2003 Harley-Davidson®

VRSCA
MODEL

SERVICE MANUAL

P/N 99501-03

IMPORTANT NOTICE

Harley-Davidson motorcycles conform to all applicable U.S.A. Federal Motor Vehicle Safety Standards and U.S.A. Environmental Protection Agency regulations effective on the date of manufacture.

To maintain the safety, dependability, and emission and noise control performance, it is essential that the procedures, specifications and service instructions in this manual are followed.

Any substitution, alteration or adjustment of emission system and noise control components outside of factory specifications may be prohibited by law.

Harley-Davidson Motor Company

2003 VRSCA

SERVICE MANUAL

The information in this Service Manual applies to all 2003 VRSCA models.

PART NO. 99501-03

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VISIT THE HARLEY-DAVIDSON WEB SITE
http://www.harley-davidson.com

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FOREWORD

GENERAL

This Service Manual has been prepared with two purposes in mind. First, it will acquaint the user with the construction of the Harley-Davidson product and assist in the performance of basic maintenance and repair. Secondly, it will introduce to the professional Harley-Davidson Technician the latest field-tested and factory-approved major repair methods. We sincerely believe that this Service Manual will make your association with Harley-Davidson products more pleasant and profitable.

HOW TO USE YOUR SERVICE MANUAL

Information is arranged as follows:

- Section 1–Maintenance
- Section 2–Chassis
- Section 3–Engine
- Section 4–Fuel System
- Section 5–Electric Starter
- Section 6–Cooling System
- Section 7–Transmission
- Section 8–Electrical
- Section 9–Fuel Injection
- Appendix A–Tools
- Appendix B–Wiring
- Appendix C–Metric Conversions
- Appendix D–Service Templates

Use the TABLE OF CONTENTS following this FOREWORD or the INDEX at the back of the book to find the desired subject.

Note that each manual section contains sequentially numbered topics. The numbering system allows quick cross references throughout the document.

For example, the sixth topic (ENGINE OIL AND FILTER) in section one (MAINTENANCE) could be referred to as:

1.6 ENGINE OIL AND FILTER

This cross reference directs the reader to section **1** (MAINTENANCE) and topic **6** (ENGINE OIL AND FILTER).

PREPARATION FOR SERVICE

⚠WARNING

Gasoline is extremely flammable and highly explosive. Always stop the engine when refueling or servicing the fuel system. Do not smoke or allow open flame or sparks near the work site. Inadequate safety precautions could result in death or serious injury.

Good preparation is very important for efficient service work. A clean work area at the start of each job will allow you to perform the repair as easily and quickly as possible, and will reduce the incidence of misplaced tools and parts. A motorcycle that is excessively dirty should be cleaned before work starts. Cleaning will occasionally uncover sources of trouble. Tools, instruments and any parts needed for the job should be gathered before work is started. Interrupting a job to locate tools or parts is a distraction and causes needless delay. See A.1 APPENDIX A–TOOLS for equipment required for special service work.

NOTES

- *To avoid unnecessary disassembly, carefully read all relative service information before repair work is started.*
- *In figure legends, the number which follows the name of a part indicates the quantity necessary for one complete assembly.*

SERVICE BULLETINS

In addition to the information presented in this Service Manual, Harley-Davidson Motor Company will periodically issue Service Bulletins to Harley dealers. Service Bulletins cover interim engineering changes and supplementary information.

USE GENUINE REPLACEMENT PARTS

⚠WARNING

When replacement parts are required, use only genuine Harley-Davidson parts or parts with equivalent characteristics (which include type, strength and material). Failure to do so may result in product malfunction. This could result in death or serious injury.

To ensure satisfactory and lasting repairs, carefully follow the Service Manual instructions and use only genuine Harley-Davidson replacement parts. This is your assurance that the parts you are using will fit right, operate properly and last longer.

WARNINGS AND CAUTIONS

Statements in this service manual preceded by the following words are of special significance.

⚠DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

CAUTION without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

⚠WARNING

- **Proper service and repair is important for the safe, reliable operation of all mechanical products. The service procedures recommended and described in this Service Manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. These special tools should be used when and as recommended. It is important to note that some warnings against the use of specific service methods, which could damage the motorcycle or render it unsafe, are stated in this Service Manual. However, please remember that these warnings are not all-inclusive. Inadequate safety precautions could result in death or serious injury.**
- **Since Harley-Davidson could not possibly know, evaluate or advise the service trade of all possible ways in which service might be performed, or of the possible hazardous consequences of each method, we have not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by Harley-Davidson must first thoroughly satisfy himself that neither his nor the operator's safety will be jeopardized as a result. This could result in death or serious injury.**
- **Wear eye protection when using hammers, arbor or hydraulic presses, gear pullers, spring compressors, slide hammers and similar tools. Be especially cautious when using pulling, pressing or compressing equipment. The forces involved can cause parts to fly outward with considerable force, possibly resulting in death or serious injury.**

PRODUCT REFERENCES

⚠WARNING

Follow the directions listed on all products. Carefully read all labels, warnings and cautions before use. Inadequate safety precautions could result in death or serious injury.

When reference is made in this Service Manual to a specific brand name product, tool or instrument, an equivalent product, tool or instrument may be substituted.

Kent-Moore Products

All tools mentioned in this manual with an "HD", "J" or "B" preface must be ordered through:

Kent-Moore
SPX Corporation
28635 Mound Road
Warren, Michigan 48092-3499
Telephone: 1-800-345-2233

Sealing and Threadlocking Products

LOCTITE PRODUCTS

Some procedures in this Service Manual call for the use of Loctite® products. If you have any questions regarding Loctite product usage or retailer/wholesaler locations, please call Loctite Corp. at 1-800-323-5106.

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All photographs, illustrations and procedures may not necessarily depict the most current model or component, but are based on the latest production information available at the time of publication.

Since product improvement is our continual goal, Harley-Davidson reserves the right to change specifications, equipment or designs at any time without notice and without incurring obligation.

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MAINTENANCE 1

SERVICING A NEW MOTORCYCLE

⚠WARNING

Always follow the listed service and maintenance recommendations, since they affect the safe operation of the motorcycle and the personal welfare of the rider. Failure to follow recommendations could result in death or serious injury.

Service operations to be performed before customer delivery are specified in the applicable model year PREDELIVERY AND SETUP MANUAL.

The performance of new motorcycle initial service is required to keep warranty in force and to ensure proper emissions systems operation. See 1600 km (1000 mile) MAINTENANCE under 1.3 MAINTENANCE SCHEDULE for details.

SAFE OPERATING MAINTENANCE

CAUTION

- **Do not attempt to retighten engine head bolts. Retightening can cause engine damage.**
- **During the initial break-in period, use only Harley-Davidson 20W50 engine oil. Failure to use the recommended oil will result in improper break-in of the engine cylinders and piston rings.**

A careful check of certain equipment is necessary after periods of storage, and frequently between regular service intervals, to determine if additional maintenance is required.

Check:

1. Tires for abrasions, cuts and correct pressure.
2. Drive belt for proper tension and condition.
3. Brakes, steering and throttle for responsiveness.
4. Brake fluid level and condition. Hydraulic lines and fittings for leaks. Also, check brake pads and rotors for wear.
5. Cables for fraying, crimping and free operation.
6. Engine oil fluid level.
7. Headlamp, passing lamp, tail lamp, brake lamp and turn signal operation.

SHOP PRACTICES

Repair Notes

NOTE

- *General maintenance practices are given in this section.*
- *Repair = Disassembly/Assembly.*
- *Replace = Removal/Installation.*

All special tools and torque values are noted at the point of use.

All required parts or materials can be found in the appropriate PARTS CATALOG.

Safety

Safety is always the most important consideration when performing any job. Be sure you have a complete understanding of the task to be performed. Use common sense. Use the proper tools. Protect yourself and bystanders with approved eye protection. Don't just do the job – do the job safely.

Removing Parts

Always consider the weight of a part when lifting. Use a hoist whenever necessary. Do not lift heavy parts by hand. A hoist and adjustable lifting beam or sling are needed to remove some parts. The lengths of chains or cables from the hoist to the part should be equal and parallel and should be positioned directly over the center of the part. Be sure that no obstructions will interfere with the lifting operation. Never leave a part suspended in mid-air.

⚠WARNING

Always check the capacity rating and condition of hoists, slings, chains or cables before use. Failure to do so can lead to an accident which could result in death or serious injury.

Always use blocking or proper stands to support the part that has been hoisted. If a part cannot be removed, verify that all bolts and attaching hardware have been removed. Check to see if any parts are in the way of the part being removed.

When removing hoses, wiring or tubes, always tag each part to ensure proper installation.

Cleaning

If you intend to reuse parts, follow good shop practice and thoroughly clean the parts before assembly. Keep all dirt out of parts; the unit will perform better and last longer. Seals, filters and covers are used in this vehicle to keep out environmental dirt and dust. These items must be kept in good condition to ensure satisfactory operation.

Clean and inspect all parts as they are removed. Be sure all holes and passages are clean and open. After cleaning, cover all parts with clean lint-free cloth, paper or other material. Be sure the part is clean when it is installed.

Always clean around lines or covers before they are removed. Plug, tape or cap holes and openings to keep out dirt, dust and debris.

Disassembly/Assembly

Always assemble or disassemble one part at a time. Do not work on two assemblies simultaneously. Be sure to make all necessary adjustments. Recheck your work when finished. Be sure that everything is done.

Operate the vehicle to perform any final check or adjustments. If all is correct, the vehicle is ready to go back to the customer.

REPAIR AND REPLACEMENT PROCEDURES

Hardware and Threaded Parts

Install helical thread inserts when inside threads in castings are stripped, damaged or not capable of withstanding specified torque.

Replace bolts, nuts, studs, washers, spacers and small common hardware if missing or in any way damaged. Clean up or repair minor thread damage with a suitable thread chaser.

Replace all damaged or missing lubrication fittings.

Use Teflon pipe sealant on pipe fitting threads.

Wiring, Hoses and Lines

Replace hoses, clamps, electrical wiring, electrical switches or fuel lines if they do not meet specifications.

Instruments and Gauges

Replace broken or defective instruments and gauges. Replace dials and glass that are so scratched or discolored that reading is difficult.

Bearings

Anti-friction bearings must be handled in a special way. To keep out dirt and abrasives, cover the bearings as soon as they are removed from the package.

Wash bearings in a non-flammable cleaning solution. Knock out packed lubricant inside by tapping the bearing against a wooden block. Wash bearings again. Cover bearings with clean material after setting them down to dry. Never use compressed air to dry bearings.

Coat bearings with clean oil. Wrap bearings in clean paper.

Be sure that the chamfered side of the bearing always faces the shoulder (when bearings installed against shoulders). Lubricate bearings and all metal contact surfaces before pressing into place. Only apply pressure on the part of the bearing that makes direct contact with the mating part. Install bearings with numbered side facing out.

Always use the proper tools and fixtures for removing and installing bearings.

Bearings do not usually need to be removed. Only remove bearings if necessary.

Bushings

Do not remove a bushing unless damaged, excessively worn or loose in its bore. Press out bushings that must be replaced.

When pressing or driving bushings, be sure to apply pressure in line with the bushing bore. Use a bearing/bushing driver or a bar with a smooth, flat end. Never use a hammer to drive bushings.

Inspect the bushing and the mated part for oil holes. Be sure all oil holes are properly aligned.

Gaskets

Always discard gaskets after removal. Replace with **new** gaskets. Never use the same gasket twice. Be sure that gasket holes match up with holes in the mating part.

Lip Type Seals

Lip seals are used to seal oil or grease and are usually installed with the sealing lip facing the contained lubricant. Seal orientation, however, may vary under different applications.

Seals should not be removed unless necessary. Only remove seals if required to gain access to other parts or if seal damage or wear dictates replacement.

Leaking oil or grease usually means that a seal is damaged. Replace leaking seals to prevent overheated bearings.

Always discard seals after removal. Do not use the same seal twice.

O-Rings (Preformed Packings)

Always discard o-rings after removal. Replace with **new** o-rings. To prevent leaks, lubricate the o-rings before installation. Apply the same type of lubricant as that being sealed. Be sure that all gasket, o-rings and seal mating surfaces are thoroughly clean before installation.

Gears

Always check gears for damaged or worn teeth.

Lubricate mating surfaces before pressing gears on shafts.

Shafts

If a shaft does not come out easily, check that all nuts, bolts or retaining rings have been removed. Check to see if other parts are in the way before using force.

Shafts fitted to tapered splines should be very tight. If shafts are not tight, disassemble and inspect tapered splines. Discard parts that are worn. Be sure tapered splines are clean, dry and free of burrs before putting them in place. Press mating parts together tightly.

Clean all rust from the machined surfaces of new parts.

Part Replacement

Always replace worn or damaged parts with **new** parts.

CLEANING

Part Protection

Before cleaning, protect rubber parts (such as hoses, boots and electrical insulation) from cleaning solutions. Use a grease-proof barrier material. Remove the rubber part if it cannot be properly protected.

Cleaning Process

Any cleaning method may be used as long as it does not result in parts damage. Thorough cleaning is necessary for proper parts inspection. Strip rusted paint areas to bare metal before repainting.

Rust or Corrosion Removal

Remove rust and corrosion with a wire brush, abrasive cloth, sand blasting, vapor blasting or rust remover. Use buffing crocus cloth on highly polished parts that are rusted.

TOOL SAFETY

Air Tools

- Always use approved eye protection equipment when performing any task using air-operated tools.
- On all power tools, use only recommended accessories with proper capacity ratings.
- Do not exceed air pressure ratings of any power tools.
- Bits should be placed against work surface before air hammers are operated.
- Disconnect the air supply line to an air hammer before attaching a bit.
- Never point an air tool at yourself or another person.
- Protect bystanders with approved eye protection.

Wrenches

- Never use an extension on a wrench handle.
- If possible, always pull on a wrench handle and adjust your stance to prevent a fall if something lets go.
- Never cock a wrench.
- Never use a hammer on any wrench other than a STRIKING FACE wrench.
- Discard any wrench with broken or battered points.
- Never use a pipe wrench to bend, raise or lift a pipe.

Pliers/Cutters/Prybars

- Plastic- or vinyl-covered pliers handles are not intended to act as insulation; don't use on live electrical circuits.
- Don't use pliers or cutters for cutting hardened wire unless they were designed for that purpose.
- Always cut at right angles.
- Don't use any prybar as a chisel, punch or hammer.

Hammers

- Never strike one hammer against a hardened object, such as another hammer.
- Always grasp a hammer handle firmly, close to the end.
- Strike the object with the full face of the hammer.
- Never work with a hammer which has a loose head.
- Discard hammer if face is chipped or mushroomed.
- Wear approved eye protection when using striking tools.
- Protect bystanders with approved eye protection.

Punches/Chisels

- Never use a punch or chisel with a chipped or mushroomed end; dress mushroomed chisels and punches with a file.
- Hold a chisel or a punch with a tool holder if possible.
- When using a chisel on a small piece, clamp the piece firmly in a vise and chip toward the stationary jaw.
- Wear approved eye protection when using these tools.
- Protect bystanders with approved eye protection.

Screwdrivers

- Don't use a screwdriver for prying, punching, chiseling, scoring or scraping.
- Use the right type of screwdriver for the job; match the tip to the fastener.
- Don't interchange POZIDRIV®, PHILLIPS® or REED AND PRINCE screwdrivers.
- Screwdriver handles are not intended to act as insulation; don't use on live electrical circuits.
- Don't use a screwdriver with rounded edges because it will slip – redress with a file.

Ratchets and Handles

- Periodically clean and lubricate ratchet mechanisms with a light grade oil. Do not replace parts individually; ratchets should be rebuilt with the entire contents of service kit.
- Never hammer or put a pipe extension on a ratchet or handle for added leverage.
- Always support the ratchet head when using socket extensions, but do not put your hand on the head or you may interfere with the action of its reversing mechanism.
- When breaking loose a fastener, apply a small amount of pressure as a test to be sure the ratchet's gear wheel is engaged with the pawl.

Sockets

- Never use hand sockets on power or impact wrenches.
- Select the right size socket for the job.
- Never cock any wrench or socket.
- Select only impact sockets for use with air or electric impact wrenches.
- Replace sockets showing cracks or wear.
- Keep sockets clean.
- Always use approved eye protection when using power or impact sockets.

Storage Units

- Don't open more than one loaded drawer at a time. Close each drawer before opening up another.
- Close lids and lock drawers and doors before moving storage units.
- Don't pull on a tool cabinet; push it in front of you.
- Set the brakes on the locking casters after the cabinet has been rolled to your work.

FUEL

⚠WARNING

Remove filler cap slowly and fill fuel tank slowly to prevent spillage; do not overfill or fill above the bottom of the filler neck insert. In addition, leave air space to allow for fuel expansion. Expansion can cause an overfilled tank to overflow gasoline through the filler cap onto surrounding areas. After refueling, be sure filler cap is securely tightened. Failure to comply may cause an explosion or fire which could result in death or serious injury.

Use a good quality leaded or unleaded gasoline of 91 pump octane (95 RON) or higher. Pump octane is the octane number usually shown on the gas pump.

GASOLINE BLENDS

CAUTION

Using gasoline that has an alcohol additive, such as methanol, may cause fuel system rubber components' failure and/or engine damage.

Harley-Davidson motorcycles were designed to give the best performance using unleaded gasoline. Some fuel suppliers sell gasoline/alcohol blends as a fuel. The type and amount of alcohol added to the fuel is important.

- DO NOT USE GASOLINES CONTAINING METHANOL. Using gasoline/methanol blends will result in starting and driveability deterioration and damage to critical fuel system components.
- ETHANOL is a mixture of 10% ethanol (Grain alcohol) and 90% unleaded gasoline. Gasoline/ethanol blends can be used in your motorcycle if the ethanol content does not exceed 10%.
- REFORMULATED OR OXYGENATED GASOLINES (RFG): "Reformulated gasoline" is a term used to describe gasoline blends that are specifically designed to burn cleaner than other types of gasoline. Your motorcycle will run normally using this type of gas.

You may find that some gasoline blends adversely affect the starting, driveability or fuel efficiency of your bike. If you experience one or more of these problems, we recommend you try a different brand of gasoline or gasoline with a higher octane rating.

ENGINE OIL

Use the proper grade of oil for the lowest temperature expected before the next oil change.

If it is necessary to add oil and Harley-Davidson oil is not available, use an oil certified for diesel engines. Acceptable diesel engine oil designations include CE, CF, CF-4 and CG-4. The preferred viscosities for the diesel engine oils, in descending order, are 20W-50, 15W-40 and 10W-40. At the first opportunity, see a Harley-Davidson dealer to change back to 100 percent Harley-Davidson oil.

See 1.3 MAINTENANCE SCHEDULE for all service information.

WINTER LUBRICATION

Combustion in an engine produces water vapor. During starting and warm-up in cold weather, especially in freezing temperatures, the vapor condenses to water before the crankcase is hot enough to exhaust it through the breather system. If the engine is run long enough for the crankcase to become thoroughly heated, the water returns to vapor and is then exhausted.

An engine used for only short trips, and seldom allowed to thoroughly warm up, accumulates increasing amounts of water in the oil pan. Water mixed with oil forms a sludge that causes accelerated engine wear. In freezing temperatures, the water becomes slush or ice, which may clog oil lines and result in engine failure.

Always change the engine oil more often in winter. If the engine is used for short runs, change the oil even more frequently. The farther below freezing the temperature drops the more often the oil should be changed.

MAINTENANCE TASK AND SERVICE DATA	PRERIDE	10000 MI 16000 KM	25000 MI 40000 KM	50000 MI 80000 KM	75000 MI 120000 KM	100000 MI 160000 KM	125000 MI 200000 KM	150000 MI 240000 KM	175000 MI 280000 KM	200000 MI 320000 KM	225000 MI 360000 KM	250000 MI 400000 KM	275000 MI 440000 KM	300000 MI 480000 KM	325000 MI 520000 KM	350000 MI 560000 KM	375000 MI 600000 KM	400000 MI 640000 KM	425000 MI 680000 KM	450000 MI 720000 KM	475000 MI 760000 KM	500000 MI 800000 KM
Engine oil *Oil level:* Fill to upper groove on dipstick with warm engine. (1.6 ENGINE OIL AND FILTER)	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R
Engine filter *Filter tightening:* Hand tighten oil filter 2/3 to 1 turn after gasket surface contacts filter mounting surface. (1.6 ENGINE OIL AND FILTER)		R		R		R		R		R		R		R		R		R		R		R
Battery (1.7 BATTERY MAINTENANCE)		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Clutch fluid *Fluid type:* D.O.T. 5 SILICONE BRAKE FLUID (1.12 CLUTCH)		I		I		I		I		I		I		I		I		I		I		I
Brake fluid level and condition *Brake fluid type:* D.O.T. 5 SILICONE BRAKE FLUID (1.8 BRAKES)		I		I		I		I		I		I		I		I		I		I		I

FIRST SCHEDULED MAINTENANCE

- A Harley-Davidson dealer should perform the first scheduled service listed in the Owner's Manual. See the Maintenance and Lubrication section in your Owner's Manual for more information.

Table Code:
A - Adjust.
I - Inspect, and if necessary, correct, adjust, clean or replace.
L - Lubricate with specified lubricant.
R - Replace or change.
T - Tighten to proper torque.
X - Perform.
D - Disassemble (Lube & Inspect).

MAINTENANCE TASK AND SERVICE DATA	PRE RIDE	10000 MI 16000 KM	25000 MI 40000 KM	50000 MI 80000 KM	75000 MI 120000 KM	100000 MI 160000 KM	125000 MI 200000 KM	150000 MI 240000 KM	175000 MI 280000 KM	200000 MI 320000 KM	225000 MI 360000 KM	250000 MI 400000 KM	275000 MI 440000 KM	300000 MI 480000 KM	325000 MI 520000 KM	350000 MI 560000 KM	375000 MI 600000 KM	400000 MI 640000 KM	425000 MI 680000 KM	450000 MI 720000 KM	475000 MI 760000 KM	500000 MI 800000 KM
Brake pads and discs for wear *Minimum pad thickness:* varies upon application *Maximum brake disc lateral runout:* 0.3 mm (0.012 in.) (1.10 BRAKE PADS AND DISCS)	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Tire pressure and inspect tire for wear/damage (1.11 TIRES AND WHEELS)	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Rear belt deflection inspection *Deflection:* 6 mm *Specialty tool:* Part No. HD-35381 (1.14 REAR BELT DEFLECTION)	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Rear belt and sprocket (1.15 REAR BELT AND SPROCKETS)		I		I		I		I		I		I		I		I		I		I		I
Steering head bearings (1.17 STEERING HEAD BEARINGS)		A								A				D								
Front fork oil (1.18 FRONT FORK OIL)														R								
Spark plugs *Plug type:* No. 10R12A *Plug gap:* 0.89 mm (0.035 in.) *Plug torque:* 23 Nm (17 ft-lbs) (1.19 SPARK PLUG/COIL)				I		R		I		R		I		R		I		R		I		R
Air filter *Cover screw:* *2.5-3 turns after contact* (1.4 AIRBOX AND AIR FILTER)		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I

Table Code:

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MAINTENANCE TASK AND SERVICE DATA	PRE RIDE	10000 MI	25000 MI	50000 MI	75000 MI	100000 MI	125000 MI	150000 MI	175000 MI	200000 MI	225000 MI	250000 MI	275000 MI	300000 MI	325000 MI	350000 MI	375000 MI	400000 MI	425000 MI	450000 MI	475000 MI	500000 MI
		160000 KM	40000 KM	80000 KM	120000 KM	160000 KM	200000 KM	240000 KM	280000 KM	320000 KM	360000 KM	400000 KM	440000 KM	480000 KM	520000 KM	560000 KM	600000 KM	640000 KM	680000 KM	720000 KM	760000 KM	800000 KM
Lubricate controls Front brake hand lever, clutch hand lever, throttle control cables, seat latch (1.20 CABLE AND CHASSIS LUBRICATION)		IL		IL		IL		IL		IL		IL		IL		IL		IL		IL		IL
Operation of throttle (1.21 THROTTLE CABLES)		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Check oil and brake lines for leaks		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Jiffy stand		IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL	IL
Rear fork bearings														D								
Valve lash (1.22 VALVE LASH)						I				I				I				I				I
Cooling system **Check coolant level** **Check clamps for tightness** **Check freeze point (-32° C, -25° F)** (1.5 COOLING SYSTEM)		I				I				I				R				I				I
Radiator clean		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Operation of all electrical equipment and switches		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
All critical fasteners (1.25 CRITICAL FASTENERS)		T				T				T				T				T				T
Road test		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table Code:

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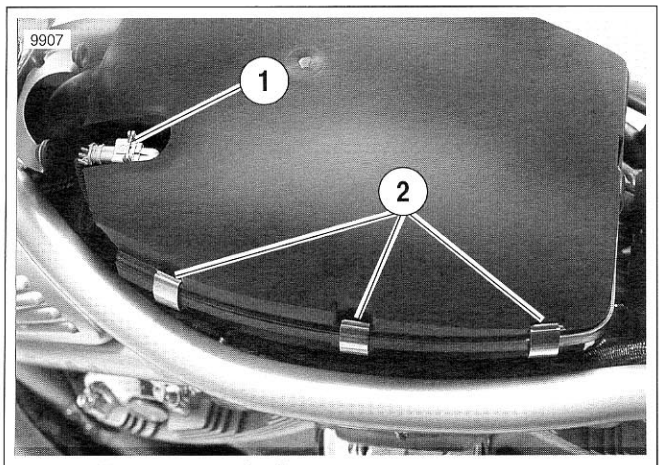
AIRBOX REMOVAL

1. Unlock seat.
2. See Figure 1-1. Remove airbox cover by turning bailhead fastener 1/4 turn counterclockwise (CCW). Pull airbox cover away from locating holes.

Figure 1-1. Airbox Cover

3. See Figure 1-2. Remove IAT connector (1) by pushing down on bail wire to unlock. Airbox top is retained by eight clips (2), three per side, one at the rear and one in the front under the snorkel. Disconnect clips and remove airbox top.



1. **IAT connector [89]**
2. **Retaining clips**

Figure 1-2. Air Filter Top

4. See Figure 1-3. Remove wing nut securing filter cap and air filter.

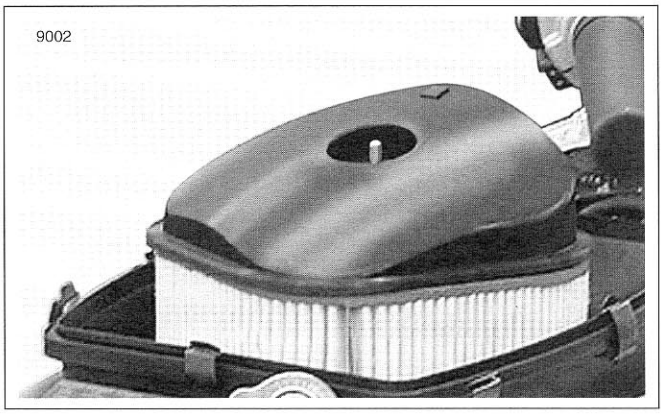
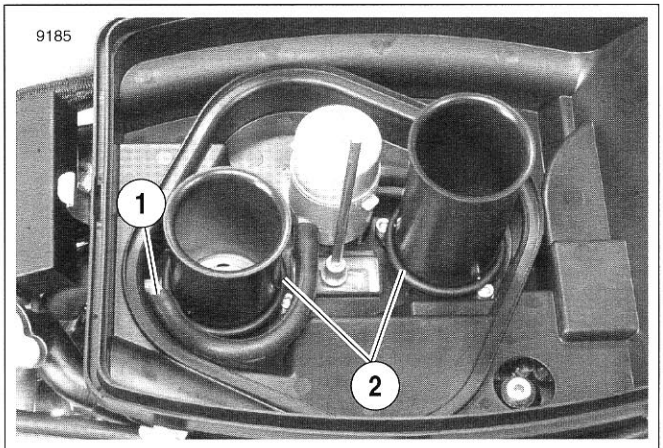


Figure 1-3. Air Filter

5. See Figure 1-4. Disconnect breather hose (1). Slide o-ring (2) up the velocity stack body to access the three retaining fasteners. Remove the velocity stacks.



1. **Breather hose**
2. **O-rings**

Figure 1-4. Velocity Stacks

6. Gently lift the air filter bottom. Front breather hose is a press-fit and will disconnect, rear breather has a worm clamp holding hose to air filter bottom. Loosen clamp and remove air filter bottom.

CAUTION

If airbox is not to be reinstalled immediately, cover throttle body intakes with tape to prevent contaminates/ objects from falling down the throttle bores. Do not use shop rags or objects that could damage the throttle body butterflies.

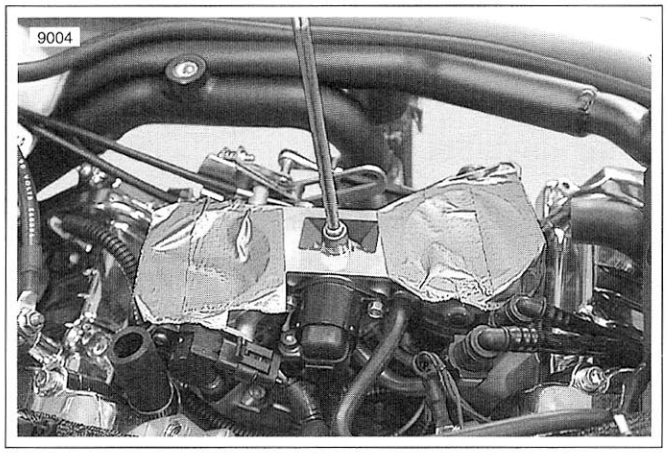


Figure 1-5. Airbox Removed

AIRBOX INSTALLATION

1. Remove tape from throttle body intakes.
2. See Figure 1-6. Inspect and replace bottom airbox gasket if damaged. Check gasket position on air filter bottom. Gasket is located by three alignment pins on mating surface.

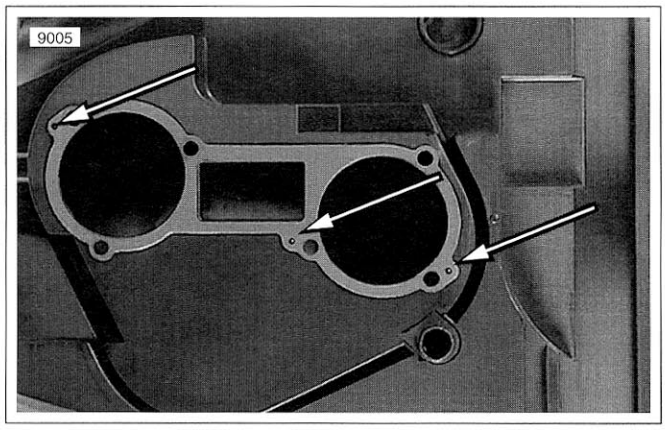


Figure 1-6. Air Filter Gasket Alignment Pins (3)

3. Place air filter bottom over throttle body and attach rear breather hose with hose clamp.
4. Align air filter bottom with front breather hose and press firmly in position.

NOTE

Velocity stacks have a mark at the bottom flange between two of the fastener locations. Align the mark with the corresponding mark on the air filter bottom.

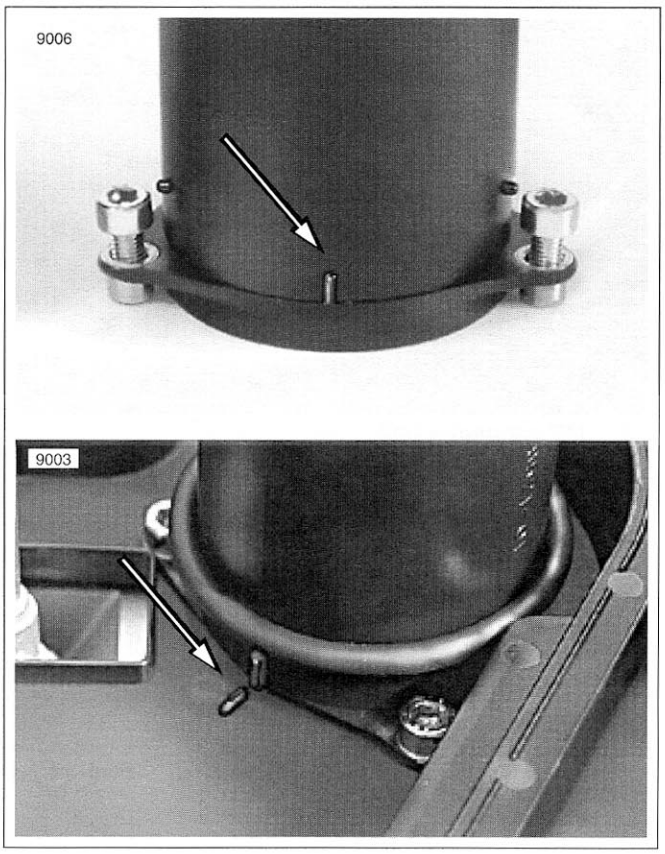


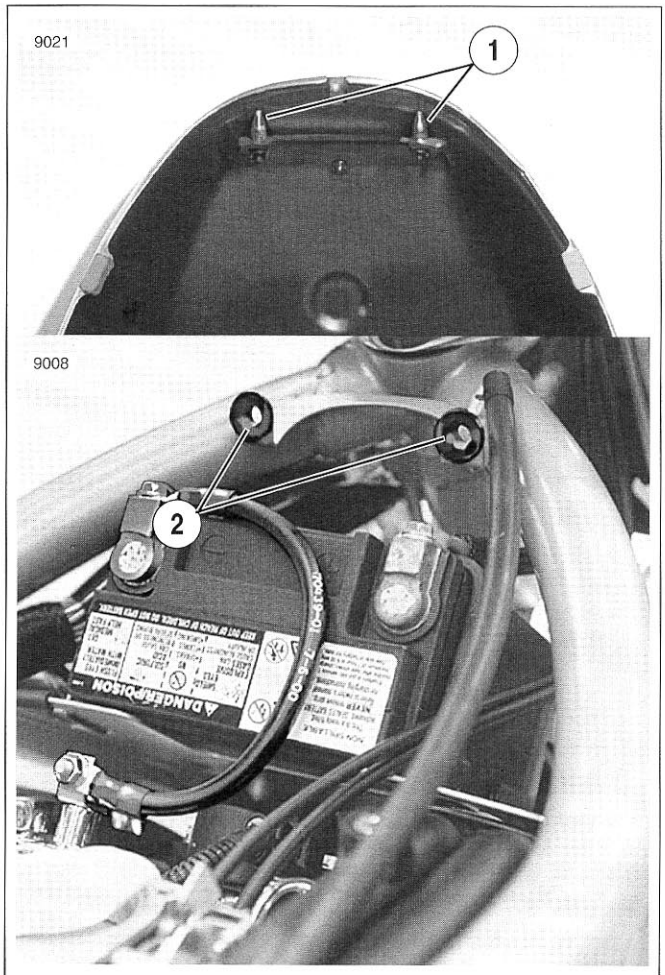
Figure 1-7. Velocity Stack Alignment Marks

5. Align index marks and install velocity stacks, longest in front. Tighten fasteners to 6 Nm (53 **in-lbs**).
6. Slide o-rings down the velocity stack body until they contact the three fasteners.

NOTE

The o-rings retain the velocity stack fasteners when assembling airbox.

7. Attach the breather hose.
8. Place air filter element in air filter bottom.
9. Align air filter cap and fasten with wing nut. Turn wing nut 2.5 - 3 turns after contact.
10. Position air filter top over bottom section with snorkel between frame tubes at the steering neck.
11. Fasten clips along each side and clip at rear.
12. See Figure 1-8. Front clip under snorkel is attached to top section and must be fastened over the lip on the air filter bottom.
13. See Figure 1-2. Install IAT connector.
14. See Figure 1-9. Position the airbox cover with the locating pins (1) in the holes (2) on the frame tabs.
15. See Figure 1-1. Turn bailhead fastener 1/4 turn clockwise.



1. **Locating pins**
2. **Frame tab holes**

Figure 1-9. Airbox Cover

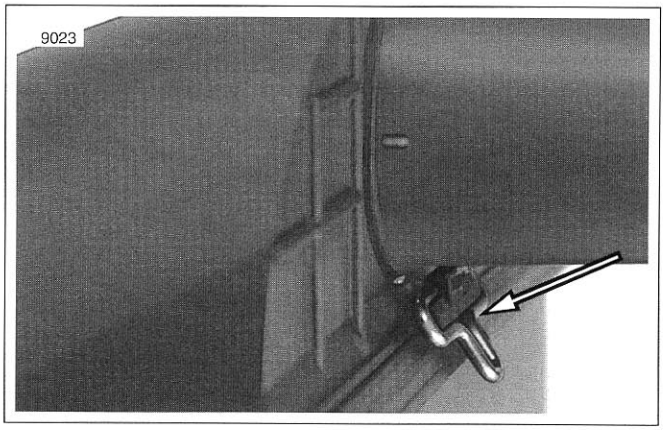


Figure 1-8. Front Airbox Clip

CHECKING COOLANT LEVEL IN OVERFLOW BOTTLE

1. See Figure 1-10. Remove fastener at upper corner of right side cover and remove cover.

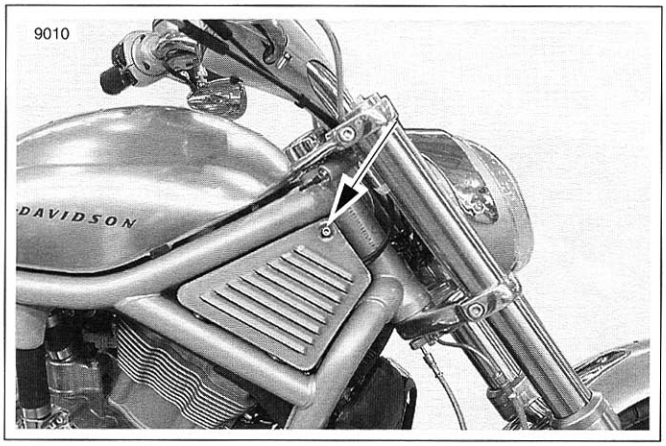


Figure 1-10. Removing Fastener and Cover to Check Coolant Level

⚠WARNING

Do not remove the filler cap when the engine is hot. The cooling system is under pressure and hot coolant and steam may escape causing severe burns. Allow engine to cool before servicing the cooling system.

2. See Figure 1-11. Check coolant level in overflow bottle with coolant cold and motorcycle on jiffy stand. If level is below COLD FULL line on tank, remove cap from tank and add Harley-Davidson, FULLY FORMULATED ANTI-FREEZE until fluid level reaches COLD FULL line.

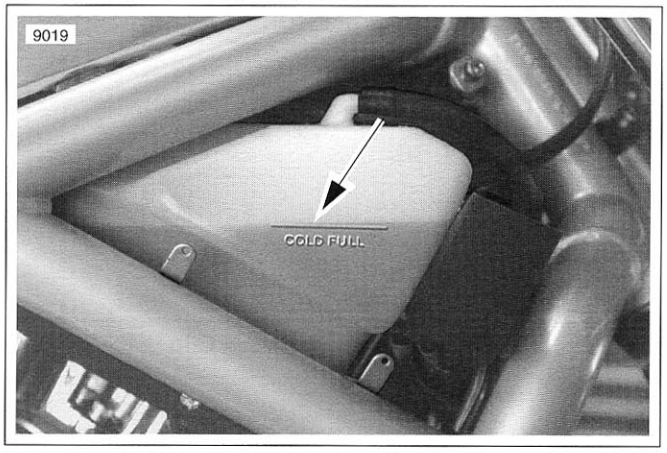


Figure 1-11. Cold Full Line On Overflow Bottle

CHECK FOR COOLANT IN SYSTEM

Coolant may be visible in the overflow bottle but not present in the rest of the cooling system. To ensure coolant is present:

1. Remove air filter top. See 1.4 AIRBOX AND AIR FILTER.

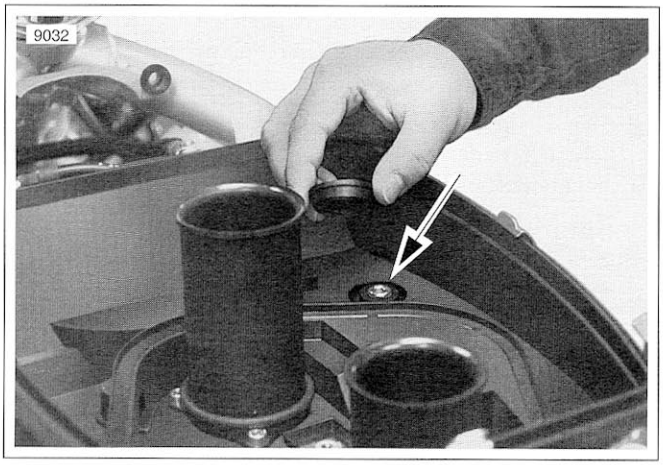


Figure 1-12. Cooling System Air Bleed Plug

2. See Figure 1-12. Remove cooling system air bleed plug.
3. Gently squeeze vertical water pump coolant hose on right side of engine.
4. Coolant should be visible in the air bleed hole. If coolant is not visible, see 6.3 ENGINE COOLANT.

CHECKING AND ADDING OIL

Check engine oil level:

- As part of the pre-ride inspection.
- At every scheduled service interval.
- At every fuel stop.

NOTE

This engine has a wet sump, an integral transmission, gear driven primary drive and wet clutch. This design allows engine oil in the sump to be used to lubricate the engine, transmission and primary drive. The clutch and primary drive are located on the right side of the engine.

Cold Engine Oil Level Check

Check engine oil level with engine **COLD** as follows:

1. Stand motorcycle upright (not leaning on side stand) on a level surface.
2. See Figure 1-13. Oil filler cap with dipstick is located on the engine left side. Remove filler cap and dipstick and wipe dipstick clean.
3. Screw filler cap into engine. Make sure cap is fully seated on crankcase.
4. See Figure 1-14. Remove filler cap and check oil level on dipstick.
5. If oil level is below the ADD mark the on cross-hatched band of the dipstick, add enough Harley-Davidson oil to bring level up to the FULL mark shown in Figure 1-14.

CAUTION

Do NOT operate engine when oil level is below the add mark on the dipstick. Engine damage could result.

Hot Engine Oil Level Check

Check engine oil level with **engine at normal operating temperature as follows:**

1. Stop engine and allow oil to drain into sump for **about two minutes.**
2. Stand motorcycle upright (not leaning on side stand) on a level surface.
3. See Figure 1-13. Unscrew filler cap (with attached dipstick) located at front of engine on left side. Remove filler cap and dipstick and wipe dipstick clean.
4. Screw filler cap into engine. Make sure cap is fully seated on crankcase.

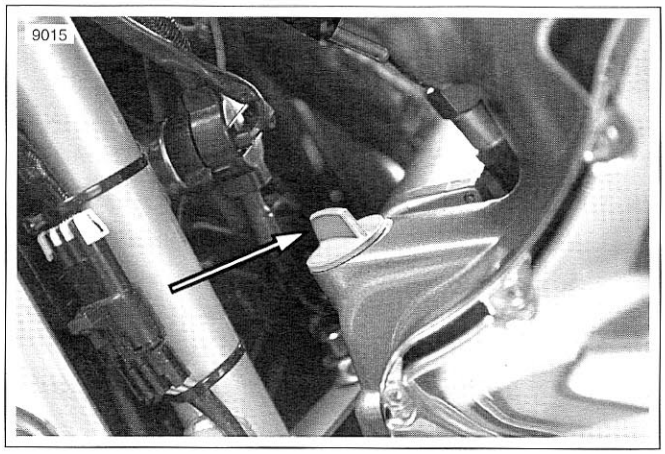


Figure 1-13. Dipstick/Filler Cap

5. See Figure 1-13. Remove filler cap and check oil level on dipstick.

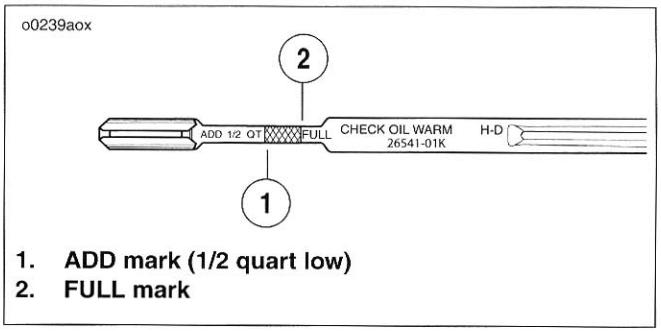
CAUTION

To allow oil to drain into sump, wait approximately three minutes after adding oil before checking level with dipstick. Checking level immediately after adding oil could give a false reading, causing more oil to be added. An over-filled sump can cause engine damage.

6. If oil level is below ADD mark on the cross-hatched band of the dipstick, add enough Harley-Davidson oil to bring level up to the FULL mark. Observe CAUTION stated below.

CAUTION

Do NOT operate engine when oil level is below the add mark on the dipstick. Engine damage could result.



1. **ADD mark (1/2 quart low)**
2. **FULL mark**

Figure 1-14. Dipstick

NOTE

Cross hatched band of dipstick indicates 0.47 liter (1/2 quart) of Harley-Davidson oil.

CHANGING OIL AND FILTER

PART NO.	SPECIALTY TOOL
HD-44067	Oil filter wrench

Change engine oil and filter:

- At the first scheduled service interval.
- At every 8000 km (5000 mile) service interval thereafter.
- When storing or removing the motorcycle for the season.

NOTES

- *If the motorcycle is ridden hard, under dusty conditions, or in cold weather, the oil and filter should be changed more often.*
- *VRSC models are shipped from the factory with Harley-Davidson Motor Oil.*
- *VRSC models come equipped from the factory with a premium 10 micron synthetic media oil filter. These are the only recommended replacement filters.*

1. Ride motorcycle until engine is warmed up to normal operating temperature.
2. See Figure 1-13. Remove the oil filler plug/dipstick on left side.
3. See Figure 1-15. Remove the engine oil drain plug at front of oil pan on left side. Allow oil to drain into a suitable container.

NOTE

Lower radiator mounting bracket can be loosened and moved forward slightly to improve access to oil filter.

4. Remove the oil filter using the OIL FILTER WRENCH. Clean the oil filter mount flange of any old gasket material.
5. See Figure 1-17. Lube the gasket on **new** oil filter with engine oil and install **new** filter. Hand tighten oil filter 2/3 to 1 turn after gasket contacts filter mounting surface.
6. See Figure 1-15. Install oil drain plug.
   a. Inspect oil drain plug for damage. Replace if required. Wipe any foreign material from plug.
   b. Install drain plug. Tighten to 35 Nm (25.8 ft-lbs).
7. See Figure 1-13. Select the grade of oil for the lowest temperature expected before next oil change. See Table 1-1.
8. Fill engine and perform a cold engine oil level check until oil level indicates a level on the cross-hatched band of the dipstick. See Cold Engine Oil Level Check in 1.6 ENGINE OIL AND FILTER

NOTE

Maximum capacity of oil system is 4.2 liters (4.5 quarts).

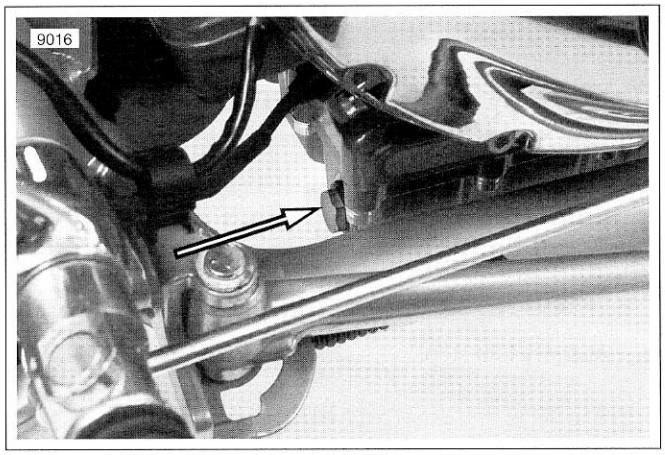


Figure 1-15. Oil Drain Plug

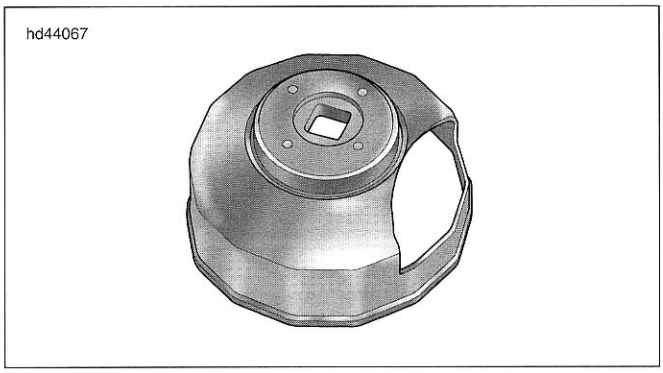


Figure 1-16. Oil Filter Wrench (HD-44067)

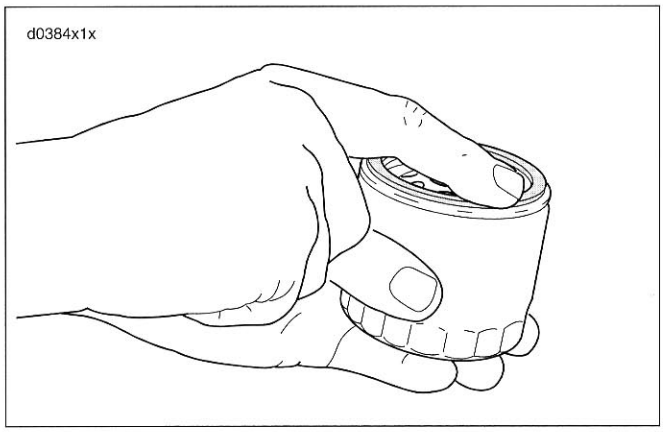


Figure 1-17. Lubing New Oil Filter

9. Start engine and carefully check for oil leaks around drain plug and oil filter.
10. Perform a complete hot engine oil level check. See Hot Engine Oil Level Check in 1.6 ENGINE OIL AND FILTER

Table 1-1. Recommended Engine Oils

Harley-Davidson Type	Viscosity	Harley-Davidson Rating	Lowest Ambient Temperature	Cold Weather Starts Below 50° F (10° C)
HD Multi-grade	SAE 10W40	HD 360	Below 40° F (4° C)	Excellent
HD Multi-grade	SAE 20W50	HD 360	Above 40° F (4° C)	Good

GENERAL

⚠WARNING

All batteries contain electrolyte. Electrolyte is a sulfuric acid solution that is highly corrosive and can cause severe chemical burns. Avoid contact with skin, eyes, and clothing. Avoid spillage. Always wear protective face shield, rubberized gloves and protective clothing when working with batteries. See Figure 1-18. A warning label is attached to the top of the battery. Never remove warning label from battery. Failure to read and understand all precautions contained in warning label before performing any service on batteries could result in death or serious injury. See Figure 1-19.

All AGM (absorption glass mat) batteries are permanently sealed, maintenance-free, valve-regulated, lead/calcium and sulfuric acid batteries. The batteries are shipped pre-charged and ready to be put into service. Do not attempt to open these batteries for any reason.

Table 1-2. Battery Electrolyte Antidotes

CONTACT	SOLUTION
External	Flush with water.
Internal	Drink large quantities of milk or water, followed by milk of magnesia, vegetable oil or beaten eggs. Call doctor immediately.
Eyes	Flush with water, get immediate medical attention.

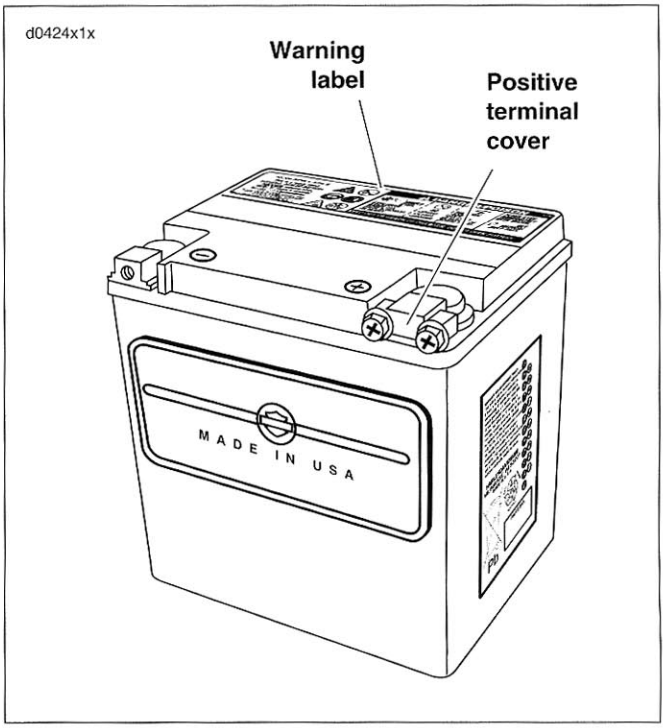


Figure 1-18. Battery

NOTE
See 8.9 BATTERY for charging and testing information.

Figure 1-19. Battery Warning Label

DISCONNECTION/REMOVAL

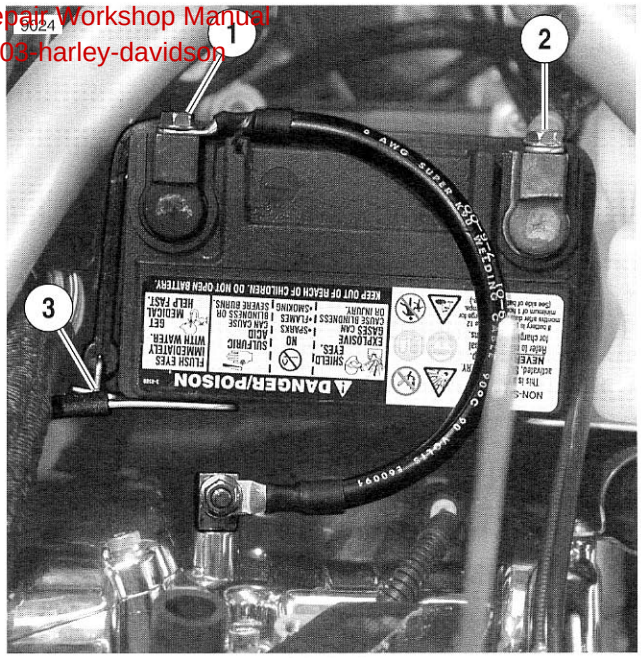
⚠ WARNING

Always disconnect the negative battery cable first. If the positive battery cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion that could result in death or serious personal injury.

1. See Figure 1-21. Remove fastener (1) and remove right side cover (2).
2. Remove maxi-fuse (3).
3. Remove airbox. See 1.4 AIRBOX AND AIR FILTER.
4. See Figure 1-20. Remove negative terminal bolt (1) and positive terminal bolt (2).
5. Release battery strap clip (3) and remove battery.
6. Check the voltage of the battery to make sure it is 12.6 V. If the open circuit (disconnected) voltage reading is below 12.6 V, refer to Table 1-2, 12 amp-hour battery, in Section 1 and charge battery at rate and time specified.

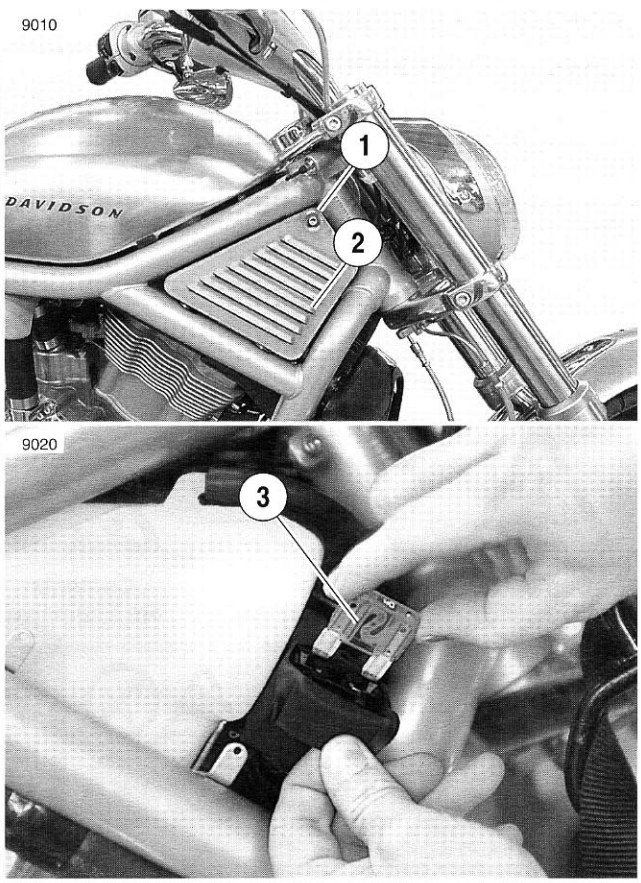
NOTE

The engine is equipped with a compression release, so a smaller battery provides adequate starting current.



1. Negative battery cable bolt
2. Positive battery cable bolt
3. Battery strap clip

Figure 1-20. Battery (12 amp-hour)



1. Fastener
2. Side cover
3. Maxi-fuse (40 amp)

Figure 1-21. Battery Disconnect