

Product: 1997-1998 Harley Davidson Softail Motorcycle Service Repair Workshop Manual
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SERVICE MANUAL

SOFTAIL[®] MODELS

1997



1998



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OFFICIAL FACTORY MANUAL

PN99482-98

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1997/1998 SOFTAIL

SERVICE MANUAL

The information in this manual applies to
the 1997 and 1998 Softail models.

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Printed in U.S.A.

FOREWORD

This service and repair manual has been prepared with two purposes in mind. First, it will acquaint the reader with the construction of the Harley-Davidson motorcycle and assist in performing 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 manual will make your association with Harley-Davidson products more pleasant and profitable.

HOW TO USE YOUR SERVICE MANUAL

Your Service Manual is arranged for quick, easy reference. This manual is divided into numbered sections. Sections are then divided into subjects. Use this manual as follows:

In order to find the desired subject, refer to the TABLE OF CONTENTS at the front of the manual, or check the INDEX at the back of the manual.

NOTE

All information for servicing a component should be read before repair work is started to avoid needless disassembly.

PREPARATION FOR SERVICE

Proper 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 reduce the incidence of misplaced tools and parts. A motorcycle that is excessively dirty should be cleaned before work starts. Cleaning will occasionally uncover trouble sources. Tools, instruments and parts needed for the job should be gathered before work is started. Interrupting a job to locate tools or parts is a needless delay. Special tools required for a job are listed at the end of Section 1.

WARNING

Gasoline is extremely flammable and highly explosive under certain conditions. Always stop engine and do not smoke or allow open flame or sparks when refueling or servicing the fuel system.

SERVICE BULLETINS

In addition to the information given in this Service Manual, Service Bulletins are issued to Harley-Davidson Dealers from time to time, which cover interim engineering changes and supplementary information. Service Bulletins should be consulted for complete information on the models covered by this manual.

USE GENUINE REPLACEMENT PARTS

WARNING

- When replacement parts are required, we recommend using only genuine Harley-Davidson parts. Other parts may appear to have equivalent characteristics including type, strength and material, but may be of inferior quality. Failure to use genuine Harley-Davidson parts may result in product malfunction and possible personal injury.
- The fasteners used in Harley-Davidson motorcycles have specific strength, finish and type requirements to perform properly in the assembly and its environment. Use only genuine Harley-Davidson replacement fasteners, tightened to the proper torque value. Substitution could cause fastener failure which may result in personal injury.

To ensure a satisfactory and lasting repair job, follow the manual instructions carefully and use only genuine Harley-Davidson replacement parts. Behind the emblem bearing the words GENUINE HARLEY-DAVIDSON® are more than 90 years of designing, research, manufacturing, testing and inspecting experience.

This is your insurance that the parts you are using will fit right, operate properly and last longer. When you use genuine Harley-Davidson parts, you use the best.

PRODUCT REFERENCES

When reference is made in this manual to a specific brand name product, tool or instrument, an equivalent product, tool or instrument may be used in place of the one mentioned.

All tools mentioned in this SERVICE MANUAL with HD or J preceding the part number must be ordered through:

Kent-Moore Tool Division

29784 Little Mack

Roseville, Michigan 48066-2239

Loctite® Products

The Loctite® products listed are designed to increase the reliability of fasteners and to aid in minor repairs.

If you have any further questions, please call Loctite Corp.

Loctite Corporation - Hartford
10 Columbus Blvd.
Hartford Square North
Hartford, CT 06106
Phone: 203-520-5000
Fax: 203-587-4919

International Operations Dept.
4450 Cranwood Parkway
Cleveland, OH. 44128
Phone: 216-475-3600
Fax: 216-587-4919

WARNING

Follow the directions listed on all Loctite® products. Read all labels, warnings and cautions carefully before using.

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, Harley-Davidson Inc. reserves the right to change specifications, equipment, or designs at any time without notice and without incurring obligation.

WARNINGS AND CAUTIONS

Statements in this manual preceded by the words

 WARNING or  CAUTION and printed in bold face are very important.

WARNING

Means there is the possibility of personal injury to yourself or others.

CAUTION

Means there is the possibility of damage to the vehicle.

We recommend you take special notice of these items.

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 Harley-Davidson could not possibly know, evaluate and advise the service trade of all possible ways in which service might be done or of the possible hazardous consequences of each way, 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 by the service methods selected.

WARNING

Wear eye protection while using any of these tools: hammers, arbor or hydraulic presses, gear pullers, spring compressors, and slide hammers. Be especially cautious when using pulling, pressing or compressing equipment. The forces involved can cause parts to "flyout" with considerable force and cause bodily injury.

Harley-Davidson products are manufactured under one or more of the following patents: U.S. Patents 2986162, 2987934, 2998809, 3116089, 3144631, 3144860, 3226994, 3229792, 3434887, 3559773, 3673359, 3709317, Des. 225 626.

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SERVICE INTERVALS

BREAK-IN MAINTENANCE

⚠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 may cause personal injury.

The performance of new motorcycle initial service is required to keep new motorcycle warranty in force and to ensure proper emissions system operation.

After a new motorcycle has been driven the first 500 miles (800 km), initial service operations should be performed by an authorized Harley-Davidson dealer.

CHECK AT FIRST 500 MILES (800 km)

After 500 miles (800 km) a Harley-Davidson dealer should perform the 500 mile (800 km) maintenance listed in the Owner's Manual (see Scheduled Service Table).

SAFE OPERATING MAINTENANCE

Good maintenance means a safe machine. A careful check of certain equipment must be made after periods of storage and frequently between the regular service intervals to determine if additional maintenance is necessary.

Check the following items:

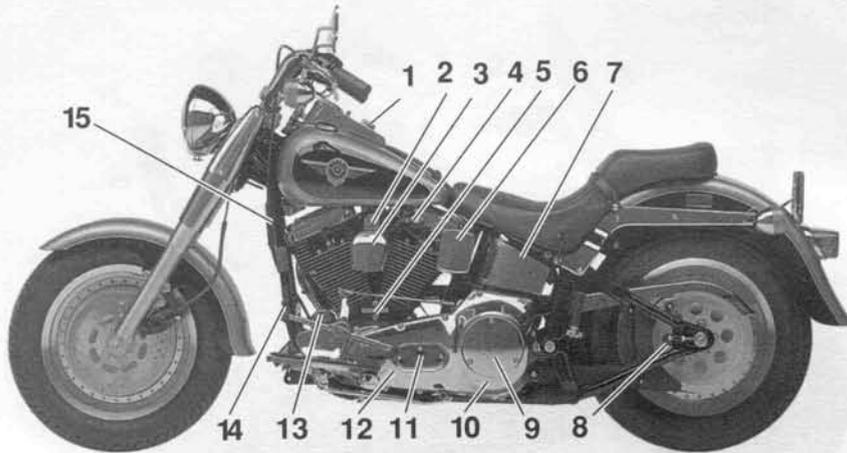
1. Tires for correct pressure, abrasions, cuts and wear.
2. Belt for proper tension.
3. Brakes, steering, and throttle for responsiveness.
4. Brake fluid level and condition. Hydraulic lines and fittings for leaks. Also, check brake pads and discs for wear.
5. Cables for fraying or crimping and free operation.
6. Engine oil, primary chaincase, and transmission fluid levels. Do not overfill oil tank.
7. Wheel spoke tightness, if applicable.
8. Headlight, taillight and turn signal operation.

REGULAR SERVICE INTERVALS

Regular lubrication and maintenance is required to keep Harley-Davidson motorcycles operating at peak performance levels. In addition, regular maintenance will provide for longer motorcycle life and greater riding pleasure.

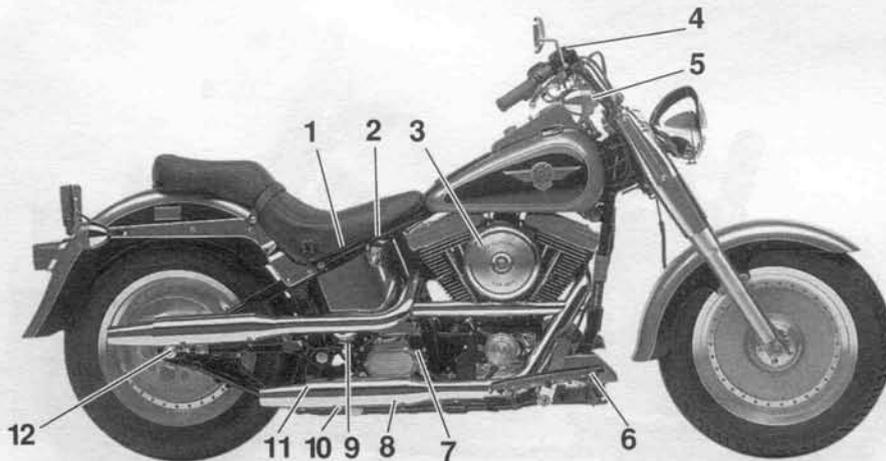
NOTE

Any alterations to the emission system components, such as carburetor and exhaust system, may be in violation of federal and state laws.



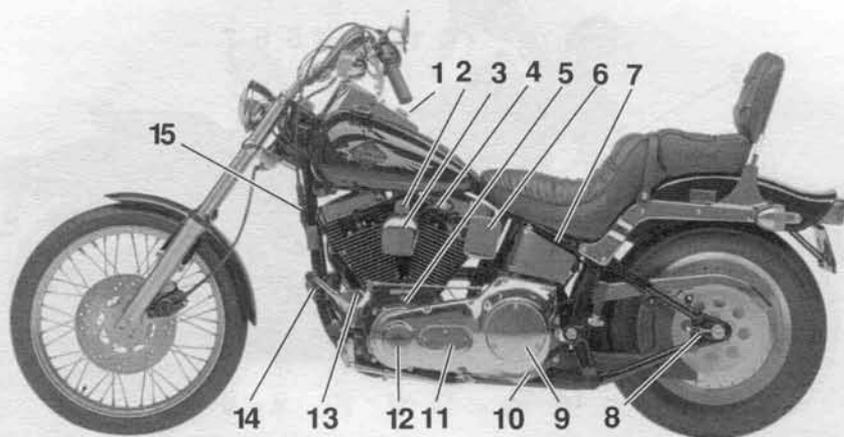
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|--------------------------------|---------------------------------|------------------------------------|
| 1. Ignition/light switch | 6. Ignition coil | 11. Primary chain inspection cover |
| 2. Carburetor enricher knob | 7. Ignition module (under seat) | 12. Primary chain cover |
| 3. Horn | 8. Rear axle adjuster | 13. Engine oil filter |
| 4. Fuel supply valve | 9. Clutch inspection cover | 14. Voltage regulator |
| 5. Timing inspection hole plug | 10. Primary drain plug | 15. Clutch cable adjuster |

Fat Boy (FLSTF) – Left Side View (Typical - 1997 Model Shown)



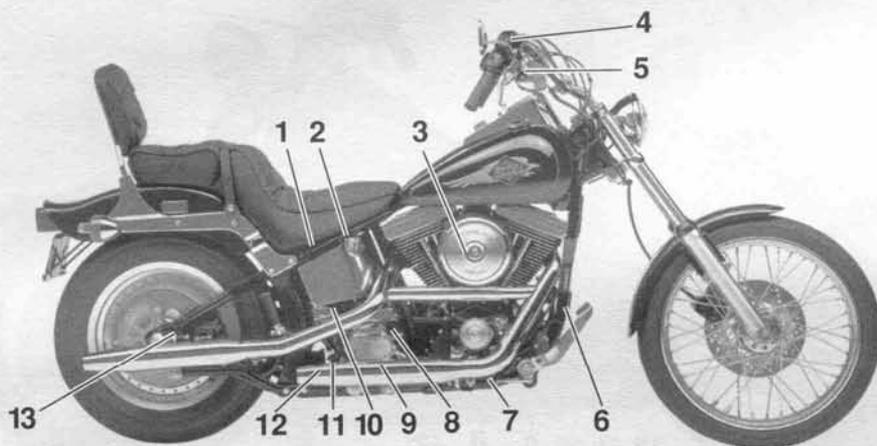
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|--|---|---------------------------|
| 1. Battery (under seat) | 5. Front turn signal and running lamp | 9. Electric starter motor |
| 2. Engine oil fill plug/dipstick | 6. Rear brake master cylinder/reservoir | 10. Shock absorbers |
| 3. Carburetor/air cleaner | 7. Transmission fill plug | 11. Engine oil tank drain |
| 4. Front brake master cylinder/reservoir | 8. Transmission drain plug | 12. Rear axle adjuster |

Fat Boy (FLSTF) – Right Side View (Typical - 1997 Model Shown)



- | | | |
|--------------------------------|---------------------------------|------------------------------------|
| 1. Ignition/light switch | 6. Ignition coil | 11. Primary chain inspection cover |
| 2. Carburetor enrichener knob | 7. Ignition module (under seat) | 12. Primary chain cover |
| 3. Horn | 8. Rear axle adjuster | 13. Engine oil filter |
| 4. Fuel supply valve | 9. Clutch inspection cover | 14. Voltage regulator |
| 5. Timing inspection hole plug | 10. Primary drain plug | 15. Clutch cable adjuster |

Softail Custom (FXSTC) – Left Side View (Typical - 1997 Model Shown)



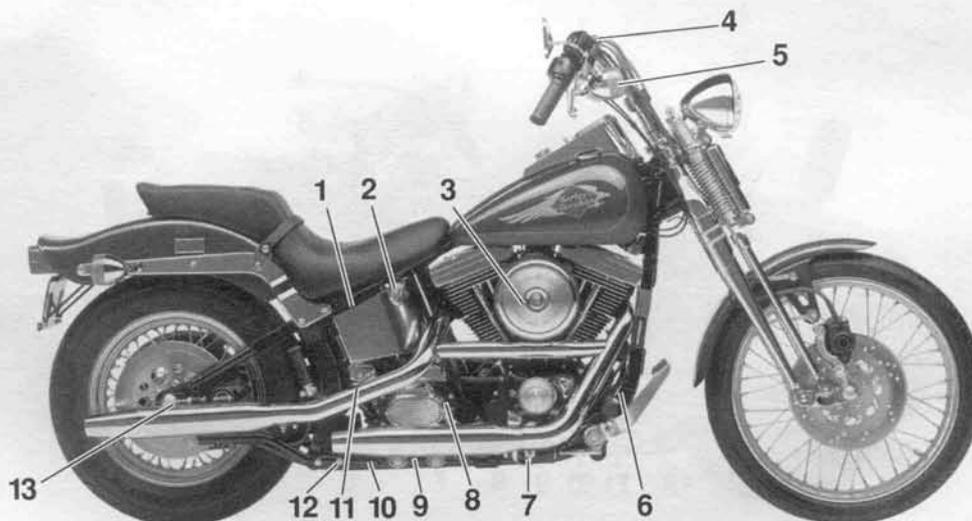
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|--|---|----------------------------|
| 1. Battery (under seat) | 5. Front turn signal and running lamp | 10. Electric starter motor |
| 2. Engine oil fill plug/dipstick | 6. Rear brake master cylinder/reservoir | 11. Engine oil tank drain |
| 3. Carburetor/air cleaner | 7. Rear brake master cylinder/reservoir | 12. Shock absorbers |
| 4. Front brake master cylinder/reservoir | 8. Transmission fill plug | 13. Rear axle adjuster |
| | 9. Transmission drain plug | |

Softail Custom (FXSTC) – Right Side View (Typical - 1997 Model Shown)



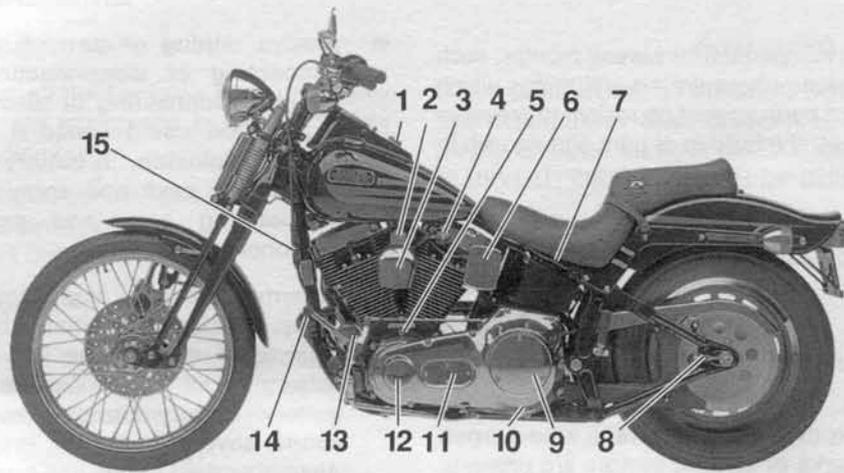
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|--------------------------------|---------------------------------|------------------------------------|
| 1. Ignition/light switch | 6. Ignition coil | 11. Primary chain inspection cover |
| 2. Carburetor enrichener knob | 7. Ignition module (under seat) | 12. Primary chain cover |
| 3. Horn | 8. Rear axle adjuster | 13. Engine oil filter |
| 4. Fuel supply valve | 9. Clutch inspection cover | 14. Voltage regulator |
| 5. Timing inspection hole plug | 10. Primary drain plug | 15. Clutch cable adjuster |

Springer Softail (FXSTS) – Left Side View (Typical - 1997 Model Shown)



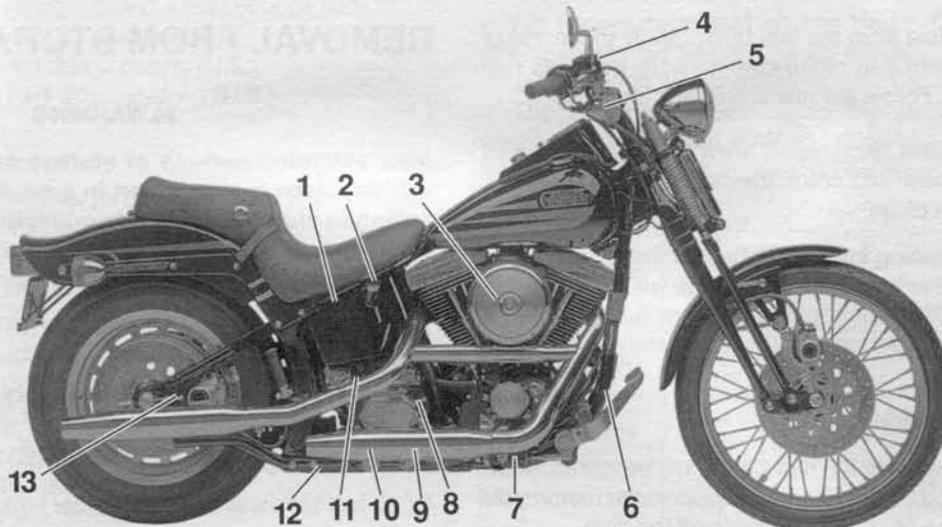
- | | | |
|--|---------------------------------------|----------------------------|
| 1. Battery (under seat) | 5. Front turn signal and running lamp | 10. Engine oil tank drain |
| 2. Engine oil fill plug/dipstick | 6. Rear brake fluid reservoir | 11. Electric starter motor |
| 3. Carburetor/air cleaner | 7. Rear brake master cylinder | 12. Shock absorbers |
| 4. Front brake master cylinder/reservoir | 8. Transmission fill plug | 13. Rear axle adjuster |
| | 9. Transmission drain plug | |

Springer Softail (FXSTS) – Right Side View (Typical - 1997 Model Shown)



- | | | |
|--------------------------------|---------------------------------|------------------------------------|
| 1. Ignition/light switch | 6. Ignition coil | 11. Primary chain inspection cover |
| 2. Carburetor enricher knob | 7. Ignition module (under seat) | 12. Primary chain cover |
| 3. Horn | 8. Rear axle adjuster | 13. Engine oil filter |
| 4. Fuel supply valve | 9. Clutch inspection cover | 14. Voltage regulator |
| 5. Timing inspection hole plug | 10. Primary drain plug | 15. Clutch cable adjuster |

Bad Boy Softail (FXSTSB) – Left Side View (Typical - 1997 Model Shown)



- | | | |
|--|---------------------------------------|----------------------------|
| 1. Battery (under seat) | 5. Front turn signal and running lamp | 10. Engine oil tank drain |
| 2. Engine oil fill plug/dipstick | 6. Rear brake fluid reservoir | 11. Electric starter motor |
| 3. Carburetor/air cleaner | 7. Rear brake master cylinder | 12. Shock absorbers |
| 4. Front brake master cylinder/reservoir | 8. Transmission fill plug | 13. Rear axle adjuster |
| | 9. Transmission drain plug | |

Bad Boy Softail (FXSTSB) – Right Side View (Typical - 1997 Model Shown)

GENERAL

If the motorcycle will not be operated for several months, such as during the winter season, there are several things which should be done to protect parts against corrosion, to preserve the battery, and to prevent the buildup of gum and varnish in the carburetor.

This work should be performed by a local Harley-Davidson dealer or other qualified technician following the procedures in this service manual.

⚠WARNING

Gasoline is flammable. Do not store a motorcycle having gasoline in tank within the home or garage where open flames, pilot lights, sparks or electric motors are present. Inadequate safety precautions may cause an accident resulting in personal injury.

1. Run motorcycle until engine is at normal operating temperature. Stop the engine then drain the oil tank, install a new oil filter, and fill oil tank with the proper grade oil. Check the transmission lubricant level.
2. Fill fuel tank and add a gasoline stabilizer. Use one of the commercially available gasoline stabilizers following the manufacturer's instructions. Turn fuel supply valve off. Drain all gasoline from carburetor by loosening fuel bowl drain screw one full turn; gasoline will drain through fuel overflow fitting. Retighten drain screw after all gasoline has been drained from carburetor.

OR

Drain all gasoline from the fuel tank. Spray the inside of the fuel tank with one of the commercially available rust preventatives. Follow the manufacturer's instructions.

3. Remove the spark plugs, inject a few squirts of engine oil into each cylinder and crank the engine 5-6 revolutions. Reinstall spark plugs.
4. Plug the line leading from the bottom of the oil tank to the 90° fitting on the oil pump cover. This will eliminate the possibility of oil seeping past the check ball into the oil pump and filling the engine flywheel compartment with oil.
5. Adjust primary chain.
6. Check tire inflation. If the motorcycle will be stored for an extended period of time, securely support the motorcycle under the frame so that all weight is off the tires.
7. Wash painted and chrome-plated surfaces. Apply a light film of oil to exposed unpainted surfaces.

⚠WARNING

Do not apply any oil to brake discs or brake pads. Oil on disc pads degrades braking efficiency and can result in an accident causing personal injury.

⚠WARNING

- Always unplug or turn off battery charger before connecting or disconnecting charger clamps at battery. Connecting or disconnecting clamps with charger on could cause a spark and a possible battery explosion. A battery explosion may rupture the battery case and spray sulfuric acid onto the surrounding area and personnel, resulting in personal injury.
 - Batteries produce explosive hydrogen gas at all times, especially when being charged. Keep cigarettes, open flame and sparks away from the battery at all times. Ventilate area when charging battery. Battery contains sulfuric acid which can cause severe burns to eyes, skin and clothing. Always protect hands and protect eyes with shield or goggles when working near a battery or acid. **KEEP BATTERIES AND ACID OUT OF THE REACH OF CHILDREN!**
8. Remove battery from vehicle. Charge battery until the correct voltage is obtained (see Section 8 for more information). Charge the battery every other month if it is stored at temperatures below 60°F (16°C). Charge battery once a month if it is stored at temperatures above 60°F (16°C).
 9. Grease wheel bearings and install new seals.
 10. If the motorcycle is to be covered, use a material that will breathe, such as light canvas. Plastic materials that do not breathe promote the formation of condensation, which leads to corrosion.

REMOVAL FROM STORAGE

⚠WARNING

After extended periods of storage and prior to starting vehicle, place transmission in gear, disengage clutch by pulling in clutch hand lever completely, and push vehicle back and forth a few times to ensure proper clutch disengagement. Improper clutch disengagement could result in personal injury.

1. Charge and install battery.
2. Remove and inspect the spark plugs. Replace if necessary.
3. Clean the air cleaner element.
4. If fuel tank was drained, fill fuel tank with fresh gasoline.
5. If oil feed line was pinched off or plugged, unplug it and reconnect.
6. Start the engine and run until it reaches normal operating temperature.
7. Check engine oil level. Check the transmission lubricant level. Fill to proper levels with correct fluids, if required.
8. Perform all of the checks in the PRE-RIDING CHECKLIST in the Owner's Manual.

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.)
- 1 gallon (U.S.) = 4 quarts (U.S.)

British Imperial System

Fluid volume measurements in this Service Manual do not include the British Imperial (Imp.) system equivalents. The following conversions exist in the British Imperial system:

- 1 pint (Imp.) = 20 fluid ounces (Imp.)
- 1 quart (Imp.) = 2 pints (Imp.)
- 1 gallon (Imp.) = 4 quarts (Imp.)

Although the same unit-of-measure terminology as the U.S. system is used in the British Imperial (Imp.) system, the actual volume of each British Imperial unit-of-measure differs from its U.S. counterpart. The U.S. fluid ounce is larger than the British Imperial fluid ounce. However, the U.S. pint, quart, and gallon are smaller than the British Imperial pint, quart, and gallon, respectively. Should you need to convert from U.S. units to British Imperial units (or vice versa), refer to the following:

- fluid ounces (U.S.) \times 1.042 = fluid ounces (Imp.)
- pints (U.S.) \times 0.833 = pints (Imp.)
- quarts (U.S.) \times 0.833 = quarts (Imp.)
- gallons (U.S.) \times 0.833 = gallons (Imp.)
- fluid ounces (Imp.) \times 0.960 = fluid ounces (U.S.)
- pints (Imp.) \times 1.201 = pints (U.S.)
- quarts (Imp.) \times 1.201 = quarts (U.S.)
- gallons (Imp.) \times 1.201 = gallons (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 (or vice versa), refer to the following:

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

SILICONE 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, Harley-Davidson Part No. 99902-77.

FRONT FORK OIL

Use only HYDRAULIC FORK OIL TYPE "E", Harley-Davidson Part No. 99884-80.

FUEL

Use a good quality leaded or unleaded gasoline (87 pump octane or higher). Pump octane is the octane number usually shown on the gas pump. See Section 3 for more information on fuel.

⚠ CAUTION

Using gasolines that have alcohol additives (such as methanol) may cause failure of rubber components in the fuel system and/or internal engine damage.

ENGINE OIL

Engine oil is a major factor in the performance and service life of the engine. Always use the proper grade of oil for the lowest temperature expected before next scheduled 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 H-D oil.

Harley-Davidson Type	Viscosity	Harley-Davidson Rating	Lowest Ambient Temperature	Cold Weather Starts Below 50°F (10°C)
HD Multi-grade	SAE 10W40	HD 240	Below 40°F (4°C)	Excellent
HD Multi-grade	SAE 20W50	HD 240	Above 40°F (4°C)	Good
HD Regular Heavy	SAE 50	HD 240	Above 60°F (16°C)	Poor
HD Extra Heavy	SAE 60	HD 240	Above 80°F (27°C)	Poor

FASTENER TORQUE VALUES

Torque specifications for specific components are listed in each section at the point of use. When converting to Newton-meters, use the formulas given under the metric chart. For all other fasteners, use the values listed in one of the tables below. In the English table, torque figures are listed in ft-lbs, except those marked with an asterisk (*), which are listed in in-lbs. In the metric table, figures are listed in Newton-meters.

WARNING

The quality fasteners used on Harley-Davidson motorcycles have specific strength, finish, and type requirements to perform properly in the assembly and the operating environment. Use only genuine Harley-Davidson replacement fasteners tightened to the proper torque. Substitution could cause fastener failure, which may result in vehicle damage and/or personal injury.

ENGLISH

FASTENER	TYPE	MINIMUM TENSILE STRENGTH	MATERIAL	BODY SIZE OR OUTSIDE DIAMETER																	
				# (number)						in. (inches)											
				2	3	4	5	6	8	10	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	
	SAE2 STEEL	74,000 PSI	LOW CARBON									6	12	20	32	47	69	96	155	206	310
	SAE5 STEEL	120,000 PSI	MEDIUM CARBON HEATTREAT						14*	22*		10	19	33	54	78	114	154	257	382	587
	SAE7 STEEL	133,000 PSI	MEDIUM CARBON ALLOY									13	25	44	71	110	154	215	360	570	840
	SAE8 STEEL	150,000 PSI	MEDIUM CARBON ALLOY									14	29	47	78	119	169	230	380	600	900
	SAE8 STEEL	150,000 PSI	MEDIUM CARBON ALLOY									14	29	47	78	119	169	230	380	600	900
	SOCKET SET SCREW	212,000 PSI	HIGH-CARBON QUENCHED TEMPERED					9*	16*	30*	70*	140*	18	29	43	63	100	146			
	STUDS																				

*These marked torque values are listed in in-lbs.

EQUIVALENTS FOR ENGLISH FASTENERS

FASTENER	TYPE	MINIMUM TENSILE STRENGTH	MATERIAL	BODY SIZE OR OUTSIDE DIAMETER																	
				# (number)						mm (millimeters)											
				2	3	4	5	6	8	10	6.4	7.9	9.5	11.1	12.7	14.3	15.9	19.1	22.2	25.4	
	SAE2 STEEL	5,202 kg/cm ²	LOW CARBON									8.3	16.6	27.7	44.3	65.0	95.4	132.8	214.4	283.5	428.7
	SAE5 STEEL	8,436 kg/cm ²	MEDIUM CARBON HEATTREAT						1.6	2.5		13.8	26.3	45.6	74.7	107.9	157.7	213.0	355.4	528.3	811.8
	SAE7 STEEL	9,350 kg/cm ²	MEDIUM CARBON ALLOY									18.0	34.6	60.8	98.2	152.1	213.0	297.3	497.9	788.3	1161.7
	SAE8 STEEL	10,545 kg/cm ²	MEDIUM CARBON ALLOY									19.4	40.1	65.0	107.9	164.6	233.7	318.1	525.5	829.8	1220.0
	SAE8 STEEL	10,545 kg/cm ²	MEDIUM CARBON ALLOY									19.4	40.1	65.0	107.9	164.6	233.7	318.1	525.5	829.8	1220.0
	SOCKET SET SCREW	14,904 kg/cm ²	HIGH-CARBON QUENCHED TEMPERED					1.0	1.8	3.4		8.1	16.1	24.9	40.1	59.5	87.1	138.3	201.9		
	STUDS																				

foot-pounds (ft-lbs) x 1.356 = Newton-meters (Nm)

inch-pounds (in-lbs) x 0.113 = Newton-meters (Nm)

METRIC CONVERSION TABLE

MILLIMETERS to INCHES (mm x 0.03937 = inches)								INCHES to MILLIMETERS (inches x 25.40 = mm)							
mm	in.	mm	in.	mm	in.	mm	in.	in.	mm	in.	mm	in.	mm	in.	mm
0.1	0.0039	25	0.9842	58	2.283	91	3.582	0.001	0.025	0.6	15.240	1 ^{15/16}	49.21	3 ^{5/16}	84.14
0.2	0.0078	26	1.024	59	2.323	92	3.622	0.002	0.051	5/8	15.875	2	50.80	3 ^{3/8}	85.72
0.3	0.0118	27	1.063	60	2.362	93	3.661	0.003	0.076	11/16	17.462	2 ^{1/16}	52.39	3.4	86.36
0.4	0.0157	28	1.102	61	2.401	94	3.701	0.004	0.102	0.7	17.780	2.1	53.34	3 ^{7/16}	87.31
0.5	0.0197	29	1.142	62	2.441	95	3.740	0.005	0.127	3/4	19.050	2 ^{1/8}	53.97	3 ^{1/2}	88.90
0.6	0.0236	30	1.181	63	2.480	96	3.779	0.006	0.152	0.8	20.320	2 ^{3/16}	55.56	3 ^{9/16}	90.49
0.7	0.0275	31	1.220	64	2.519	97	3.819	0.007	0.178	13/16	20.638	2.2	55.88	3.6	91.44
0.8	0.0315	32	1.260	65	2.559	98	3.858	0.008	0.203	7/8	22.225	2 ^{1/4}	57.15	3 ^{5/8}	92.07
0.9	0.0354	33	1.299	66	2.598	99	3.897	0.009	0.229	0.9	22.860	2.3	58.42	3 ^{11/16}	93.66
1	0.0394	34	1.338	67	2.638	100	3.937	0.010	0.254	15/16	23.812	2 ^{5/16}	58.74	3.7	93.98
2	0.0787	35	1.378	68	2.677	101	3.976	1/64	0.397	1	25.40	2 ^{3/8}	60.32	3 ^{3/4}	95.25
3	0.1181	36	1.417	69	2.716	102	4.016	0.020	0.508	1 ^{1/16}	26.99	2.4	60.96	3.8	96.52
4	0.1575	37	1.456	70	2.756	103	4.055	0.030	0.762	1.1	27.94	2 ^{7/16}	61.91	3 ^{13/16}	96.84
5	0.1968	38	1.496	71	2.795	104	4.094	1/32	0.794	1 ^{1/8}	28.57	2 ^{1/2}	63.50	3 ^{7/8}	98.42
6	0.2362	39	1.535	72	2.834	105	4.134	0.040	1.016	1 ^{3/16}	30.16	2 ^{9/16}	65.09	3.9	99.06
7	0.2756	40	1.575	73	2.874	106	4.173	0.050	1.270	1.2	30.48	2.6	66.04	3 ^{15/16}	100.01
8	0.3149	41	1.614	74	2.913	107	4.212	0.060	1.524	1 ^{1/4}	31.75	2 ^{5/8}	66.67	4	101.6
9	0.3543	42	1.653	75	2.953	108	4.252	1/16	1.588	1.3	33.02	2 ^{11/16}	68.26	4 ^{1/16}	102.19
10	0.3937	43	1.693	76	2.992	109	4.291	0.070	1.778	1 ^{5/16}	33.34	2.7	68.58	4.1	104.14
11	0.4331	44	1.732	77	3.031	110	4.331	0.080	2.032	1 ^{3/8}	34.92	2 ^{3/4}	69.85	4 ^{1/8}	104.77
12	0.4724	45	1.772	78	3.071	111	4.370	0.090	2.286	1.4	35.56	2.8	71.12	4 ^{3/16}	106.36
13	0.5118	46	1.811	79	3.110	112	4.409	0.1	2.540	1 ^{7/16}	36.51	2 ^{13/16}	71.44	4.2	106.68
14	0.5512	47	1.850	80	3.149	113	4.449	1/8	3.175	1 ^{1/2}	38.10	2 ^{7/8}	73.02	4 ^{1/4}	107.95
15	0.5905	48	1.890	81	3.189	114	4.488	3/16	4.762	1 ^{9/16}	39.69	2.9	73.66	4.3	109.22
16	0.6299	49	1.929	82	3.228	115	4.527	0.2	5.080	1.6	40.64	2 ^{15/16}	74.61	4 ^{5/16}	109.54
17	0.6693	50	1.968	83	3.268	116	4.567	1/4	6.350	1 ^{5/8}	41.27	3	76.20	4 ^{3/8}	111.12
18	0.7086	51	2.008	84	3.307	117	4.606	0.3	7.620	1 ^{11/16}	42.86	3 ^{1/16}	77.79	4.4	111.76
19	0.7480	52	2.047	85	3.346	118	4.645	5/16	7.938	1.7	43.18	3.1	78.74	4 ^{7/16}	112.71
20	0.7874	53	2.086	86	3.386	119	4.685	3/8	9.525	1 ^{3/4}	44.45	3 ^{1/8}	79.37	4 ^{1/2}	114.30
21	0.8268	54	2.126	87	3.425	120	4.724	0.4	10.160	1.8	45.72	3 ^{3/16}	80.96	4 ^{9/16}	115.89
22	0.8661	55	2.165	88	3.464	121	4.764	7/16	11.112	1 ^{13/16}	46.04	3.2	81.28	4.6	116.84
23	0.9055	56	2.205	89	3.504	122	4.803	1/2	12.700	1 ^{7/8}	47.62	3 ^{1/4}	82.55	4 ^{5/8}	117.47
24	0.9449	57	2.244	90	3.543	123	4.842	9/16	14.288	1.9	48.26	3.3	83.82	4 ^{11/16}	119.06

TROUBLESHOOTING

GENERAL

The following check list of possible operating troubles and their probable causes will be helpful in keeping a motorcycle in good operating condition. More than one of these conditions may be causing the trouble and all should be carefully checked.

⚠CAUTION

The troubleshooting section of this manual is intended solely as a guide to diagnosing problems. Carefully read the appropriate sections of this manual before performing any work. Observe all cautions and warnings.

ENGINE

Starter Motor Does Not Operate or Does Not Turn Engine Over

1. Engine run switch in OFF position.
2. Ignition switch not on.
3. Discharged battery, loose or corroded connections (solenoid chatters).
4. Starter control circuit, relay, or solenoid faulty.
5. Electric starter shaft pinion gear not engaging or overrunning clutch slipping.

Engine Turns Over But Does Not Start

1. Fuel tank empty or fuel supply valve turned off.
2. Vacuum hose to automatic fuel supply valve disconnected, leaking, or pinched.
3. Fuel valve or filter clogged.
4. Discharged battery, loose or broken battery terminal connections.
5. Fouled spark plugs.
6. Spark plug cables in bad condition and shorting or cable connections loose.
7. Ignition timing badly out of adjustment.
8. Loose wire connection at coil, battery, or plug between ignition sensor and module.
9. Faulty ignition coil, module, or sensor.
10. Sticking or damaged valve or wrong length push rod.
11. Engine flooded with gasoline as a result of over use of enricher.
12. Engine lubricant too heavy (winter operation).

Starts Hard

1. Spark plugs in bad condition or have improper gap or are partially fouled.
2. Spark plug cables in bad condition.
3. Battery nearly discharged.
4. Loose wire connection at one of the battery terminals, coil, or plug between ignition sensor and module.
5. Carburetor controls not adjusted correctly.
6. Faulty ignition coil.
7. Engine lubricant too heavy (winter operation).

8. Ignition not timed properly.
9. Fuel tank vent hose and vapor valve plugged, or carburetor fuel line closed off, restricting fuel flow.
10. Water or dirt in fuel system and carburetor.
11. Enricher valve inoperative.
12. Air leak at intake manifold.
13. Valves sticking.

Starts But Runs Irregularly or Misses

1. Spark plugs in bad condition or partially fouled.
2. Spark plug cables in bad condition and leaking.
3. Spark plug gap too close or too wide.
4. Faulty ignition coil, module, or sensor.
5. Battery nearly discharged.
6. Damaged wire or loose connection at battery terminals, coil, or plug between ignition sensor and module.
7. Intermittent short circuit due to damaged wire insulation.
8. Water or dirt in fuel system, carburetor or filter.
9. Fuel tank vent system plugged or carburetor vent line closed off.
10. Carburetor controls misadjusted.
11. Damaged carburetor.
12. Weak or broken valve springs.
13. Air leak at intake manifold or air cleaner.
14. Damaged intake or exhaust valve.
15. Incorrect valve timing.
16. Faulty vacuum operated electric switch (V.O.E.S.).
17. Loose or dirty ignition module connector at crankcase.

A Spark Plug Fouls Repeatedly

1. Incorrect spark plug for the kind of service.
2. Piston rings badly worn or broken.
3. Fuel mixture too rich or enricher left on too long.
4. Valve guides or seals badly worn.

Pre-Ignition or Detonation (Knocks or Pings)

1. Excessive carbon deposit on piston head or in combustion chamber.
2. Incorrect spark plug for the kind of service.
3. Faulty spark plugs.
4. Ignition timing advanced.
5. Fuel octane rating too low.
6. Faulty V.O.E.S.

Overheating

1. Insufficient oil supply or oil not circulating.
2. Leaking valve.
3. Heavy carbon deposit.
4. Ignition timing retarded.
5. Faulty V.O.E.S.
6. Insufficient air flow over engine.

Valve Train Noise

1. Low oil pressure caused by oil feed pump not functioning properly or oil screen obstructed.
2. Incorrect push rod length.
3. Faulty hydraulic tappets.
4. Bent push rod.
5. Cam or cam gears do not fit properly.
6. Rocker arm binding on shaft.
7. Valve sticking in guide.

Excessive Vibration

1. Upper engine mounting bracket loose.
2. Engine to transmission mounting bolts loose.
3. Broken frame.
4. Primary chain badly worn or links tight as a result of insufficient lubrication or misalignment.
5. Wheels and/or tires worn or damaged.
6. Internal engine problem.
7. Engine/transmission/rear wheel not aligned properly.
8. Ignition timing incorrect/poorly tuned engine.

LUBRICATION SYSTEM

Oil Does Not Return To Oil Tank

1. Oil tank empty.
2. Scavenger pump gear key sheared.
3. Oil feed pump not functioning.
4. Restricted oil lines or fittings.
5. Restricted oil filter.

Engine Uses Too Much Oil Or Smokes Excessively

1. Breather valve incorrectly timed.
2. Piston rings badly worn or broken.
3. Valve guides or seals worn.
4. Restricted oil return line to tank.
5. Restricted breather hose.
6. Oil tank overfilled.
7. Restricted oil filter.

Engine Leaks Oil From Cases, Push Rods, Hoses, Etc.

1. Loose parts.
2. Imperfect seal at gaskets, push rod cover, washers, etc.
3. Restricted oil return line to tank.
4. Restricted breather hose to air cleaner.
5. Breather valve incorrectly timed.
6. Restricted oil filter.
7. Oil tank overfilled.

ELECTRICAL SYSTEM

Alternator Does Not Charge

1. Faulty regulator-rectifier module.
2. Module not grounded.

3. Engine ground wire loose or broken.
4. Loose or broken wires in charging circuit.
5. Faulty stator and/or rotor.

Alternator Charge Rate Is Below Normal

1. Faulty regulator-rectifier module.
2. Faulty stator and/or rotor.
3. Weak or damaged battery.
4. Loose connections.

CARBURETOR

Floods

1. Inlet valve sticking.
2. Inlet valve and/or valve seat worn or damaged.
3. Dirt or other foreign matter between valve and its seat.
4. Excessive "pumping" of hand throttle grip.
5. Leaky or damaged float.
6. Float misadjusted.
7. See carburetor TROUBLESHOOTING CHART, Section 4.

TRANSMISSION

Shifts Hard

1. Bent shifter rod.
2. Clutch dragging slightly.
3. Shifter forks (inside transmission) sprung.
4. Corners worn off shifter clutch dogs (inside transmission).
5. Shifter return spring (inside transmission) bent or broken.
6. Transmission lubrication too heavy (winter operation).

Jumps Out Of Gear

1. Shifter rod improperly adjusted.
2. Shifter drum (inside transmission) improperly adjusted or damaged.
3. Shifter engaging parts (inside transmission) badly worn and rounded.
4. Shifter forks bent.
5. Damaged gears.

Clutch Slips

1. Clutch controls improperly adjusted.
2. Insufficient clutch spring tension.
3. Worn friction discs.

Clutch Drags Or Does Not Release

1. Clutch controls improperly adjusted.
2. Insufficient clutch spring tension.
3. Clutch discs warped.
4. Primary chain badly misaligned.
5. Lubricant level too high in primary chaincase.

Clutch Chatters

1. Friction discs or steel discs worn or warped.

BRAKES

Brake Does Not Hold Normally

1. Master cylinder reservoir low on fluid.
2. Brake system contains air bubbles.
3. Master or wheel cylinder piston worn or parts damaged.
4. Brake pads contaminated with grease or oil.
5. Brake pads badly worn (1/16 in. minimum lining thickness).
6. Brake disc badly worn or warped.
7. Brake fades due to heat build up – brake pads dragging or excessive braking.
8. Brake drags – insufficient brake pedal free play.

HANDLING

Irregularities

1. Loose wheel axle nuts. Tighten to recommended torque specification.
2. Excessive wheel hub bearing play.
3. Rear wheel out of alignment with frame and front wheel.
4. Rims and tires out-of-true sideways.
5. Rims and tires out-of-round or eccentric with hub.
6. Irregular or peaked front tire tread wear.
7. Incorrect tire pressure. Check TIRE DATA section.
8. Tire and wheel unbalanced.
9. Steering head bearings improperly adjusted. Correct adjustment and replace pitted or worn bearings and races. See FORKS.
10. Shock absorber not functioning normally.
11. Improperly loaded motorcycle. Non-standard equipment on the front end such as heavy radio receivers, extra lighting equipment or luggage tends to cause unstable handling.
12. Damaged tire(s) or improper front-rear tire combination.

SHOP PRACTICES

REPAIR NOTES

General maintenance practices are given in this section. All special tools and torque values are noted at the point of use and 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. 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.

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 and 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 motorcycle 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 tap or die.

Replace all damaged or missing lubrication fittings.

Use Teflon tape 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.

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.

⚠CAUTION

Serious damage to the motorcycle can occur if any oil holes are blocked.

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.

If a gasket must be made, be sure to cut holes that match up with the mating part. Use gasket material that is the right type and thickness.

⚠CAUTION

Serious damage to the motorcycle can occur if any flange holes are blocked by gasket material.

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-ring and seal mating surfaces are thoroughly clean before installation.

Gears

Always check gears for damaged or worn teeth.

Remove burrs and rough spots with a honing stone or crocus cloth before installation. 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.

Bearings

Remove shields and seals from bearings before cleaning. Bearings with permanent shields should NOT be cleaned in solvent as they are already lubricated.

Clean open bearings by soaking them in a petroleum cleaning solution. Never use a solution that contains chlorine.

Let bearings stand and dry. Do not dry using compressed air. Do not spin bearings while they are drying.

TOOL SAFETY

WARNING

Failure to follow the safety practices given in this section could lead to personal injury.

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

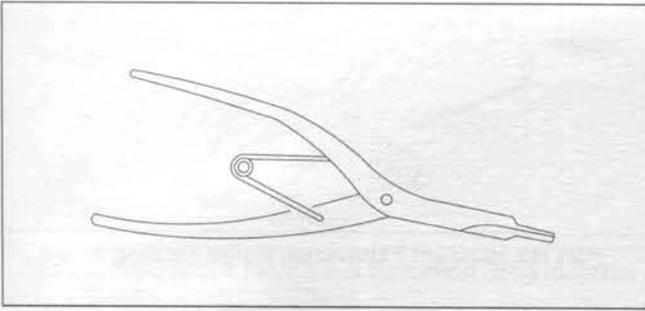
- Never use hand sockets on power or impact wrenches.
- Select the right size socket for the job.
- Never cock any wrench or socket.

- 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.

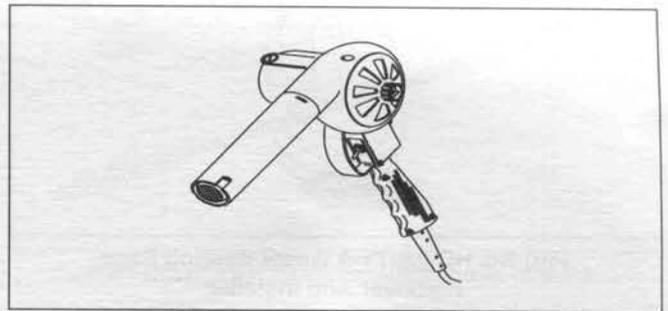
STORAGE UNITS

- 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.

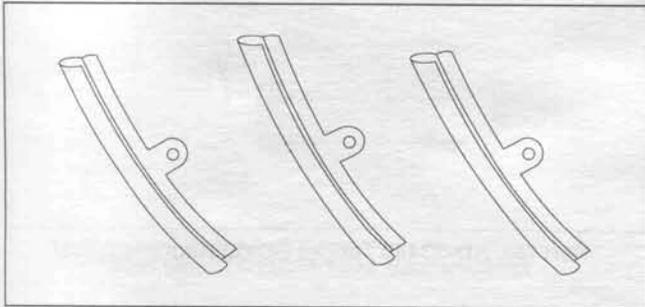
TOOLS



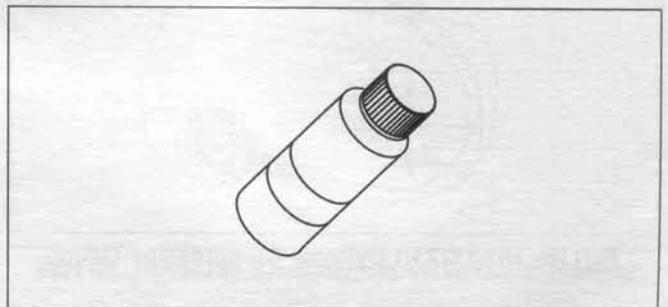
Part No. J-5586-A Transmission Shaft Retaining Ring Pliers



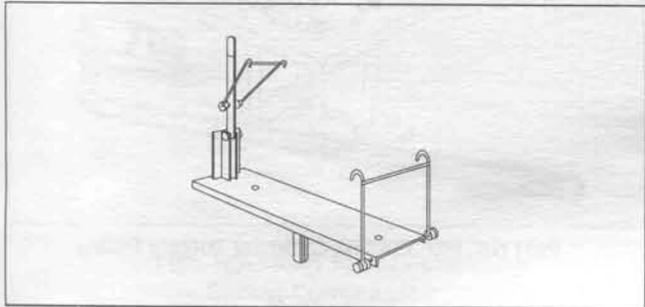
Part No. HD-25070 Robinair Heat Gun



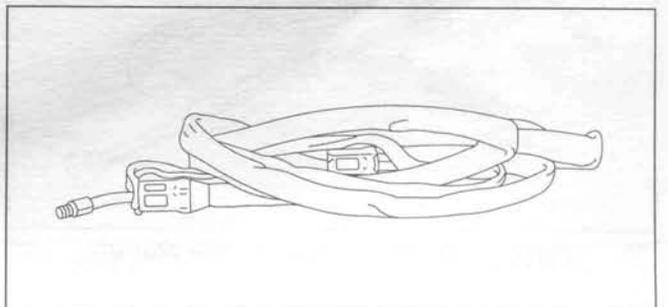
Part No. HD-01289 Rim Protectors



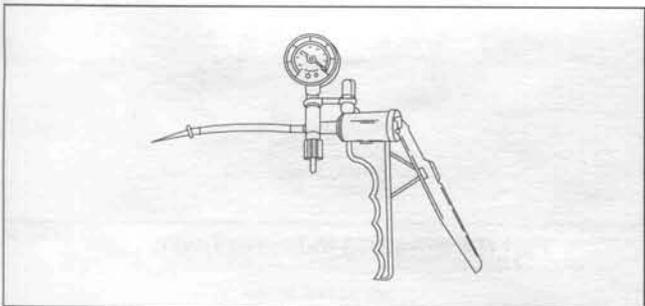
Part No. HD- 28431B Black Light Fluorescent Additive (24 Oz Bottle)



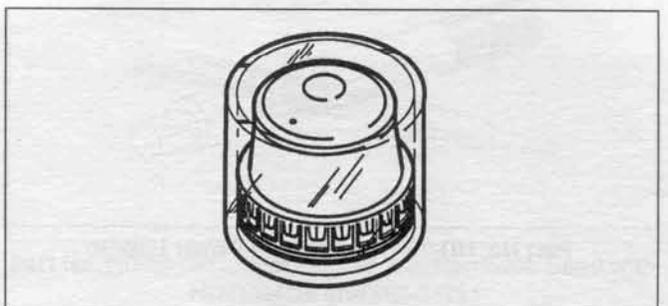
Part No. HD-21000 Tire Spreader



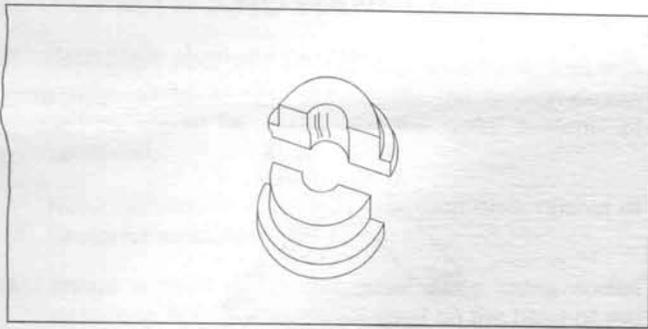
Part No. HD-28700 Tire Bead Expander



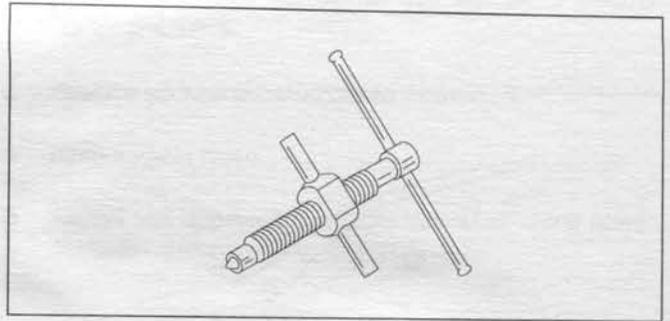
Part No. HD-23738 Vacuum Pump



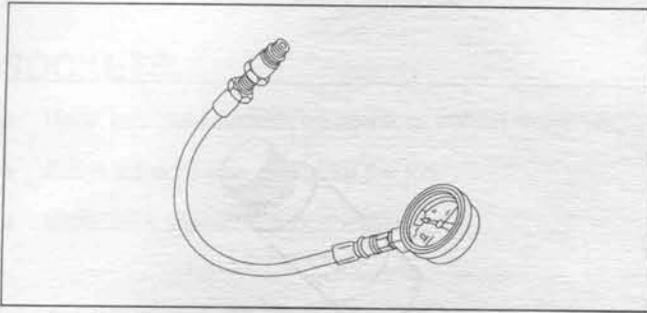
Part No. HD-33067 Wheel Bearing Packer



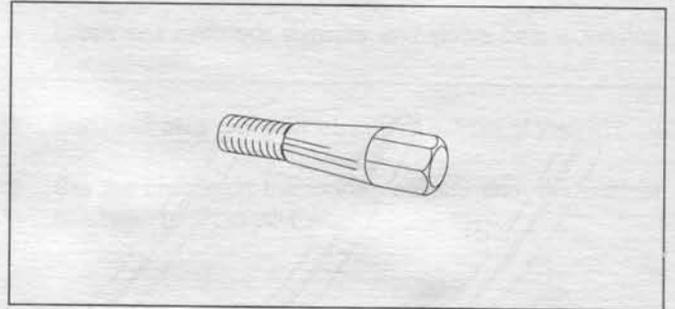
**Part No. HD-33071-A Wheel Bearing Race
Remover And Installer**



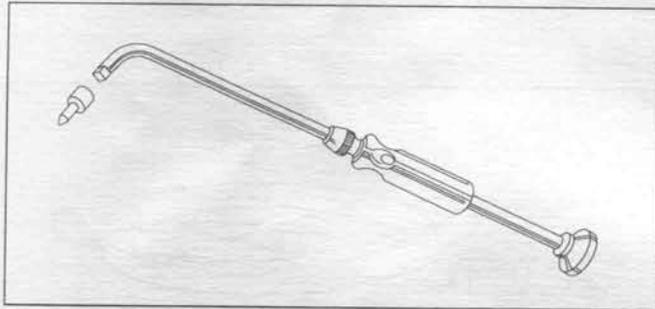
Part No. HD-33418 Universal Puller Forcing Screw



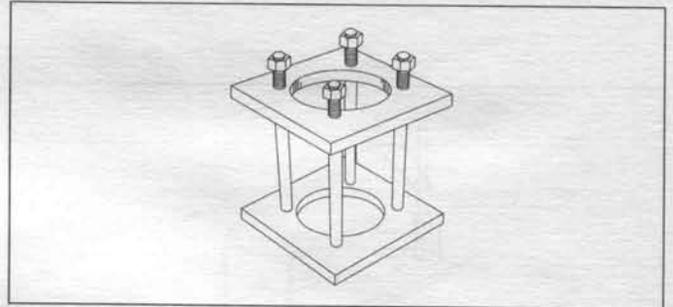
Part No. HD-33223-1 Cylinder Compression Gauge



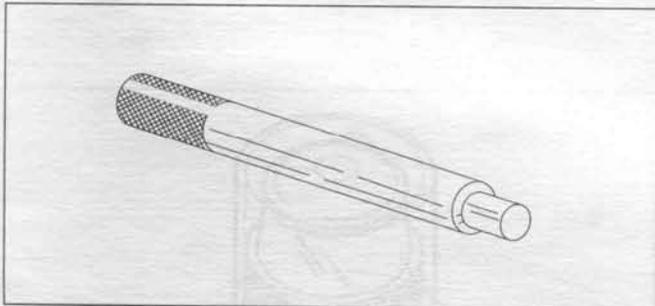
Part No. HD-33443 Tappet Guide Alignment Tool



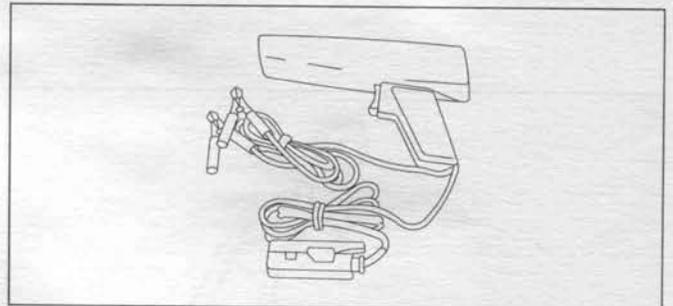
Part No. HD-33413 Carburetor Idle Adjuster



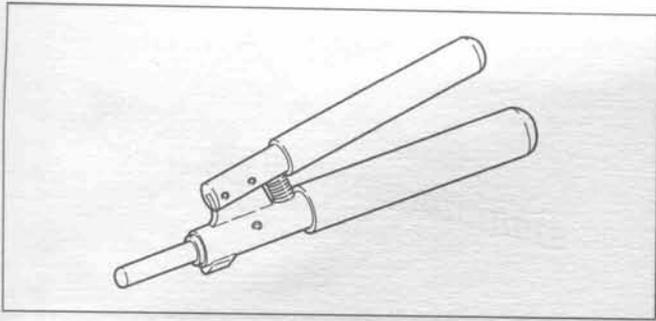
Part No. HD-33446A Cylinder Torque Plates



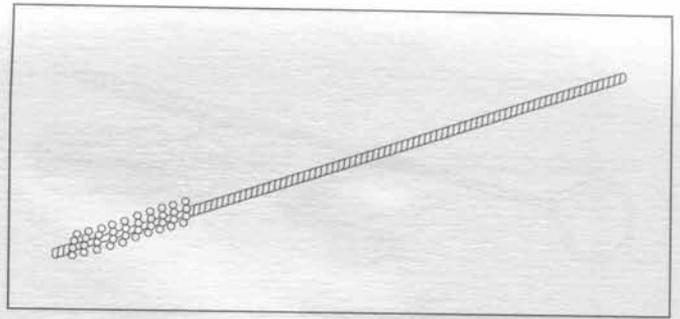
Part No. HD-33416 Universal Driver Handle



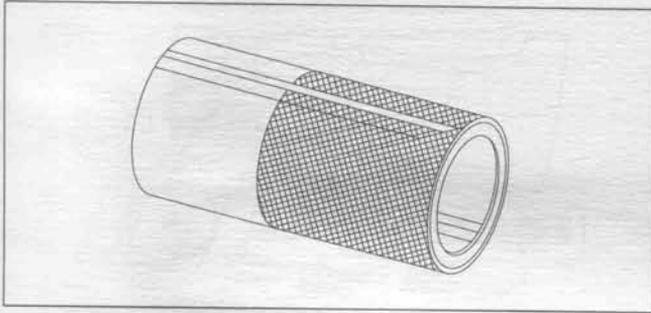
Part No. HD-33813 Inductive Timing Light



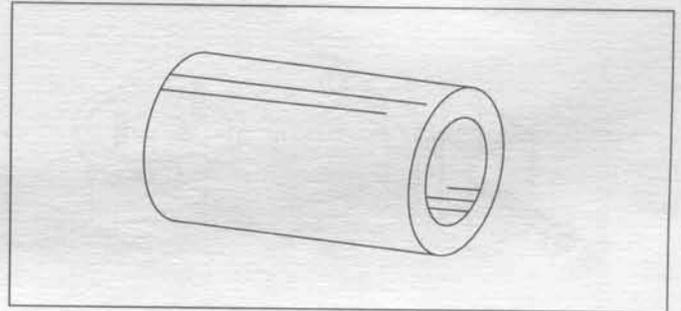
Part No. HD-34623B Piston Pin Retaining Ring Installer



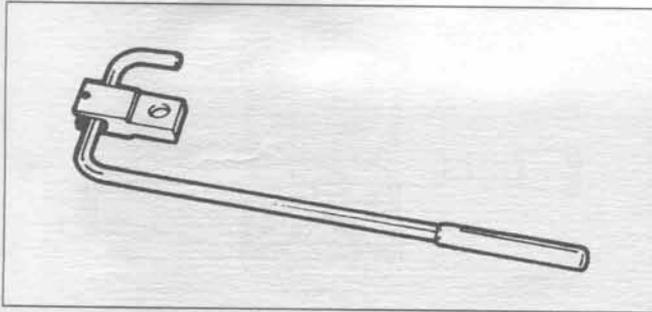
Part No. HD-34723 Valve Guide Hone (8 mm)



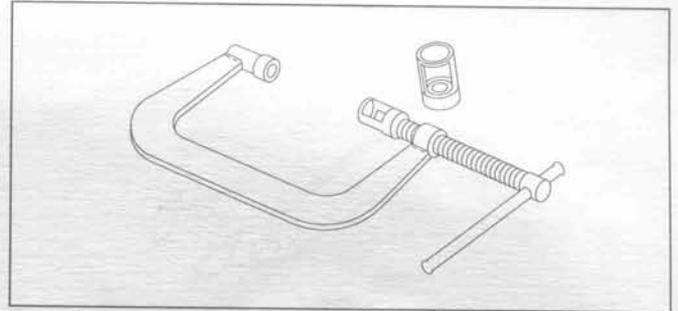
Part No. HD-34634 Fork Seal Installer



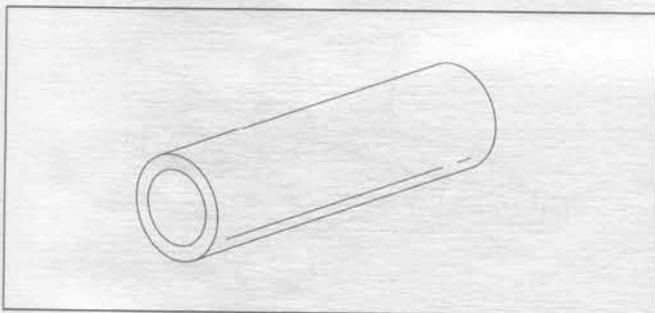
Part No. HD-34731 Shoulderless Valve Guide Installer



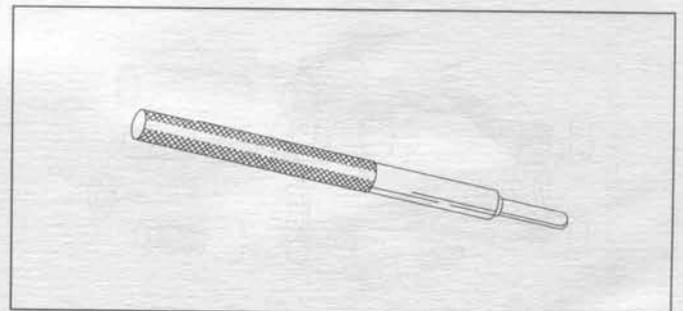
Part No. HD-34641 Rear Intake Valve Spring Compressor



Part No. HD-34736B Valve Spring Compressor



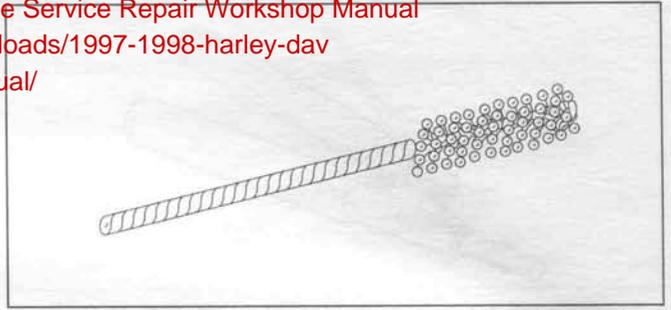
Part No. HD-34643A Shoulderless Valve Guide Seal Installer



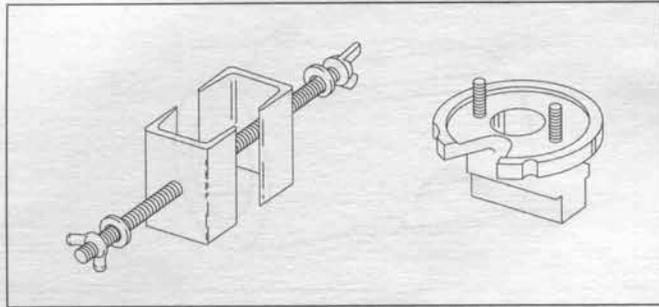
Part No. HD-34740 Driver Handle and Remover. Used with HD-34643A and HD-34731



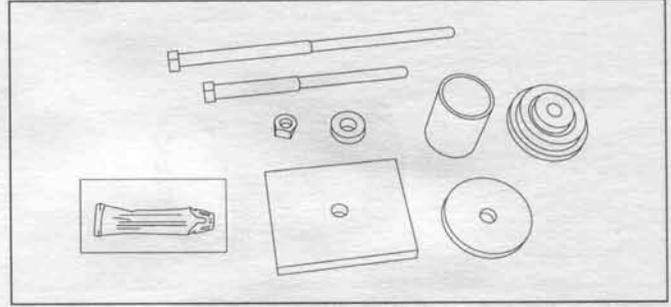
Part No. HD-34751 Nylon Valve Guide Cleaning Brush



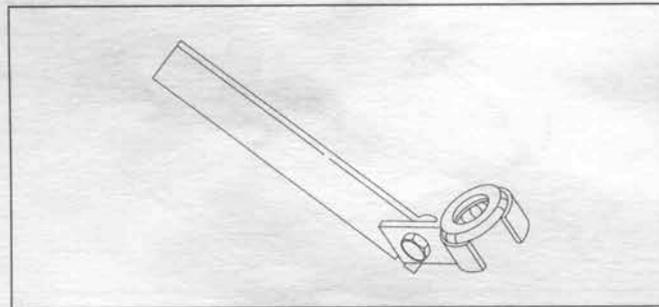
Part No. HD-35102 Wrist Pin Bushing Hone (20 mm)



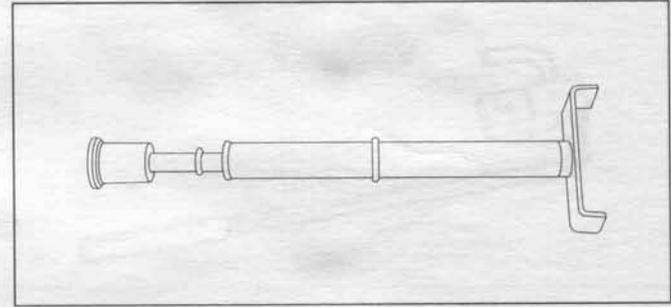
Part No. HD-34813 Rowe Flywheel Rebuilding Jig



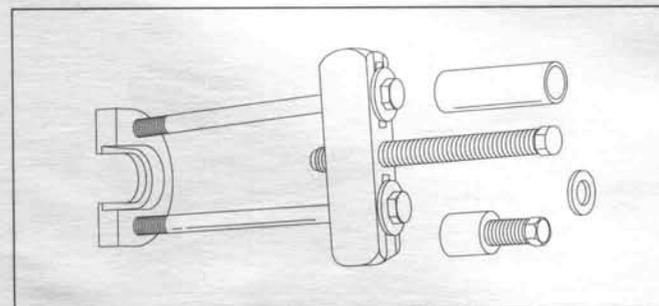
Part No. HD-35316A Main Drive Gear Remover/Installer and Main Drive Gear Bearing Installer



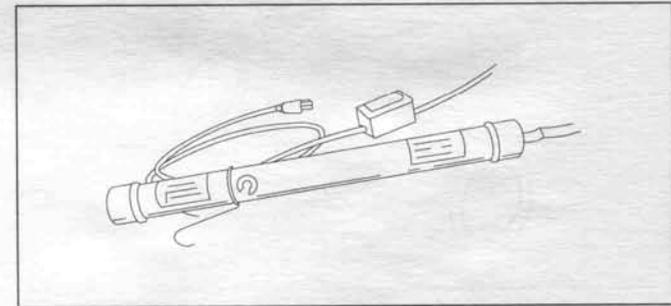
Part No. HD-34816 Oil Pressure Switch Wrench



Part No. HD-35381 Belt Tension Gauge



Part No. HD-34902A Mainshaft Primary Bearing Race Remover And Installer



Part No. HD-35457 Black Light Leak Detector