the B.O.B. Crank the engine. The test light should blink-showing coil/injector driver function. The fuel pump connector has been unplugged so the motor will not start. This quick cranking test is easy to complete with the B.O.B. Here is a question to think about. What would the outcome of a driver test be if the CKP was faulty? Lets talk about this more Thursday in our discussion / teaching time.



## ION Sense

ION Sense is an internal knock-detector/combustion analyzer within the ECM. The secondary ignition circuit has the secondary tower out to the spark plug wires on one side and the other is the coil terminal B (ION Sense pin). This pin connects through the wiring harness to the ECM at terminal 9 (78A-1). This ION sense wire as shown from the diagram is Light Green with a Brown stripe (LGN/BN). During a spark event, 80 Volts DC is stored in a capacitor for a brief moment and then the ECM sends it through terminal 9 through the coil and out the secondary output tower to the spark plug. IONs are left over in the combustion chamber after a spark event and they are conductors of electricity. An efficient spark event leaves behind many IONS. An inefficient spark event leaves behind few IONS. The ECM measures how much current (amps) it takes for the 80 Volts DC to jump the gap of the sparkplug. If there is a high amount of resistance (few ions) the current will drop. A low amount of resistance and the current will be high. If the ECM sees on pin 9 a low current reading it will compare it with previous engine cycles to determine if detonation or a lack of combustion is present. If combustion is absent, a Diagnostic Trouble Code (DTC) is set. If knock is detected by an oscillation in voltage, the spark timing is retarded according to engine parameters. Timing can be retarded up to 13° maximum for a Big Twin independently for each cylinder. Additionally, 2002 and later ECMs richen the fuel mixture to compensate for poor combustion. If the ECM fails to detect combustion on terminal 9 at high speed and load there may be a misfire, or a lack of continuity in the ignition coil secondary circuit. Original equipment spark plugs and cables are essential as aftermarket components provide incorrect resistance values and will set these DTCs.

## WHY IS VOLTAGE DROP A BETTER WAY TO TEST CIRCUITS?

An 18 gauge / 1.024mm wire has 16 strands of thin copper wire inside....how many strands are required to show continuity from one end to the other? 5...3....2.....1. Only 1 strand is needed to get a good continuity reading or





even a good battery voltage reading. When we have a substantial amount of “electrical work” to do such as start the motor, we also need high amperage. Starter amperage would burn right through a thin 18 gauge / 1.024mm wire even if it was in perfect condition because it can be as high as 200 Amps. High amounts of amps / current load going through the wrong dimension of wire will result in high amounts of heat and probably failure of the wire. Voltage doesn't show the weakness in the wire nor does resistance (continuity) but current does! Energizing current flowing through the wires is easily done by pulling the fuel pump fuse or its connector or removing the spark plug boots off the plugs and cranking the starter button for a few seconds. When the correct amount of current flows through a small filament/wire like for Thomas Edison, it illuminates. While a resistance check may show a good number in a wire, the voltage drop test alone may take what wires are left and burn them-leaving an open circuit. If it doesn't burn the wires it may show a voltage higher than 1VDC showing the technician a poor connection. Continuity and voltage are needed, but the quality of the wires, connectors, or components is what can be determined by conducting several Voltage Drop tests around the motorcycle. A typical switch or load will have a measured drop or loss of less than 0.2 VDC. A length of wire can drop or lose up to a maximum of 0.1 VDC.

## Voltage Drop Defined

Voltage drop is the measurement of consumed or lost voltage as electric current (amps) move through the wires, connectors and sensors while fully assembled and functioning. No wires, sensors or connectors can be disconnected during a voltage drop test. Another way to define voltage drop is a test that measures the difference in potential energy or the actual voltage dropped between the source (Battery) and destination (Circuit, or component). Wires, connectors and sensors are called passive elements because they do not normally supply voltage in an electrical circuit. These passive elements can be predicted to consume a certain amount of voltage. When the measured voltage drop exceeds our expected reading it may be because of loose connections, oxidized pins and sockets or compromised wiring such as something higher than 1VDC. Again, any voltage drop reading higher than 1 VDC is a problem. We can voltage drop just about any section of wire or circuit, just as long as we crank the motor and keep that circuit complete -nothing disconnected. WAIT! Go back and read that last sentence one more time. Its important! Pressing the starter button / cranking the engine (3-4 seconds) = energizing the circuit. This is a must. For the SkillsUSA competition the fuel pump is unplugged and the engines will not run.

## CONNECT THE METER / DIGITAL VOLT OHMS METER (DVOM)

To test positive circuits using voltage drop, **ALWAYS** connect the meter positive (RED) lead to BAT+ and the negative/common (BLACK) lead to the end of the circuit-farthest away from the battery. Energize the system (press the starter button) with the circuit complete take a reading. .1-.65 VDC are usual good positive circuit readings. To test the positive battery cable place the red meter lead on Bat+ and the black lead at the end of the cable on top of the starter case. Maintain this connection while cranking the motor and take a reading.

To test negative or ground circuits **ALWAYS** connect the meter positive (RED) lead on the battery negative post and the other lead at the end of the grounding circuit being tested. To check a ground circuit such as the negative battery cable place leads on the Bat- and the grounding stud coming out of the transmission case. With current flowing through that circuit, a cracked ground cable or a loose fastener on the battery side or the transmission case can be easily seen. Good ground circuits such as this one usually average around .03 - .2 VDC. Checking battery cables is easy by going from the appropriate battery terminal to the end of the cable while cranking the motor.

## Voltage Drop Benefits

- Lower than full charge batteries do not affect Voltage Drop readings. They are still accurate at full or less than full charge can be used on lighting circuits, starters, ignition circuits, etc.
- Voltage Drop readings show the actual voltage dropped or lost/consumed when circuit is energized
- It is more accurate and will display (hard-to-find) poor connections. This tests the system as it is actually being used-with all wires, relays, components connected.

- The cost of vibration can be a high one. Large battery cables can become cracked over time under the sheathing-so cracks can't be seen. A voltage drop test will find it quickly.

**NOTE:**

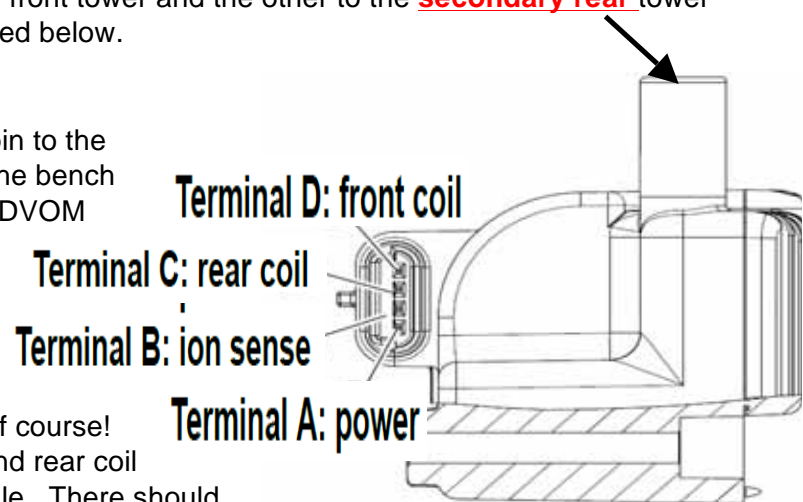
*Think opposite of a Voltage check. Start from the end of the circuit (negative side) with the negative/common/BLACK lead and work back toward the battery (positive side) of the circuit. The positive/RED lead will always be connected to the **BATTERY** while testing a circuit.*

**NOTE:**

*Ask yourself what if my meter leads were reversed but yet in the correct positions for a voltage drop test? Does a negative voltage drop test communicate the same information to you as a positive one? Sure it does! Don't let simple polarity be confusing. Time spent with the DVOM around the motorcycle will grow confidence and efficiency when diagnosing. Get comfortable with voltage drop!*

## Ignition Coil Bench Testing **Record Readings in OHMS $\Omega$ scale not kOhms**

- Primary resistance checks can be performed on the bench measuring resistance from the Power pin (terminal A) to each ignition coil pin (C and D). Study the image below to be efficient during the competition. See specifications listed below.
- ION Sense coil resistance specification is 2500-3500  $\Omega$  (ohms). This bench test is performed measuring the ION Sense pin to each tower of the ignition coil (front and rear). Remove each spark plug wire from the coil which are connected to the secondary towers (note arrow). Remember to cycle the range button on your meter observing what scale the meter is reading. 2.5 kilo ohms is the same as 2500 ohms. Your answer here needs to be in ohms not k Ohms. You may write the Omega symbol ( $\Omega$ ) for the unit of measure instead of the word ohms for any resistance question.
- Secondary ignition coil resistance checks can be done without removing the coil or using the B.O.B. Simply connect one meter lead to the secondary front tower and the other to the **secondary rear** tower and record your reading. See specifications listed below. The coil is marked "F" and "R" for front and rear.
- Internal shorts can be checked from the power pin to the ION sense pin. This test can be done best on the bench checking resistance across those two pins. The DVOM should read OL or no resistance.
- Lastly, each coil pin (front and rear) can be checked for shorts to ground. For this test the B.O.B. makes it easy. What is the best ground on the motorcycle? The battery – post of course! Using the B.O.B. check resistance of the front and rear coil pins to ground. Meter must be in the OHMS scale. There should be no continuity or (OL) on the meter.



**Table 1-6. Ignition Coil Specifications**

WINDING	RESISTANCE
Ignition coil primary resistance at room temperature	0.3-1.5 Ohm
Ignition coil secondary resistance at room temperature	5500-7500 Ohms

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2015 Motorcycle Service Technology Contest

**Written Test**  
**Motorcycle Electrical Basics**

**50 Possible Points**

Time Limit 30 Minutes

Sponsored by:



SkillsUSA  
2015 Motorcycle Service Technology Contest  
Motorcycle Electrical Basics

**Objective:** This written test allows the participant to demonstrate their knowledge of motorcycle electrical basics

**Directions:** Select the best answer for each question and write in the selected letter on the answer sheet provided.

1. Voltage is defined as :
  - A. **Electrical pressure**
  - B. Electrical current flow
  - C. Opposition to current flow
  - D. Electrical power
  
2. Amperage is defined as :
  - A. Electrical pressure
  - B. **Electrical current flow**
  - C. Opposition to current flow
  - D. Electrical power
  
3. Wattage is defined as :
  - A. Electrical pressure
  - B. Electrical current flow
  - C. Opposition to current flow
  - D. **Electrical power**
  
4. Resistance is defined as :
  - A. Electrical pressure
  - B. Electrical current flow
  - C. **Opposition to current flow**
  - D. Electrical power

5. Given a wire of constant gauge, how will the resistance of the wire be affected by length?
- A. **Resistance will increase as length increases**
  - B. Resistance will increase as length decreases
  - C. Wires do not hold resistance
  - D. Resistance is not affected by length
6. Given a 16 AWG wire, an 8 AWG wire of the same length in comparison will be :
- A. Smaller diameter and of less resistance
  - B. Larger in diameter and of higher resistance
  - C. Smaller in diameter and the same resistance as wires do not hold resistance
  - D. **Larger in diameter and of less resistance**
7. The four essential parts of a circuit are :
- A. Battery, relay, kill switch, headlight
  - B. Key, inverter, solenoid, ground
  - C. **Source, path, load, control**
  - D. Key, wires, start button, ground
8. In a series circuit, if one load fails how are the rest of the loads affected?
- A. They are not affected, the remaining loads function normally
  - B. **All loads in the circuit no longer operate**
  - C. Series circuits only have one load
  - D. They all become 2 times stronger
9. In a parallel circuit, if one load fails how are the rest of the loads affected?
- A. **They are not affected, the remaining loads function normally**
  - B. All loads in the circuit no longer operate
  - C. Series circuits only have one load
  - D. They all become 2 times stronger
10. A short is defined as :
- A. **An unwanted path to ground before the load**
  - B. An unwanted path to the load from the switch
  - C. Any electrical failure
  - D. An incomplete path anywhere in the circuit

11. An open is defined as :
- A. An unwanted path to ground before the load
  - B. An unwanted path to the load from the switch
  - C. A break only in the power side of the circuit
  - D. An incomplete path anywhere in the circuit**
12. The two different types of electrical current used on a motorcycle are :
- A. Anode/Cathode
  - B. AC/DC**
  - C. Emitter/Base
  - D. Electron/Proton
13. The process by which we create electricity with a motorcycle charging system is known as :
- A. Convection
  - B. Osmosis
  - C. Sulfation
  - D. Induction**
14. The voltage producing coil of wire in a motorcycle charging system is known as the :
- A. Tesla coil
  - B. FM coil
  - C. Stator coil**
  - D. Pulser coil
15. The device used to convert the AC created in the charging system into storable DC is the :
- A. Regulator
  - B. Oscillator
  - C. Rectifier**
  - D. Potentiometer

**Use Watts Law (Watts = Volts x Amps) and Ohms Law (Volts = Amps x Ohms) to answer the following questions (16 – 18)**

16. A 12 Volt 160 Watt headlight bulb will draw how much current?
- A. 13.3 Amps**
  - B. 13.3 Ohms
  - C. .075 Amps
  - D. Not enough information to calculate the answer

17. How much resistance would the headlight bulb in question 16 be?
- A. 9 Watts
  - B. 9 Ohms
  - C. .9 Ohms**
  - D. Not enough information to calculate the answer
18. How many Watts would the bulb in question 16 be if it were rated at .5 Ohms?
- A. 160 Watts
  - B. 288 Watts**
  - C. 72 Watts
  - D. .5 Watts
19. One \_\_\_\_\_ will push one \_\_\_\_\_ through one \_\_\_\_\_.
- A. Amp, Ohm, Watt
  - B. Volt, Amp, Ohm**
  - C. Watt, Volt, Amp
  - D. Ohm, Amp, Volt
20. In a 12 Volt parallel circuit containing two loads, each load must be able to consume \_\_\_\_\_ Volts.
- A. 12**
  - B. 6
  - C. 3
  - D. Not enough information to calculate the answer





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## Written Test

### Motorcycle Electrical Basics

50 Possible Points

Time Limit 30 Minutes

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2015 Motorcycle Service Technology Contest  
Motorcycle Electrical Basics

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  - D. Electrical power
  
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  - B. Electrical current flow
  - C. Opposition to current flow
  - D. Electrical power
  
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  - D. An incomplete path anywhere in the circuit

11. An open is defined as :
- A. An unwanted path to ground before the load
  - B. An unwanted path to the load from the switch
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  - C. Sulfation
  - D. Induction
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  - B. FM coil
  - C. Stator coil
  - D. Pulser coil
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  - B. Oscillator
  - C. Rectifier
  - D. Potentiometer

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- A. 9 Watts
  - B. 9 Ohms
  - C. .9 Ohms
  - D. Not enough information to calculate the answer
18. How many Watts would the bulb in question 16 be if it were rated at .5 Ohms?
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  - B. 288 Watts
  - C. 72 Watts
  - D. .5 Watts
19. One \_\_\_\_\_ will push one \_\_\_\_\_ through one \_\_\_\_\_.
- A. Amp, Ohm, Watt
  - B. Volt, Amp, Ohm
  - C. Watt, Volt, Amp
  - D. Ohm, Amp, Volt
20. In a 12 Volt parallel circuit containing two loads, each load must be able to consume \_\_\_\_\_ Volts.
- A. 12
  - B. 6
  - C. 3
  - D. Not enough information to calculate the answer

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**Written Test Answer Key**  
**Motorcycle Electrical Basics**

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2015 Motorcycle Service Technology Contest  
Written Test  
Motorcycle Electrical Basics

**Each question 2.5pts each total possible of 50 points**

1.   A  

13.   D  

2.   B  

14.   C  

3.   D  

15.   C  

4.   C  

16.   A  

5.   A  

17.   C  

6.   D  

18.   B  

7.   C  

19.   B  

8.   B  

20.   A  

9.   A  

10.   A  

11.   D  

12.   B  

**SCORE : Number correct x 2.5pts each**  
**(50pts possible)**

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# **Written Test Answer Sheet**

## **Motorcycle Electrical Basics**

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Written Test  
Motorcycle Electrical Basics

CONTESTANT # \_\_\_\_\_

1. \_\_\_\_\_

13. \_\_\_\_\_

2. \_\_\_\_\_

14. \_\_\_\_\_

3. \_\_\_\_\_

15. \_\_\_\_\_

4. \_\_\_\_\_

16. \_\_\_\_\_

5. \_\_\_\_\_

17. \_\_\_\_\_

6. \_\_\_\_\_

18. \_\_\_\_\_

7. \_\_\_\_\_

19. \_\_\_\_\_

8. \_\_\_\_\_

20. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

11. \_\_\_\_\_

12. \_\_\_\_\_

SCORE \_\_\_\_\_

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## 360° Safety Inspection Introduction

- Read these pages carefully before continuing -

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One of the most important skills needed as a motorcycle service technician is the ability to notice and effectively communicate safety related issues found with a customer's vehicle. This helps the dealership to sell work, current and future, and most importantly keeps our customers safe and riding.

To make this process as efficient and accurate as possible many OEMs have a standard practice such as the 360° Walk-a-round method of safety inspection.

This process breaks the inspection down into 6 key inspection areas.

Moving in counter-clockwise direction from rider position:

1. Left Front

- Includes but not limited to
  - Handlebars : Bent, tight, grip condition
  - Clutch lever and cable : Operation, condition, free-play
  - Headlight : Beams, alignment, secured
  - Turn signals : Operation, lens condition, secured
  - Horn : Operation, secured
  - Instruments : Operation, secured
  - Steering : Smooth, tight
  - Tire : Pressure, wear, direction, valve stem
  - F. Wheel : Bends, loose weights, bearings, spokes, axle tight, pinch bolts tight
  - F. Suspension : Operation, secured, fork height, seals

2. Left Center

- Includes but not limited to
  - Side Stand/Center Stand : Smooth, bent, spring
  - Foot pegs/floor boards : Secured, bent, springs
  - Shift lever : Secured, bent, smooth, seal

3. Left Rear

- Includes but not limited to
  - Tire : Pressure, wear, direction, valve stem

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(3. Left Rear continued)

- R. Wheel : Bends, loose weights, bearings, spokes, axle tight, pinch bolts tight, axle alignment
- Brake stay (if on the L side) : tight, secured, cotter pin/e-clip
- Rear suspension : Operation, secured, bearings, equal adjustments, leaks, swing arm movement
- Passenger backrest : Tight, secure

4. Right Rear

○ Includes but not limited to

- Brake stay (if on the R side) : tight, secured, cotter pin/e-clip
- R. Brakes : Operation, fluid level, hose routing, hose condition, shoe or pad wear, disc condition, free-play
- Tail and brake lights : Operation, lenses, secured
- Exhaust system : Secured, rust, holes, leaks

5. Right Center

○ Includes but not limited to

- Kick start lever (if applicable) : Secured, operation, positioning
- Frame : Bent, fork stops, battery damage
- Seat : Secured, condition
- Fuel system : Leaks, hose condition, hose routing, petcocks, vent hoses
- Engine oil leaks

6. Right Front

○ Includes but not limited to

- Throttle : Operation, cable routing, return smoothly, free-play, grip housing
- F. Brakes : Operation, fluid level, hose routing, hose condition, shoe or pad wear, disc condition, free-play
- Mirrors : Secure, broken
- Fairing/windscreen : Secure, cracks, clarity, cleanliness

**Follow this process when completing the 360 • safety inspection work station!**

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## 360° Safety Inspection Judge's Sheet

50 Possible Points

Time Limit 30 Minutes

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**Objective:** This workstation is designed to allow the contestant to show their ability to locate and effectively communicate, by recording onto a document, safety related concerns with a modern day motorcycle

**Directions:** Contestants have 30 minutes to read supplied support material, inspect a “bugged” motorcycle and properly identify 10 safety related issues. ***DO NOT CORRECT ANY ISSUES FOUND!!*** Proper terminology is required to receive credit for an answer. No disassembly of the vehicle will be required to successfully complete this task.

**Contestant #** \_\_\_\_\_

**Judge's Initials :** \_\_\_\_\_

Scoring Directions: After collected, use the supplied **Key Sheet** to check answers. Each of the 10 “bugs” are either **0** or full points **5**. Correct terminology is required, i.e. “the bolt that holds the brake on is loose” would NOT be acceptable. The bugs are numbered 1 – 10 and listed as what area they are in (i.e. #1- Loose Front Axle Nut -A1), contestants must list each bug in the correct area or it is **0**. Circle any bugs that were located and identified correctly on the chart at the bottom of the page. (i.e. contestant got bug #3 correct, circle #3 at the bottom of the page) Contestants are NOT penalized for incorrect answers, they can list as much as they like in the given amount of time.

**1      2      3      4      5      6      7      8      9      10**

Amount correct : \_\_\_\_\_

x5 Points each : \_\_\_\_\_

**SCORE :** \_\_\_\_\_

Judge attach this score sheet to the contestant answer sheet

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## **360° Safety Inspection Key Sheet**

**50 Possible Points**

Time Limit 30 Minutes

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**Objective:** This workstation is designed to allow the contestant to show their ability to locate and effectively communicate, by recording onto a document, safety related concerns with a modern day motorcycle

**Directions:** Contestants have 30 minutes to read supplied support material, inspect a “bugged” motorcycle and properly identify 10 safety related issues. ***DO NOT CORRECT ANY ISSUES FOUND!!*** Proper terminology is required to receive credit for an answer. No disassembly of the vehicle will be required to successfully complete this task.

Scoring Directions: After collected, use the supplied **Key Sheet** to check answers. Each of the 10 “bugs” are either **0** or full points **5**. Correct terminology is required, i.e. “the bolt that holds the brake on is loose” would NOT be acceptable. The bugs are numbered 1 – 10 and listed as what area they are in (i.e. #1- Loose Front Axle Nut -A1), contestants must list each bug in the correct area or it is **0**. Circle any bugs that were located and identified correctly on the chart at the bottom of the page. (i.e. contestant got bug #3 correct, circle #3 at the bottom of the page) Contestants are NOT penalized for incorrect answers, they can list as much as they like in the given amount of time.

- 1) Front axle pinch bolt loose – A1**
- 2) Front right handlebar mounting/pinch bolt loose – A1**
- 3) Left upper triple tree pinch bolt loose – A1**
- 4) Left foot peg snap-ring missing – A2**
- 5) Rear shocks set at different settings – A3**
- 6) Right side belt adjuster nut loose – A3**
- 7) Rear brake hose routing bracket missing bolt – A4**
- 8) Rear brake pedal pinch bolt/nut loose – A4**
- 9) Incorrectly mounted seat – A5**
- 10) Right side speedscreen/fairing/etc. mounting fastener missing – A6**



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## 360° Safety Inspection

50 Possible Points

Time Limit 30 Minutes

Sponsored by:





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**Objective:** This workstation is designed to allow the contestant to show their ability to locate and effectively communicate, by recording onto a document, safety related concerns with a modern day motorcycle

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**Contestant # \_\_\_\_\_**

Inspection Area 1

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Inspection Area 2

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Inspection Area 3

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Inspection Area 4

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

- \_\_\_\_\_

### Inspection Area 5

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### Inspection Area 6

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

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## Building a Repair Order Judges Scoresheet

50 Possible Points

Time Limit 30 Minutes

Sponsored by:



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2015 Motorcycle Service Technology Contest

**OBJECTIVE:** The contestant will complete an accurate repair order using the materials supplied: Service Manual, Job Time Code Manual, Consumables Catalogue, Service interval Checklist and blank repair order.

**Directions:** Using the provided materials, Service Manual, Job Time Code Manual, Consumables Catalogue, Service interval Checklist and blank repair order, fill in an accurate and complete repair order for the scenario.

Contestant # \_\_\_\_\_

Judges Initials: \_\_\_\_\_

Scoring directions:

After collected, use the supplied “key” to check answers. Each marked area is either zero or full points. Correct part numbers are required.

Customer information + VIN filled in correctly = 10pts (all or nothing)

Part information filled in correctly including part numbers, quantity and cost = 10 pts (all or nothing)

Mileage and date information filled in correctly = 10 pts (all or nothing)

Description of work including “customer states” = 10 pts (all or nothing)

Labor rate, total labor, total parts and tax information filled in correctly = 10 pts (all or nothing)

<u>Area</u>	<u>Score</u>
Customer Info & V.I.N.	_____(0,10)
Parts Information	_____(0,10)
Mileage & Date	_____(0,10)
Description of work	_____(0,10)
Labor Rate & Costing	_____(0,10)
<b>Total Score :</b> _____	

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2015 Motorcycle Service Technology Contest

## **Building a Repair Order**

**50 Possible Points**

Time Limit 30 Minutes

Sponsored by:



**OBJECTIVE:** The contestant will complete an accurate repair order using the materials supplied: Service Manual, Job Time Code Manual, Consumables Catalogue, Service interval Checklist and blank repair order.

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## **Building a Repair Order**

A 2005 FLSTNI Softail has arrived at the dealership for a 10,000 mile service.

VIN = **5HD1JDB125Y022712**

Mileage = 10,371

John Q. Customer  
3700 W. Juneau Ave  
Milwaukee, WI 53208  
555-555-5555

The customer states they want a black oil filter and non-synthetic oil for the engine during this service.

### **Resources Required**

- Appropriate Service Manual
- Appropriate Job Time Code manual
- Current Parts & Accessories list (as provided)

### **Performance Standard**

Locate the necessary service literature and accurately complete the assignment.

#### **1) Receiving**

Fill in accurate customer and vehicle information on the repair order.

#### **2) Research**

Using the appropriate service literature, identify all parts that must be replaced during this service and add them to the repair order.

Use the Job Time Code manual to find the flat rate time for this service.

Complete the repair order and estimate the total cost of the job. Assume an \$80.00 per hour labor rate and 6.5% tax on parts. Every motorcycle repaired at this dealership is taken for a 9 mile test ride after service.

# CONSUMABLES

FEATURING:

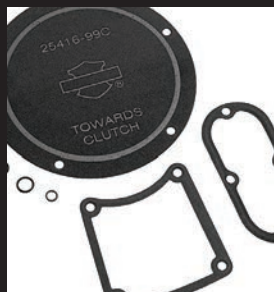
TIRE FITMENT  
GUIDE

OILS

LUBRICANTS

BATTERY  
CHARGERS

QUICK WASH



SEPTEMBER  
2013



**NOTICE:**

Oil and Tire orders can now be combined on one bill of lading thus, the \$2,000 minimum order quantity has been discontinued. Please see below for rate.

**Description**

Harley-Davidson® pays the shipping cost on non-emergency orders for Genuine Motor Parts, Motor Accessories, Tires, Buell® products and on limited order types for MotorClothes® Apparel and Accessories based on the parameters that follow.

**Program Overview**

Dealer is not responsible for freight charges on eligible product and orders totaling \$995.00 or more at dealer net pricing. Method of shipment will be at Harley-Davidson's option.

**Eligible Rules**

- All continental U.S. and Alaskan dealers are eligible for free freight.
- Freight is free on orders totaling at least \$995.00 for any combination of:
  - Motor Parts
  - Motor Accessories
  - MotorClothes Apparel and Accessories (on TA, SO and SE order types only) shipped from the Ace Distribution Center
  - Tires
  - Buell Products
  - Motor Oil and Lubricants

**Non-Eligible Product Lines and Order Types**

- DV/SS/ND type orders do not qualify for free freight.
- General Merchandise on RG orders.
- Supplier Direct Products.\*
- Keys shipped via U.S. Postal Service.
- Dealer Aids.
- Marketing Materials.
- Service Literature.
- Sales Tools.

\* Note: All Motor Parts & Accessories resalable product shipped directly from suppliers is eligible for free freight.

**International Dealers**



Free Freight and Trade Acceptance terms are not applicable.

See your District Manager, Distributor or Harley-Davidson Europe Representative to discuss programs, part numbers and pricing for H-D® 360 Motorcycle Oil, Synthetic Blend, SYN3® and FORMULA+ Lubricants.

**Freight Costs**

- Dealers are responsible for C.O.D., insurance fees and other special freight/fuel charges where applicable.
- Your P&A invoice will reflect the actual freight cost to ship the product to your dealership. If the shipment qualified for free freight, there will be a line on the invoice reflecting the freight savings.

**Manufacturer suggested retail prices are subject to change. Please see [harley-davidson.com](http://harley-davidson.com) for the most current manufacturer suggested retail prices on any product listed in this catalog. Actual retail prices may vary.**

	DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
	<b>Screamin' Eagle® SYN3® Full Synthetic Motor-cycle Lubricant – SAE 20W50 – 1 Quart Bottle</b> Formulated for use in Harley-Davidson® Engines, Transmissions and the following Primary Chaincase applications: '71-later XL, '83-'84 XR1000, and '84-later Big Twin models with wet-type diaphragm spring clutch.	62600005	\$12.95	12
	<b>Screamin' Eagle SYN3 Full Synthetic Motorcycle Lubricant – SAE 20W50 – 1 Gallon</b>	62600031	\$48.95	4
	<b>Screamin' Eagle SYN3 Full Synthetic Motorcycle Lubricant – SAE 20W50 – 55 Gallon Drum</b>	62600050	NA*	1
	<b>HD 360 SAE 20W50</b> Quart bottle. Supplier direct ship.	62600007	\$7.49	12
	<b>HD 360 SAE 20W50</b> Gallon bottle. Supplier direct ship.	62600038	\$29.95	4
	<b>HD 360 SAE 20W50</b> 55-gallon drum. Supplier direct ship.	62600039	NA*	1
	<b>HD 360 SAE 10W40</b> Quart bottle. Supplier direct ship.	62600053	\$7.49	12
	<b>HD 360 SAE 50</b> Quart bottle. Supplier direct ship.	62600008	\$7.49	12
	<b>HD 360 SAE 50</b> 55-gallon drum. Supplier direct ship.	62600045	NA*	1
	<b>HD 360 SAE 60</b> Quart bottle. Supplier direct ship.	62600009	\$7.49	12
	<b>HD 360 SAE 60</b> 55-gallon drum. Supplier direct ship.	62600046	NA*	1
	<b>FORMULA+ Transmission, Primary and Chain Case Lubricant</b> One quart bottle. Supplier direct ship.	62600004	\$8.95	12
	<b>FORMULA+ Transmission, Primary and Chain Case Lubricant</b> 55 gallon drum. Supplier direct ship.	62600047	NA*	1

\* NA parts for dealer purchase only. Please refer to system pricing for these items.



### 330-Gallon (1247.4 Liter) Tote

Top dispensing fitting allows complete draining of all fluid with no residual fluid when empty. The tote liner design contracts as fluid is being dispensed preventing air from entering and condensation from building up in the remaining fluid. Totes also eliminate condensation and scale contamination from forming as is prone in bulk tanks. 46"x46" floor space area allows more shop floor space over area required for four 55-gallon (220 gallon) drum storage. Reduces pump change-over time by 75%. Gross filled tote weight is 2,609 lbs. Empty tote and pallet weight is 160 lbs. Empty tote folds easily to allow for disposal in trash. Minimizes environmental risks associated with empty drums and eliminates drum disposal costs. The tote bulk dispensing fittings and equipment is available through the H-D® Authorized Tool and Equipment Program. For information call 1-877-HDEQUIP.

DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
<b>330-Gallon (1247.4 Liter) Tote – SYN3® Screamin' Eagle® Full Synthetic Motorcycle Lubricant, SAE 20W50</b> Intermediate bulk tote container 45.25" x 45.25" x 45" and a wood pallet, 46" x 46"	62600051	NA*	1
<b>330-Gallon (1247.4 Liter) Tote – H-D® 360 Motorcycle Oil, SAE 20W50</b> Intermediate bulk tote container 45.25" x 45.25" x 45" and a wood pallet, 46" x 46"	62600040	NA*	1
<b>330-Gallon (1247.4 Liter) Tote – FORMULA+ Transmission and Primary Chaincase Lubricant</b> Intermediate bulk tote container 45.25" x 45.25" x 45" and a wood pallet, 46" x 46"	62600048	NA*	1

\* NA parts for dealer purchase only. Please refer to system pricing for these items.

Manufacturer suggested retail prices are subject to change.  
 Please see [harley-davidson.com](http://harley-davidson.com) for the most current manufacturer  
 suggested retail prices on any product listed in this catalog.  
 Actual retail prices may vary.

**Who should use this procedure?**

- Dealers who purchase H-D oil in bulk
  - 55 gallon drums
  - 330 gallon totes

**What are the benefits of using this process?**

- Accurate inventory management
- Allows use of re-order points in CIM
- Service Order Billing – oil SKU's appear on service order and are recognized at register
- Price changes are automatically captured on price tape

**Conversions:**







- 55 gallon drum = 220 quarts / 208 liters
- 330 gallon tote = 1,320 quarts / 1,249 liters

(as of 6/1/12)




DESCRIPTION / WEIGHT	BULK P/N	CONVERT TO SALEABLE UNIT (QUART OR LITRE)
<b>HD360</b>		
55 Gal. Drum – 20W50	U.S. – 62600039 Outside U.S. – 62600034	62600039QUART 62600039LITRE
330 Gal. Tote – 20W50	62600040	62600039QUART 62600039LITRE
55 Gal. Drum – SAE50	U.S. – 62600045 Outside U.S. – 62600035	62600045QUART 62600045LITRE
55 Gal. Drum – SAE60	62600046	62600046QUART 62600046LITRE
<b>Formula +</b>		
55 Gal. Drum	U.S. – 62600047 Outside U.S. – 62600036	62600047QUART 62600047LITRE
330 Gal. Tote	62600048	62600047QUART 62600047LITRE
<b>SYN3</b>		
55 Gal. Drum – 20W50	U.S. – 62600050 Outside U.S. – 62600037	62600050QUART 62600050LITRE
330 Gal. Tote – 20W50	62600051	62600050QUART 62600050LITRE

Upon receipt of drum or tote, simply adjust the quart saleable unit into inventory, per the quantity above. Don't forget to adjust the bulk unit out of stock.



	DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
	<b>Battery Charging Harness with LED Charge Indicator</b> Fits Harley-Davidson 12-volt batteries.	66000005	\$14.95	1
	<b>Battery Charging Harness with LED Charge Indicator – Bulk Jar – 15 Count</b>  <b>Battery Charging Harness Bulk Pack – 3 Prong – 25 Count</b> Fits Harley-Davidson® 12-volt batteries. (Individual harness P/N 94624-97B has a retail price of \$7.95.) Includes 25 marketing hangtags to place on pre-wired motorcycles.	66000067	\$15.40	15
	<b>Battery Charging Extension Lead – 25'</b> For use with most Harley-Davidson Battery Chargers.	99828-09	\$19.95	1
	<b>Battery Charging Extension Lead – 12.5'</b> For use with most Harley-Davidson Battery Chargers.	99821-09	\$14.95	1
	<b>1.25 Amp Harley-Davidson® Battery Charging Stations – 2-Bank</b> For 12-volt batteries.	99829-09	\$129.95	1
	<b>1.25 Amp Harley-Davidson Battery Charging Stations – 4-Bank</b> For 12-volt batteries.	99847-09	\$249.95	1
	<b>Harley-Davidson 5-Bank Automatic “SUPERSMART” Battery Charger – (120V) 3-Prong Grounded US Plug</b> Supplier direct ship. To order an International battery charger, please refer to your country’s Sales Administration Representative.	66000039	NA*	1
	<b>Harley-Davidson 10-Bank Automatic “SUPERSMART” Battery Charger – (120V) 3-Prong Grounded US Plug</b> Supplier direct ship. To order an International battery charger, please refer to your country’s Sales Administration Representative.	66000040	NA*	1

\* NA parts for dealer purchase only. Please refer to system pricing for these items.

	DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
	<b>750mA "SUPERSMART" Battery Tender</b> For 12-volt batteries.	66000038	\$39.95	1
	<b>1.25 Amp Global Battery Charger</b> Fits Harley-Davidson 12-volt batteries. United States, Canada, Mexico and South America (except Argentina).	66000033	\$79.95	1
	<b>800mA Waterproof Battery Tender – United States, Canada, Mexico &amp; South America</b> For 12-volt batteries.	66000004	\$49.95	1
	<b>800mA Waterproof Battery Tender – International – Europe</b> For 12-volt batteries.	99814-09	\$49.95	1
	<b>800mA Waterproof Battery Tender – International – U.K.</b> For 12-volt batteries.	99816-09	\$49.95	1
	<b>800mA Waterproof Battery Tender – International – Australia</b> For 12-volt batteries.	99819-09	\$49.95	1
	<b>800mA Waterproof Battery Tender – International – Japan</b> For 12-volt batteries.	99820-09	\$49.95	1





### Wash Bay Bike Soap

Safe for use on all vehicle surfaces including denim paint, this low-foam soap is the perfect companion for your indoor wash bay. Wash Bay Bike Soap rinses clean, and is formulated to provide superior sheeting action to reduce water spots. Biodegradable.

DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
<b>1 Gallon (3.79L) Bottle</b>	<b>93600105</b>		<b>1</b>



### Quick Wash

Fast and easy to use, Quick Wash is tough on dirt, oil and bugs, but gentle on other surfaces. This all-over bike cleaner is safe for use on all surfaces of your motorcycle, and does not strip wax, corrode fasteners or spokes, or stain leather and vinyl seats and saddlebags. Just spray it on and hose it off. Quick Wash gets into hard-to-reach spaces, and cleans without scrubbing. Sheeting action rinses clean and prevents spotting. Available in easy-to-handle trigger pump bottles, a convenient gallon refill container, and value priced bulk containers for use in your dealership's wash bay.

DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
<b>16 oz. Trigger Bottle</b>	<b>93600011</b>	<b>\$7.95</b>	<b>12</b>
<b>32 oz. Trigger Bottle</b>	<b>93600012</b>	<b>\$15.95</b>	<b>6</b>
<b>1 Gallon Refill Bottle</b>	<b>93600013</b>	<b>\$42.95</b>	<b>4</b>
<b>5 Gallon Refill Pail</b>	<b>93600014</b>	<b>NA*</b>	<b>1</b>
<b>20 Gallon Drum</b>	<b>93600015</b>	<b>NA*</b>	<b>1</b>

\* NA parts for dealer purchase only. Please refer to system pricing for these items.



### Quick Wash Pump

Reduce the chance of messy spills. This hand pump simplifies the transfer of Quick Wash Cleaner from bulk storage containers into refillable bottles. The dual-action design draws liquid on both the up and down stroke for fast filling. Reusable pump is easy to clean and install.

DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
<b>Fits Quick Wash 5 gallon pail P/N 93600014.</b>	<b>93600017</b>	<b>NA*</b>	<b>1</b>
<b>Fits Quick Wash 20 gallon drum P/N 93600015.</b>	<b>93600018</b>	<b>NA*</b>	<b>1</b>

\* NA parts for dealer purchase only. Please refer to system pricing for these items.


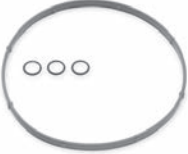




### Gloss Detailer

This easy-to-apply mist produces the highest possible gloss finish in the shortest amount of time. Formulated to enhance luster and provide UV protection between waxes, this non-abrasive quick detailer can be applied to paint, clear coat, chrome, powder coat, windshields, vinyl and plastic. Gloss Detailer contains no waxes, silicones, oils or hydro-carbon solvents, and will not remove Glaze Poly Sealant. Biodegradable.

DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
<b>16 oz. Spray Bottle</b>	<b>93600062</b>	<b>\$9.95</b>	<b>12</b>
<b>1 Gallon Refill Bottle</b>	<b>93600085</b>	<b>\$29.95</b>	<b>4</b>

\* NA parts for dealer purchase only. Please refer to system pricing for these items.

	DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
	<b>Gasket Service Kit</b> Fits '99-'06 Twin Cam (except '06 Dyna®) models. Kit Comprised of: 2 O-Rings (11105), 1 O-Ring (11324), 1 Clutch Cover Gasket (25416-99C), 1 Inspection Cover Gasket (34906-85D), and 1 Inspection Cover Gasket (60567-90C)	17361-05	\$17.71	24
	<b>Gasket Service Kit</b> Fits '06 Dyna and '07-later Twin Cam models.	17369-06	\$5.12	36
	<b>SYN3® Service Sticker</b>	13334-04	\$.75	50
	<b>Spark Plug Bulk Pack – 6R12</b> Fits '99-later Twin Cam-equipped models and '86-later Evolution®-equipped Sportster® models.	32369-04X	\$3.95	200
	<b>Spark Plug Bulk Pack – 5R6A</b> Fits '84-'00 Evolution 1340 and '75-'84 Shovelhead 1200 and 1340 models.	32368-04X	\$3.95	200

\* NA parts for dealer purchase only. Please refer to system pricing for these items.

# H-D RIM SEAL KITS AND MICHELIN® INNER TUBES AND RIM BANDS

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DESCRIPTION / FITMENT	PART NUMBER		PKG. QTY.
<b>HARLEY-DAVIDSON RIM SEAL KITS</b>			
<b>Harley-Davison® Rim Seal – 16" x 3"</b> Fits '12 FLHRC, FLSTN, FLSTC, and TLE/TLE Ultra Sidecars equipped with Smoothie Laced Wheels.	44752-11	\$25.95	1
<b>Harley-Davison Rim Seal – 17" x 3"</b> Fits '12 FLHTC, FLHTCU, FLTRU, and TLE/TLE Ultra Sidecars equipped with Smoothie Laced Wheels.	44753-11	\$25.95	1
<b>Harley-Davison Rim Seal – 18" x 3.5"</b> Fits '12 FLHX and FLTRX models equipped with Smoothie Laced Wheels.	44754-11	\$26.95	1
<b>Harley-Davison Rim Seal – 16" x 5"</b> Fits '12 FLHRC, FLHTC, FLHTCU, FLHX, FLTRU and FLTRX models equipped with Smoothie Laced Wheels.	44755-11	\$27.95	1
<b>MICHELIN INNER TUBES</b>			
<b>Michelin® Inner Tubes – 17" Center Metal Valve</b> Fits 17" 160/70-17 and 180/60-17 tires and rims with Center Valve.	41314-10	\$30.95	1
<b>Michelin Inner Tubes – 19" Center Metal Valve</b> Fits 19" 100/90-19 tires and rims with Center Valve.	41316-10	\$25.95	1
<b>Michelin Inner Tubes – 19" Center Metal Valve</b> Fits VRSC models with 120/10-19 Radial front tires.	43233-11	\$24.95	1
<b>Michelin Inner Tubes – 16" Side Metal Valve</b> Fits 130/90-16, 150/80-16, MT90-16 and MU85-16 tires and rims with side valve.	40572-11	\$31.95	1
<b>Michelin Inner Tubes – 16" Center Metal Valve</b> Fits 130/90-16, 150/80-16, MT90-16 and MU85-16 tires and rims with center valve.	40876-11	\$31.95	1
<b>Michelin Inner Tubes – 21" Center Metal Valve</b> Fits 80/90-21 and MH90-21 tires and rims with center valve.	40941-11	\$21.95	1
<b>MICHELIN RIM BANDS</b>			
<b>Michelin Rim Bands – 4.5" x 17/18"</b> Fits 17" Center Valve rims.	41319-10	\$5.49	2
<b>Michelin Rim Bands – 1.6/2.0" x 18/19"</b> Fits 19" Center Valve rims.	41323-10	\$3.95	2
<b>Michelin Rim Bands – 2.15/3" x 17/18/19"</b> Fits 19" Center Valve rims. Fits VRSC Models with 120/10-19 Radial front tires.	42039-11	\$6.95	2
<b>Michelin Rim Bands – 3" x 16"</b> Fits 16" Side Metal Valve rims.	40875-11	\$3.95	2
<b>Michelin Rim Bands – 3" x 16"</b> Fits 16" Center Metal Valve rims.	40877-11	\$3.95	2
<b>Michelin Rim Bands – 1.6"/1.85" x 17"/18"/19"</b> Fits 21" Center Metal Valve rims.	40954-11	\$2.95	2

DESCRIPTION / FITMENT	PART NUMBER	SUGGESTED RETAIL	PKG. QTY.
<b>DUNLOP® INNER TUBES</b>			
<b>MT/MU90-16 Side Metal Valve – 16" Tube JP</b>	40558-82	\$32.95	1
<b>MT/MU90-16 Center Metal Valve – 16" Tube JP</b> Fits '05-later smooth profile laced wheels.	40575-05	\$33.95	1
<b>180/65-16 Center Metal Valve – 16" Tube JP</b>	40592-09	\$32.95	1
<b>130/80-17 Center Metal Valve – 17" Tube JP</b>	40593-09	\$30.95	1
<b>160/70-180/60-17 Center Metal Valve – 17" Tube JP</b>	40502-06	\$32.95	1
<b>200/55R17 Center Metal Valve – 17" Tube JP</b>	41491-08	\$45.95	1
<b>MJ/MM90-19 Center Metal Valve with Adapter Ring – 19" Tube JP</b> Fits Center Rubber Valve and Metal Valve rims.	41188-06	\$28.95	1
<b>120/70R19 Center Metal Valve – 19" Tube JP</b>	41007-07	\$38.95	1
<b>MH90-21 Center Metal Valve – 21" Tube JP</b>	43140-80	\$27.95	1
<b>DUNLOP RIM BANDS</b>			
<b>Rim Band for Center Valve Rim – 16" JP</b> For Smooth Profile Laced Wheels.	43164-05	\$4.49	2
<b>Rim Band for MT90-16 Side Valve Rim – 16" JP</b>	43147-40	\$3.95	2
<b>Rim Band for 180/65-16 Center Valve Rim – 16" JP</b>	43099-09	\$6.95	2
<b>Rim Band for Center Valve Rim – 17" JP</b>	43101-06	\$5.49	2
<b>Rim Band for Center Valve Radical Rim – 17" JP</b>	40916-08	\$8.95	1
<b>Rim Band for 130/80-17 Center Valve Rim – 17" JP</b>	43341-09	\$3.95	2
<b>Rim Band for Center Valve Rim – 19" JP</b>	43145-47	\$3.95	2
<b>Rim Band for Center Valve Radial Tube Rim – 19" JP</b>	41996-07	\$3.95	2
<b>Rim Band for Center Valve Rim – 21" JP</b>	43939-89	\$3.95	2

## ORIGINAL EQUIPMENT AND RECOMMENDED REPLACEMENT TIRES

Model Fitment	Stock or Optional Fitment	Tread	Size	Rim Size in Inches	PSI	Sidewall Style	Part Number	Price
SPORTSTER® – FRONT								
DUNLOP® HARLEY-DAVIDSON® PERFORMANCE TIRES								
'96-'03 XL1200 Sport	Stock	GT502F	100/90-19	2.15 x 19	30	BW	40554-04A	\$165.95
'04-later XL (except XL Custom, XL1200X, XL1200V, XR1200/X or '11-later XL883L) Installation requires installation of matching GT502 Rear Tire P/N 40555-04A	Optional							
'96-'10 XL883C	Optional	GT502F	80/90-21	2.15 x 21	30	BW	43117-09	\$169.95
'96-'10 XL1200C	Optional							
DUNLOP® HARLEY-DAVIDSON® TIRE SERIES								
'10-later XL1200X	Stock on MY '10	D402F	MT90B16	3.00 x 16	30	BW	43022-91A	\$174.95
'08-'13 XR1200/X	Stock on MY '08-'11	D209F RP	120/70ZR18	3.50 x 18	36	BW	43229-08	\$238.95
'04-later XL (except XL Custom, XL1200X, XL1200V, XR1200/X or '11-later XL883L)	(BW)	D401F	100/90-19	2.15 x 19	30	WWW	55193-10	\$202.95
	Stock on MY '04-'10					BW	43112-91A	\$154.95
'91-'09 XL883, XL883R, XL883 Hugger (except XL Custom)	Stock	D401F	100/90-19	2.15 x 19	30	BW	43112-91A	\$154.95
'88-'03 XL1200 (except XL Custom, XL Sport)	Stock							
'83-'84 XR1000	Stock	D401F	90/90-19	2.15 x 19	30	BW	40567-90A	\$158.95
'81-'90 XL (except XR1000, XL1200)	Stock							
'96-'10 XL883C / XL1200C	Stock	D402F	MH90-21	2.15 x 21	30	BW	43104-93A	\$145.95
'12-later XL1200V	Stock	D402F	MH90-21	2.15 x 21	30	MWW	43100004	\$185.95
MICHELIN® HARLEY-DAVIDSON® TIRE SERIES								
'11-later XL1200C	Stock on MY '11-later	SCORCHER 31	130/90B16	3.00 x 16	36	BW	55035-11A	\$199.95
'10-later XL1200X								
'11-later XL883L	Stock	SCORCHER 11	120/70ZR18	3.50 x 18	30	BW	40879-11A	\$239.95
'08-'13 XR1200/X	Stock on MY '12-later							
'04-later XL (except XL Custom, XL1200X, XL1200V, XR1200/X or '11-later XL883L)	Stock on MY '11-later	SCORCHER 31	100/90B19	2.15 x 19	30	BW	43258-07B	\$165.95
'12-later XL1200V	Optional	SCORCHER 31	80/90-21	2.15 x 21	30	BW	41036-12	\$169.95
SPORTSTER – REAR								
DUNLOP® HARLEY-DAVIDSON® PERFORMANCE TIRES								
'04-later XL (except XL1200X, XL1200V, XR1200/X, '11-later XL883L or '11-later XL1200C) Installation on models with 19" front wheel requires installation of matching GT502F Front Tire P/N 40554-04A	Optional	GT502	150/80B16	3.00 x 16	36/40	BW	40555-04A	\$234.95
'96-'03 XL1200 Sport	Stock	GT502	130/90B16	3.00 x 16	36/40	BW	40556-06A	\$218.95
DUNLOP® HARLEY-DAVIDSON® TIRE SERIES								
'04-later XL (except XR1200/X, XL1200V, '11-later XL883L, '11-later XL1200C)	Stock MY '04-'10	D401	150/80B16	3.00 x 16	36/40	BW	43264-02	\$203.95
'04-later XL (except XL1200X, XL1200V, XR1200/X, '11-later XL883L or '11-later XL1200C)	Optional	D401	150/80B16	3.00 x 16	36/40	WWW	55192-10	\$272.95
'12-later XL1200V	Stock	D401	150/80B16	3.00 x 16	40	MWW	43200007	\$252.95
'81-'03 XL (except XL1200 Sport)	Stock	D401	130/90B16	3.00 x 16	36/40	BW	40565-91B	\$178.95
'08-'13 XR1200/X	Stock '08-'10	D209HD	180/55ZR17	5.50 x 17	42	BW	43231-08	\$301.95
MICHELIN® HARLEY-DAVIDSON® TIRE SERIES								
'04-later XL (except XR1200/X, '11-later XL883L)	Stock on MY '11-later (except XL1200V)	SCORCHER 31	150/80B16	3.00 x 16	36/40	BW	40878-11	\$234.95
'08-'13 XR1200/X	Stock on MY '12	SCORCHER 11	180/55ZR17	5.50 x 17	42	BW	43200011	\$299.95
'11-later XL883L	Stock	SCORCHER 11	150/60ZR17	4.50 x 17	36/40	BW	43216-11	\$220.95

**Sidewall Style Key:**

BW – Blackwall  
 SWW – Slim Whitewall  
 MWW – Medium Whitewall  
 WWW – Wide Whitewall  
 EWWW – Engraved Wide Whitewall

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## ORIGINAL EQUIPMENT AND RECOMMENDED REPLACEMENT TIRES

Model Fitment	Stock or Optional Fitment	Tread	Size	Rim Size in Inches	PSI	Sidewall Style	Part Number	Price
DYNA® – FRONT								
DUNLOP® HARLEY-DAVIDSON® PERFORMANCE TIRES								
'02-later Dyna (except FXDF, FXDFSE and FXDWG models)	Optional	GT502F	100/90-19	2.15 x 19	30	BW	40554-04A	\$165.95
'00-'01 FXDX	Stock							
'93-later FXDWG	Stock MY '10-'11	GT502F	80/90-21	2.15 x 21	30	BW	43117-09	\$169.95
DUNLOP® HARLEY-DAVIDSON® TIRE SERIES								
'08-later FXDF	Stock	D427F	130/90B16	3.00 x 16	36	BW	43218-08	\$199.95
'09-'10 FXDFSE/2								
'12-later FLD	Stock	D402F	130/70-18	3.50 x 18	36	BW	43371-07A	\$230.95
'91-later Dyna models (except FXDF, FXDFSE/2 and FXDWG models)	Stock MY '91-'09	D401F	100/90-19	2.15 x 19	30	BW	43112-91A	\$154.95
'84-later FXR (except FXLR, FXR2)	Stock							
'83-later FXRT	Stock	D401F	90/90-19	2.15 x 19	30	BW	40567-90A	\$158.95
'81-'85 FX	Stock							
'82-'83 FXR (except FXRT)	Stock	D402F	MH90-21	2.15 x 21	30	BW	43104-93A	\$145.95
'93-'08 FXDWG	Stock							
'86-earlier FXWG	Stock							
'94-earlier FXLR	Stock							
'99 FXR2	Stock							
'07-'08 FXDSE/2	Stock							
MICHELIN® HARLEY-DAVIDSON® TIRE SERIES								
'02-later Dyna (except FXDF, FXDFSE/2 and FXDWG models)	Stock MY '10-later	SCORCHER 31	100/90-19	2.15 x 19	30	BW	43258-07B	\$165.95
'08-later FXDF	Optional	SCORCHER 32	130/90B16	3.00 x 16	36	BW	43100003	\$214.95
'10-later FXDWG	Stock MY '12-later	SCORCHER 31	80/90-21	2.15 x 21	38	BW	41036-12	\$169.95
DYNA – REAR								
DUNLOP® HARLEY-DAVIDSON® PERFORMANCE TIRES								
'00-'01 FXDX	Stock	GT502	150/80B16	3.00 x 16	36/40	BW	40555-04A	\$234.95
'02-'05 Dyna	Optional							
'10-later FXDWG	Stock MY '10-'11	GT502	180/60B17	4.50 x 17	40	BW	43197-04B	\$329.95
Replacement Tire for Harley-Davidson Wide Tire Kits P/N 44075-04, 43705-06, 43768-06	Optional							
DUNLOP® HARLEY-DAVIDSON® TIRE SERIES								
'82-later FXR	Stock	D401	130/90B16	3.00 x 16	36/40	BW	40565-91B	\$178.95
'82-later FXRT	Stock							
'91-'01 Dyna (except '00-'01 FXDX)	Stock	D401	150/80B16	3.00 x 16	36/40	BW	43264-02	\$203.95
'02-'05 Dyna	Stock							
'08-later FXDF	Stock	D427	180/70B16	5.00 x 16	36/40	BW	43228-08	\$294.95
'09-'10 FXDFSE/2	Stock							
'07-'08 FXDSE/2	Stock	D407	170/60R17	4.50 x 17	38/42	BW	41998-07	\$254.95
'06-later Dyna (except '07-'08 FXDSE/2, '08-later FXDF)	Stock MY '06-'10	K591	160/70B17	4.50 x 17	36/40	BW	43169-00A	\$237.95
'12-later FLD	Stock	D401	160/70B17	4.50 x 17	40	BW	43200015	\$296.95
MICHELIN® HARLEY-DAVIDSON® TIRE SERIES								
'08-later FXDF	Optional	SCORCHER 32	180/70B16	5.00 x 16	36/40	BW	43200004	\$294.95
'06-later Dyna (except FLD, FXDF and '07-'08 FXDSE/2)	Stock MY '10-later	SCORCHER 31	160/70B17	4.50 x 17	36/40	BW	43250-07B	\$246.95
'10-later FXDWG	Stock MY '12-later	SCORCHER 31	180/60B17	4.50 x 17	40	BW	43200005	\$329.95

**Sidewall Style Key:**

**BW** – Blackwall  
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## ORIGINAL EQUIPMENT AND RECOMMENDED REPLACEMENT TIRES

Model Fitment	Stock or Optional Fitment	Tread	Size	Rim Size in Inches	PSI	Sidewall Style	Part Number	Price
SOFTAIL® – FRONT								
DUNLOP® HARLEY-DAVIDSON® PERFORMANCE TIRES								
'84-'07 FXST	Optional	GT502F	80/90-21	2.15 x 21	30	BW	43117-09	\$169.95
'84-'07 FXSTB	Optional							
'84-'07 FXSTC	Optional							
'84-'07 FXSTD	Optional							
'84-'07 FXSTS	Optional							
DUNLOP® HARLEY-DAVIDSON® TIRE SERIES								
'87-later FLSTC	(BW) Stock (WWW) Stock MY '09-later	D402F	MT90B16	3.00 x 16	36	EWWW WWW SWW BW	43124-94B 43118-92A 43115-91A 43022-91A	\$276.95 \$212.95 \$203.95 \$172.95
'90-'06 FLSTF	(BW) Stock							
'05-later FLSTN	(WWW) Stock							
'81-'08 FLSTS	(BW) Stock							
'05-'07 FLSTSC	(BW) Stock							
'08-'11 FLSTSB	(BW) Stock	D402F	MT90B16	3.00 x 16	36	WWW	43118-92A	\$212.95
'14 FLSTNSE	Stock							
'05 FLSTFSE	Stock							
'12-later FLS	Stock							
'07-later FLSTF	Stock							
'10-later FLSTFB	Stock	D408F	140/75R17	3.50 x 17	36	BW	41474-06B	\$230.95
'06 FLSTFSE2	Stock							
'10-'12 FLSTSE/2/3	Stock							
'08-'09 FXSTSSE2/3	Stock							
'08-'09 FXCW	Stock							
'08-'11 FXCWC	Stock	D408F	90/90-19	2.15 x 19	30	BW	41566-08B	\$158.95
'13-'14 FXSB/FXSBSE/2	Stock							
'84-'07 FXST	Stock							
'84-'07 FXSTB	Stock							
'84-'07 FXSTC	Stock							
'84-'07 FXSTD	Stock	D402F	MH90-21	2.15 x 21	30	BW	43104-93A	\$145.95
'04 FXSTDSE2	Stock							
'84-'07 FXSTS	Stock							
'07 FXSTSSE	Stock							
'11-'13 FXS	Stock							
'08-later FXST	Stock	D408F	MH90-21	2.15 x 21	30	BW	43390-08A	\$151.95
'08-'09 FXSTB	Stock							
'08-'10 FXSTC	Stock							
MICHELIN® HARLEY-DAVIDSON® TIRE SERIES								
'06-'10 FLSTC	Optional	SCORCHER 31	130/90B16	3.00 x 16	36	BW	55035-11A	\$199.95

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## ORIGINAL EQUIPMENT AND RECOMMENDED REPLACEMENT TIRES

Model Fitment	Stock or Optional Fitment	Tread	Size	Rim Size in Inches	PSI	Sidewall Style	Part Number	Price
<b>SOFTAIL® – REAR</b>								
<b>DUNLOP® HARLEY-DAVIDSON® PERFORMANCE TIRES</b>								
'03-'05 Softail (except FXSTD, FLSTS)	Optional							
Replacement tire for Harley-Davidson Wide Tire Kits P/N 43684-99A, 43685-00A, 44490-00A	Optional	GT502	150/80B16	3.00 x 16	36/40	BW	40555-04A	\$234.95
'04 FXSTDSE2	Optional	GT502	180/60B17	4.50 x 17	40	BW	43197-04B	\$329.95
<b>DUNLOP® HARLEY-DAVIDSON® TIRE SERIES</b>								
'87-'02 FLSTC	(BW) Stock							
'90-'02 FLSTF	(BW) Stock							
'97-'02 FLSTS	(WWW) Stock	D402	MT90B16	3.00 x 16	36/40	EW WWW WWW BW	43125-94B 43119-92A 43114-91B 43102-91B	\$304.95 \$240.95 \$231.95 \$203.95
'95-'02 FXSTC	(BW) Stock							
'95-'02 FXSTS	(BW) Stock							
'99-'02 FXSTB	Stock	D402	MT90B16	3.00 x 16	36/40	BW	43102-91B	\$203.95
'05-later FLSTN	(WWW) Stock							
'03 FLSTS	(WWW) Stock	D402	MU85B16	3.00 x 16	36/40	EW WWW WWW BW	43167-08 43353-03 43332-04 43200001	\$299.95 \$251.95 \$242.95 \$211.95
'11-'13 FXS	(BW) Stock							
'12-later FLS	Stock	D402	MU85B16	3.00 x 16	40	BW	43200001	\$211.95
'84-'94 FXSTC	Stock	D401	130/90B16	3.00 x 16	36/40	BW	40565-91B	\$178.95
'84-'94 FXSTS	Stock							
'03-later FLSTC	(BW) Stock (WWW) Stock MY '09-later (SWW) Option (EWWW) Option	D401 D402 D402 D402	150/80B16 MU85B16 MU85B16 MU85B16	3.00 x 16	36/40	BW WWW WWW EWWW	43264-02 43353-03 43332-04 43167-08	\$203.95 \$251.95 \$242.95 \$299.95
'03-'05 Softail (except FXSTD, FLSTS)	Stock							
'06 FLSTF	Stock	D401	150/80B16	3.00 x 16	36/40	BW	43264-02	\$203.95
'05 FLSTFSE	Stock							
'05-later FLSTSC	Stock							
'07-later FLSTF	Stock							
'10-later FLSTFB	Stock							
'06 FLSTFSE2	Stock							
'06-later FXST	Stock	D407	200/55R17	6.00 x 17	42	BW	43242-06B	\$260.95
'06-later FXSTB	Stock							
'06-later FXSTC	Stock							
'06-later FXSTS	Stock							
'07-'08 FXSTSSE/2	Stock							
'08-later FLSTSB	Stock	D401	200/55R17	6.00 x 17	42	BW	43970-08	\$240.95
'00-'07 FXSTD (except '04 FXSTDSE2)	Stock	K591	160/70B17	4.50 x 17	36/40	BW	43169-00A	\$237.95
'08-'09 FXCW	Stock							
'08-'11 FXCWC	Stock							
'13-'14 FXSB/FXSBSSE/2	Stock	D407	240/40R18	8.00 x 18	42	BW	41688-08	\$314.95
'09 FXSTSSE3	Stock							
'10-'12 FLSTSE/2/3	Stock	D407	200/50R18	6.00 x 18	42	BW	41771-10	\$270.95
<b>MICHELIN® HARLEY-DAVIDSON® TIRE SERIES</b>								
'06-'10 FLSTC	Optional	SCORCHER 31	150/80-16	3.00 x 16	36/40	BW	40878-11	\$234.95

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## ORIGINAL EQUIPMENT AND RECOMMENDED REPLACEMENT TIRES

Model Fitment	Stock or Optional Fitment	Tread	Size	Rim Size in Inches	PSI	Sidewall Style	Part Number	Price
<b>TOURING – FRONT</b>								
<b>DUNLOP® HARLEY-DAVIDSON® TIRE SERIES</b>								
'14 FLHR	Stock	D408F	130/80B17	3.00 x 17	36	BW	43109-09A	\$227.95
'14 FLHTCU	Stock							
'14 FLHTK/FLHTKSE	Stock							
'14 FLHP	Stock							
'14 FLHTP	Stock							
'14 FLHX	Stock	D408F	130/60B19	3.50 x 19	36	BW	43100013	\$192.95
'14 FLHXS	Stock							
'14 FLHRSE6	Stock	D402F	MT90B16	3.00 x 16	36	WWW	43118-92A	\$212.95
'14 FLHRC	Stock							
'05 FLHTCSE2	Stock	D402F	MT90B16	3.00 x 16	36	BW	43022-91A	\$172.95
'06-'08 FLHTCUSE/2/3	Stock							
'09-'13 FLHRC and FLHRC/TLE Sidecar	Stock	D408F	130/90B16	3.00 x 16	36	WWW	43211-09A	\$235.95
'09-'13 FLHP/E FLHTP	Stock							
'09-'13 FLHR	(SWW) Stock	D408F	130/80B17	3.00 x 17	36	BW SWW	43109-09A 43115-09A	\$227.95 \$235.95
'09-'13 FLHT	Optional							
'09-'13 FLHTC/U	(SWW) Stock							
'09-'13 FLHTCUSE4/5/6/7/8	Optional							
'10-'13 FLHTK	(SWW) Stock							
'09 FLHX	(BW) Stock							
'09-'13 FLTR/U	(BW) Stock							
'09-'13 TLE Sidecar (except FLHRC/TLE)	Optional							
'04-'08 FL Touring models equipped with 18" accessory Front Wheel (except '07-'08 FLHRSE)	Optional	D402F	130/70-18	3.50 x 18	36	BW	43371-07A	\$230.95
'07-'08 FLHRSE3/4	Optional							
'10-'13 FLHX and FLTRX	Stock	D408F	130/70B18	3.50 x 18	36	BW	44026-09A	\$212.95
'10 FLHXSE	Stock							
'09 FLTRSE3	Stock							
'11 FLTRUSE	Stock							
'11-'12 FLHXSE2/3	Stock							
'13 FLHRSE5	Stock	D408F	130/60B19	3.50 x 19	36	BW	43100013	\$192.95
'12-'13 FLTRXSE/2	Stock							
'13-earlier Touring models equipped with 19" Agitator wheels	Optional							
'81-'08 FLH	Optional	D402F	MT90B16	3.00 x 16	36	EWWW WWW SWW BW	43124-94B 43118-92A 43115-91A 43022-91A	\$276.95 \$212.95 \$203.95 \$174.95
'81-'08 FLHR (except '07-'08 FLHRSE/2)	(SWW) Stock							
'81-'08 FLHRC	(WWW) Stock							
'81-'08 FLHS	Optional							
'81-'08 FLHT	(BW) Stock							
'81-'08 FLHTC/U	(SWW) Stock							
'81-'08 FLHX	(BW) Stock							
'81-'08 FLT	(BW) Stock							
'81-'08 FLTR	(BW) Stock							
'04-'08 TLE/Ultra Sidecar	Optional							

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## ORIGINAL EQUIPMENT AND RECOMMENDED REPLACEMENT TIRES

Model Fitment	Stock or Optional Fitment	Tread	Size	Rim Size in Inches	PSI	Sidewall Style	Part Number	Price
<b>TOURING – REAR</b>								
<b>DUNLOP® HARLEY-DAVIDSON® TIRE SERIES</b>								
'14 Touring (except FLHRC, FLHRSE6)	Stock	D407T	180/65B16	5.00 x 16	40	BW	43200027	\$290.95
'14 FLHRSE6	Stock	D407	180/55B18	5.00 x 18	40	BW	44006-09	\$296.95
'14 FLHRC	Stock	D407	180/65B16	5.00 x 16	40	WWW	43230-09	\$308.95
'09-'13 FLHP/E FLHTP	Stock	D407	180/65B16	5.00 x 16	40	BW	43329-09	\$290.95
'09-'13 FLHRC	Stock	D407	180/65B16	5.00 x 16	40	WWW	43230-09	\$308.95
'09-'13 FLHTC	(SWW) Stock	D407	180/65B16	5.00 x 16	40	BW SWW	43329-09 43332-09	\$290.95 \$301.95
'09-'13 FLHTCU	(SWW) Stock							
'09-'13 FLHR	(SWW) Stock							
'09-'13 FLHT	(BW) Stock							
'09-'13 FLHTCUSE4/5/6/7/8	(BW) Stock							
'10-'13 FLHTK	(SWW) Stock							
'09-'13 FLHX	(BW) Stock							
'09-'13 FLTR/U	(BW) Stock							
'10-'13 FLTRX	(BW) Stock							
'05 FLHTCSE2	Stock	D402	MU85B16	3.00 x 16	36/40	BW	43200001	\$211.95
'06-'08 FLHTCUSE/2/3		D402	MU85B16	3.00 x 16	36/40	BW SWW	43200001 43332-04	\$211.95 \$242.95
'04-'08 FLHX	Optional	D402	MU85B16	3.00 x 16	36/40	BW SWW	43200001 43332-04	\$211.95 \$242.95
'04-'08 FLHR (except '07-'08 FLHRSE/2)	(SWW) Stock	D402	MU85B16	3.00 x 16	36/40	EWWW WWW SWW BW	43167-08 43353-03 43332-04 43200001	\$299.95 \$251.95 \$242.95 \$211.95
'04-'08 FLHRC	(WWW) Stock							
'04-'08 FLHT	(BW) Stock							
'04-'08 FLHTC	(SWW) Stock							
'04-'08 FLHTCU	(SWW) Stock							
'04-'08 FLTR	(BW) Stock							
'81-'03 FLH	(SWW) Stock							
'81-'03 FLHR	(SWW) Stock							
'81-'03 FLHRC	(WWW) Stock	D402	MT90B16	3.00 x 16	36/40	EWWW WWW SWW BW	43125-94B 43119-92A 43114-91B 43102-91B	\$304.95 \$240.95 \$231.95 \$203.95
'81-'03 FLHS	(SWW) Stock							
'81-'03 FLHT	(SWW) Stock							
'81-'03 FLHTC/U	(SWW) Stock							
'81-'03 FLT	(SWW) Stock							
'81-'03 FLTR	(SWW) Stock							
'81-'03 CLE, RLE, TLE/Ultra Sidecar	(SWW) Stock							
'07-'08 FLHRSE/2	Stock	D407	170/60R17	4.50 x 17	38/42	BW	41998-07	\$254.95
'13 FLHRSE5	Stock	D407	180/55B18	5.00 x 18	40	BW	44006-09	\$296.95
'10-'12 FLHXSE/2/3	Stock							
'09 FLTRSE	Stock							
'11 FLTRUSE	Stock							
'12-'13 FLTRXSE/2	Stock							

**TRI GLIDE® – FRONT**

<b>DUNLOP® HARLEY-DAVIDSON® TIRE SERIES</b>								
'09-later FLHTCUTG	(BW) Stock	D402F	MT90B16	3.00 x 16	36	EWWW WWW SWW BW	43124-94B 43118-92A 43115-91A 43022-91A	\$276.95 \$212.95 \$203.95 \$174.95
'10-'11 FLHXXX	(BW) Stock							

**TRI GLIDE – REAR**

<b>DUNLOP® HARLEY-DAVIDSON® TIRE SERIES</b>								
'09-later FLHTCUTG	Stock	SIGNATURE	P205/65R15	5.50 x 15	26	BW	83324-09	\$167.95
'10-'11 FLHXXX	Stock							
H-D Trike models equipped with accessory wheel P/N 55069-11 or 55130-11	Optional	SIGNATURE	P205/60R16	5.50 x 16	26	BW	83665-11A	\$171.95

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Model Fitment	Stock or Optional Fitment	Tread	Size	Rim Size in Inches	PSI	Sidewall Style	Part Number	Price
VRSC™ – FRONT								
DUNLOP® HARLEY-DAVIDSON® TIRE SERIES								
'02-later VRSC™ models	Stock MY '02-'10	D208F	120/70ZR19	3.00 x 19	36	BW	43172-01B	\$226.95
MICHELIN® HARLEY-DAVIDSON® TIRE SERIES								
'07-'10 VRSCAW	Optional	SCORCHER 11	120/70ZR19	3.00 x 19	36	BW	43213-11	\$239.95
'07-'08 VRSCD	Optional							
'07-later VRSCDX	Stock MY '11-later							
'09-later VRSCF	Stock MY '11-later							
'06 VRSCSE2	Optional							
'07 VRSCX	Optional							
VRSC – REAR								
DUNLOP® HARLEY-DAVIDSON® TIRE SERIES								
'07-'10 VRSCAW	Stock	D419	240/40R18	8.00 x 18	42	BW	41473-06	\$289.95
'07-later VRSCDX	Stock MY '07-'10							
'09-later VRSCF	Stock MY '07-'10							
'06 VRSCSE2	Stock							
'07 VRSCX	Stock							
Replacement Tire for Harley-Davidson Wide Tire Kit P/N 43687-06	Optional							
'02-'08 VRSC (except '06 VRSCSE2, VRSCAW, VRSCDX, VRSCX and VRSCF).	Stock	D207	180/55ZR18	5.50 x 18	38/42	BW	43173-01	\$282.95
MICHELIN® HARLEY-DAVIDSON® TIRE SERIES								
'06 VRSCSE2	Optional	SCORCHER 11	240/40R18	8.00 x 18	42	BW	43189-11	\$319.95
'07-'10 VRSCAW	Optional							
'07-later VRSCDX	Stock MY '11-later							
'07 VRSCX	Optional							
'09-later VRSCF	Stock MY '11-later							

## RECOMMENDED REPLACEMENT INNER TUBES AND RIM BANDS

<b>Dunlop® Inner Tubes</b>			<b>Michelin® Inner Tubes</b>		
Part Number	Price		Part Number	Price	
16" MT/MU90-16 Side Metal Valve	<b>40558-82</b>	<b>\$32.95</b>	17" Center Metal Valve	<b>41314-10</b>	<b>\$30.95</b>
16" MT/MU90-16 Center Metal Valve	<b>40575-05</b>	<b>\$33.95</b>	Fits 17" 160/70-17 and 180/60-17 tire/rim		
16" 180/65-16 Center Metal Valve	<b>40592-09</b>	<b>\$32.95</b>	19" Center Metal Valve	<b>41316-10</b>	<b>\$25.95</b>
17" 130/80-17 Center Metal Valve	<b>40593-09</b>	<b>\$30.95</b>	Fits 19" 100/90-19 tire/rim		
17" 160/70-180/60-17 Center Metal Valve	<b>40502-06</b>	<b>\$32.95</b>	19" Center Metal Valve	<b>43233-11</b>	<b>\$24.95</b>
17" 200/55R17 Center Metal Valve	<b>41491-08</b>	<b>\$45.95</b>	Fits VRSC models with 120/10-19 Radial front tires.		
19" MJ/MM90-19 Center Metal Valve with Adapter Ring	<b>41188-06</b>	<b>\$28.95</b>	16" Side Metal Valve	<b>40572-11</b>	<b>\$31.95</b>
19" 120/70R19 Center Metal Valve	<b>41007-07</b>	<b>\$38.95</b>	Fits 130/90-16, 150/80-16, MT90-16 and MU85-16 tire/rim		
21" MH90-21 Center Metal Valve	<b>43140-80</b>	<b>\$27.95</b>	16" Center Metal Valve	<b>40876-11</b>	<b>\$31.95</b>
			Fits 130/90-16, 150/80-16, MT90-16 and MU85-16 tire/rim		
			21" Center Metal Valve	<b>40941-12</b>	<b>\$22.95</b>
			Fits 80/90-21 and MH90-21 tire/rim		
<b>Dunlop Rim Bands</b>			<b>Michelin Rim Bands</b>		
Part Number	Price		Part Number	Price	
16" Center Valve Smooth Profile Rim	<b>43164-05</b>	<b>\$4.49</b>	17" Center Valve Rim (4.5" x 17"/18")	<b>41319-10</b>	<b>\$5.49</b>
16" MT90-16 Side Valve Rim	<b>43147-40</b>	<b>\$3.95</b>	19" Center Valve Rim (1.6"/2.0" x 18"/19")	<b>41323-10</b>	<b>\$3.95</b>
16" 180/65-16 Center Valve Rim	<b>43099-09</b>	<b>\$6.95</b>	19" VRSC 120/10-19 Radial Rim (2.15"/3" x 17"/18"/19")	<b>42039-11</b>	<b>\$6.95</b>
17" Center Valve Rim	<b>43101-06</b>	<b>\$5.49</b>	16" Side Metal Valve Rim (3" x 16")	<b>40875-11</b>	<b>\$3.95</b>
17" Center Valve Radical Rim	<b>40916-08</b>	<b>\$8.95</b>	16" Center Metal Valve Rim (3" x 16")	<b>40877-11</b>	<b>\$3.95</b>
17" 130/80-17 Center Valve Rim	<b>43341-09A</b>	<b>\$4.95</b>	21" Center Metal Valve Rim (1.6"/1.85" x 17"/18"/19")	<b>40954-12</b>	<b>\$3.95</b>
19" Center Valve Rim	<b>43145-47</b>	<b>\$3.95</b>			
19" Center Valve Radial Rim	<b>41996-07</b>	<b>\$3.95</b>			
21" Center Valve Rim	<b>43939-89</b>	<b>\$3.95</b>			

### Sidewall Style Key:

**BW** – Blackwall  
**SWW** – Slim Whitewall  
**MWW** – Medium Whitewall  
**WWW** – Wide Whitewall  
**EWWW** – Engraved Wide Whitewall

Notice: Suggested retail prices are subject to change.  
 Please see [harley-davidson.com](http://harley-davidson.com) for the most current suggested retail prices on any product listed in this catalog. Actual retail prices may vary.



**WARNING:** Use only Harley-Davidson approved tires. See a Harley-Davidson dealer. Using non-approved tires or mixing approved tires from different manufacturers on the same motorcycle, can adversely affect stability, which could result in death or serious injury.

Model Fitment	Stock or Optional Fitment	Tread	Size	Rim Size in Inches	PSI	Sidewall Style	Part Number	Price
BUELL® – FRONT								
DUNLOP® BUELL TIRE SERIES								
'06-'09 XB12X	Stock – '06 XB12X, Optional on other Ulysses models	D616F	120/70ZR17	3.50 x 17	36	BW	G0150.1AKS	\$198.65
PIRELLI® BUELL TIRE SERIES								
'00-later Blast models	Stock	MT 75	100/80-16	2.50 x 16	34	BW	G0150.9A7	\$89.95
'08-later 1125R and 1125CR	Optional	Scorpion SYNC	120/70ZR17	3.50 x 17	34	BW	G0150.1AJ	\$186.95
'03-later XB models	Stock and Optional fitments, see parts book							
BUELL – REAR								
PIRELLI® BUELL TIRE SERIES								
'00-later Blast models	Stock	MT 75	120/80-16	2.75 x 16	36	BW	G0350.9A7	\$108.95





For Educational Purposes Only



Odometer Reading In						.	Date In
Odometer Reading Out						.	Date Promised
Warranty Request No.							Date Completed
Parts Order No.							Date Picked Up
Parts Received Date							Technician's Name
Save Old Parts?							Technician's License No.

[illegible]

UTMMI does not assume responsibility or accept liability for vehicles and vehicle parts or work performed by students. The proper performance of tasks by students is a slow, methodical process which cannot be accelerated. Student work is performed as an educational experience and is observed by the Instructor to assure that the work is performed properly.

However, instances do occur where work has to be repeated because the student failed to follow instructions or perform the work correctly.

Parts installed are not warranted beyond the warranty given by respective manufactures. No other warranties are given whether expressed or implied.

All work performed in this laboratory is performed for the sole purpose of student learning experience, with no expressed warranty or specific completion time. I hereby authorize the repair work listed herein, including actual work to be performed along with the purchase of necessary materials. The staff or students may operate the described vehicle for testing and inspection at owner's risk. An express lien is hereby granted and acknowledged on said vehicle to secure the amount of repairs thereto. I hereby agree to hold the school, its officers, directors, shareholders, agents and employees free from any loss, damages, liability, cost or expense caused in any way that may arise during or as a result of this vehicle being repaired by or used at UT/UMM.

Signature \_\_\_\_\_

ESTIMATES			TOTAL PARTS		LABOR RATE ____X LABOR HRS ____ = Total Labor			
	Original	Revised	No charge shall be made in excess of the estimated cost until the customer is notified and has given his/her consent, unless allowed by state law.	<p>I have inspected the motor- cycle and the work done meets with my satisfaction.          ____ I have had safety-related items of repair explained to me and I have elected not to have them corrected.          Pick Up Date: _____          X_____</p>	Total Parts			
Parts					Sub Labor			
Labor					Shop Sup			
Total					Tax			
Authorized By: _____			Date: _____	Telephone _____	In Person _____	TOTAL		

# WORKSHEET

HD-RO-03312009

# Repair Order

For Educational Purposes Only



Customer Name John Q. Customer										Make H-D				Year 2005			
Address 3700 W. Juneau Ave										Model FLSTNI							
City Milwaukee						State WI				Lic No.							
Daytime Phone 555-555-5555																	
Other Phone						Eng No.											
VIN	5	H	D	1	J	D	B	1	2	5	Y	0	2	2	7	1	2

Odometer Reading In	10,371							Date In	6/2/15
Odometer Reading Out	10380							Date Promised	
Warranty Request No.							Date Completed	6/2/15	
Parts Order No.							Date Picked Up	6/2/15	
Parts Received Date							Technician's Name		
Save Old Parts?							Technician's License No.		

[illegible]

ESTIMATES

TOTAL PARTS

	Original	Revised
Parts		
Labor		
Total		

Authorized By:	Date:	Telephone	In Person
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Signature \_\_\_\_\_

Description of Work	Amount
Customer states please complete 10,000 mile	
<b>10 pts</b>	
10,000 mile service = 4.3 hrs	344.00

LABOR RATE 80 LABOR HRS 4.3 = Total Labor 344.00

Total Parts	84.41
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Sub Labor		
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Shop Sup		
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Tax	5.49
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TOTAL	433.90
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## WORKSHEET

# **Harley-Davidson Models**

# **JOB TIME/CODE MANUAL**

# **2005**

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Binder 99998-88  
Contents 99997-05



## 2005 SOFTAIL MODELS (EXCEPT SPRINGERS)

Unless otherwise specified, Job Times shown include all operations necessary to complete the listed job.

Table 1-1. Service

ITEM	DESCRIPTION	LABOR CODE	MODELS				
			BJY, BWB, JHB	BNY, JDB	BHY, BTY, BVB, JAB	BMV, BXB, JGB	BSY, JBB
NEW							
Set-up and pre-delivery			2.1	2.1	2.1	2.1	2.1
1000 mile service			2.0	2.0	2.0	2.0	2.0
REGULAR							
5,000 mile maintenance			2.0	2.0	2.0	2.0	2.0
10,000 mile maintenance			4.3	4.3	4.3	4.3	4.3

Table 1-2. Chassis

ITEM	DESCRIPTION	LABOR CODE	MODELS				
			BJY, BWB, JHB	BNY,JDB	BHY, BTY, BVB, JAB	BMV, BXB, JGB	BSY, JBB
DRIVE							
Adjust secondary belt		---	0.3	0.3	0.3	0.3	0.3
Replace secondary belt		2011	2.6	2.6	2.6	2.6	2.6
Replace rear wheel sprocket		2021	0.8	0.8	0.8	0.8	0.8
WHEELS							
Replace tire - includes balancing	front	2106	0.5	0.5	0.5	0.5	0.5
	rear	2111	0.6	0.6	0.6	1.1	1.1
Replace wheel assembly - includes disc and sprocket exchange and balancing	front	2113	0.8	0.8	0.8	0.8	0.8
	rear	2114	0.9	0.9	0.9	1.1	1.1
Replace rim, hub or spokes	front	2116	2.3	2.3	2.3	---	2.3
	rear	2121	2.3	2.3	2.3	---	---

BJY FLSTC BNY FLSTN BVB FXST-I BMY FLSTF BSY FXSTD  
 BWB FLSTC-I JDB FLSTN-I BTY FXSTB BXB FLSTF-I JBB FXSTD-I  
 JHB FLSTC-I SHRINE BHY FXST JAB FXSTB-I JGB FLSTF-I SHRINE

## SOFTAIL MODELS

Table 56. Regular Service Intervals: 2005 Softail Models

ITEM SERVICED	PROCEDURE	1000 MI. 1600 KM	5000 MI. 8000 KM	10,000 MI. 16,000 KM	15,000 MI. 24,000 KM	20,000 MI. 32,000 KM	25,000 MI. 40,000 KM	NOTES
Engine oil and filter	Replace	X	X	X	X	X	X	
Oil lines and brake system	Inspect for leaks	X	X	X	X	X	X	1
Air cleaner	Inspect, service as required	X	X	X	X	X	X	
Tires	Check pressure, inspect tread	X	X	X	X	X	X	
Wheel spokes	Check tightness	X	X			X		1, 4
Primary chaincase lubricant	Replace	X	X	X	X	X	X	
Transmission lubricant	Replace	X	X	X	X	X	X	
Clutch	Check adjustment	X	X	X	X	X	X	1
Primary chain	Check adjustment	X	X	X	X	X	X	
Rear belt and sprockets	Inspect, adjust belt	X	X	X	X	X	X	1
Throttle, brake, enrichener and clutch controls	Check, adjust and lubricate	X	X	X	X	X	X	1, 4
Jiffy stand	Inspect and lubricate	X		X		X		1
Fuel valve, lines and fittings	Inspect for leaks	X	X	X	X	X	X	1, 4
Fuel tank filter screen	Clean (EFI: replace)						X	1
Brake fluid	Check levels and condition	X	X	X	X	X	X	
Brake pads and discs	Inspect for wear	X	X	X	X	X	X	
Spark plugs	Inspect	X	X		X		X	
Spark plugs	Replace			X		X		
Electrical equipment and switches	Check operation	X	X	X	X	X	X	
Engine idle speed	Check adjustment	X	X	X	X	X	X	1
Front fork oil	Replace					X		1
Steering head bearings (Softail Models)	Adjust	X		X		X		1
Steering head bearings (Softail Models)	Lubricate			X		X		2
Steering head bearings (Springer models)		Adjust and lubricate every 2500 miles (4000 kilometers).						1, 5
Rear fork bearings (if applicable)	Repack					X		1
Windshield bushings	Inspect			X		X		1
Springer rocker bearings	Adjust	X		X		X		1
Fuel door, Tour-Pak, saddlebags	Lubricate hinges and latches	X	X	X	X	X		
Critical fasteners	Check tightness	X		X		X		1
Battery	Check battery and clean connections	Perform annually.						3
Road test	Verify component and system functions	X	X	X	X	X	X	
NOTES:	1. Should be performed by an authorized Harley-Davidson dealer, unless you have the proper tools, service data and are mechanically qualified. 2. Disassemble, lubricate and inspect every 30,000 miles (48,000 kilometers). 3. Perform annually. 4. Not all vehicles are equipped with an enrichener, fuel valve or spoke wheels. Consult appropriate topic in service manual. 5. Disassemble, lubricate and inspect every 20,000 miles (32,000 kilometers).							

## 872 GARAGE

### Oil Filters

#### A. SUPERPREMIUM5™ OIL FILTERS – 5 MICRON

Utilizing advances in synthetic media technology, the SuperPremium5™ Oil Filters are Tested-Certified to provide filtration to retain dust, soot and other solid matter with low internal pressure drop. Filter also includes internal pressure relief and anti-drain back valves.

Fits '99-later Twin Cam and Evolution® models (except '08-'13 XR) and can be used as an upgrade for any motorcycle that requires Oil Filter P/N 63796-77A, 63805-80A, 63812-90 or 63813-90.

<b>63798-99A</b>	Chrome.	<b>\$14.95</b>
<b>63731-99A</b>	Black.	<b>\$10.95</b>

#### SuperPremium10 Oil Filter – 10 Micron (not shown)

Fits '02-later VRSC™ models.

<b>63793-01K</b>	Black.	<b>\$9.95</b>
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#### B. GENUINE HARLEY-DAVIDSON® OIL FILTERS

Filter features cured resin impregnated paper which removes harmful foreign particles from the oil. End caps and thermal setting adhesive provide positive seals, preventing bypassing of contaminant-laden oil.

##### Spin-On

Fits all XB and Buell models.

<b>63806-00Y</b>	Black.	<b>\$7.95</b>
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Fits '15-later XG models.

<b>62700045</b>		<b>\$7.95</b>
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Fits '91-98 Dyna® models.

<b>63812-90</b>	Black, Extra Long.	<b>\$8.95</b>
<b>63813-90</b>	Chrome, Extra Long.	<b>\$12.95</b>

Fits late '82-'84 FLH-80 Classics, '82-'86 FXWG, FXSB, FXEF and '79-early '84 XL models.

<b>63782-80</b>	Chrome, Short.	<b>\$11.95</b>
<b>63810-80A</b>	Black, Short.	<b>\$8.95</b>

Fits '80-'98 FLT, FLHT, FLHR, '82-'94 FXR, '84-'98 Softail®, '84-'95 FXRP, FLHTP, late '84-later XL and '08-'13 XR models.

<b>63796-77A</b>	Chrome, Long.	<b>\$10.95</b>
<b>63805-80A</b>	Black, Long.	<b>\$8.95</b>

#### CLASSIC MOTOR PARTS OIL FILTERS (not shown)

Quality filters at a great price. Replaces P/N 63840-53 or 63835-87T with a cartridge type filter and spring.

<b>62700055</b>	In Tank Oil Filter.	<b>\$10.95</b>
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#### DEFINITIVE5 FILTER ELEMENT (not shown)

TESTED-CERTIFIED Synthetic Filter media provides nominal 5 micron filtration. Increased retained capacity for dust, soot and other solid matter. Low internal pressure drop.

<b>63834-07</b>		<b>\$13.95</b>
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Fits models equipped with DEFINITIVE5 Filtration System.

**Shell** – Thicker shell material for extra strength. The heavier shell provides extra security against puncture from road debris.

**Center Tube** – Prevents filter element collapse.

**Bypass Valve** – Oil Pressure Relief Valve is calibrated to protect engine. The Bypass Valve is designed to ensure oil flow in situations of excessive filter element flow restriction.

**Gasket** – Premium nitrile rubber with special lubricity compound to reduce torque during installation and removal.

**Bar & Shield Stamp**

**Metal End-Cap** – Provides positive seal for filter element assembly.

**Filter Element** – 100% wire-backed synthetic media provides superior filtration while keeping flow restriction low.

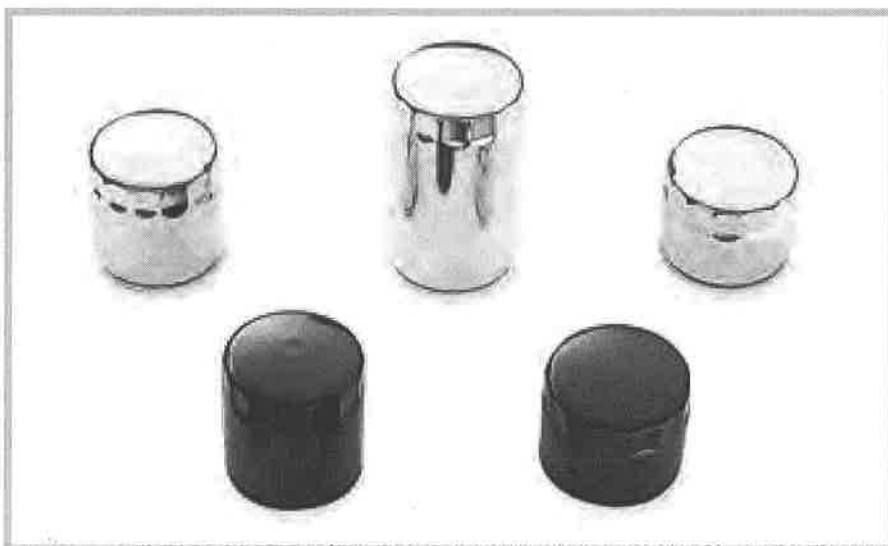
**Steel Back Plate** – Zinc-plated for superior rust prevention. Extra large inlet holes for lower flow resistance.

**Check Valve** – Silicone anti-drain back valve prevents dry starts by eliminating oil drain back during shutdown. Silicone outperforms and outlasts standard nitrile rubber in both extreme cold and hot temperatures.

#### A. SUPERPREMIUM5 OIL FILTERS



#### A. SUPERPREMIUM5 OIL FILTERS



#### B. GENUINE HARLEY-DAVIDSON OIL FILTERS

Notice: The prices appearing in this catalog are the manufacturer's suggested retail prices. Actual retail prices may vary.