

FOREWORD

GENERAL

This Service Manual Supplement has been prepared with two purposes in mind. First, it will acquaint the user with the construction of the 1997 Buell S1 Lightning 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 Supplement will make your association with Buell products more pleasant and profitable.

HOW TO USE YOUR SERVICE MANUAL SUPPLEMENT

1. Check the TABLE OF CONTENTS following this FOREWORD to find the desired subject.
2. If the information you seek is not in this supplement, refer to the corresponding section in the Buell 1996 S1 Lightning Service Manual (Part No. 99490-96Y). Check the TABLE OF CONTENTS or INDEX to find the desired subject.
3. Information is presented in a definite order as follows:

Specifications
General/Model Year Change
Adjustment/Testing
Removal/Disassembly
Cleaning, Inspection, and Repair
Assembly/Installation

In figure legends, the number which follows the name of a part indicates the quantity necessary for one complete assembly.

NOTE

To avoid needless disassembly, carefully read all relative service information before repair work is started.

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 an unnecessary distraction and causes needless delay.

SERVICE BULLETINS

In addition to the information presented in this Service Supplement, 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 injury to the operator and/or passenger.

To ensure satisfactory and lasting repairs, carefully follow the 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.

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 Supplement 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 supplement with an "HD", "J" or "B" preface must be ordered through:

**Kent-Moore
SPX Corporation
29784 Little Mack
Roseville, Michigan 48066-2298
Telephone: 1-800-345-2233**

Sealing and Threadlocking Products

LOCTITE PRODUCTS

Some procedures 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 and illustrations 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 reserves the right to change specifications, equipment or designs at any time without notice and without incurring obligation.

WARNINGS AND CAUTIONS

Statements in this supplement preceded by the word "⚠WARNING" or "⚠CAUTION" are very important. Since these items alert you to situations where the possibility of personal injury or vehicle damage exists, please take special notice of them.

⚠WARNING

A "WARNING" indicates the potential for personal injury, whether to yourself or others.

⚠CAUTION

A "CAUTION" indicates that vehicle damage can occur.

⚠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 patents: U.S. Patents – 2986161, 2987934, 2998809, 3116089, 3144531, 3144860, 3226994, 3229792, 3434887, 3559773, 3673359, 3709317, Des. 225 626.



SECTION I—MAINTENANCE

SUBJECT	PAGE NO.
1. Specifications	3
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3. Fluid Requirements	6
4. Clutch	7
5. Rear Preload Adjustment	8
6. Ignition Timing	9

This section explains procedures unique to 1997 model S1 Lightnings. Any procedures not found in this supplement are covered in the [1996 S1 Lightning Service Manual](#) (Part No. 99490-96Y).

NOTES



SPECIFICATIONS

DIMENSIONS	IN.	MM
Wheel base	55	1397
Overall length	79.5	2019
Overall width	30	762
Road clearance	5.2	132
Seat height	29.5	749

CAPACITIES	U.S.	LITERS
Fuel tank (including reserve)	4.0 gallons	15.14
Reserve	0.6 gallons	2.27
Oil tank	2.0 quarts	1.89
Transmission	1.0 quart	0.95

WEIGHT	LBS.	KG
S1 shipping weight	446	202
GVWR	820	372
GAWR - Front	340	154
GAWR - Rear	480	218

NOTE

Gross Vehicle Weight Rating (GVWR) (maximum allowable loaded vehicle weight) and corresponding Gross Axle Weight Ratings (GAWR) are given on an information decal located on the front frame steering head.

ENGINE		
Number of cylinders	2	
Type	4-Cycle, 45 Degree V-Type	
Bore	3.498 in.	88.849 mm
Stroke	3.8125 in.	96.838 mm
Piston displacement	73.4 cu. in.	1203 cc
Compression ratio	10.0 to 1	
Horsepower @ RPM	91 @ 5800	
Torque ft-lb @ RPM	87 @ 5200	

IGNITION SYSTEM		
Spark plugs	No. 6R12	
Size	12 mm	
Gap	0.038-0.045 in.	0.97-1.14 mm

TRANSMISSION	
Type	Constant Mesh, Foot Shift
Speeds	5 Forward

NUMBER OF SPROCKET TEETH	
Engine	35
Clutch	56
Transmission	27
Rear wheel	61
Belt	128

TRANSMISSION GEAR RATIOS	FINAL*	OVERALL**
First (low) gear	2.69	9.717
Second gear	1.97	7.118
Third gear	1.43	5.180
Fourth gear	1.18	4.269
Fifth (high) gear	1.00	3.615

*Final gear ratios indicate number of mainshaft revolutions required to drive output sprocket one revolution.

**Overall gear ratios indicate number of engine revolutions required to drive rear wheel one revolution.

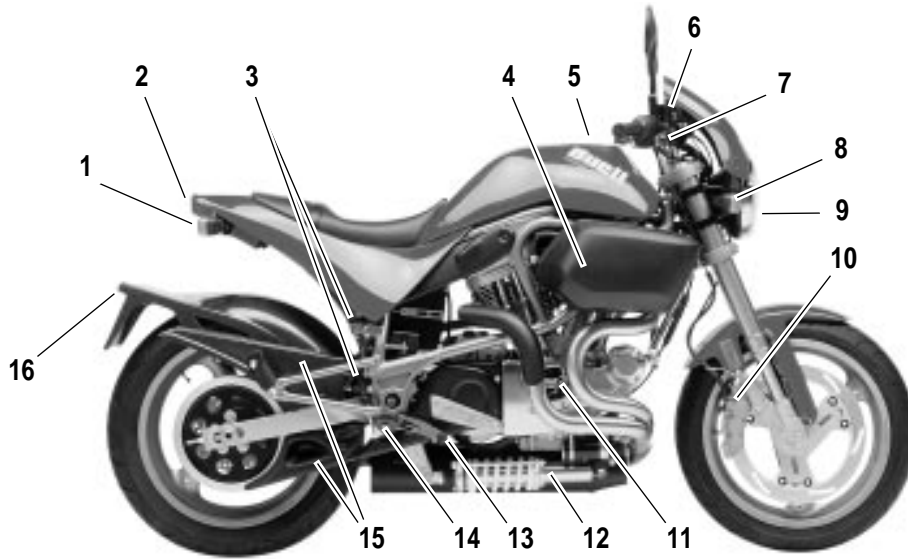
TIRE AND POSITION	PRESSURE FOR SOLO RIDING	PRESSURE AT GVWR
Front-Dunlop Sportmax Radial II 120/70 ZR 17	32 PSI (2.2 bar)	36 PSI (2.5 bar)
Rear-Dunlop Sportmax Radial II 170/60 ZR 17	36 PSI (2.5 bar)	38 PSI (2.8 bar)

WARNING

Do not inflate any tire beyond its maximum inflation pressure as specified on tire sidewall. Overinflation may cause tire to suddenly deflate leading to personal injury.

SIDE VIEWS

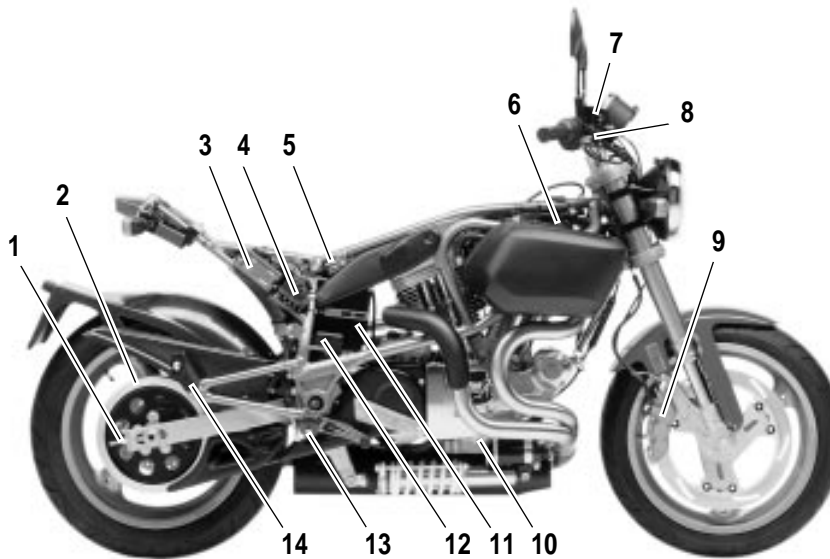
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|---|--------------------------------|-------------------------|
| 1. Right rear turn signal | 6. Front brake master cylinder | 12. Rear shock absorber |
| 2. Tail/stop lamp | 7. Front brake hand lever | 13. Rear brake pedal |
| 3. Rear brake master cylinder/
reservoir | 8. Right front turn signal | 14. Rider footrest |
| 4. Air cleaner cover | 9. Headlamp | 15. Belt guard(s) |
| 5. Fuel filler cap | 10. Front brake caliper | 16. License plate light |
| | 11. Timer cover | |

Figure 1. 1997 S1 Lightning, Right Side View

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|--|--------------------------------|------------------------|
| 1. Rear axle adjuster nut | 5. Turn signal flasher | 10. Oil pump |
| 2. Rear sprocket and secondary
drive belt | 6. Remote idle adjuster | 11. Battery |
| 3. Ignition module | 7. Front brake master cylinder | 12. Voltage regulator |
| 4. Fuse block and spare fuse | 8. Front brake hand lever | 13. Rider footrest |
| | 9. Front brake caliper | 14. Passenger footrest |

Figure 2. 1997 S1 Lightning, Right Side View (Body Removed)

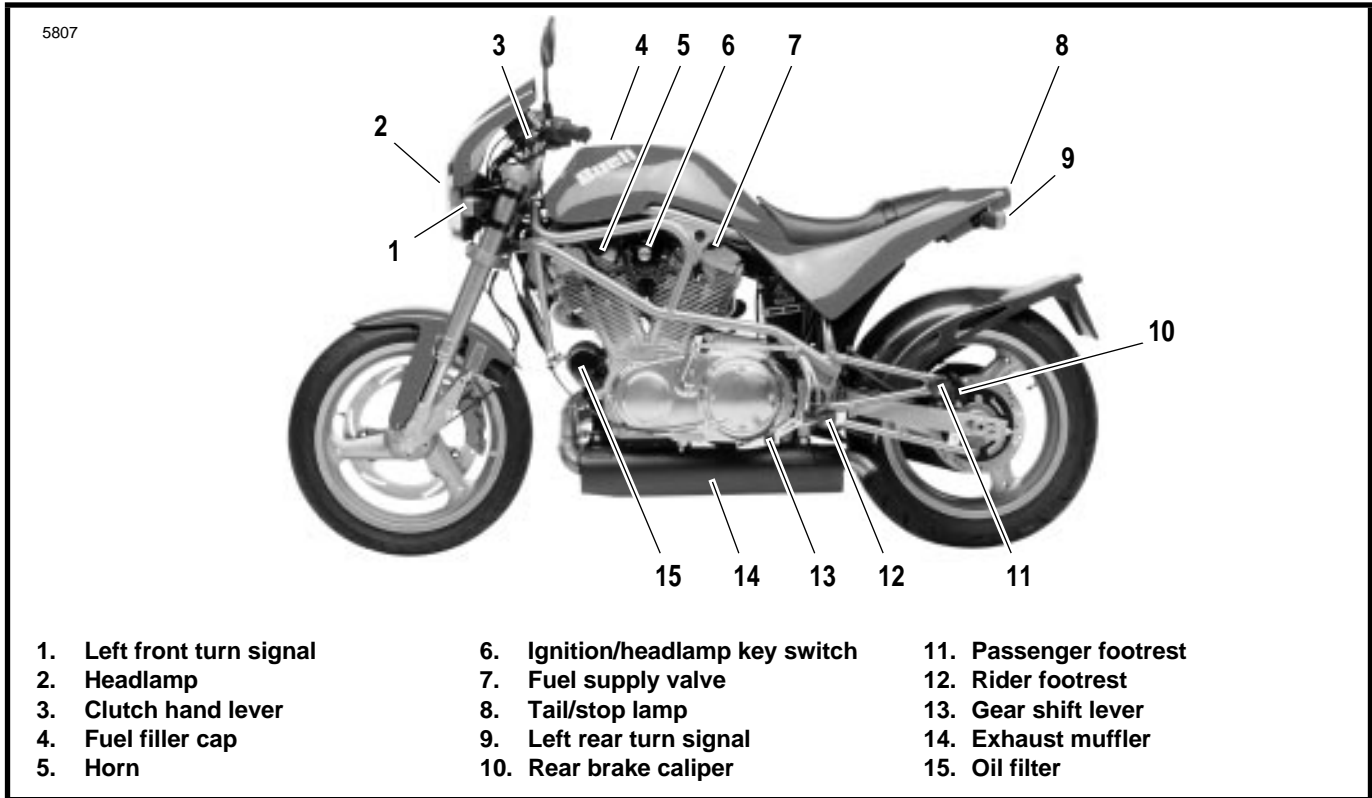


Figure 3. 1997 S1 Lightning, Left Side View

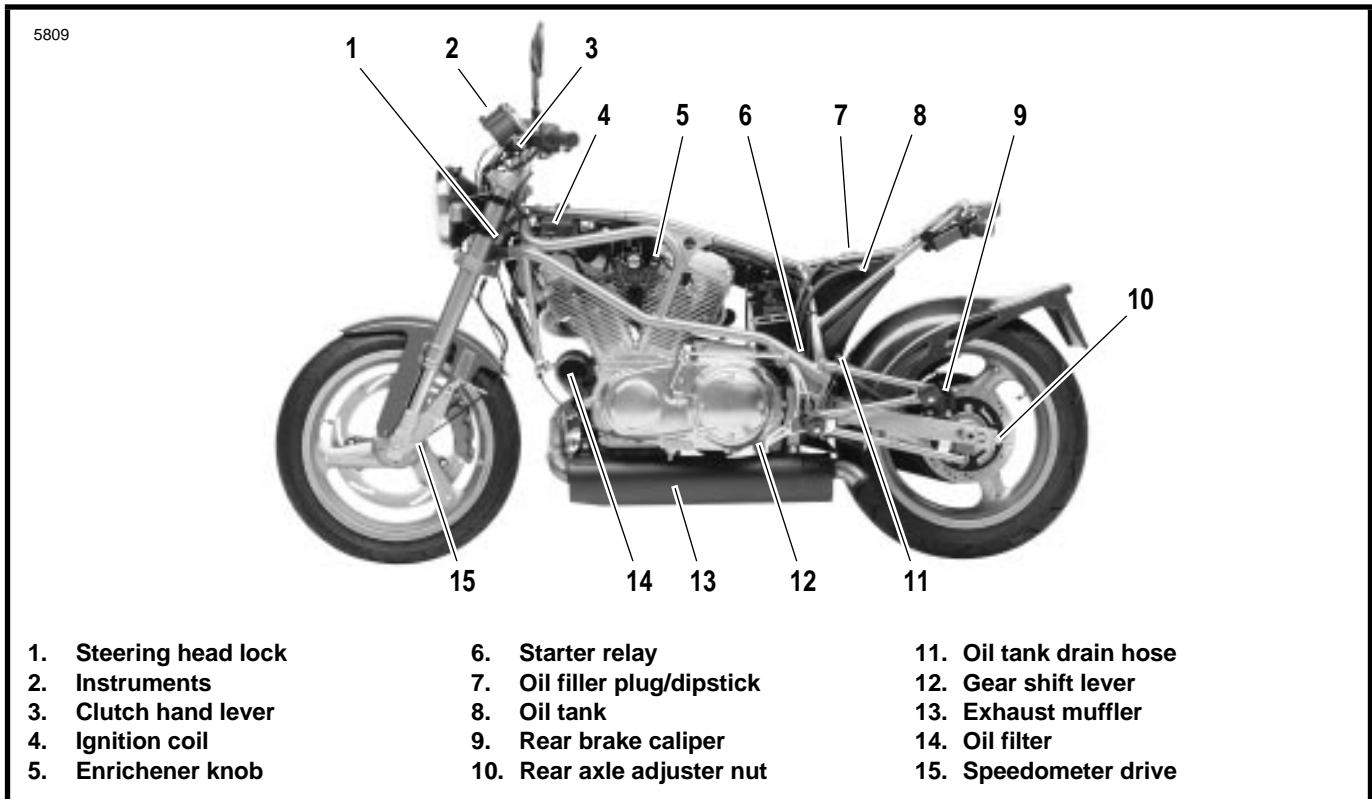


Figure 4. 1997 S1 Lightning, Left Side View (Body Removed)

FLUID REQUIREMENTS

GENERAL

United States System

Unless otherwise specified, **all fluid volume measurements in this Service Manual are expressed in United States (U.S.) units-of-measure.** See below:

- 1 pint (U.S.) = 16 fluid ounces (U.S.)
- 1 quart (U.S.) = 2 pints (U.S.) = 32 fl. oz. (U.S.)
- 1 gallon (U.S.) = 4 quarts (U.S.) = 128 fl. oz. (U.S.)

Metric System

Fluid volume measurements in this Service Manual include the metric system equivalents. In the metric system, 1 liter (L) = 1,000 milliliters (mL). Should you need to convert from U.S. units-of-measure to metric units-of-measure (or vice versa), refer to the following:

- fluid ounces (U.S.) x 29.574 = milliliters
- pints (U.S.) x 0.473 = liters
- quarts (U.S.) x 0.946 = liters
- gallons (U.S.) x 3.785 = liters
- milliliters x 0.0338 = fluid ounces (U.S.)
- liters x 2.114 = pints (U.S.)
- liters x 1.057 = quarts (U.S.)
- liters x 0.264 = gallons (U.S.)

STEERING HEAD BEARING GREASE

Use WHEEL BEARING GREASE (Part No. 99855-89).

BRAKE FLUID

WARNING

D.O.T. 5 SILICONE HYDRAULIC BRAKE FLUID can cause eye irritation. In case of contact with eyes, flush with plenty of water and get medical attention. KEEP BRAKE FLUID OUT OF THE REACH OF CHILDREN!

Use only D.O.T. 5 SILICONE HYDRAULIC BRAKE FLUID (Part No. 99902-77).

FRONT FORK OIL

Use only WP FORK OIL, 5 WEIGHT.

FUEL

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

ENGINE OIL

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

Table 1. Recommended Oil Grades

HARLEY-DAVIDSON TYPE	VISCOSITY	HARLEY-DAVIDSON RATING	LOWEST AMBIENT TEMP.	COLD WEATHER STARTS BELOW 50° F
H.D. Multi-Grade	SAE 10W40	HD 240	Below 40°F (4°C)	Excellent
H.D. Multi-Grade	SAE 20W50	HD 240	Above 40° (4°C)	Good
H.D. Regular Heavy	SAE 50	HD 240	Above 60° (16°C)	Poor
H.D. Extra Heavy	SAE 60	HD 240	Above 80° (27°C)	Poor

PRIMARY DRIVE/TRANSMISSION LUBRICANT

Use only SPORT-TRANS FLUID (Part No. 98854-96 quart size or Part No. 98855-96 gallon size).

CLUTCH

MODEL YEAR CHANGE

See [Figure 5](#). All 1997 model year motorcycles use the new style clutch release ramp introduced on late 1996 vehicles. The clutch adjustment and lever freeplay procedures remain the same. The change was made to provide additional clearance between the coupler and the primary cover.

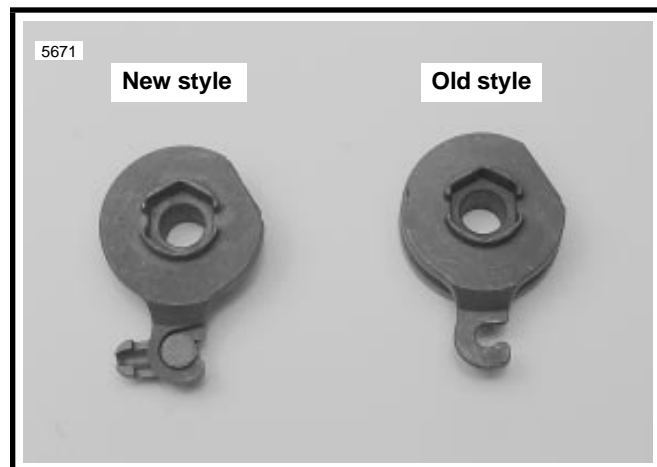


Figure 5. Ramp Change

REAR PRELOAD ADJUSTMENT

GENERAL

Rear suspension spring preload must be adjusted before any other adjustments can be attempted. This adjustment assures that the rear suspension has the proper amount of travel.

Spring preload is the most important suspension adjustment on the S1 Lightning. Improper preload will adversely affect both the handling and motorcycle ride. Correct preload setting will result in motorcycle handling that suits the rider's size and weight.

ADJUSTMENT

You will need three people to carry out this adjustment.

1. Verify correct front and rear tire pressure. See [SPECIFICATIONS](#) on [page 3](#).
2. Remove all accessories from motorcycle including tank bag and/or saddlebags.
3. Take the motorcycle off the side stand and bounce the rear up and down a few times to be sure the suspension is free and not binding.
4. See [Figure 6](#). Measure the distance from the center of the rear axle nut to the rear turn signal mounting bolt **without** rider/passenger/cargo/accessories on the motorcycle.
5. Install items removed in Step 2. Load all cargo.
6. Bounce a few times on the seat to be sure the suspension is free and not binding.
7. With the help of an assistant, take the same measurement with the vehicle fully loaded (rider/passenger/luggage/cargo). The assistant should help balance the motorcycle so the rider can keep both feet on the footrests.
8. Subtract the second measurement from the first. The difference, which is the squat, should be 0.25-0.75 in. (6.4-19.1 mm). If it is not, you will have to adjust the spring preload.

⚠ CAUTION

- Be sure to apply the same number of turns to each preload adjusting nut to ensure that the drawing rings do not become misaligned. Misaligned drawing rings will cause the shock absorber spring to bind against the adjustment rods
 - Be sure the drawing rings are parallel within 1/64 in. (0.4 mm). Misaligned drawing rings will cause the shock absorber spring to bind against the adjustment rods.
9. See [Figure 7](#). Change the spring preload by adjusting both preload adjusting nuts (1) (metric) behind the rear drawing ring (2).
 - a. Increase the preload by tightening the nuts.
 - b. Decrease the preload by loosening the nuts.

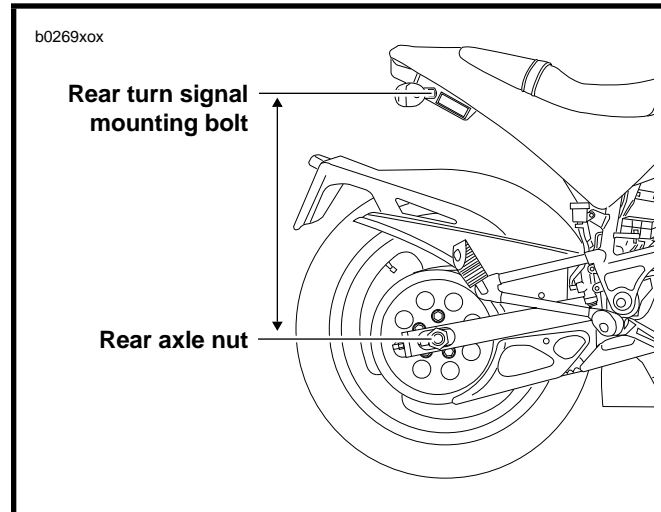


Figure 6. Checking Rear Preload

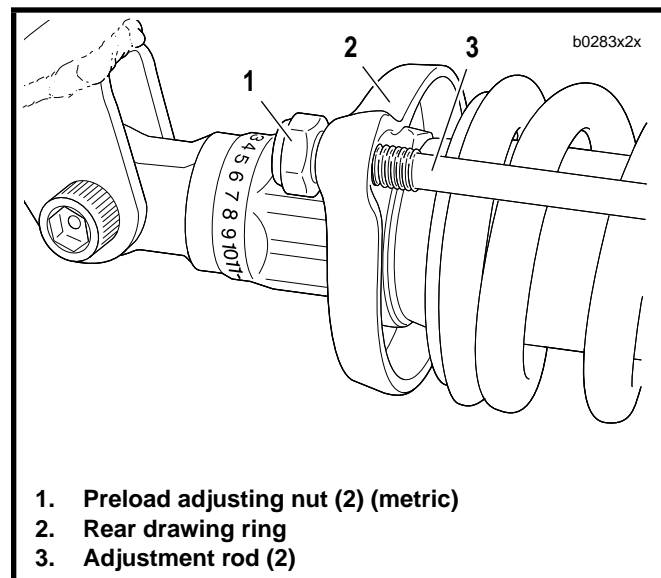


Figure 7. Adjusting Rear Preload