

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 motorcycle 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.

Always verify cleanliness of blind holes before assembly. Tightening screws with dirt, water or oil in the holes can cause castings to crack or break.

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

Checking Torques on Fasteners with Lock Patches

To check the torque on a fastener that has a lock patch:

1. Set the torque wrench for the lowest setting in the specified torque range.
2. Attempt to tighten fastener to set torque. If fastener does not move and lowest setting is satisfied (torque wrench clicks), then the proper torque has been maintained.

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.

Gaskets

Always discard gaskets after removal. Replace with new gaskets. Never use the same gasket twice (unless instructed otherwise). 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. Serious damage can occur if any flange holes are blocked by the gasket. Use material that is the right type and thickness.

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. Clean bearings with permanent shields and seals in solution.

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

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.

GENERAL

The table below lists the maintenance requirements for Touring models. If you are familiar with the procedures, just refer

to the table for the recommended service interval. If necessary, see the quick reference table on the next page for the required specifications. If more detailed information is needed, turn to the sections which follow for step-by-step instructions.

Table 1-1. Scheduled Maintenance Intervals

ITEM	PROCEDURE	1000 mi	5000 mi	10,000 mi	15,000 mi	20,000 mi	25,000 mi	NOTES
		1600 km	8000 km	16,000 km	24,000 km	32,000 km	40,000 km	
Engine oil and filter	Replace	X	X	X	X	X	X	
Oil lines and brake system	Inspect for leaks	X	X	X	X	X	X	1
Air cleaner	Inspect, service as required	X	X	X	X	X	X	
Tires	Check pressure, inspect tread	X	X	X	X	X	X	
Wheel spokes	Check tightness	X	X			X		1, 4
Primary chain tension	Check adjustment	X	X	X	X	X	X	
Primary chaincase lubricant	Replace	X		X		X		
Clutch	Check adjustment	X	X	X	X	X	X	1
Transmission lubricant	Replace	X				X		
Drive belt and sprockets	Inspect, adjust belt	X	X	X	X	X	X	1
Throttle, brake, clutch and enricher controls	Check, adjust and lubricate	X	X	X	X	X	X	1, 4
Jiffy stand	Inspect and lubricate	X	X	X	X	X	X	1
Fuel valve, lines and fittings	Inspect for leaks	X	X	X	X	X	X	1, 4
Fuel filter	Clean (EFI: replace)						X	1
Brake fluid	Check levels and condition	X	X	X	X	X	X	5
Brake pads and discs	Inspect for wear	X	X	X	X	X	X	
Spark plugs	Inspect	X	X		X		X	
	Replace			X		X		
Electrical equipment and switches	Check operation	X	X	X	X	X	X	
Engine idle speed	Check adjustment	X	X	X	X	X	X	1
Front fork oil	Replace							1, 2
Steering head bearings	Lubricate	X		X		X		2
	Adjust						X	1
Air suspension	Check pressure, operation and leakage	X	X	X	X	X	X	1
Windshield bushings	Inspect			X		X		1
Cruise control	Inspect disengage switch and components	X	X	X	X	X	X	1
Fuel door, Tour-pak, saddlebags	Lubricate hinges and latches	X	X	X	X	X	X	
Critical fasteners	Check tightness	X		X		X		1
Engine mounts and stabilizer links	Inspect			X		X		1
Battery	Check battery and clean connections							3
Road test	Verify component and system functions	X	X	X	X	X	X	

NOTES:

- Should be performed by an authorized Harley-Davidson dealer, unless you have the proper tools, service data and are mechanically qualified.
- Disassemble, lubricate and inspect every 50,000 miles (80,000 km).
- Perform annually.
- Not all vehicles are equipped with enricher, fuel valve or spoke wheels.
- Change DOT 4 brake fluid and flush every two years.

Table 1-2. Quick Reference Data

ITEM	SPECIFICATION	DATA
Engine oil and filter	Drain plug torque	14-21 ft-lbs (19-28 Nm)
	Oil capacity	4 qt. (3.8 L)
	Filter	Hand tighten 1/2-3/4 turn after gasket contact
	Chrome filter part number	63798-99
	Black filter part number	63731-99
Air cleaner	Air cleaner cover bracket screw torque	40-60 in-lbs (5-7 Nm)
	Air cleaner cover screw torque	36-60 in-lbs (4-7 Nm)
	Air cleaner cover screw threadlocker	Loctite Medium Strength Threadlocker 243 (blue), Part No. 99642-97 (6 ml)
Tire condition and pressure	Pressure: solo rider	Front: 36 psi (2.5 bar), Rear: 36 psi (2.5 bar)
	Pressure: rider with passenger	Front: 36 psi (2.5 bar), Rear: 40 psi (2.8 bar)
	Wear	Replace tire if 1/32 in. (0.8 mm) or less of tread pattern remains
Wheel spokes	Spoke nipple torque	40-50 in-lbs (4.5-5.6 Nm)
Primary chain tension	Deflection with engine cold	5/8-7/8 in. (15.9-22.2 mm)
	Deflection with engine hot	3/8-5/8 in. (9.5-15.9 mm)
	Chain tensioner nut torque	21-29 ft-lbs (29-39 Nm)
	Primary chain inspection cover torque	84-108 in-lbs (10-12 Nm)
Primary chaincase lubricant	Lubricant capacity	32 oz (946 mL)
	Primary chaincase drain plug torque	36-60 in-lbs (4-7 Nm)
	<i>FORMULA+ TRANSMISSION AND PRIMARY CHAINCASE LUBRICANT</i> part number	99851-05 (qt)
Clutch adjustment	Free play at adjuster screw	1/2-1 turn
	Free play at hand lever	1/16-1/8 in. (1.6-3.2 mm)
	Adjuster screw locknut torque	72-120 in-lbs (8-14 Nm)
	Clutch inspection cover torque	84-108 in-lbs (10-12 Nm)
Transmission lubricant	Lubricant level	Dipstick at FULL with motorcycle level and filler plug resting on threads
	Lubricant capacity	20-24 oz (590-710 mL)
	<i>FORMULA+ TRANSMISSION AND PRIMARY CHAINCASE LUBRICANT</i> part number	99851-05 (qt)
	Transmission drain plug torque	14-21 ft-lbs (19-28 Nm)
	Filler plug torque	25-75 in-lbs (3-9 Nm)
Drive belt	Upward force at midpoint of bottom belt strand	10 lb. (4.5 kg)
	Deflection with motorcycle on jiffy stand without rider or luggage and 10 psi (69 kPa) in rear shocks	1/4 - 5/16 in. (6.4-7.9 mm)
	Deflection with motorcycle upright and rear wheel in the air	3/16 - 1/4 in. (4.8-6.4 mm)
Throttle and clutch cables	Lubricant part number	<i>Super Oil</i> , 94968-85TV (1/4 fl. oz)
	Handlebar clamp screw torque	60-80 in-lbs (6.8-9.0 Nm)
	Handlebar switch housing screw torque	35-45 in-lbs (4-5 Nm)
Enrichener control	Hex nut torque	20-35 in-lbs (2-4 Nm)
Fuel filter	Hex jam nut torque	15-20 ft-lbs (20-27 Nm)
Brake Fluid Reservoir Level	<i>DOT 4 Brake Fluid</i> part number	99953-99A (12 oz)
	Level	1/8 inch (3.2 mm) from the top
	Master cylinder reservoir cover torque	6-8 in-lbs (0.7-0.9 Nm)

Table 1-2. Quick Reference Data

ITEM	SPECIFICATION	DATA
Brake pad linings and discs	Minimum brake pad thickness	0.04 in. (1.02 mm)
	Minimum brake disc thickness	See stamp on side of disc
Spark plugs	Type	HD-6R12
	Gap	0.038-0.043 in. (0.97-1.09 mm)
	Torque	12-18 ft-lbs (16-24 Nm)
Engine idle speed	Idle speed	950-1050 rpm
Front Fork Oil	<i>Hydraulic Fork Oil (Type E)</i> part number	99884-80 (16 oz)
	Amount	See Section 2.15 FRONT FORKS
Steering head bearings	Neck fitting lubricant	<i>Special Purpose Grease</i> , 99857-97 (14 oz cartridge)
Critical fasteners, engine mounts and stabilizer links	See Section 1.19 CRITICAL FASTENERS .	
Battery	Lubricant part number	<i>Electrical Contact Lubricant</i> , 99861-02 (1 oz)
	Terminal bolt torque	60-96 in-lbs (6.8-10.9 Nm)
	Hold-down clamp screw torque	15-20 ft-lbs (20-27 Nm)