

# 1999/2000 BUELL LIGHTNING X1

## SERVICE MANUAL

The information in this Service Manual applies  
to 1999 and 2000 Buell X1 models.

©COPYRIGHT 1999  
BUELL DISTRIBUTION CORPORATION  
ALL RIGHTS RESERVED  
PART NO. 99490-00Y

**MAINTENANCE** 1

**CHASSIS** 2

**ENGINE** 3

**FUEL SYSTEM** 4

**ELECTRIC STARTER** 5

**DRIVE/TRANSMISSION** 6

**ELECTRICAL** 7

**APPENDIX**

**INDEX**

# FOREWORD

---

## GENERAL

---

This Service Manual has been prepared with two purposes in mind. First, it will acquaint the user with the construction of the Buell product and assist in the performance of basic maintenance and repair. Secondly, it will introduce to the professional Buell Technician the latest field-tested and factory-approved major repair methods. We sincerely believe that this Service Manual will make your association with Buell 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—Drive/Transmission
- Section 7—Electrical
- Appendix A—Tools
- Appendix B—Metric Conversions

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 topic is sequentially numbered in the upper left or right hand corner of the page. The numbering system allows the user to quickly find cross referenced topics by flipping through the pages.

For example, the twelfth topic (CLUTCH) in section one (MAINTENANCE) is listed as:

### 1.12 CLUTCH

The 1.12 will appear in the upper left or right hand corner of the page.

## 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 may result in personal 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 APPENDIX A—TOOLS for equipment required for special service work.

### NOTE

- 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, Buell Distribution Corporation will periodically issue Service Bulletins to Buell dealers. Service Bulletins cover interim engineering changes and supplementary information.

## USE GENUINE REPLACEMENT PARTS

---

### WARNING

**When replacement parts are required, use only genuine Buell parts or parts with equivalent characteristics (which include type, strength and material). Failure to do so may result in product malfunction and possible personal injury.**

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

## SAFETY DEFINITIONS

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

### 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 serious 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.
- Since Buell 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 Buell must first thoroughly satisfy himself that neither his nor the operator's safety will be jeopardized as a result.
- 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 personal injury.

Buell products are manufactured under one or more of the following U.S. patents – 4776423, 4951774, 4964484, 4989696, 5209319, 5295702, 5303795, 5332246, 5435584.

## PRODUCT REFERENCES

### WARNING

Follow the directions listed on all products. Carefully read all labels, warnings and cautions before use. Inadequate safety precautions may result in personal 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, Buell Distribution Corporation reserves the right to change specifications, equipment or designs at any time without notice and without incurring obligation.

# FOREWORD

---

## GENERAL

---

This Service Manual has been prepared with two purposes in mind. First, it will acquaint the user with the construction of the Buell product and assist in the performance of basic maintenance and repair. Secondly, it will introduce to the professional Buell Technician the latest field-tested and factory-approved major repair methods. We sincerely believe that this Service Manual will make your association with Buell 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—Drive/Transmission
- Section 7—Electrical
- Appendix A—Tools
- Appendix B—Metric Conversions

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 topic is sequentially numbered in the upper left or right hand corner of the page. The numbering system allows the user to quickly find cross referenced topics by flipping through the pages.

For example, the twelfth topic (CLUTCH) in section one (MAINTENANCE) is listed as:

### 1.12 CLUTCH

The 1.12 will appear in the upper left or right hand corner of the page.

## 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 may result in personal 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 APPENDIX A—TOOLS for equipment required for special service work.

### NOTE

- *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, Buell Distribution Corporation will periodically issue Service Bulletins to Buell dealers. Service Bulletins cover interim engineering changes and supplementary information.

## USE GENUINE REPLACEMENT PARTS

---

### WARNING

**When replacement parts are required, use only genuine Buell parts or parts with equivalent characteristics (which include type, strength and material). Failure to do so may result in product malfunction and possible personal injury.**

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



# TABLE OF CONTENTS

	Page No.		Page No.
<b>SECTION 1-MAINTENANCE</b>			
<b>1.1 General</b> .....	1-1	Fuel .....	1-6
Servicing a New Motorcycle .....	1-1	Engine Oil .....	1-6
Safe Operating Maintenance .....	1-1	Recommended Oil Grades (table) .....	1-6
Shop Practices .....	1-1	Regular Maintenance Intervals (table) .....	1-7
Repair Notes .....	1-1	<b>1.4 Battery (1999 Models)</b> .....	1-11
Safety .....	1-1	General .....	1-11
Removing Parts .....	1-1	Inspection .....	1-11
Cleaning .....	1-1	Storage .....	1-12
Disassembly and Assembly .....	1-2	Removal .....	1-12
Checking Torques on Fasteners with Lock Patches .....	1-2	Installation .....	1-12
Repair and Replacement Procedures .....	1-2	<b>1.5 Battery (2000 Models)</b> .....	1-14
Hardware and Threaded Parts .....	1-2	General .....	1-14
Wiring, Hoses and Lines .....	1-2	Battery Testing .....	1-14
Instruments and Gauges .....	1-2	Voltmeter Test (Table) .....	1-14
Bearings .....	1-2	Disconnection and Removal .....	1-15
Bushings .....	1-2	Cleaning and Inspection .....	1-15
Gaskets .....	1-2	Storage .....	1-15
Lip Type Seals .....	1-2	Removal .....	1-15
O-Rings (Preformed Packings) .....	1-2	Installation and Connection .....	1-16
Gears .....	1-2	<b>1.6 Engine Lubrication System</b> ..	1-17
Shafts .....	1-2	Checking Engine Oil Level .....	1-17
Part Replacement .....	1-2	Recommended Oil Grades (Table) .....	1-17
Cleaning .....	1-3	Changing Engine Oil and Filter .....	1-18
Part Protection .....	1-3	<b>1.7 Brakes (1999 Models)</b> .....	1-19
Cleaning Process .....	1-3	General .....	1-19
Rust or Corrosion Removal .....	1-3	Bleeding Brakes .....	1-19
Bearings .....	1-3	Rear Brake Pedal .....	1-20
Inspecting .....	1-3	<b>1.8 Brake Pads and Rotors (1999 Models)</b> .....	1-21
Leak Dye .....	1-3	Brake Pads .....	1-21
Tool Safety .....	1-3	Brake Rotors .....	1-21
Air Tools .....	1-3	Brake Rotor Drive Pins .....	1-21
Wrenches .....	1-3	Brake Rotor Thickness .....	1-21
Pliers/Cutters/Prybars .....	1-3	Brake Carrier Lateral Free Play .....	1-22
Hammers .....	1-3	Brake Carrier Rotational Free Play .....	1-22
Punches/Chisels .....	1-3	<b>1.9 Brakes (2000 Models)</b> .....	1-23
Screwdrivers .....	1-3	General .....	1-23
Ratchets and Handles .....	1-4	Bleeding Brakes .....	1-23
Sockets .....	1-4	Rear Brake Pedal .....	1-25
Storage Units .....	1-4		
<b>1.2 Side Views</b> .....	1-5		
<b>1.3 Fluid Requirements</b> .....	1-6		
General .....	1-6		
United States System .....	1-6		
Metric System .....	1-6		
Steering Head Bearing Grease .....	1-6		
Primary Drive/Transmission Fluid .....	1-6		
Front Fork Oil .....	1-6		
Brake Fluid (1999 Models) .....	1-6		
Brake Fluid (2000 Models) .....	1-6		

	Page No.
<b>1.10 Brake Pads and Rotors (2000 Models)</b> .....	1-26
Brake Pads .....	1-26
Brake Rotors .....	1-26
Brake Rotor Thickness .....	1-26
<b>1.11 Tires and Wheels</b> .....	1-27
Tire Inflation .....	1-27
Tire Pressures (table) .....	1-27
Wheel Bearings .....	1-27
<b>1.12 Clutch</b> .....	1-28
Transmission Fluid .....	1-28
Adjustment .....	1-29
<b>1.13 Rear Belt Deflection</b> .....	1-30
Inspection .....	1-30
Adjustment .....	1-31
Axle Alignment .....	1-31
Deflection Adjustment .....	1-31
<b>1.14 Rear Belt and Sprocket</b> .....	1-32
General .....	1-32
Cleaning .....	1-32
Inspection .....	1-32
Rear Sprocket .....	1-32
Drive Belt .....	1-32
Drive Belt Wear Analysis (table) .....	1-33
<b>1.15 Primary Chain</b> .....	1-34
Inspection .....	1-34
Primary Chain Tension (table) .....	1-34
Adjustment .....	1-35
<b>1.16 Preload Adjustment</b> .....	1-36
General .....	1-36
Adjustment .....	1-36
<b>1.17 Suspension</b> .....	1-38
Adjustment .....	1-38
Front Fork Rebound .....	1-38
Front Fork Compression .....	1-38
Rear Shock Rebound .....	1-38
Rear Shock Compression .....	1-38

	Page No.
<b>1.18 Front Fork Oil</b> .....	1-39
Fork Oil Change .....	1-39
Fork Oil (table) .....	1-39
<b>1.19 Steering Head Bearings</b> .....	1-40
Inspection .....	1-40
Lubrication .....	1-40
Adjustment .....	1-41
<b>1.20 Spark Plugs</b> .....	1-42
Inspection .....	1-42
<b>1.21 Air Cleaner Filter</b> .....	1-43
Removal .....	1-43
Installation .....	1-43
<b>1.22 Throttle Cables</b> .....	1-44
Adjustment .....	1-44
Idle Adjustment .....	1-44
<b>1.23 Ignition Timing</b> .....	1-45
Inspection .....	1-45
Static Timing .....	1-45
<b>1.24 Handlebars</b> .....	1-47
Inspection .....	1-47
Adjustment .....	1-47
<b>1.25 Headlamp</b> .....	1-48
Inspection .....	1-48
Adjustment .....	1-48
<b>1.26 Storage</b> .....	1-49
General .....	1-49
Removal from Storage .....	1-49

	Page No.
<b>1.27 Troubleshooting</b> .....	1-50
General .....	1-50
Engine .....	1-50
Starter Motor Does Not Operate .....	1-50
Engine Turns Over But Does Not Start .....	1-50
Starts Hard .....	1-50
Starts But Runs Irregularly or Misses .....	1-50
Spark Plug Fouls Repeatedly .....	1-51
Pre-Ignition or Detonation (Knocks or Pings) .....	1-51
Overheating .....	1-51
Valve Train Noise .....	1-51
Excessive Vibration .....	1-51
Engine Lubrication System .....	1-51
Oil Does Not Return To Oil Tank .....	1-51
Engine Uses Too Much Oil/Smokes .....	1-51
Engine Leaks Oil From Cases, Etc. ....	1-51
Electrical System .....	1-51
Alternator Does Not Charge .....	1-51
Alternator Charge Rate Is Below Normal .....	1-51
Fuel .....	1-51
Fuel System Floods .....	1-51
Poor Fuel Economy .....	1-51
Transmission .....	1-51
Shifts Hard .....	1-51
Jumps Out of Gear .....	1-51
Clutch .....	1-52
Slips .....	1-52
Drags or Does Not Release .....	1-52
Chatters .....	1-52
Chassis .....	1-52
Irregular/Inadequate Brake Action .....	1-52
Handling Irregularities .....	1-52

## SECTION 2-CHASSIS

<b>2.1 Specifications</b> .....	2-1
Dimensions .....	2-1
Weight .....	2-1
Capacities .....	2-1
Tire and Position .....	2-1
Torque Values .....	2-1
<b>2.2 Tire Specifications</b> .....	2-4
General .....	2-4
Tire Fitment-Cast Wheels (table) .....	2-4
Tire Fitment-P/M Wheels (table) .....	2-4
<b>2.3 Vehicle Identification Number</b> .....	2-5
General .....	2-5
<b>2.4 Wheels</b> .....	2-6
General .....	2-6
Troubleshooting .....	2-6
Wheel Service (table) .....	2-6

	Page No.
<b>2.5 Front Wheel (1999 Models)</b> .....	2-8
Removal .....	2-8
Disassembly .....	2-8
Cleaning, Inspection and Repair .....	2-8
Assembly .....	2-9
Installation .....	2-10
<b>2.6 Front Wheel (2000 Models)</b> .....	2-11
Model Year Change .....	2-11
Removal .....	2-11
Disassembly .....	2-11
Cleaning and Inspection .....	2-11
Assembly .....	2-12
Installation .....	2-13
<b>2.7 Rear Wheel</b> .....	2-14
Removal .....	2-14
Disassembly .....	2-15
Cleaning, Inspection and Repair .....	2-15
Assembly .....	2-15
Installation .....	2-15
<b>2.8 Checking Cast Rim Runout</b> ..	2-17
General .....	2-17
Rim Lateral Runout .....	2-17
Rim Radial Runout .....	2-17
Wheel Runout (table) .....	2-17
<b>2.9 Tires</b> .....	2-18
Model Year Change .....	2-18
General .....	2-18
Removal .....	2-18
Cleaning and Inspection .....	2-18
Installation .....	2-19
Checking Tire Lateral Runout .....	2-19
Checking Tire Radial Runout .....	2-19
Adjustment .....	2-20
Wheel Balancing .....	2-20
<b>2.10 Brakes (1999 Models)</b> .....	2-21
General .....	2-21
Brake Troubleshooting (table) .....	2-21
<b>2.11 Front Brake Master Cylinder (1999 Models)</b> .....	2-22
Removal .....	2-22
Disassembly .....	2-22
Cleaning, Inspection and Repair .....	2-23
Assembly .....	2-23
Installation .....	2-24

<b>2.12 Front Brake Caliper (1999 Models)</b> .....	2-25
Removal.....	2-25
Disassembly.....	2-25
Cleaning, Inspection and Repair.....	2-26
Assembly.....	2-26
Installation.....	2-27
<b>2.13 Front Brake Line (1999 Models)</b> .....	2-29
Removal.....	2-29
Installation.....	2-29
<b>2.14 Rear Brake Master Cylinder (1999 Models)</b> .....	2-31
Removal.....	2-31
Disassembly.....	2-31
Cleaning, Inspection and Repair.....	2-32
Assembly.....	2-32
Installation.....	2-32
<b>2.15 Rear Brake Caliper (1999 Models)</b> .....	2-34
Removal.....	2-34
Disassembly.....	2-34
Cleaning, Inspection and Repair.....	2-34
Assembly.....	2-35
Installation.....	2-35
<b>2.16 Rear Brake Line and Switch (1999 Models)</b> .....	2-37
Removal.....	2-37
Installation.....	2-38
<b>2.17 Brakes (2000 Models)</b> .....	2-40
General.....	2-40
Brake Troubleshooting (table).....	2-41
<b>2.18 Front Brake Master Cylinder (2000 Models)</b> .....	2-42
Removal.....	2-42
Disassembly.....	2-42
Cleaning and Inspection.....	2-43
Assembly.....	2-43
Installation.....	2-44
<b>2.19 Front Brake Caliper (2000 Models)</b> .....	2-45
Removal.....	2-45
Disassembly.....	2-45
Cleaning and Inspection.....	2-46
Assembly.....	2-46
Installation.....	2-46

<b>2.20 Front Brake Line (2000 Models)</b> .....	2-48
Removal.....	2-48
Installation.....	2-48
<b>2.21 Rear Brake Master Cylinder (2000 Models)</b> .....	2-50
Removal.....	2-50
Disassembly.....	2-50
Cleaning and Inspection.....	2-51
Assembly.....	2-51
Installation.....	2-51
<b>2.22 Rear Brake Caliper (2000 Models)</b> .....	2-53
Removal.....	2-53
Disassembly.....	2-53
Cleaning and Inspection.....	2-53
Assembly.....	2-54
Installation.....	2-54
<b>2.23 Rear Brake Line and Switch (2000 Models)</b> .....	2-56
Removal.....	2-56
Installation.....	2-57
<b>2.24 Front Fork</b> .....	2-60
General.....	2-60
Removal.....	2-60
Disassembly.....	2-60
Cleaning, Inspection and Repair.....	2-62
Assembly.....	2-62
Installation.....	2-64
<b>2.25 Fork Stem and Bracket Assembly</b> .....	2-65
Removal/Disassembly.....	2-65
Cleaning, Inspection and Repair.....	2-65
Assembly/Installation.....	2-65
<b>2.26 Steering Head Lock</b> .....	2-67
Removal.....	2-67
Installation.....	2-67
<b>2.27 Swingarm</b> .....	2-69
Removal.....	2-69
Disassembly.....	2-70
Cleaning/Inspection.....	2-70
Assembly.....	2-71
Installation.....	2-71



	Page No.		Page No.
<b>2.28 Rear Shock Absorber</b> .....	2-74	<b>2.36 Footrests (1999 Models)</b> .....	2-90
Removal .....	2-74	Removal .....	2-90
Installation .....	2-74	Installation .....	2-90
<b>2.29 Suspension Theory</b> .....	2-76	<b>2.37 Footrests (2000 Models)</b> .....	2-91
Definitions .....	2-76	Removal .....	2-91
Damping .....	2-76	Installation .....	2-91
Compression .....	2-76	<b>2.38 Sprocket Cover</b> .....	2-92
Rebound .....	2-76	Removal/Disassembly .....	2-92
Vehicle Sag .....	2-76	Assembly/Installation .....	2-92
Rider Sag .....	2-76	<b>2.39 Front Fender</b> .....	2-93
Preload .....	2-76	Removal/Installation .....	2-93
General .....	2-76	<b>2.40 Rear Fender</b> .....	2-94
<b>2.30 Suspension Adjustments</b> .....	2-77	Removal .....	2-94
Spring Preload .....	2-77	Installation .....	2-94
Adjustments .....	2-77	<b>2.41 Belt Guards</b> .....	2-95
Troubleshooting .....	2-77	Removal .....	2-95
General Suspension Problems (table) .....	2-77	Installation .....	2-95
Rear Suspension Problems (table) .....	2-78	<b>2.42 Chin Fairing</b> .....	2-96
Front Suspension Problems (table) .....	2-78	Removal .....	2-96
Rider Suspension Preferences (table) .....	2-79	Installation .....	2-96
<b>2.31 Throttle Control</b> .....	2-80	<b>2.43 Fuel Tank Cover</b> .....	2-97
Model Year Change .....	2-80	Model Year Change .....	2-97
Removal/Disassembly .....	2-80	Removal .....	2-97
Cleaning, Inspection and Repair .....	2-80	Installation .....	2-97
Assembly/Installation .....	2-80	<b>2.44 Air Scoop</b> .....	2-98
<b>2.32 Clutch Control</b> .....	2-82	Removal .....	2-98
Adjustment .....	2-82	Installation .....	2-98
Removal/Disassembly .....	2-82	<b>2.45 Trunk</b> .....	2-99
Clutch Cable-Lower .....	2-82	Removal .....	2-99
Clutch Hand Control .....	2-82	Installation .....	2-99
Assembly/Installation .....	2-83	<b>2.46 Tail Section</b> .....	2-100
Clutch Cable-Lower .....	2-83	Removal .....	2-100
Clutch Hand Control .....	2-83	Cleaning .....	2-100
<b>2.33 Instrument Support</b> .....	2-84	Disassembly .....	2-100
Removal .....	2-84	Assembly .....	2-102
Installation .....	2-84	Installation .....	2-102
<b>2.34 Handlebars</b> .....	2-85	<b>2.47 Windscreen</b> .....	2-103
Removal .....	2-85	Removal .....	2-103
Installation .....	2-85	Installation .....	2-103
<b>2.35 Exhaust System</b> .....	2-86		
Removal/Disassembly .....	2-86		
Muffler .....	2-86		
Exhaust Header .....	2-86		
Assembly/Installation .....	2-88		
Muffler .....	2-88		
Exhaust Header .....	2-89		

	Page No.
<b>2.48 Seat (1999 Models)</b> .....	2-104
Removal .....	2-104
Installation .....	2-104
Attachment Points .....	2-104
<b>2.49 Seat (2000 Models)</b> .....	2-105
Model Year Change .....	2-105
Removal .....	2-105
Installation .....	2-105
Attachment Points .....	2-105
<b>2.50 Side Stand</b> .....	2-106
Model Year Change .....	2-106
General .....	2-106
Removal/Disassembly .....	2-106
Assembly/Installation .....	2-106

## SECTION 3-ENGINE

<b>3.1 Specifications</b> .....	3-1
General .....	3-1
Camshaft Specifications .....	3-1
Engine Ignition Specifications .....	3-1
Service Wear Limits .....	3-1
Torque Values .....	3-4
<b>3.2 Engine</b> .....	3-5
Model Year Change .....	3-5
General .....	3-5
Cylinder .....	3-5
Crankcase .....	3-5
Gearcase .....	3-5
Fuel .....	3-5
Gasoline/alcohol Blends .....	3-5
Lubrication .....	3-5
Adjustment/Testing .....	3-6
General .....	3-6
Compression Test Procedure .....	3-6
Compression Test Results (table) .....	3-6
Cylinder Leakage Test .....	3-7
Diagnosing Smoking Engine/ High Oil Consumption .....	3-7
Air Leakage Test (table) .....	3-7
<b>3.3 Stripping Motorcycle For Engine Repair</b> .....	3-8
Disassembling Engine for Cylinder Head Repair .....	3-8
Engine Crankcase Replacement or Complete Engine Removal .....	3-8
<b>3.4 Installing The Engine</b> .....	3-10
Engine Crankcase Installation .....	3-10
Engine Installation After Cylinder Head Repair .....	3-11

<b>3.5 Cylinder Head</b> .....	3-12
Removal .....	3-12
Disassembly .....	3-14
Cleaning, Inspection and Repair .....	3-15
Rocker Arms and Bushings .....	3-16
Replacing Valve Guides .....	3-17
Valve Stem Clearances (table) .....	3-17
Grinding Valve Faces and Seats .....	3-18
Neway Valve Seat Cutters (table) .....	3-18
Replacing Valve Seats .....	3-19
Lapping Valve Faces and Seats .....	3-19
Assembly .....	3-20
Installation .....	3-21
Push Rod Selection (table) .....	3-21
Lower Rocker Box Hardware (table) .....	3-22

<b>3.6 Cylinder and Piston</b> .....	3-23
Removal/Disassembly .....	3-23
Cleaning, Inspection and Repair .....	3-24
Checking Gasket Surface .....	3-24
Measuring Cylinder Bore .....	3-25
Cylinder Bore Service Wear Limits (table) .....	3-25
Measuring Piston .....	3-26
Fitting Cylinder to Piston .....	3-26
Boring and Honing Cylinder .....	3-26
Fitting Piston Rings .....	3-26
Final Cylinder Bore Sizes (table) .....	3-26
Connecting Rod Bushing .....	3-28
Assembly/Installation .....	3-29

<b>3.7 Lubrication System</b> .....	3-30
Checking and Adding Oil .....	3-30
Changing Oil and Filter .....	3-30
Winter Lubrication .....	3-30

<b>3.8 Oil Hose Routing</b> .....	3-31
General .....	3-31

<b>3.9 Oil Tank</b> .....	3-32
Removal/Disassembly .....	3-32
Assembly/Installation .....	3-32

<b>3.10 Oil Pressure Indicator Switch</b> .....	3-33
General .....	3-33
Oil Pressure Signal Light .....	3-33
Oil Pressure .....	3-33
Troubleshooting Oil Pressure Signal Light (table) .....	3-33

<b>3.11 Crankcase Breathing System</b> .....	3-34
General .....	3-34

### 3.12 Oiling System (Color Foldout)..... 3-35

### 3.13 Oil Pump..... 3-36

General .....	3-36
Removal/Disassembly .....	3-37
Cleaning, Inspection and Repair .....	3-38
Assembly/Installation .....	3-38

### 3.14 Oil Filter Mount..... 3-39

General .....	3-39
Disassembly .....	3-39
Cleaning/Inspection .....	3-39
Assembly .....	3-39

### 3.15 Valve Tappets (1999 Models)..... 3-40

General .....	3-40
Removal .....	3-40
Cleaning/Inspection .....	3-40
Installation .....	3-41

### 3.16 Hydraulic Lifters (2000 Models)..... 3-42

General .....	3-42
Removal .....	3-42
Cleaning/Inspection .....	3-42
Installation .....	3-43

### 3.17 Gearcase Cover and Cam Gears (1999 Models)..... 3-44

General .....	3-44
Removal/Disassembly .....	3-44
Cleaning, Inspection and Repair .....	3-45
Cam and Pinion Gear Identification, Inspection, and Selection .....	3-45
Cam/Pinion Gear Color Code & Diameter (table) .....	3-46
Bushing Inspection and Removal .....	3-47
Bushing Installation .....	3-47
Gear Shaft Specifications (table) .....	3-47
Bushing Reaming .....	3-48
Assembly/Installation .....	3-50

### 3.18 Gearcase Cover and Cam Gears (2000 Models)..... 3-52

Model Year Change.....	3-52
General .....	3-52
Removal/Disassembly .....	3-53
Cleaning and Inspection .....	3-53

Cam and Pinion Gear Identification, Inspection, and Selection .....	3-53
Cam/Pinion Gear Color Code & Diameter (table) .....	3-54
Bushing Inspection and Removal .....	3-55
Bushing Installation .....	3-55
Gear Shaft Specifications (table) .....	3-55
Bushing Reaming .....	3-56
Assembly/Installation .....	3-58

### 3.19 Crankcase (1999 Models)..... 3-60

General .....	3-60
Adjustment/Testing .....	3-60
Flywheel End Play .....	3-60
Flywheel End Play Spacers (table) .....	3-60
Disassembly .....	3-61
Crankcase Halves .....	3-61
Flywheels .....	3-63
Cleaning/Inspection .....	3-63
Replacing Flywheel Washers .....	3-65
Lapping Connecting Rod Races .....	3-65
Fitting Rod Bearings .....	3-66
Fitting Sprocket Bearings .....	3-67
Fitting Pinion Bearings .....	3-67
Race Diameter and Crank Pin Size (table) .....	3-67
Connecting Rod Specifications (table) .....	3-67
Pinion Shaft Bearing Selection (table) .....	3-70
Lapping Engine Main Bearing Races .....	3-71
Assembly .....	3-71
Flywheels .....	3-71
Crankcase Halves .....	3-73

### 3.20 Crankcase (2000 Models)..... 3-77

Model Year Change .....	3-77
General .....	3-77
Adjustment/Testing .....	3-77
Flywheel End Play .....	3-77
Flywheel End Play Shims (table) .....	3-77
Gearshaft Bearings (table) .....	3-77
Disassembly .....	3-78
Crankcase Halves .....	3-78
Flywheel/Connecting Rod Assembly .....	3-81
Cleaning/Inspection .....	3-81
Flywheel/Connecting Rod Assembly .....	3-81
Fitting Sprocket Bearings .....	3-81
Fitting Pinion Bearings .....	3-81
Race Diameter and Crank Pin Size (table) .....	3-82
Pinion Shaft Bearing Selection (table) .....	3-85
Lapping Engine Main Bearing Races .....	3-85
Assembly .....	3-85
Crankcase Halves .....	3-85

**Thank you very much  
for your reading.**

**Please click here and go  
back to the website.**

**Then, you can  
download the complete  
manual instantly.**

**No waiting.**