

2003 Harley-Davidson®

# VRSCA MODEL



# SERVICE MANUAL

P/N 99501-03

# 2003 VRSCA

# SERVICE MANUAL

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

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# FOREWORD

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## GENERAL

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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

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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
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- 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

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### 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

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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

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### 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.

## CONTENTS

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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## 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.



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