



THE NEW AMERICAN MOTORCYCLE™

2012 SERVICE MANUAL

Vegas®
Kingpin®
Vegas Jackpot®
Hammer®

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GENERAL INFORMATION

TRADEMARKS

The following are REGISTERED trademarks of Polaris Industries Inc.:

POLARIS; POLARIS THE WAY OUT; VICTORY MOTORCYCLES; FREEDOM; VEGAS; VEGAS JACKPOT; HAMMER; KINGPIN; NESS SIGNATURE SERIES VEGAS.

Polaris acknowledges the following products mentioned in this manual:

LOCTITE, is a registered trademark of the Henkel Corporation

DUNLOP, is a registered trademark of the Dunlop Tire Corporation.

STA-BIL, is a registered trademark of Gold Eagle

NYOGEL, is a registered trademark of the William F. Nye Company

FLUKE, registered trademark of the Fluke Corporation

SERVICE RULES

In order to perform service work efficiently and prevent costly errors, technicians should read the text in this manual and familiarize themselves with the procedures before beginning. A sound knowledge of mechanical theory, tool use and shop procedures is necessary to perform some procedures in this manual safely and correctly.

Always replace locking hardware such as lock nuts or lock washers, or any fasteners that have pre-applied locking agent. Replace other fasteners as noted in this service manual. Always use genuine Victory parts and hardware from an authorized Victory dealer. Do NOT substitute fasteners or hardware.

Cleanliness of parts, tools, and the work area is of primary importance. Clean the motorcycle before beginning service. Inspect and clean all parts before assembly.

If difficulty is encountered in removing or installing a component, look to see if a cause for the difficulty can be found. If it is necessary to tap the part into place, use a soft face hammer and tap lightly.

Always follow torque specifications as outlined throughout this manual. Incorrect torquing may lead to serious machine damage or in the case of steering, driveline, and chassis components, can result in loss of control during operation of the motorcycle, which could result in serious personal injury or death.

If a torquing sequence is indicated for nuts, bolts or screws of a certain component, start all fasteners and hand tighten. Following the method and sequence indicated, tighten evenly in 2-3 steps to the specified torque value. When removing nuts, bolts or screws from a component with several fasteners, loosen them all about 1/4 turn before removing them to prevent distortion of that component.

Replace all oil seals, sealing washers, gaskets, and O-rings with new ones during assembly. Be sure sealing surfaces are clean and smooth to avoid leaks and maintain specified tolerances.

Some procedures require removal of retaining rings or clips. Removal can weaken and deform these parts, therefore, they should always be replaced with new parts. When installing new retaining rings and clips, use care not to expand or compress them beyond what is required for installation.

Victory lubricants and greases have been specially formulated to provide maximum performance and protection when applied properly. In some applications, warranty coverage may be void if improper lubricants are used.

Parts requiring grease should be cleaned thoroughly and fresh grease applied before reassembly. Deteriorating grease loses lubricity and may contain abrasive foreign matter.

Working with batteries can be hazardous. Review all battery Warnings and Cautions. See battery safety in chapter 16.

Review ALL Safety Information before you begin any service work.

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SAFETY INFORMATION

UNDERSTANDING SAFETY LABELS & INSTRUCTIONS

READ AND BECOME FAMILIAR WITH ALL WARNING AND CAUTION SYMSBOLS AND STATEMENTS LISTED BELOW AND IN THE TEXT OF THIS MANUAL BEFORE YOU BEGIN WORK.



This is the safety alert symbol. When you see this symbol on the vehicle or in this manual, be alert to the potential for personal injury. Your safety is involved!

WARNING

Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.

NOTICE:

Indicates a hazardous situation, which, if not avoided, could result in damage to the motorcycle.

WARNING

Gasoline is extremely flammable and explosive under certain conditions.

- Always stop the engine and refuel outdoors or in a well ventilated area
- Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored
- Do not overfill the tank. Do not fill the tank neck above the fuel tank insert. Leave air space to allow for fuel expansion
- If you get gasoline in your eyes or if you swallow gasoline, see your doctor immediately. Never try to syphon gasoline using mouth suction
- If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing
- Never start the engine or let it run in an enclosed area. Engine exhaust fumes are poisonous and can cause loss of consciousness or death in a short time

WARNING

The engine exhaust from this product contains chemicals known to cause cancer, birth defects or other reproductive harm.

WARNING

Improper repairs or service can create unsafe conditions that may cause severe personal injury or death.

WARNING

The engine and exhaust components on this product become very hot during operation and remain so for a period of time after the engine is stopped.

WARNING

Never run the engine in an enclosed area without a properly functioning exhaust gas evacuation system connected to the product.

WARNING

Modifications to this motorcycle not approved by Victory may cause loss of performance, excessive emissions, and make the machine unsafe for use.

WARNING

Brake fluid is poisonous.
KEEP OUT OF REACH OF CHILDREN.

WARNING

Wear insulated protection for hands and arms or wait until hot components have cooled sufficiently before working on the product.

WARNING

Brake fluid is poisonous. Do not ingest or allow brake fluid to contact eyes. Always wear eye protection when working with brake fluid.

WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing.

WARNING

Care should be taken to be sure the motorcycle will not tip or fall while elevated. Severe personal injury or death could occur if the motorcycle tips or falls.

NOTICE

Brake fluid will damage plastic, painted and rubber parts. Protect these surfaces whenever the brake system is being serviced.



GENERAL INFORMATION / ROUTING

GENERAL SPECIFICATIONS - VEGAS

2012 Vegas Specifications

CAPACITIES & DIMENSIONS		2012 Vegas	2012 Vegas 8-Ball / NESS
	Oil Capacity	5.0 Qt (4.75 ltr) (Approximately 4.5 qts. or 4.25 ltr at oil & filter change)	
	Fuel Capacity	4.5 US Gal (17 ltr) (.8 U.S. gal / 3.0 ltr reserve)	
	Fuel Type / Octane Minimum	Premium Unleaded / 91 Octane	
	Wheelbase	66.3 in (1684 mm)	
	Dry Weight	645 lbs (293 kg)	638 lbs (293 kg)
	Wet Weight	674 lbs (306 kg)	667 lbs (303 kg)
	Gross Vehicle Weight Rating	1151 lbs. (522 kg)	
	Maximum Load Capacity*	Subtract <i>Wet Weight</i> from GVWR for maximum load capacity. Never exceed GVWR.	
	Overall Length	96 in (2439 mm)	
	Overall Width	38 in (97 cm)	
	Overall Height	50.75 in (129.0 cm)	
	Seat Height	25.2 in (640mm)	25.2 in (640mm)
	Ground Clearance	5.3 in (135 mm)	5.3 in (135 mm)
	Passenger Capacity	1 [8-Ball - 0]	1 [8-Ball - 0]
	Rake / Trail	32.9 Degrees / 4.9 in. (126 mm)	32.9 Degrees / 4.9 in. (126 mm)
ENGINE	Engine Type	Freedom® 106/6 V-Twin	Freedom® 106/6 V-Twin
	Engine Configuration	50° SOHC Transverse V-Twin 4 Stroke	
	Engine Displacement	1731cc / 106 cubic inch	
	Engine Cooling System	Air / Oil	
	Compression Ratio	9.4:1	
	Compression Pressure	210 - 225 psi (1448 - 1551 kPa)	
	Valve Train	4 Valves per cylinder. Hydraulic Lifters & Cam Chain Adjusters (No Adjustment)	
	Bore x Stroke	101 x 108 mm	
	Starter	Electric / Direct Drive	
	Fuel System / Throttle Body	Electronic Fuel Injection / Dual 45 mm Throttle Bodies	
	Exhaust System Type	Staggered slash cut dual exhaust with crossover	
	Lubrication System	Wet Sump	
	Spark Plug Type (Gap)	NGK DCPR6E (.032 in. / 0.8 mm)	
BRAKE	Dry Weight (Engine) (Approx)	(Approx) 265 lbs. (120 Kg)	
	Brake Type (Front / Rear)	Disc / Disc	
	Front Brake	Single 300 x 5 mm Floating Disc with 4 Piston Caliper	
	Rear Brake	Single 300 x 5 mm Floating Disc with 2 Piston Caliper	

All specifications are for standard Victory Vegas and Vegas 8-Ball models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.

* Maximum load capacity includes the weight of all additional accessories, options, cargo, rider with riding gear, and passenger with riding gear. See GVWR and Vehicle Loading information.



2012 Vegas Specifications (cont.)

		2012 Vegas	2012 Vegas 8-Ball / NESS
D R I V E S Y S T E M	Transmission Type	Manual, 6 Speed Overdrive Constant Mesh	
	Clutch Type	Wet, Multi-Plate Diaphragm Spring	
	Primary Drive Type	Wet, Gear Drive w/ Torque Compensator	
	Primary Reduction Ratio	1.48:1	
	Final Drive Type / Final Drive Ratio	28mm Carbon Fiber Reinforced Belt / 2.12:1	
	Gear Shift Pattern	1 Down, 5 Up	1 Down, 5 Up
	Internal Gear Ratios 1st	3.13:1	
	2nd	2.02:1	
	3rd	1.50:1	
	4th	1.20:1	
T I R E S	5th	1:1	
	6th	.87:1	
	Front Wheel	Cast or Billet / 2.15 x 21 (inch)	
	Rear Wheel	5.50 x 18 in. (Cast) or 5.00 x 18 in. (Billet)	
	Front Tire	Dunlop Elite 3 - 90/90 21 54H (Tubeless)	
S U S P E N S I O N	Rear Tire	Dunlop D417 - 180/55-B18 74H (Tubeless)	
	Minimum Tread Depth	.063 in. (1.6mm)	
	Front Type	43mm Conventional Telescopic Fork	
	Front Travel	5.1 in. (130 mm)	
	Front Tube Diameter	43 mm (1.7 in.)	
L I G H T S	Rear Shock Type	Single, Monotube Gas w/Adjustable Preload	
	Rear Swingarm Type	Forged and Cast Aluminum with Rising Rate Linkage	
	Rear Travel (inches)	3.0 in (75 mm)	3.0 in (75 mm)
	Headlamp	High: H-11 55W Low: H-11 55W	
	Marker Lamp (Euro)	W5W	
F U S E S	Brake / Tail Light	Non-Serviceable LED	
	Turn Signal Light	R10W (10W)	
	Instrument Cluster	Indicator Lights: W2.3W (2.3 Watt Wedge Base) Backlighting: T10 (1.7 Watt) Tach (if equipped): T6.5 (1.7 Watt)	
	Alternator / Battery	625W (48A @ 13.0VDC) / 12V 18AH 310 CCA	
	Brake / Headlamp (Primary Lights)	20 amp fuse	
F U S E S	Tail Lamp / Flashers / Indicator Lamps / Horn	15 amp fuse	
	Engine / ECM	15 amp fuse	
	Ignition / Gauges	15 amp fuse	
	Fuel Pump / Coil	15 amp fuse	
	Accessory	15 amp fuse	
	Main Circuit Breaker	40 amp circuit breaker	

All specifications are for standard Victory Vegas and Vegas 8-Ball models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.



GENERAL INFORMATION / ROUTING

GENERAL SPECIFICATIONS - KINGPIN

2012 Kingpin Specifications

CAPACITIES & DIMENSIONS	2012 Kingpin	
	Oil Capacity	5.0 Qt (4.75 ltr) (Approximately 4.5 qts. or 4.25 ltr at oil & filter change)
	Fuel Capacity	4.5 US Gal (17 ltr) (.8 U.S. gal / 3.0 ltr reserve)
	Fuel Type / Octane	Premium Unleaded / 91 Octane (Minimum)
	Wheelbase	65.6 in (166.6 cm)
	Dry Weight	666 lb. (303 kg)
	Wet Weight	696 lb. (316 kg) [8-Ball / Low - 687 lb. (312 kg)]
	Gross Vehicle Weight Rating (GVWR)	1234 lbs. (560 kg)
	Maximum Load Capacity*	Subtract <i>Wet Weight</i> from GVWR for maximum load capacity. Never exceed GVWR.
	Overall Length	99.9 in (2537 cm)
	Overall Width	38 in (97 cm)
	Overall Height	50.75 in (129.0 cm)
	Seat Height	26.5 in (673 mm)
	Ground Clearance	5.8 in (148 mm)
	Passenger Capacity	1
	Rake / Trail	32.8 Degrees / 5.43 in. (13.8 cm)
ENGINE	Engine Type	Freedom® 106/6 V-Twin
	Engine Configuration	50° SOHC Transverse V-Twin 4 Stroke
	Engine Displacement	1731cc / 106 cubic inch
	Engine Cooling System	Air / Oil
	Compression Ratio	9.4:1
	Compression Pressure	210 - 225 psi (1275 - 1551 kPa)
	Valve Train	4 Valves per cylinder. Hydraulic Lifters & Cam Chain Adjusters (No Adjustment)
	Bore x Stroke	101 x 108 mm
	Starter	Electric / Direct Drive
	Fuel System/Throttle Body	Electronic Fuel Injection / 45 mm
	Exhaust System Type	Staggered slash cut dual exhaust with crossover
	Lubrication System	Wet Sump
	Spark Plug Type (Gap)	NGK DCPR6E (.032 in. / 0.8 mm)
	Dry Weight (Engine)	(Approx) 265 lbs. (120 Kg)
BRAKES	Brake Type (Front / Rear)	Disc / Disc
	Front Brake	300 x 5 mm Floating Disc / 4 P Caliper
	Rear Brake	300 x 5 mm Floating Disc with 2 Piston Caliper

All specifications are for standard Victory Kingpin models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.

* Maximum load capacity includes the weight of all additional accessories, options, cargo, rider with riding gear, and passenger with riding gear. See GVWR and Vehicle Loading information.



2012 Kingpin Specifications (cont.)

D R I V E S Y S T E M	2012 Kingpin	
T I R E S	Transmission Type	Manual, 6 Speed Overdrive Constant Mesh
	Clutch Type	Wet, Multi-Plate Diaphragm Spring
	Primary Drive Type	Wet, Gear Drive w/ Torque Compensator
	Primary Reduction Ratio	1.48:1
	Final Drive Type/Final Drive Ratio	28mm Carbon Fiber Reinforced Belt / 2.12:1
	Gear Shift Pattern	1 Down, 5 Up
	Internal Gear Ratios 1st	3.13:1
	2nd	2.02:1
S U S P E N S I O N	3rd	1.50:1
	4th	1.20:1
	5th	1:1
	6th	.87:1
	Front Wheel	3.50 x 18 in. (Cast) or 3.00 x 18 in. (Billet)
	Rear Wheel	5.50 x 18 in. (Cast) or 5.00 x 18 in. (Billet)
	Front Tire	Dunlop 491 Elite II (130/70 B 18 63H Tubeless)
	Rear Tire	Dunlop D417 (180/55-B18 74H Tubeless)
L I G H T S	Minimum Tread Depth	.063 in. (1.6mm)
	Front Type	43mm Inverted Cartridge Telescopic Fork
	Front Travel	5.1 in. (130 mm)
	Front Tube Diameter	43 mm (1.7 in.)
	Rear Shock Type	Single, Monotube Gas w/Adjustable Preload
	Rear Swingarm Type	Forged and Cast Aluminum with Rising Rate Linkage
	Rear Travel (inches)	3.9 in (100 mm)
	Headlamp	High: H-11 55W Low: H-11 55W
F U S E S	Marker Lamp (Euro)	W5W
	Brake / Tail Light	Non-Serviceable LED
	Turn Signal Light	R10W (10W)
	Instrument Cluster	Indicator Lights: W2.3W (2.3 Watt Wedge Base) Backlighting: T10 (1.7 Watt) Tach (if equipped): T6.5 (1.7 Watt)
	Alternator / Battery	625W (48A @ 13.0VDC) / 12V 18AH 310 CCA
	Brake / Headlamp (Primary Lights)	20 amp fuse
	Tail Lamp / Flashers / Indicator Lamps / Horn (Secondary Lights)	15 amp fuse
	Engine / ECM	15 amp fuse
S	Ignition / Gauges	15 amp fuse
	Fuel Pump	10 amp fuse
	Accessory	15 amp fuse
	Main Circuit Breaker	40 amp circuit breaker

All specifications are for standard Victory Kingpin models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.



GENERAL INFORMATION / ROUTING

GENERAL SPECIFICATIONS - HAMMER

SPECIFICATIONS - 2012 Hammer® S / Hammer 8-Ball™

CAPACITIES & DIMENSIONS	2012 Hammer S® / Hammer 8-Ball™	
	Oil Capacity	5.0 Qt (4.75 ltr) (Approximately 4.5 qts. or 4.25 ltr at oil & filter change)
	Fuel Capacity	4.5 US Gal (17 ltr) (.8 U.S. gal / 3.0 ltr reserve)
	Fuel Type / Octane Minimum	Premium Unleaded / 91 Octane
	Dry Weight	672 lbs. (305 kg)
	Wet Weight	702 lbs. (319.0 kg)
	Gross Vehicle Weight Rating	1173 lbs. (532 kg)
	Maximum Load Capacity*	Subtract <i>Wet Weight</i> from GVWR for maximum load capacity. Never exceed
	Overall Length	93.1 in. (2366 mm)
	Overall Width	38.75 in. (98.4 cm)
	Overall Height	47.25 in. (120 cm) [8-Ball: 46.75 (118.7 cm)]
	Seat Height	26.5 in. (673 mm) [8-Ball: 26 in (660 mm)]
	Ground Clearance	5.8 in. (14.8 cm) [8-Ball: 5.3 in. (13.5 cm)]
	Passenger Capacity	1 [Hammer 8-Ball - No Passenger]
ENGINE	Wheelbase	65.7 in. (166.9 cm)
	Rake / Trail	32.7 Degrees / 5.5 in. (140 mm)
	Engine Type	Freedom® 106/6 V-Twin
	Engine Configuration	50° SOHC Transverse V-Twin 4 Stroke
	Engine Displacement	1731cc / 106 cubic inch 6 speed (106/6 engine)
	Engine Cooling System	Air / Oil
	Compression Ratio	9.4:1
	Compression Pressure	210 - 225 psi (1448 - 1551 kPa)
	Valve Train	4 Valves per cylinder. Hydraulic Lifters & Cam Chain Adjusters (No Adjustment)
	Bore x Stroke	101 x 108 mm
	Starter	Electric / Direct Drive
	Fuel System / Throttle Body Bore Size	Electronic Fuel Injection / Dual 45 mm
	Exhaust System Type	Dual - Large bore slash cut with common volume
	Lubrication System	Wet Sump
BRAKE	Spark Plug Type (Gap)	NGK DCPR6E (.032 in. / 0.8 mm)
	Dry Weight (Engine Approximate)	265 lbs. (120 Kg)
	Brake Type (Front / Rear)	Disc / Disc
	Front Brake	Dual 300 x 5 mm Floating Disc / 4 Piston Calipers [8-Ball Single 300 x 5mm]
	Rear Brake	Single 300 x 5 mm Floating Disc / 2 Piston Caliper

All specifications are for standard Victory Hammer S models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.

* Maximum load capacity includes the weight of all additional accessories, options, cargo, rider with riding gear, and passenger with riding gear. See GVWR / loading information.



2012 Hammer® S / Hammer® 8-Ball™ Specifications (cont.)

D R I V E S Y S T E M		2012 Hammer S® / Hammer 8-Ball™
	Transmission Type	Manual, 6 Speed Overdrive, Constant Mesh
T I R E S	Clutch Type	Wet, Multi-Plate Diaphragm Spring
	Primary Drive Type	Wet, Gear Drive w/ Torque Compensator
	Primary Reduction Ratio	1.48:1
	Final Drive Type / Belt Width / Final Drive Ratio	Carbon Fiber Reinforced Belt / 28mm 2.12:1
	Gear Shift Pattern	1 Down, 5 Up
	Internal Gear Ratios 1st	3.13:1
	2nd	2.02:1
	3rd	1.50:1
S U S P E N S I O N	4th	1.20:1
	5th	1:1
	6th	.87:1
	Front Rim	3.50 x 18 in. (Cast) or 3.00 x 18 in. (Billet)
L I G H T S	Rear Rim	Cast or Billet - 8.50 x 18 (inch)
	Front Tire	Dunlop Elite 3 (130/70R18 63H) Tubeless
	Rear Tire	Dunlop Elite 3 (250/40R18 81V) Tubeless
	Minimum Tread Depth	.063 in. (1.6mm)
F U S E S	Front Type	43mm Inverted Telescopic Cartridge Fork
	Front Travel	5.1 in. (13 cm)
	Front Tube Diameter	43 mm (1.7 in.)
	Rear Shock Type	Single, Monotube Gas w /Adjustable Preload
	Rear Swingarm Type	Forged and Cast Aluminum with Rising Rate Linkage
	Rear Travel (inches)	3.9 in (10 cm) [2010 Hammer 8-Ball - 3.0 (76.2 mm)]
F U S E S	Headlamp	High: H-11 55W Low: H-11 55W
	Marker Lamp (Euro)	W5W
	Brake / Tail Light	Non-Serviceable LED
	Turn Signal Light	R10W (10W)
	Instrument Cluster	Indicator Lights: W2.3W (2.3 Watt Wedge Base) Backlighting: T10 (1.7 Watt) Tach (if equipped): T6.5 (1.7 Watt)
	Alternator / Battery	625W (48A @ 13.0VDC) / 12V 18AH 310 CCA
	Brake/Headlamp (Primary Lights)	20 amp fuse
F U S E S	Tail Lamp / Indicator Lamps / Horn (Secondary Lights)	15 amp fuse
	Engine / ECM	15 amp fuse
	Ignition / Gauges	15 amp fuse
	Fuel Pump / Coil	15 amp fuse
	Accessory	15 amp fuse
	Main Circuit Breaker	40 amp circuit breaker

All specifications are for standard Victory Hammer S models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.



GENERAL INFORMATION / ROUTING

GENERAL SPECIFICATIONS - VEGAS JACKPOT

SPECIFICATIONS - 2012 Vegas Jackpot®

C A P A C I T I E S & D I M E N S I O N S	2012 Vegas Jackpot®	
	Oil Capacity	5.0 Qt (4.75 ltr) (Approximately 4.5 qts. at change)
	Fuel Capacity	4.5 US Gal (17 ltr) (.8 U.S. gal / 3.0 ltr reserve)
	Fuel Type / Octane Minimum	Premium Unleaded / 91 Octane
	Wheelbase	66.3 in (168.4 cm)
	Dry Weight	652 lbs (296 kg)
	Wet Weight	680 lbs (309 kg)
	Gross Vehicle Weight Rating	1171 lbs. (531 kg)
	Maximum Load Capacity*	Subtract <i>Wet Weight</i> from GVWR for maximum load capacity. Never exceed GVWR.
	Overall Length	95.9 in (2435 mm)
	Overall Width	37 in (94 cm)
	Overall Height	47.25 (120 cm)
	Seat Height	25.7 in (65.3 cm)
	Ground Clearance	5.3 in (13.5 cm)
	Passenger Capacity	1
E N G I N E	Rake / Trail	32.9 Degrees / 4.9 in. (125 mm)
	Engine Type	Freedom® 106/6 V-Twin
	Engine Configuration	50° SOHC Transverse V-Twin 4 Stroke
	Engine Displacement	1731cc / 106 cubic inch 6 speed (106/6 engine)
	Engine Cooling System	Air / Oil
	Compression Ratio	9.4:1
	Compression Pressure	210 - 225 psi (1448 - 1551 kPa)
	Valves Train	.4 Valves per cylinder. Hydraulic Lifters & Cam Chain Adjusters (No Adjustment)
	Bore x Stroke	101 x 108 mm
	Starter	Electric / Direct Drive
	Fuel System / Throttle Body Bore Size	Electronic Fuel Injection / 45 mm
	Exhaust System Type	Dual - Large bore slash cut with common volume
	Lubrication System	Wet Sump
	Engine RPM @ 60 mph	2220 (Approximate)
	Spark Plug Type (Gap)	NGK DCPR6E (.032 in. / 0.8 mm)
B R A K E	Dry Weight (Engine Approximate)	265 lbs. (120 Kg)
	Brake Type (Front / Rear)	Disc / Disc
	Front Brake	Single 300 x 5 mm Floating Disc with 4 Piston Caliper
	Rear Brake	Single 300 x 5 mm Floating Disc with 2 Piston Caliper

All specifications are for standard Victory Vegas Jackpot models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.

* Maximum load capacity includes the weight of all additional accessories, options, cargo, rider with riding gear, and passenger with riding gear. See GVWR / loading information.

1.10



SPECIFICATIONS - 2012 Vegas Jackpot® (cont.)

D R I V E S Y S T E M	2012 Vegas Jackpot®	
T I R E S	Transmission Type	Manual, 6 Speed Overdrive Constant Mesh
	Clutch Type	Wet, Multi-Plate Diaphragm Spring
	Primary Drive Type	Wet, Gear Drive w/ Torque Compensator
	Primary Reduction Ratio	1.48:1
	Final Drive Type / Final Drive Ratio	28mm Carbon Fiber Reinforced Belt / 2.12:1
	Gear Shift Pattern	1 Down, 5 Up
	Internal Gear Ratios 1st	3.13:1
	2nd	2.02:1
S U S P E N S I O N	3rd	1.50:1
	4th	1.20:1
	5th	1:1
	6th	.87:1
	Front Wheel (Size / Type)	Cast or Billet / 2.15 x 21 (inch)
	Rear Wheel (Size / Type)	Cast or Billet 8.50 x 18 (inch)
	Front Tire	Dunlop Elite 3 (90/90 21 Tubeless)
	Rear Tire	Dunlop Elite 3 (250/40R18 Tubeless)
L I G H T S	Minimum Tread Depth	.063 in. (1.6mm)
	Front Type	43mm Conventional Telescopic Fork
	Front Travel	5.1 in. (13 cm)
	Front Tube Diameter	43 mm (1.7 in.)
	Rear Shock Type	Single, Monotube Gas w/Adjustable Preload
	Rear Swingarm Type	Forged and Cast Aluminum with Rising Rate Linkage
	Rear Travel (inches)	3.0 in (7.5 cm)
	Headlamp	High: H-11 55W Low: H-11 55W
F U S E S	Marker Lamp (Euro)	W5W
	Brake / Tail Light	Non-Serviceable LED
	Turn Signal Light	R10W (10W)
	Instrument Cluster	Indicator Lights: W2.3W (2.3 Watt Wedge Base) Backlighting: T10 (1.7 Watt) Tach (if equipped): T6.5 (1.7 Watt)
	Alternator / Battery	625W (48A @ 13.0VDC) / 12V 18AH 310 CCA
	Brake / Headlamp (Primary Lights)	20 amp fuse
	Tail Lamp / Flashers / Indicator Lamps / Horn (Secondary Lights)	15 amp fuse
	Engine / ECM	15 amp fuse
F U S E S	Ignition / Gauges	15 amp fuse
	Fuel Pump / Coil	15 amp fuse
	Accessory	15 amp fuse
	Main Circuit Breaker	40 amp circuit breaker

All specifications are for standard Victory Vegas Jackpot models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.



GENERAL INFORMATION / ROUTING

GENERAL SPECIFICATIONS - VEGAS HIGH-BALL

SPECIFICATIONS - 2012 Vegas High-Ball™

CAPACITIES & DIMENSIONS	2012 Vegas High-Ball™	
	Oil Capacity	5.0 Qt (4.75 ltr) (Approximately 4.5 qts. at change)
	Fuel Capacity	4.5 US Gal (17 ltr) (.8 U.S. gal / 3.0 ltr reserve)
	Fuel Type / Octane Minimum	Premium Unleaded / 91 Octane
	Wheelbase	64.8 in (164.7 cm)
	Dry Weight	659 lbs (300 kg)
	Wet Weight	688 lbs (313 kg)
	Gross Vehicle Weight Rating	1151 lbs. (522 kg)
	Maximum Load Capacity*	Subtract <i>Wet Weight</i> from GVWR for maximum load capacity. Never exceed GVWR.
	Overall Length	92.5 in (2350 mm)
	Overall Width	38 in (94 cm)
	Overall Height	50.75 (120 cm)
ENGINE	Seat Height	25 in (63.5 cm)
	Ground Clearance	4.7 in (12 cm)
	Passenger Capacity	1
	Rake / Trail	31.7 Degrees / 6.7 in. (170 mm)
	Engine Type	Freedom® 106/6 V-Twin
	Engine Configuration	50° SOHC Transverse V-Twin 4 Stroke
	Engine Displacement	1731cc / 106 cubic inch 6 speed (106/6 engine)
	Engine Cooling System	Air / Oil
	Compression Ratio	9.4:1
	Compression Pressure	210 - 225 psi (1448 - 1551 kPa)
	Valves Train	4 Valves per cylinder. Hydraulic Lifters & Cam Chain Adjusters (No Adjustment)
	Bore x Stroke	101 x 108 mm
BRAKE	Starter	Electric / Direct Drive
	Fuel System / Throttle Body Bore Size	Electronic Fuel Injection / 45 mm
	Exhaust System Type	Dual - Large bore slash cut with common volume
	Lubrication System	Wet Sump
	Engine RPM @ 60 mph	2220 (Approximate)
	Spark Plug Type (Gap)	NGK DCPR6E (.032 in. / 0.8 mm)
	Dry Weight (Engine Approximate)	265 lbs. (120 Kg)
	Brake Type (Front / Rear)	Disc / Disc
	Front Brake	Single 300 x 5 mm Floating Disc with 4 Piston Caliper
	Rear Brake	Single 300 x 5 mm Floating Disc with 2 Piston Caliper

All specifications are for standard Victory Vegas High-Ball models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.

* Maximum load capacity includes the weight of all additional accessories, options, cargo, rider with riding gear, and passenger with riding gear. See GVWR / loading information.



SPECIFICATIONS - Vegas High-Ball™(cont.)

1

		2012 Vegas High-Ball™
D R I V E S Y S T E M	Transmission Type	Manual, 6 Speed Overdrive Constant Mesh
	Clutch Type	Wet, Multi-Plate Diaphragm Spring
	Primary Drive Type	Wet, Gear Drive w/ Torque Compensator
	Primary Reduction Ratio	1.48:1
	Final Drive Type / Final Drive Ratio	28mm Carbon Fiber Reinforced Belt / 2.0:1
	Gear Shift Pattern	1 Down, 5 Up
	Internal Gear Ratios 1st	3.13:1
	2nd	2.02:1
	3rd	1.50:1
	4th	1.20:1
T I R E S	5th	1:1
	6th	.87:1
	Front Wheel (Size / Type)	Spoked / 3.5 x 16 (inch)
	Rear Wheel (Size / Type)	Spoked / 3.5 x 16 (inch)
	Front Tire	Dunlop Cruisemax 130/90-16 67H (Tube-Type)
	Rear Tire	Dunlop Cruisemax 150/80-16 71H (Tube-Type)
	Front Tube Size	16 inch
S U S P E N S I O N	Rear Tube Size	16 inch
	Minimum Tread Depth	.063 in. (1.6mm)
	Front Type	43mm Conventional Telescopic Fork
	Front Travel	5.1 in. (13 cm)
	Front Tube Diameter	43 mm (1.7 in.)
	Rear Shock Type	Single, Monotube Gas w/Adjustable Preload
	Rear Swingarm Type	Forged and Cast Aluminum with Rising Rate Linkage
L I G H T S	Rear Travel (inches)	3.0 in (7.5 cm)
	Headlamp	High: H-11 55W Low: H-11 55W
	Marker Lamp (Euro)	W5W
	Brake / Tail Light	Non-Serviceable LED
	Turn Signal Light	R10W (10W)
	Instrument Cluster	Indicator Lights: W2.3W (2.3 Watt Wedge Base) Backlighting: T10 (1.7 Watt) Tach (if equipped): T6.5 (1.7 Watt)
	Alternator / Battery	625W (48A @ 13.0VDC) / 12V 18AH 310 CCA
F U S E	Brake / Headlamp (Primary Lights)	20 amp fuse
	Tail Lamp / Flashers / Indicator Lamps / Horn (Secondary Lights)	15 amp fuse
	Engine / ECM	15 amp fuse
	Ignition / Gauges	15 amp fuse
	Fuel Pump / Coil	15 amp fuse
	Accessory	15 amp fuse
	Main Circuit Breaker	40 amp circuit breaker

All specifications are for standard Victory Vegas High-Ball models. Specifications may change with the addition of custom order options and / or accessories. Polaris Sales Inc. reserves the right without prior notice to discontinue at any time at its discretion any of the items herein or change specifications or designs without incurring any obligation to the customer.



1.13

GENERAL INFORMATION / ROUTING

VEHICLE LOADING

WEIGHT CAPACITY

When operating a motorcycle with original equipment or accessory saddlebags and / or top box (trunk):

- Never ride at speeds exceeding 80 mph (129 km/h). Depending on load and weather conditions, the maximum safe operating speed may be less than 80 mph (129 km/h). Saddlebags and / or top box, combined with the lifting or buffeting effects of wind, can make the motorcycle unstable and cause loss of control.
- Distribute weight evenly in each of the saddlebags.
- Do not exceed the maximum cargo weight limit of original equipment or accessory saddlebags or trunk.
- Do not exceed the motorcycle's Gross Vehicle Weight Rating (GVWR). Exceeding the weight capacity can reduce stability and handling and cause loss of control.

GROSS VEHICLE WEIGHT RATING (GVWR)

WARNING

Exceeding the gross vehicle weight rating of your motorcycle can reduce stability and handling and could cause loss of control. NEVER exceed the gross vehicle weight rating of your motorcycle.

The *maximum load capacity* of your motorcycle is the maximum weight you may add to your motorcycle *without exceeding the GVWR*. This capacity is determined by calculating the difference between your motorcycle's GVWR and wet weight.

Refer to the specification section of this manual or the Manufacturing Information / VIN label on the motorcycle frame for model-specific information. Refer to Information label section in this manual for location on the motorcycle.

When determining the weight you will be adding to your motorcycle, to ensure you do not exceed the maximum load capacity, include the following:

- operator body weight
- passenger body weight
- weight of all riders' apparel and items in or on apparel
- weight of any accessories and their contents
- weight of any additional cargo on the motorcycle



REFINISHING**PAINT COLORS BY MODEL****1****VEGAS® / NESS SERIES VEGAS® MODEL YEAR 2012**

V12GB36NE, NEA, NEC, EE (int'l)	Sunset Red & Pearl White
V12GB36NF, NFA, NFC, EF (int'l)	Imperial Blue & Pearl White
V12ZB36NV, NVA, NVC, EV (int'l)	Ness Black

VEGAS 8-BALL® MODEL YEAR 2012

V12GA36NA, NAA, NAC, EA (int'l)	Solid Black
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KINGPIN® MODEL YEAR 2012

V12CB36NP, NPA, NPC	Pearl White / Vogue Silver / Graphics
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HAMMER® S MODEL YEAR 2012

V12HS36NJ, NJA, NJC, EJ (int'l)	Matte Indy Red / Black
V12HS36ND, NDA, NDC, ED (int'l)	Gloss Fireball Red / White Lightening

HAMMER® 8-BALL™ MODEL YEAR 2012

V12HA36NA, NAA, NAC, EA (int'l)	Solid Black
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VEGAS JACKPOT® MODEL YEAR 2012

V12XB36NA, NAA, NAC, EA (int'l)	Solid Black
V12XB36NG, NGA, NGC, EG (int'l)	Pearl White Decals w/ Black Pinstripe
V12XB36NH, NHA, NHC, EH (int'l)	Fireball Red Pinstripe

VEGAS HIGH-BALL™ MODEL YEAR 2012

V12WB36NA, EA, NAA, NAC	Flat Black / Matte White w / Victory Graphics
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GENERAL INFORMATION / ROUTING

PAINT COLOR CODES

For current information go to www.polarisdealers.com/News, Forms, and Links. Enter PAINT CODES in the search box.

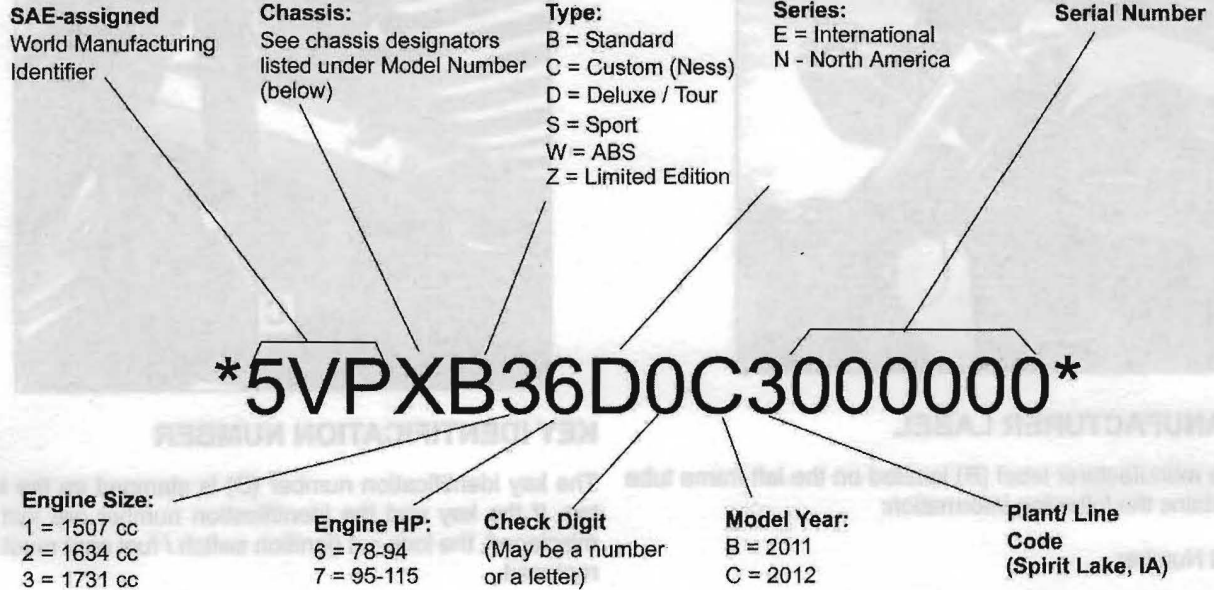
PAINT COLOR: 2012	Paint Code	NOTES
Anodized Aluminum	P-565	
Black	P-266	
Boardwalk Blue	P-524	Requires P-519 Clear Pearl Topcoat
Clear	C	
Clear Metallic	CM	Clear with metal flake added
Clear Pearl	CP	Clear with pearl flake added
Clear Pearl	P-519	
Cobalt Blue	P-1278	P-574 Cobalt Blue / P-585 Tinted Black (1st Overlay) / P-500 Graphics
Fireball Red	P-1277	P-575 Fireball Red Base / P-500 Graphics
Flat Black	P-463	
Graphics (Victory)	P-500	
Imperial Blue	P-598	
Indy Red	P-293	
Matte White	P-570	
Metallic Flake Additive	METALLIC	Add vial of flake to quart of clear base
Midnight Cherry	P-554	
Ness Metallic Purple	P-543	
Nuclear Sunset	P-493	
Nuclear Sunset / Graphics	P-1266	P493 / P-500 Graphics
Ocean Blue Metallic	P-1284	P-576 Ocean Blue Metallic Base / P-577 Suede Metallic (1st Overlay)
Orange Crush	P-516	
Orange Crush / Graphics	P-1276	P-516 Orange Crush / P-500
Pearl White	P-352	
Pearl White / Graphics	P-1272	P352 / P-500 Graphics
Poison Green	P-1294	P-579 Poison Green Base / P-500 Graphics
Sands Metallic	P-555	
Silver Undercoater	SU	Base coat only
Suede Metallic	P-577	
Sunset Red	P-520	
Sunset Red / Graphics	P-1258	P-520 Sunset Red / P-500 Graphics
Super Graphite	P-509	
Supersteel Gray	P-553	Requires P-519 Clear Pearl Topcoat
Tequila Gold	P-1283	P-578 Tequila Gold Base / P-500 Graphics
Tinted Black	P-585	
Turbo Silver	P-445	Paint kits require base coat with a topcoat of Clear Metallic (CM)
UNDERCOATERS (Base Coat Only)	WU, OWU, PWU, VVU	WU=White Undercoater; OWU=Off-White Undercoater; PWU=Pearl White Undercoater; VVU=Victory Violet Undercoater
Vogue Silver	P-354	



VEHICLE INFORMATION

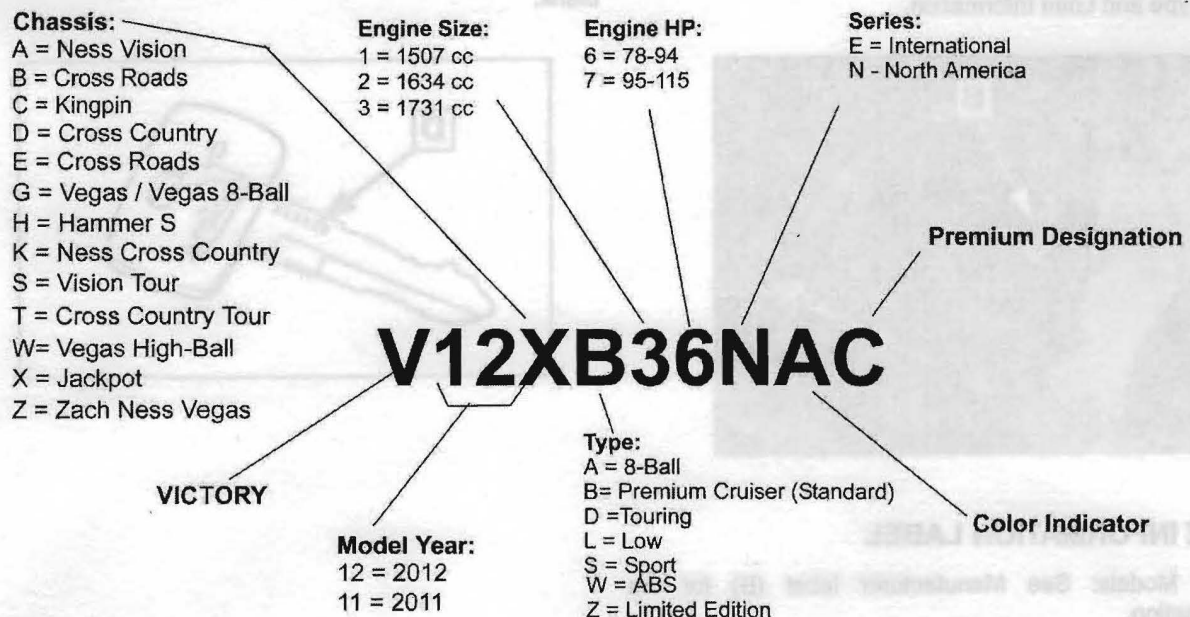
VEHICLE IDENTIFICATION NUMBER (VIN)

VIN is stamped on the right side of the steering head.



MODEL NUMBER

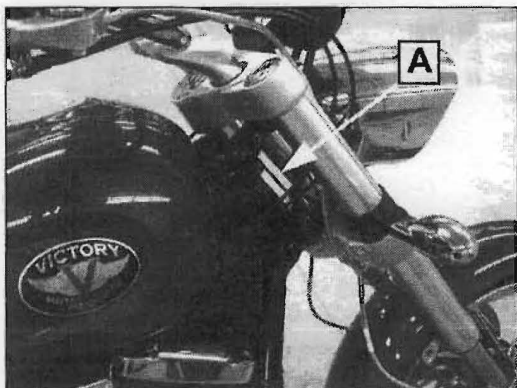
See "MANUFACTURER LABEL" on page 1.18. for location on vehicle.



GENERAL INFORMATION / ROUTING

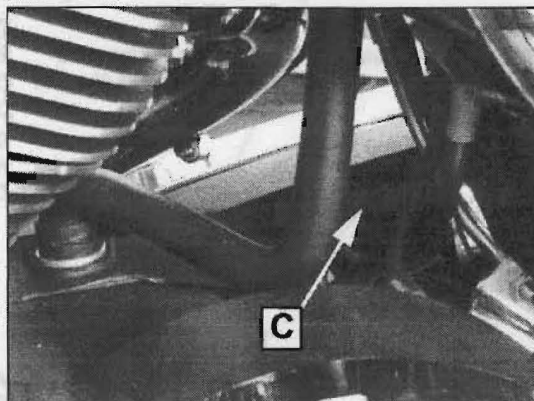
VIN NUMBER LOCATION

The vehicle identification number (A) is stamped on the right side of the steering head.



ENGINE NUMBER LOCATION

The engine number (C) is stamped into the right crankcase boss. The stamping identifies the engine model and serial number.



MANUFACTURER LABEL

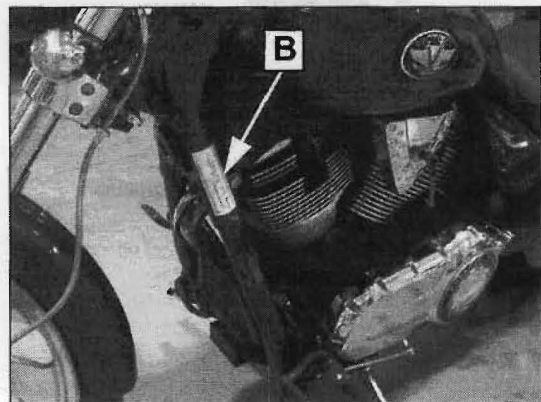
The manufacturer label (B) located on the left frame tube contains the following information:

VIN Number

Gross Vehicle Weight Rating (GVWR)

Gross Axle Weight Rating (GAWR)

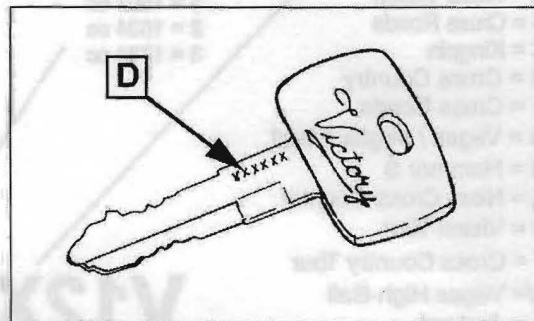
Tire Type and Load Information.



KEY IDENTIFICATION NUMBER

The key identification number (D) is stamped on the key tag. If the key and the identification number are lost or misplaced, the lock set (ignition switch / fuel cap) must be replaced.

Key blanks are available from Victory. Locksmiths familiar with the motorcycle industry will be able to cut a replacement key with the key I.D. number and a Victory key blank.



TIRE INFORMATION LABEL

2012 Models: See Manufacturer label (B) for tire information.



PUBLICATIONS & TECHNICAL LITERATURE**PUBLICATION PART NUMBERS**

Some Victory publications, such as Owner's Manuals and Parts Books are available on-line and can be downloaded from the Victory motorcycles web site (<http://www.polarisindustries.com/en-us/Victory/>). Click on the *Riders* pull down menu and select *Manuals and Parts*.

Service Manuals and Owner's Manuals can be purchased through any authorized Victory motorcycle dealer. The part numbers are listed in the following table. Some manuals are available for purchase on-line at www.purepolaris.com.

MODEL	Service Manual PN	Owner's Manual PN
2011 Vegas, Kingpin, Hammer, Jackpot	9923014	--
2011 Vision	9923025	--
2011 Cross Roads, Cross Country	9923030	--
2012 Vegas, Kingpin, Hammer, Jackpot	9923271	9923268 (NA)
2012 Vision	9923282	9923276 (NA)
2012 Cross Roads / Cross Country	9923286	9923283 (NA)
2012 Vegas High-Ball Supplement	9923568	--



GENERAL INFORMATION / ROUTING

BREAK IN PERIOD

BREAK-IN PROCEDURE

To ensure the best possible performance and longest possible service life the following BREAK-IN guidelines **must** be followed. A Victory motorcycle is manufactured using the best possible materials and manufacturing techniques, but the final machining process is the break-in. During break-in period, many parts in the engine wear and polish to correct operating clearances. During this time, the operator should:

- Avoid prolonged full throttle operation.
- Avoid operation which might result in excessive heating of the engine.

The general break-in guidelines are as follows:

BREAK-IN GUIDELINES		
Miles/km	Throttle Position	Notes
0-90 miles	0-1/3	Avoid prolonged operation above 1/3 throttle. Stop engine and let it cool following every hour of operation. Vary speed of motorcycle. Do not operate machine at one set throttle position.
90-300 miles	0-1/2	Avoid prolonged operation above 1/2 throttle. Stop engine and let it cool following every hour of operation. Vary speed of the motorcycle. Do not operate machine at one set throttle position.
300-500 miles	0-3/4	Avoid cruising speeds above 3/4 throttle.
<u>500 miles</u>	<u>Replace the engine oil and engine oil filter.</u> Perform 500 mile service. See Chapter 2 for more information.	
500 +	Avoid prolonged full-throttle operation. Vary the engine speed occasionally. Follow the pre-ride inspection outlined in the owner's manual.	



EMISSIONS

EMISSION CONTROL SYSTEMS

The U.S. Environmental Protection Agency and California Air Resources Board (CARB) require manufacturers to certify that their motorcycles comply with applicable exhaust emissions standards during their useful life, and that motorcycles built after January 1, 1983 comply with applicable noise emission standards for one year or 6,000 km (3,730 mi) after the time of sale to the ultimate purchaser, when operated and maintained according to the instructions provided.

EMISSION SOURCES

An internal combustion engine produces carbon monoxide and hydrocarbons during operation. Hydrocarbons must be controlled because under some conditions hydrocarbons react with sunlight to produce photochemical smog. Carbon monoxide must be controlled because it is toxic.

EXHAUST EMISSION CONTROL

Victory Motorcycles have an electronic engine management system which controls fuel delivery and ignition timing to control hydrocarbon and carbon monoxide emissions. If components are replaced that affect idle speed, no adjustments should be made to the system. Do not tamper with throttle body screws. The EFI system controls idle / fast idle speed.

NOISE EMISSION CONTROL

Tampering with Noise Control Systems is Prohibited. Federal law prohibits the following acts or causing thereof:

1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement, any device or element of design incorporated into the motorcycle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or
2. The use of the motorcycle after such device or element of design has been removed or rendered inoperative.

Among those acts presumed to constitute tampering are the acts listed below:

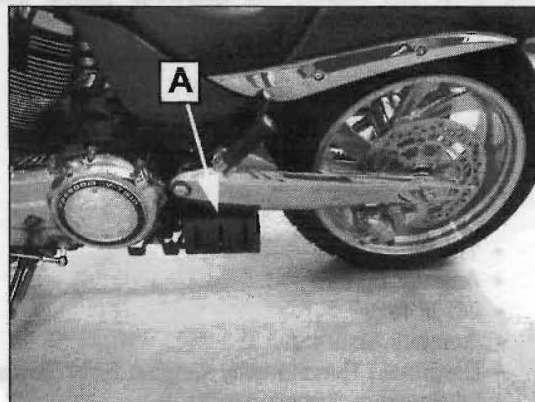
1. Removal of, or puncturing the muffler, baffles, header pipes or any other component which conducts exhaust gases.
2. Removal or puncturing of any part of the intake system.
3. Lack of proper maintenance.
4. Replacing any moving part of the motorcycle or parts of the exhaust / intake system with parts other than those specified by the manufacturer.

CRANKCASE EMISSION CONTROL

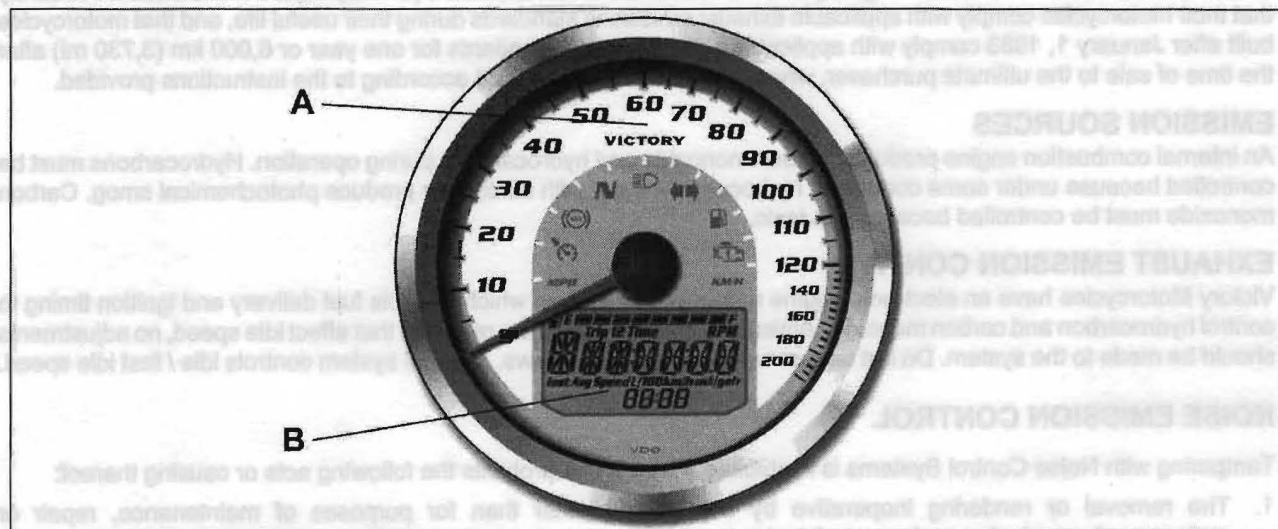
The crankcase emission control system is comprised of a closed system that routes crankcase emissions through the air cleaner into the combustion chamber.

EVAPORATIVE EMISSION CONTROL (California Models)

California models are equipped with an Evaporative Emissions Canister (A). Activated charcoal inside the canister temporarily stores fuel system vapors until the engine is started and the motorcycle is driven. The Electronic Control Module (ECM) automatically opens a Purge Control Valve under certain conditions, and engine intake vacuum draws vapors out of the canister.



INSTRUMENTS



SPEEDOMETER (A)

The speedometer receives an input signal from the ECM. The ECM outputs the speed information to the speedometer via CAN. These outputs are displayed by the analog needle (speed) or in the MFD window (distance). The speedometer operates only when the ignition switch is in the On position and the speed sensor has an input (vehicle is moving). Refer to Chapter 19 for speedometer or sensor diagnostics.

Multi-Function Display (MFD) (B)

The MFD can display many items, selectable by the MODE button on the LH handlebar switch. See chapter 19 for more information.

The MFD can display the following: (some accessory modes listed)

- Odometer
- Trip Odometer 1 & 2
- Fuel Economy
- Tachometer
- Gear Indicator
- Clock
- Trip Hours
- Average Speed
- DC Voltage
- Ambient Air Temp
- Diagnostic Functionality (Engine Error Codes)
- Oil Pressure Warning (MY12)

Speedometer Gear position Indicator

For model year 2012, ALL Victory Motorcycles with a gear indicator display will show two dashes (--) if the clutch is disengaged (lever pulled in).

The gear indicator system uses multiple inputs to determine gear number (1-6). ALL of the following criteria must be present for gear indicator function:

- Vehicle ignition and run / stop switch are powered and the engine is running.
- Vehicle is in motion.
- Vehicle clutch is engaged (clutch lever out).
- Vehicle transmission is in gear 1 through 6 (not neutral).



1.22



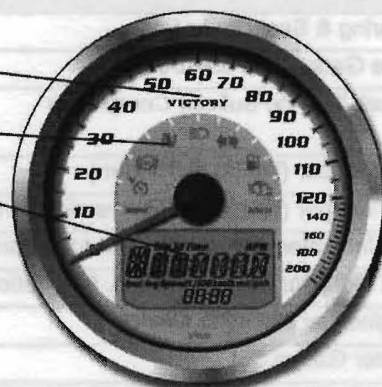
SPEEDOMETER

Instrument Cluster Speedometer









The speedometer displays vehicle speed in either miles per hour (MPH) or kilometers per hour (km/h).

Speedometer

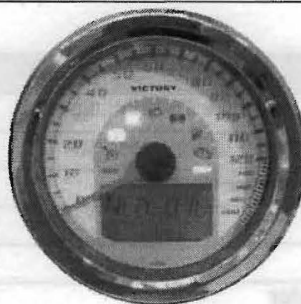
Indicator Lamps

Multi-Function Display
(MFD)

Indicator Lamps

Lamp	Indicates	Condition
	Anti-Lock Brake (ABS) Test / Fault	N/A
	Neutral	This lamp illuminates when the transmission is in neutral and the ignition key is in the ON position.
	High Beam	This lamp illuminates when the headlamp switch is set to high beam.
	Turn Signal	The turn signal indicator flashes when the left, right, or both turn signals (hazard) are active. <i>If a bulb fails, or if there is a short circuit in the signal system, the lamp flashes at more than twice the normal rate.</i>
	Low Oil Pressure <i>Oil Pressure Warning located on MFD for MY12 SEE IMAGE BELOW</i>	This lamp illuminates when the ignition switch is in the ON position and the engine is off, indicating that the indicator circuit is functioning properly. This lamp also illuminates if engine oil pressure drops below safe operating pressure. <i>If this lamp illuminates while the engine is running, turn the engine off as soon as safely possible and check the oil level. If the oil level is correct and the lamp remains on after the engine is restarted, turn the engine off immediately.</i>
	Low Fuel	This lamp illuminates when approximately one gallon (3.8 liters) of fuel remains in the fuel tank.
	Check Engine	This lamp illuminates momentarily when the ignition switch is in the ON position and the engine is off. This indicates proper function. <i>If this lamp illuminates while the engine is running, contact an authorized VICTORY dealer promptly for diagnosis. The light will remain on if the tilt sensor shuts down the engine. If abnormal sensor or engine operation is detected the light will remain on as long as the fault condition exists. Retrieve the error codes for diagnosis. This lamp is also known as a malfunction indicator lamp (MIL).</i>
	Cruise Control Engaged (if equipped)	

NOTE: Oil Pressure Warning has moved to the Multi-Function Display (MFD) for MY12. When the ignition is turned on the LO OIL message will be displayed momentarily. THIS IS NORMAL. If the LO OIL message illuminates while the engine is running, turn the engine off as soon as safely possible and check the oil level. *If the oil level is correct and the lamp remains on after the engine is restarted, turn the engine off immediately.*



GENERAL INFORMATION / ROUTING

SPECIAL SERVICE TOOLS

GENERAL & PRECISION MEASUREMENT

TOOL	PART NUMBER
Bearing & Seal Driver Set	PV-43558
Bore Gauge Set, 50-100mm	PV-3017
Decal, Service Bulletin Completion	7170107 (Order from Victory Parts Dept.)
Dial Caliper (Metric, 0-150mm)	PV-26900-7
Dial Caliper (Electronic Conversion. English 0-6" / Metric 0-150mm)	PV-39776
Dial Indicator, Adjustable (Metric. 10mm travel)	PV-26900-12
Dial Indicator Stand, Flexible. Magnetic Base	PV-34481
Engine Ear Listening Device	PV-39565
Feeler Gauge Set	PV-26900-8 or PV-26900-9
Outside Micrometer (0-25 & 25-50mm)	PV-3006, PV-3007
Outside Micrometer Set (0-100mm)	PV-3009
Plastigauge®	Commercially Available
Small Hole Gauge Set	Commercially Available
Straight Edge, Precision	PV-34673
Surface Plate	Commercially Available
Telescoping Gauge Set	PU-45423
Torque Wrench (3/8" Drive 0-50 in-lb. beam type)	PV-43543
Torque Wrench (1/2" Drive 0-150 lb-ft. beam type)	PV-43552
Torque Wrench (3/8" Drive 15-100 lb-ft. click type)	PV-43564

TUNE UP & MAINTENANCE

TOOL	PART NUMBER
Belt Tension Gauge	PV-43532
Cylinder Leakdown Tester	PV-35667-A
Compression Gauge Set	PV-33223
Oil Pressure Gauge Set	PV-43531
Oil Filter Wrench	65mm/2.5in. Commercially Available

ELECTRICAL

TOOL	PART NUMBER
Ammeter Inductive Clamp for Fluke 73™ Multimeter	PV-39617
Cruise Control Jumper Harness (Diagnostic) Kit	PV-49358
Electrical Connector Test Adapter Kit	PV-43526
Inductive Timing Light	PV-43537
Multimeter, Fluke 73™	PV-43546
Battery / Conductance Tester	PU-50296 / MDX - 610P



ENGINE, CLUTCH, & TRANSMISSION

1

TOOL	PART NUMBER
Clutch Shaft Bearing Support (for clutch shaft installation)	PV-47331
Crankcase Assembly Tool (Crankcase Installer)	PV-46299 (Must be used with PV-45030) and Adapter (Extension) PVX-47429
Crankcase Assembly Tool Adapter	PVX-47429
Crankshaft Bearing Protector	PV-47207
Crankshaft Rotation Tool	PV-48736
Crankcase Separator	PV-47332B (MY12 complete new kit), or PV- 47332A & PV-50371 (PV-50371 updates PV- 47332A for MY12 engines).
Engine Hoist or Lift	Commercially Available
Engine Lock Tool	PV-43502-A
Engine Stand	Commercially Available
Flywheel Puller	PV-43533
Mainshaft (Clutch Shaft) Holder	PV-45028
Crankcase Installation Tool (Crankcase Assembly)	PV-46299 (Must be used with PV-45030)
Mainshaft (Output Shaft) Seal Installation Tool	PV-43505
Piston Ring Compressor (97mm +)	Includes PV-43570-1 Pliers, PV-43570-2 Band (3 5/8" to 3 7/8")
Valve Spring Compressors (Adapter is PV-43513-A)	PV-1253 or PV-4019 (Quick Release)

STEERING & SUSPENSION

TOOL	PART NUMBER
Blind Bearing Remover Set	PV-43551
Wheel Bearing Service Set	PV-49462
Fork Spring Compressor	PV-49463
Fork Spring Compressor Adaptor (For Cap Installation - 19 & 22mm)	PV-49464
Cartridge Shaft Extension (Hammer / Kingpin)	PV-47060 or PV-49453**
Cartridge Holder (Required for Hammer / Kingpin TYPE 2 KYB forks)	PV-49452
Damper Rod Holder (Vegas & Jackpot)	PV-43517
Fork Oil Level Gauge	PV-59000-A
Fork Seal Driver 43mm, Inverted - Hammer / Kingpin TYPE 1 and 2	PV-47035
Fork Seal Driver, 43mm, Conventional (Vegas & Jackpot)	PV-47036
Fork Seal Guide Tool, 43mm (All)	PV-47037
Steering Bearing, Wheel Bearing Installation Set	PV-43515
Steering Stem Bearing Adjustment Socket	PV-43508
Steering Stem Bearing Spanner Wrench	PV-43509
Shock Absorber Pre-Load Adjustment Spanner	PV-46993
Shock Spring Compressor	PV-43571



GENERAL INFORMATION / ROUTING

WHEEL & TIRE

TOOL	PART NUMBER
Air Pressure Gauge	PV-48909 (Victory Air Pump & Gauge) Or Commercially Available Tire Pressure Gauge
Tire Bead Breaker (May be part of the tire removal equipment being used)	Commercially Available
Tire Mounting Lubricant	Commercially Available
Tire Removal Equipment	Commercially Available
Rim Protector	PV-43536
Wheel Balancing/Truing Stand	Commercially Available

FUEL SYSTEM & FUEL INJECTION

TOOL	PART NUMBER
(See Chapter 5 for more information)	
Victory/Polaris Diagnostic Tool Kit	PV-46085-B
PV-46085-B (above) INCLUDES:	Digital Wrench Software: PU-47052-G
	Standard Interface Cable: PU-47151
	Victory Adapter: PV-46085-2
	SmartLink Interface Kit: PU-47471
Fuel Pressure Gauge	PU-43506-A
Fuel Pressure Gauge Adapter	PV-48656
Fluke 73 Digital Multi-Meter or (Fluke 77 DMM)	PV-43546 (Fluke 77 - PV-43568)
Electrical Connector Test Adapter Kit	PV-43526
Laptop Computer (Refer to diagnostic software user manual or HELP section for minimum specifications)	Commercially Available
Fuel Tank Fitting Plug Tool (9.5mm) 2009-2011	PV-50251
Fuel Tank Fitting Plug Tool (11.8mm) 2011-current <i>Refer to Chapter 5 for tool application details.</i>	PV-50567

TOOL ORDERING INFORMATION

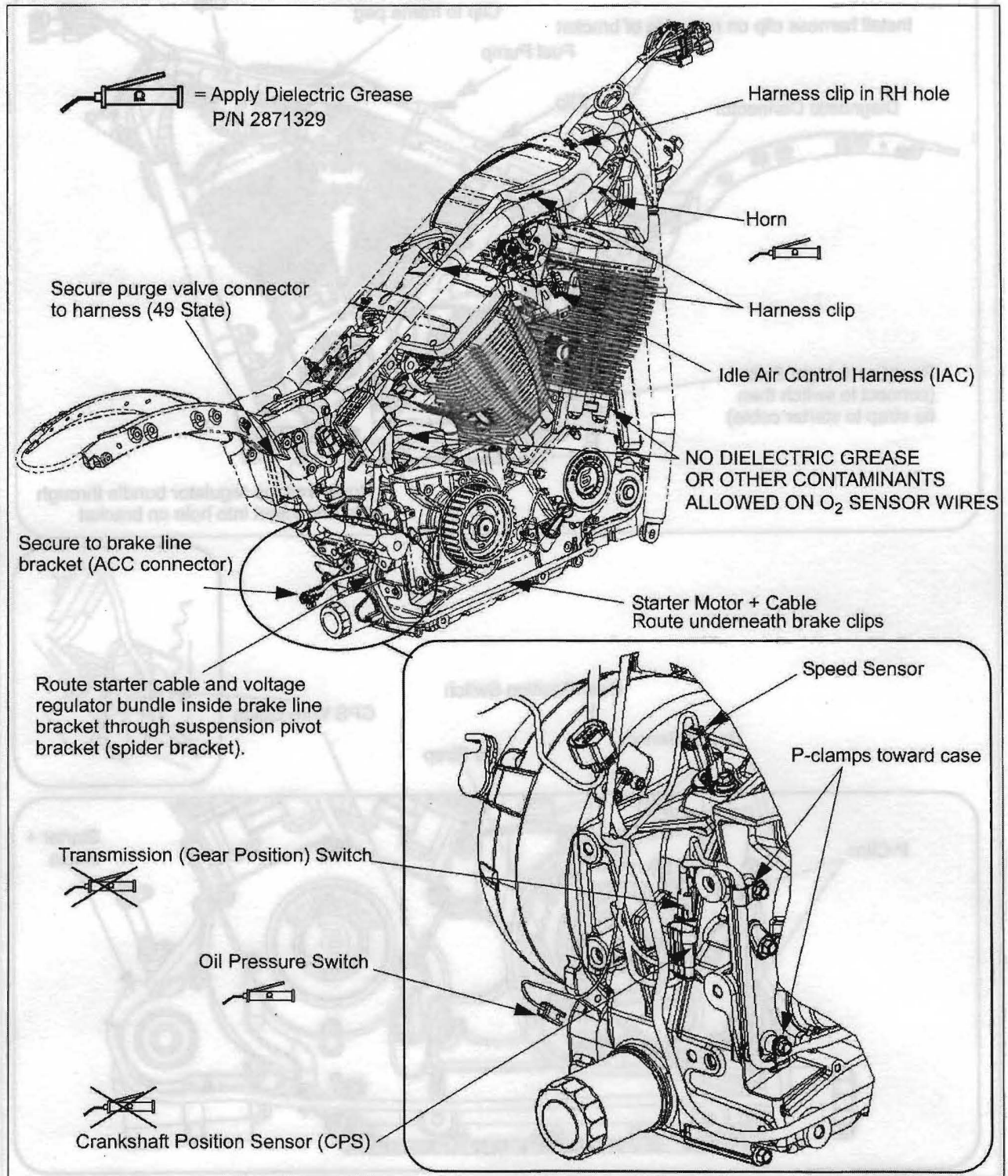
Order Special Service Tools from SPX Corporation (Phone 800-328-6657 / FAX 586-578-7375) or use the link on the Victory Dealer Web site.

If you are not a Victory dealer use the phone or FAX number listed above or visit <http://polaris.spx.com/>



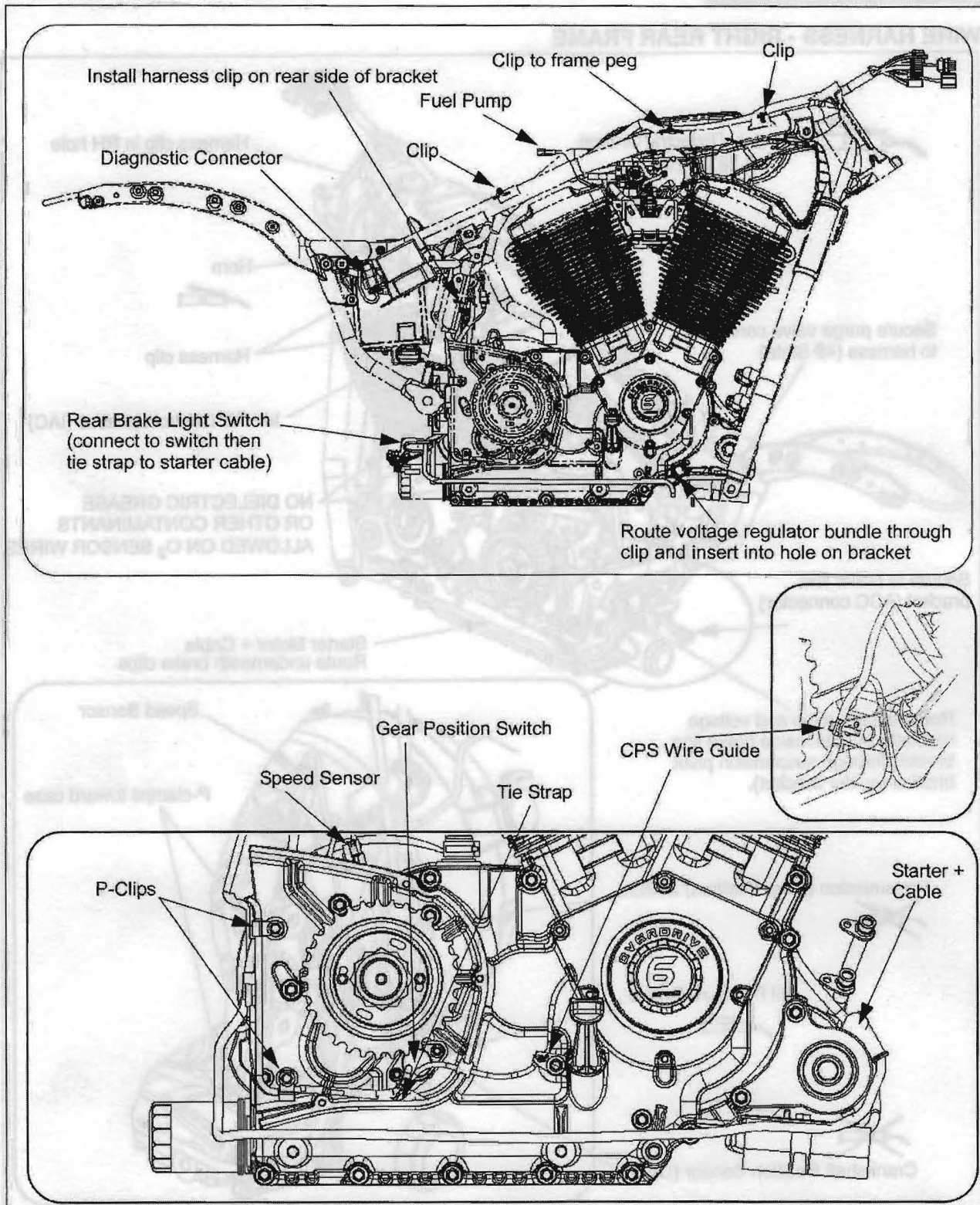
ROUTING DIAGRAMS

WIRE HARNESS - RIGHT REAR FRAME

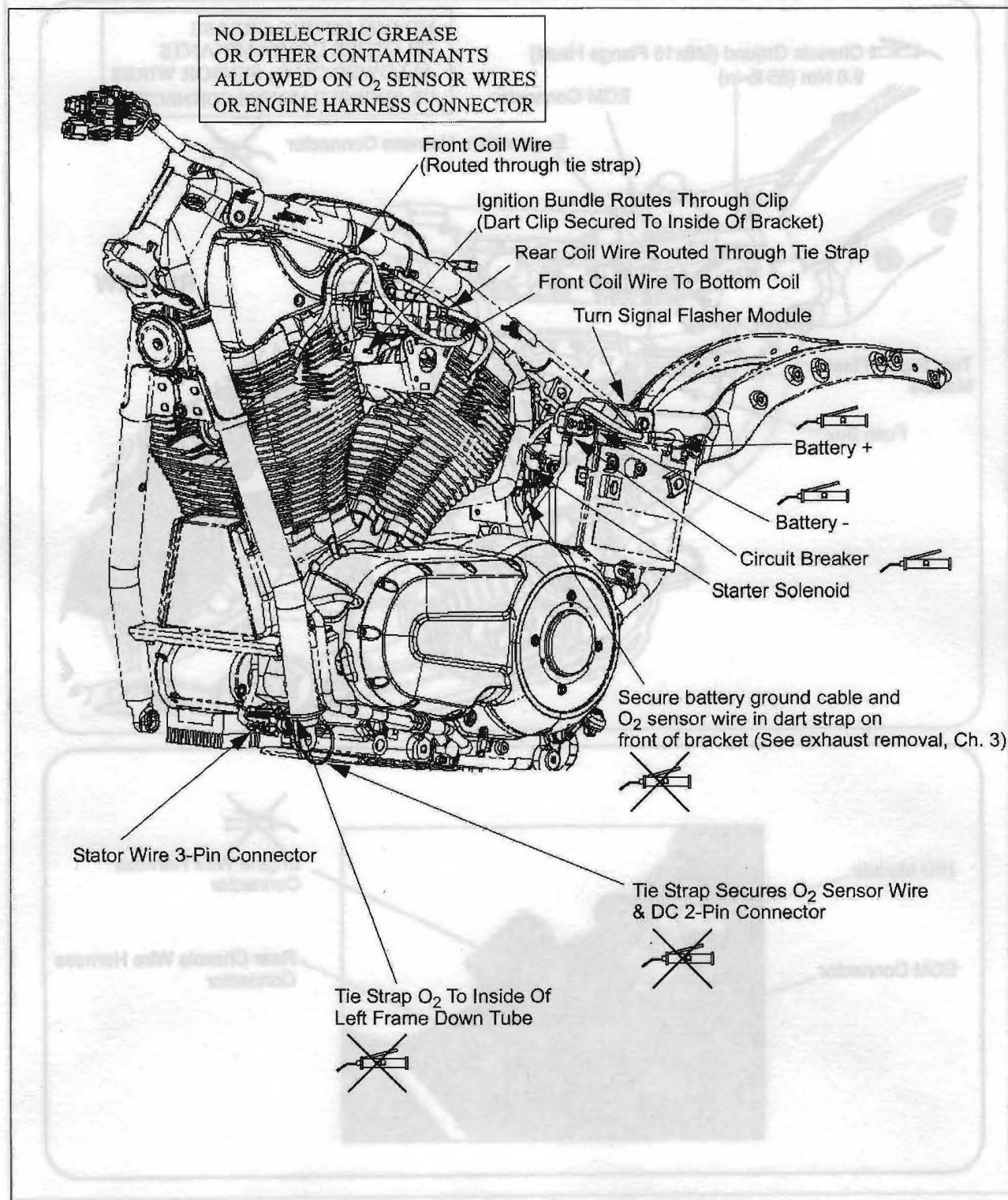


GENERAL INFORMATION / ROUTING

WIRE HARNESS - RIGHT SIDE

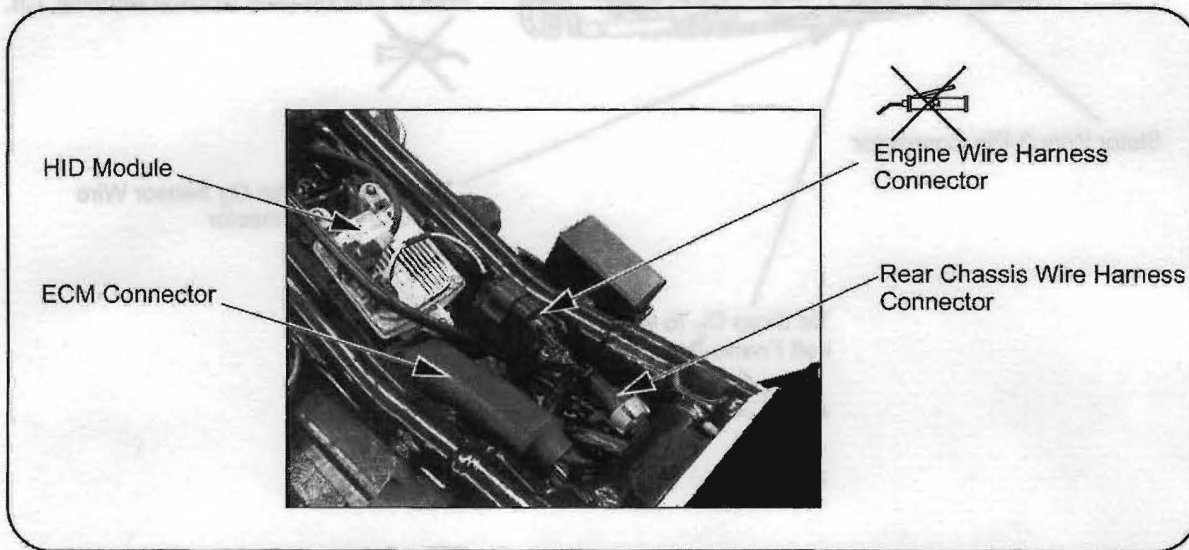
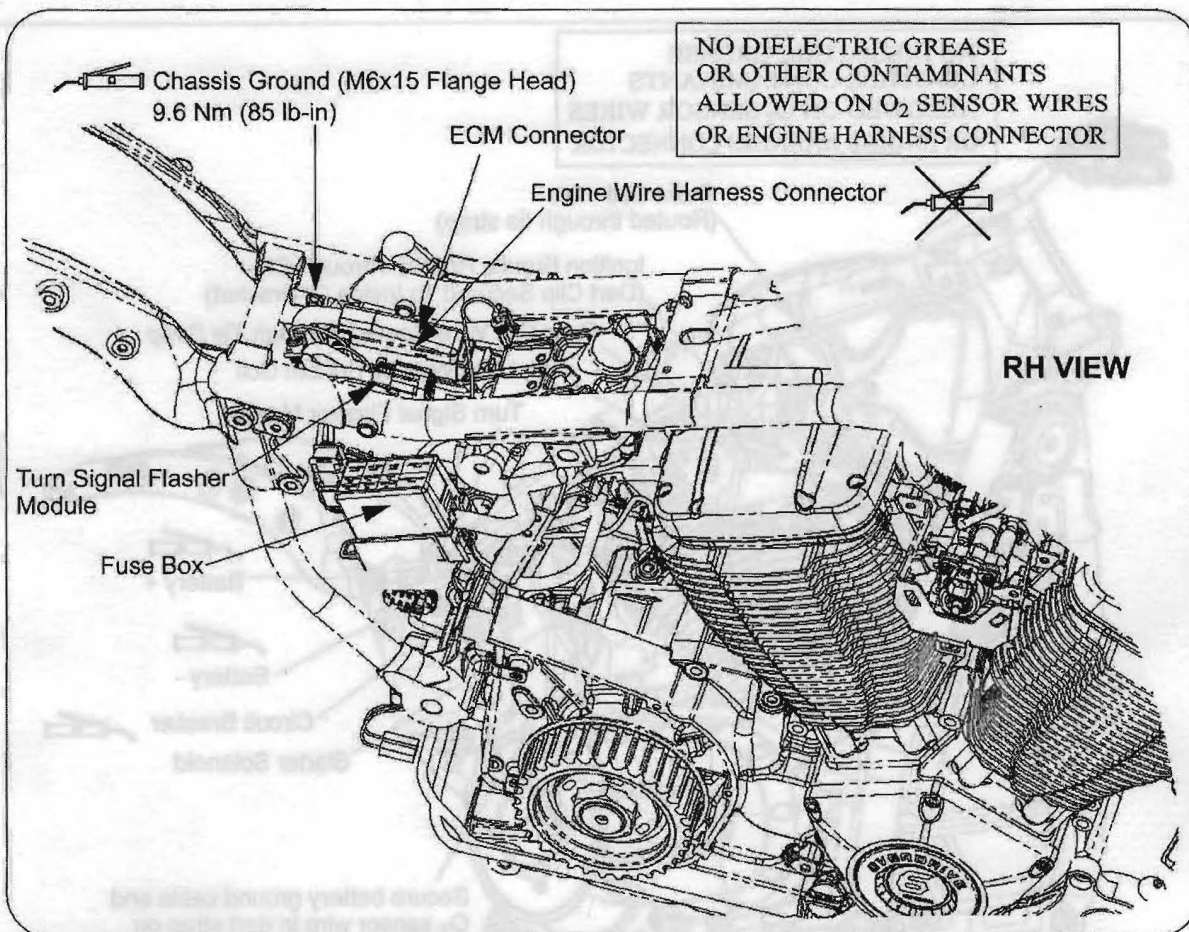


WIRE HARNESS - LEFT SIDE



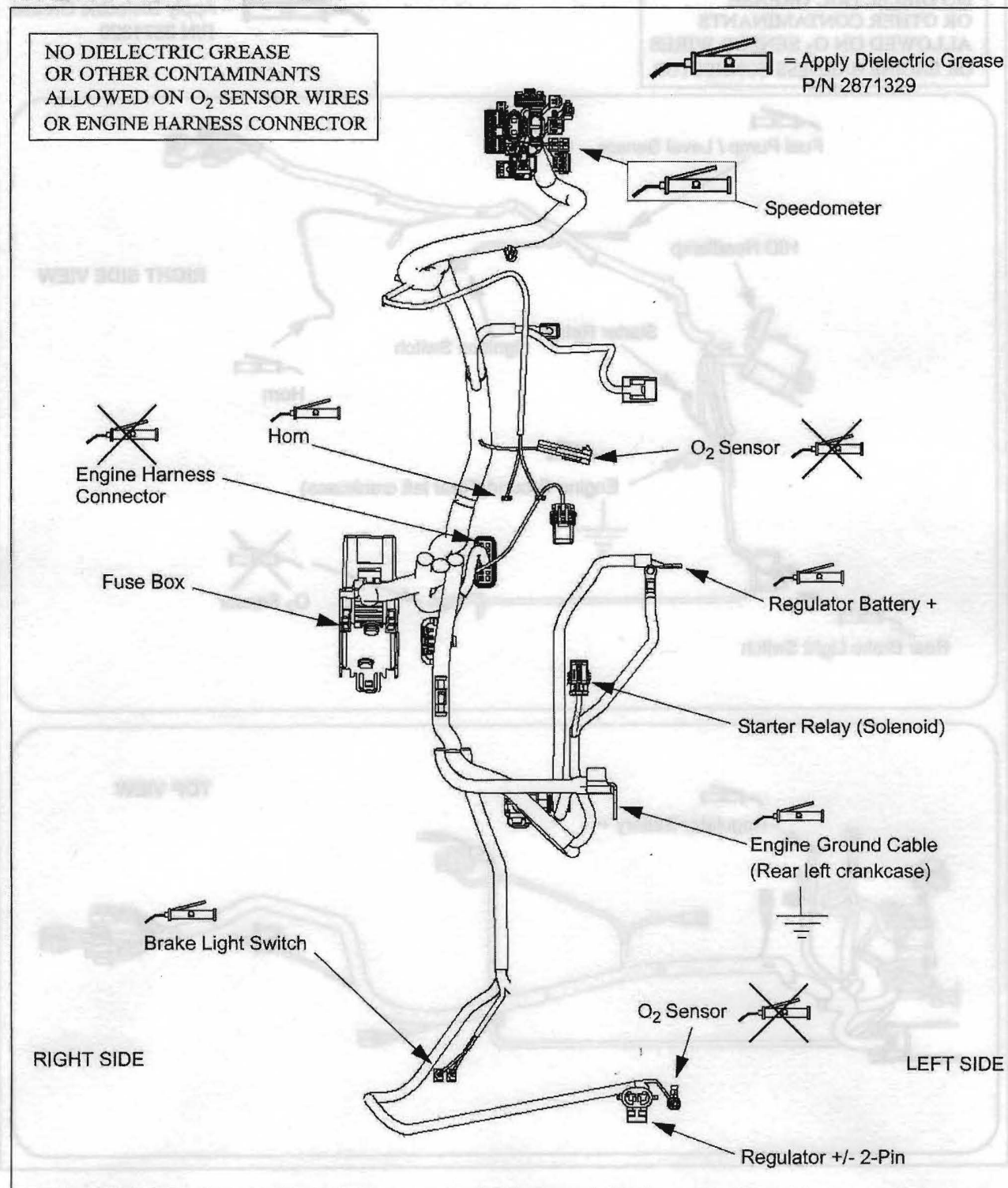
GENERAL INFORMATION / ROUTING

WIRE HARNESS - UNDER SEAT



WIRE HARNESS CONNECTOR LOCATIONS

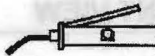
WIRE HARNESS FRONT VIEW

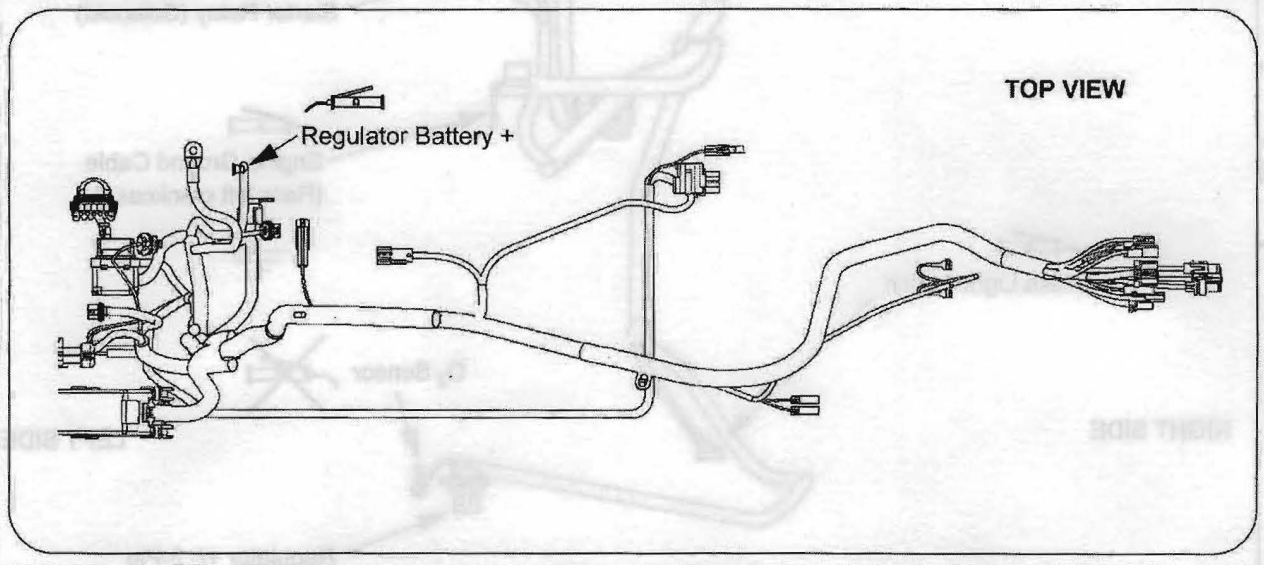
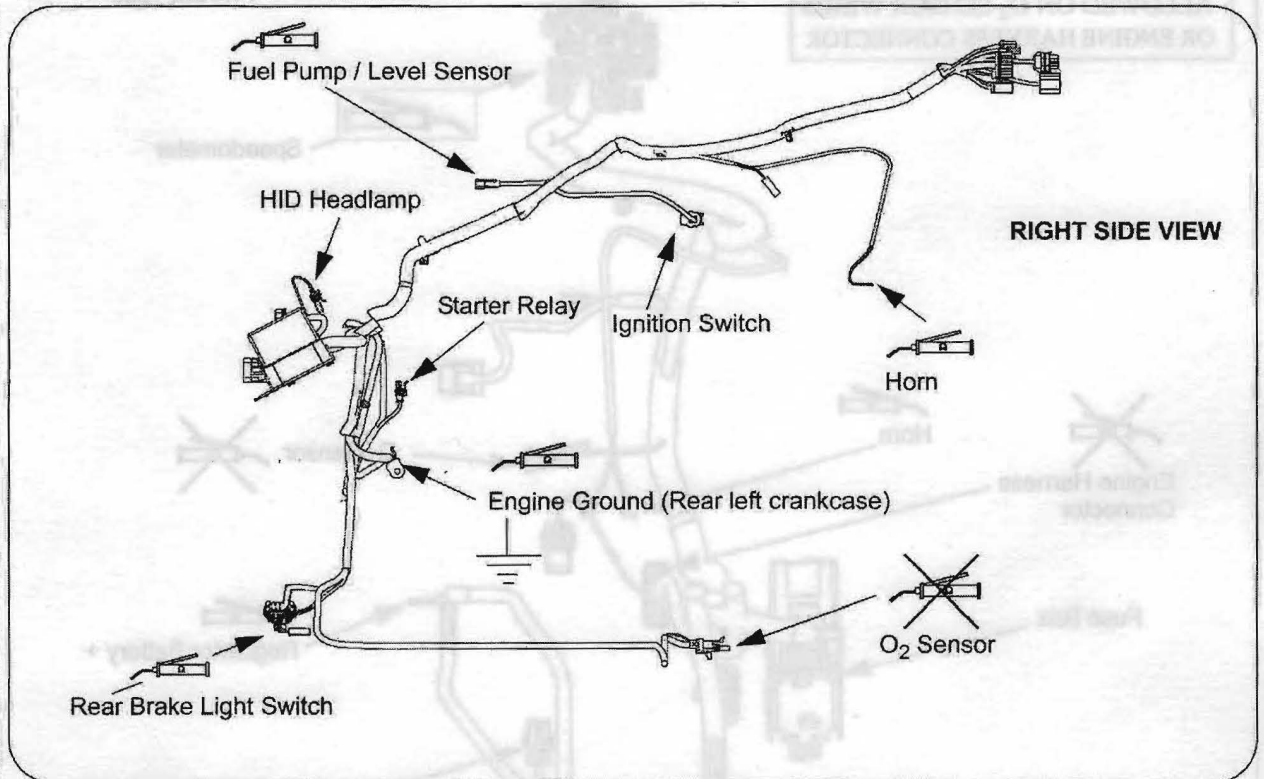


GENERAL INFORMATION / ROUTING

WIRE HARNESS RIGHT SIDE VIEW / TOP VIEW

NO DIELECTRIC GREASE
OR OTHER CONTAMINANTS
ALLOWED ON O₂ SENSOR WIRES
OR ENGINE HARNESS CONNECTOR

 = Apply Dielectric Grease
P/N 2871329



REFERENCE

SAE TAP DRILL SIZES

Thread Size/ Drill Size		Thread Size / Drill Size	
#0-80	3/64	1/2-13	27/64
#1-64	#53	1/2-20	29/64
#1-72	#53	9/16-12	31/64
#2-56	#51	9/16-18	33/64
#2-64	#50	5/8-11	17/32
#3-48	5/64	5/8-18	37/64
#3-56	#45	3/4-10	21/32
#4-40	#43	3/4-16	11/16
#4-48	#42	7/8-9	49/64
#5-40	#38	7/8-14	13/16
#5-44	#37	1-8	7/8
#6-32	#36	1-12	59/64
#6-40	#33	1 1/8-7	63/64
#8-32	#29	1 1/8-12	1 3/64
#8-36	#29	1 1/4-7	1 7/64
#10-24	#24	1 1/4-12	1 11/64
#10-32	#21	1 1/2-6	1 11/32
#12-24	#17	1 1/2-12	1 27/64
#12-28	#15	1 3/4-5	1 9/16
1/4-20	7	1 3/4-12	1 43/64
1/4-28	3	2-4 1/2	1 25/32
5/16-18	F	2-12	1 59/64
5/16-24	I	2 1/4-4 1/2	2 1/32
3/8-16	O	2 1/2-4	2 1/4
3/8-24	Q	2 3/4-4	2 1/2
7/16-14	U	3-4	2 3/4
7/16-20	25/64		

METRIC TAP DRILL SIZES

Tap Size	Drill Size	Decimal Equivalent	Nearest Fraction
3x.50	#39	0.0995	3/32
3x.60	3/32	0.0937	3/32
4x.70	#30	0.1285	1/8
4x.75	1/8	0.125	1/8
5x.80	#19	0.166	11/64
5x.90	#20	0.161	5/32
6x1.00	#9	0.196	13/64
7x1.00	16/64	0.234	15/64
8x1.00	J	0.277	9/32
8x1.25	17/64	0.265	17/64
9x1.00	5/16	0.3125	5/16
9x1.25	5/16	0.3125	5/16
10x1.25	11/32	0.3437	11/32
10x1.50	R	0.339	11/32
11x1.50	3/8	0.375	3/8
12x1.50	13/32	0.406	13/32
12x1.75	13/32	0.406	13/32



GENERAL INFORMATION / ROUTING

DECIMAL EQUIVALENTS

1/64	.0156	
1/32	.0312	... 1 mm = .0394"
3/64	.0469	
1/16	.0625	
5/64	.0781	... 2 mm = .0787"
3/32	.0938	
7/64	.1094	... 3 mm = .1181"
1/8	.1250	
9/64	.1406	
5/32	.1563	... 4 mm = .1575"
11/64	.1719	
3/16	.1875	... 5mm= .1969"
13/64	.2031	
7/32	.2188	
15/64	.2344	... 6 mm = .2362"
1/4	.25	
17/64	.2656	... 7 mm = .2756"
9/32	.2813	
19/64	.2969	
5/16	.3125	... 8mm= .3150"
21/64	.3281	
11/32	.3438	... 9 mm = .3543"
23/64	.3594	
3/8	.375	
25/64	.3906	... 10 mm = .3937"
13/32	.4063	
27/64	.4219	... 11 mm =.4331"
7/16	.4375	
29/64	.4531	
15/32	.4688	... 12 mm = .4724"
31/64	.4844	
1/2	.5	... 13mm = .5118"
33/64	.5156	
17/32	.5313	
35/64	.5469	... 14 mm = .5512"
9/16	.5625	
37/64	.5781	... 15 mm = .5906"
19/32	.5938	
39/64	.6094	
5/8	.625	... 16mm=. 6299"
41/64	.6406	
21/32	.6563	... 17 mm = .6693"
43/64	.6719	
11/16	.6875	
45/64	.7031	... 18 mm = .7087"
23/32	.7188	
47/64	.7344	... 19 mm = .7480"
3/4	.75	
49/64	.7656	
25/32	.7813	... 20 mm = .7874"
51/64	.7969	
13/16	.8125	... 21 mm = .8268"
53/64	.8281	
27/32	.8438	
55/64	.8594	... 22 mm = .8661"
7/8	.875	
57/64	.8906	... 23 mm = .9055"
29/32	.9063	
59/64	.9219	
15/16	.9375	... 24 mm = .9449"
61/64	.9531	
31/32	.9688	... 25 mm = .9843"
63/64	.9844	
1	1.0	

FAHRENHEIT TO CELSIUS

$$^{\circ}\text{C to }^{\circ}\text{F: } 9 (^{\circ}\text{C} + 40) \div 5 - 40 = ^{\circ}\text{F}$$

$$^{\circ}\text{F to }^{\circ}\text{C: } 5 (^{\circ}\text{F} + 40) \div 9 - 40 = ^{\circ}\text{C}$$

DEGREES F	DEGREES C
32	0
41	5
50	10
59	15
68	20
77	25
86	30
95	35
104	40
113	45
122	50
131	55
140	60
149	65
158	70
167	75
176	80
185	85
194	90
203	95
212	100



MEASUREMENT CONVERSION CHART

UNIT OF MEASURE	MULTIPLIED BY	CONVERTS TO
ft-lb	x 12	= in-lb
in-lb	x.0833	= ft-lb
ft-lb	x 1.356	= Nm
in-lb	x.0115	= kg-m
Nm	x.7376	= ft-lb
kg-m	x 7.233	= ft-lb
kg-m	x 86.796	= in-lb
kg-m	x 10	= Nm
in	x 25.4	= mm
mm	x.03937	= in
in	x 2.54	= cm
mile	x 1.6	= km
km	x.6214	= mile
Ounces (oz)	x 28.35	= grams (g)
Fluid Ounce	x 29.57	= CCs
grams (g)	x.035	= Ounces (oz)
cc's	x.03381	= Fluid Ounces (oz)
lbs	x.454	= kg
kg	x 2.2046	= lbs
Cubic Inches	x 16.387	= Cubic Centimeters
Cubic Centimeters	x.061	= Cubic Inches
Imperial pints	x.568	= liters (l)
liters (l)	x 1.76	= Imperial pints
Imperial quarts	x 1.137	= liters (l)
liters (l)	x.88	= Imperial quarts
Imperial quarts	x 1.201	= US quarts
US quarts	x.833	= Imperial quarts
US quarts	x.946	= liters
liters	x 1.057	= US quarts
US gallon	x 3.785	= liter
liter	x .264	= US gallon
Pounds force per square inch (psi)	x 6.895	= Kilo pascals (kPa)
Kilo pascals (kPa)	x .145	= Pounds force per square inch (psi)
Kilo pascals (kPa)	x .01	= Kilograms force per cm ²
Kilograms force per cm ²	x 98.1	= Kilo pascals (kPa)
$\pi (3.14159) \times R^2 \times H$ (height)		= Cylinder Volume



GENERAL INFORMATION / ROUTING

NOTES

MEASUREMENT CONVERSION CHART

1 in	25.4 mm	1 ft	304.8 mm
1/2 in	12.7 mm	1/2 ft	152.4 mm
3/4 in	19.0 mm	3/4 ft	228.6 mm
1 1/4 in	31.8 mm	1 1/4 ft	368.3 mm
1 1/2 in	38.1 mm	1 1/2 ft	426.7 mm
2 in	50.8 mm	2 ft	609.6 mm
2 1/2 in	63.5 mm	2 1/2 ft	762.0 mm
3 in	76.2 mm	3 ft	914.4 mm
3 1/2 in	88.9 mm	3 1/2 ft	1066.8 mm
4 in	101.6 mm	4 ft	1219.2 mm
4 1/2 in	114.3 mm	4 1/2 ft	1371.6 mm
5 in	127.0 mm	5 ft	1524.0 mm
5 1/2 in	139.7 mm	5 1/2 ft	1676.4 mm
6 in	152.4 mm	6 ft	1828.8 mm
6 1/2 in	165.1 mm	6 1/2 ft	1981.2 mm
7 in	177.8 mm	7 ft	2133.6 mm
7 1/2 in	190.5 mm	7 1/2 ft	2286.0 mm
8 in	203.2 mm	8 ft	2438.4 mm
8 1/2 in	215.9 mm	8 1/2 ft	2590.8 mm
9 in	228.6 mm	9 ft	2743.2 mm
9 1/2 in	241.3 mm	9 1/2 ft	2895.6 mm
10 in	254.0 mm	10 ft	3048.0 mm
10 1/2 in	266.7 mm	10 1/2 ft	3200.4 mm
11 in	279.4 mm	11 ft	3352.8 mm
11 1/2 in	292.1 mm	11 1/2 ft	3505.2 mm
12 in	304.8 mm	12 ft	3657.6 mm
12 1/2 in	317.5 mm	12 1/2 ft	3810.0 mm
13 in	330.2 mm	13 ft	3962.4 mm
13 1/2 in	342.9 mm	13 1/2 ft	4114.8 mm
14 in	355.6 mm	14 ft	4267.2 mm
14 1/2 in	368.3 mm	14 1/2 ft	4419.6 mm
15 in	381.0 mm	15 ft	4572.0 mm
15 1/2 in	393.7 mm	15 1/2 ft	4724.4 mm
16 in	406.4 mm	16 ft	4876.8 mm
16 1/2 in	419.1 mm	16 1/2 ft	5029.2 mm
17 in	431.8 mm	17 ft	5181.6 mm
17 1/2 in	444.5 mm	17 1/2 ft	5334.0 mm
18 in	457.2 mm	18 ft	5486.4 mm
18 1/2 in	469.9 mm	18 1/2 ft	5638.8 mm
19 in	482.6 mm	19 ft	5791.2 mm
19 1/2 in	495.3 mm	19 1/2 ft	5943.6 mm
20 in	508.0 mm	20 ft	6096.0 mm
20 1/2 in	520.7 mm	20 1/2 ft	6248.4 mm
21 in	533.4 mm	21 ft	6400.8 mm
21 1/2 in	546.1 mm	21 1/2 ft	6553.2 mm
22 in	558.8 mm	22 ft	6705.6 mm
22 1/2 in	571.5 mm	22 1/2 ft	6858.0 mm
23 in	584.2 mm	23 ft	7010.4 mm
23 1/2 in	596.9 mm	23 1/2 ft	7162.8 mm
24 in	609.6 mm	24 ft	7315.2 mm
24 1/2 in	622.3 mm	24 1/2 ft	7467.6 mm
25 in	635.0 mm	25 ft	7620.0 mm
25 1/2 in	647.7 mm	25 1/2 ft	7772.4 mm
26 in	660.4 mm	26 ft	7924.8 mm
26 1/2 in	673.1 mm	26 1/2 ft	8077.2 mm
27 in	685.8 mm	27 ft	8229.6 mm
27 1/2 in	698.5 mm	27 1/2 ft	8382.0 mm
28 in	711.2 mm	28 ft	8534.4 mm
28 1/2 in	723.9 mm	28 1/2 ft	8686.8 mm
29 in	736.6 mm	29 ft	8839.2 mm
29 1/2 in	749.3 mm	29 1/2 ft	8991.6 mm
30 in	762.0 mm	30 ft	9144.0 mm
30 1/2 in	774.7 mm	30 1/2 ft	9296.4 mm
31 in	787.4 mm	31 ft	9448.8 mm
31 1/2 in	800.1 mm	31 1/2 ft	9601.2 mm
32 in	812.8 mm	32 ft	9753.6 mm
32 1/2 in	825.5 mm	32 1/2 ft	9906.0 mm
33 in	838.2 mm	33 ft	10058.4 mm
33 1/2 in	850.9 mm	33 1/2 ft	10210.8 mm
34 in	863.6 mm	34 ft	10363.2 mm
34 1/2 in	876.3 mm	34 1/2 ft	10515.6 mm
35 in	889.0 mm	35 ft	10668.0 mm
35 1/2 in	901.7 mm	35 1/2 ft	10820.4 mm
36 in	914.4 mm	36 ft	10972.8 mm
36 1/2 in	927.1 mm	36 1/2 ft	11125.2 mm
37 in	939.8 mm	37 ft	11277.6 mm
37 1/2 in	952.5 mm	37 1/2 ft	11430.0 mm
38 in	965.2 mm	38 ft	11582.4 mm
38 1/2 in	977.9 mm	38 1/2 ft	11734.8 mm
39 in	990.6 mm	39 ft	11887.2 mm
39 1/2 in	1003.3 mm	39 1/2 ft	12039.6 mm
40 in	1016.0 mm	40 ft	12192.0 mm
40 1/2 in	1028.7 mm	40 1/2 ft	12344.4 mm
41 in	1041.4 mm	41 ft	12496.8 mm
41 1/2 in	1054.1 mm	41 1/2 ft	12649.2 mm
42 in	1066.8 mm	42 ft	12801.6 mm
42 1/2 in	1079.5 mm	42 1/2 ft	12954.0 mm
43 in	1092.2 mm	43 ft	13106.4 mm
43 1/2 in	1104.9 mm	43 1/2 ft	13258.8 mm
44 in	1117.6 mm	44 ft	13411.2 mm
44 1/2 in	1130.3 mm	44 1/2 ft	13563.6 mm
45 in	1143.0 mm	45 ft	13716.0 mm
45 1/2 in	1155.7 mm	45 1/2 ft	13868.4 mm
46 in	1168.4 mm	46 ft	14020.8 mm
46 1/2 in	1181.1 mm	46 1/2 ft	14173.2 mm
47 in	1193.8 mm	47 ft	14325.6 mm
47 1/2 in	1206.5 mm	47 1/2 ft	14478.0 mm
48 in	1219.2 mm	48 ft	14630.4 mm
48 1/2 in	1231.9 mm	48 1/2 ft	14782.8 mm
49 in	1244.6 mm	49 ft	14935.2 mm
49 1/2 in	1257.3 mm	49 1/2 ft	15087.6 mm
50 in	1270.0 mm	50 ft	15240.0 mm
50 1/2 in	1282.7 mm	50 1/2 ft	15392.4 mm
51 in	1295.4 mm	51 ft	15544.8 mm
51 1/2 in	1308.1 mm	51 1/2 ft	15697.2 mm
52 in	1320.8 mm	52 ft	15849.6 mm
52 1/2 in	1333.5 mm	52 1/2 ft	16002.0 mm
53 in	1346.2 mm	53 ft	16154.4 mm
53 1/2 in	1358.9 mm	53 1/2 ft	16306.8 mm
54 in	1371.6 mm	54 ft	16459.2 mm
54 1/2 in	1384.3 mm	54 1/2 ft	16611.6 mm
55 in	1397.0 mm	55 ft	16764.0 mm
55 1/2 in	1409.7 mm	55 1/2 ft	16916.4 mm
56 in	1422.4 mm	56 ft	17068.8 mm
56 1/2 in	1435.1 mm	56 1/2 ft	17221.2 mm
57 in	1447.8 mm	57 ft	17373.6 mm
57 1/2 in	1460.5 mm	57 1/2 ft	17526.0 mm
58 in	1473.2 mm	58 ft	17678.4 mm
58 1/2 in	1485.9 mm	58 1/2 ft	17830.8 mm
59 in	1498.6 mm	59 ft	17983.2 mm
59 1/2 in	1511.3 mm	59 1/2 ft	18135.6 mm
60 in	1524.0 mm	60 ft	18288.0 mm
60 1/2 in	1536.7 mm	60 1/2 ft	18440.4 mm
61 in	1549.4 mm	61 ft	18592.8 mm
61 1/2 in	1562.1 mm	61 1/2 ft	18745.2 mm
62 in	1574.8 mm	62 ft	18897.6 mm
62 1/2 in	1587.5 mm	62 1/2 ft	19050.0 mm
63 in	1600.2 mm	63 ft	19202.4 mm
63 1/2 in	1612.9 mm	63 1/2 ft	19354.8 mm
64 in	1625.6 mm	64 ft	19507.2 mm
64 1/2 in	1638.3 mm	64 1/2 ft	19659.6 mm
65 in	1651.0 mm	65 ft	19812.0 mm
65 1/2 in	1663.7 mm	65 1/2 ft	19964.4 mm
66 in	1676.4 mm	66 ft	20116.8 mm
66 1/2 in	1689.1 mm	66 1/2 ft	20269.2 mm
67 in	1701.8 mm	67 ft	20421.6 mm
67 1/2 in	1714.5 mm	67 1/2 ft	20574.0 mm
68 in	1727.2 mm	68 ft	20726.4 mm
68 1/2 in	1739.9 mm	68 1/2 ft	20878.8 mm
69 in	1752.6 mm	69 ft	21031.2 mm
69 1/2 in	1765.3 mm	69 1/2 ft	21183.6 mm
70 in	1778.0 mm	70 ft	21336.0 mm
70 1/2 in	1790.7 mm	70 1/2 ft	21488.4 mm
71 in	1803.4 mm	71 ft	21640.8 mm
71 1/2 in	1816.1 mm	71 1/2 ft	21793.2 mm
72 in	1828.8 mm	72 ft	21945.6 mm
72 1/2 in	1841.5 mm	72 1/2 ft	22098.0 mm
73 in	1854.2 mm	73 ft	22250.4 mm
73 1/2 in	1866.9 mm	73 1/2 ft	22402.8 mm
74 in	1879.6 mm	74 ft	22555.2 mm
74 1/2 in	1892.3 mm	74 1/2 ft	22707.6 mm
75 in	1905.0 mm	75 ft	22860.0 mm
75 1/2 in	1917.7 mm	75 1/2 ft	23012.4 mm
76 in	1930.4 mm	76 ft	23164.8 mm
76 1/2 in	1943.1 mm	76 1/2 ft	23317.2 mm
77 in	1955.8 mm	77 ft	23469.6 mm
77 1/2 in	1968.5 mm	77 1/2 ft	23622.0 mm
78 in	1981.2 mm	78 ft	23774.4 mm
78 1/2 in	1993.9 mm	78 1/2 ft	23926.8 mm
79 in	2006.6 mm	79 ft	24079.2 mm
79 1/2 in	2019.3 mm	79 1/2 ft	24231.6 mm
80 in	2032.0 mm	80 ft	24384.0 mm
80 1/2 in	2044.7 mm	80 1/2 ft	24536.4 mm
81 in	2057.4 mm	81 ft	24688.8 mm
81 1/2 in	2070.1 mm	81 1/2 ft	24841.2 mm
82 in	2082.8 mm	82 ft	24993.6 mm
82 1/2 in	2095.5 mm	82 1/2 ft	25146.0 mm
83 in	2108.2 mm	83 ft	25298.4 mm
83 1/2 in	2120.9 mm	83 1/2 ft	25450.8 mm
84 in	2133.6 mm	84 ft	25603.2 mm
84 1/2 in	2146.3 mm	84 1/2 ft	25755.6 mm
85 in	2159.0 mm	85 ft	25908.0 mm
85 1/2 in	2171.7 mm	85 1/2 ft	26060.4 mm
86 in	2184.4 mm	86 ft	26212.8 mm
86 1/2 in	2197.1 mm	86 1/2 ft	26365.2 mm
87 in	2209.8 mm	87 ft	26517.6 mm
87 1/2 in	2222.5 mm	87 1/2 ft	26670.0 mm
88 in	2235.2 mm	88 ft	26822.4 mm
88 1/2 in	2247.9 mm	88 1/2 ft	26974.8 mm
89 in	2260.6 mm	89 ft	27127.2 mm
89 1/2 in	2273.3 mm	89 1/2 ft	27279.6 mm
90 in	2286.0 mm	90 ft	27432.0 mm
90 1/2 in	2298.7 mm	90 1/2 ft	27584.4 mm
91 in	2311.4 mm	91 ft	27736.8 mm
91 1/2 in	2324.1 mm	91 1/2 ft	27889.2 mm
92 in	2336.8 mm	92 ft	28041.6 mm
92 1/2 in	2349.5 mm	92 1/2 ft	28194.0 mm
93 in	2362.2 mm	93 ft	28346.4 mm
93 1/2 in	2374.9 mm	93 1/2 ft	28498.8 mm
94 in	2387.6 mm	94 ft	28651.2 mm
94 1/2 in	2400.3 mm	94 1/2 ft	28803.6 mm
95 in	2413.0 mm	95 ft	28956.0 mm
95 1/2 in	2425.7 mm	95 1/2 ft	29108.4 mm
96 in	2438.4 mm	96 ft	29260.8 mm
96 1/2 in	2451.1 mm	96 1/2 ft	29413.2 mm
97 in	2463.8 mm	97 ft	29565.6 mm
97 1/2 in	2476.5 mm	97 1/2 ft	29718.0 mm
98 in	2489.2 mm	98 ft	29870.4 mm
98 1/2 in	2501.9 mm	98 1/2 ft	30022.8 mm
99 in	2514.6 mm	99 ft	30175.2 mm
99 1/2 in	2527.3 mm	99 1/2 ft	30327.6 mm
100 in	2540.0 mm	100 ft	30480.0 mm



CHAPTER 2 MAINTENANCE

2

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MAINTENANCE

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2.2



SERVICE SPECIFICATIONS

TUNE UP

2

ITEM		SPECIFICATION
Brake Pedal Freeplay		2-5mm (.080-.200") Gap At Pedal Stop (See procedure page 2.13)
Clutch Lever Freeplay (Cable Operated)		.5 - 1.5mm (.020-.060")
Compression Pressure (Cylinder)		See page 2.23
Drive Belt Deflection (See page 2.26).	2012 Kingpin 2012 Hammer S	12 mm (15/32") with 10 lb force +/- 1.0 mm (+/- 1/32)
	2012 High-Ball 2012 Jackpot 2012 Vegas & Vegas 8-Ball 2012 Hammer 8-Ball	6 mm (15/64") with 10 lb force +/- .5mm (+/- 1/64)
	Models with 12mm Deflection: Frequency = 32 Hz +/- 1 Hz	
	Models with 6mm Deflection: Frequency = 48 Hz +/- 1 Hz	
Drive Belt Frequency (Use Sonic Tension Meter) See page 2.26 for required data.		
Idle Speed / Fast Idle Speed		NO ADJUSTMENT (Set by ECM / IAC valve) (See page 2.8)
Oil Pressure, Lubrication @ 3000 rpm		552 kPa (80 psi) (Minimum 40 psi)
Oil Pressure, Cooling @ 3000 rpm		(See special notes)
Ride Height (Rear Shock Spring Pre-Load)		See page 2.36
Spark Plug Type / Gap		NGK DCPR6E / .8 - .9 mm (.032-.036")
Throttle Cable Freeplay		2 - 4 mm (5/64" - 5/32")
Tire Pressure		Refer to chart (page 2.9) or decal under LH side cover

OIL CHANGE

Start the engine and warm it up for several minutes. While warming up, check for oil leaks. If any leaks are found, stop the engine immediately and determine the source of the problem before starting the engine again.

NOTE: After the engine is started, the oil indicator light should go off. If the indicator light flickers or remains on, immediately stop the engine and diagnose the problem before continuing.

TIGHTENING TORQUE	
Drain Plug (Inspect / replace sealing washer)	20 Nm (15 lb-ft)
Oil Filter	3/4 turn after contacting the sealing surface

OIL TYPE / QUANTITY	
Oil Type	Victory Semi-Synthetic 20W40 Engine Oil
Oil Capacity (Oil & Filter Change)	Approximately 4.25 liters (4.5 quarts)
Oil Capacity (Dry)	Approximately 4.75 liters (5.0 quarts)

Use Victory 20W40 Synthetic Blend 20W40 engine oil for all temperatures. If Victory oil is not available, use a high quality 20W40 motorcycle oil designed for use with wet clutches (such as those with a JASO MA rating).

NOTICE

Do not put chemical additives in the oil. Victory motorcycle oil has been specially designed for this application. Additional additives are not necessary and have not been approved by Victory Engineering.



MAINTENANCE

FASTENER TORQUE SPECIFICATIONS

MAINTENANCE ITEMS

DESCRIPTION	TORQUE		APPLY / NOTES
	N-m	Lb-ft (Lb-in)	
Air Filter Cover	-	(10)	
Axle Nut, Rear	88.0	65	
Battery Terminal Bolts & Battery Cover Nuts	4.5	(40)	Dielectric Grease
Battery Cable To Solenoid or Starter Motor	6.8	(60)	Dielectric Grease
Brake Lever Pivot Screw (Front)	1.0	(9)	
Brake Lever Pivot Screw Nut (Front)	6.0	(52)	
Circuit Breaker Nut (Main Circuit Breaker)	6.0	(25)	
Clutch Lever Pivot Nut	3.0	(52)	
Drive Sprocket Nut	244.0	180	Loctite™ 262
Drive Sprocket Nut Retainer Plate Screws	10.0	(85)	
Exhaust / Muffler	See page 3.10		
Foot Peg Assembly to Frame	47.5	35	
Foot Peg Feeler	9.5	(84)	
Fuel Tank Mounting Screws	47.5	35	
Oil Drain Plug	20.0	15	12x1.5mm
Oil Filter	3/4 Turn Past Gasket Contact		
Seat (Vegas / Kingpin / Jackpot models)	24.5	18	
Seat (Hammer models)	9.5	(84)	
Side Stand Pivot Bolt & Nut	47.5	35	
Spark Plug	14.5-19.5	10.8-14.5	Anti-seize compound
Swingarm Pivot Shaft	88.0	65	
Strut Covers (on rear fender)	24.5	18	
Switch Cube Screws (L & R Handlebar Switch)	3.0	(25)	Tighten Top Screw First

SPECIAL TOOLS

MAINTENANCE TOOLS

- Belt Tension Gauge PV-43532 (Sonic Tension Meter is optional and commercially available)
- Spanner Wrench - PV-46993
- Compression Gauge Set PV-33223

2.4



MAINTENANCE PRODUCTS

LUBRICANTS / CHEMICALS

2

MAINTENANCE PRODUCT PART NUMBERS

All Purpose Grease	2872187
Moly Assembly Paste	2871460
Semi-Synthetic 20W/40 Engine Lubricant	2872175 (Quart) 2872176 (Gallon)
Oil Change Kit	2873551
Lubricant, Multi-Purpose	2872863
Fuel Additive, Carbon Clean	2872190
Fuel Stabilizer	2872280
Brake Fluid, DOT 4	2872189
Brake Cleaner	2872191
Nyogel™ Dielectric Grease	2871329
Paint Restore Polish, 12 oz. Aerosol	2872192
Paint Wax and Final Finish	2872193
Hand Grip Adhesive (Three Bond 1501) (10ml tube)	2872575
Fork Oil - Jackpot / Ness Jackpot (KYB) models	2874568
Fork Oil - Cartridge Forks - Hammer (KYB)*	2877421 (Red)



MAINTENANCE

PERIODIC MAINTENANCE

PERIODIC MAINTENANCE INTERVAL TABLE

ENGINE	ODOMETER READING in MILES (KILOMETERS)												
Component (see operation codes below)	PAGE	500 (800)	5000 (8,000)	10,000 (16,000)	15,000 (24,000)	20,000 (32,000)	25,000 (40,000)	30,000 (48,000)	35,000 (52,000)	40,000 (64,000)	45,000 (72,000)	50,000 (80,000)	
Air Filter	2.7	I	I	R	I	R	I	R	I	R	I	R	
Crankcase Ventilation System	2.19	I	I	I	I	I	I	I	I	I	I	I	
Drive Belt	2.24	I	I	I	I	I	I	R	I	I	I	I	
Engine Compression	2.23	I		I		I		I		I		I	
Engine Oil*	2.7	R	R	R	R	R	R	R	R	R	R	R	
Engine Oil Filter*	2.8	R	R	R	R	R	R	R	R	R	R	R	
Evaporative Emission Control System (CA. Only)	2.19	I	I	I	I	I	I	I	I	I	I	I	
Exhaust System	Ch 3	I	I	I	I	I	I	I	I	I	I	I	
Fuel Filter	2.19						R					R	
Fuel System	2.20	I	I	I	I	I	I	I	I	I	I	I	
Spark Plugs	2.20	I	I	I	I	I	I	R	I	I	I	I	
Throttle Cable	2.10	I	I	L	I	L	I	L	I	L	I	L	

CHASSIS	ODOMETER READING in MILES (KILOMETERS)												
Battery	2.21	I	I	I	I	I	I	I	I	I	I	I	I
Brake Fluid**	2.17	I	I	I	I	I	I	R	I	I	I	I	I
Brake Pads	2.18	I	I	I	I	I	I	I	I	I	I	I	I
Clutch Lever	2.11	L	I	L	I	L	I	L	I	L	I	L	I
Control Cable Ends	2.10	I	I	L	I	L	I	L	I	L	I	L	I
Fasteners	2.37	I	I	I	I	I	I	I	I	I	I	I	I
Front Brake Lever	2.11	L	I	L	I	L	I	L	I	L	I	L	I
Front Fork Oil**	2.37	I	I	I	R	I	I	R	I	I	R	I	I
Front Forks and Front Axle	2.37	I	I	I	I	I	I	I	I	I	I	I	I
Gear Shift Pedal	2.14	I	I	L	I	L	I	L	I	L	I	L	I
Headlamp	2.30	I	I	I	I	I	I	I	I	I	I	I	I
Rear Brake Pedal	2.13	I	I	L	I	L	I	L	I	L	I	L	I
Rear Shock Absorber	2.33	I	I	I	I	I	I	I	I	I	I	R	I
Rear Wheel Alignment	2.27	I	I	I	I	I	I	I	I	I	I	I	I
Road Test	-	P	P	P	P	P	P	P	P	P	P	P	P
Sidestand / Sidestand Pad	2.31	I	I	L	I	L	I	L	I	L	I	L	I
Steering Bearings	2.37	I	I	I	L	I	I	L	I	I	L	I	I
Suspension Linkage, Rear	2.33	I	I	I	L	I	I	L	I	I	L	I	I
Swing Arm and Rear Axle	2.33	I	I	I	I	I	I	I	I	I	I	I	I
Tires / Wheels	2.9	I	I	I	I	I	I	I	I	I	I	I	I

Operation Codes:

I - Inspect (tighten, clean, adjust, correct or replace if necessary) R - Replace/Rebuild

L - Lubricate with proper lubricant as directed

P - Perform

* Replace at specified interval or annually. If driven in extreme conditions.

** Replace at specified interval or every 2 years

2.6

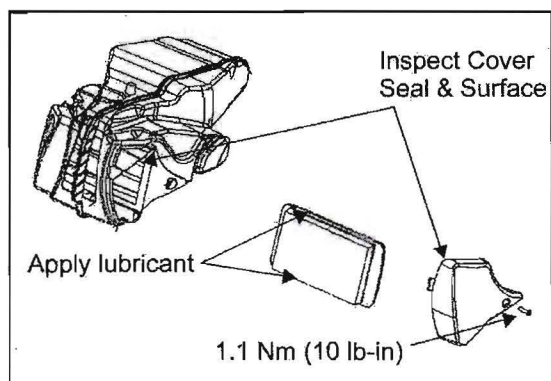
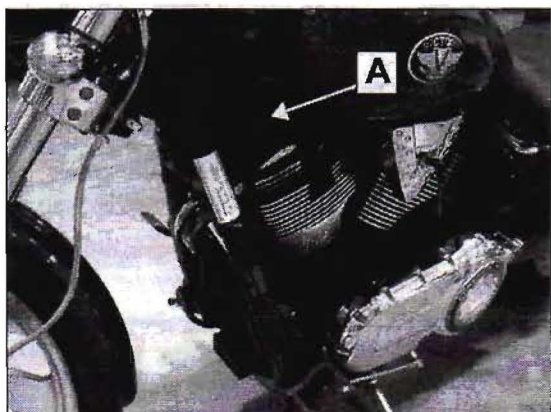


AIR FILTER

NOTE: If the motorcycle is operated in wet or dusty conditions, more frequent servicing is required.

NOTE: The air filter element cannot be cleaned. Replace the filter when necessary. Do not apply oil to the treated paper element.

1. Remove air filter access cover (A). Inspect gasket and replace if damaged.



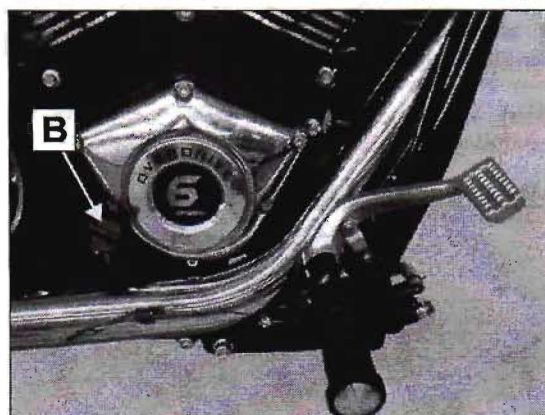
2. Grasp the air filter frame and pull it out of air box housing.
3. Inspect filter element visually and replace if dirty, wet, or oil fouled.
4. Reverse steps to install filter. Apply lubricant top and bottom edges of element to ease installation. Arrows printed on the filter element point to the front of the vehicle.
5. Torque air filter cover fasteners to 1.0 Nm (10 lb-in).

NOTICE

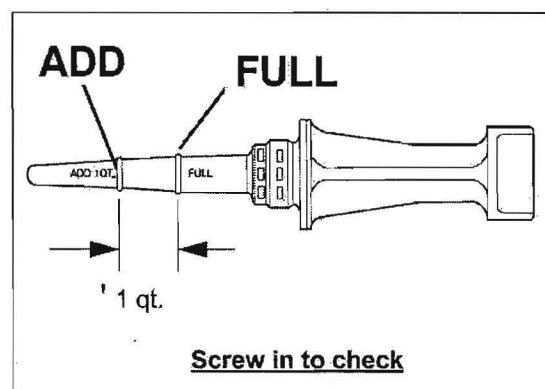
A loose fitting cover or improperly installed filter element or cover may allow debris to enter the engine which may cause premature engine wear.

ENGINE OIL LEVEL

1. Warm the engine for several minutes until operating temperature is reached.
2. Stop engine and wait for 3-5 minutes.
3. Place the machine on a level area and hold it in an upright position.
4. Remove and clean the oil off of the dipstick (B).



5. Screw the dipstick in until seated.
6. Remove dipstick and view oil level.
7. Oil level should be between ADD and FULL lines on dipstick. If oil level is low, add Victory 20W-40 Semi-Synthetic engine oil to raise level to FULL mark. DO NOT overfill.



ENGINE OIL & FILTER CHANGE

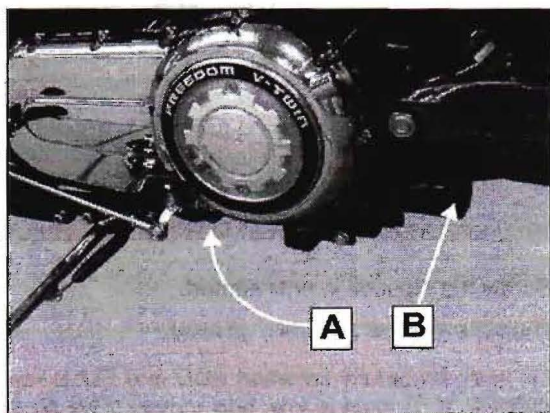
Oil Change Kit: P/N 2873551

Change engine oil and filter with the motorcycle on its side stand, engine warm.

WARNING

HOT COMPONENTS Wear insulated gloves and/or allow engine and exhaust to cool before handling these parts.

1. Start and run the engine until it reaches normal operating temperature. Stop the engine.



2. Securely support the motorcycle on the sidestand.
3. Place an oil drain pan under drain plug (A) and oil filter (B).
4. Remove drain plug and sealing washer using a good quality 6mm Allen socket.
5. Allow oil to drain completely.
6. Use an oil filter wrench, strap wrench, or adjustable pliers, to loosen filter. Allow oil in filter to drain before removing the filter.
7. Use a new sealing washer and reinstall drain plug.
Drain Plug Torque: 20 Nm (15 lb-ft)
8. Clean any residue or debris from oil filter sealing surface and threads.
9. Make sure oil filter gasket is properly seated in new oil filter. Apply a thin film of clean engine oil to gasket. Screw filter on until gasket contacts the sealing surface. Tighten filter *by hand* an additional 3/4 turn.
10. Remove dipstick and install a funnel or filler spout.

11. Fill crankcase through dipstick hole with 4.5 quarts (4.25 liters) Victory Semi-Synthetic 20W-40 Motor Oil, or an equivalent.



12. Reinstall dipstick. Start and run engine until it reaches normal operating temperature.

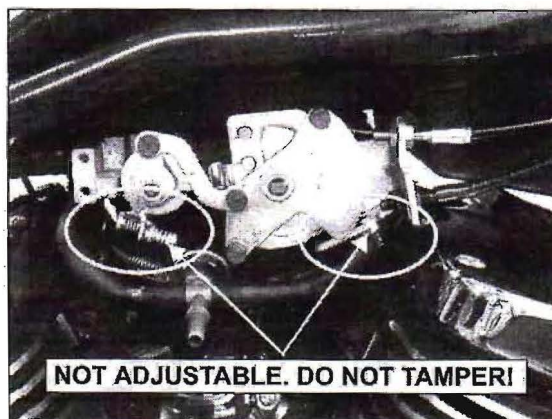
NOTE: The low oil pressure indicator remains illuminated longer than usual after an oil change. Do not increase RPM above idle until indicator lamp goes out or engine may be damaged.

13. Stop engine and wait 3-5 minutes before checking oil level. Adjust oil level as required.
14. Check for leaks around drain plug and oil filter.

NOTE: Recycle used oil and oil filter in accordance with local regulations.

IDLE SPEED / FAST IDLE SPEED

NOTE: Idle speed is continuously monitored and adjusted by the ECM via the IAC valve. DO NOT tamper with or attempt to "adjust" the idle stop screw or throttle plate flow screw! They are factory pre-set. If idle is erratic or if idle speed is incorrect, refer to troubleshooting in this section to find the cause of the problem.



TIRES



WARNING

Victory motorcycles are produced using the designated tires listed below as original equipment. This includes field testing to ensure stability and superior handling. The use of tires other than original equipment may cause instability. See Chapter 14 for a review of all tire related Warnings.

1. Inspect tires for weather checking, cuts, imbedded foreign objects, etc.
2. Inspect front and rear wheels for damage / runout. Refer to Chapters 12 and 13 for procedure.
3. Measure tread depth at center of tread. Measure in 3-4 places equally spaced around the tire and record the smallest measurement.



WARNING

It is dangerous to ride with a worn tire. When a tire reaches the minimum tread depth listed below, replace the tire immediately.

MINIMUM TIRE TREAD DEPTH	
FRONT TIRE MINIMUM TREAD DEPTH	REAR TIRE MINIMUM TREAD DEPTH
1.6mm (.063") (1/16 inch)	1.6mm (.063") (1/16 inch)

TIRE PRESSURE TABLE (COLD)

NOTE: Also refer to Manufacturing Information label (on left frame down tube).

VEGAS		
	Up to 200 lbs (91 kg) load	201 lb (92 kg) to Max Load
FRONT: Dunlop Elite 3 90/90 R21 54H	36 psi (248 kPa)	38 psi (262 kPa)
REAR: Dunlop D417 180/55 R18 74H	36 psi (248 kPa)	41 psi (283 kPa)

VEGAS HIGH-BALL

	Up to 200 lbs (91 kg) load	201 lb (92 kg) to Max Load
FRONT: Dunlop Cruisemax 130/90 R16 67H (Tube-Type)	36 psi (248 kPa)	36 psi (248 kPa)
REAR: Dunlop Cruisemax 150/80 R16 71H (Tube-Type)	36 psi (248 kPa)	40 psi (276 kPa)

HAMMER

Cold tire pressure	Up to 200 lbs (91 kg) load	201 lb (92 kg) to Max Load
FRONT: Dunlop Elite 3 130/70 R18 63H	36 psi (248 kPa)	38 psi (262 kPa)
REAR: Dunlop Elite 3 250/40 R18 81V	38 psi (262 kPa)	41 psi (283 kPa)

VEGAS JACKPOT

Cold tire pressure	Up to 200 lbs (91 kg) load	201 lb (92 kg) to Max Load
FRONT: Dunlop Elite 3 90/90 R21 54H	36 psi (248 kPa)	38 psi (262 kPa)
REAR: Dunlop Elite 3 250/40 R18 81V	38 psi (262 kPa)	41 psi (283 kPa)

KINGPIN

	Up to 200 lbs (91 kg) load	201 lb (92 kg) to Max Load
FRONT: Dunlop 491 Elite II 130/70 R18	36 psi (248 kPa)	38 psi (262 kPa)
REAR: Dunlop D417 180/55-R18	36 psi (248 kPa)	41 psi (283 kPa)

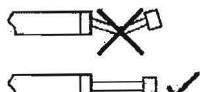
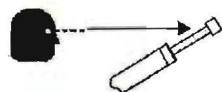


CABLE INSPECTION / LUBRICATION

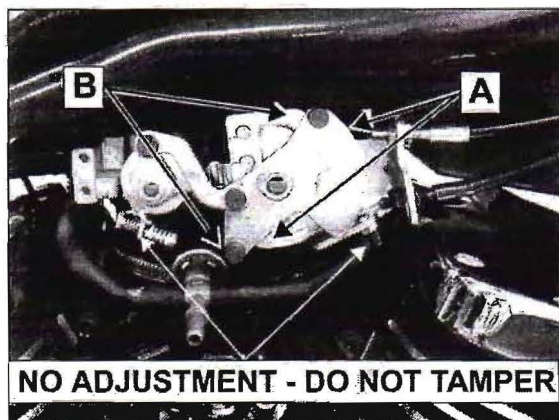
NOTE: Control cable casings are lined with a low friction sleeve and are factory lubricated for reliable operation. Periodic lubrication of cables is not required and could be detrimental to cable performance. Only cable *ends* must be periodically inspected and lubricated in accordance with the Periodic Maintenance Schedule (page 2.6).

NOTICE

Inspect inner cable for fraying. Do not kink, bend or twist inner cable or cable casing during removal or installation.



1. Inspect all cables for proper routing, smooth movement, and damage to the external casing. Inspect the exposed cable wire for fraying, kinks, or corrosion. Replace any damaged cables or cables that are sluggish to return.
2. For throttle cables, disconnect cable from throttle body bracket (A) (mark position of threaded cable end to ease assembly) and apply a light film of Victory All Purpose Grease (2872187) to barrel ends (B).



3. Install cables on bracket in same position as removed (or refer to Chapter 5 for procedure if required).
4. Tighten both nuts securely to bracket.
5. Adjust cable free play.

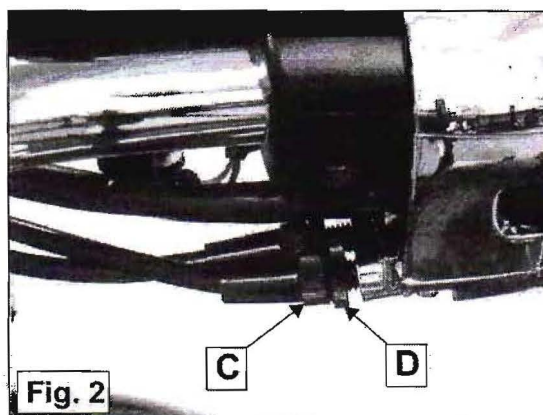
Clutch Cable: Refer to page 2.11 for clutch lever removal & lubrication, and page 2.12 to adjust free play

THROTTLE FREE PLAY ADJUSTMENT

1. Point handlebars straight ahead. Measure free play at throttle grip and compare to specification. (Fig. 1)



2. Adjustments are made at upper throttle cable adjusters. Note that a properly secured lock nut is tightened against the adjuster - not against the throttle housing. (Fig. 2)
3. Hold adjuster nuts (C). Loosen lock nuts (D) on both cables.



4. Turn lock nuts away from adjuster nuts as far as possible on both cables.
5. Turn both adjuster nuts toward lock nuts as far as possible to gain maximum cable play (both cables).
6. Turn adjuster on throttle opening (front) cable away from lock nut until free play is 2-4mm (Fig. 1).
7. To adjust closing cable (the one toward rear of motorcycle) move throttle grip back and forth constantly, and turn adjuster out slowly just until free play is removed. Turn the adjuster back in one full turn.

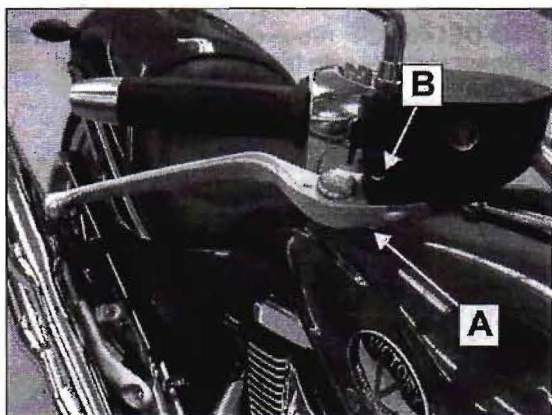
2.10



8. Turn lock nuts on both cables until seated against adjuster nuts. Hold adjuster nut and tighten lock nut securely (both cables).
 - Be sure the throttle opens and closes smoothly in all steering positions, and returns to the fully closed position when throttle grip is released.
 - If throttle grip does not return properly, re-check cable free play, inspect cables for proper routing, and be sure cables are attached properly to the throttle body (under fuel tank).
 - Inspect condition of cables for kinks, damage, or frayed ends.
 - Be sure switch cube and grip are located properly on handlebar, and that screws are properly torqued to 3 Nm (25 lb-in).
 - Be sure all cable fasteners are tight.
9. Start engine with transmission in neutral.
10. Turn handlebars full right to full left. Idle speed should not change in any steering position. If idle speed changes, re-check throttle grip free play, inspect cables for proper routing, and be sure cables are attached properly. Replace cable(s) if damaged.

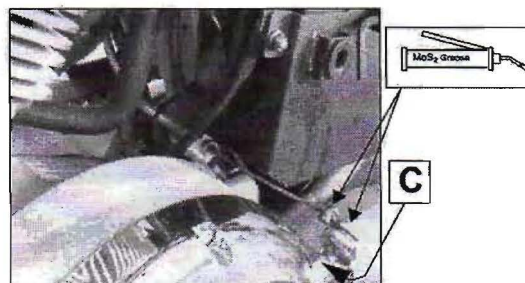
FRONT BRAKE LEVER LUBRICATION

1. Remove nut (A) and lever pivot screw (B).
2. Clean pivot pin, lever and lever perch.
3. Apply Special Grease 2203685 to pivot screw, lever bushing, and contact surface of piston. Assemble lever.
4. Torque screw to 1 Nm (9 lb-in).
5. Hold screw and torque nut to 6 Nm (52 lb-in).

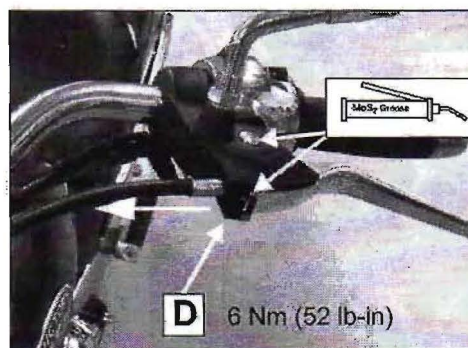


CLUTCH LEVER LUBRICATION (CABLE)

1. Disconnect clutch cable at primary cover by rotating lever arm (C) inward with an adjustable wrench. Protect finish of arm with a shop towel or tape.



2. Pull cable (outer casing) out and rotate carefully out of lever perch and lever. Do not kink cable.
3. Remove nut (D) and push pivot bolt upward to remove.
4. Inspect both ends of inner cable for frayed strands. Clean parts and apply Moly Paste 2871460 or Special Grease 2203685 to pivot bolt and both cable ends.
5. Assemble lever. Torque nut to 6 Nm (52 lb-in).

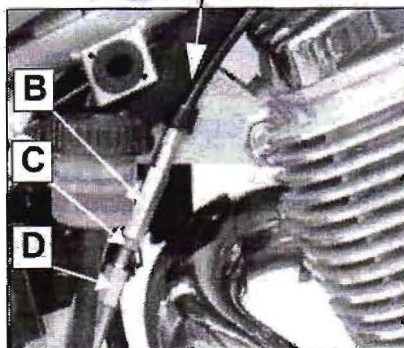
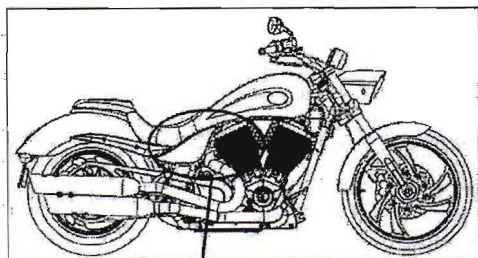
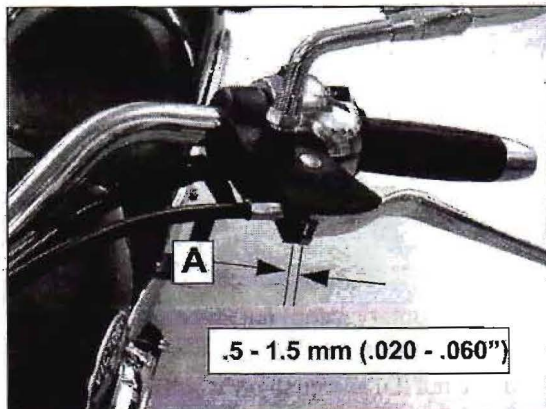


6. Install cable to lever. Rotate cable back through slot in perch, and push outer casing back into perch recess.
7. Lubricate and attach lower end of cable to lifter arm on primary cover, and adjust lever free play (page 2.12).



CLUTCH LEVER FREE PLAY (CABLE)

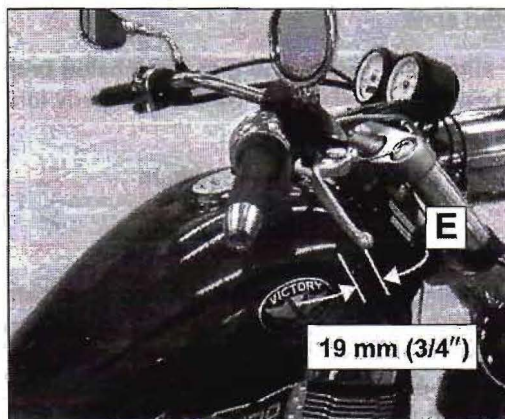
1. With handlebars pointing straight ahead, measure the clutch lever free play (A).



2. Compare measurement to specification. If adjustment is required, proceed to Step 3.
3. Remove right side cover.
4. Hold cable (B) and loosen the adjuster jam nut (C).
5. Turn cable adjuster (D) in or out until clutch freeplay is correct.
6. Tighten adjuster jam nut to cable securely.

FRONT BRAKE LEVER INSPECTION

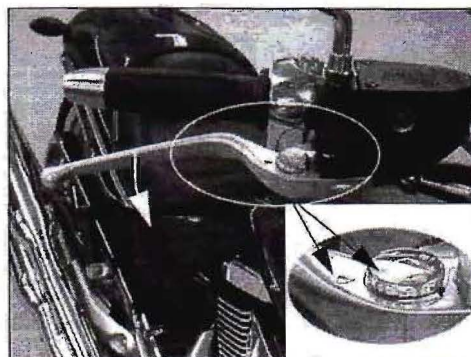
1. Pull and release the front brake lever. It should move freely and smoothly and return to its rest position quickly when released. Lubricate brake lever as described on page 2.11 if binding, or if it does not return quickly and completely when released.
2. Measure brake lever freeplay (E). You should feel a firm resistance in the lever within the first 3/4-inch (19 mm) of lever travel. If brake lever travels too far before beginning to apply the brake, inspect for brake fluid leaks and bleed air from the system (see page 15.14).



3. Safely elevate the front wheel. Verify wheel rotates freely without drag or binding when lever is released.
4. The front brake lever freeplay is not adjustable.

FRONT BRAKE LEVER REACH

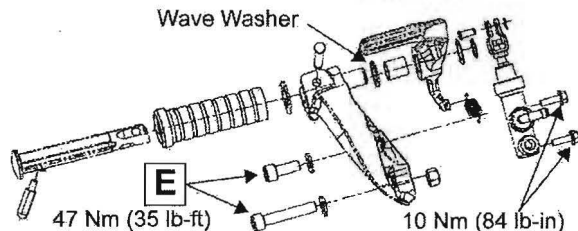
1. Lever reach (distance to hand grip) is adjustable on some models:
 - Pull lever forward (away from hand grip) and *hold*.
 - TO INCREASE reach distance, turn dial to align a *lower* number with the arrow on the lever.
 - TO DECREASE reach distance, turn dial to align a *higher* number with the arrow on the lever.



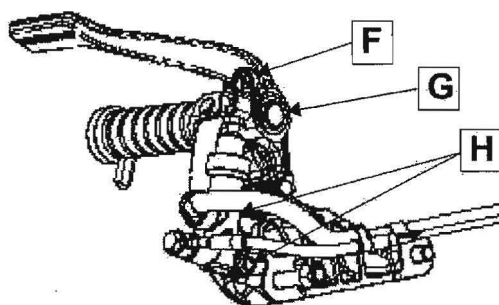
BRAKE PEDAL LUBRICATION - FOOT PEGS

Lubricate brake pedal and shift lever at intervals listed on periodic maintenance table on page 2.6.

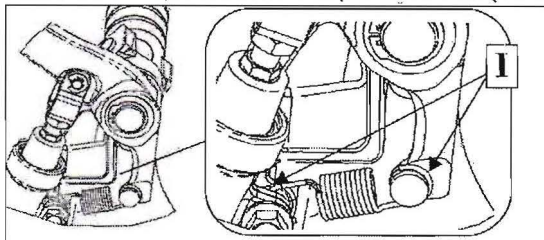
1. Remove right foot peg support bolts (E).



2. Remove E-clip (F) and pin.
3. Remove retaining ring (G) and flat washer behind it.
4. Remove master cylinder screws (H). Move master cylinder enough for push rod clevis to clear brake pedal. Remove pedal and wave washer from post.



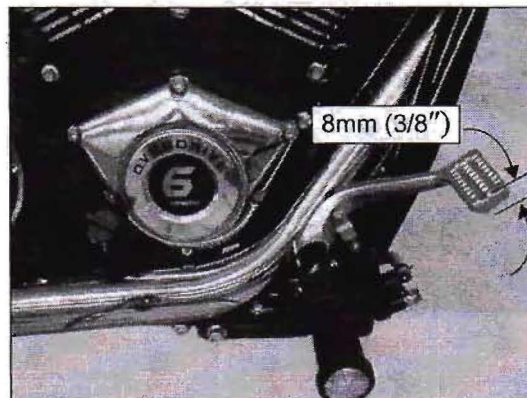
5. Clean off old lubricant and dirt from all parts.
6. Apply Victory All-Purpose Grease to post and pedal bushing.
7. Install wave washer, pedal, flat washer, and a new retaining ring. Be sure retaining ring is seated tightly in the groove.
8. Install master cylinder push rod clevis over brake pedal and insert pin. Install a new E-clip on pin making certain the E-clip fits tightly and is fully seated in the groove.
9. Fit pedal return spring (I) to upper master cylinder mount and install screws. Torque to 10 Nm (84 lb-in).



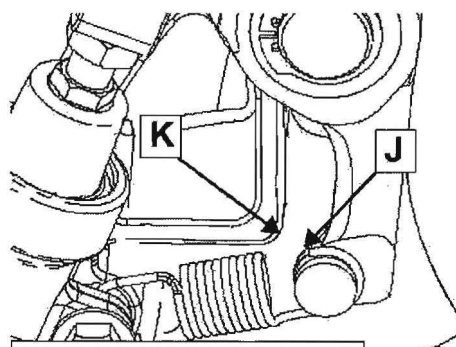
10. Assemble foot peg support to frame. Torque mounting bolts to 47.5 Nm (35 lb-ft).
11. Inspect brake pedal stop clearance as follows.

BRAKE PEDAL INSPECTION - FOOT PEGS

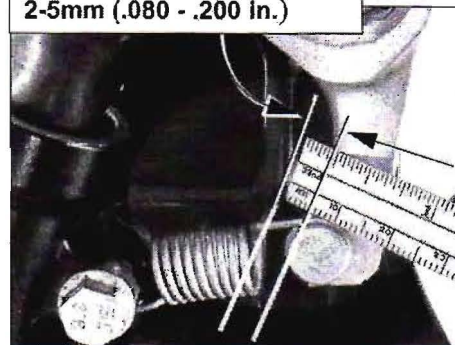
1. Press and release brake pedal. It should move freely and smoothly and return to the rest position quickly when released. See page 2.13 to lubricate pedal.
2. Press brake pedal and check for firm resistance within the first 8mm (3/8 inch) of pedal travel. If pedal feels spongy or travels too far without resistance, inspect system for leaks and bleed as outlined on page 15.14.



3. With brake pedal released (and master cylinder piston against its internal stop) a properly adjusted push rod will leave a 2-5mm gap (.080-.200 inch) between the brake pedal stop (J) and the foot peg support (K) as shown below. If gap is not within specified range, proceed to Step 4 to adjust the pushrod.

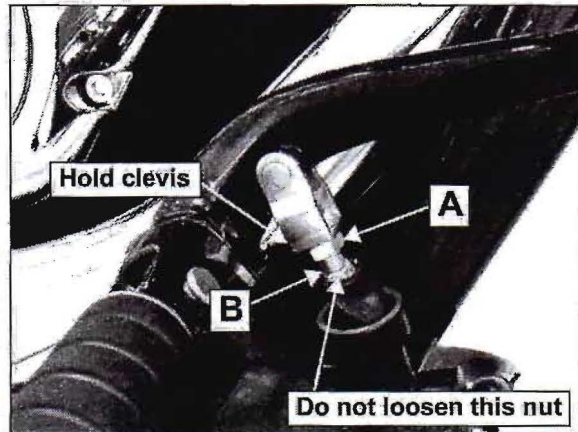


Brake Pedal Stop Clearance
2-5mm (.080 - .200 in.)



BRAKE PEDAL ADJUSTMENT - FOOT PEGS

1. Hold clevis and loosen lock nut (A) (turn lock nut clockwise as viewed from brake pedal end of clevis).



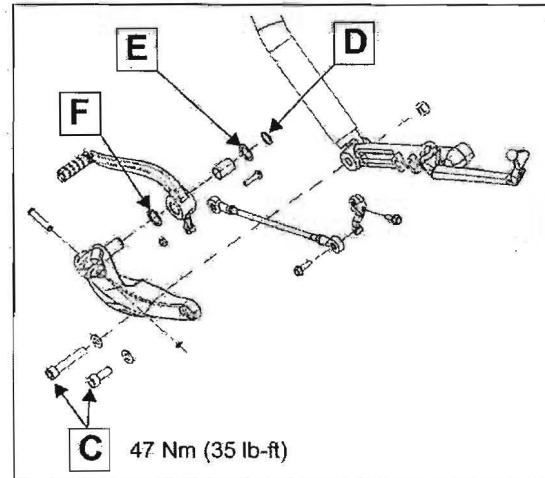
2. Rotate actuator rod (B) as necessary to achieve correct clearance between pedal and pedal stop.
3. Tighten lock nut securely.
4. Verify rear wheel rotates freely without drag or binding through the first 6mm (1/4 inch) of pedal movement.

⚠ WARNING

Verify the rear wheel rotates freely without drag or binding through full freeplay range of pedal. If drag is evident with pedal released, repeat the clearance inspection described previously or refer to Chapter 15 to inspect the brake system.

SHIFT PEDAL LUBRICATION - FOOT PEGS

1. Remove left foot peg support bolts (C).



2. Remove retaining ring (D) and flat washer (E) behind it.
3. Slide pedal and wave washer (F) off post with linkage rod attached.
4. Clean off old lubricant and dirt from all parts.
5. Apply Victory All-Purpose Grease to post and pedal bushing.
6. Install wave washer, pedal, flat washer, and a new retaining ring with machined edge facing away from pedal. Be sure retaining ring is seated tightly in the groove.
7. Assemble foot peg support to frame. Torque mounting bolts to 47.5 Nm (35 lb-ft).



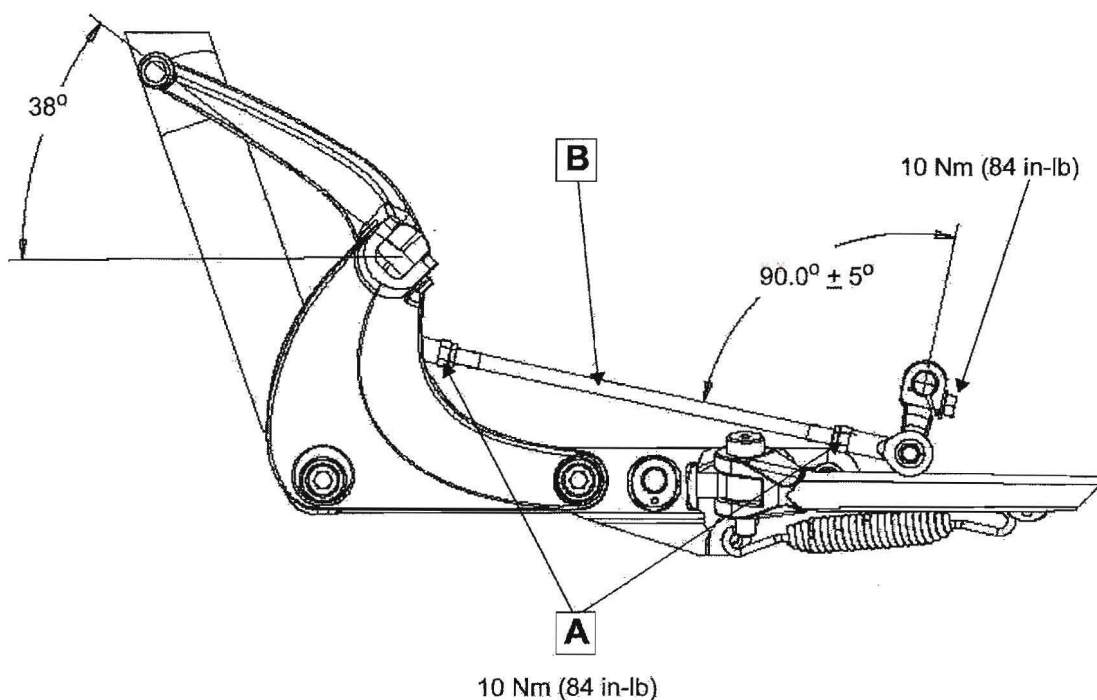
GEAR SHIFT PEDAL ADJUSTMENT - FOOT PEGS / FLOORBOARDS

1. Loosen lock nuts (A).
2. Rotate linkage rod (B) until pedal angle is correct.
3. Tighten (A).

2

NOTICE

Do not remove and reposition the shift arm on the shift shaft to adjust gear shift pedal height. A 90 degree angle between the shift arm and the linkage rod must be maintained to ensure correct shift linkage operation.

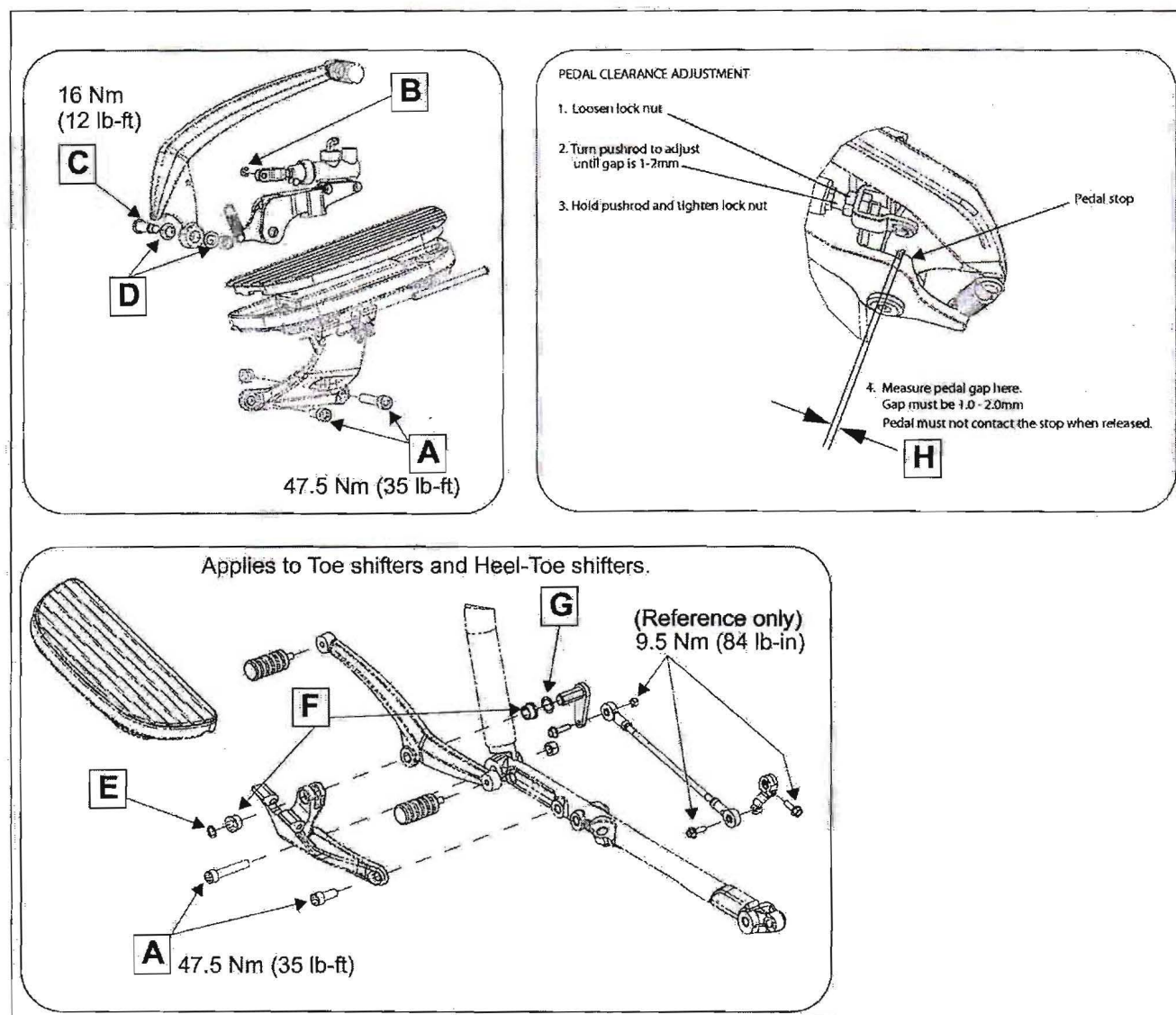


2.15

SHIFT PEDAL & BRAKE PEDAL PIVOT LUBRICATION (FLOORBOARDS)

Lubricate brake pedal and shift pedal at intervals listed on page 2.6.

1. Loosen or remove floor board mount bolts (A).
2. **Brake Pedal Only:** Remove retainer clip (B) and pin from pushrod clevis. Disconnect return spring, remove pivot bolt (C), brake pedal, and bushings (D).
3. **Shift Pedal Only:** Remove snap ring (E), shift pedal with bushings (F), and wave washer (G).
4. Clean off old lubricant and dirt from all parts.
5. Lubricate parts with Victory All-Purpose Grease.
6. **Shift Pedal Only:** Reassemble wave washer (against the shift lever shaft), pedal, bushings, and snap ring. Be sure snap ring is seated properly in groove on support post. Replace snap ring if it does not fit tightly.
7. **Brake Pedal Only:** Reassemble bushings in pedal. Install pedal between support bracket. Install master cylinder actuator rod clevis onto pedal and insert pin. Install retaining ring. Replace if it does not fit tightly.
8. Install pedal bolt and nut and torque to specification.
9. Install return spring.
10. Assemble floor board assembly to frame. Torque fasteners to specification.
11. Inspect pedal clearance (H) and adjust if necessary.

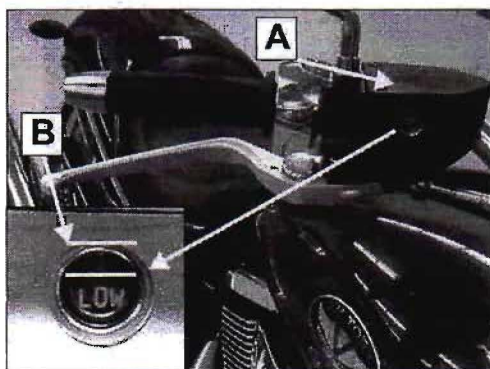


BRAKE FLUID LEVEL INSPECTION

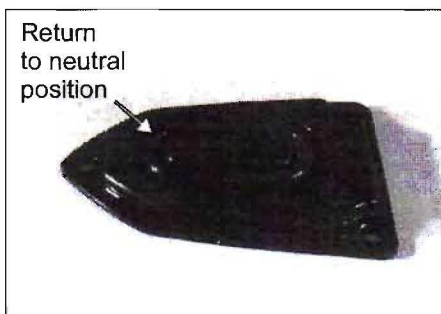
Review all brake system safety information on page 15.2 before you begin.

The brake fluid level in the reservoir will go down as brake pads wear. If you notice a constant or sudden lowering of the brake fluid level, inspect brake pads for wear and brake system for leaks.

Front Brake Fluid



1. Turn handlebars or adjust the motorcycle until top of reservoir (A) is level.
2. View front brake fluid level through sight glass. The fluid should be clear and at a level above the LOW mark on the sight glass and below UPPER level (B).
3. Wipe area around reservoir cover with a clean cloth.
4. Wipe brake fluid container with a clean cloth.
5. Remove reservoir cover and diaphragm. If diaphragm is extended, return it to the neutral position.

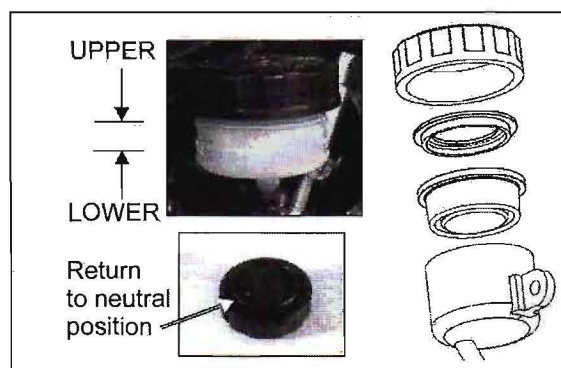


6. Carefully add enough DOT 4 brake fluid to bring level above sight glass.
7. Reinstall reservoir diaphragm and cover and torque screws to 1.6 Nm (14 lb-in).

Rear Brake Fluid



1. Remove right side cover. Adjust the motorcycle until the reservoir (C) is level.
2. View fluid level through side of reservoir. The fluid should be clear and at a level between UPPER and LOWER lines on reservoir.
3. Wipe area around reservoir cover with a clean cloth.
4. Wipe brake fluid container with a clean cloth.
5. Remove reservoir cover and diaphragm. If diaphragm is extended, return it to the neutral position.
6. Carefully add enough DOT 4 brake fluid to bring level between UPPER and LOWER marks.



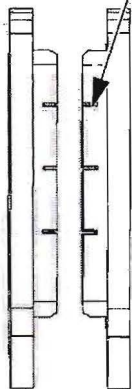
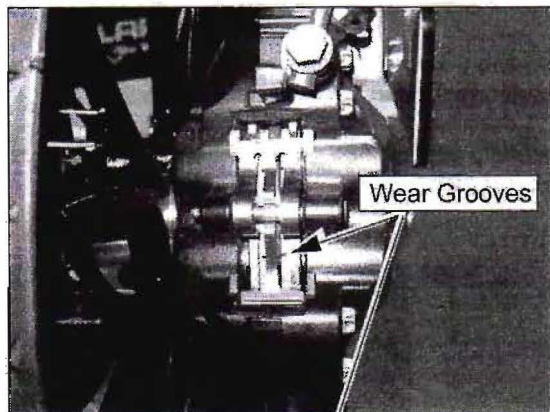
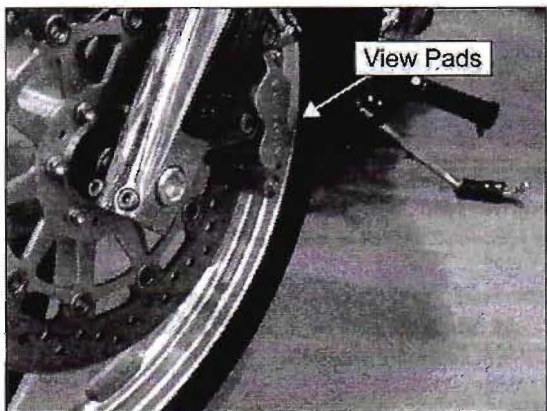
7. Install diaphragm, vent washer, and cover and tighten firmly by hand.



FRONT BRAKE PAD INSPECTION

Wear indicator grooves are provided on each front brake pad to allow for a visual inspection without pad removal. Inspect pads by viewing from rear of caliper.

Replace pads if worn to bottom of grooves. Refer to Chapter 15 for pad replacement.

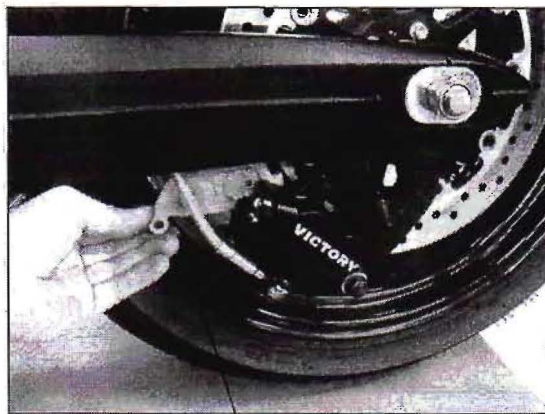


REAR BRAKE PAD INSPECTION

Wear indicator grooves are provided on each rear brake pad to allow for a visual inspection without pad removal.

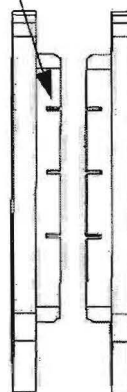
View pad material thickness from top of caliper behind swingarm.

Refer to Chapter 15 to remove pads for further inspection or to replace if worn.



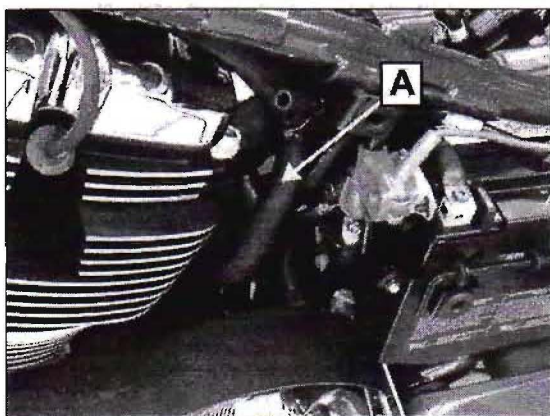
Refer to Chapter 15 to remove pads

Wear Grooves



CRANKCASE VENTILATION SYSTEM

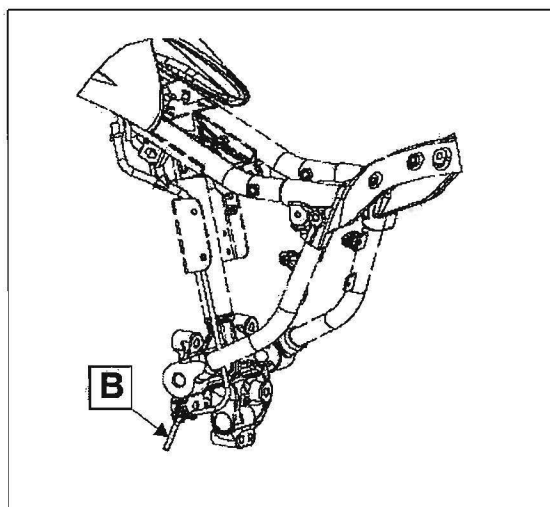
1. Remove side covers (Refer to Chapter 3).
2. Remove seat (Refer to Chapter 3).
3. Remove fuel tank (Refer to Chapter 5).
4. Inspect condition of ventilation hose (A) along its length and at both ends.
5. Be sure hose is not restricted, kinked, or cracked. Be sure clamps are secure.
6. Replace hose if worn or damaged.



FUEL TANK VENT INSPECTION (49 State)

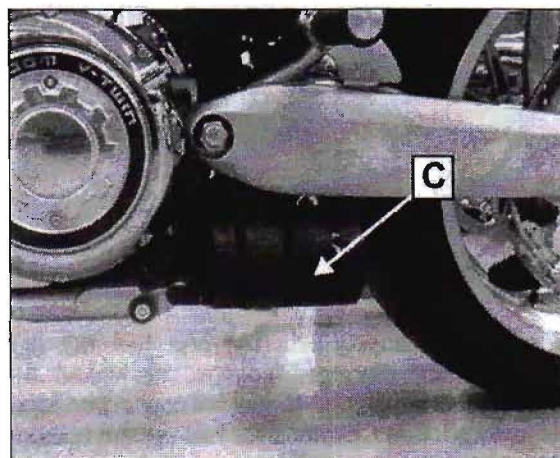
NOTE: To inspect fuel cap vent refer to Chapter 5.

1. Inspect fuel tank vent hose (B) in accordance with periodic maintenance schedule and any time fuel tank has been removed and installed. Be sure the hose is clear and not pinched or kinked, and that all connections are tight.



EVAPORATIVE EMISSION CONTROL SYSTEM (California Models)

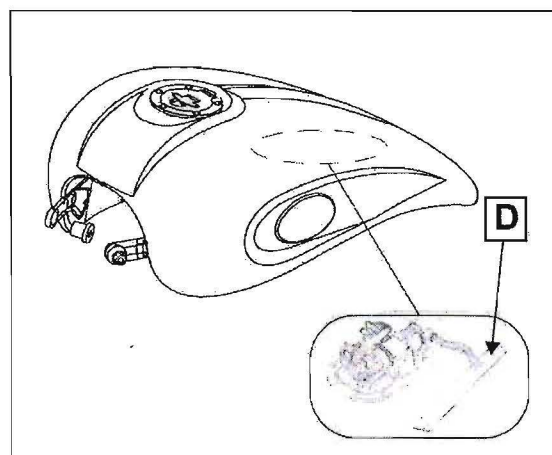
NOTE: The fuel tank vent is routed to an evaporative canister (C). Inspect all hoses for abrasion or wear. Check that all connections for both vent and canister purge systems are securely attached. Refer to Chapter 5 for hose connection diagram and inspection procedure.



FUEL PRE-FILTER INSPECTION

1. The pre-filter (D) is located inside fuel tank on the fuel pump pickup. Refer to the Periodic Maintenance Schedule for replacement interval.
2. If fuel system is run completely dry, the pump must be primed. Refer to procedure outlined in Chapter 5.

NOTE: Refer to page 5.16 for filter replacement.

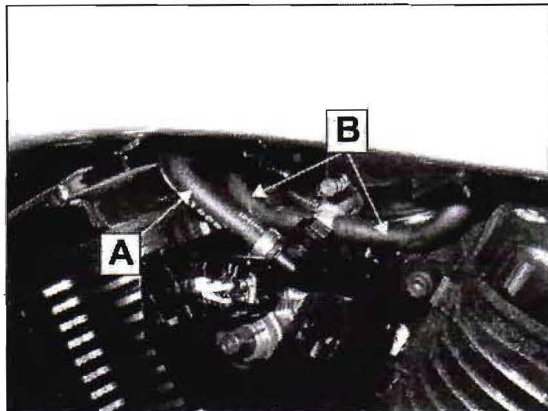


FUEL SUPPLY HOSE (FUEL RAIL) INSPECTION

1. Remove fuel line cover by pulling straight outward at the corners.



2. Inspect fuel supply line (A) and fuel rail (B) for deterioration, damage, leakage, or kinked areas. Inspect fuel supply line-to-fuel rail connection for signs of leakage. See Chapter 5 for fuel system component removal and replacement procedures.



3. Replace any components that fail inspection with genuine Victory replacement parts.

WARNING

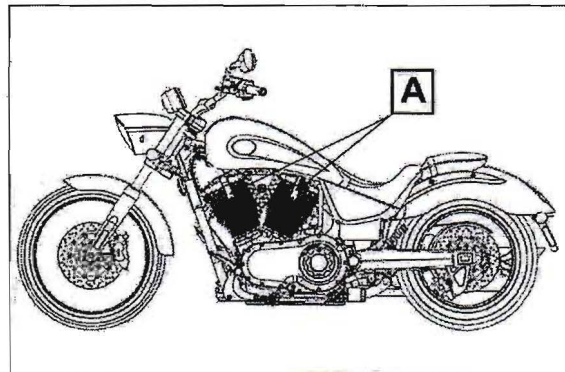
The fuel lines exiting fuel pump are subjected to high pressure. Replace with genuine Victory replacement parts to reduce the possibility of fuel line failure. Be sure fuel lines are routed properly and do not come in contact with sharp or hot objects, or anything that may cause wear or damage.

SPARK PLUG REMOVAL & INSPECTION

WARNING

HOT COMPONENTS Wear insulated gloves and/or allow engine and exhaust to cool before handling these parts.

1. With the engine at room temperature, grasp the spark plug boot (A) at the base to disconnect. DO NOT pull on the wire or spark plug wire may be damaged.



2. Clean the area around spark plug base with compressed air to remove loose debris.
3. Remove spark plugs.
4. Inspect spark plugs for:
 - Insulator damage
 - Worn electrodes
 - Color of insulator

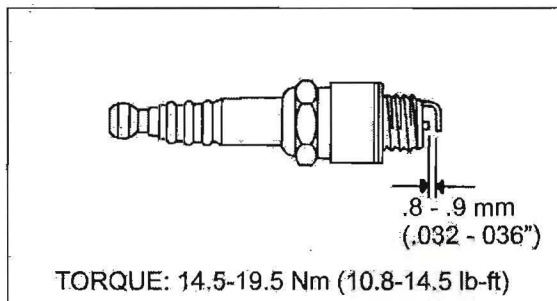
NOTE: The color of the insulator gives a general indication of engine operation. Additional troubleshooting is necessary to determine if a problem exists:

Light to dark brown	Good
White	Lean fuel mixture
Wet or black sooty deposit	Over-Rich mixture
	Oil control problems



SPARK PLUG INSTALLATION

1. Inspect spark plug gap with a wire gauge. If gap adjustment is necessary, bend ground electrode carefully using a spark plug gap tool.



Specification:

NGK DCPR6E Gap: .8 - .9 mm (.032 - .036 in)

2. Apply anti-seize compound sparingly to spark plug threads, avoiding the bottom 2 - 3 threads.
3. Torque spark plugs to specification above.

NOTICE

Do not over tighten spark plugs. Damage to the cylinder head or spark plug may result.

4. Install spark plug wire boots securely over the plugs.

BATTERY

This motorcycle is equipped with a maintenance free battery which is located under the left side cover. DO NOT remove cell caps or add distilled water to the battery. If the battery discharges, refer to Chapter 16 for diagnostic procedures.

WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Antidote:

External: Flush with water.

Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

Eyes: Flush with water for 15 minutes and get prompt medical attention.

Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in an enclosed space. Always shield eyes when working near batteries. **KEEP CHILDREN AWAY FROM BATTERY.**

NOTICE

Whenever removing the battery, disconnect the negative (black) cable first. When reinstalling the battery, connect the negative (black) cable last.

Do not remove the battery cables while the engine is running. Doing so may damage the Electronic Control Module (ECM).

Take great care not to reverse the battery leads when installing the battery.

BATTERY CHARGING

Refer to "BATTERY CHARGING (IN SERVICE)" in Chapter 16.



BATTERY STORAGE

When the motorcycle is not used for periods of one month or longer, charge the battery using the charging plug harness or remove battery from motorcycle and charge it. Store battery in a cool, dry place.

Battery should be charged monthly using a 12 volt battery charger with a maximum charge rate of 1.8 amp-hr.

WARNING

Battery charging can create explosive gasses; keep sparks, flames, cigarettes or anything that could ignite the gasses away. Provide adequate ventilation when charging in an enclosed space. Batteries contain acid that is caustic. Wear protective clothing and a face shield or protective eyewear when working with the battery. **KEEP OUT OF REACH OF CHILDREN.**

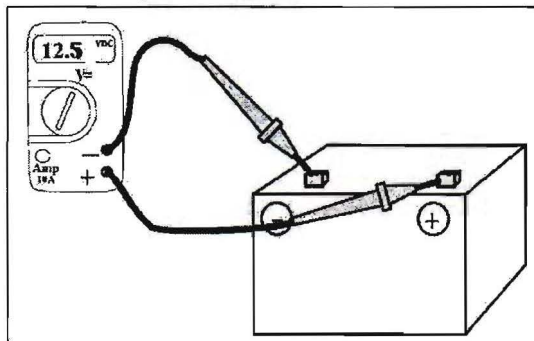
BATTERY INSPECTION

Battery terminals and connections should be kept free of corrosion. If cleaning is necessary, remove the corrosion with a stiff wire brush. Wash with a solution of one tablespoon baking soda to one cup water. Rinse well with tap water and dry off with clean rags. Coat terminals with dielectric grease.

1. Visually inspect the exterior of the battery. Replace battery if housing is damaged, case is deformed, or if electrolyte is leaking.
2. To remove corrosion, remove battery from motorcycle and wash terminals with water and baking soda solution. Clean terminals, bolts, and cable ends with a brass wire brush and apply a thin film of dielectric grease.
3. Measure battery voltage.

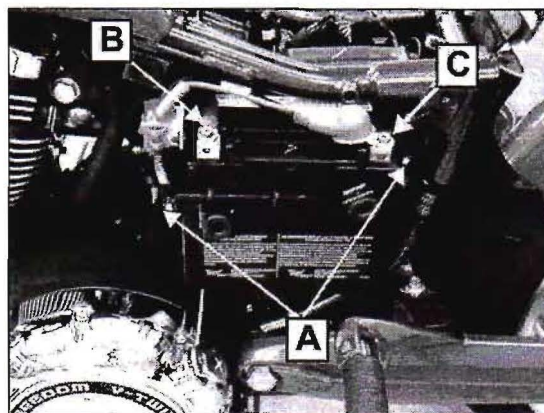
Specification: 12.5V DC minimum

4. If battery voltage is below 12.5V DC, charge it thoroughly (refer to Chapter 16). Replace battery if it will not accept a charge.



BATTERY REMOVAL

1. Remove both side covers (Chapter 3).

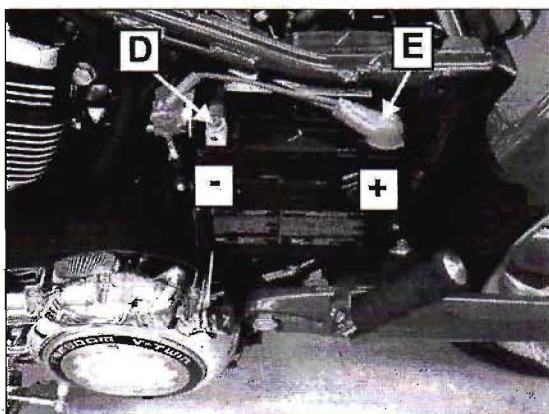


2. Remove seat (Chapter 3).
3. Jackpot: Remove frame rail covers.
4. Remove battery cover nuts (A) and cover.
5. Remove negative (-) battery terminal bolt and cable first (B).
6. Slide boot off positive battery terminal and remove bolt and positive cable last (C).
7. Lift battery up and tip the top edge inward (toward the bike) until bottom edge clears the battery box.
8. Remove battery.

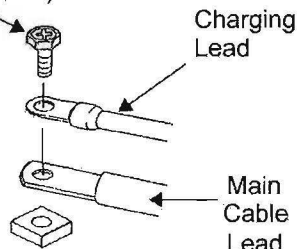
BATTERY INSTALLATION

NOTE: Be sure cable ends and battery terminals are clean. Apply a light film of dielectric grease to terminal bolt threads.

1. Carefully install battery with negative (-) terminal (D) to front of vehicle.
2. Connect positive cable (+) with charging lead ring terminal (red marking). Torque bolt to specification.
3. Apply dielectric grease over terminal area for corrosion protection.



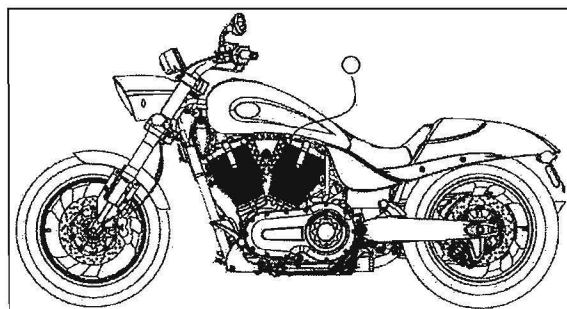
4.5 Nm (40 lb-in.)



4. Slide red protective boot (E) over the positive terminal.
5. Connect ground (-) cable with charging lead ring terminal. Torque bolt to specification.
6. Apply dielectric grease over terminal area for corrosion protection.
7. Install battery cover. Assemble two nuts to studs and torque to 4.5 Nm (40 lb-in.).
8. Install seat and side covers.

ENGINE COMPRESSION TEST

1. Warm engine to operating temperature.



2. Shift transmission into neutral and stop engine.
3. Disconnect ignition cables from both spark plugs.
4. Remove spark plug from cylinder to be tested.
5. Remove 15A FUSE (FP / IGN COIL) from fuse box (see pg. 2.29) to disable fuel pump and ignition.
6. Install compression tester in the spark plug hole following manufacturers instructions.
7. Open throttle and crank engine until needle on compression gauge stops rising (about 5 seconds).
8. Repeat procedure for other cylinder.

Specification - 106 Cubic Inch:

HAMMER S / HAMMER 8-BALL / KINGPIN / JACKPOT MODELS / VEGAS / VEGAS HIGH-BALL MODELS / VEGAS 8-BALL

STD: 210-225 (1448-1551 kPa)

SERVICE LIMIT: Below 185 PSI

High engine compression may indicate:

- Carbon deposits in combustion chamber
- Engine modification
- Faulty Gauge



Low engine compression may indicate:

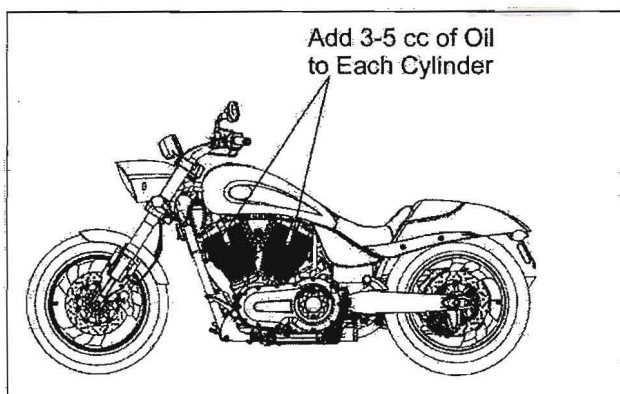
- Slow starter motor cranking speed
- Carbon or foreign material on valve seat
- Worn or damaged piston and/or piston rings
- Leaking exhaust or intake valves
- Leaking head gasket
- Valve timing incorrect
- Non-OEM camshafts or faulty gauge

If cylinder compression is below specification, perform a cylinder leakage test to determine where the leak is occurring. Follow the instructions provided with the leakdown tester.

Cylinder Leakdown Tester: PV-35667-A

ENGINE COMPRESSION TEST (WET)

If a cylinder leakage tester is not available, perform a wet cylinder compression test.



1. Pour 3-5 cc of clean engine oil into each cylinder through spark plug hole. Repeat cylinder compression test.
2. If compression increases substantially, inspect cylinder, piston, and rings.
3. If compression does not increase, inspect valves and valve seats.

DRIVE BELT INSPECTION

NOTE: Inspect drive belt in accordance with Periodic Maintenance Interval Chart on page 2.6, and replace at specified intervals regardless of belt condition.

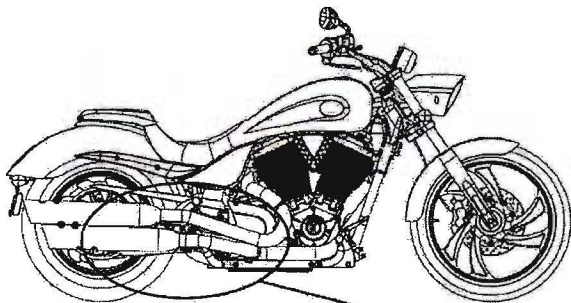
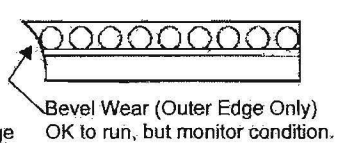
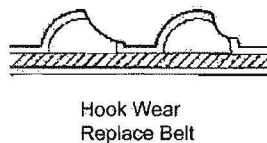
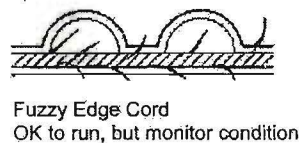
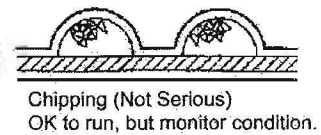
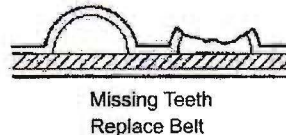
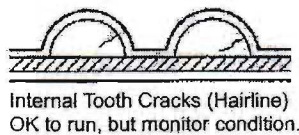
1. Periodically inspect drive belt for cuts, excessive wear, foreign substance (oil, grit), missing teeth, or any other damage.
2. If any damage is found, belt should be replaced.

NOTE: Adjust drive belt tension at intervals in accordance with the Periodic Maintenance Interval Chart on page 2.6.

3. If the drive belt or sprocket is being replaced due to damage, replace belt and both sprockets as a set if drive system has more than 5000 miles (8000 Km) of use.

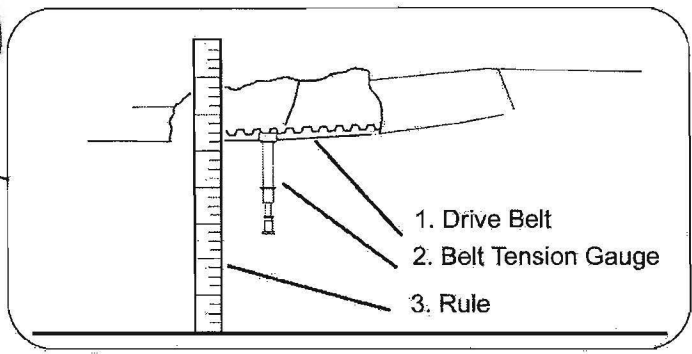
SPROCKET INSPECTION

1. Inspect front and rear sprocket teeth for wear or damage from foreign material (Chapter 11).
2. Closely inspect drive belt condition.

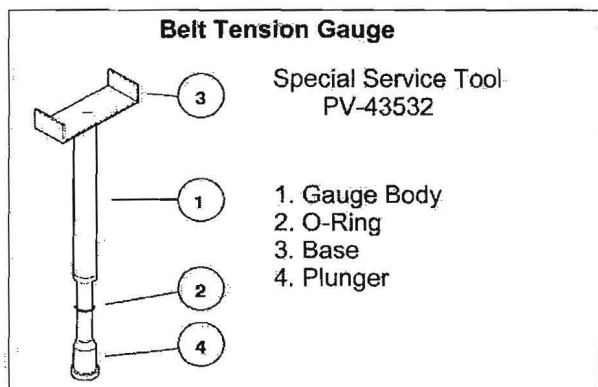


If belt is damaged, inspect sprockets carefully if belt is damaged

Replace belt and both sprockets if drive system has been in service over 5000 miles (8000 Km)



DRIVE BELT TENSION



WARNING

Care should be taken to be sure the motorcycle will not tip or fall while elevated. Severe personal injury or death may occur if the motorcycle tips or falls.

1. Secure motorcycle in an upright position.
2. Shift transmission into NEUTRAL.
3. ELEVATE rear wheel off the ground when checking deflection or adjusting the belt.

IMPORTANT! Do not adjust the belt when wet, or immediately after riding. Belt must be dry and the drive system must be at ambient temperature (60-80° F). This is extremely important for accuracy.

Find Tight Spot In Belt

4. Use the tire valve stem as a reference and perform the following Steps:
 - Check / record belt deflection at 4 different points, 90 degrees apart. Rotate wheel in a **CLOCKWISE** rotation as viewed from belt side of motorcycle.
 - Place a mark on rear wheel at the tightest point (least deflection) to use as a reference.

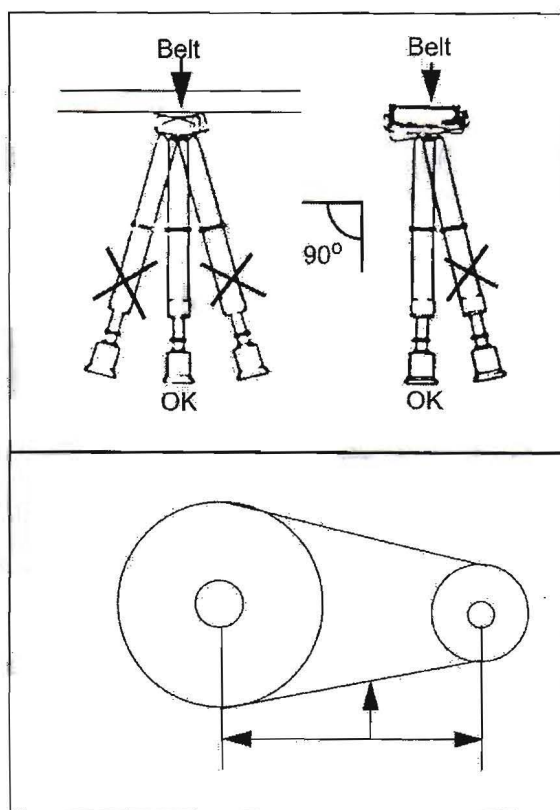
- Continue to rotate the wheel in normal drive direction (**CLOCKWISE**) 1-2 revolutions back to your reference mark (the tightest point).

- Adjust belt deflection with wheel in this position.

5. Place tape measure or ruler next to drive belt or use the graduations on belt bracket for reference (see illustration page 2.24).

6. Slide O-ring on belt tension gauge to the 10 lb. mark.

- Place belt tension gauge squarely against belt at center and keep it at a 90° angle to the belt surface



7. Push up on gauge until O-ring just touches tool body.
8. If belt deflects more than the specified distance with 10 lbs. of force, tighten the belt. If deflection is less than specified loosen the belt. Refer to page 2.26 to adjust belt tension and maintain or adjust belt alignment.

2.26



DRIVE BELT SPECIFICATIONS

BELT DEFLECTION*		
	2012 Kingpin 2012 Hammer S	2012 High-Ball 2009-2012 Jackpot 2012 Vegas 2012 Vegas 8-Ball 2012 Hammer 8-Ball
@ 10 lbs. force	12.0 mm \pm 1.0 (15/32" \pm 1/32)	6.0 mm \pm .5 (15/64" \pm 1/64)
SONIC TENSION*		
The following data is provided for use with a Sonic Tension Meter. Follow instructions included with your sonic tension meter.		
Required Data	Models with 12mm Deflection	Models with 6mm Deflection
Span (mm)	658.30	658.30
Belt Width (mm)	28	28
Belt Mass Constant	9.1	9.1
Tension (Hz \pm 1)	32	48

NOTE: New drive systems (new vehicle or when belt and sprockets are replaced) should be set to the tight side of the specification and inspected after the first 500 miles (800 km).

DRIVE BELT ADJUSTMENT

Rear Wheel Alignment / Belt Adjustment

WARNING

A rear axle not in alignment can cause drive line noise and damage the drive belt, causing possible belt failure and loss of control of the motorcycle.

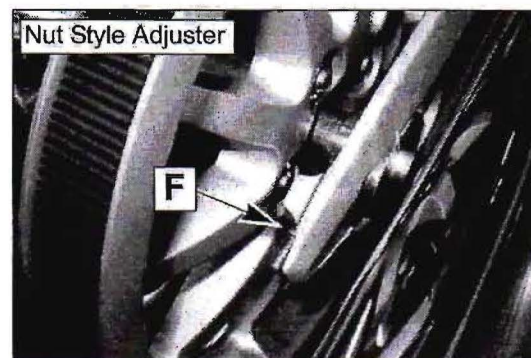
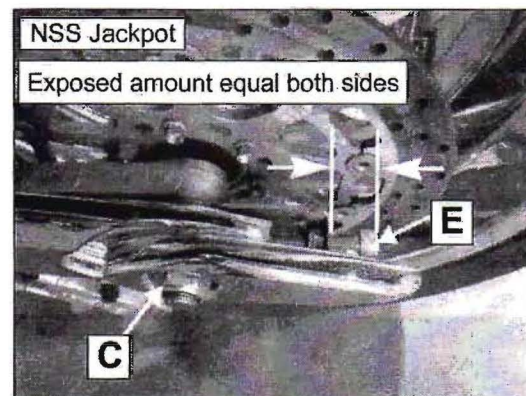
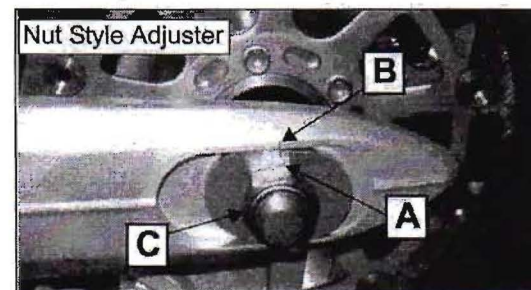
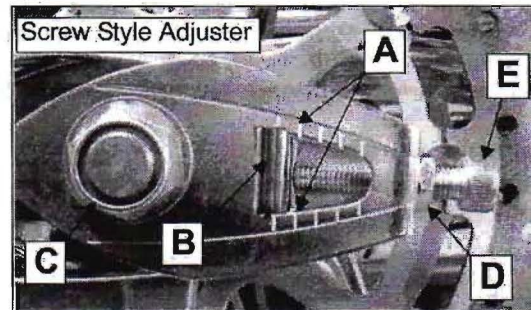
1. Marks (A) and (B) are used as a reference for initial wheel alignment on nut style and screw style rear axle adjusters. Marks should be in same position on both left and right sides of wheel.

NOTE: On Ness models the marks are not visible. Measure the length of the exposed adjuster screws to determine equal adjustment.

2. Loosen axle nut (C). Remove axle nut cover (if equipped).
3. Safely elevate motorcycle with tire off floor.
4. *Screw style adjusters* - loosen lock nut (D) both sides.

5. Turn adjuster screws (E) or nuts (F) to achieve:

- Recommended belt tension
- Wheel alignment (marks equal both sides)

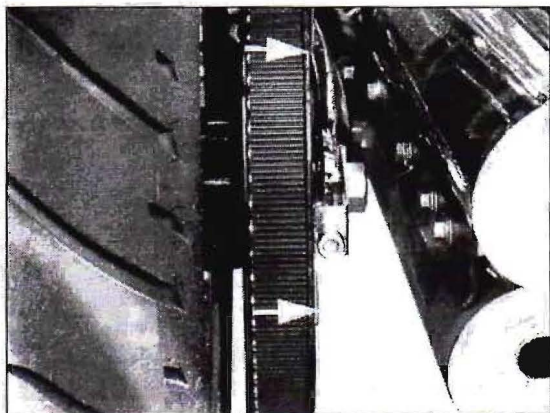


MAINTENANCE

- When belt tension is correct, check and adjust final wheel alignment as follows.

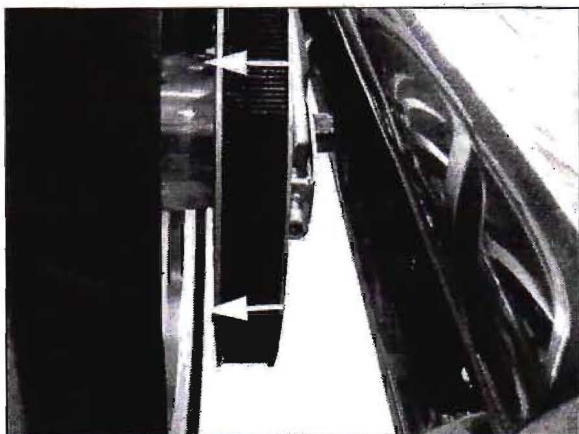
NOTE: To minimize change in belt tension, use **LEFT SIDE** adjuster only to make final adjustments to belt alignment. *Be sure to keep axle seated forward against axle adjusters during this procedure.*

- Rotate the wheel **BACKWARD**. Tighten **LEFT** rear axle adjuster until belt *begins* to track to right (outboard) sprocket flange during backward wheel rotation.



Rear Wheel Alignment (Final) (Cont.)

- Rotate the wheel in **FORWARD** direction. Loosen left rear axle adjuster until belt just moves off the right flange and begins to track to left (inboard) sprocket flange during forward wheel rotation. *Tap left end of axle (if necessary) to be sure left side of wheel moves forward when adjuster is loosened.*



- Tighten rear axle nut to 88 Nm (65 lb-ft). Install axle nut cover (if equipped) and tighten set screw to 2.0 Nm (18 lb-in).

10. Screw style adjusters:

Torque adjuster screws to 11 N-m (8 lb-ft).
Hold each adjuster screw and tighten lock nut to 11 N-m (8 lb-ft) on each side.

11. Nut style adjusters:

Torque adjuster nuts to 11 N-m (8 lb-ft).

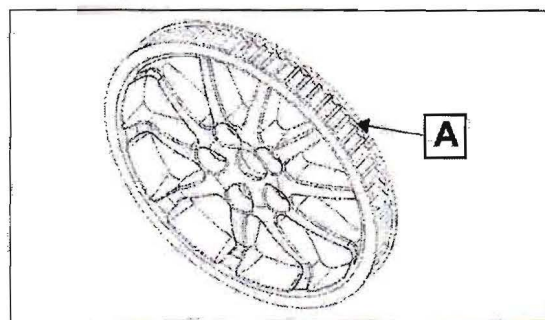
- Pump rear brake pedal several times to reset brake pad distance.

- Verify wheel rotates smoothly and freely without drag when brake pedal is released.

DRIVE BELT CLEANING

Drive belt and sprocket service life is maximized and drive line noise minimized by proper cleaning. Cleaning interval is approximately every tire change, or more often if operated in dirty, dusty, or high debris environments.

- Mix a few drops of mild dish soap with a cup of warm water and use a soft nylon brush to clean the belt and sprocket teeth.
- Pay close attention to corner areas (A) where road debris and belt dust can collect.



- Rinse thoroughly with clear water. Dry thoroughly.

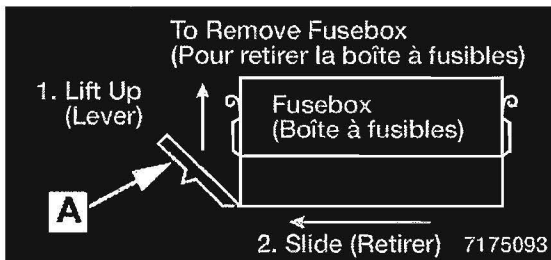
NOTE: Do not inspect or adjust drive belt tension when the belt is wet. Improper adjustment will result.



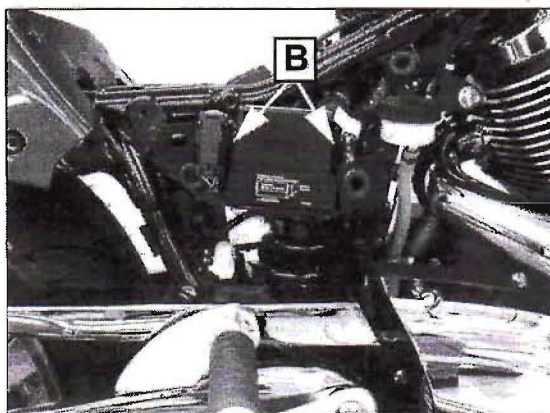
FUSE REPLACEMENT

Fuses and relays are located in the fuse box under the right side cover.

1. Remove right side cover.
2. Lift tab (A) at rear of fuse box and slide fusebox rearward and off bracket to gain access to cover tabs.



3. Push back tabs (B) on each side of fuse box cover and lift cover off.



4. If any fuse is blown, turn off main switch. Install new fuse of specified amperage. Turn on switches and see if system operates correctly. Repeat fuse failure indicates an electrical problem. Refer to electrical section (beginning at Chapter 16).

NOTICE

Do not use fuses of a higher amperage rating than what is specified.

If the correctly rated fuse continues to blow, something is wrong and needs to be corrected. Substituting a higher amperage fuse can lead to extensive electrical system and vehicle damage.

FUSE BOX DIAGRAM

ACCESSORY RELAY	FP / COIL RELAY	ENGINE RELAY	PRIMARY LIGHTS RELAY
TS / HORN 15A	PRI. LIGHTS 20A	ENGINE 15A	TS / HORN RELAY
RESISTOR 66 Ω	IGNITION 15A	FP / COIL 15A	7176799

Under right side cover, top of fuse box cover.



HEADLIGHT AIM INSPECTION

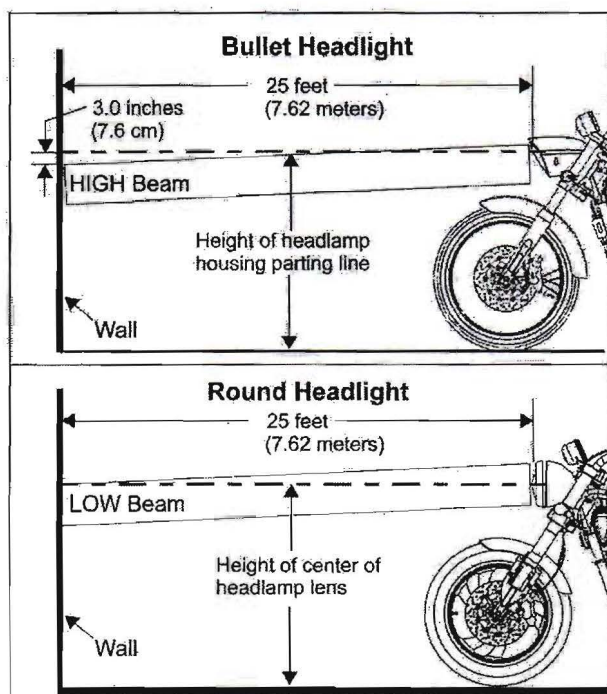
Adjust headlight aim when there is a change in load (rider, cargo, accessories, etc.) or after suspension adjustment.

Bullet Headlights: TOP EDGE OF **HIGH** BEAM must be 3.0 inches (7.6 cm) below the height of the headlight housing parting line and centered straight ahead at 25 feet (7.62 m).

Round Headlights: TOP EDGE OF **LOW** BEAM must be at the same height as the center of the headlight lens and centered straight ahead at 25 feet / 7.62 m).

Follow all steps below to ensure accurate aim inspection.

1. Check and adjust the tire pressure (page 2.9).
2. Verify suspension ride height is set correctly (page 2.35) for rider, passenger (where applicable) and cargo load.
3. Move the motorcycle to a clear area with a level floor and dim lighting, and place it so the top front edge of the headlight housing is 25 feet from the wall.



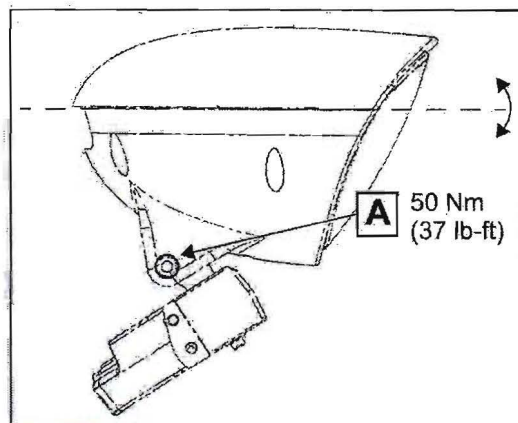
4. Have the rider (and passenger if normally present) straddle the motorcycle in an upright position and sit in the seat(s). Center the handlebars in a straight ahead position.
5. Turn ignition switch ON.
6. Set headlight to High beam.
7. Check position of headlight beam on the wall and adjust if necessary.

2.30

HEADLAMP AIM ADJUSTMENT

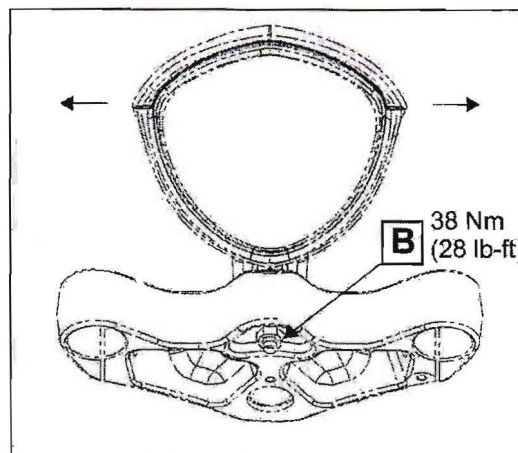
1. To adjust headlamp vertically:

- Loosen headlamp pivot bolt (A).
- Initially adjust headlamp position so seam of headlamp housing and top cover is horizontal.
- Precisely adjust beam to proper vertical height (see Headlight Aim Inspection procedure).
- Tighten bolt.
- Verify proper beam height adjustment.



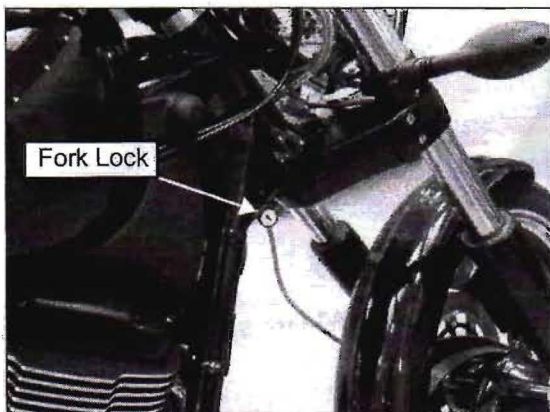
2. To adjust headlamp horizontally:

- Loosen headlamp mount nut (B).
- Adjust beam to proper horizontal position (straight ahead).
- Tighten nut.
- Verify proper horizontal adjustment.



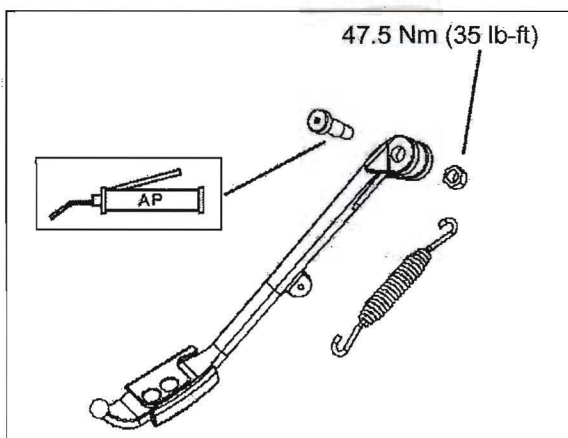
LOCK LUBRICATION

1. Insert spray nozzle of Victory Multi-Purpose Lubricant (2872863) into ignition switch and spray 1-2 seconds.
2. Insert ignition key and turn it to all positions to distribute the lubricant.
3. Repeat the lubrication procedure for the fork lock (A) if equipped, by turning handlebars fully left and turning the key through the 180 degree range multiple times.
4. Wipe any excess lubricant from lock or switch.



SIDESTAND INSPECTION

1. Support the motorcycle in an upright position.
2. Inspect sidestand spring for damage or loss of tension. Be sure stand returns to fully retracted position.
3. Inspect side stand for smooth movement (page 2.31).



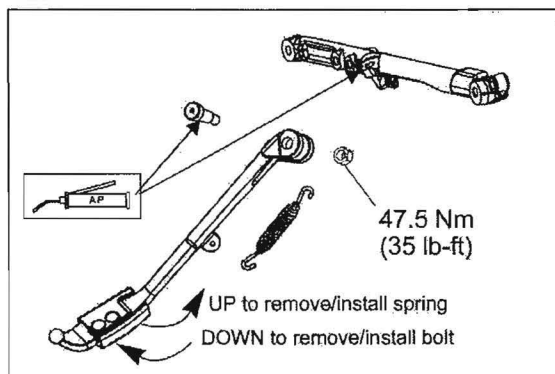
4. Inspect sidestand pivot bolt nut for proper torque.
5. Replace sidestand if it is bent. Do not attempt to straighten sidestand.
6. Inspect sidestand pad for wear.

SIDESTAND & SPRING REMOVAL

! WARNING

The sidestand spring is under tension. Wear eye and face protection when removing and installing the spring and sidestand. Be sure the vehicle is properly secured before you begin.

1. Sidestand will be moved between the UP (retracted) and DOWN (extended) position during removal and installation. Be sure vehicle is properly secured.

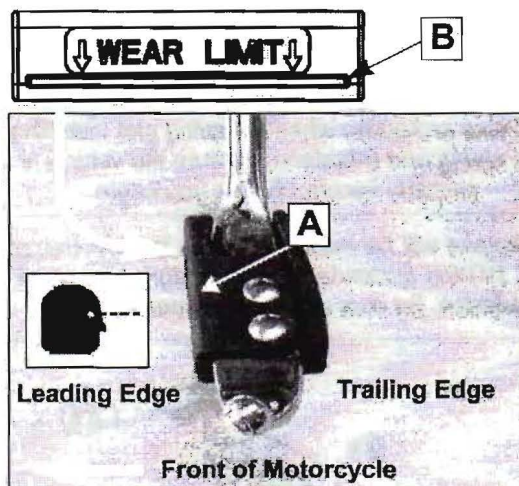


2. Remove sidestand pivot nut using a 15mm socket while holding bolt with a 6mm hex wrench.
3. Place sidestand in the **DOWN** position, then remove the bolt.
4. Grasp sidestand firmly and move it to the UP position.
5. Pull sidestand straight rearward against spring tension until mounting flange on sidestand is clear of the recessed mounting boss on the frame cradle.
6. Remove spring.
7. *Installation:* Attach spring to sidestand.
8. Lightly grease sidestand mounting boss on frame rail and the shouldered portion of the pivot bolt.
9. Place loose end of spring through hole in frame rail.
10. With sidestand in the retracted position (up), pull stand straight rearward against spring tension until the mounting flange on the sidestand drops into the recessed mounting boss on the frame cradle.
11. Swing sidestand to the extended position to align bolt hole and install bolt and nut.
12. Torque nut to 47.5 Nm (35 lb-ft) and wipe off any excess grease. Cycle the sidestand to be sure it moves freely, and returns to the fully retracted position.
13. Cycle the sidestand to be sure it moves freely, and returns to the fully retracted position.



MAINTENANCE

SIDESTAND PAD INSPECTION



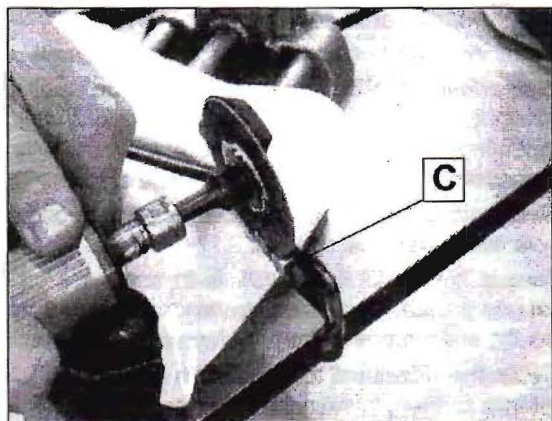
Sidestand Pad Inspection

1. To inspect the sidestand rubber pad (A) for wear, look at the wear limit line on the front of the pad (B).
2. Be sure pad is secured in place and not damaged or torn. Replace pad if worn to or beyond the wear mark.

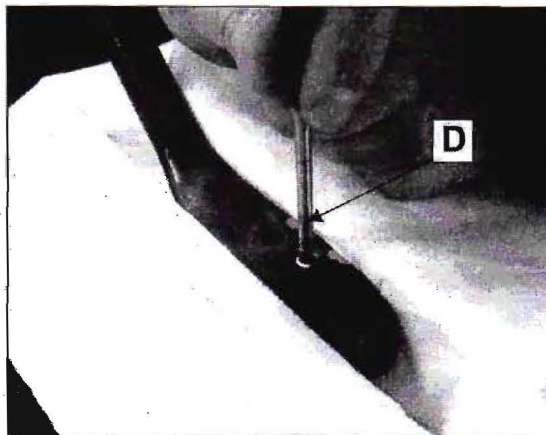
SIDESTAND PAD REPLACEMENT

Sidestand Pad Removal

1. Remove side stand from frame (page 2.31).
2. Place sidestand in a soft-jawed vise.
3. Remove rubber pad with a pliers to expose the rivets.
4. Using an angle grinder, cut off the head of both rivets on the top side of the sidestand foot (C). Be careful to avoid grinding wheel contact with the finished area of the stand.

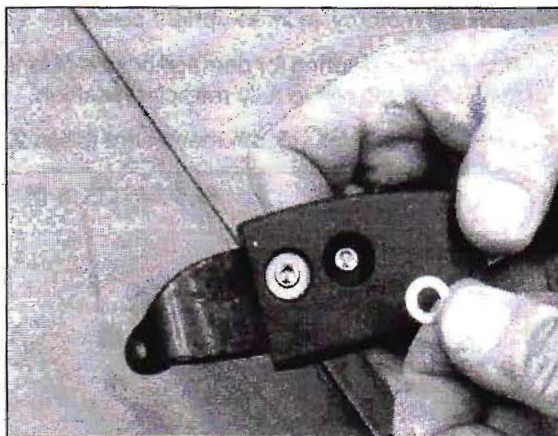


5. Drive rivets out of sidestand foot from top to bottom with a suitable drift punch (D).

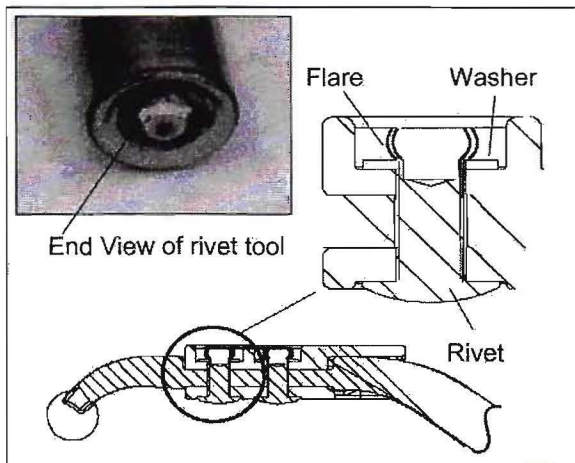


Sidestand Pad Installation

1. Install new sidestand pad with open side on trailing edge of sidestand.
2. Install new rivets from top to bottom.
3. Invert sidestand and place washers over rivets.



4. Hold washers and rivets in place and set sidestand on a hard surface (such as the anvil of a vise) with hollow end of rivets facing upward. Push washers as far down as possible. Be sure washers are at least 1/16 - 1/8 inch (1.5-3.0mm) below hollow end of rivets.
5. Peen hollow end of rivets with a commercially available rivet tool. Be sure rivets, washers and pad are secure.



NOTE: An alternative method is to use a center punch to start a flare on hollow end of rivet, then use a 1/4 inch drift (flat) punch to complete the peening operation.

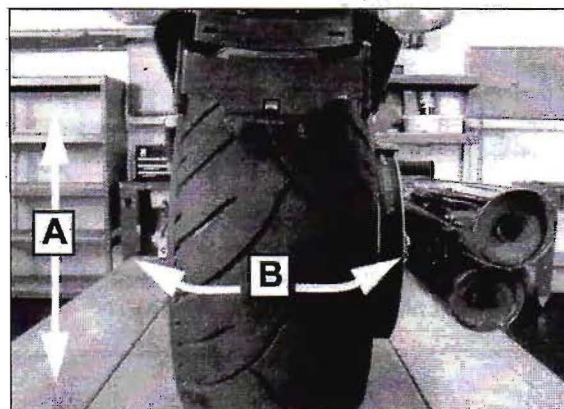
6. Apply touch up paint or primer to exposed bare metal.

REAR SUSPENSION / SWINGARM INSPECTION

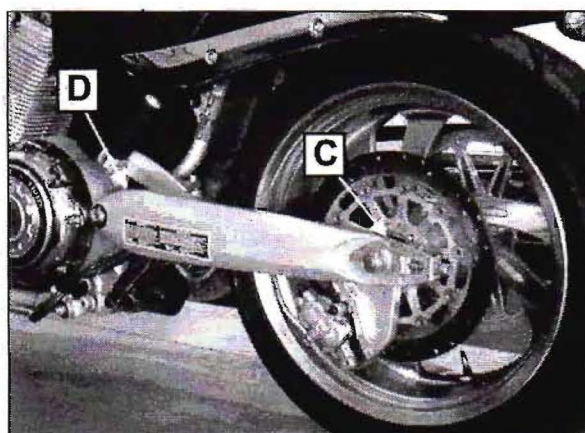
⚠ WARNING

Care should be taken to be sure the motorcycle will not tip or fall while elevated. Severe personal injury or death may occur if the motorcycle tips or falls.

1. Sit astride the motorcycle. Compress the rear suspension several times and check for smooth and quiet operation (A).

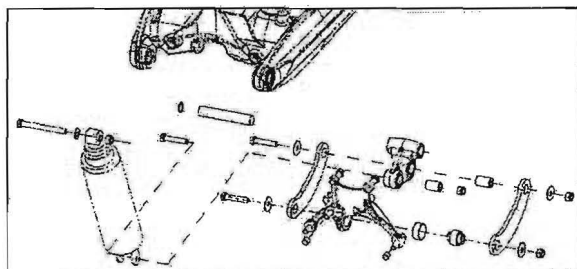


2. Secure motorcycle with rear wheel elevated.
3. Inspect for worn swing arm bearings by grasping the rear wheel and attempting to move wheel side-to-side (B).
4. If movement is detected, determine if movement is at axle area (C) or swingarm pivot area (D). Refer to Chapter 13 for wheel bearing and swingarm bearing replacement.



MAINTENANCE

5. Rotate rear wheel and inspect for smooth rotation of rear wheel bearings. If roughness or unusual sounds are detected, inspect rear wheel bearings, belt tension and alignment, and brake pads.
6. Inspect rear shock for leakage and all rear suspension components for damage or loose fasteners.
7. Inspect suspension pivots and shock mounts for radial movement in all pivot joints. If a joint has radial movement, remove rear shock absorber and inspect suspension pivot linkage (Chapter 13).



8. Verify axle nut is tight.
9. Replace any worn or damaged parts.



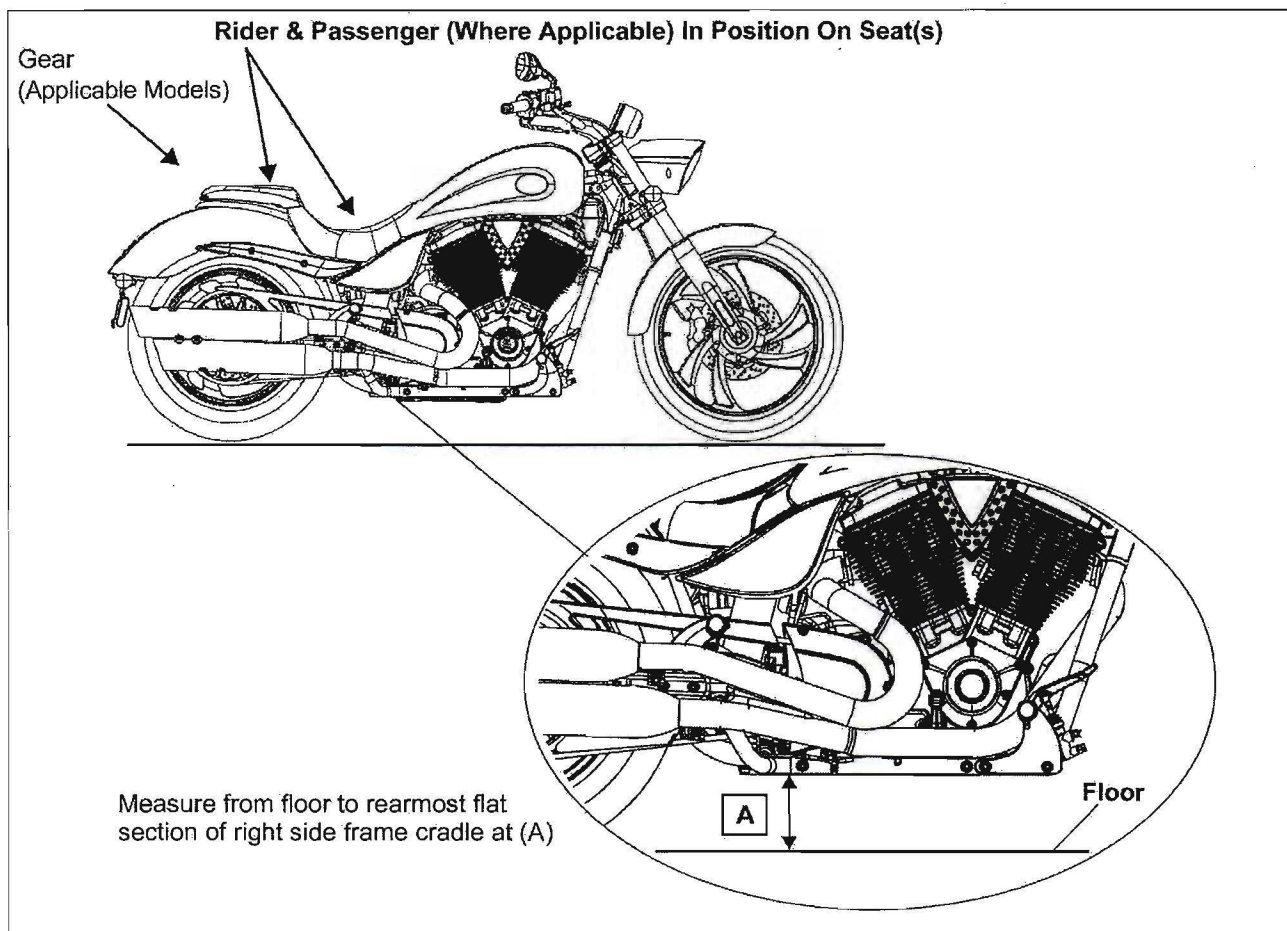
RIDE HEIGHT MEASUREMENT (Rear Shock Spring Pre-Load)

Have an assistant help you complete the following procedure. Refer to illustration below.

1. Set tire pressure to specification (page 2.9). Place motorcycle on a level paved surface.
2. Load motorcycle with all cargo that will be carried. With motorcycle in upright position, have operator sit on the seat with riding gear on. If a passenger will be riding have passenger sit on passenger seat with gear on.
3. Compress rear suspension a few times by pushing on seat and slowly releasing. Make sure suspension moves freely without binding.
4. With as much rider weight on seat as possible and the motorcycle upright and level, measure distance (A) from floor to rearmost flat section of right side frame cradle as shown below.
5. Record measurement and compare to specification.
6. If ride height is not as specified, adjust shock spring pre-load. Refer to page 2.36.

RIDE HEIGHT SPECIFICATIONS

YEAR / MODEL	SPECIFICATION
* Motorcycle loaded and in upright position * Operator, Passenger, & Gear * Tire Pressure set for load (page 2.9)	
2009-2012 Kingpin	127 mm \pm 3mm (5.0 " \pm 1/8)
2009-2012 Hammer S	132 mm \pm 3mm (5.2" \pm 1/8)
2009-2012 Jackpot 2012 Vegas & Vegas 8-Ball 2012 Hammer 8-Ball	120 mm \pm 3mm (4.75" \pm 1/8)
2012 Vegas High-Ball	104 mm \pm 3mm (4.1 " \pm 1/8)

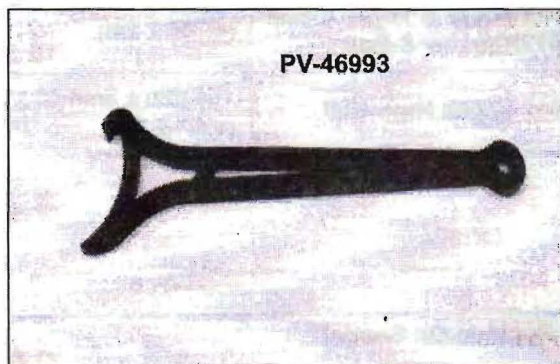


RIDE HEIGHT ADJUSTMENT

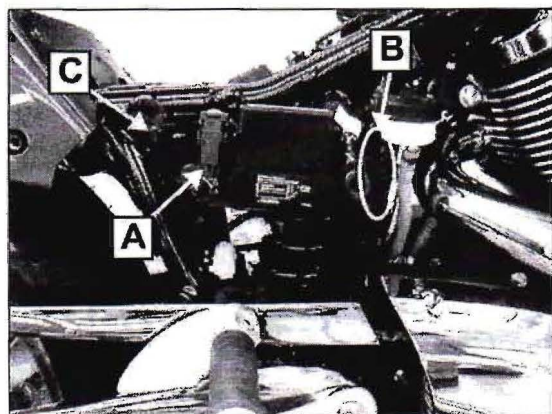
WARNING

Care should be taken to be sure the motorcycle will not tip or fall while elevated. Severe personal injury or death could occur if the motorcycle tips or falls.

This procedure involves using the shock absorber preload wrench PV-46993. Ride height should be set for load conditions before riding to ensure optimum handling, safety, and ride quality.

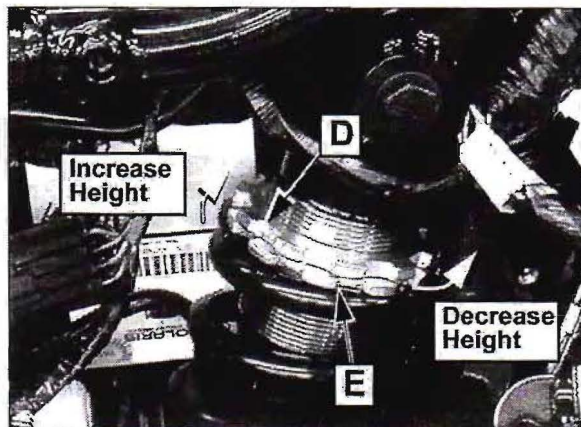


1. Remove right side cover.
2. Remove fuse box (page 2.29).
3. Push tab to disconnect the diagnostic connector (A).



4. Remove two bolts (B) that fasten the rear brake reservoir to the bracket. Secure the reservoir in an upright position.
5. Remove rear bracket bolt (C).
6. Move bracket and harness to access shock spring.

7. Safely elevate the motorcycle to unload the rear suspension.
8. The uppermost spanner nut on the shock is the locknut (D). The spanner nut closest to the spring is the adjustment nut (E). Loosen the locknut by turning it counterclockwise (as viewed from the top of shock absorber).



9. Spray a light lubricant (sparingly) on the shock spring where it contacts the adjuster nut. Do not allow spray to contact the drive belt or tire.
10. Adjust preload by rotating adjustment nut clockwise (as viewed from the top of shock absorber) to INCREASE the height measurement, or counterclockwise to DECREASE the height measurement.
11. Lower the vehicle and verify height dimension is correct after adjustment.
12. Tighten lock nut securely against adjuster nut when adjustment is complete. Wipe away any residual lubricant from shock, spring, adjuster nut, and lock nut.
13. Install the (3) fuse box bracket bolts and brake reservoir and tighten to 10 Nm (87 lb-in).
14. Install diagnostic connector on fuse box bracket.
15. Install fuse box and right side cover.

2.36



FASTENERS

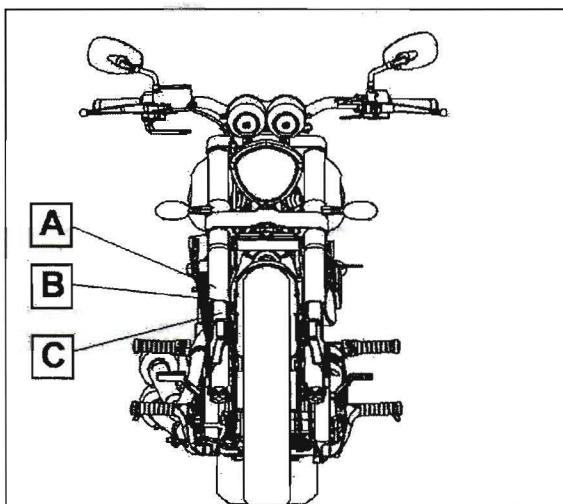
Inspect all fasteners on the vehicle to be sure they are tight. Refer to the appropriate chapter as required for torque specifications.

FRONT SUSPENSION INSPECTION

WARNING

Damaged, worn, or loose suspension components may cause loss of control, increasing the chance of a crash or possible injury. Damaged, worn, or loose suspension components must be repaired before the motorcycle is operated. See Chapter 12.

1. Place motorcycle on sidestand and inspect front forks. Make sure no fork oil present on the outer fork tubes (A), fork seals (B), or around the inner tubes (C).



2. Clean fork tubes with mild soap and water as required to remove bugs, tar, or buildup which may cause seal wear or leakage.
3. Inspect outer surfaces of inner fork tubes for scoring, scratches, and damage from foreign objects.
4. With motorcycle upright, apply front brake and pump forks through travel range several times. Fork operation should be smooth and quiet.
5. Verify all fasteners are tight. Refer to Chapter 12 for torque specifications.
6. Replace worn or damaged parts.

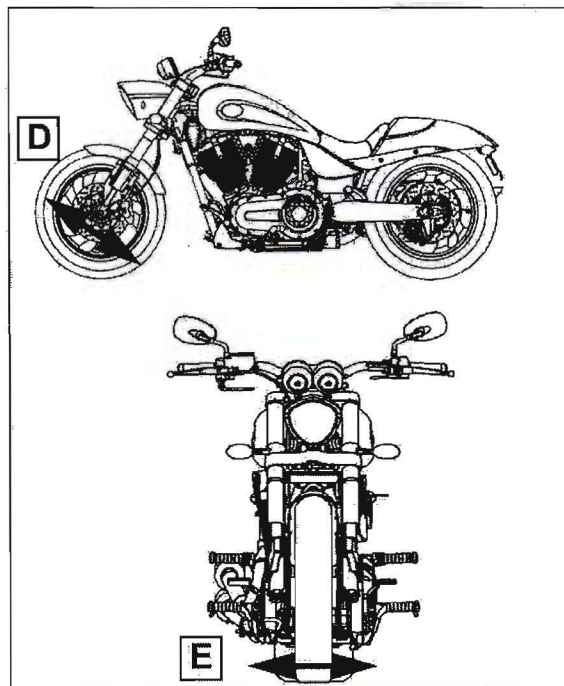
STEERING HEAD / FRONT WHEEL INSPECTION

WARNING

Care should be taken to be sure the motorcycle will not tip or fall while elevated. Severe personal injury or death may occur if the motorcycle tips or falls.

NOTE: Be sure control cables, hoses and wiring are not interfering with handle bar rotation.

1. Secure motorcycle with front wheel off the floor.



2. Turn handlebars from full left to full right and inspect for smooth, free movement. Point front wheel straight ahead, grasp fork tubes and pull/push fork tubes back and forth (D). If steering binds, feels rough or uneven, or if movement is detected at steering stem, adjust or replace steering head bearings as necessary.
3. Rotate front wheel and inspect for smooth rotation of front wheel bearings. If roughness or unusual sounds are present, replace front wheel bearings (Chapter 12).
4. Turn handle bars full right or left and hold against the fork stop. Attempt to move front wheel side-to-side (E). If movement is observed, inspect front axle, wheel, and bearings (Chapter 12).



CLEANING

NOTE: Refer to page 2.5 for Pure Victory Cleaning Product part numbers, and the Owner's Manual for more information. Pure Victory cleaning and polishing products and accessories have been specifically designed to offer the best care possible for a Victory motorcycle. In addition to the products recommended here, Pure Victory products are also available for removing scratches, scuffs, and swirls in paint or clear coat, cleaning or enhancing black or silver engines, cleaning tires and wheels, and removing brake dust.

Before washing the motorcycle, do the following:

- Be sure exhaust has cooled completely. Cover each pipe opening with a plastic bag secured with a strong rubber band to prevent water from entering exhaust system.
- Check that the spark plugs, spark plug wire caps, oil dipstick, fuel cap, and other filler caps are properly seated.
- Avoid spraying the air box / air filter area or electrical connectors and wiring.
- Removing excess dirt with water running at low pressure. Use as little water as possible when washing near the air intake or exhaust pipe openings. Dry thoroughly before starting the engine or operating the motorcycle.
- Make sure brakes are functioning properly before operating the motorcycle.
- Do not use abrasive cleaners. Paint wear or other cosmetic damage can occur if abrasives are used.

NOTICE

Electrical components may be damaged by water. Do not allow water to contact electrical components or connectors.

NOTICE

Do not use pressurized water to wash the motorcycle. Water may seep in and deteriorate wheel bearings and seals, brake caliper assemblies, brake master cylinders, electrical connectors, steering head bearings, and transmission seals if excessive pressure is used.

NOTICE

Do not use glass cleaners, water or soil repellents, and petroleum or alcohol based cleaners on the windshield (if equipped), as these products can damage the windshield.

WINDSHIELD CARE

A windshield is included with some Victory models or available as an accessory.

Rinse the windshield with water to remove loose dirt and dust. Wash the windshield using one of the Pure Victory wash products (follow directions on the container for the product you choose) then rinse (if recommended in the directions) and wipe with a Pure Victory Microfiber Chamois or Plush Microfiber Towel to dry virtually spot free.

NOTICE

Do not use glass water and soil repellents, petroleum or alcohol based cleaners as these products can damage the windshield.

NOTICE

Windshield material is polycarbonate plastic. Do not use cleaners or rain protective products meant for glass surfaces on the windshield.

STORAGE

! WARNING

Care should be taken to be sure the motorcycle will not tip or fall while elevated. Severe personal injury or death could occur if the motorcycle tips or falls.

To prevent storage damage due to long-term storage (60 days or more) the following guidelines should be followed.

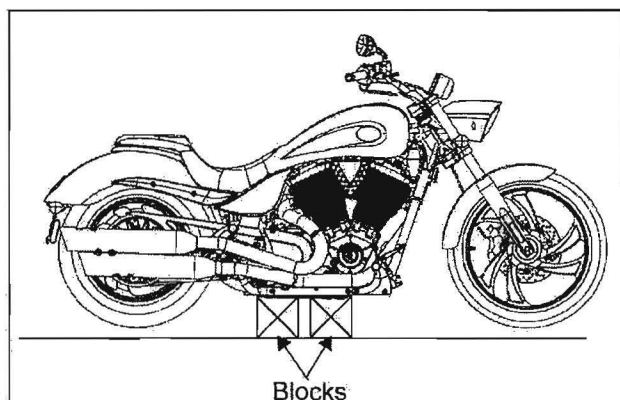
1. Top off fuel tank with fresh fuel and add fuel stabilizer to fuel.
2. Run motorcycle for 15 minutes or more to distribute fuel stabilizer throughout fuel system.
3. Clean motorcycle completely.
4. Dry machine thoroughly and wax all painted surfaces.
5. Change engine oil as outlined in Chapter 2.
6. Block frame to take some of the weight off of front and rear wheels.
7. Secure a plastic bag over the exhaust outlets to prevent moisture from entering the exhaust system.



IMPORTANT: Make certain exhaust system is cool prior to securing plastic.

8. Remove battery and charge it.
9. Store battery in a cool, dry area and charge it once a month.
10. Cover motorcycle with a genuine Victory cover, or a covering made of fabric that allows for adequate ventilation. Do not use plastic or tarps, as corrosion may result.

IMPORTANT: Starting the motorcycle periodically during storage is not recommended. Water vapor is a by-product of the combustion process and corrosion may result unless the engine is operated long enough to bring the oil and exhaust system to normal operating temperature.



Set floor jack under the center of the engine. Raise vehicle off the floor and set 2 blocks underneath the bike as shown. Set bike down on blocks and secure so it cannot tip or fall.

SUEDE FINISH CARE

Suede paint is different from Victory's usual high gloss finish. Like suede fabric, suede paint changes as you interact with the finish. It will change with time, exposure to elements, and use. Although the quality of the paint is not affected by these changes, special care is required when cleaning a suede finish.

Suede paint cannot be buffed out if it becomes scratched or scuffed. If polished, the finish will become less flat or matte. This finish cannot be repaired if it receives heavy damage like a scratch or a chip.

Suede Finish Cleaning Instructions

1. Spray Pure Victory Polish Suede Finish Cleaner (#90949) directly on all suede bodywork.
2. Using a Pure Victory Polish 100% Microfiber Polishing Towel (#90962), wipe cleaner into the surface, then wipe dry using a clean, dry surface of the towel.
3. After suede bodywork is clean and dry, apply Pure Victory Polish Suede Finish Protectant to maintain and protect the beauty of your Victory Motorcycle.

Suede Finish Protectant Instructions

1. Spray Pure Victory Polish Suede Finish Protectant (#90950) onto clean suede bodywork and use Polishing Towel (#90962) or Microfiber Applicator (#90965) to rub protectant thoroughly into the surface.
2. Using a clean, dry microfiber towel, wipe surface to achieve that showroom-new Suede Finish.

IMPORTANT: Be sure to apply Pure Victory Polish Suede Finish Protectant after every cleaning.



NOTES



CHAPTER 3

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FRAME-BODY-EXHAUST

SAFETY

GENERAL PRECAUTIONS

This section covers the removal and installation of the frame body panels and exhaust system. Always replace exhaust system sealing gaskets when exhaust components are removed. Inspect the system for leaks after installation.

WARNING

Gasoline is extremely flammable and explosive under certain conditions.

Always stop the engine and refuel outdoors or in a well ventilated area.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

Do not overfill the tank. Do not fill the tank neck above the fuel tank insert. Leave air space to allow for fuel expansion.

If you get gasoline in your eyes or if you swallow gasoline, see your doctor immediately. Never try to siphon gasoline using mouth suction.

If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.

Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

WARNING

The engine exhaust from this product contains chemicals known to cause cancer, birth defects or other reproductive harm.

WARNING

Improper repairs or service can create unsafe conditions that may cause serious injuries or death to your customers or others.

WARNING

Never run the engine in an enclosed area without a properly functioning exhaust gas evacuation system connected to the product.

WARNING

Engine and exhaust components get hot and remain hot for a period of time after the engine is stopped. Wear insulated protective clothing or wait for components to cool sufficiently before working on the machine.

WARNING

Engine exhaust from this product contains poisonous carbon monoxide gas that can cause loss of consciousness and may lead to death.

WARNING

Modifications to this motorcycle not approved by Victory may cause loss of performance, excessive emissions, and make the machine unsafe for use.

SPECIAL TOOLS

No special tools are required in this section.

3.2

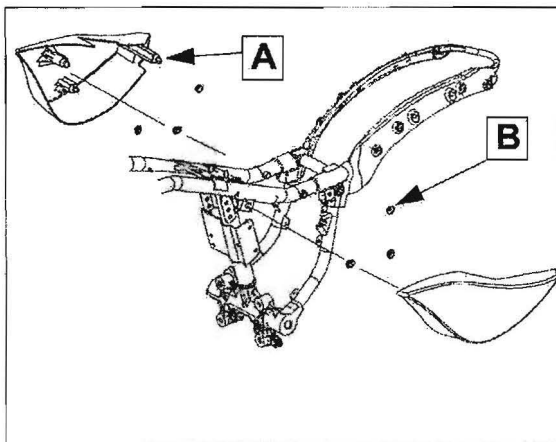


TROUBLESHOOTING

EXHAUST SYSTEM TROUBLESHOOTING	
SYMPTOM	POSSIBLE CAUSE
Excessive Exhaust Noise	Broken or Leaking Exhaust System
Vibration	Loose Exhaust Mounts Exhaust Contacting Frame
Poor Performance	Bent or Damaged Exhaust Components Deformed Exhaust Components Leaking Exhaust System Plugged or Restricted Exhaust System Plugged or restricted IAC system hoses

BODY

SIDE COVER REMOVAL



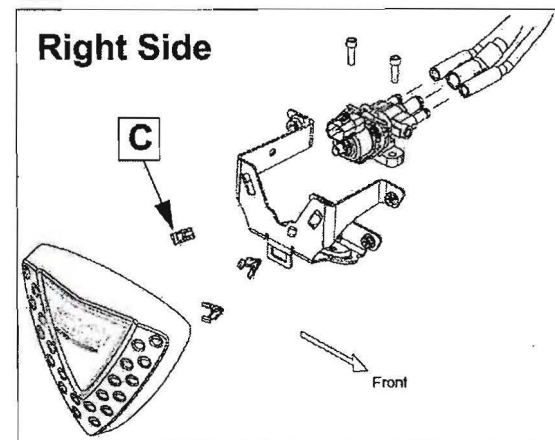
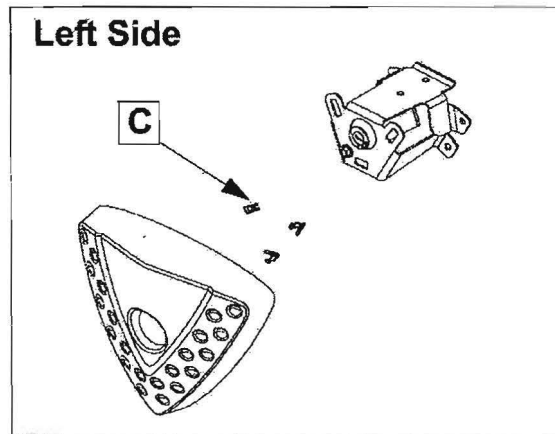
1. Pull corners of left or right cover evenly straight outward to disengage each tab (A) from rubber grommet in frame (B).
2. Be sure rubber grommets are in place before reversing procedure to install side covers.

Installation

1. Lubricate rubber grommets with mild soap and water solution. Push cover evenly inward on all 3 corners until tabs are securely engaged.

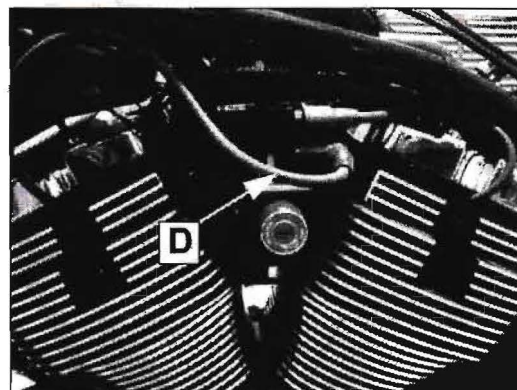
IGNITION SWITCH / IAC COVER REMOVAL / INSTALLATION

1. Grasp ignition switch cover (left side) or Idle Air Control (IAC) cover (right side) and pull outward to release 3 clips (C).



Installation

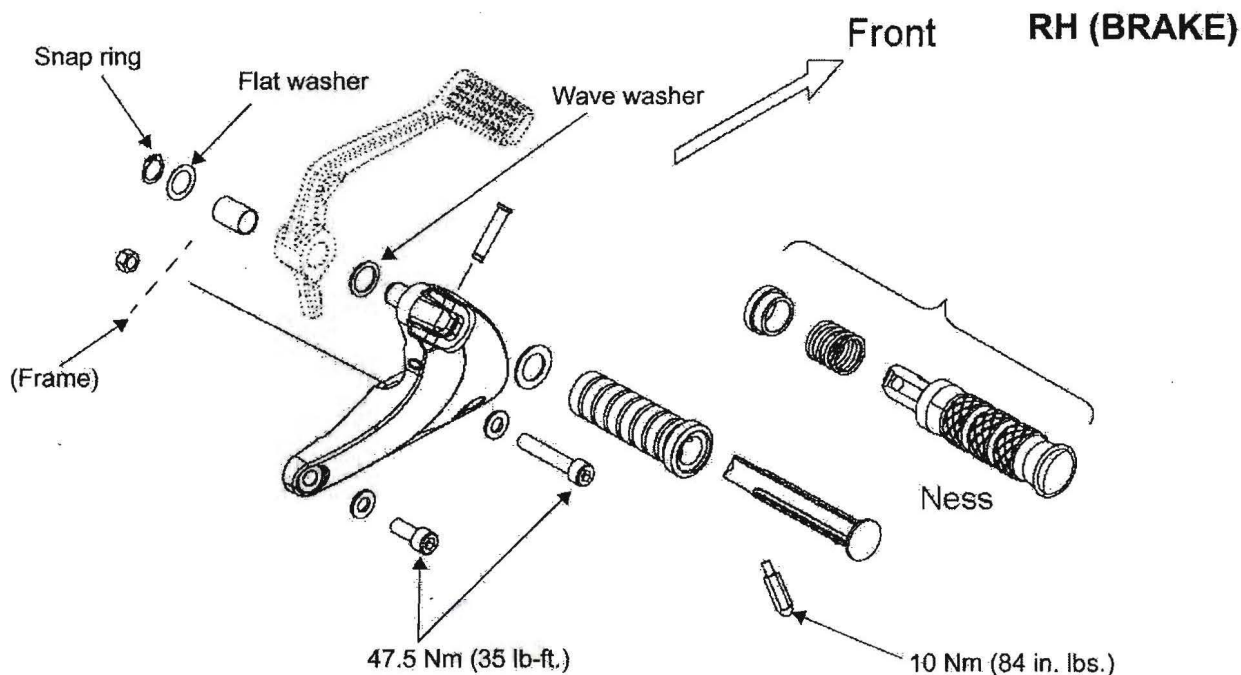
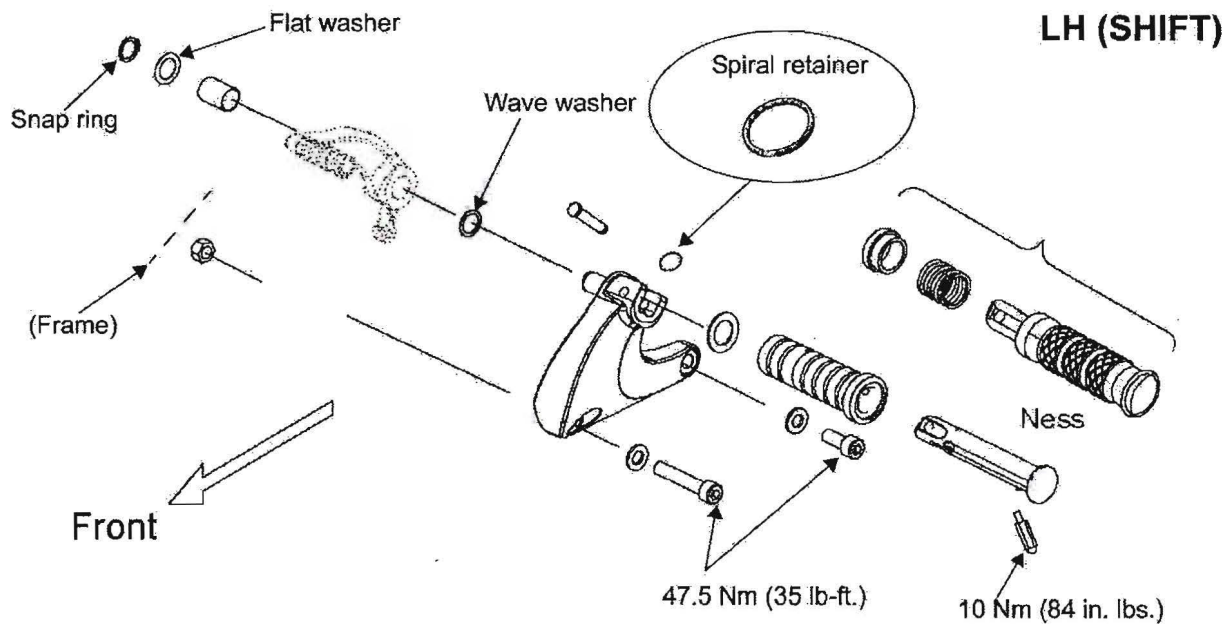
1. Be sure clips are in place and in good condition.
2. LH cover - route front HTL (D) below top of cover.
3. Push cover evenly inward to install.



FOOT REST SUPPORT - FOOTPEGS

⚠ WARNING

Do not bend brake lines. Support brake pedal and lines to prevent damage.
Remove L and R footrest as an assembly with brake pedal or shift pedal attached.



3.4



FOOT REST SUPPORT - FLOORBOARDS

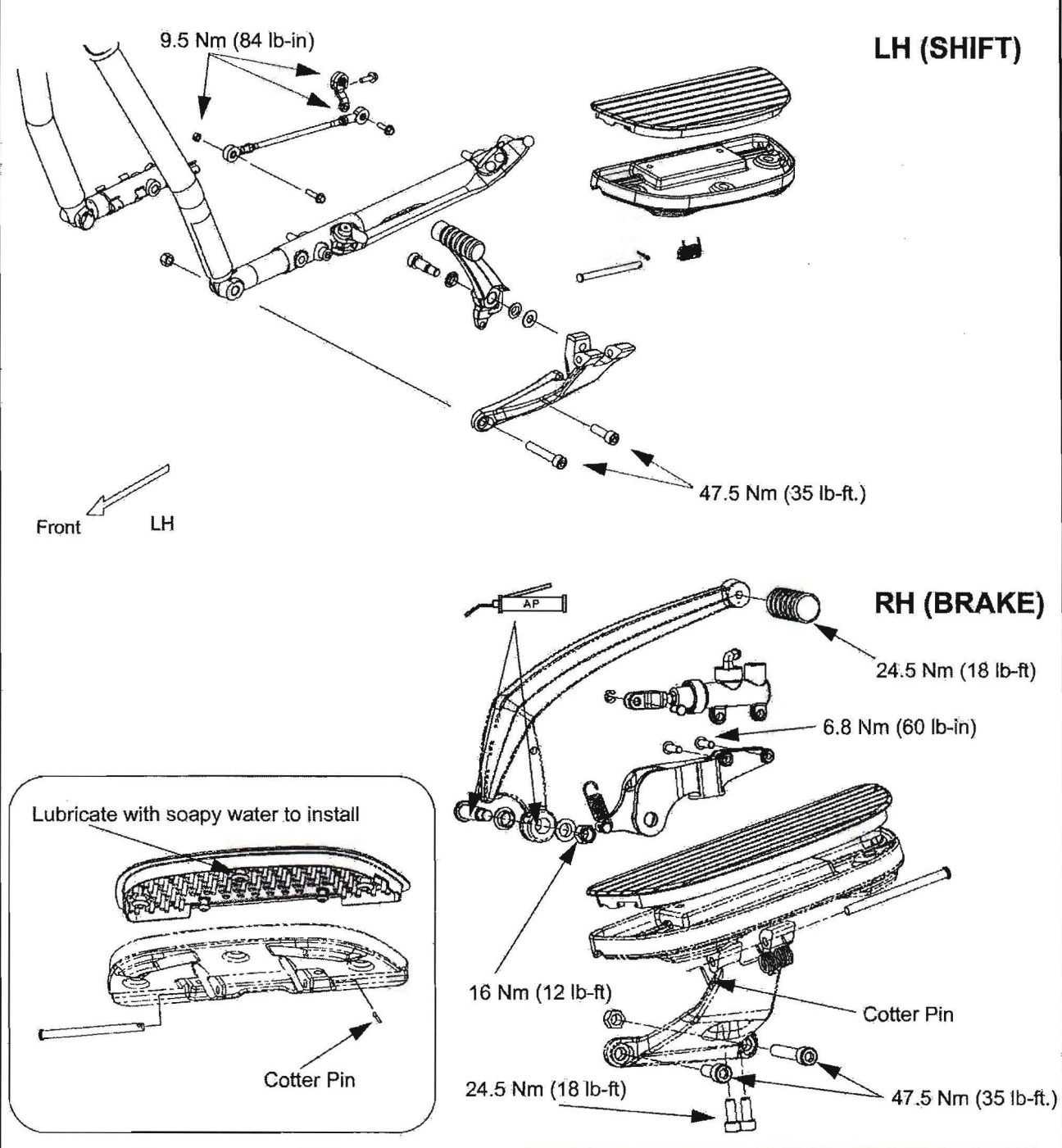
⚠ WARNING

Do not bend brake lines. Support brake pedal and lines to prevent damage.

Remove L and R footrest as an assembly with brake pedal or shift pedal attached.

24.5 Nm (18 lb-ft)

3



SEAT (VEGAS)

WARNING

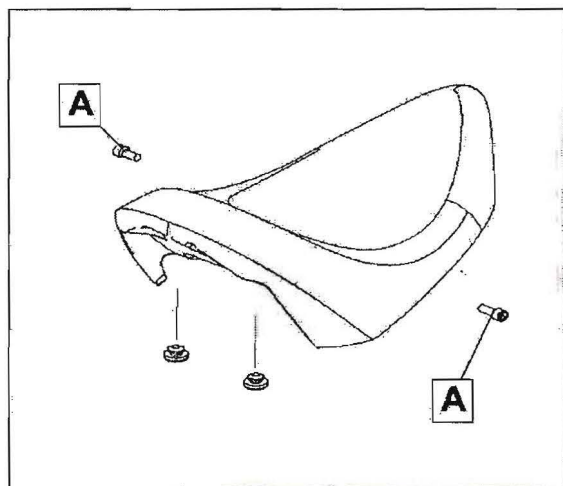
Always make sure the seat is securely fastened before riding the motorcycle. A loose seat could cause a sudden shift in riding position, causing you to lose control of the motorcycle.

Operator Seat Removal

1. Remove left and right side covers (page 3.3).
2. Remove fuse box from base (page 2.29).
3. Remove screws (A).
4. Lift the rear of the seat and pull rearward to disengage front tongue from rubber mount at rear of fuel tank.

Seat Installation

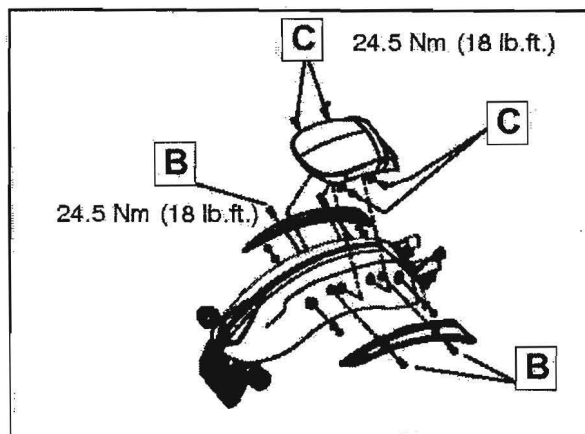
1. Slide tongue of seat into rubber mount at rear of fuel tank.
2. Push down on rear of seat until screw holes align.
3. Ensure front seat tab is engaged in front rubber mount by pulling upward on front of seat.
4. Reinstall screws. Tighten to 24.5 Nm (18 lb.ft.)



PASSENGER SEAT (VEGAS)

Removal

1. Remove (4) rail cover screws (B).
2. Remove four seat fasteners (C).
3. Lift passenger's seat off frame with seat base attached.



Installation

1. Set seat base in place and align mounting holes.
2. Install fasteners and torque to specification.
3. Install rail covers and torque screws to specification.

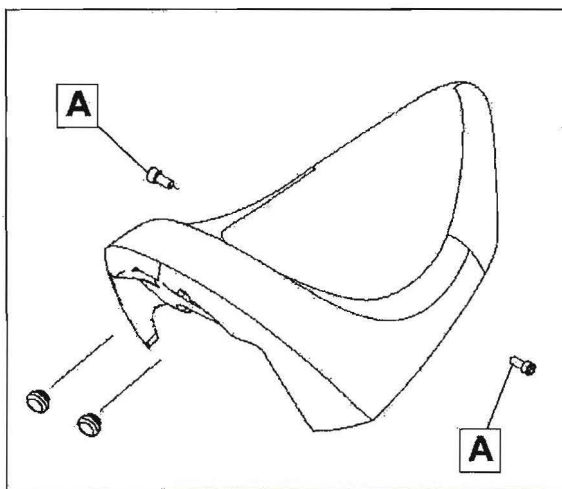
SEAT (KINGPIN)

Operator Seat Removal

1. Remove left and right side covers (page 3.3).
2. Remove fuse box from base (page 2.29).
3. Remove screws (A).
4. Lift the rear of the seat and pull rearward to disengage front tongue from rubber mount at rear of fuel tank.

Seat Installation

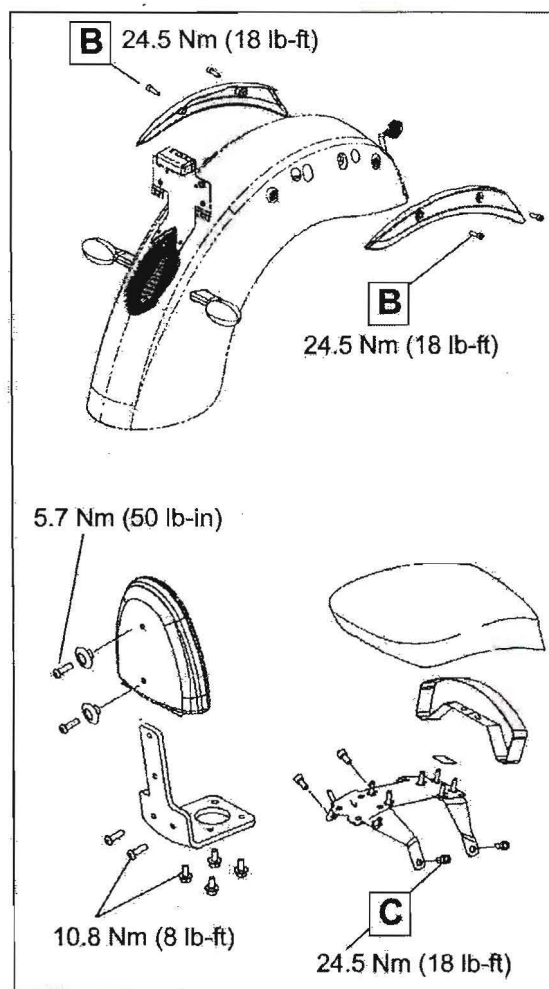
1. Slide tongue of seat into rubber mount at rear of fuel tank.
2. Push down on rear of seat until screw holes align.
3. Ensure front seat tab is engaged in front rubber mount by pulling upward on front of seat.
4. Reinstall screws. Tighten to 24.5 Nm (18 lb-ft)



PASSENGER SEAT (KINGPIN)

Removal

1. Remove (4) rail cover screws (B).
2. Remove four seat fasteners (C).
3. Lift passenger's seat off frame with seat base attached.



Installation

1. Set passenger seat in place and align mounting holes.
2. Install fasteners and torque to specification.
3. Install rail covers and torque screws to specification.



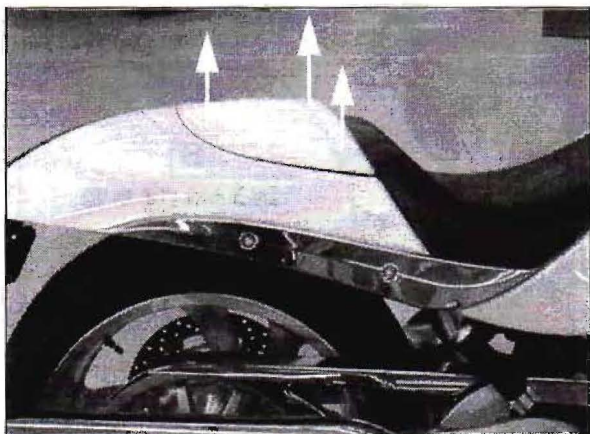
SEAT (HAMMER)

WARNING

Always make sure the seat is securely fastened before riding the motorcycle. A loose seat could cause a sudden shift in riding position, causing you to lose control of the motorcycle.

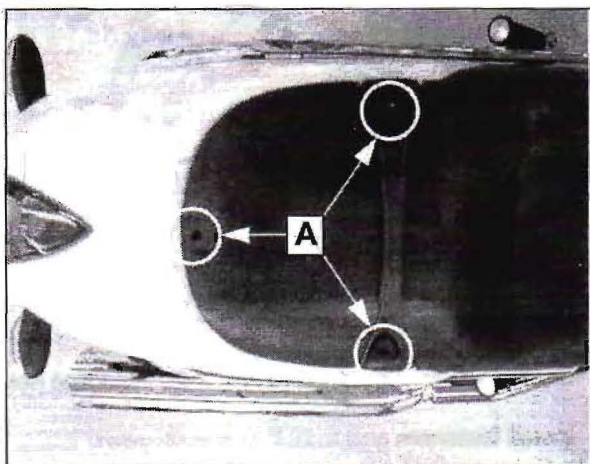
Passenger Seat Cowl Removal

1. Lift upward evenly at front corners and center of rear edge (see arrows).



Seat Removal

2. Remove three 5mm socket head screws from each side and rear edge of seat (A).



3. Lift rear edge of seat and slide rearward and upward to disengage tab at front of seat.

Seat Installation

1. Slide front tab into mount at rear of fuel tank.
2. Push down on rear of seat until screw holes align.
3. Be sure front tab is engaged in front mount by lifting upward on front of seat.
4. Install screws and tighten to 9.5 Nm (84 lb-in.)

Passenger Seat Cowl Installation

1. Lubricate grommets with a mild soap and water solution. Install cowl by pressing evenly on all three points until tabs are engaged in grommets.

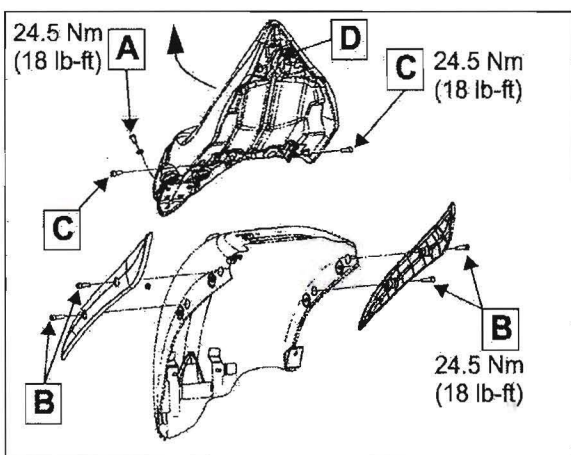
SEAT (JACKPOT)

⚠ WARNING

Always make sure the seat is securely fastened before riding the motorcycle. A loose seat could cause a sudden shift in riding position, causing you to lose control of the motorcycle.

3

1. Remove rear screw (A) and washer.
2. Remove screws (B) and both rail covers.
3. Remove screws (C).
4. Lift slightly at rear of seat and pull straight rearward to disengage front tab (D).

Seat Installation

1. Slide tab on front of seat into seat bracket at rear of fuel tank.
2. Align screw holes on each side of seat and start screws.
3. Align screw hole at rear of seat and star screw.
4. Tighten screws to 18 lb-ft. (24.5 Nm).
5. Ensure front tab is engaged with bracket by pulling upward on front of seat.
6. Reinstall rail covers and torque fasteners to 18 lb-ft. (24.5 Nm).

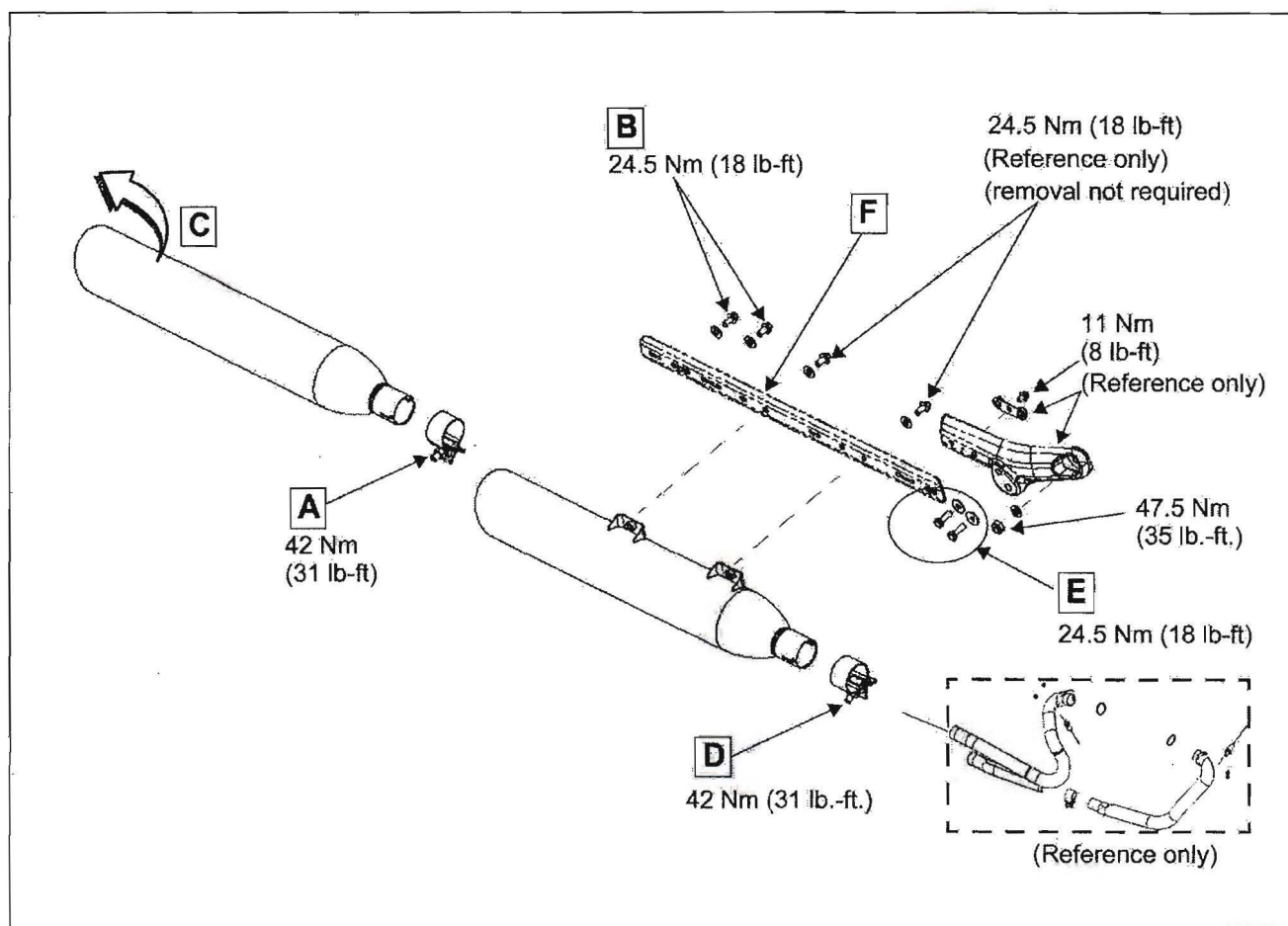


EXHAUST MUFFLER

Review all **WARNINGS** on page 3.2 before working on exhaust system. Clean any oil, grease, or fingerprints from the exhaust system before starting the engine to reduce the chance of chrome discoloration.

Loosen or remove in following order:

1. (A) (15mm).
2. (B) (13mm).
3. (C)
4. (D) (15mm).
5. (E) (13mm) Remove lower muffler and bracket (F) as an assembly.
6. Remove head pipes (page 3.11).
7. Reverse steps above to install mufflers.



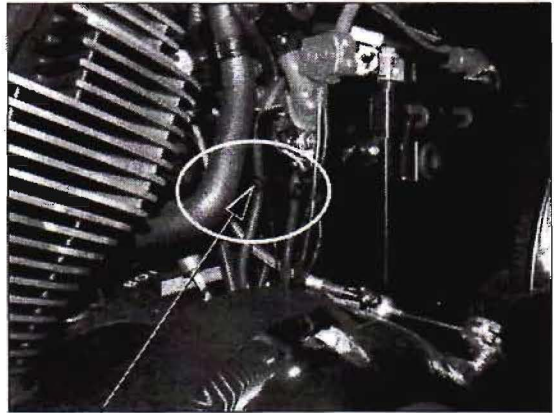
EXHAUST HEAD PIPE

Review all **WARNINGS** on page 3.2 before working on exhaust system. Clean any oil, grease, or fingerprints from the exhaust system before starting the engine to reduce the chance of chrome discoloration.

Replace All Gaskets Upon Assembly (where applicable)

Loosen or Remove in the following order:

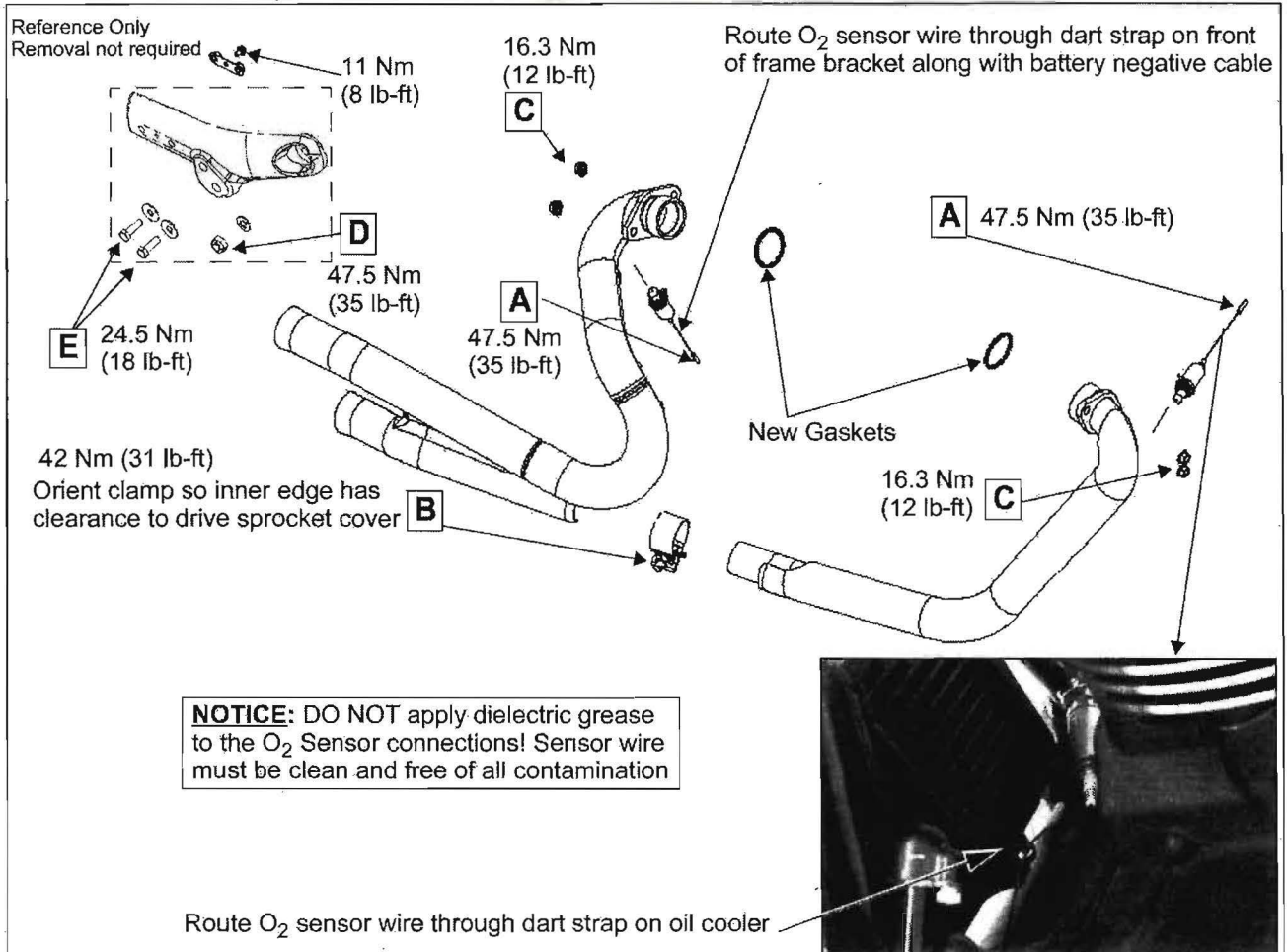
1. Mufflers (page 3.10).
2. Disconnect front and rear O₂ sensors at connector (A) (not at sensor).
3. (B) (15mm).
4. (C) (13mm).
5. Loosen footrest support (if required) and separate head pipes at (B) to remove.
6. (D) (17mm)
7. (E) (13mm)



3

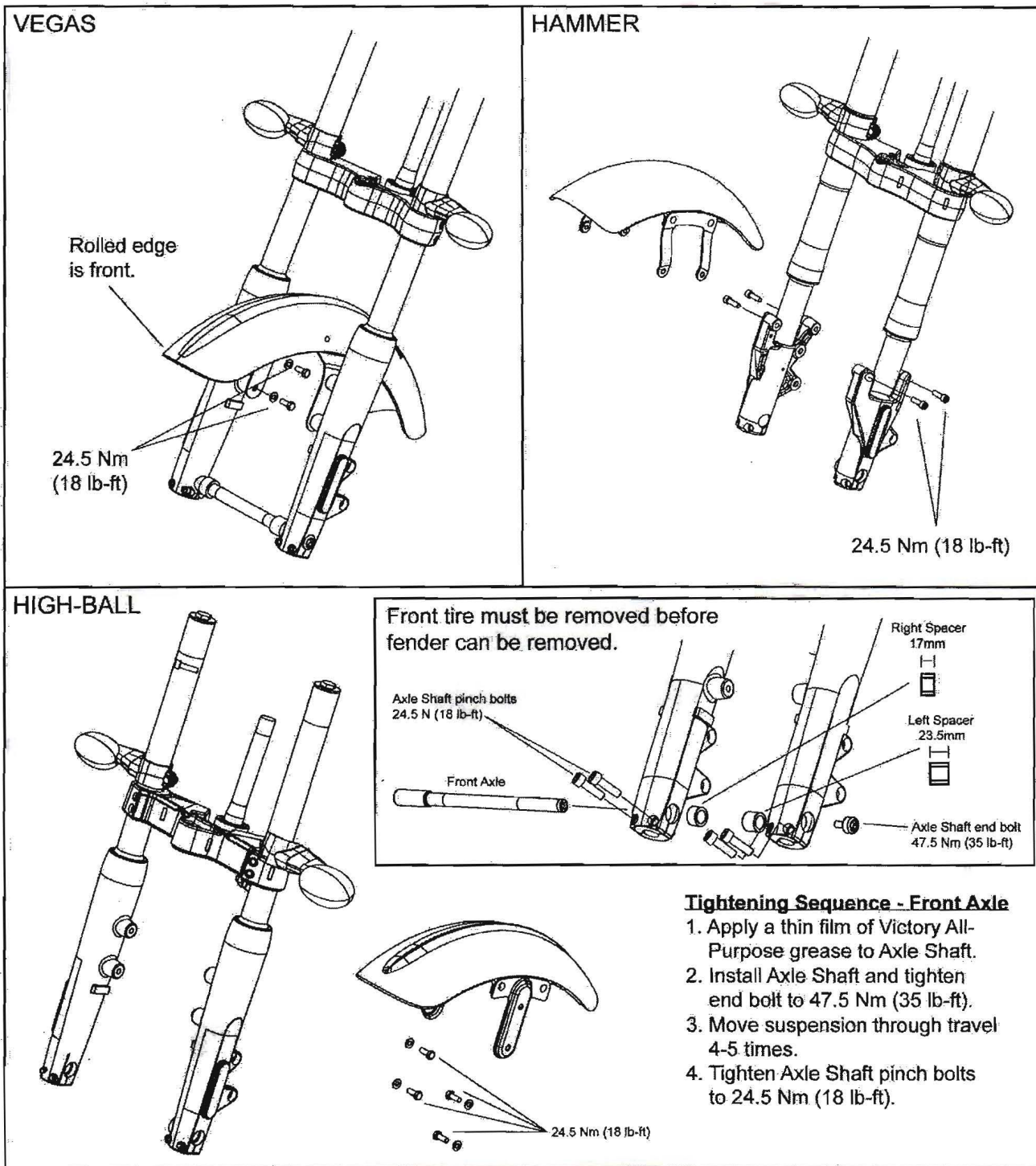
INSTALLATION

1. Reverse removal steps above.



FRONT FENDER

Remove:



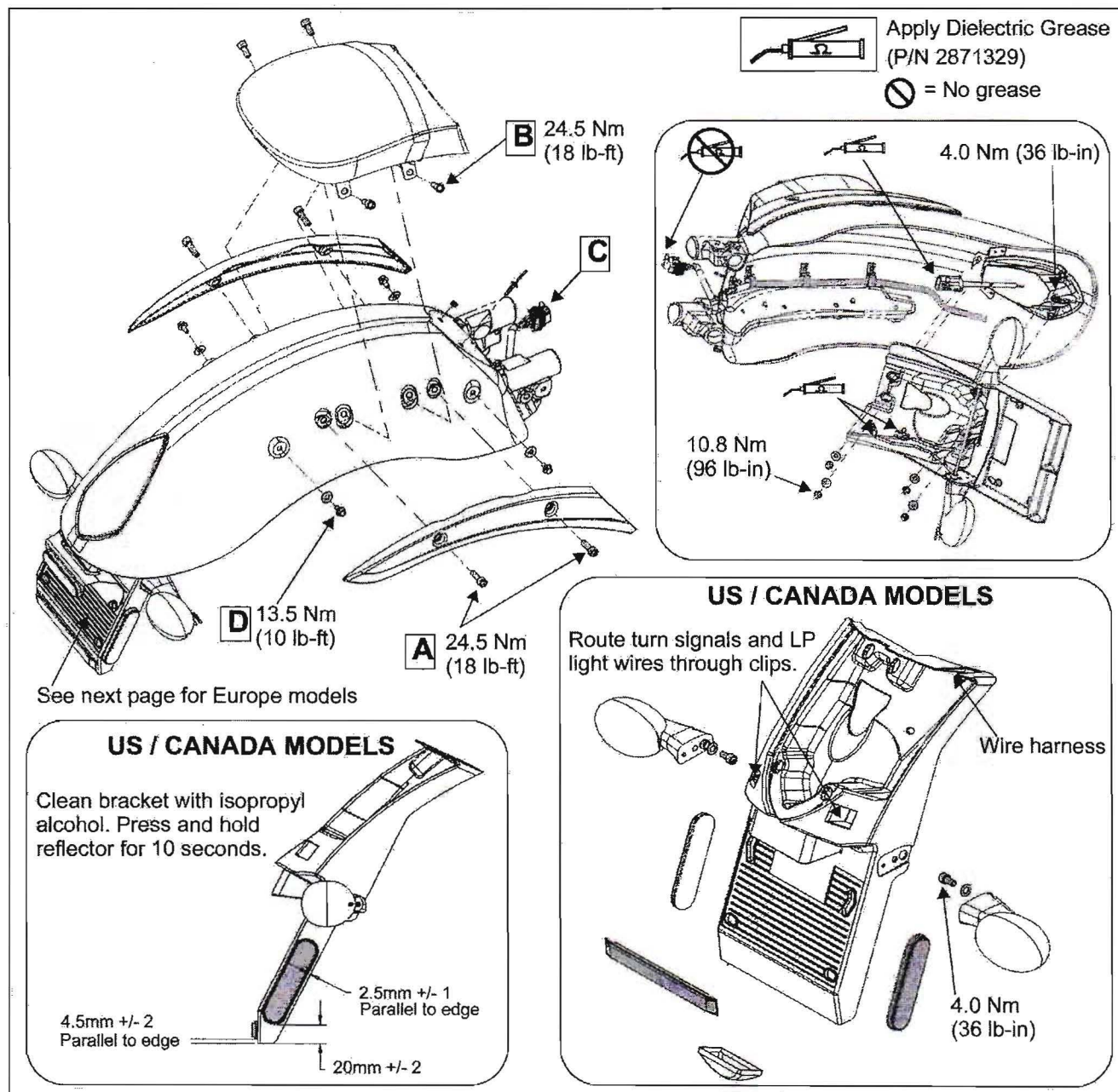
REAR FENDER REMOVAL (VEGAS)

1. Remove side covers (page 3.3) and operator seat (page 3.6).
2. Remove strut cover screws (A) and passenger seat screws (B).
3. Disconnect harness (C).
4. Remove fender screws (D).
5. Remove rivet at front of debris flap.
6. Release wire harness dart and remove fender.

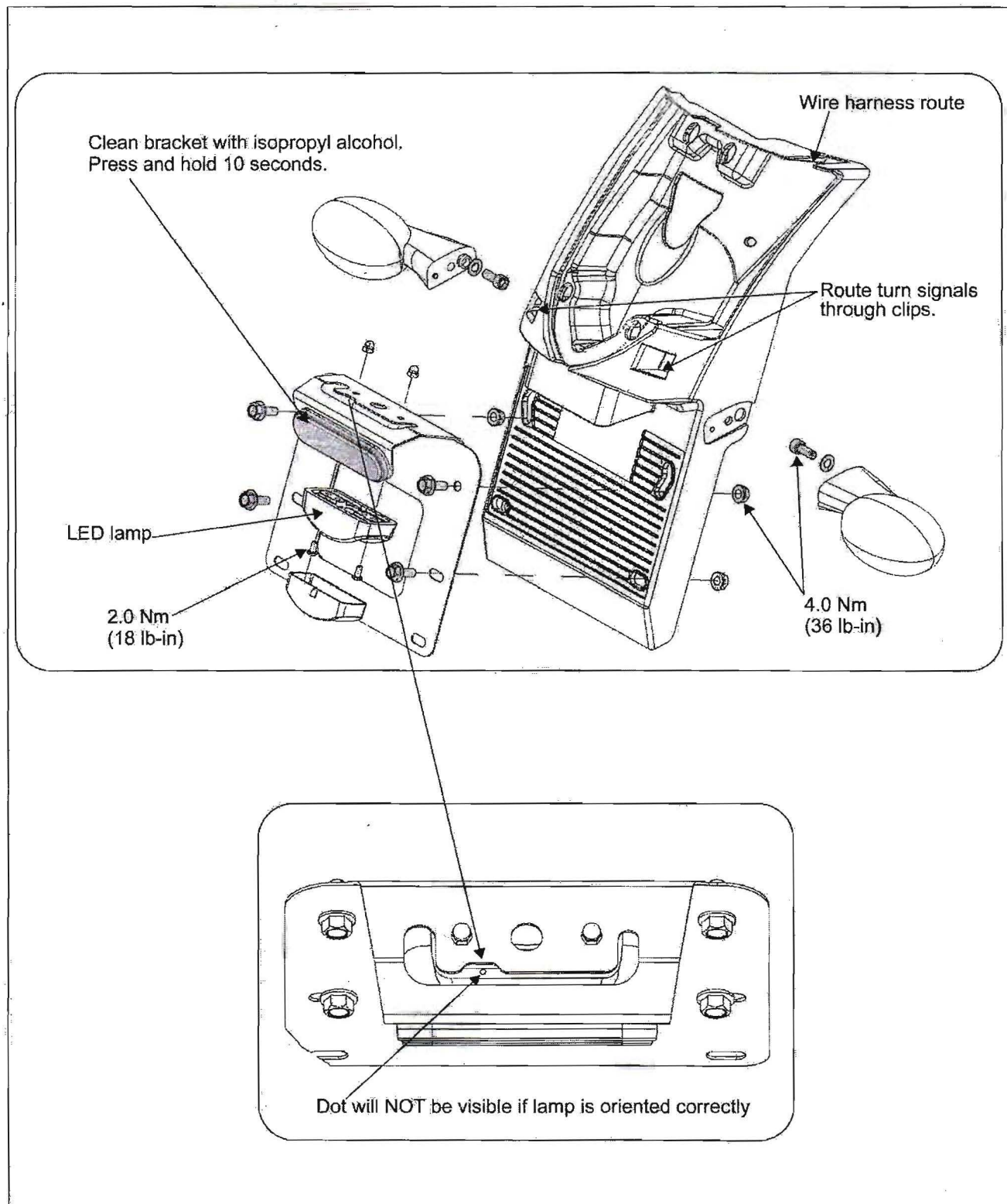
REAR FENDER INSTALLATION (VEGAS)

1. Reverse the order of disassembly to install fender. Be sure wire harness is routed properly and secured at all locations.
2. Torque all fasteners to specification.
3. Use new darts upon assembly.

3



LICENSE PLATE MODULE - EUROPE (VEGAS)



3.14

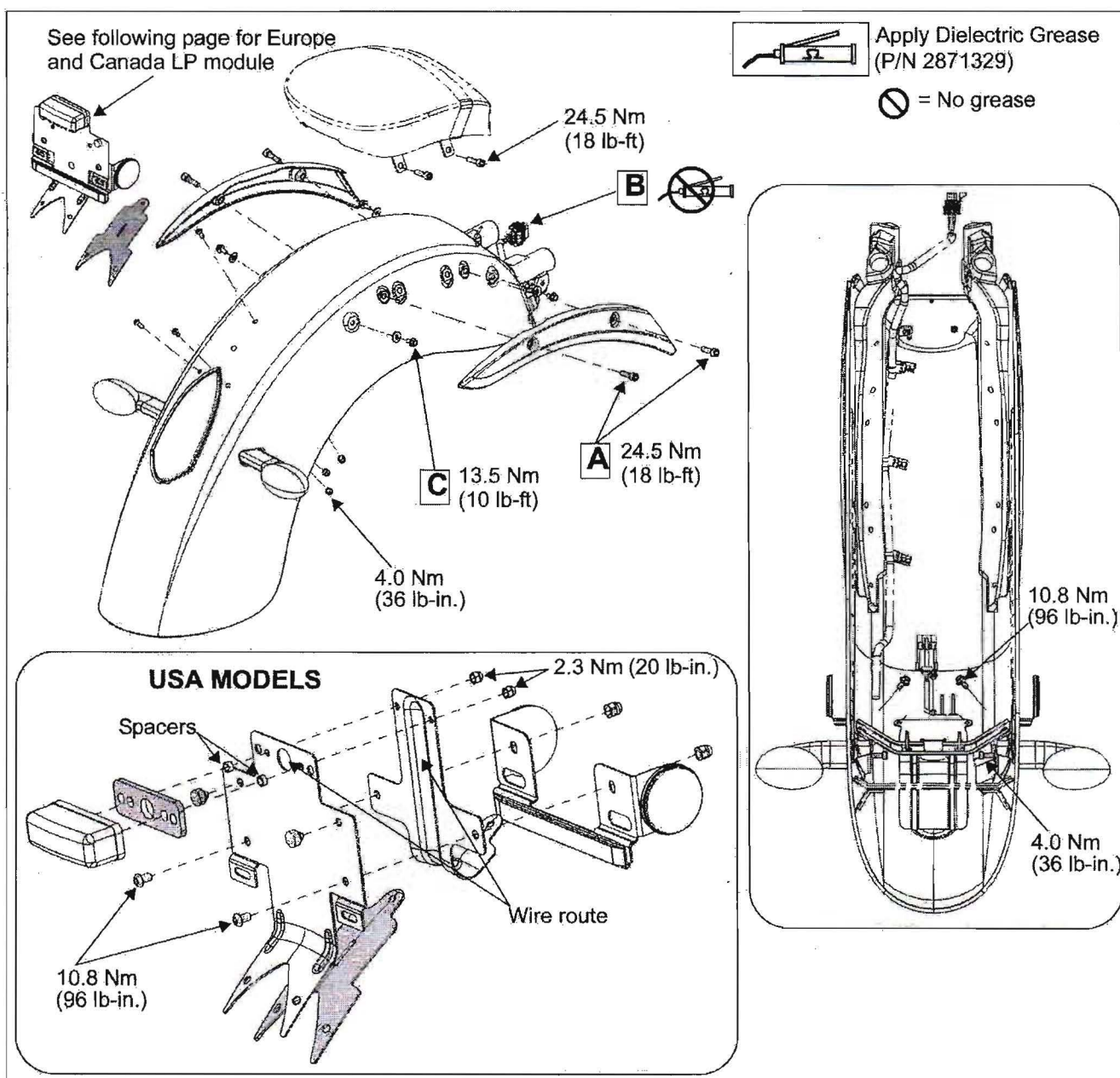


REAR FENDER REMOVAL (KINGPIN)

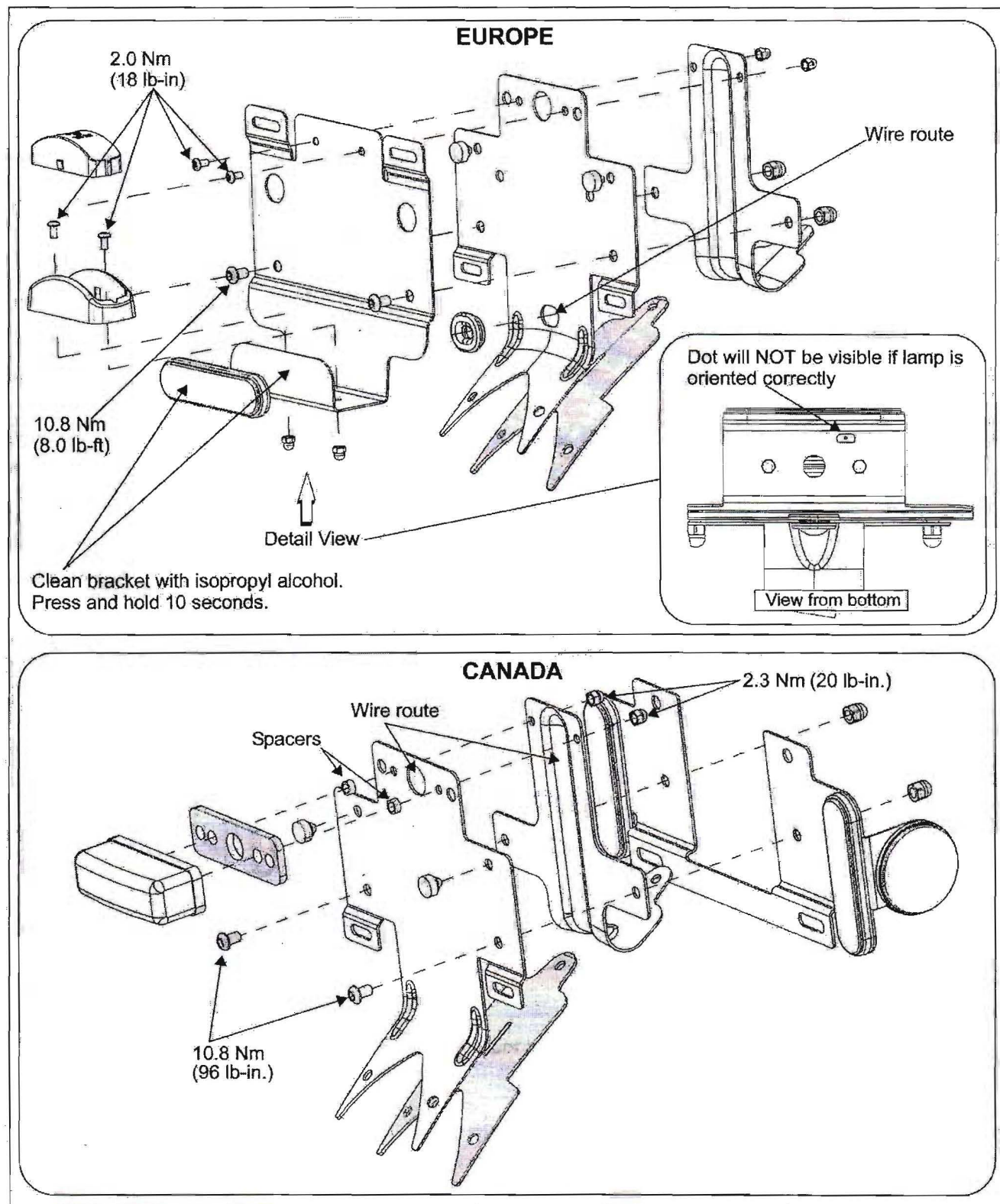
1. Remove side covers and seat(s) (page 3.7).
2. Remove strut cover screws (A).
3. Disconnect rear harness (B).
4. Remove screws (C) from each side of fender.
5. Remove rivet to release debris flap.
6. Release wire harness dart.
7. Remove fender.

REAR FENDER INSTALLATION (KINGPIN)

1. Reverse the order of disassembly to install fender. Be sure wire harness is routed properly and secured at all locations.
2. Torque all fasteners to specification.
3. Use new rivet upon assembly.
4. Connect wire harness.



LICENSE PLATE MODULE - EUROPE / CANADA (KINGPIN)



3.16



REAR FENDER REMOVAL (HAMMER / JACKPOT)

Refer to Assembly Views on page 3.18 (Hammer) or page 3.19 (Jackpot).

Remove:

1. Seat and passenger seat (where applicable).
2. Remove battery negative (-) cable from battery terminal.
3. Disconnect rear wire harness (A) under seat.
4. Remove strut covers (B), saddlebag brackets (where applicable) and fender screws (C).
5. Remove dart from right side of fender flap so wire harness can be guided between flap and frame.
6. Remove fender assembly.

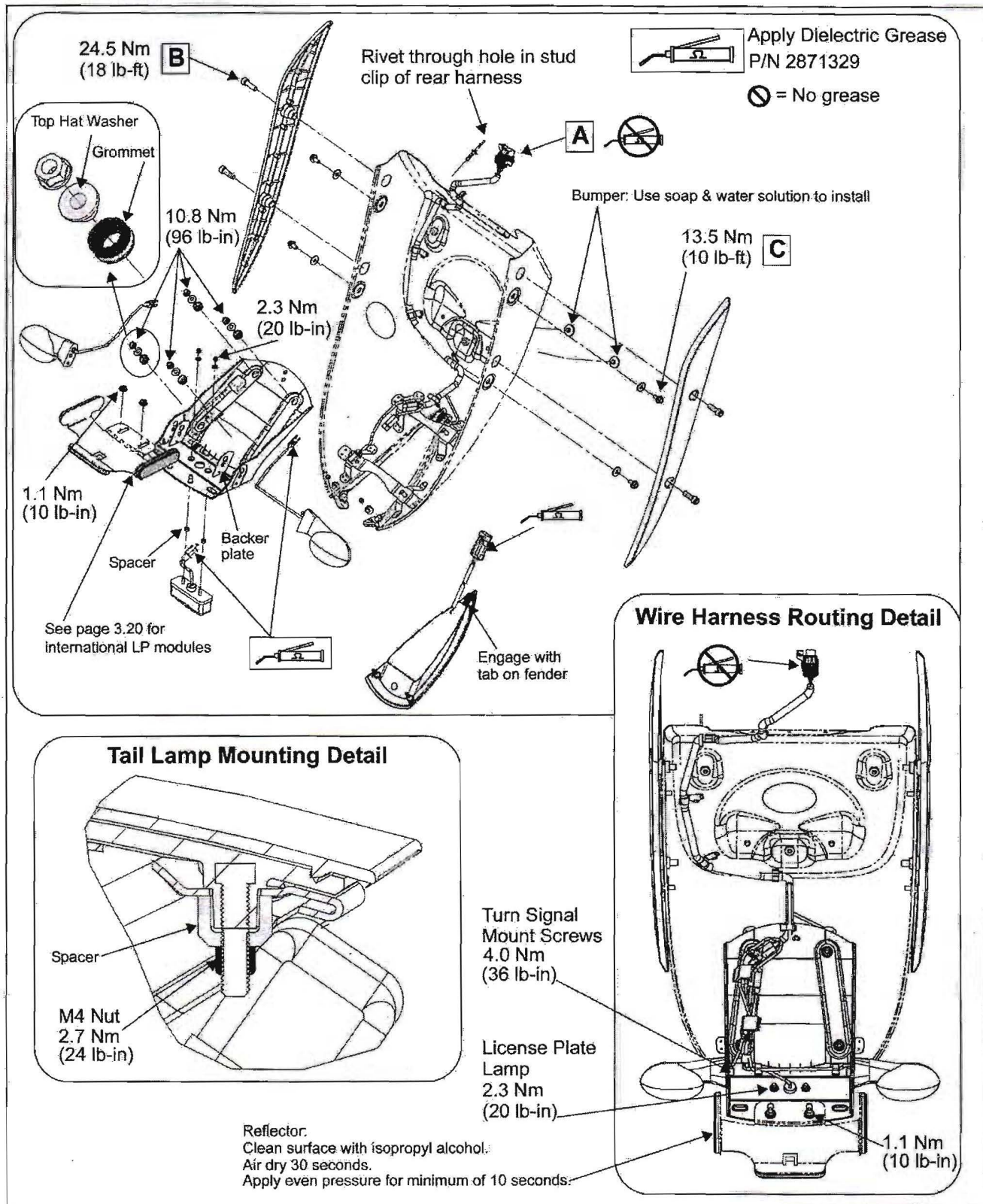
REAR FENDER INSTALLATION (HAMMER / JACKPOT)

Install:

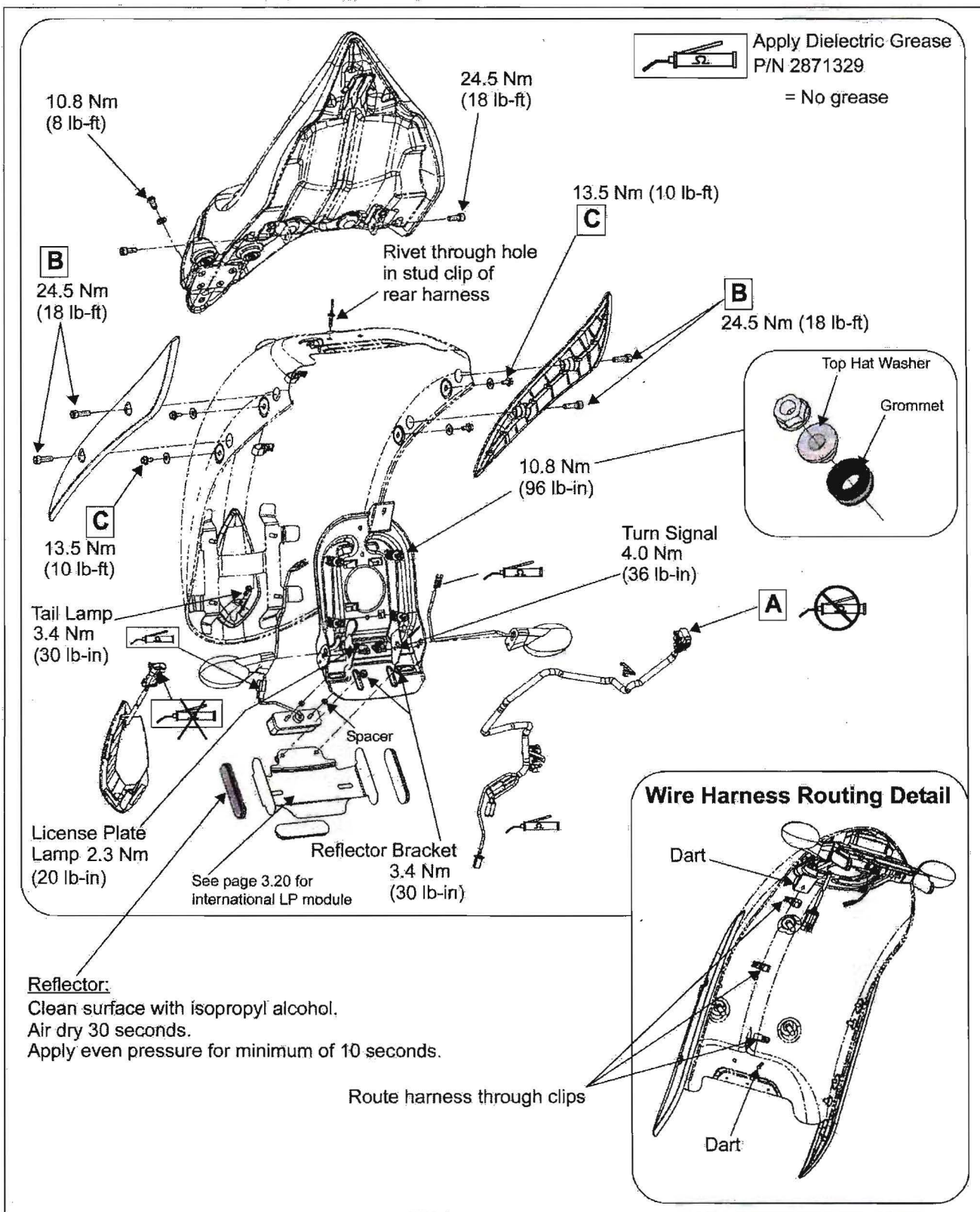
1. Be sure all wires are routed and secured properly under the fender.
2. Install fender with debris flap in front of leading edge, and route wire harness through harness clip on right side and toward connector on right side of chassis.
3. Install fasteners and torque to specification.
4. Connect harness and secure any harness darts.
5. Install strut covers and saddlebag brackets (where applicable).
6. Tighten all fasteners to specified torque.
7. Install seat(s) and side covers.



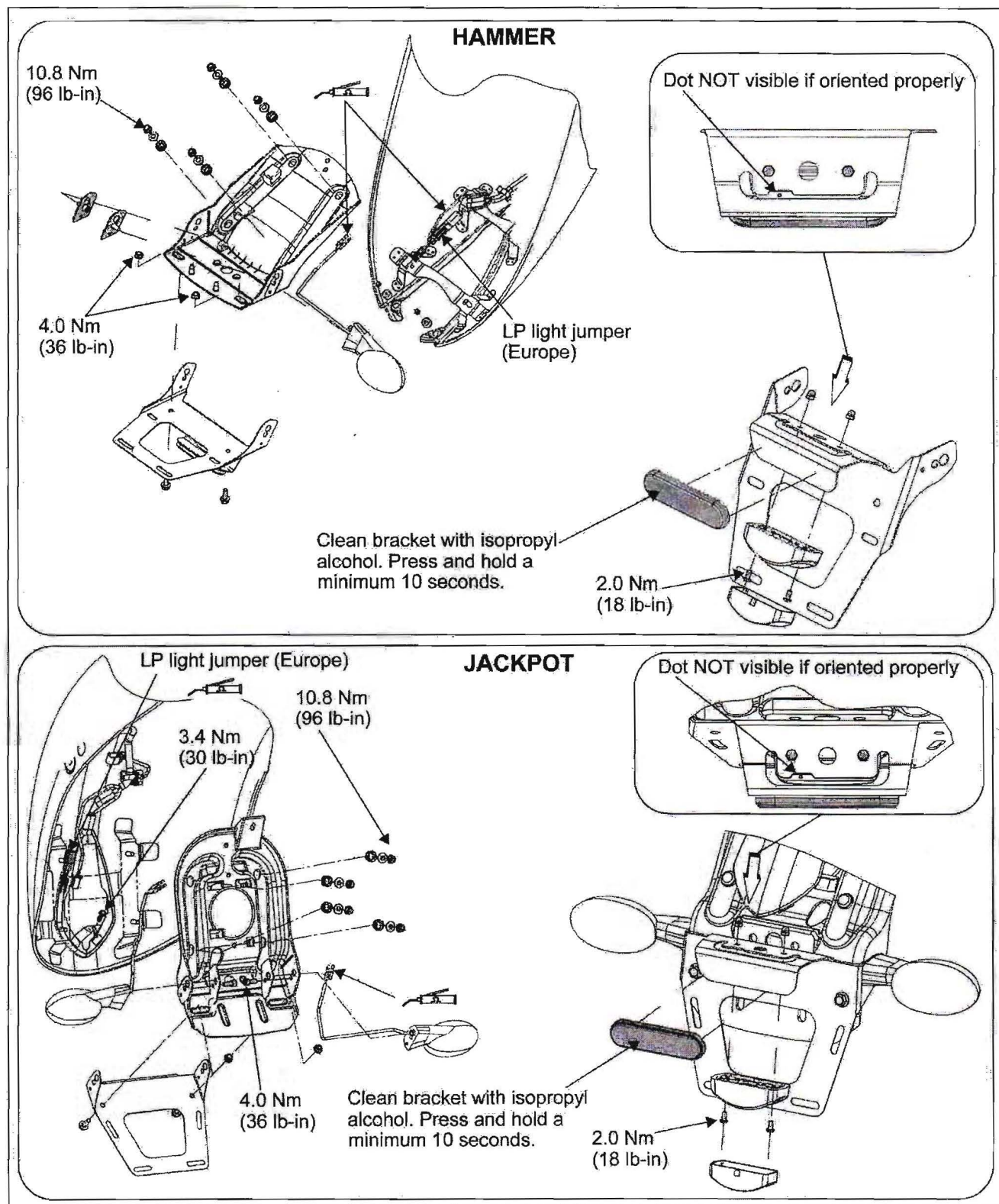
REAR FENDER ASSEMBLY - HAMMER



REAR FENDER ASSEMBLY - JACKPOT

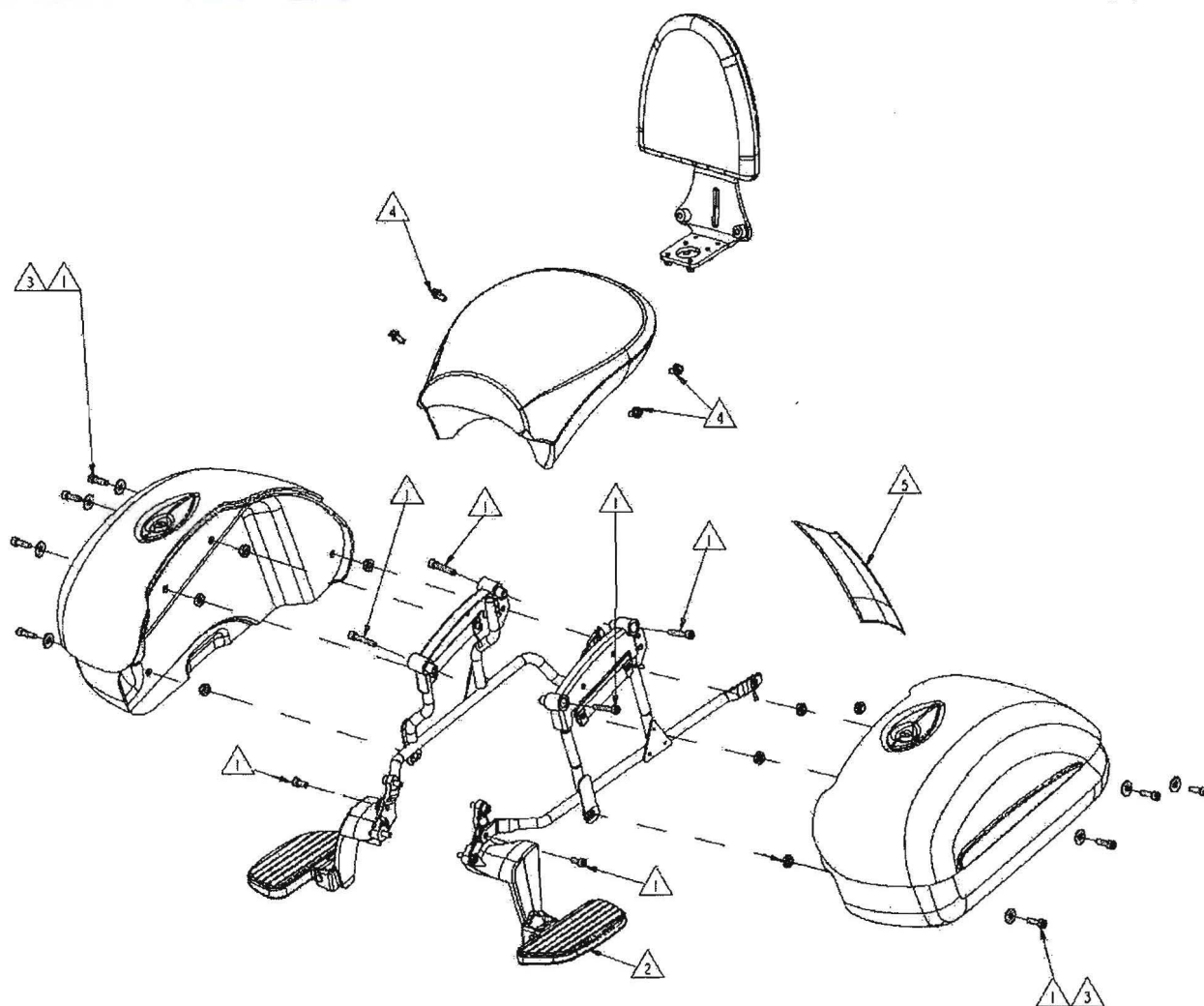







LICENSE PLATE MODULE - INTERNATIONAL (HAMMER / JACKPOT)



SADDLEBAGS

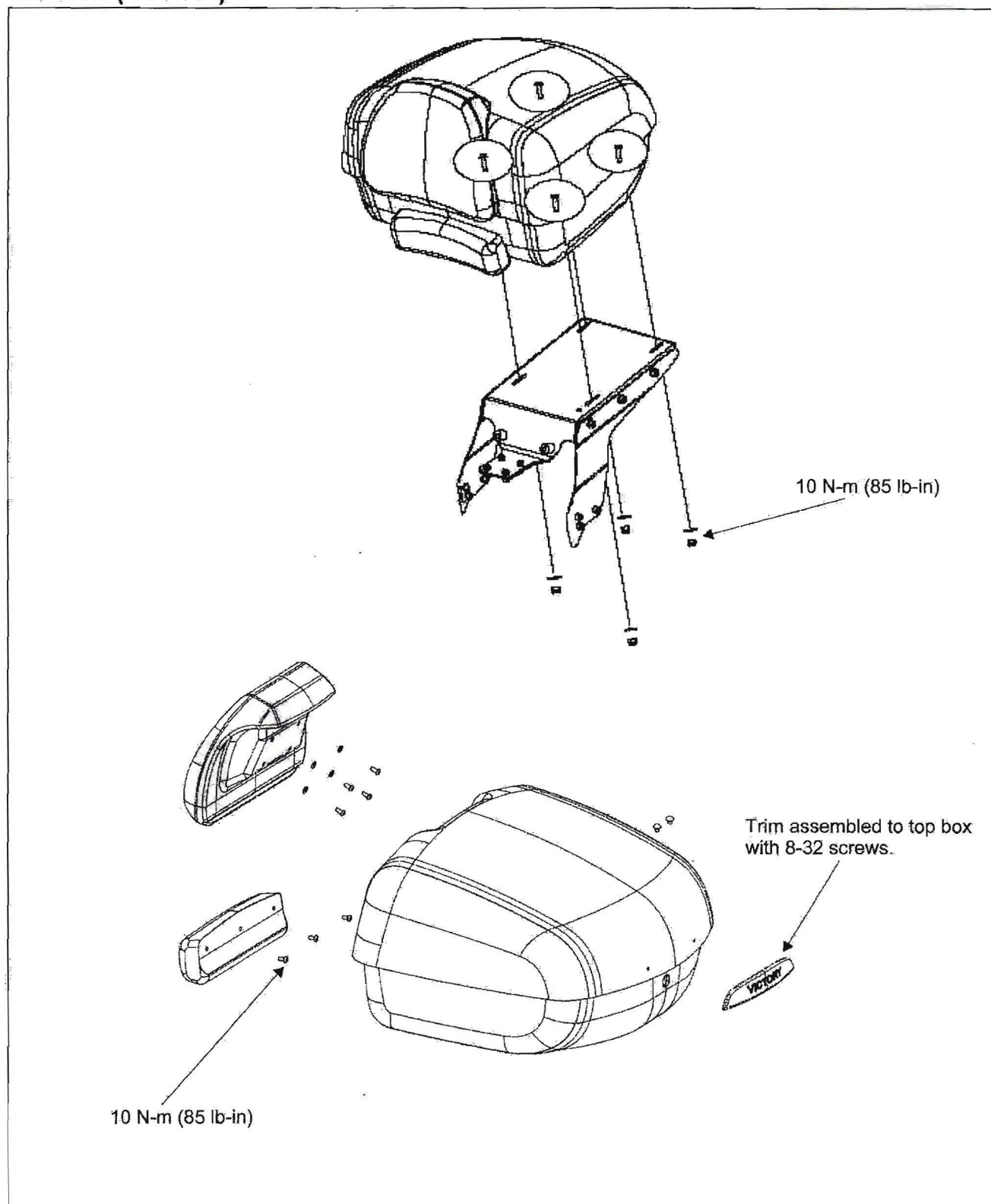
3



-  1 24.5 Nm (18 lb-ft)
-  2 Lubricate detent ball and spring as required
-  3 Attach from inside bag into bracket
-  4 31 Nm (23 lb-ft)
-  5 Apply 40 lbs. even pressure for minimum 5 seconds



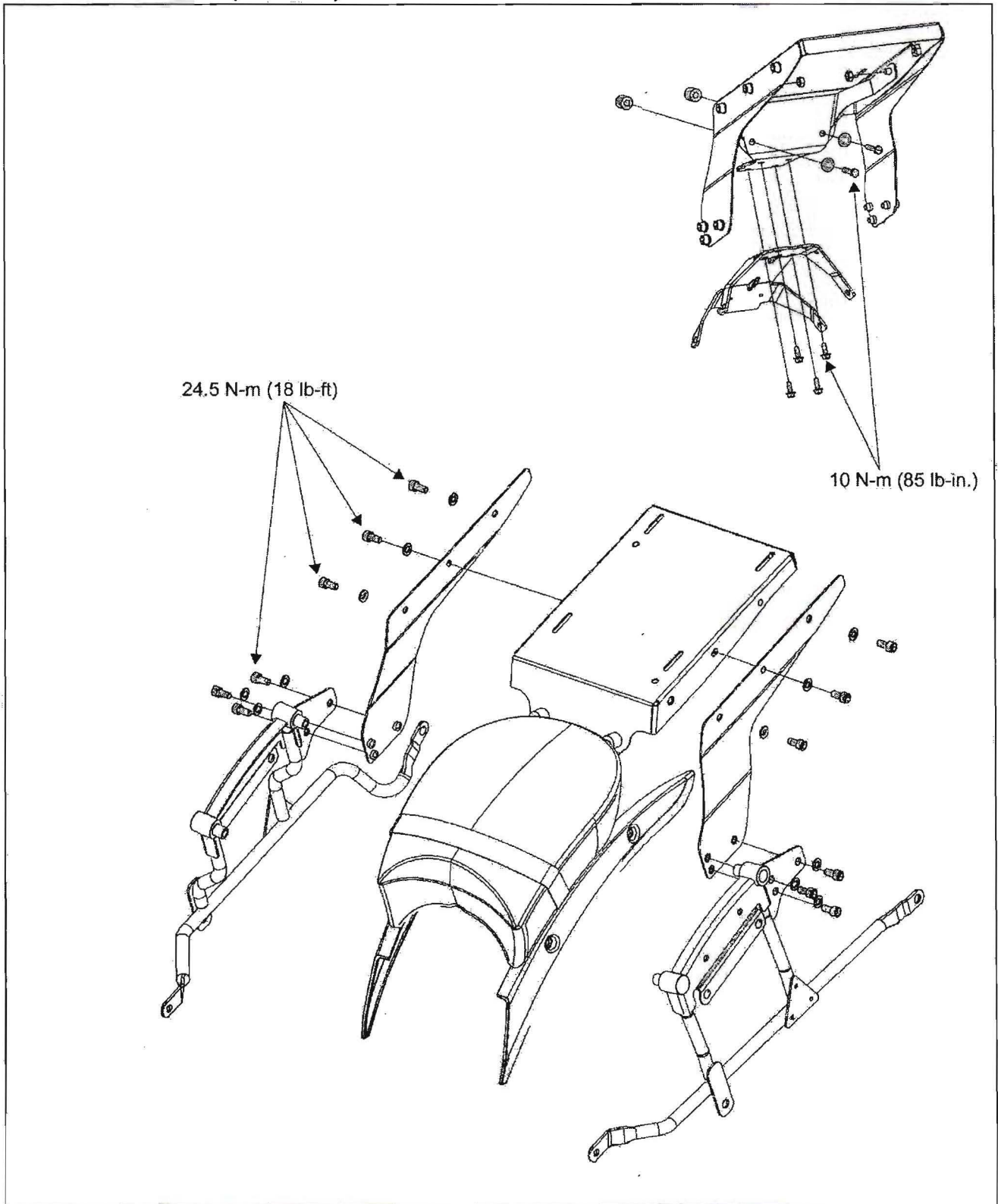
TOP BOX (KINGPIN)



3.22

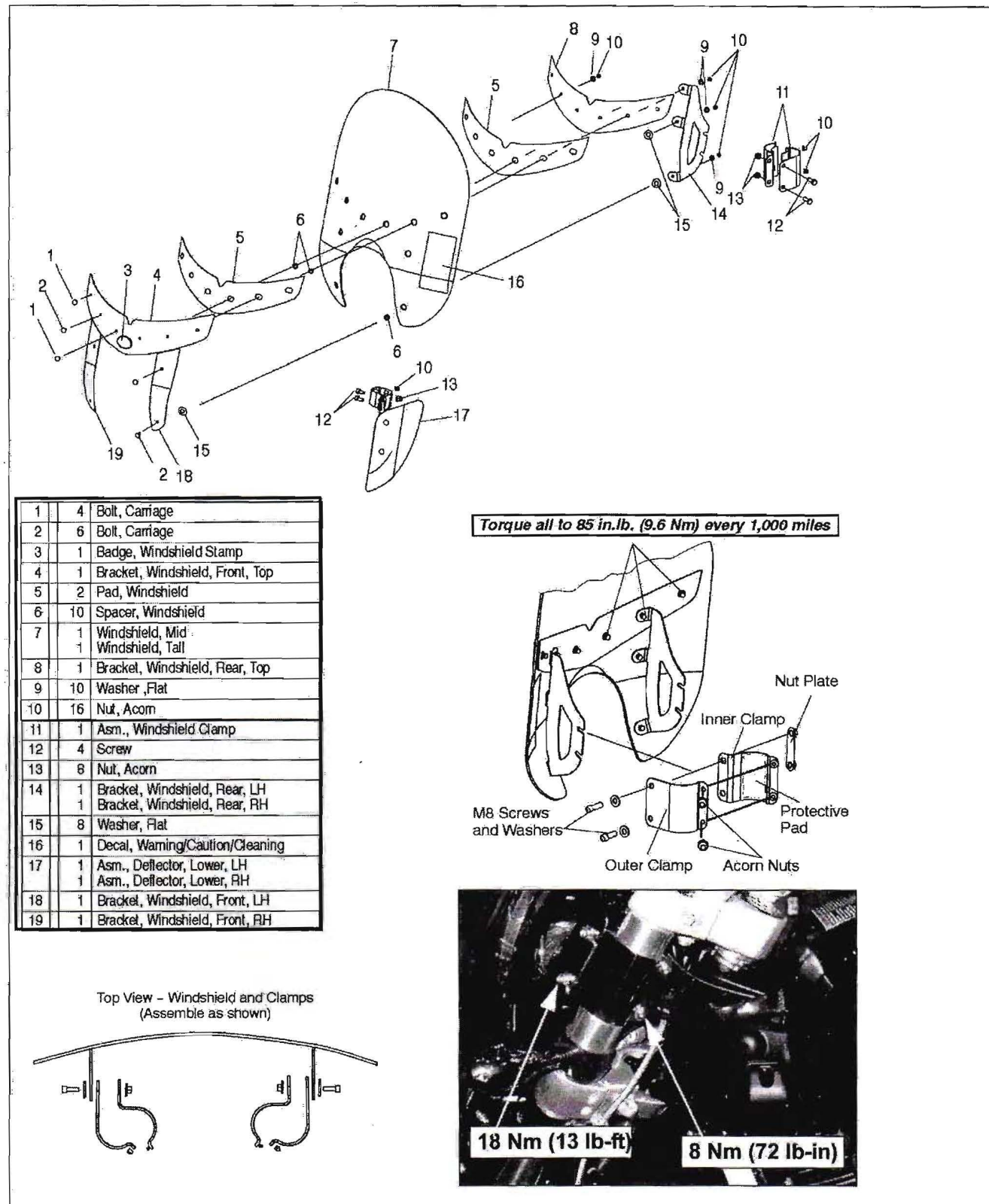


TOP BOX SUPPORT (KINGPIN)



FRAME-BODY-EXHAUST

WINDSHIELD



3.24



CHAPTER 4

LUBRICATION & COOLING

OILING SYSTEM	4.2
OPERATION	4.2
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OIL PUMP INSTALLATION	4.15



OILING SYSTEM

OPERATION

For safety, read, understand and follow the warnings/cautions contained in this section.

To perform some of the procedures in this section, the engine must be running.

The oil pump has two sets of internal gerotors. One set provides lubrication pressure and the second set provides cooling oil pressure. A separate pressure relief valve is located on the oil pump for each oiling system.

To access the oil pump, the engine must be removed from the frame and disassembled. Before disassembly, review the troubleshooting charts located in this chapter.

If the engine is making irregular noises that appear to be coming from rotating parts, check the lubrication side oil pressure. Check the oil pressure before engine disassembly, and recheck the oil pressure after a repair.

Cooling oil pressure troubleshooting is done by verifying cooling oil flow, not cooling oil pressure. For more information, see oil pressure testing on page 4.8.

WARNING

DO NOT loosen any oil line connections with the engine running, or within 30 minutes of operation. Oil inside the lines could be under pressure.

WARNING

Never run an engine in an enclosed area. Exhaust contains poisonous carbon monoxide gas that can cause loss of consciousness or death. Operate the engine in an open area or with an exhaust evacuation system connected and functioning properly.

WARNING

The engine components, oil and exhaust system become hot during operation and remain hot for a period of time after the engine is shut off. Wear eye protection and heat-resistant garments for hands and arms if working on a hot engine or wait until the components have cooled sufficiently before working on the machine.

TROUBLESHOOTING

LOW OIL PRESSURE	HIGH OIL PRESSURE
Incorrect oil being used or low oil level	Incorrect oil being used
Engine temp above test temperature range	Additives added to oil to increase viscosity
Damaged O-rings or leaks at pipes or fittings	Engine temp below test temperature range
Damaged or worn oil pump or oil pump drive	Restricted oil passages
Pressure relief valve stuck open	Incorrect oil filter
Damaged engine bearings/excessive engine wear.	Pressure relief valve stuck closed
Restricted oil filter, oil filter screen or passages	

SPECIAL TOOLS

Oil Pressure Gauge PV-43531

Moly Assembly Paste PN 2871460



OILING SYSTEM DATA

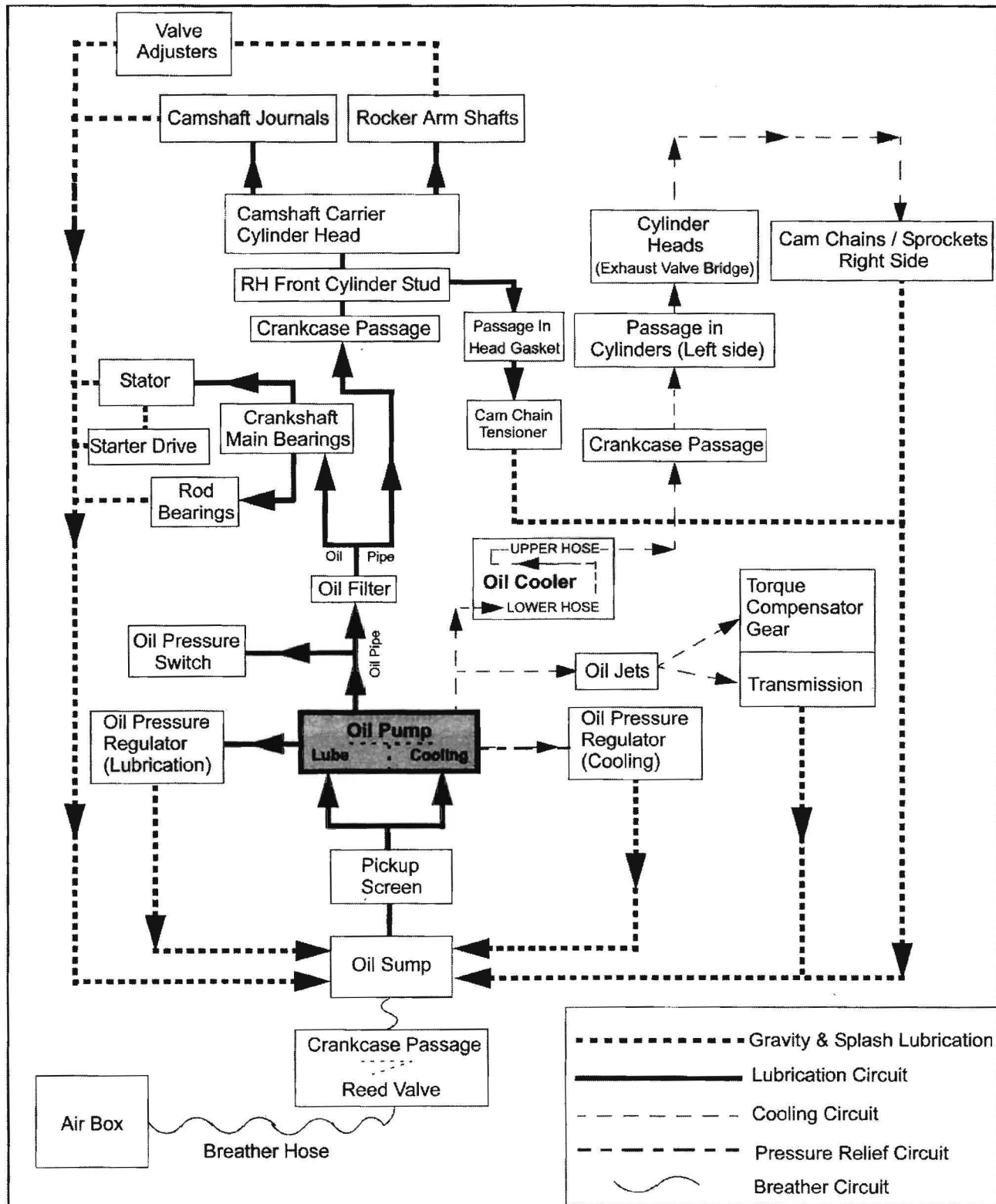
SPECIFICATIONS - LUBRICATION

LUBRICATION & COOLING SYSTEM			
Item		Standard	Service Limit
Engine Oil Capacity (After Disassembly)		4.75 Liters (5.0 U.S. qts)	Not Applicable
Engine Oil Capacity (At Change) Fill to full line with the engine at operating temperature.		Approximately 4.25 Liters (4.5 U.S. qts)	Not Applicable
Recommended Engine Oil If Victory 20W/40 is not available, use motorcycle oil suitable for wet clutches (such as those with JASO MA rating). DO NOT use additives of any kind.		Victory 20W/40 for all operating temperatures.	Not Applicable
Oil Pressure @ 3000 rpm (Lubrication System) Measurements must be taken with engine at operating temperature (82°C/180°F) and specified Victory Engine Oil		552 kPa (80 psi)	Readings should be within 20% of the specifications. Minimum Lubrication Pressure 276 kPa (40 psi)
Oil Pressure (Cooling System)		No measurement. See page 4.8.	-
Oil Pump Clearances	Rotor Tip Clearance	.12 mm (.005")	18 mm (.007")
	Pump Body Clearance	.10 mm (.004")	.26 mm (.010")
	Pump End Clearance	.025 mm (.001")	.10 mm (.004")
	Cooling Rotor Width	14.96 mm (.5889")	14.90 mm (.5866")
	Lubrication Rotor Width	9.99 mm (.3933")	9.90 mm (.3897")
	Shaft End Play (Check assembly of pump if excessive)	2.0 mm (.080")	± .5 mm (.020")

Fastener Torque Specifications - Lubrication & Cooling		
Description	Torque Nm	Torque lb-ft (lb-in)
Cylinder Head Temperature Sensor - (CHT) - (Install new if removed)	13.5	10 lb-ft
Oil Cooler Lower Support Bracket	13.5	(120 lb-in)
Oil Drain Plug	20 Nm	15 lb-ft
Oil Filter - apply oil to filter O-ring	8 Nm (71 lb-in) Approximately 3/4 turn after sealing ring has contacted the engine case.	
Oil Filter Nipple (threaded fitting to crankcase)	61	45
Oil Line to Crankcase	10	(85 lb-in)
Oil Lines to Cooler	10	(85 lb-in)
Oil Pressure Relief Valves	6	20 lb-ft
Oil Pressure Sensor Loctite™ 565 or pipe sealant	14	(125 lb-in)
Oil Pump to Crankcase / Oil Tube to Crankcase	10	(85 lb-in)
Oil Pump Sprocket	10	(85 lb-in)



OIL FLOW DIAGRAM

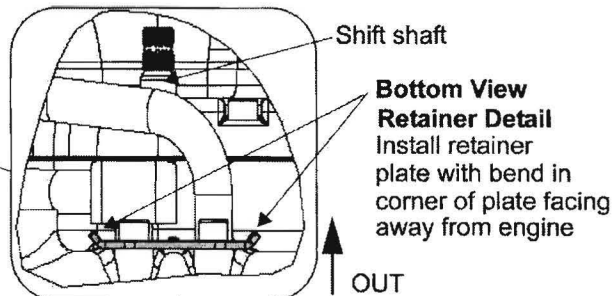
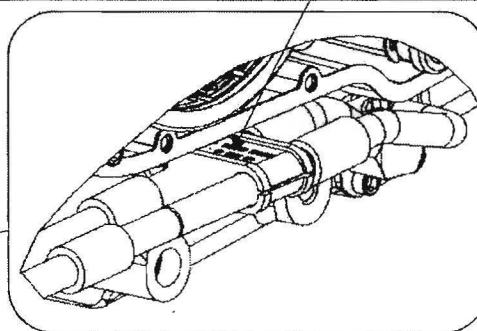
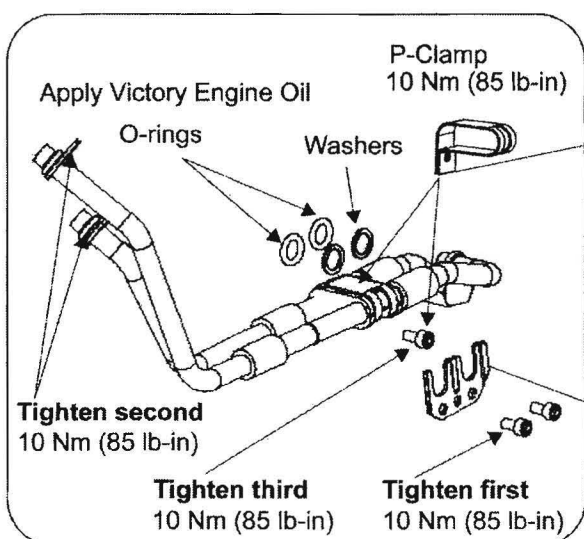
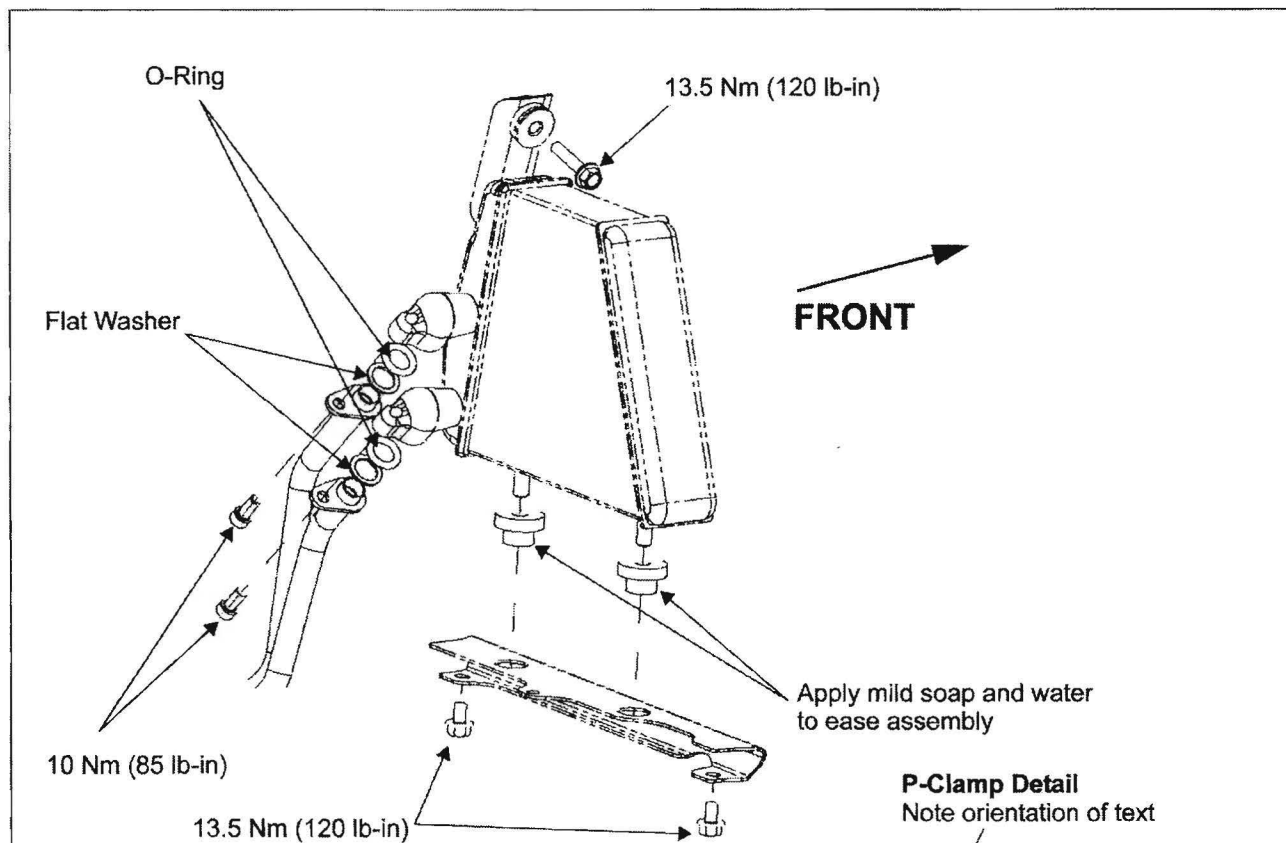


4.4



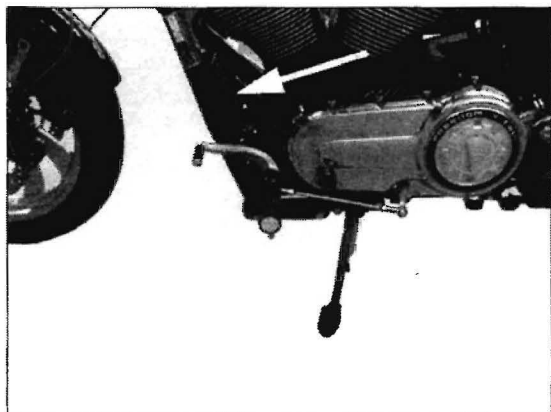
OIL COOLER

ASSEMBLY VIEW - OIL COOLER AND LINES



OIL COOLER INSPECTION / CLEANING

1. Inspect cooler, lines, and all connections for leaks.
2. Inspect lines for proper routing. Replace if there is any sign of abrasion or damage.
3. Inspect cooler surface for obstructions or debris.
4. Rinse from back side to front with low pressure water.

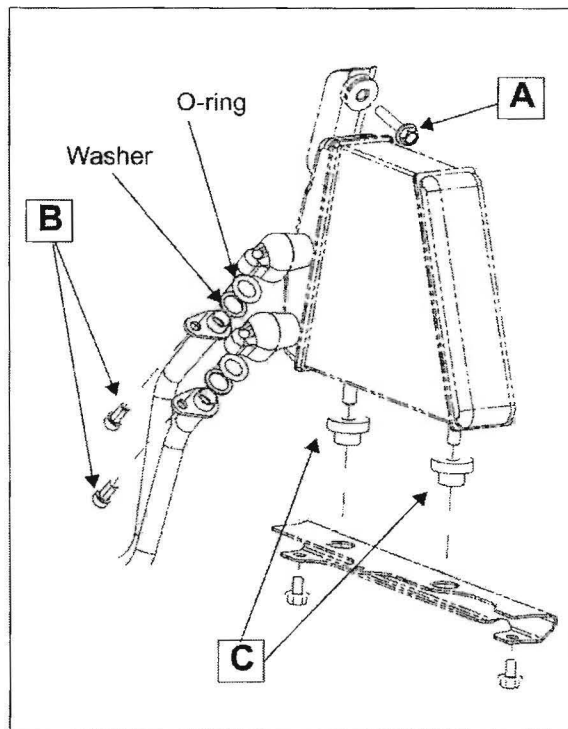


5. Inspect oil cooler fins for deformation. Fins can be straightened if not severely deformed and no oil leaks are present.
6. Inspect cooler mounting fastener for proper torque. Inspect mounting bracket and rubber grommets for cracks or damage (page 4.5).
7. Replace any damaged components.

OIL COOLER REMOVAL

Refer to Illustration on page 4.5 for fastener torque.

1. Place drain pan beneath oil cooler.
2. Remove screw (A) from top left side of cooler.

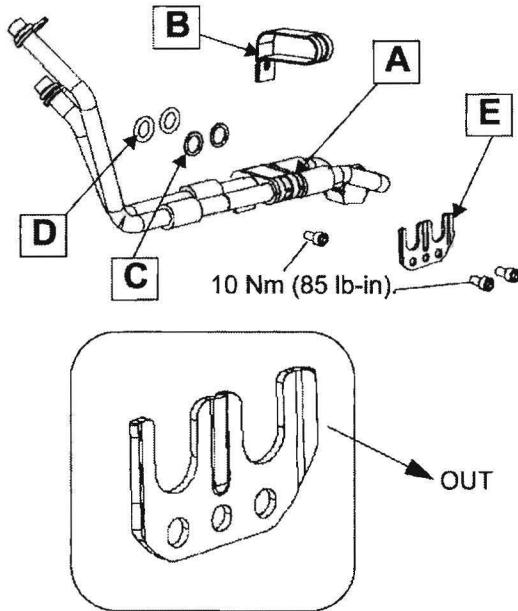


3. Remove oil hoses from cooler (B).
4. Lift cooler off of grommets (C).
5. Carefully remove from bracket.

OIL COOLER / LINE INSTALLATION

Refer to Illustration on page 4.5 for detail views.

Oil Lines to Engine



1. Installation of lines to engine is easier with lines removed from cooler.
2. Assemble support grommet (A) to lines with print facing UP. Install P-clamp (B) over grommets. See P-clamp detail on page 4.5.
3. Install new backing washers (C) on lines.
4. Lubricate new O-rings (D) with engine oil and install against backing washers.
5. Clean oil line sealing surfaces on engine. Carefully assemble lines to engine by rotating the lines to clear primary cover gasket surface and frame.
6. Install retainer plate (E) with curved ends facing OUT.
7. Install screws and torque to 10 Nm (85 lb-in).
8. Install P-clamp screw and torque to 10 Nm (85 lb-in).

Oil Cooler Installation

If oil lines were removed from cooler and engine, install engine end first.

1. Lubricate cooler support grommets in bracket with mild soap and water solution.
2. Install cooler, engaging posts with grommets and press downward until seated.
3. Install mounting screw. Torque to 13.5 Nm (120 lb-in).

Oil Lines to Cooler

1. Install new backing washers on oil lines.
2. Lubricate new O-rings with engine oil and install on lines against backing washers.
3. Carefully assemble lines to cooler.
4. Install screws and torque to 10 Nm (85 lb-in).



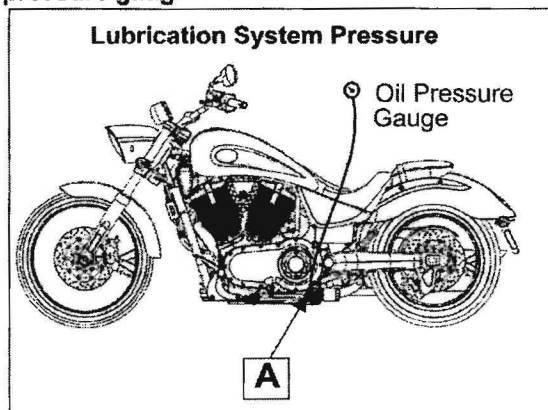
OIL PRESSURE INSPECTION

LUBRICATION OIL PRESSURE

Use caution when working around hot engine oil. Review all WARNINGS on page 4.2.

1. Start the engine and run until operating temperature is reached.
2. Turn off the engine.
3. Remove oil pressure sensor (A).
4. Install oil pressure gauge adapter.

Oil pressure gauge: PV-43531



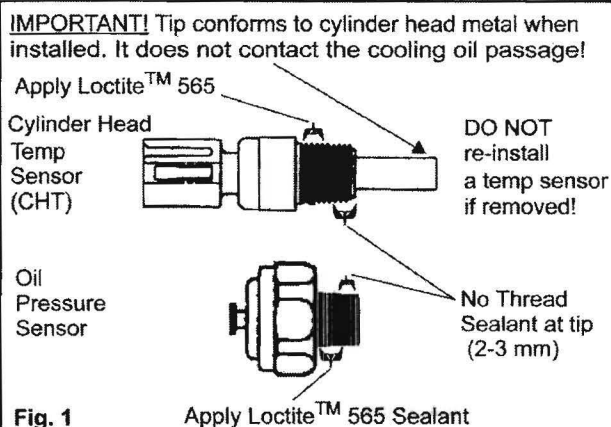
5. Use the dipstick to check the engine oil level and add recommended oil, if necessary.
6. Start engine and check oil pressure at 3000 rpm.
7. If oil pressure is outside of specification, refer to the troubleshooting chart on page 4.2 for possible causes.
8. Once testing is completed, clean threads with Loctite™ Primer N, and apply sealant to the threads indicated in Fig. 1 and install.

Oil Pressure Sensor

TORQUE: Oil Pressure Sensor
14.0 Nm (125 lb-in)

COOLING OIL FLOW INSPECTION

Cooling oil inspection is accomplished by verifying oil flow through the cooler. The temperature of the cooler should be close to crankcase temperature. Pressure testing cannot be performed at the Cylinder Head Temperature (CHT) port, because the sensor does not enter the cooling oil passage. Cooling oil pressure changes along various paths and designed flow restrictions located inside the engine (like voltage drops across a resistive electrical circuit). Diagnostics should be limited to verifying that oil is flowing through the cooler, and that air flow through the cooler and to the engine cylinder fins is unobstructed. Cooling oil enters the cooler on the bottom line and exits (back to the engine) on the upper line.



Cylinder Head Temperature Sensor (CHT)

TORQUE: Temperature Sensor
REPLACE WITH NEW IF REMOVED
13.5 Nm (10 lb-ft)
Do Not Overtighten

NOTE: See Chapter 5 for temperature sensor location and installation.

Item	Standard	Service Limit
Lubrication Oil Pressure @ 3000 rpm Measure at Oil Pressure Sensor @ 82°C/180°F	552 kPa (80 psi)	Standard ±20% MINIMUM pressure is 276 kPa (40 PSI)
Cooling Oil	OIL FLOW	-

OIL PUMP

4

LUBRICATION/COOLING OIL PUMP ASSEMBLY

Replace all gaskets, washers, and O-rings

A Fitting (Nipple)

Install after pump and pipe (B)
62 Nm (45 lb-ft)

3/4 turn past gasket
contact (by hand)

Remove / install this pipe
and oil pump as an assembly

Pump - Check for free rotation after
installation

9.6 Nm (85 lb-in)

O-Ring

O-Ring

O-Ring

Washer

Washer

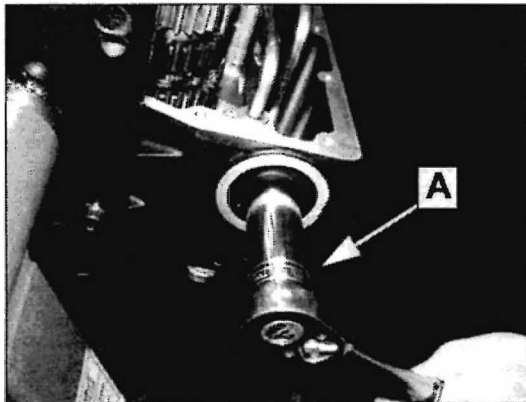
B

Oil tube installed with pump
and before nipple (A)

9.6 Nm (85 lb-in)

OIL PUMP REMOVAL

1. Disassemble engine to access oil pump. (Refer to Chapters 6-10)



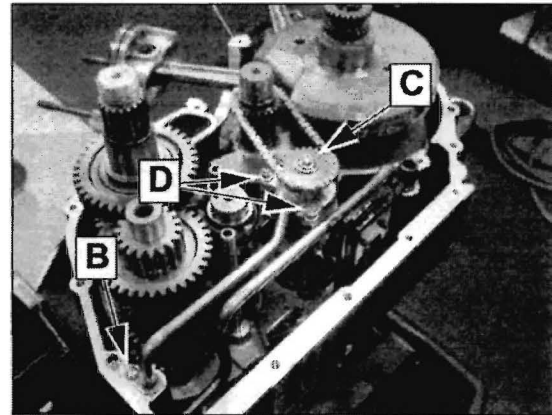
2. Remove oil filter and oil filter nipple (fitting) (A).

NOTE: The oil filter nipple MUST be detached before the long oil delivery tube can be removed. See photo above.

3. Remove retaining screw for short oil tube (B).

NOTE: The washers and/or O-rings for the oil piping may stay in the engine cases/oil pump body. Be sure to retrieve the used O-rings and washers and discard. Use new O-rings and washers during assembly.

4. Detach oil pump drive sprocket bolt and sprocket (C).
5. Remove the (3) oil pump mounting bolts (D). Note that they also hold the oil pump body together.



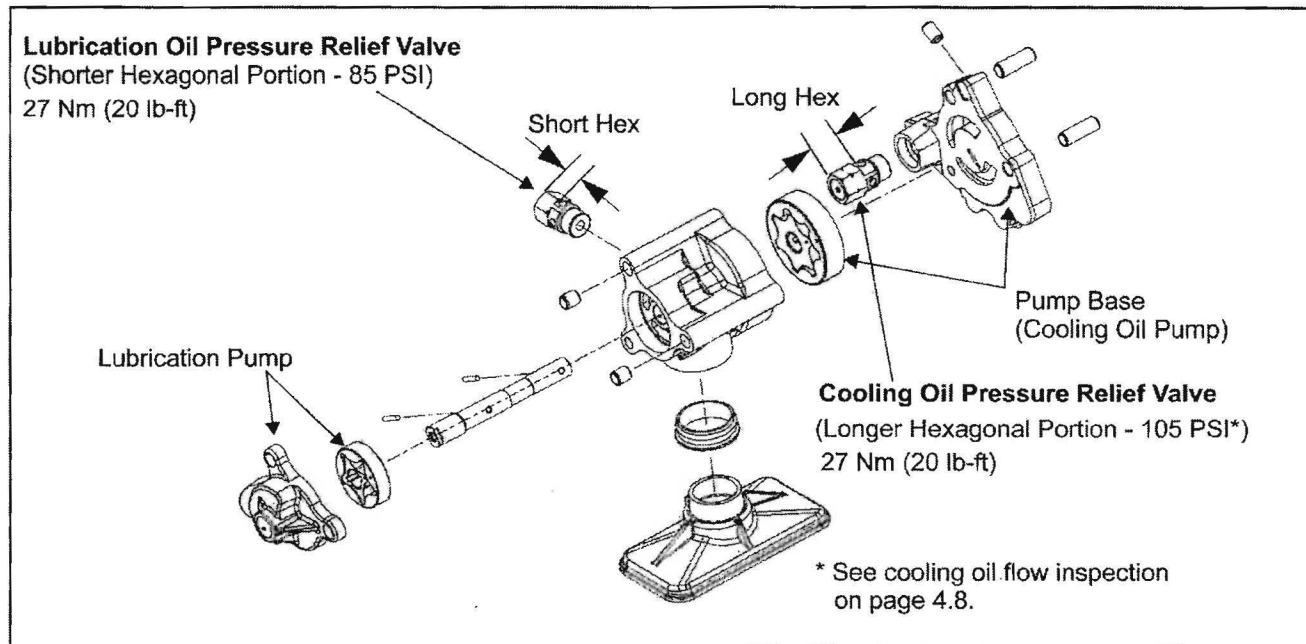
6. Take out the long oil tube.
7. Remove, as a unit, the oil pump and short oil tube being careful not to drop any parts when taking them out of the crankcase.



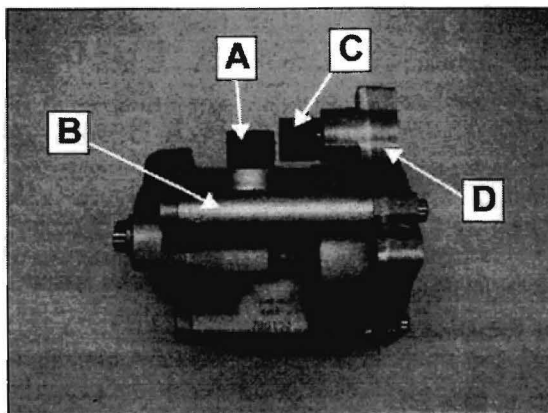
LUBRICATION & COOLING

OIL PRESSURE RELIEF VALVES

The lubrication and cooling systems operate at different oil pressures, regulated by pressure relief valves. The valves are not interchangeable. Be sure to install each valve in the proper location on the oil pump as indicated below.



1. Remove the relief valves. The lubrication relief valve (A) has a SHORTER hexagonal portion and screws into the pump BODY (B). The cooling pressure relief valve (C) has a longer hexagonal portion and screws into the pump BASE (D).
2. Visually inspect the relief valve for obstruction or unusual wear.



4.10



OIL PUMP INSPECTION

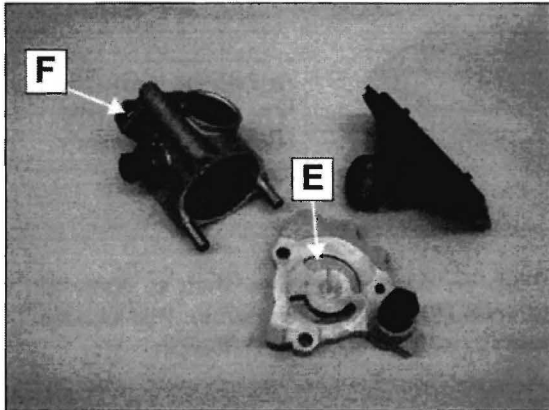
Inspect the oil pump when lubrication oil pressure is below specification. The oil pump contains (2) sets of gerotors. Follow the inspection procedure for both sets of gerotors and both ends of the pump.

Keep gerotors together as a set, and oriented the same way (dots on each gerotor must be on the same side upon assembly). The parts are not interchangeable.

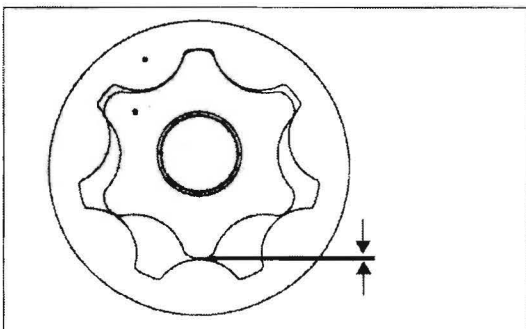
If dots on the gerotors are not visible, mark the gerotors upon disassembly so they can be matched and oriented properly upon assembly.

Before disassembling pump completely, follow these inspection steps, and compare to specifications on page 4.3.

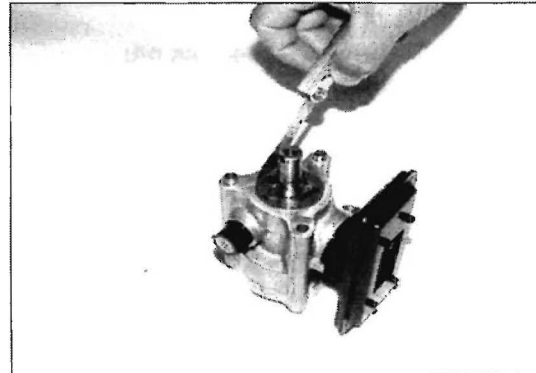
1. Remove the pump base (E) and lubrication side end cap (F).



2. Measure tip clearance as shown below for both cooling (larger gerotor set) and lubrication.

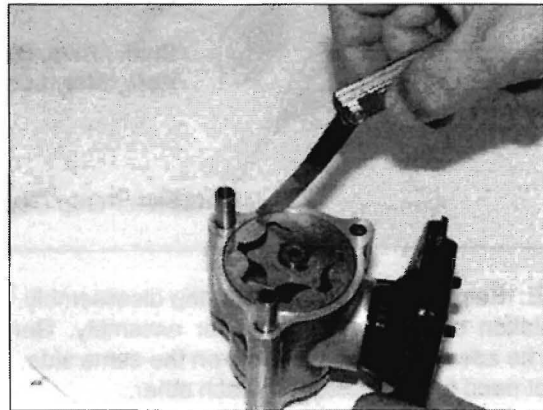


3. Measure clearance between pump body and outer gerotor on the lubrication side.

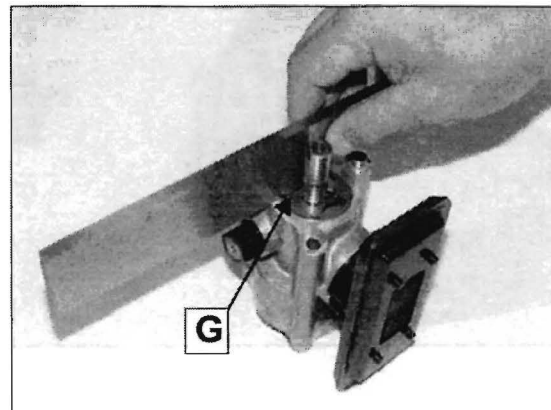


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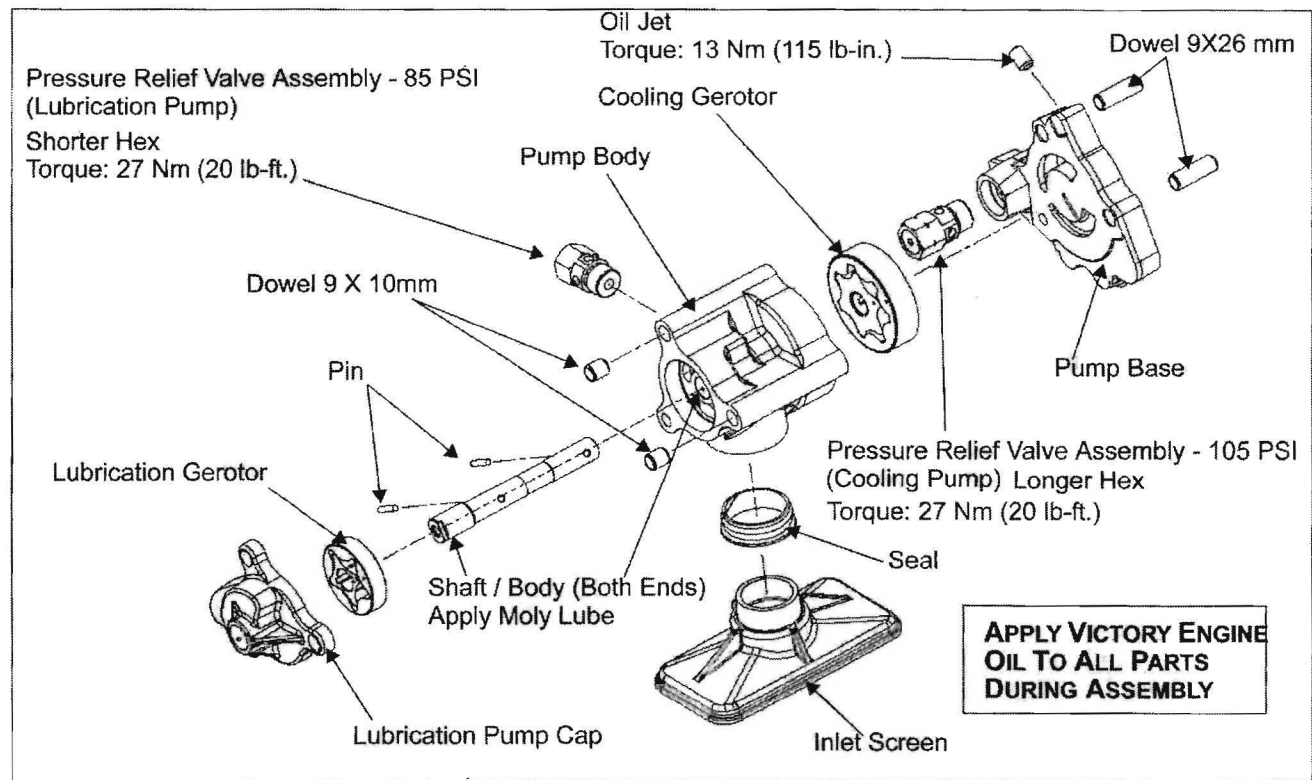
4. Measure clearance between pump body and outer gerotor on the cooling side.



5. Measure the oil pump end clearance with a feeler gauge at point (G). Lubrication side of pump is shown below. Cooling side is measured in the same manner.

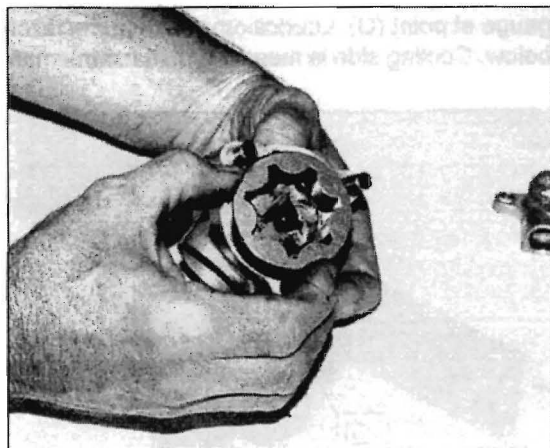


OIL PUMP DISASSEMBLY

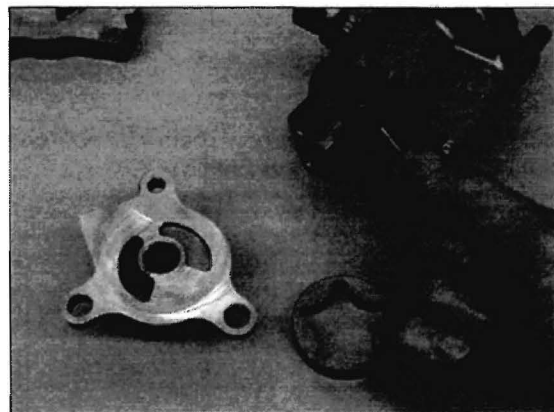


NOTE: Keep all parts together during disassembly. Note orientation of dots on gerotors for assembly. Gerotors must be assembled with the dots on the same side. They do not need to be aligned with each other.

6. Remove cooling outer gerotor.



7. Push on opposite end of shaft to allow pin to be removed from lubrication gerotor. Pull lubrication rotor back to expose and remove the pin.



8. Push shaft back toward cooling end of pump and remove pin from cooling gerotor.

9. Pull shaft with inner rotor from pump body.

10. Clean all parts and inspect for wear.

11. Dry with compressed air.

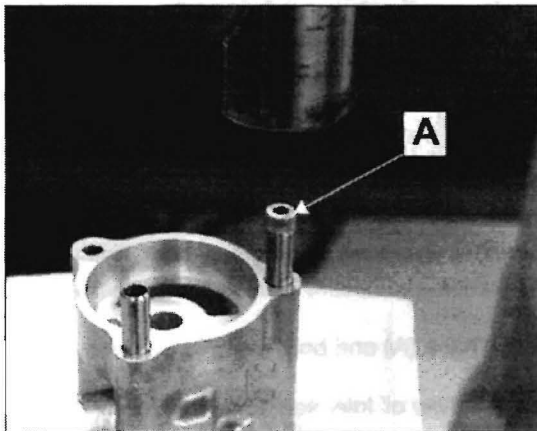
4.12



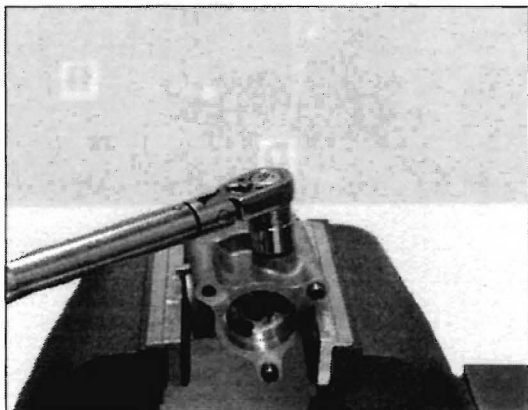
OIL PUMP ASSEMBLY

Refer to Illustration on page 4.12 for assembly view and torque values.

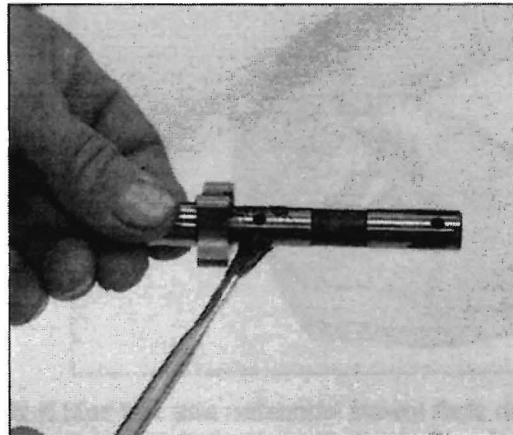
1. Press short dowel pins into lubrication side of pump body using an arbor press and a 6mm screw (A).



2. Press long dowel pins into cooling side of pump body using same method as above.
3. Secure pump body in a soft jaw vise. Apply Victory engine oil to threads of lubrication pressure relief valve and install into pump body. The lubrication relief valve has a shorter hexagonal portion than the cooling relief valve. torque to (20 lb-ft).

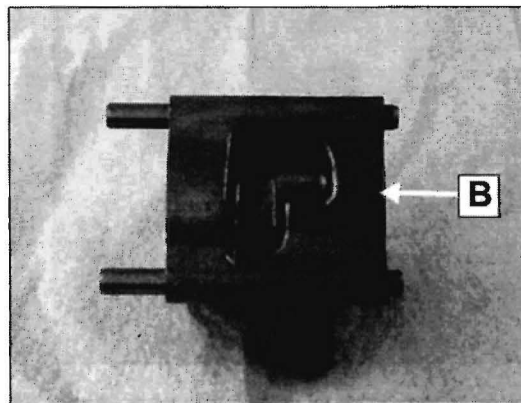


4. Assemble lubrication gerotor on pump shaft.
5. Lubricate shaft with moly assembly paste PN 2871460.

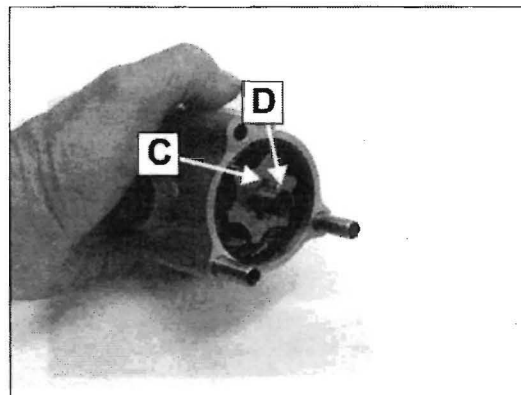


4

6. Insert pump shaft/rotor assembly into pump body in direction shown (B).



7. Lubricate and install the cooling gerotor with pin slot (C) facing OUT.
8. Insert pin (D) into shaft on cooling side.
9. Push shaft inward while rotating to align pin and slot.

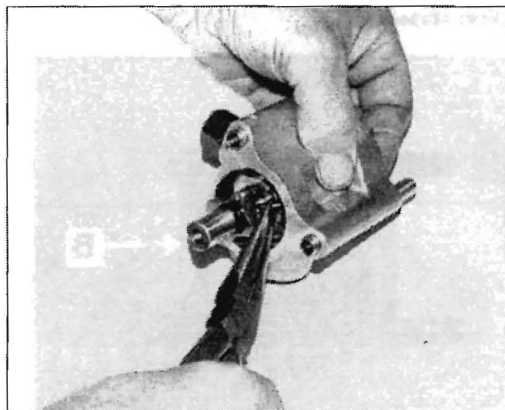


LUBRICATION & COOLING

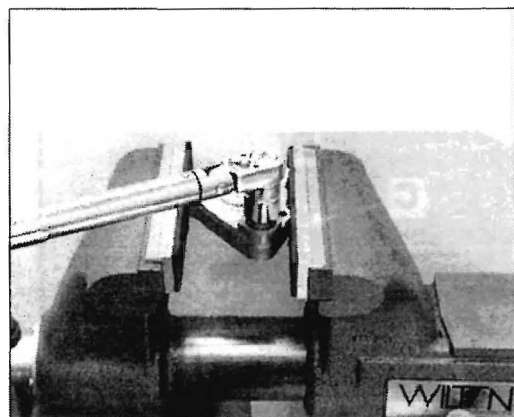
10. Install outer gerotor.



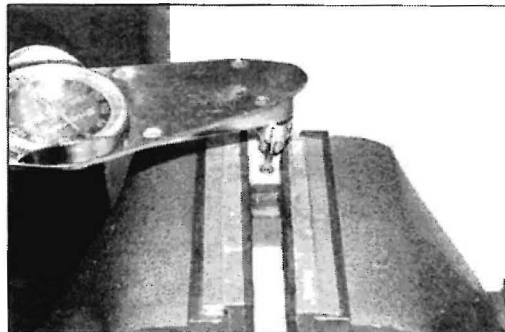
11. Push shaft toward lubrication side and hold in place. Install pin for lubrication rotor. Lubricate both gerotors with oil.



12. Secure pump base in a soft jaw vise. Apply Victory engine oil to threads of cooling pressure relief valve and install into pump base. The cooling relief valve has a longer hexagonal portion than the lubrication relief valve. **Torque to 27 Nm (20 lb-ft).**



13. Install oil jet to oil pump base.
Torque to 13 Nm (115 lb-in)

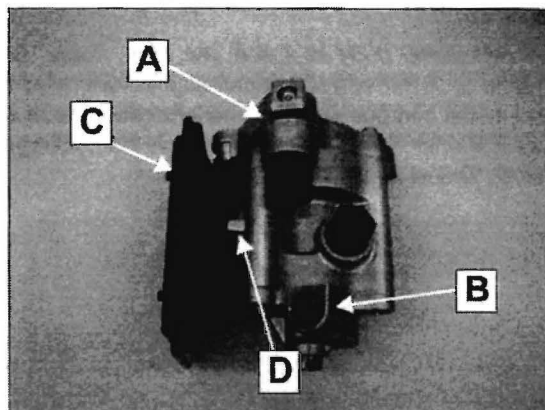


14. Lubricate pressure relief valve assemblies and both lubrication and cooling gerotors with engine oil.

15. Install base (A) and body cap (B) to pump.

16. Install a new oil inlet seal to inlet screen (C).

17. Pre-lubricate the entire oil pump and relief valves with Victory engine oil and assemble screen to oil pump body, aligning groove (D) in screen to tab on pump.



4.14



OIL PUMP INSTALLATION

1. Clean oil pipes and dry with compressed air.

NOTE: After oil pump is installed, be sure the pump rotates freely by installing the sprocket without the chain and rotating pump a few revolutions.

2. Use new washers and O-rings upon assembly.

3. Install a backing washer (A) and lightly oiled O-ring (B) onto short oil pipe. Insert pipe into pump body with a twisting motion until seated.

4. Place washer (C) onto the other end of short oil pipe followed by a new lightly oiled O-ring (D).

5. Install oil pump and short pipe into left crankcase. Start by inserting oil pipe into rear of crankcase, then place oil pump into crankcase alignment holes.

6. Start the top two oil pump retaining bolts (E) and the rear pipe bolt (F) but do not tighten at this time.

7. Install new oiled O-rings (G) onto front of long oil pipe. Install new washer (H) on end of pipe and a new O-ring (I).

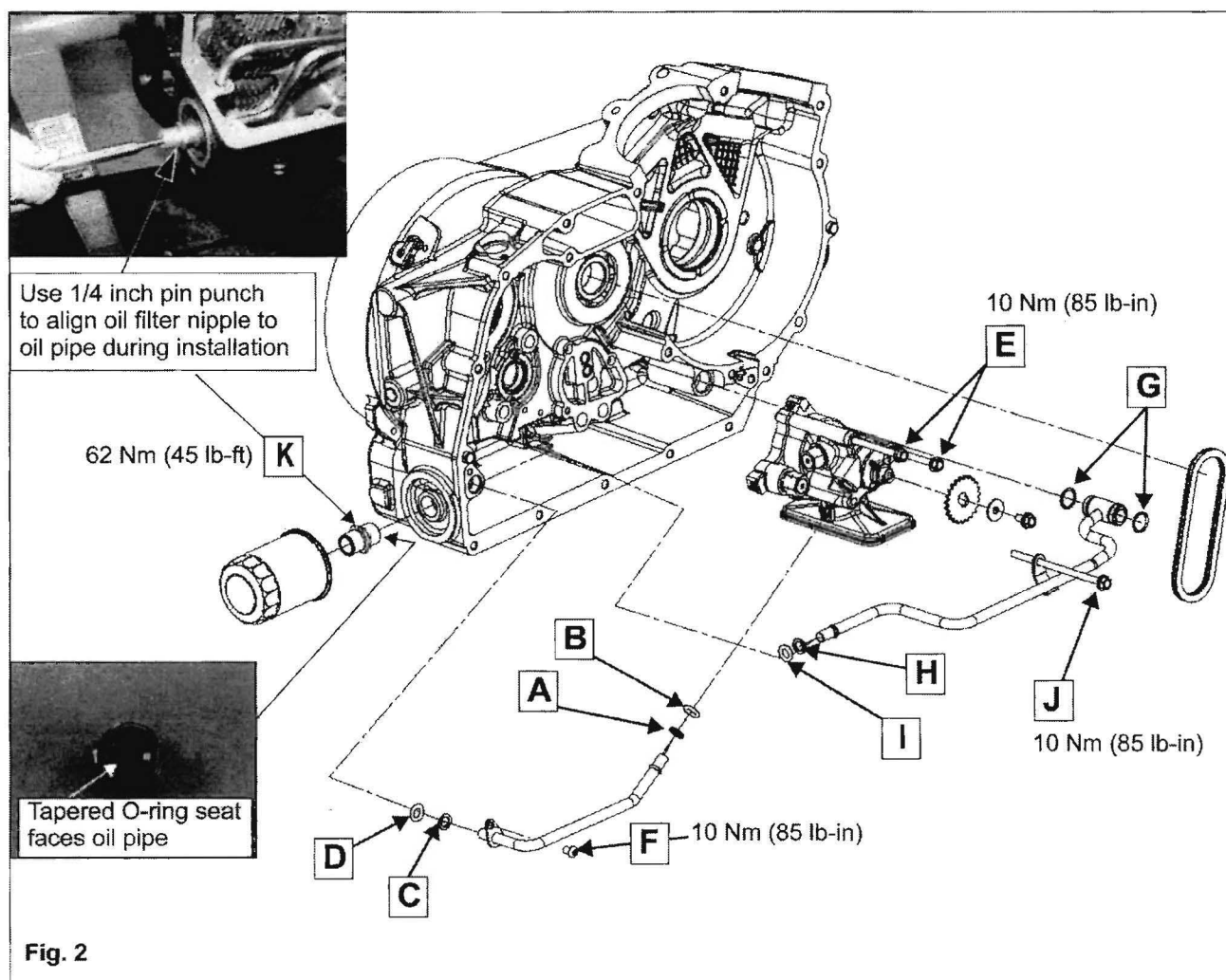
8. Fit front end of long oil pipe into position at front of crankcase and rear of pipe through oil filter nipple opening in crankcase. Install pipe retaining bolt (J).

9. Torque all pump fasteners to specification.

10. Install oil filter nipple (K). Center the oil pipe to the fitting with a 1/4 inch pin punch as shown.

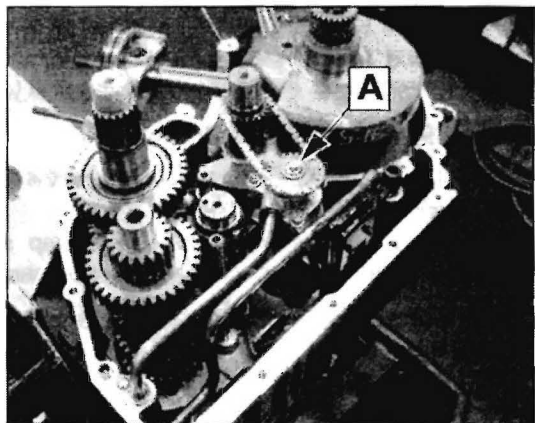
11. Temporarily install pump sprocket on pump shaft (without the chain) and turn oil pump over by hand.

NOTE: Turn pump shaft by hand a few revolutions to make sure it turns freely.



LUBRICATION & COOLING

12. Remove sprocket so chain can be installed.
13. Install chain over oil pump sprocket and balance shaft sprocket. Align pump sprocket to shaft and install retaining bolt (A). Torque to 10 Nm (85 lb-in).



NOTE: The sprocket is a floating design. A small amount of end play is normal after tightening the retaining bolt.

14. Refer to Chapter 10 for crankcase assembly.
15. Verify lubrication oil pressure after assembly. Refer to page 4.8.



CHAPTER 5

FUEL SYSTEM / FUEL INJECTION

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FUEL SYSTEM / FUEL INJECTION

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DIGITAL WRENCH GUIDED DIAGNOSTICS	5.47
DIGITAL WRENCH COMMUNICATION ERRORS	5.47
DIGITAL WRENCH FEATURE MAP	5.48
DIGITAL WRENCH SCREEN EXAMPLES	5.49
REPROGRAMMING TIPS	5.51
REPROGRAMMING PROCESS	5.53
TROUBLESHOOTING	5.55
FUEL SYSTEM TROUBLESHOOTING	5.55
SMART LINK CABLE	5.59

5.2



SAFETY PRECAUTIONS

FUEL SAFETY

Many hazards are present when working on or around the fuel injection system. Read and pay close attention to the following warnings and cautions when working on any component in this section.

WARNING

Gasoline is extremely flammable and explosive under certain conditions.

Always stop the engine and refuel outdoors or in a well ventilated area.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

Do not overfill the tank. Do not fill the tank above the fuel tank insert or into the filler neck. Leave air space to allow for fuel expansion.

If you get gasoline in your eyes or if you swallow gasoline, see your doctor immediately. Never try to syphon gasoline using mouth suction.

If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.

Never start the engine or let it run in an enclosed area. Engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

5

WARNING

Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area. Open flames, sparks and cigarettes must be kept away from gasoline.

KEEP GASOLINE OUT OF THE REACH OF CHILDREN

WARNING

Careless handling of the control cables can result in twisting or bending of the cables. This can cause the cables to stick or bind, resulting in loss of vehicle control.

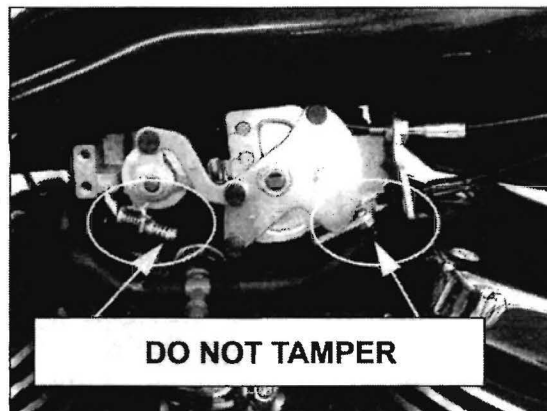
WARNING

The engine exhaust from this product contains chemicals known to cause cancer, birth defects or other reproductive harm.

WARNING

The engine and exhaust system become very hot during operation and remains hot for a period of time after the engine is shut off. Wear insulated protection for hands and arms or wait until the engine and exhaust system have cooled before performing service work.

DO NOT TAMPER WITH THROTTLE BODY FLOW SCREW.



DO NOT TAMPER WITH IDLE STOP SCREW.

IDLE CONTROL IS REGULATED BY THE ECM VIA THE IAC VALVE. REFER TO IAC SYSTEM INFORMATION IN THIS CHAPTER



SPECIFICATIONS

FUEL SYSTEM SPECIFICATIONS

FUEL SYSTEM	
Item	Specifications
Fuel Pump Pressure	3.51 BAR (351 kPa) (51 psi)
Fuel Pump Volume (Approximate @ 12 V)	60 liters / hr 500 ml / 30 seconds 16.9 oz. / 30 seconds 0.26 gal / min
Idle Speed IMPORTANT! See NOTE below.	900 rpm \pm 100 rpm
Throttle Grip Free-Play	2-4 mm (1/16"-5/32")
Fast Idle Speed	Not Adjustable (Set by ECM/ IAC valve)
Fuel Pump Amp Draw	5A maximum @ 13.8 VDC
Recommended Octane	91 Octane Minimum
Injector Resistance	11.4 - 12.6 Ohms

NOTE: Idle speed is continuously monitored and adjusted by the ECM via the IAC valve. DO NOT tamper with or attempt to "adjust" the factory pre-set idle stop screw or throttle plate flow screw! If idle is erratic or if idle speed is incorrect, refer to troubleshooting in this section to find the cause of the problem.

SPECIAL TOOLS

FUEL SYSTEM SERVICE TOOLS

TOOL DESCRIPTION	SPX PART NUMBER
Diagnostic Tool Kit (PV-46085-B) INCLUDES: Digital Wrench Software PU-47052-G Standard Interface Cable PU-47151 Victory Adapter PV-46085-2 SmartLink Interface Kit (PU-47471)	PV-46085-B
Fuel Pressure Gauge	PU-43506-A
Fuel Pressure Gauge Adapter	PV-48656
Fuel Pump Relay Bypass Jumper	PV-49466
Fluke 77 Digital Multi Meter	PV-43568
Electrical Connector Test Adapter Kit	PV-43526
Fuel Tank Fitting Plug Tool (9.5mm)	PV-50251
Fuel Tank Fitting Plug Tool (11.8mm)	PV-50567

TROUBLESHOOTING

BASICS TROUBLESHOOTING

NOTE: The closed-loop EFI system does not require TPS calibration. Refer to Fuel System Troubleshooting page 5.55 - 5.58.

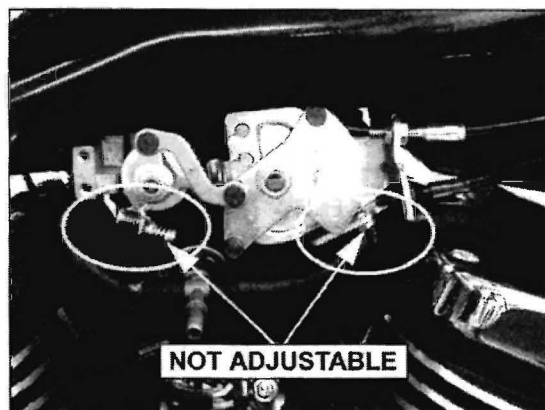
DO NOT OVERLOOK THE BASICS WHEN TROUBLESHOOTING:

1. Except where noted, views of connectors are from WIRE side of the connector.
2. A battery in a low state of charge can cause problems. Be sure battery is in good condition and fully charged.
3. Air leaks in intake tract / air box - check for air leaks and repair to avoid mis-diagnosing the EFI system.
4. Contaminated or improper fuel.
5. Restricted fuel flow / filters (low fuel pressure).
6. Fuel tank vent line pinched or obstructed.
7. Faulty spark plug(s).
8. Corroded, disconnected, or mis-connected wiring. (Mis-connected wiring after recent service).
9. Poor ground connections - be sure all are clean and tight.
10. Exhaust system restriction or improper exhaust.
11. Engine mechanical condition.

THROTTLE BODY FLOW SCREW IDLE STOP SCREW

DO NOT TAMPER WITH THESE SCREWS!

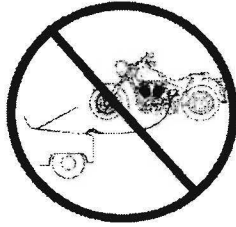
Throttle body flow and idle stop screws are factory pre-set. Throttle body must be *replaced* if screw setting is changed. Any adjustment of these screws could void portions of the vehicle warranty and could also constitute tampering under state and federal Vehicle Emission Control Tampering laws. "Adjustment" of either of these screws WILL NOT correct an erratic idle or incorrect idle speed. See troubleshooting (page 5.55 - 5.58).



SERVICE PRECAUTIONS

EFI SYSTEM PRECAUTIONS

NOTICE: While electronic fuel injection is durable and reliable, the components can be damaged or problems may occur if the following precautions are not taken.



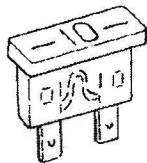
It is not advisable to "jump start" the machine with another battery. Although problems are unlikely to occur if everything is done carefully, the electrical component could be damaged.

Never disconnect the battery while the engine is running.

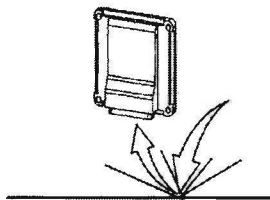
When connecting and disconnecting the battery cables refer to Chapter 16 for complete battery connection and charging information.

Make sure that the key switch is off before connecting and disconnecting connections. Best practice is to disconnect the battery before connecting or disconnecting the electrical connections.

Fuses and circuit breakers protect critical electrical components and circuits. Never replace the fuse with a larger value fuse or "jumper" the fuse with wire, aluminum foil or any other means. Always investigate the cause of the problem and repair before replacing the fuse.

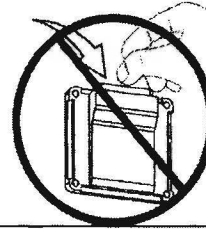


The ECM and the sensors are sensitive pieces of electronic equipment. Dropping or hitting them may cause irreparable damage.



Do not drop or strike fuel injection components

Static electricity can damage the ECM beyond repair. The human body can easily store enough static electricity to damage sensitive electronic components. Before working with any components of the Fuel Injection system, ground yourself to dissipate any static charge. Also take care not to touch any of terminal pins on the ECM.

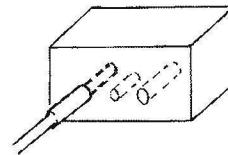


Do not touch ECM connector pins

Anti-static wrist strap PV-43541

NOTICE: Some tests require probing of the ECM wiring harness connector. Do not touch or probe the exposed pins on the ECM. Static electricity from your body or the meter can easily damage the ECM.

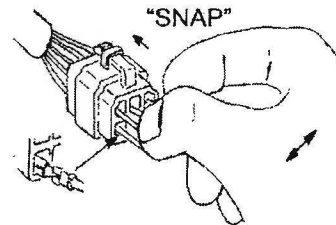
Always use the proper adapter from the Connector Test Adapter Kit when probing the terminals. Most of the connectors are sealed and cannot be back probed. Be extremely careful not damage the connectors by forcing meter probes into the connectors.



Use proper test adapters on connector pins

Connector test adapter kit PV-43536

Poor connections are the most common cause of Electronic Fuel Injection malfunctions. Inspect connector and wiring connections carefully during troubleshooting.

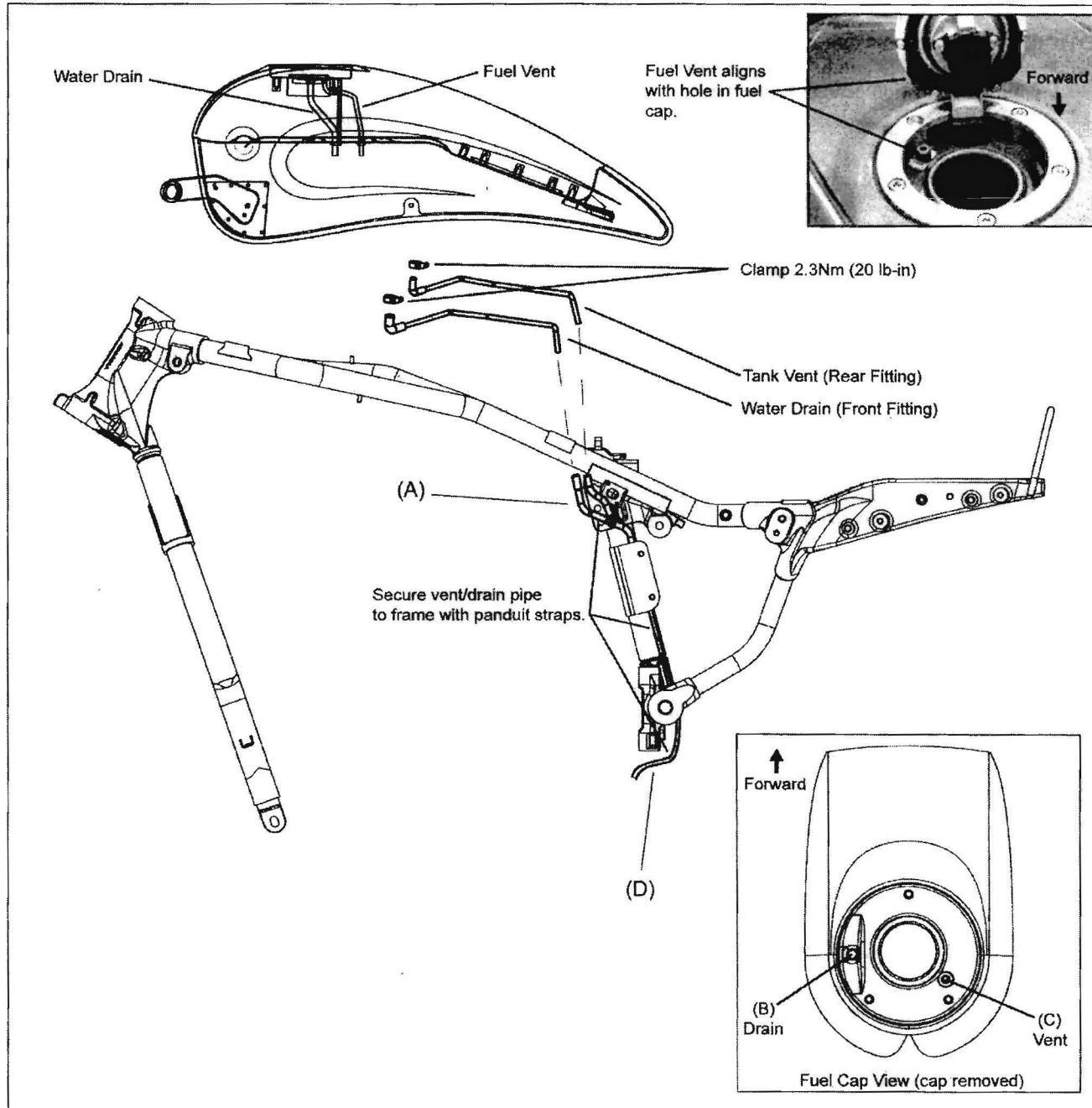


Carefully inspect the connections of the failed circuit before doing any other troubleshooting steps. Wire terminals should be corrosion free and fully seated into the connectors. Connector should snap together and lock.



FUEL SYSTEM ASSEMBLY VIEWS

FUEL TANK HOSE CONNECTION - 49 STATE MODELS



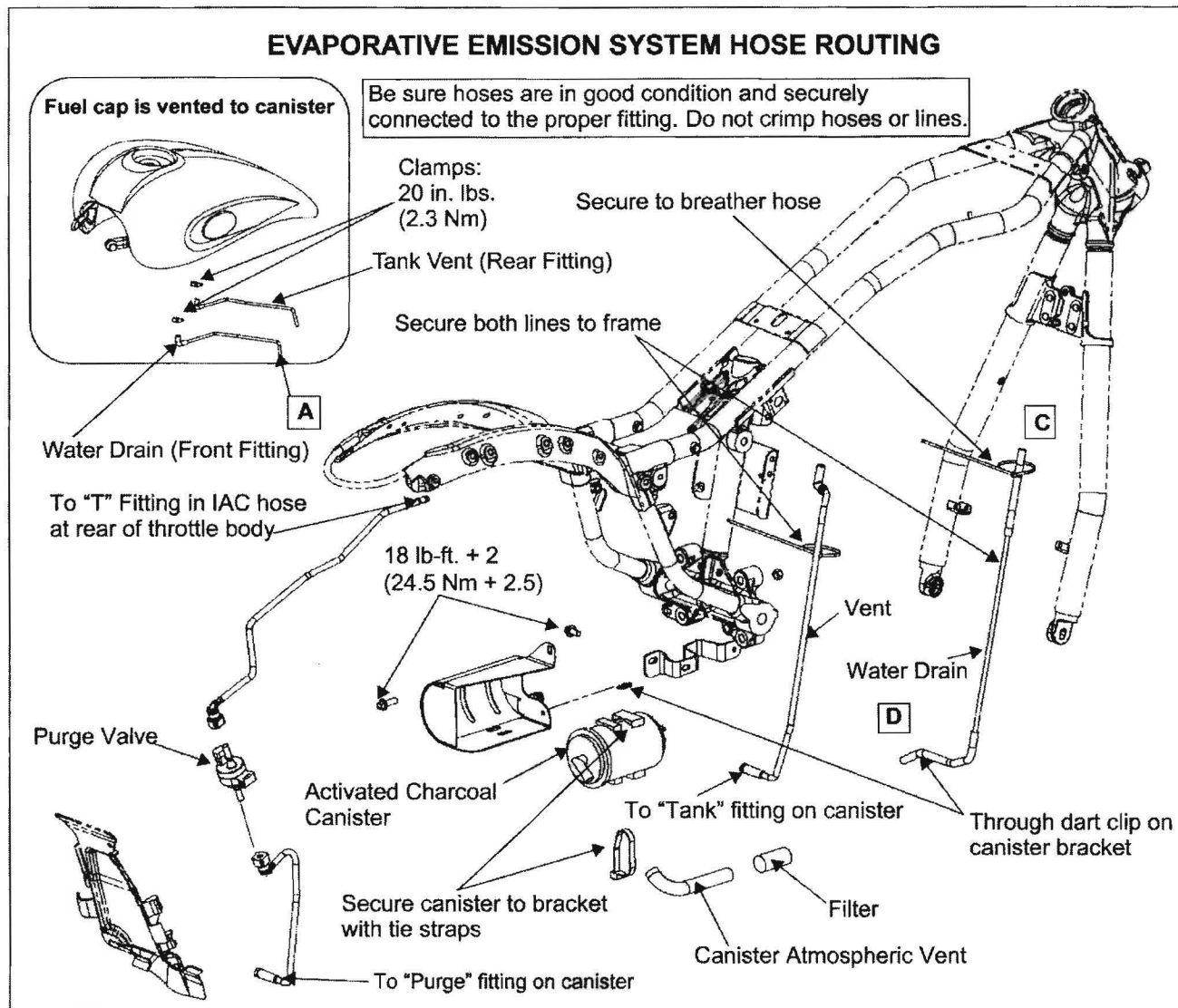
Water Drain Hose and Fuel Tank Vent Inspection - 49 State

1. Remove left side cover and disconnect hoses from "Y" fitting at rear left side of fuel tank (A).
2. Open fuel cap. Verify hoses are clear between cap and "Y" fitting. WATER DRAIN (B) is connected to front fitting under fuel tank. VENT (C) connects vapor separator circuit in fuel cap to vent fitting (rear of two line fittings) when cap is closed.
3. Verify both hoses are clear from rear left side of tank, through "Y" fitting, to bottom of drain hose (D).

5.6



FUEL TANK HOSE CONNECTION - CALIFORNIA MODELS



5

Tank Vent Inspection (California Models)

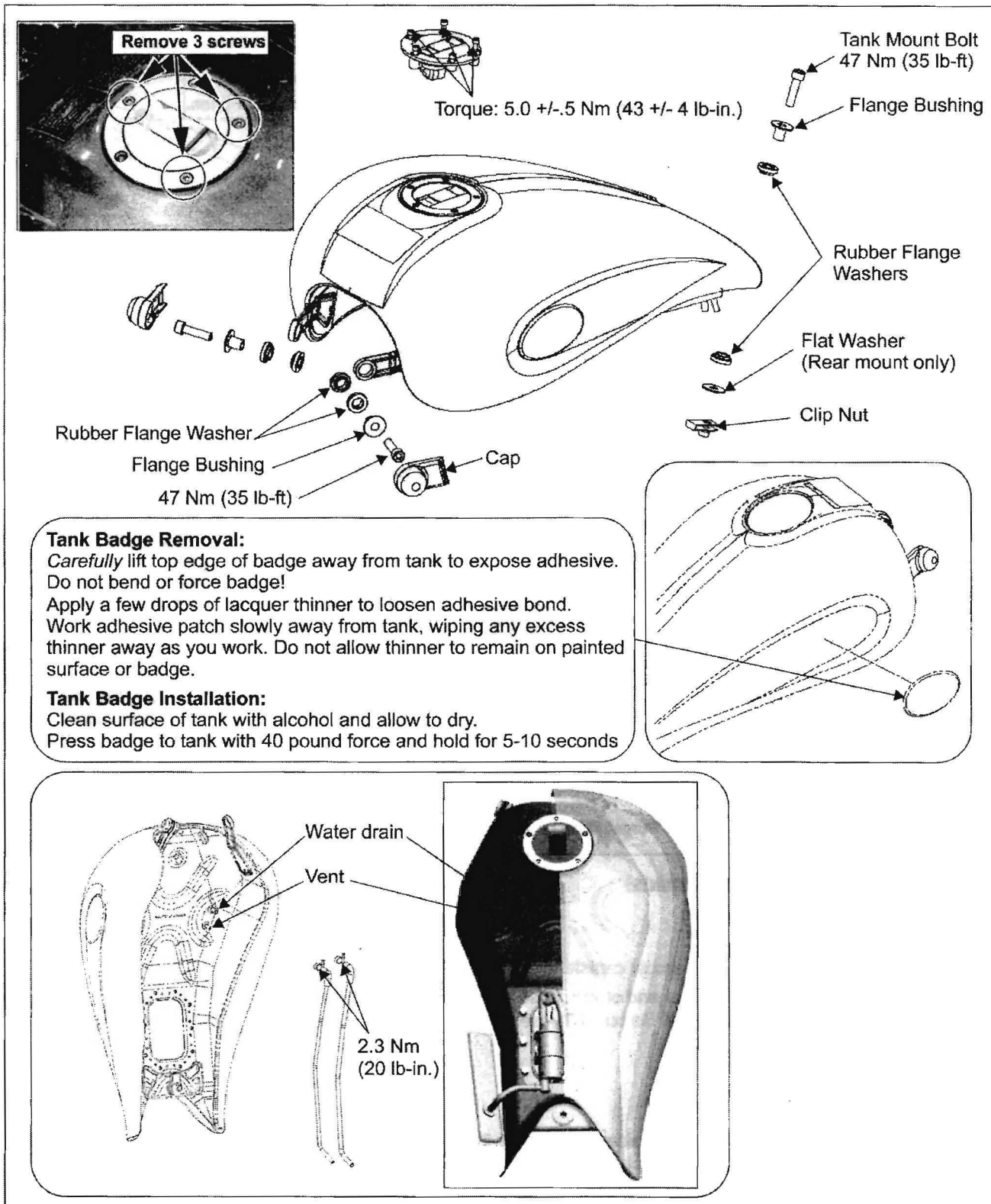
1. Remove LH side cover.
2. Open fuel cap.
3. Disconnect line from fitting on charcoal canister marked "TANK".
4. Pump low pressure air into canister end of vent hose. Verify air escapes from vent tube in gas cap area (right side) that aligns with hole in fuel cap seal. Be sure all hose connections are secure between canister and fuel tank fitting.

Water Drain Inspection

1. Remove LH side cover.
2. Open fuel cap.
3. Disconnect drain hose at (A) (left rear side of fuel tank). Pump low pressure air into bottom of drain hose at (A) and listen for air escaping from drain hole on left side of fuel cap well ((B) on page 5.6).
4. Pump low pressure air into drain hose at (C) to check lower hose for obstruction. Air should exit the hose at (D).



FUEL TANK / FUEL CAP MOUNTING ASSEMBLY VIEWS

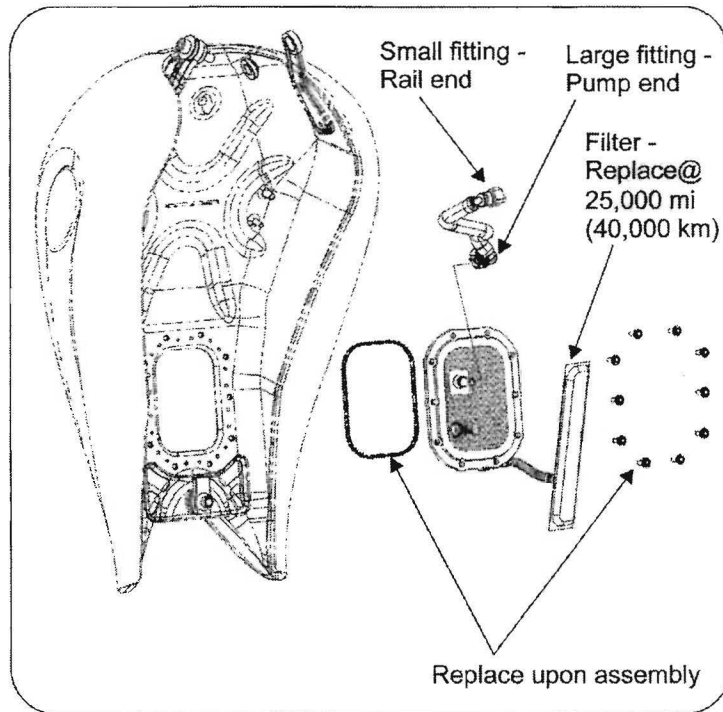


FUEL PUMP ASSEMBLY VIEW

Fuel level sensor test - page 5.20

Fuel pump test - page 5.21

Fuel pressure test - page 5.23



FUEL PUMP DATA (Room Temperature)

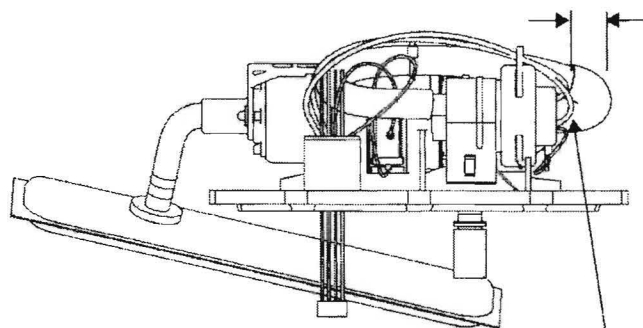
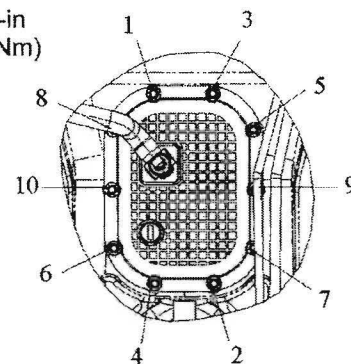
Fuel Pressure: 3.51 BAR (351 kPa) (51 PSI)

Current Draw: ≤ 5.0 Amp

Level Sensor Resistance: 850 - 1110 Ohms

Fuel Pump Torque Sequence

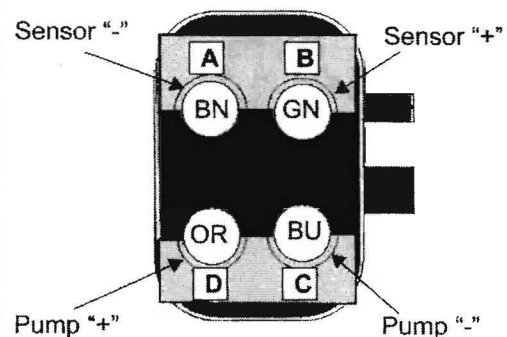
43 lb-in
(4.8 Nm)



Make sure wires are inside bend radius of hose before installing pump to prevent damage

Fuel Sensor Resistance Test

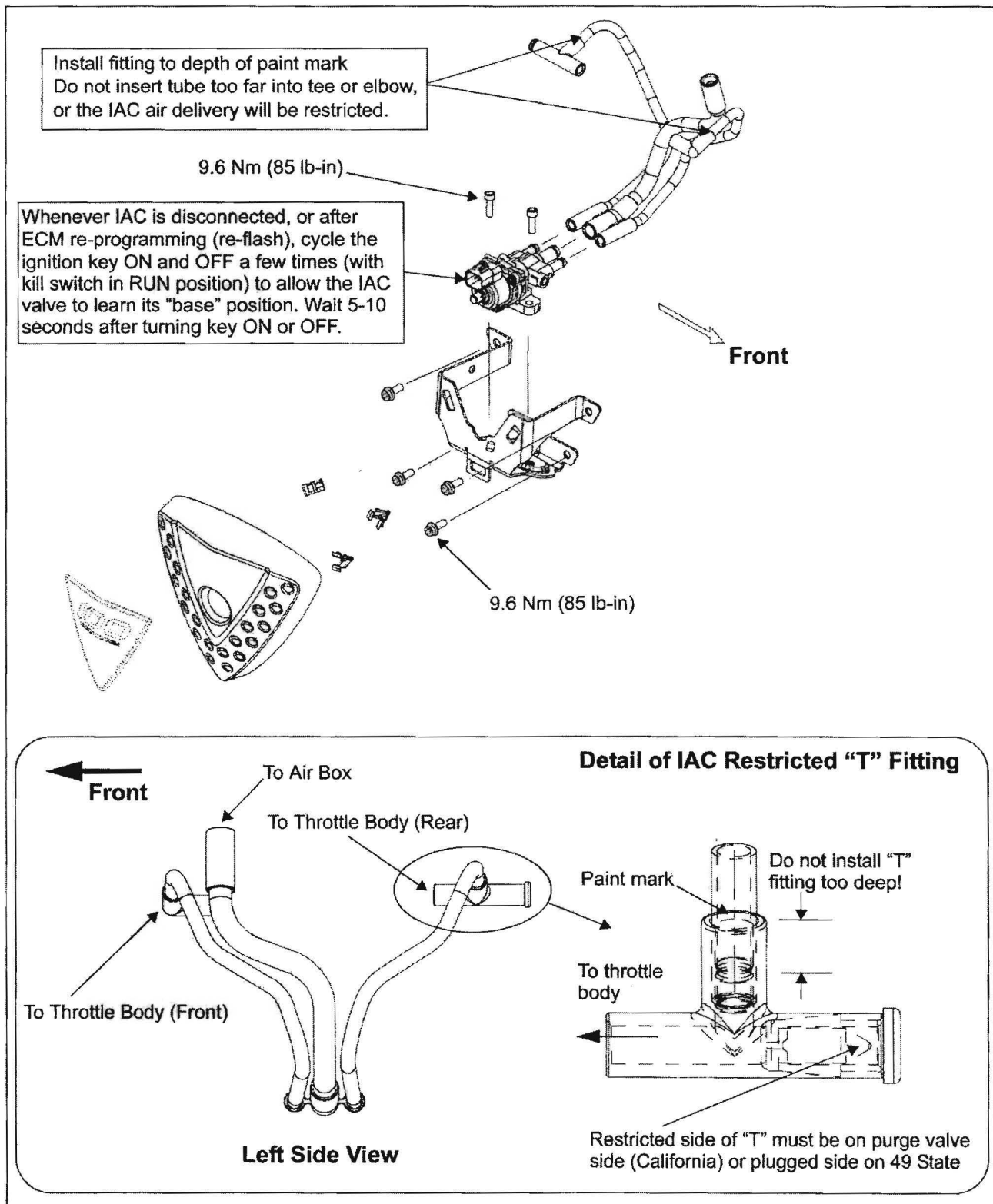
Bn to Gn = 850 - 1100 Ω



View from WIRE side of connector



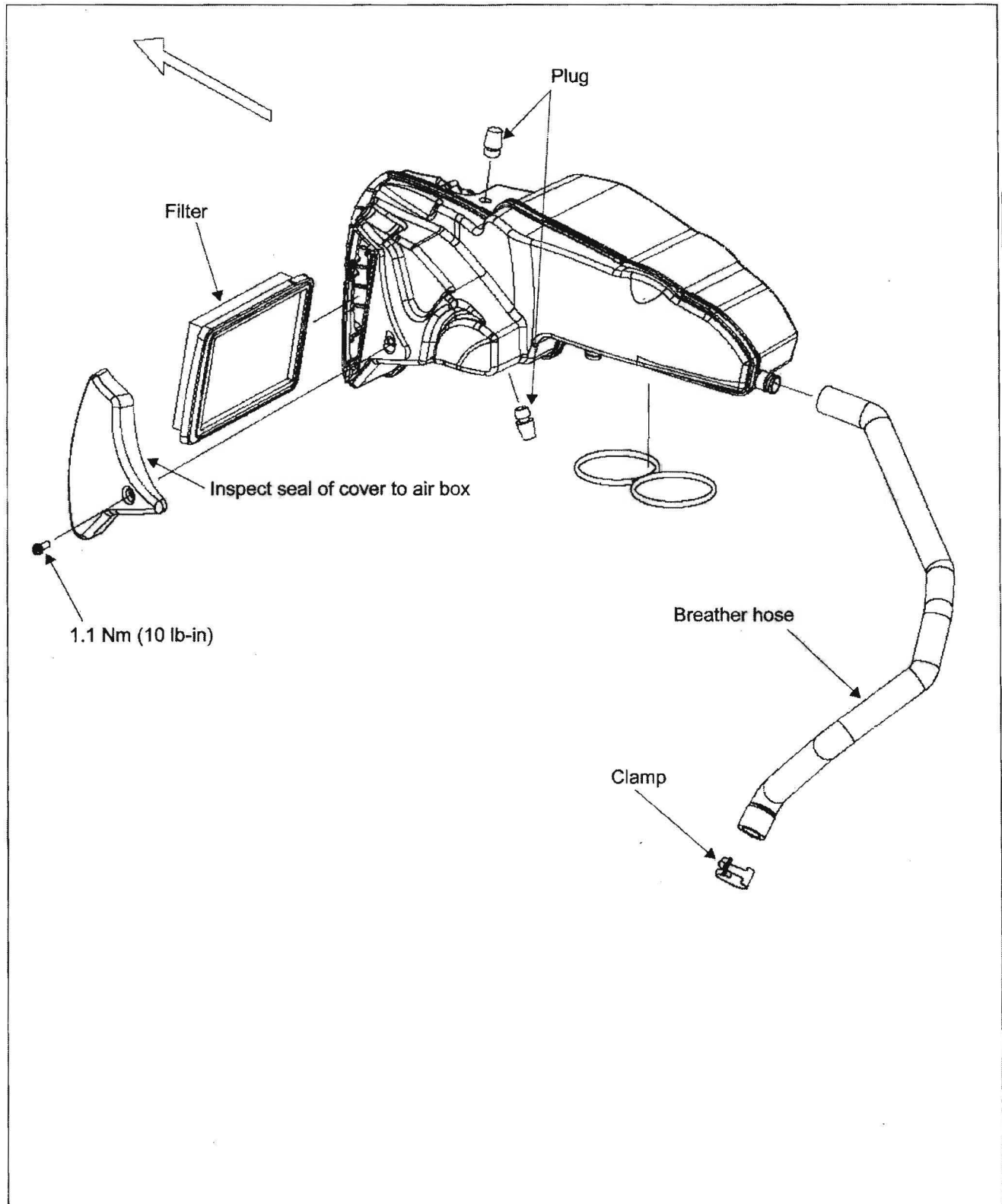
IDLE AIR CONTROL ASSEMBLY VIEW



5.10



AIR INTAKE ASSEMBLY VIEW



FUEL SYSTEM SERVICE

FUEL TANK REMOVAL

WARNING

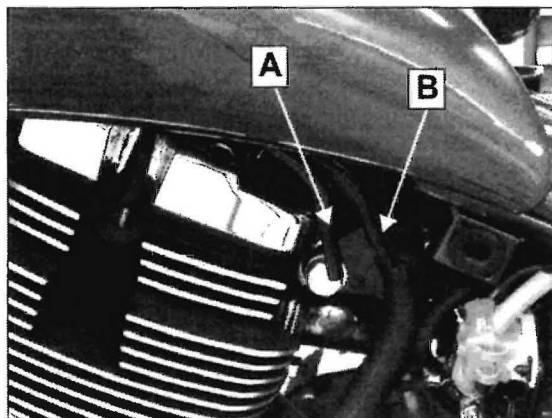
Review gasoline warnings on page 5.3. Allow engine and exhaust to cool completely before disconnecting fuel line or removing tank. Protect fuel tank finish when removing, storing, and installing tank. Refer to Assembly View on page 5.8.

Be prepared to place the fuel tank in a secure location with a drain pan positioned to catch any fuel that may leak or drip from disconnected hoses or fittings.

1. Pull straight outward at each corner to remove fuel line / IAC access cover on right side.



2. Remove side covers and seat (Chapter 3).
3. Disconnect water drain hose (A) and vent hose (B).



4. Depressurize fuel system as described next.

5.12

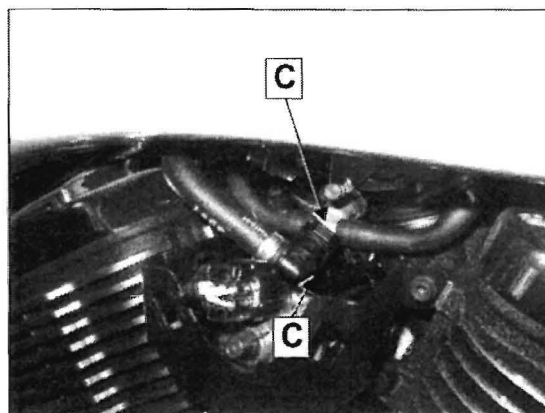
FUEL SYSTEM DEPRESSURIZATION

WARNING

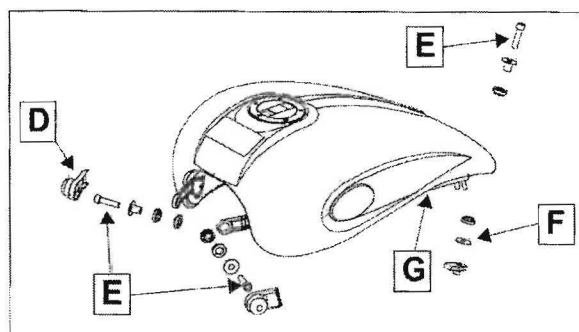
Allow engine and exhaust to cool completely before disconnecting fuel line or removing tank. Wear eye protection.

IMPORTANT: Two different Fuel Tank Fitting Plug tools have been used with Victory Motorcycles. To determine which tool must be used, the fuel pump outlet fitting must be measured with a caliper. See "SPECIAL TOOLS" on page 5.4 for application details.

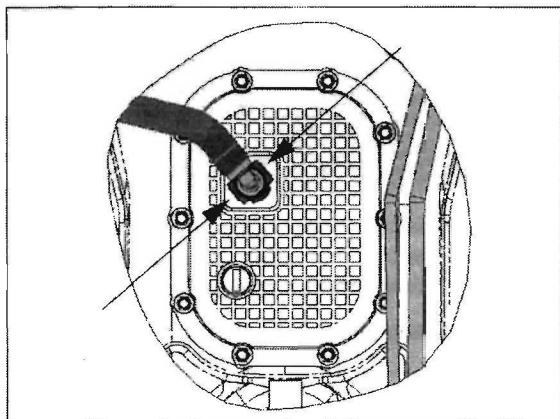
5. Wrap a clean shop towel around fuel line fitting.
6. Squeeze both release buttons (C) (one on each side of fitting) and hold. Gently slide fitting straight off fuel rail.



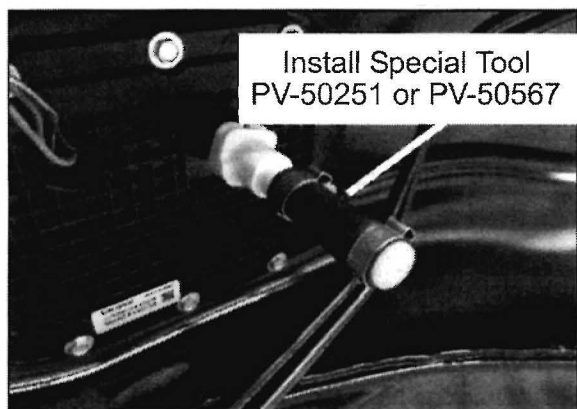
7. Remove tank mount caps (D).
8. Remove front and rear mounting bolts (E).



9. Position front wheel straight ahead to gain clearance between tank and triple clamps and place a protective cover over the front of the tank.
10. Lift rear of tank and remove flat washer (F).
11. Disconnect fuel pump wire harness connector (G) under tank.
12. Squeeze both release buttons on fuel line connector at fuel pump and hold.



13. Pull fuel line fitting straight off fuel pump (do not bend).
14. Install fuel tank fitting plug tool onto fuel pump fitting to protect the fitting and prevent fuel from seeping out of tank.



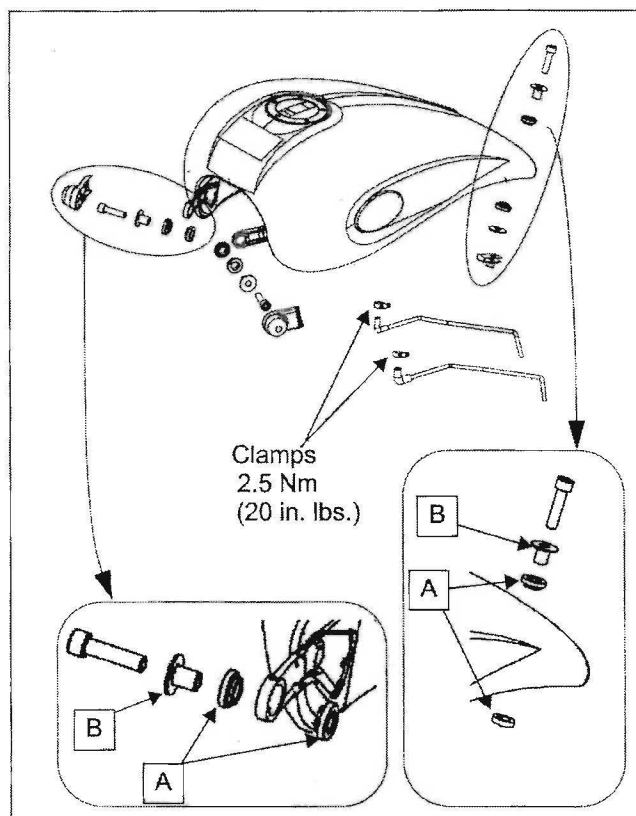
15. Carefully remove tank.
16. Cover fuel fittings to keep debris out.

Place the fuel tank in a secure location with a drain pan positioned to catch any fuel that may leak or drip from disconnected hoses or fittings. Fuel can damage cosmetic surfaces. Wipe any fuel spills immediately with a clean cloth.

FUEL TANK INSTALLATION

Place a protective cloth on the front of the tank when assembling tank to frame.

1. Install (2) rubber flanged bushings (A) and a flange spacer (B) in each tank mount.



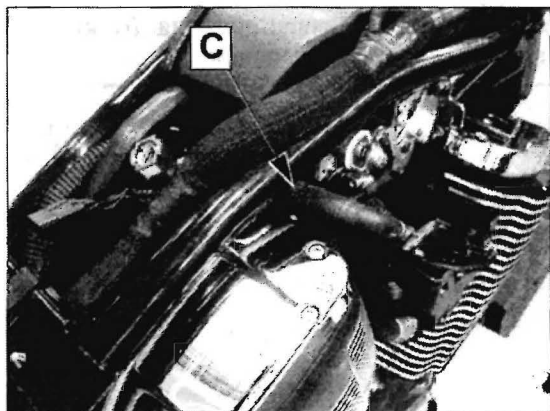
2. Install fuel cap assembly if removed (page 5.8).
3. Install fuel tank vent hose on rear-most fitting and water drain hose on front fitting. Torque both clamps.

TORQUE: Drain and Vent Hose Clamps
2.3 Nm (20 lb-inch)

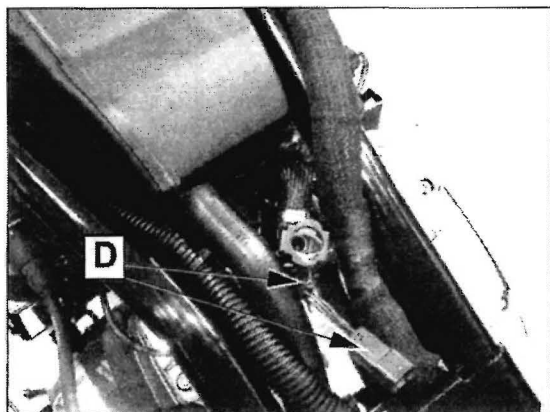


FUEL SYSTEM / FUEL INJECTION

4. Place fuel line on motorcycle (if removed) routing it below right frame tube with smaller diameter end toward fuel rail fitting and sheathed end (C) to inside of frame (toward tank)

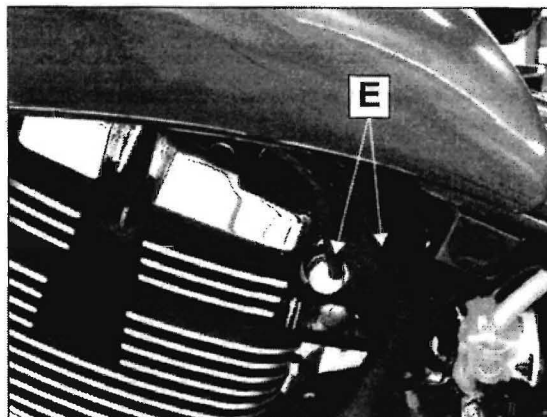


5. Route fuel line in front of pump wire harness (D).



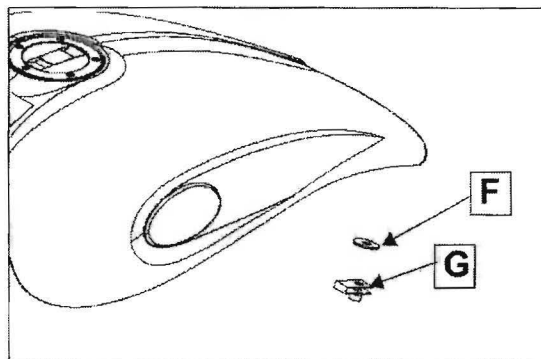
6. With front wheel pointed straight ahead, place tank on frame. Be careful not to snag Special Tool PV-50251 on frame of vehicle.
7. Loosely install front tank mounting bolts.
8. Route fuel pump wire harness smoothly toward rear of tank and connect it to main harness.
9. Lift rear of tank enough to attach fuel line to fuel pump fitting. Press straight upward on quick-connect fitting until you hear it click securely in place.

10. Connect vent hose and water drain hose at rear left side of tank (E).



NOTICE: A kinked or obstructed vent line may damage fuel tank or cause fuel starvation. Be sure vent line is properly installed and routed without kinks or obstruction.

11. Place flat washer (F) on top of frame clip nut (G).



12. Start rear mounting bolt. Torque all tank mounting bolts to specification.

TORQUE: Fuel Tank Mounting Bolts
47 Nm, 35 lb-ft

13. Install caps on front tank bolts.
14. Carefully align quick-connect fitting to fuel rail. Support rail and press fuel line inward until you hear it snap into place on the rail fitting.
15. Install IAC cover.
16. Prime fuel system as outlined on page 5.18.
17. Inspect fuel supply line connections for leaks.
18. Install seat and side covers.

5.14



FUEL PUMP REMOVAL

WARNING

Replace all mounting screws and pump seal O-ring any time pump is removed for service or fuel filter maintenance. Review gasoline warnings on page 5.3. Do not kink or bend fuel pickup hose upon removal.

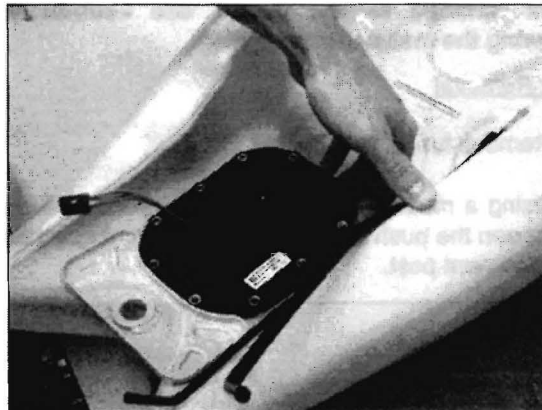
NOTICE

Be careful when removing the fuel pump to avoid damaging the fuel pump, electrical wiring, or hoses. Follow pump removal procedure and always inspect wires and hoses closely for damage after removing the pump.

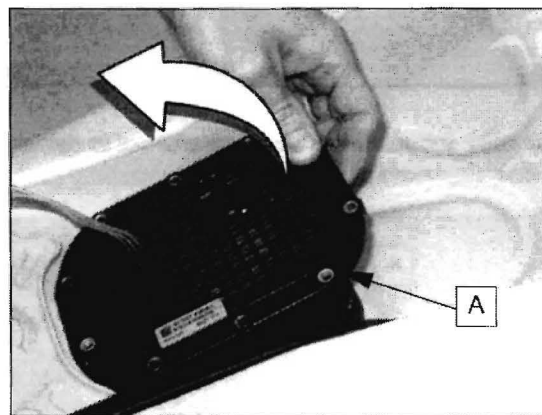
1. Drain fuel from fuel tank using a vacuum or siphon pump designed for fuel systems. Observe all fuel handling precautions on page 5.3.
2. Remove fuel tank (page 5.12).
3. Place a clean, soft protective cloth on a work bench or flat surface.
4. Lay tank on cloth with pump facing UP. Be prepared to contain any fuel spillage as a small amount of fuel will remain in the tank.
5. Loosen all mounting screws evenly in a cross pattern until all are loose. Remove all screws and discard.



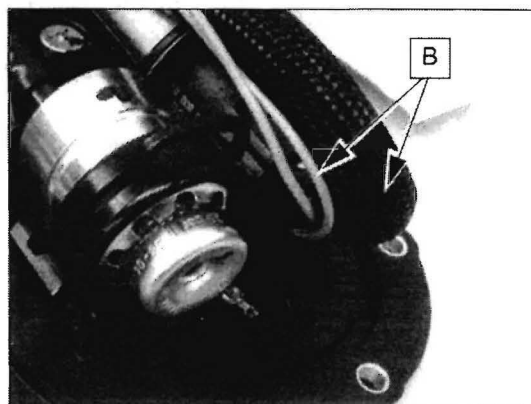
6. Lift FRONT EDGE of pump upward until resistance is felt.



7. Push wires and hose at front edge of pump away from the edge of the tank opening (Area A" below) to gain more clearance for pump removal.
8. Lift front of pump upward until wires and hose are clear of pump opening.



9. Carefully remove pump, being careful not to bend or kink the fuel pickup hose.
10. Inspect wires and hose for damage (B).



FUEL FILTER REPLACEMENT

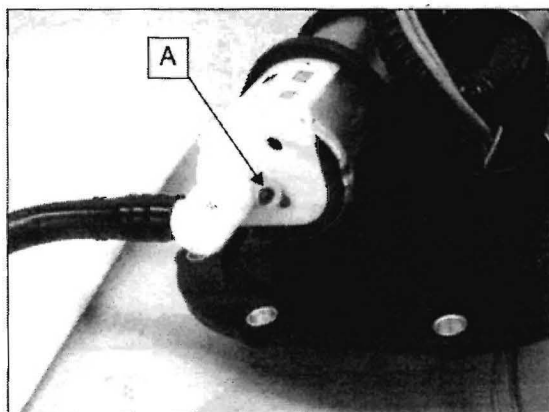
NOTE: Removal of the fuel pump pickup filter can cause damage to the pump, use caution while following the instructions.

Filter Removal

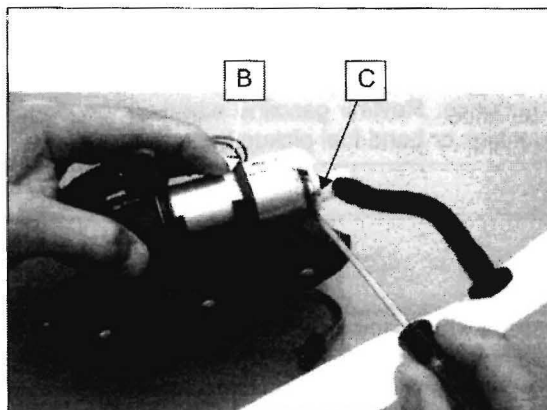
1. Remove fuel pump (page 5.15).
2. Using a machinist's scribe, or a similar pointed tool, loosen the push nut by *carefully* prying it open on the alignment post.



3. Remove the push-nut, being careful not to damage or break alignment post (A).

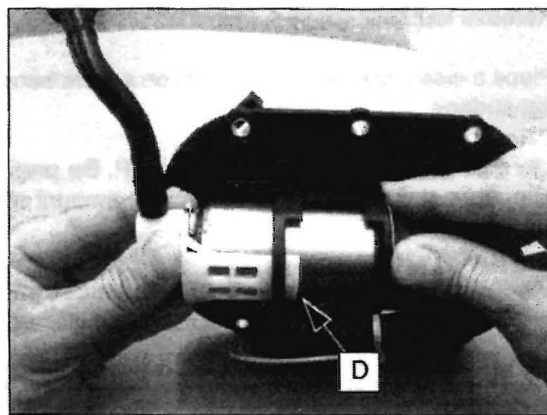


4. Push and hold retainer tab (B). Using a small flat screw driver, gently pry the connector plate off the inlet fitting of pump (C), prying as close to the fitting as possible.

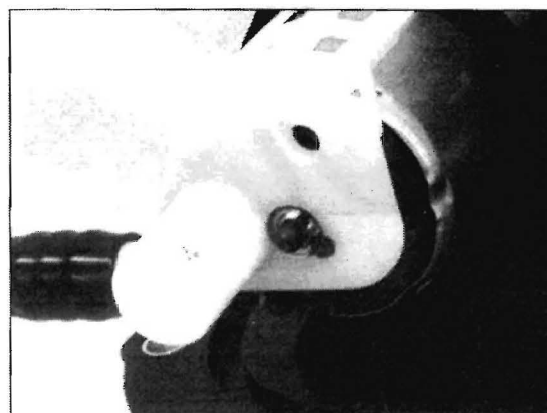


Filter Installation

1. Push the new filter straight onto the inlet fitting while guiding retainer tab (D) under the fuel pump mounting ring.

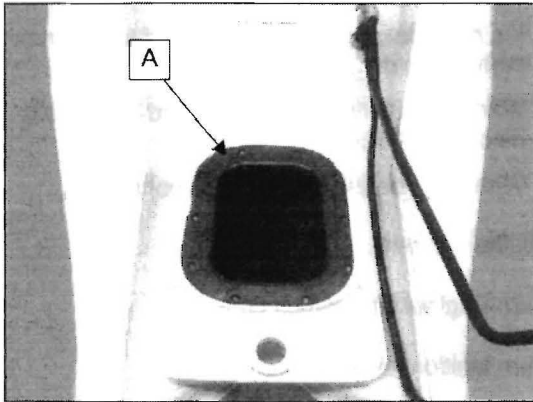


2. Install a new push-nut from the filter kit onto the alignment post, making sure it is firmly seated against the connector plate.

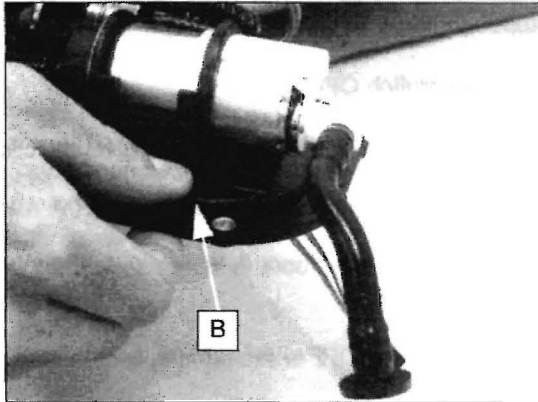


FUEL PUMP INSTALLATION

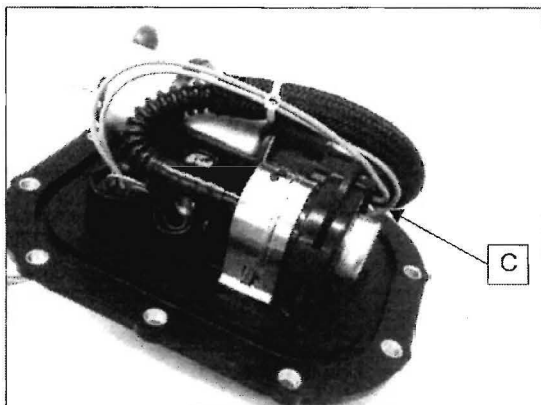
1. Clean sealing surface of tank (A) and inspect closely for scratches or surface damage that would prevent the O-ring from sealing properly.



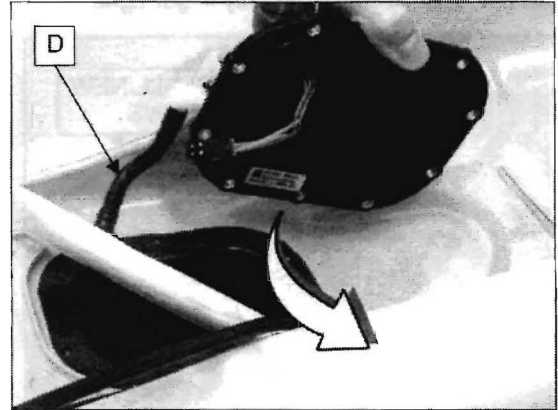
2. Install a NEW O-ring (B) by pressing firmly into the groove of the pump flange, making sure it is not twisted.



3. In checking the position of the wires and protective hose jacket, the wires should not extend past the curve in the hose (located on the outside). If the wires need adjusting, route them toward the inside of the hose, as shown (C) to prevent damage during pump installation.



4. Position pump as shown, sliding filter and pickup tube toward left side of tank (right side of photo). Do not kink or bend the pickup hose (D).



5. Continue to rotate pump in order to position the filter sock at lowest point of left side tank half.
6. Rest rear edge of pump flange on rear sealing surface of pump mounting flange on tank.
7. Grasp front edge of pump flange as shown. Push hose of pump back slightly with index finger while pushing downward on front edge of pump flange. Apply enough force to slip hose past front edge of tank opening.

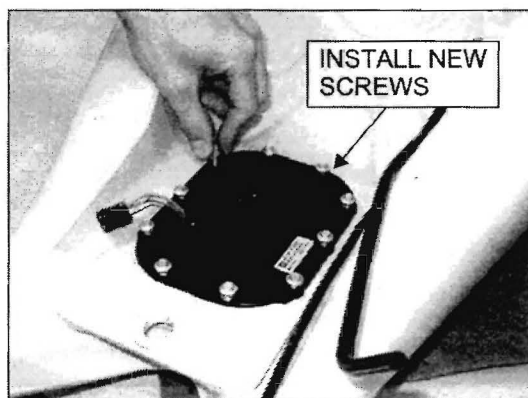


(Cont.)

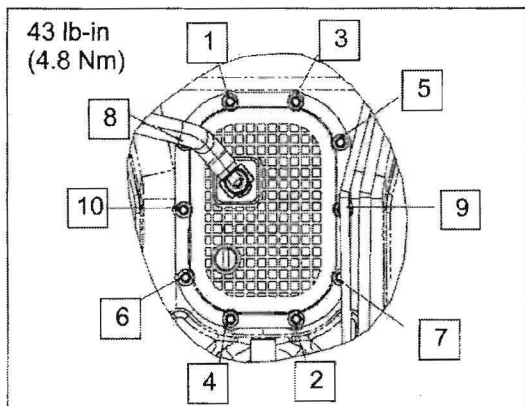
FUEL SYSTEM / FUEL INJECTION

Fuel Pump Installation (Cont.)

8. Start all NEW pump mounting screws in each hole, then tighten all screws evenly finger tight.



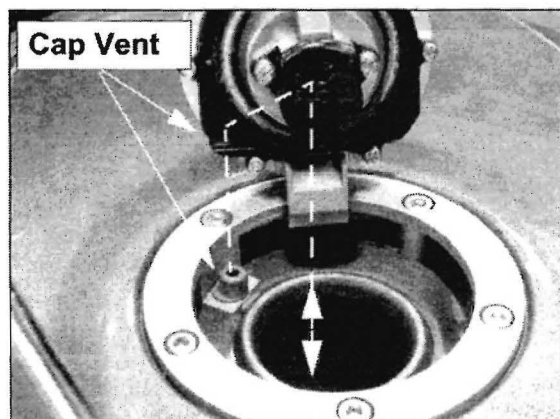
9. Torque in 3 steps to final torque following the star pattern shown below. Repeat final torque one time.



10. Add fuel. Check for leaks before installing fuel tank.

FUEL TANK VENT INSPECTION

1. Refer to page 5.6 (49 State) or 5.7 (California) for tank vent inspection and hose routing information.



PRIMING THE FUEL SYSTEM

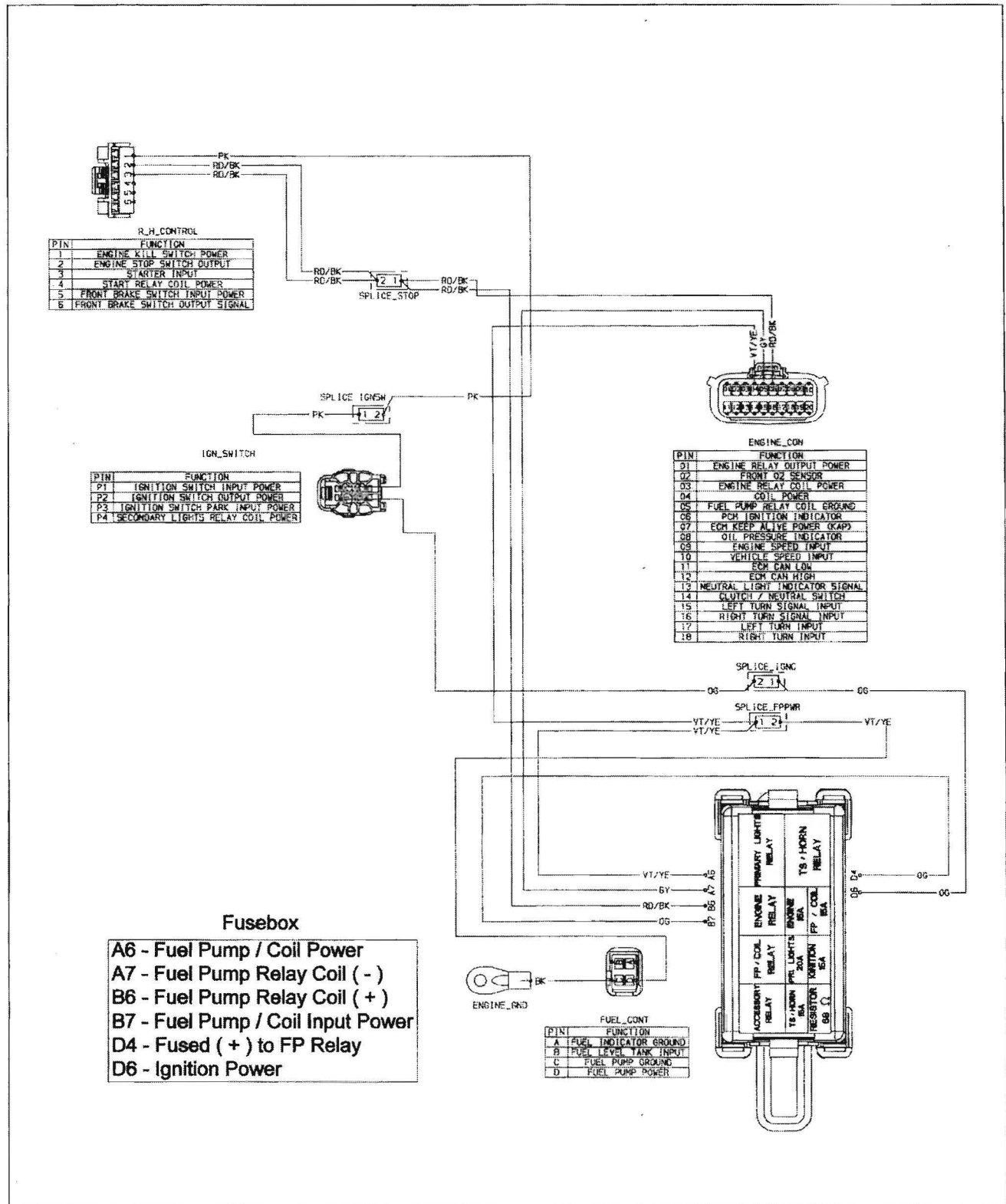
Fuel pump prime procedure also centers the IAC valve. Prime procedure should be performed:

- If a new fuel pump is installed or if tank is run completely dry.
 - Whenever fuel system is serviced (fuel line is disconnected).
 - Whenever battery or IAC is disconnected.
1. Fill the fuel tank.
 2. Turn Engine Stop switch OFF.
 3. Turn ignition key ON.
 4. Turn stop switch to RUN.
 5. Allow switch to remain in RUN position until pump stops running (about 2-3 seconds).
 6. Turn stop switch OFF.
 7. WAIT until the ECM centers the IAC valve (the clicking sound stops) and then *wait an additional 10 seconds*, or until you hear a faint single "click" from the relay.
 8. Repeat Steps 4-7 about 5 times to complete the priming procedure.
 9. Turn ignition key OFF when priming is complete.

NOTE: Fuel level in tank must be high enough to submerge pickup screen on fuel pump.



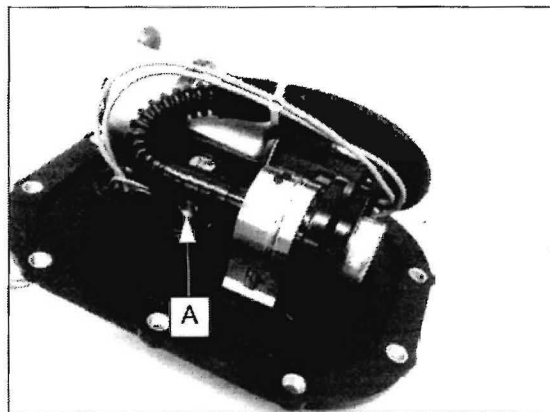
FUEL PUMP CIRCUIT DIAGRAM



FUEL SYSTEM / FUEL INJECTION

FUEL LEVEL SENSOR RESISTANCE TEST

OVERVIEW OF OPERATION: The fuel level sensor (A) is located inside the fuel tank on the fuel pump.



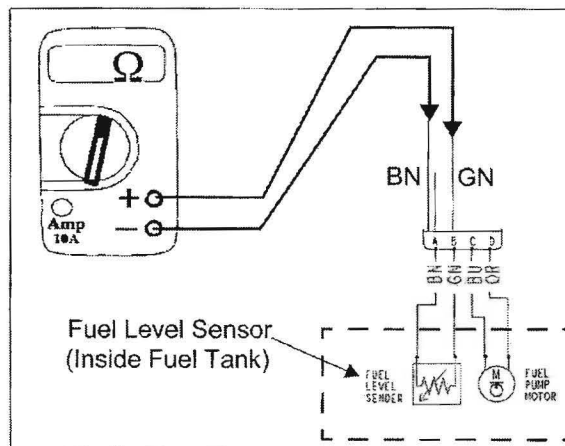
The sensor is a thermistor with inverse temperature characteristics (as temperature increases, sensor resistance decreases). When the fuel level falls below the sensor, temperature increases, lowering the resistance to provide a ground path for the Low Fuel lamp bulb which is powered when the ignition key is on. The lamp will start to glow dimly when the fuel level falls below the sensor, and will brighten as the fuel level continues to fall (low resistance).

With fuel tank empty and key ON the lamp will take approximately 30 seconds to 1 minute to reach full intensity (depending upon temperature). The sensor can be tested using a digital multimeter. Resistance readings obtained with tank installed will be in proportion to the amount of fuel in the tank (the temperature of the thermistor). The sensor wires are located in the 4-pin connector with the fuel pump wires, at rear of fuel tank.

Fuel Pump / Level Sensor Connector Access

1. For Low Fuel Light circuit testing, refer to. If you suspect a faulty sensor, perform this test.
2. Remove side covers (page 3.3) and seat (page 3.6).
3. Remove rear tank mount bolt.
4. Loosen both front mount bolts and protect front of tank.
5. Lift rear of fuel tank and support.
6. Disconnect fuel pump / level sensor 4-pin connector.
7. Set multimeter to measure resistance. Attach suitable test probe adaptors to meter leads (from kit PV-43526).

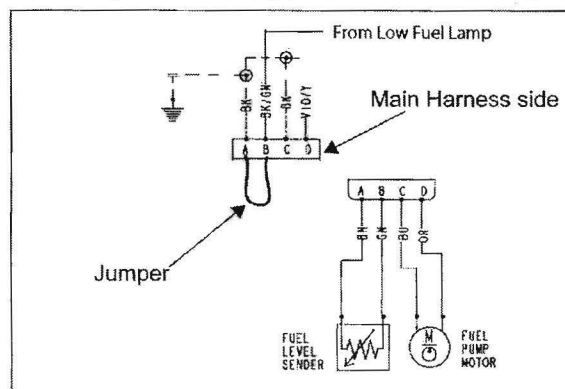
8. On the fuel pump side of the connector, measure resistance across the sensor and compare to the table. Temperature **MUST** be close to the testing temperature listed in the table for accuracy.



Measure Resistance Pin A to Pin B (Pump Side)	Approximate Resistance
Sensor Resistance $\pm 20\%$ @ 25° C (77° F).	800 Ω – 1100 Ω (.80-1.1 K Ω)

FUEL LEVEL SENSOR BYPASS TEST

1. If sensor resistance is within specified range but fuel light is inoperative, perform the following test when the connector is still unplugged.
2. Connect a jumper wire across Pin A and Pin B on the harness side of the fuel pump connector (connect Black/Green wire to Black).
3. Turn ignition key ON.
4. If low fuel lamp does not illuminate, check the bulb, continuity between bulb and sensor connector, and continuity of Black wire(s) in 4-Pin connector to ground.



5.20



FUEL PUMP ELECTRICAL DIAGNOSTICS

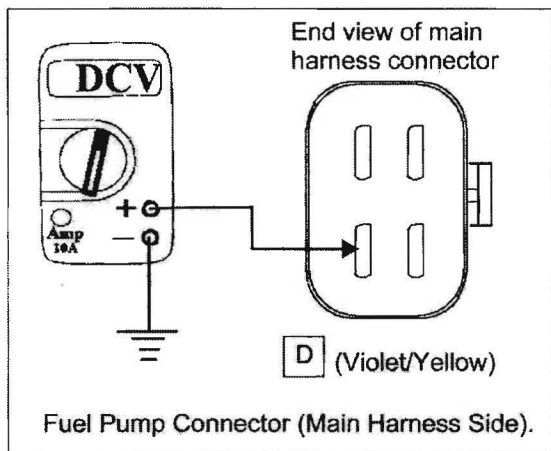
FUEL SYSTEM	
Fuel Pump Pressure	3.51 BAR (351 kPa) (51 psi)
Fuel Pump Volume (@ 12VDC)	60 liters/hr (500 ml / 30 seconds) (16.9 oz. / 30 seconds) (0.26 gal / min)
Fuel Pump Current Draw	5 amps maximum @ 13.5 VDC

NOTE: When ignition switch is turned ON and Engine Stop switch is in the RUN position, fuel pump will run momentarily (about 2-3 seconds). Key or Engine Stop switch must be turned OFF for at least 5 seconds before fuel pump will cycle again (there may be an audible click as the relay re-sets). Fuel pump will not cycle again if switch is turned on and off quickly.

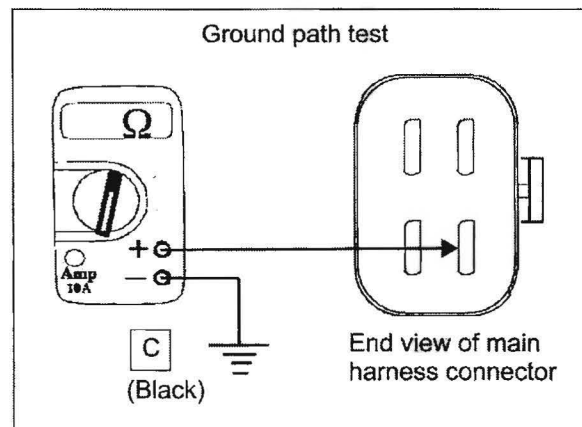
5

FUEL PUMP SUPPLY VOLTAGE TEST

1. Disconnect fuel pump / level sensor harness (as described on page 5.20 for level sensor test).



5. If low or no voltage is delivered to the fuel pump, verify ground wire (Pin C, Black) has good continuity to battery (-) post.



2. Connect meter on wire harness side of connector.
3. Turn Engine Stop switch to RUN.
4. Turn ignition key ON and read DC voltage on meter when key is first turned on. Voltage reading on pin D (Violet/Yellow) should be close to battery voltage for 2-3 seconds after turning key ON.

6. If ground is OK, check Gray wire from fuel pump relay to Pin 5 of the Engine-Chassis harness connector, and from there to ECM pin #28. The Gray wire receives a momentary ground from the ECM (for 2-3 seconds) and activates the fuel pump relay which supplies power to the pump on the VIO/Y wire. Trace both power and ground circuits to determine fault if battery voltage is not present for 2-3 seconds after key and kill switch are turned on.

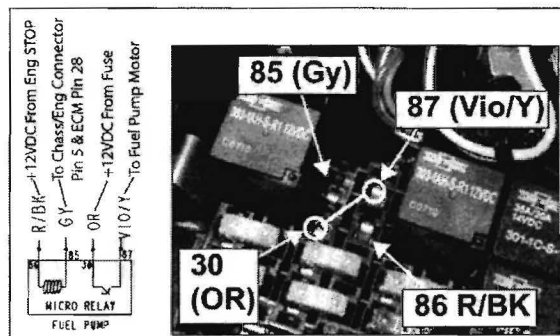
When a CPS signal is received by the ECM (engine is cranking or running) the ECM maintains the ground on Pin 28 (Gray wire), keeping the pump powered.



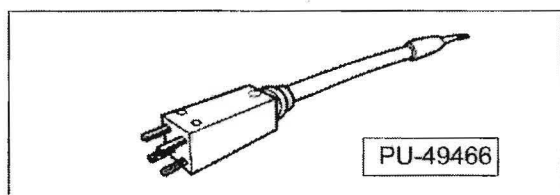
FUEL SYSTEM / FUEL INJECTION

BATTERY VOLTAGE TO FUEL PUMP

1. Check fuel pump fuse. If open (blown) visually inspect circuit wiring for shorts to ground and then perform fuel pump current draw test on page 5.22.
2. If fuse is OK, remove fuel pump relay. Verify battery voltage on OR wire (relay terminal 30).



3. If power is present, connect PU-49466 Relay Jumper or a jumper wire diagonally across fuel pump relay contact terminals 30 and 87 (OR to VIO/Y). An ammeter can also be used as in a current draw test.



CAUTION

DO NOT apply battery power to terminal 85 of the relay (Gray wire) or ECM damage will result! Do not power a dry fuel pump or pump damage could result. Pump must be in tank, submerged in fuel, and connected to fuel rail.

4. If pump runs when powered directly in Step 3, swap fuel pump relay with accessory relay, turn ignition key ON and cycle key/stop switch to test. If pump runs when key/kill switch is cycled replace faulty relay.
5. If pump does not run with relay swapped and key / stop switch cycled (but ran in Step 3) check for battery voltage on Red/Black wire (terminal 86) at pump relay.
6. If there is no battery voltage on terminal 86 (with ignition key ON and Engine Stop switch to RUN) refer to the wiring schematic to trace power path through ignition switch and Engine Stop switch (Orange to Pink, and Pink to Red / Black leading to relay).

NOTE: If starter motor circuit works, key and kill switch are not suspect. Check continuity of R/BK wire from kill switch (Pin 2) to pump relay (term. 86).

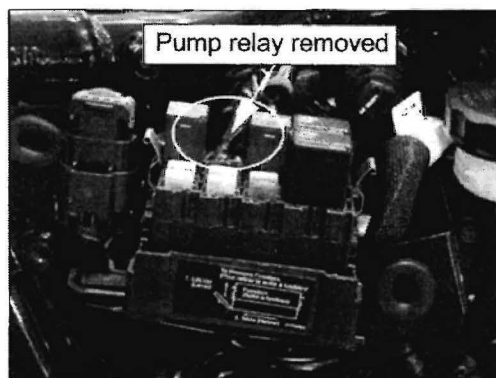
7. If no battery voltage on terminal 86, check continuity of gray wire from pump relay (terminal 85) through engine harness connector to ECM pin 28. The ECM grounds the pump relay through pin 28 for 2-3 seconds when key and kill switch are first turned ON. The ECM maintains the ground connection after engine start-up. Ground Gray wire to bypass ECM ground.

FUEL PUMP CURRENT DRAW TEST

OVERVIEW: Fuel pump current draw is an indicator of pump condition. Perform draw test if fuel pump operation is suspect, or if fuel pump fuse is found open (blown).

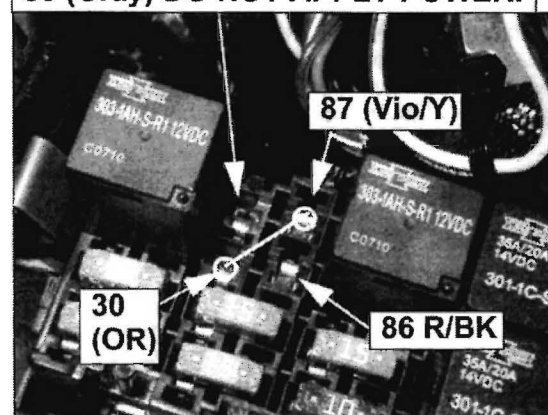
NOTE: When meter leads are inserted the pump will run, and current draw will be displayed on the meter, even with key and stop switch off. Fuel tank must be completely installed and have enough fuel in it to cover the fuel pickup screens for an accurate test.

1. Remove right side cover and fuse box cover.
2. Remove fuel pump relay (A) by pulling straight upward.



3. Set meter to DC Amps. Be sure red meter lead is in the 10A jack, and black meter lead is in common (-) jack.
4. Insert one meter lead in pin socket (30) and other meter lead in pin socket (87) of relay block.

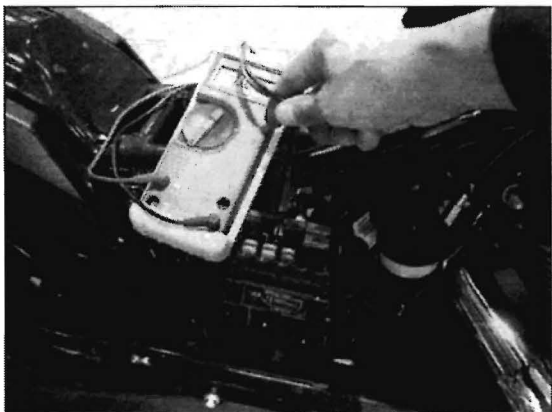
85 (Gray) DO NOT APPLY POWER!



5.22



- Read fuel pump current draw on meter and compare to specification.



- Inspect fuel pump circuit wiring or replace fuel pump if current draw exceeds specification.

SPECIFICATION: Fuel Pump Current Draw
Maximum: 5 DC Amps

CAUTION

Wear safety glasses or a face shield when working around the fuel system to protect your eyes.

- De-pressurize fuel system and disconnect fuel line at fuel rail (page 5.12).

Fuel Pressure Gauge Adapter: PV-48656

Fuel Pressure Gauge: PU-43506-A



5

FUEL PUMP PRESSURE INSPECTION

WARNING

GASOLINE

Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area. Open flames, sparks and cigarettes must be kept away from gasoline. KEEP GASOLINE OUT OF THE REACH OF CHILDREN!

- Start engine and record fuel pressure (or cycle key and Engine Stop switch to read pressure when pump cycles for 2-3 seconds).

Fuel pressure 3.51 BAR (351 kPa) (51 psi)

- Turn ignition switch off. Disconnect gauge adapter and re-connect fuel line (page 5.13).

FUEL PRESSURE TROUBLESHOOTING

FUEL PRESSURE TOO LOW: INSPECT

- * Low fuel level (add fuel)
- * Pump not running (Fuel pump or circuit malfunction)
- * Restricted fitting, fuel supply line, or gauge adapter hose
- * Fuel line kinked or restricted (from tank fitting to rail)
- * Fuel line leaking (leaking air in or fuel out)
- * Vent restriction
- * Plugged fuel pickup filter (located in fuel tank)
- * Pressure regulator malfunction (located on pump)
- * Fuel pump malfunction (Pump should run for about 2 seconds the instant that the key switch and Engine Stop switch are turned ON).

FUEL PRESSURE TOO HIGH: INSPECT

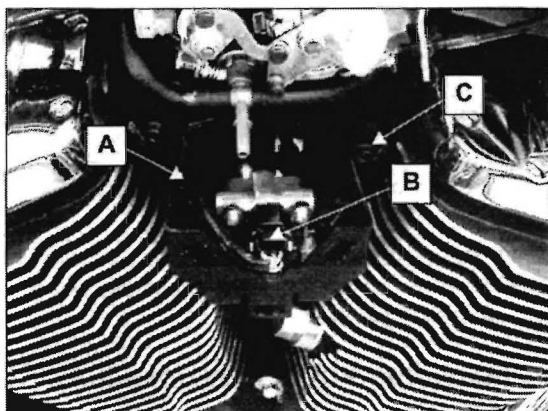
- * Plugged fuel return (in tank on pressure regulator)
- * Pressure regulator malfunction (located on pump).



IDLE AIR CONTROL REMOVAL

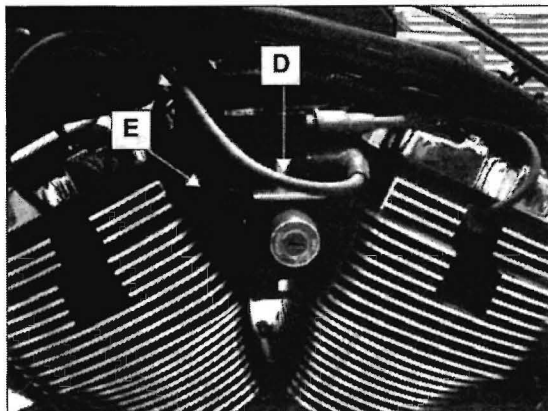
Also refer to IAC Assembly View on page 5.10. If hoses are removed from elbow fitting or tee fitting, do not push air supply hose too far into fitting(s) upon assembly, or IAC air will be restricted and idle control affected.

1. Remove fuel tank (page 5.12).
2. Remove ignition switch cover and IAC cover (page 3.3).
3. Remove wire dart (A).
4. Push tab (B) to disconnect IAC harness.
5. Remove (4) IAC bracket screws (C) using a 5mm ball drive hexagonal socket.



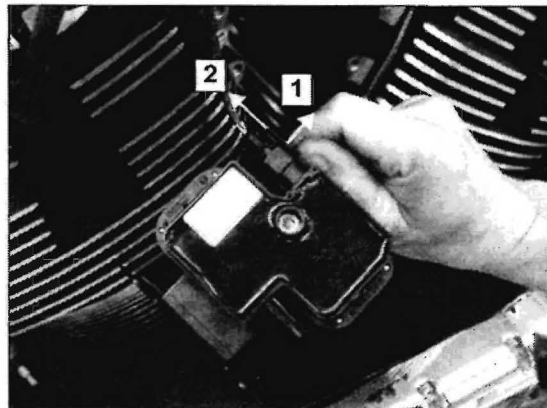
6. Remove high tension leads from coils.

NOTE: The front HTL (D) is routed *behind* the ignition switch cover, not above it upon assembly.



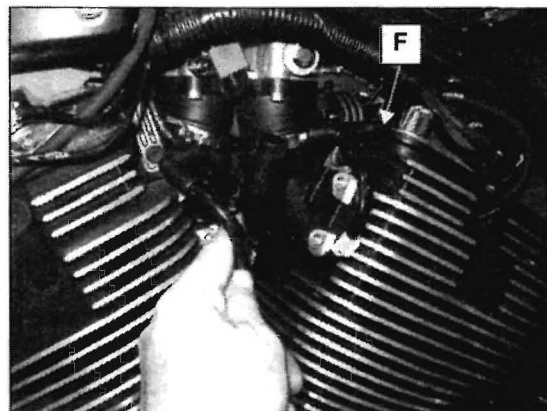
7. Remove (4) screws (E) at the corners of the bracket with a 5mm ball drive hexagonal socket.

8. Disconnect primary wire harness from coil.



9. Push tab on ignition switch connector and remove bracket with switch attached.
10. Remove air supply hose from air box, the front air delivery hose, and the rear air hose with "T" fitting from throttle body.

NOTE: Restricted side of tee fitting faces purge valve on California models. On 49 state models, the restricted side of the tee fitting is plugged (F).

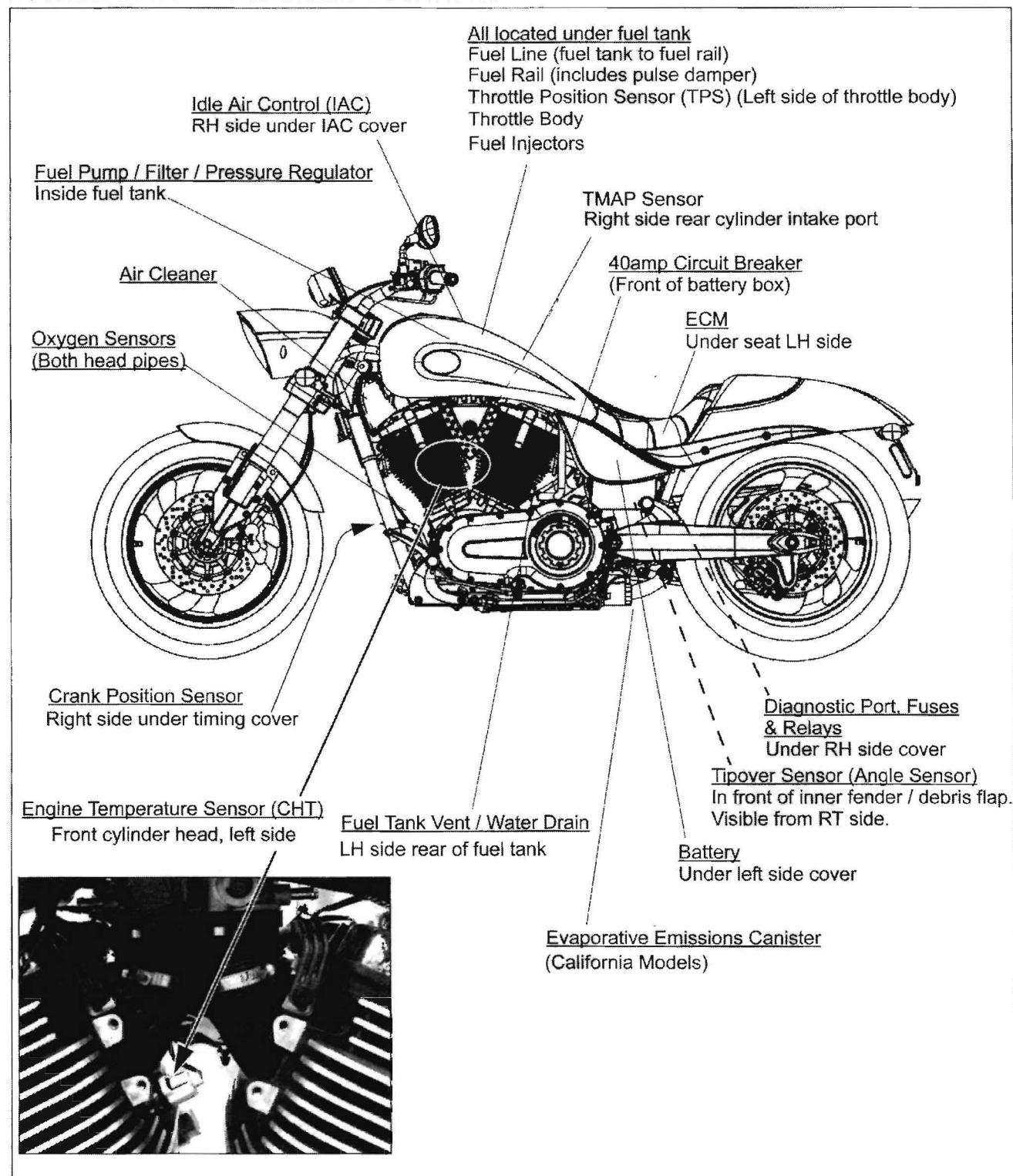


5.24

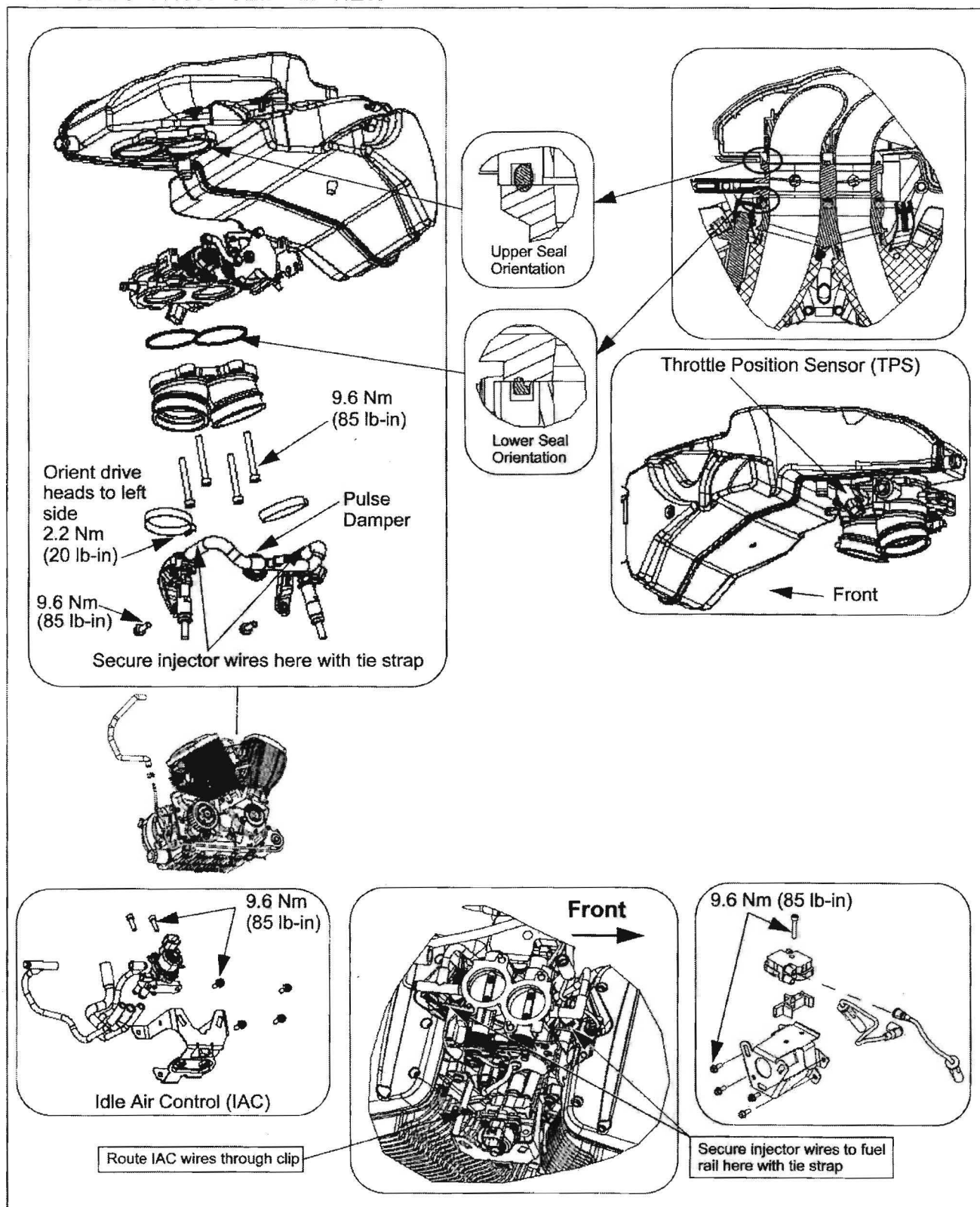


EFI SYSTEM COMPONENTS

FUEL INJECTION COMPONENT LOCATIONS

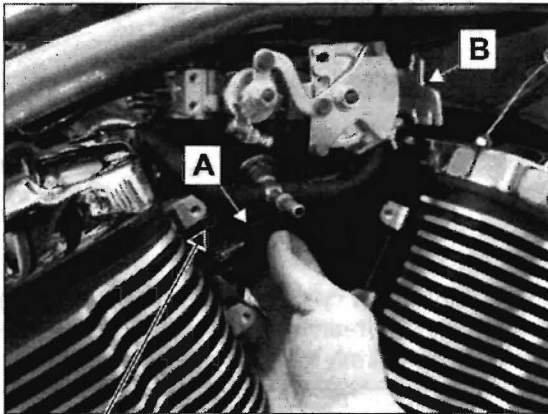


FUEL INJECTION ASSEMBLY VIEW



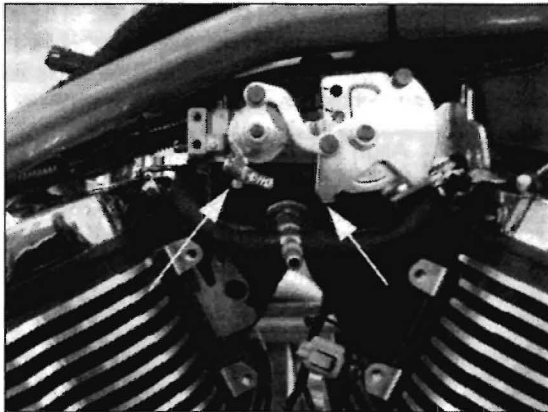
THROTTLE BODY REMOVAL

1. Remove fuel tank (page 5.12).
2. Remove IAC hoses, IAC valve, and bracket after removing ignition coil and bracket (page 5.24).
3. Remove TMAP sensor (A) and throttle cables from bracket (B).

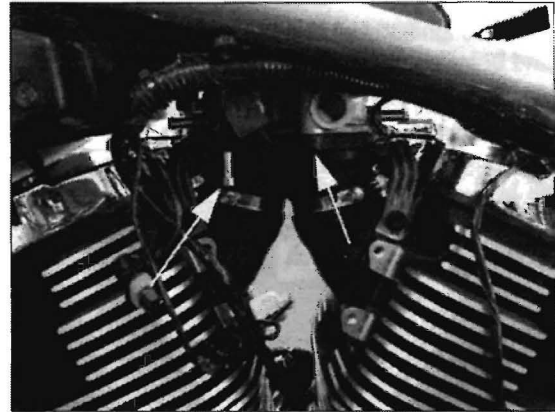


TMAP Sensor Screw Torque: 2.25 Nm (20 lb-in)

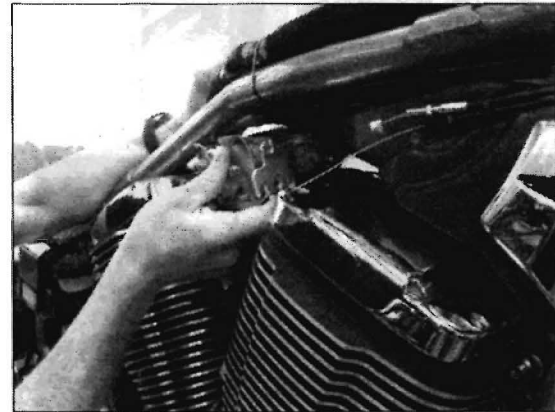
4. Remove breather hose from air box.
5. Use an extended length 5mm ball drive hex socket to remove (2) screws securing right side of throttle body to intake adaptors.



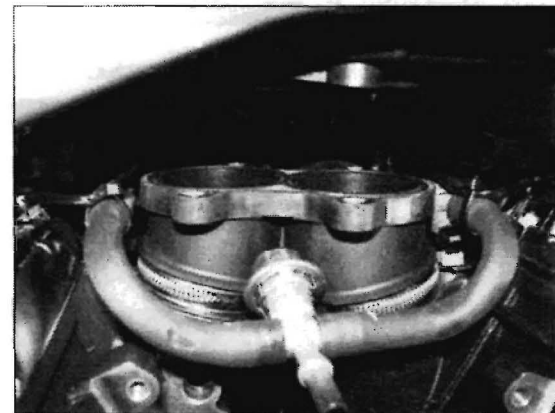
6. Use an extended length 5mm ball drive hex socket to remove (2) screws securing left side of throttle body to intake adaptors.



7. Lift air box and slide throttle body out left side.



8. Replace O-rings upon assembly, using care during installation that O-rings are not damaged or displaced.

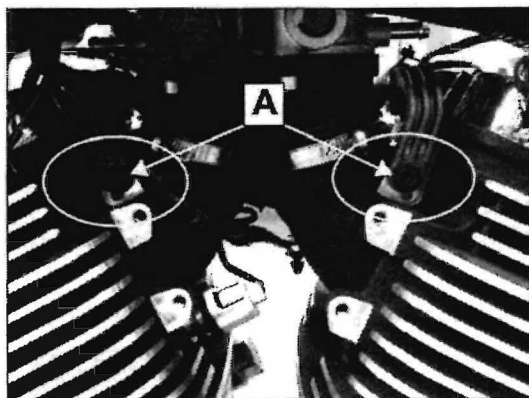


9. Refer to "FUEL INJECTION ASSEMBLY VIEW" on page 5.26 for fastener torques.

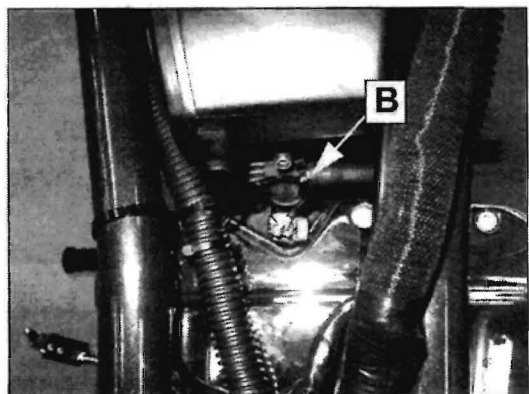


FUEL RAIL / FUEL INJECTOR REMOVAL

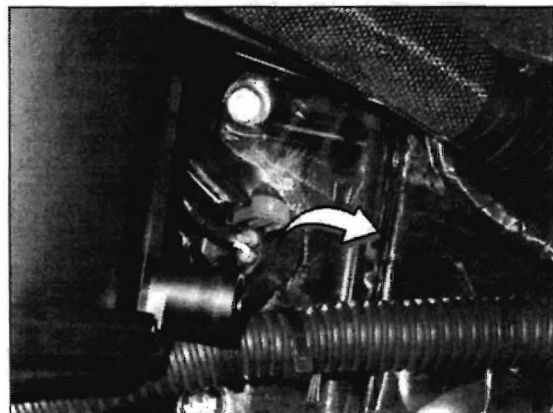
1. Remove fuel tank (page 5.12) and de-pressurize system (page 5.12).
2. Remove ignition coil bracket and IAC valve with hoses and bracket (page 5.24).
3. Remove fuel rail screws (A) and remove throttle body (page 5.27).



4. Cut tie straps (B) that secure injector harness wires to the fuel rail.



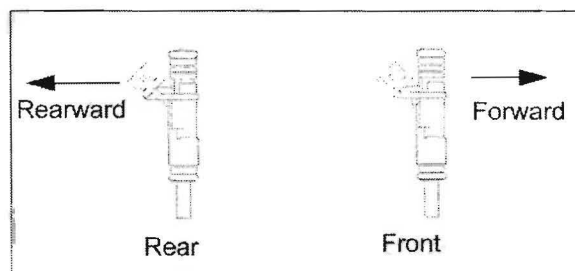
5. Slide red lock tab up and out of connector.



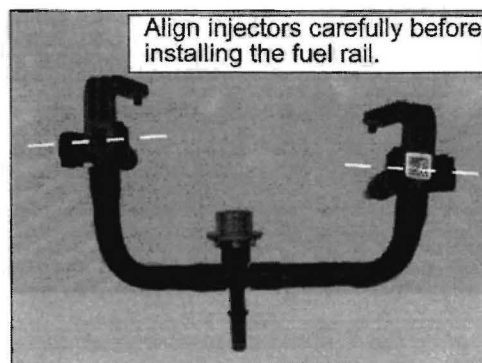
6. Press tab to remove harness from each injector.
7. Slide fuel rail retaining clip back until rail is released from injector, or remove them completely.
8. Lift fuel rail off injectors and rotate rail to the right to remove it. Cover ends of injectors and fuel with plastic wrap rail to prevent contamination.
9. Clean the area around injectors with compressed air to prevent foreign material from entering the engine. Pull injectors out of cylinder heads, keeping them in order (front and rear) for assembly.

FUEL RAIL INSTALLATION

1. Install new O-rings on each injector and lubricate with engine oil. (Note: Service O-rings are the same color and suitable for use on bottom and top of injector).
2. Install retainer clips fully onto each injector. Be sure clips are fully seated in the groove.
3. Install injectors in cylinder heads with rear connector facing straight rearward and front facing straight forward. Press firmly to seat. Remove protective cover.



4. Install fuel rail and place in position on top of injectors. Press rail over each injectors evenly until retaining clips "click" into place on the rail. Be sure rail is seated completely and clips are engaged in the groove.



5. Install throttle body flange screws and fuel rail retaining screws. Torque all to 9.6 Nm (85 lb-in).
6. Install wire harness on each injector and then install the lock clips. Secure wires to fuel rail with a new tie strap.
7. Assemble remaining parts in reverse order and prime the fuel system (page 5.18).

FUEL INJECTION SYSTEM TESTING AND DIAGNOSTICS

FUEL INJECTION SYSTEM - OVERVIEW OF OPERATION

The Electronic Fuel Injection (EFI) system functions to provide the engine with precisely metered fuel under varying loads and conditions.

The Engine Control Module or "ECM", is located under the seat. It is programmed to provide the correct fuel/air mixture and ignition timing based on several sensor input signals (engine load, temp, altitude, manifold pressure etc.). The ECM also provides grounds or voltage to other *EFI related* circuits of the electrical and fuel delivery systems.

A Throttle Position Sensor (TPS) is mounted on the left side of the throttle body. The TPS is not a primary input for air flow information in the closed loop system. It mainly provides "rate of change" feedback to the ECM (such as rapid acceleration) and also serves as a plausibility check for the TMAP sensor. The MAP portion of the TMAP sensor is the primary air flow and load sensing device.

An electric fuel pump, mounted inside the fuel tank supplies fuel pressure to the injectors continuously when the engine is running or cranking. A pressure regulator incorporated on the pump keeps fuel pressure steady at approximately 3.51 Bar (350 kPa / 51 PSI). The fuel pump cycles "ON" for 2-3 seconds when the ignition key and Engine Stop switch are turned on to pressurize the system for start-up.

The fuel injectors inject fuel when they are grounded by drivers inside the ECM. The duration of an injector pulse (length of time the injector circuit is grounded) is controlled by the ECM. Pulse duration determines the amount of fuel delivered to the engine (longer cycles = more fuel). The ECM selects the correct amount of fuel injector cycle time by referencing a three dimensional fuel "map". Simplified, each reference point on the map represents a different amount of time.

Although TMAP and engine RPM are the most influential inputs for selecting a map reference point, the ECM also evaluates feedback from minor sensors in the system, to obtain a more accurate "picture" of the fuel needs at any given moment.

The locations of sensors and other EFI system related components is shown on page 5.25.

IDLE AIR CONTROL (IAC) - OVERVIEW OF OPERATION

The Idle Air Control system consists of the Engine Control Module (ECM), IAC valve, air supply hose, two air delivery hoses, and related wiring between ECM and IAC valve. (See IAC Assembly View on page 5.10).

The IAC valve is located behind the triangular cover on the right side of the throttle body. Its main function is to stabilize the engine's base idle speed by varying the amount of air allowed to the engine when the throttle plates are closed. The air is regulated by main and trim valves located inside the IAC valve body.

The ECM continuously monitors engine RPM, and changes the position of IAC air valves (via step motors) to maintain idle speed between (approx) 800-1000 RPM.

Filtered air from the air box is delivered to the IAC valve body through a supply hose on the lower left side of the air box, then distributed to front and rear cylinder throttle bodies through separate delivery hoses.

IAC CYCLING - Whenever the IAC wire harness is disconnected or after ECM re-programming (re-flash), cycle key switch on and off so IAC valve can "learn" its position. Wait 5 seconds after turning key ON. The system requires no scheduled maintenance beyond visual inspection to ensure all hoses and electrical connections are tight. NEVER attempt to "adjust" idle speed with the throttle stop screw or flow balance screw located on the throttle body. These screws are factory pre-set. Any tampering will require throttle body replacement.

SELF-DIAGNOSTIC FEATURE

The ECM used on the Victory motorcycle stores trouble codes in memory. Trouble Codes are stored by the ECM when a sensor reading is outside of the normal or "plausible" range. These codes are listed and described on page 5.32. The ECM is located under the seat.

When a fault occurs, the ECM records a code in the "Logged Faults" memory. If a fault is currently active, the code is also recorded in the ECM "Current Faults" memory and remains until the fault is no longer occurring. If the problem is corrected, the "Current Fault" is erased, but the code remains in the "Logged Faults" memory until it is manually deleted (cleared) using Digital Wrench™ software. Logged trouble codes remain even if the battery power is removed from the ECM.

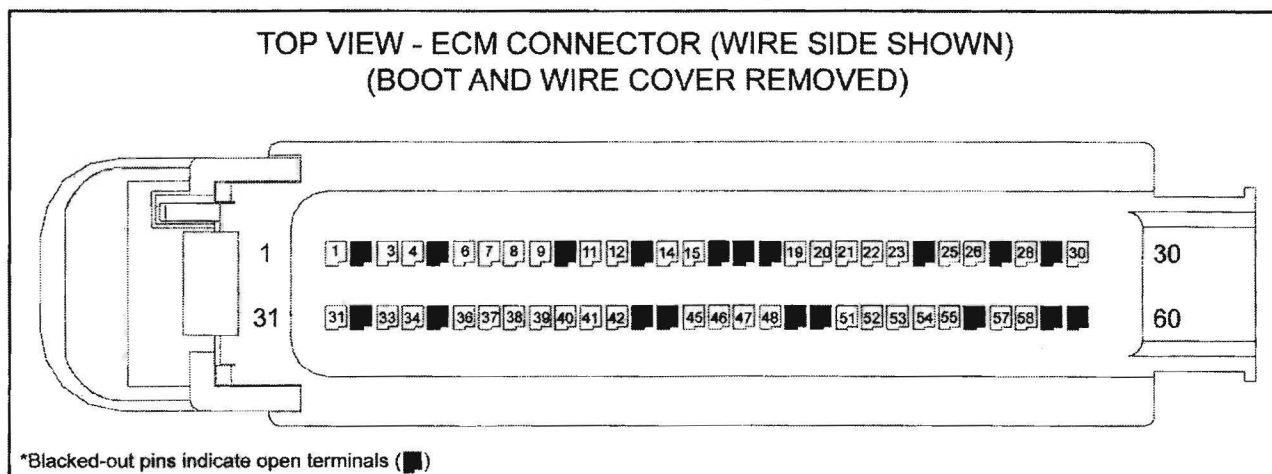
Digital Wrench™ diagnostic software is the tool used to interface with the EFI system via a diagnostic port located under the right side cover (aft of fuse box). When available, Digital Wrench™ should always be connected to ensure accurate problem diagnosis. Diagnostic screen examples in this chapter give you some examples of "normal" sensor readings under given conditions.



FUEL SYSTEM / FUEL INJECTION

ECM CONNECTOR MAP

Refer to page 5.34 to remove connector from ECM.



Wire Color Key - BN = Brown; DG = Dark Green; BK = Black; GY = Gray; PK = Pink;
RD = Red; VT = Violet; WH = White; YE = Yellow; OG = Orange; DB = Dark Blue

ECM CONNECTOR MAP

(System related wire color & pin number shown. Refer to wiring diagram for complete connector diagram.)


Pin	Color	Function	Pin	Color	Function
1	VT / PK	VPWR	31	VT / PK	VPWR
3	WH / BK	FRONT CYL COIL OUTPUT	32	BK / OG	SIDE STAND SWITCH OUTPUT
4	WH / DG	REAR CYL COIL OUTPUT	33	BK / WH	POWER GROUND
6	DB / PK	IAST 1	34	RD / BK	IGNITION SENS
7	DB / WH	IAST 2	36	GY / RD	FRONT O2 SENSOR
8	DB / OG	IAST 3	37	GY / DB	REAR O2 SENSOR
9	DB/RD	IAST 4	38	OG / DG	INTAKE AIR TEMP
11	GY / BK	POWER SUSTAIN	39	OG / DB	CYLINDER HEAD TEMP
12	BK / WH	POWER GROUND	40	OG / WH	TIP OVER SWITCH
14	BK / DB	LEFT T/S OUTPUT	41	BK	CASE GROUND
15	BK / RD	RIGHT T/S OUTPUT	42	DG / BN	VEHICLE SPEED SENSOR
19	DB	CANISTER PURGE VALVE	45	WH	REVERSE MOTOR SWITCH
20	VT / DB	LEFT T/S SWITCH INPUT	46	BN / DB	SIGNAL RETURN
21	DG / DB	VEHICLE SPEED OUTPUT	47	YE	CAN HIGH
22	DG / WH	TACHOMETER OUTPUT	48	DG	CAN LOW
23	NOT USED	NOT USED	51	DB / YE	CLUTCH SWITCH
25	WH / DB	FRONT CYL FUEL INJECTOR	52	YE / BK	NEUTRAL SWITCH INPUT
26	WH / GY	REAR CYL FUEL INJECTOR	53	OG / YE	THROTTLE POSITION SENSOR
28	GY	FUEL PUMP CONTROL	54	OG / BN	MAP SENSOR
30	VT / RD	RIGHT T/S SWITCH INPUT	55	BN / RD	REFERENCE VOLTAGE (+5Vdc)
			57	RD	CPS POSITIVE SIGNAL
			58	BK	CPS NEGATIVE SIGNAL



VIEWING AND CLEARING TROUBLE CODES

Trouble codes are logged in the ECM memory when a sensor or other supported system fault occurs. To view the codes, do the following:

Viewing Trouble Codes

1. Connect the Digital Wrench™ diagnostic software and establish communication with the ECM (page 5.46).
2. Select the  icon to display loaded trouble code(s).
3. The codes are classified as *Current or Historical*. Current codes are occurring at the moment. Historical codes are not occurring at the moment but have occurred in the past. A list of codes is on page 5.32.

Clearing Trouble Codes

1. Click on "Clear Trouble Codes" icon to clear codes.

SENSOR DIAGNOSTICS - IMPORTANT INFORMATION TO UNDERSTAND BEFORE YOU BEGIN

If a sensor fails or reads outside a "normal" range, a "pre-programmed" (default) value is substituted by the ECM until sensor reading returns to normal.

Sensor values can be viewed in Digital Wrench™ on the "Sensor Data Grid Or Graphs" screen. Since the sensor reading may either be actual feedback from the sensor OR a default value set by the EM in the event of a fault in the sensor or wiring, it is important to verify the condition of the sensor.

The check engine ("ENG") warning may or may not illuminate to alert the rider of a possible problem, depending on which system fault has occurred. The first step following a check engine light is to perform a visual inspection to see if a cause can be determined.

Connect Digital Wrench™ to see what codes are present in memory, and focus your diagnostics on that sensor and the related wiring for that circuit. Refer to wiring diagrams and system break-out diagrams to narrow a problem search.

If multiple codes are set, refer to the wiring diagram and focus your efforts on wiring and connections common to each of the sensors, such as a power supply or common ground. Multiple sensor failure is extremely unlikely.

Many sensor tests described in this section are performed at the ECM wire connector. This method ensures that the data from a sensor is reaching the ECM. Sensor tests can be performed at the sensor if easily accessible, but the wiring between the sensor and the 60 pin ECM connector should always be closely examined and the path between the sensor and ECM verified if the sensor itself passes the test.

Poor or corroded connections are the most common cause of system faults. Always check the integrity of the male pins and female receptacles of the connectors in the affected circuit. These may include the sensor connector, the ECM connector, and any in between the two, such as jumper harnesses or the Engine-to-Chassis harness 20 pin connector (located under the seat) where applicable.



FUEL SYSTEM / FUEL INJECTION

TROUBLE CODES



Code Access Icon

Access codes by clicking on the icon on the Digital Wrench™ diagnostic screen. Refer to Digital Wrench™ guided diagnostics for detailed P-code description. These codes will illuminate the MIL except as noted.

CODE NUMBER	DESCRIPTION	POSSIBLE CAUSE (See list below table)
P0107	Manifold Absolute Pressure sensor circuit voltage low - MAP portion of TMAP sensor circuit is open, or shorted to ground.	1
P0108	Manifold Absolute Pressure sensor circuit voltage high - MAP portion of TMAP sensor circuit is shorted to battery voltage.	1
P0112	Intake Air Temperature Sensor voltage low - Temperature portion of TMAP sensor circuit is shorted to ground.	1
P0113	Intake Air Temperature Sensor voltage high - Temperature portion of TMAP sensor circuit is open, or shorted to battery voltage.	1
P0117	Cylinder Head Temperature (CHT) Sensor voltage low - circuit is shorted to ground.	1
P0118	Cylinder Head Temperature (CHT) Sensor voltage high - circuit is open, or shorted to battery voltage.	1
P0122	Throttle Position Circuit voltage low - TPS open, or shorted to ground.	1
P0123	Throttle Position Circuit voltage high - TPS shorted to battery voltage.	1
P0130	Oxygen Sensor Signal Fault	-
P0131	Oxygen Sensor Voltage Low	-
P0132	Oxygen Sensor Voltage High	-
P0136	Oxygen Sensor Signal Fault	-
P0137	Oxygen Sensor Voltage Low	-
P0138	Oxygen Sensor Voltage High	-
P0171	Fuel Correction - System Too Lean (Front Cylinder, #1)	-
P0172	Fuel Correction - System Too Rich (Front Cylinder, #1)	-
P0174	Fuel Correction - System Too Lean (Rear Cylinder, #2)	-
P0175	Fuel Correction - System Too Rich (Rear Cylinder, #2)	-
P0181C	Kickstand Switch Condition Exists	1
P0230	Fuel Pump Driver Circuit open or shorted to ground.	1, 2
P0231	Fuel Pump Driver Circuit grounded.	1
P0232	Fuel Pump Circuit shorted to battery voltage.	1, 3
P0261	Injector 1 (Front Cylinder) driver circuit open or shorted to ground.	1
P0262	Injector 1 (Front Cylinder) driver circuit shorted to battery voltage.	1
P0264	Injector 2 (Rear Cylinder) driver circuit open or shorted to ground.	1
P0265	Injector 2 (Rear Cylinder) driver circuit shorted to battery voltage.	1
P0336	Crankshaft Position Sensor fault - missing tooth signal not detected in CPS signal within the correct period of time.	1, 5
P0443	Canister Purge Valve - driver circuit shorted to battery voltage.	1, 5
P0444	Canister Purge Valve - driver circuit open / grounded.	1, 5

(Continued)

5.32



TROUBLE CODES (Cont.)

CODE NUMBER	DESCRIPTION	POSSIBLE CAUSE (See list below table)
P0508	Idle Air Control (IAC) circuit or IAC motor shorted to ground.	1
P0509	Idle Air Control (IAC) circuit or IAC motor open or shorted to battery voltage.	1
P0519	Idle Air Control (IAC) motor out of range. Note: Low battery or system voltage can also cause P0519 to appear as a historical code. If code appears as historical and MIL light is not on (and no running condition problem exists), clear code, charge battery and re-test.	1
P0562	System Voltage Low - System voltage too low.	1, 6
P0563	System Voltage High - System voltage above allowable limit.	1, 6
P0601	Internal Control Module Memory Check Sum Error	4
P0914	Gear Sensor Signal - Signal Fault	-
P0916	Gear Sensor Signal - Voltage Too Low	-
P0917	Gear Sensor Signal - Voltage Too High	-
P1351	Ignition Coil Primary Driver 1 (Front Cylinder) - circuit open or grounded.	1
P1352	Ignition Coil Primary Driver 2 (Rear Cylinder) - circuit open or grounded.	1
P1353	Ignition Coil Primary Driver 1 (Front Cylinder) - circuit shorted to battery voltage.	1
P1354	Ignition Coil Primary Driver 2 (Rear Cylinder) - circuit shorted to battery voltage.	1
P1501	Tipover Sensor - Signal Fault	1
P1502	Tipover Sensor - Voltage Low	1
P1503	Tipover Sensor - Voltage High	1
P1504	Tipover Condition (Sensor Has Exceeded the Tipover Angle)	See Chapter 19.
P1651	Check Engine Lamp (MIL) - MIL lamp driver circuit open or shorted to ground.	1
P1653	Check Engine Lamp (MIL) - MIL lamp driver circuit shorted to battery voltage.	1
P1710	Right Turn Indicator Driver Circuit - Circuit open or grounded (Refer to Chapter 19)	NO MIL
P1712	Right Turn Indicator Driver Circuit - Circuit grounded (Refer to Chapter 19)	NO MIL
P1714	Left Turn Indicator Driver Circuit - Circuit open or grounded (Refer to Chapter 19)	NO MIL
P1716	Left Turn Indicator Driver Circuit - Circuit grounded (Refer to Chapter 19)	NO MIL

IMPORTANT: The following list indicates possible fault code triggers and diagnostic tips.

- Can be caused by: damaged wiring, poor connections (loose / corroded pins in a connector), faulty sensor, or a faulty ECM**.
- Detected when fuel pump is OFF and output pin of ECM is: shorted to ground; or there is an open circuit in the fuel pump; or there is an open/short to ground in the ECM-to-fuel pump wiring.
- Detected when fuel pump is ON and output pin of ECM or output wiring from ECM to pump is shorted to battery, or the fuel pump is shorted internally.
- A "Memory Check Sum" trouble code can usually be cleared. See page 5.45.

5. Incorrect air gap at sensor or debris buildup on sensor.

6. Possible stator, voltage regulator rectifier, or related wiring problem.

** An ECM failure is extremely rare. Inspect and test all wiring and connections in the circuit, and the sensor itself, before replacing an ECM. Replacement of the ECM requires prior authorization during the warranty period.



ECM HARNESS CONNECTOR TEST PRECAUTIONS

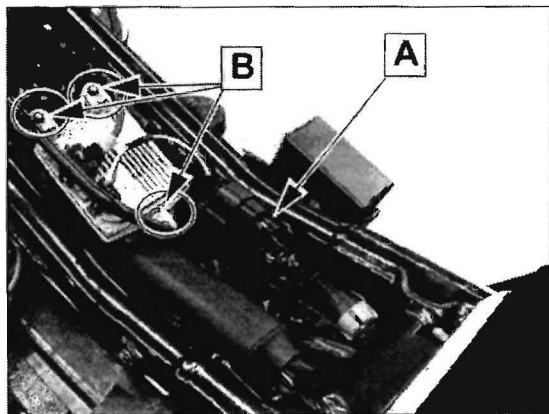
NOTICE: Tests in this section may require reading resistance and voltages at ECM connector. Once ECM connector has been removed from the ECM:

- Do not touch pins on ECM. Static electricity from your body can damage the ECM.
- Do not attempt to perform tests on the ECM unit.
- Always use the appropriate test connector from the Electrical Connector Test Adapter Kit (PV-43526) or an appropriate Fluke meter test probe that will not damage (expand) the connector pin socket.
- DO NOT attempt to use standard meter probes or other devices to probe connector pin sockets. This could expand a terminal socket or damage the connector, create a problem where none existed before, and complicate the diagnostic process.
- Sensor tests on the following pages can often be performed at the sensor connector itself or at the ECM connector based on accessibility of the connector or wiring.
- If a sensor tests within the specified range (OK), then test the circuit wiring. This usually originates at the ECM 60-pin connector, but may include other connections (Engine-to-Chassis harness 20-pin connector located under the seat).

ECM CONNECTOR REMOVAL

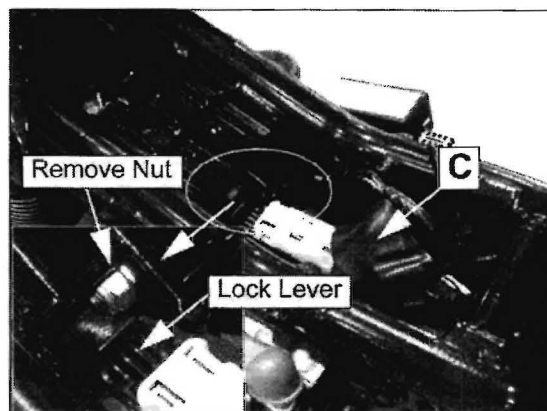
IMPORTANT: CHASSIS TO ENGINE HARNESS CONNECTOR (20 PIN) - Some sensor tests refer to the Engine Harness Connector (A) located under the seat.

1. Remove seat (page 3.6).
2. Remove HID headlamp module (if equipped) by removing three nuts (B) from mounting bracket studs.



NOTICE: DO NOT attempt to force the lock lever around the nut for the upper shock bolt or you could break the ECM connector.

3. Roll boot (C) backward to expose the ECM connector.



4. Remove fuse box from bracket by lifting the tab and sliding box rearward.
5. Lift the motorcycle as needed to remove most of the weight from the rear shock.
6. Remove nut from upper shock mounting bolt and slide the bolt to the right (but do not remove). This will provide clearance to slide the lock lever on the ECM connector forward far enough to disengage the connector.
7. To disconnect ECM 60-pin connector:
 - Slide the lock lever toward the front of the vehicle until connector is disengaged from the ECM.
 - Lift the connector straight off of the ECM.

ECM Connector Installation

1. Carefully align the ECM connector straight with the flange on the ECM. (Do not tip or rotate the connector into the ECM).
2. Gently apply straight inward pressure on the connector while sliding the lock lever back toward the connector until the lever stops and the connector is fully seated.

ECM REMOVAL

1. Remove battery (page 16.6).
2. Remove battery box (page 16.7).
3. Cut the (4) ECM dart clips out of battery box with a diagonal pliers or drive them out with a 1/8" (3 mm) pin punch.



SENSOR TESTS

Tests outlined on the following pages are listed in order of P-Code number.

TEMPERATURE & MANIFOLD ABSOLUTE PRESSURE SENSOR (TMAP) DIAGNOSTICS

FAIL CODE: P0107 / P0108 (MAP SENSOR COMPONENT OF TMAP SENSOR)

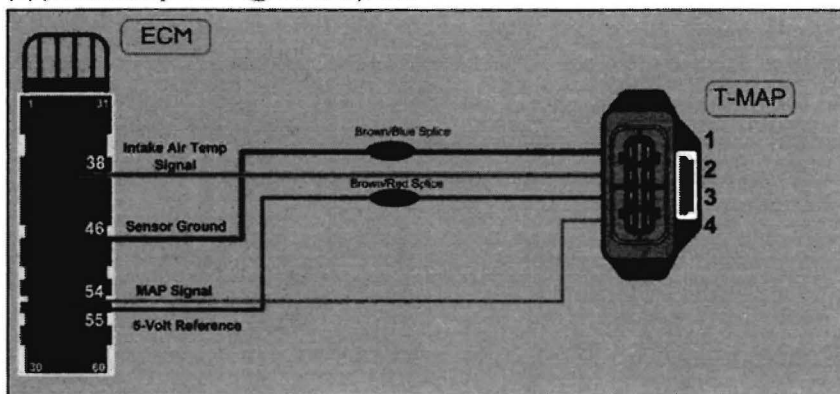
COMPONENT AFFECTED: Manifold Absolute Pressure Sensor

INDICATES	INSPECT	LOCATION
Voltage received at ECM from MAP sensor is outside of parameters.	<ul style="list-style-type: none"> * Continuity of wires from ECM connector to TMAP connector at sensor. * +5 Vdc at TMAP sensor BN / R wire (ECM connector attached and Ignition key and kill switch ON.) * Connect Digital Wrench for MAP sensor test. * <u>Approximate</u> voltage examples: ~ 0.6 V @ 30 kPa (4.35 lb / in²) ~ 1.0 V @ 50 kPa (7.25 lb / in²) 	On rear cylinder head intake port.

5

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

1. Disconnect ECM 60 pin connector (page 5.34).
2. Disconnect TMAP sensor connector.
3. Attach test lead adapters to meter leads and set DMM to measure resistance.
4. Place test leads in open side of connector (**not the ECM**) and measure resistance of each wire to the TMAP sensor connector. Verify good continuity on each wire (example: pin 53 of ECM connector to pin 4 of the TMAP connector should have less than .5 Ohm resistance).
5. Re-connect the ECM connector.
6. Turn key ON and turn engine stop switch to RUN.
7. Set DMM to measure DC Volts.
8. Test for 5VDC reference voltage at connector (see test in table below).
9. Check the MAP Sensor Volts and pressure in Digital Wrench. Voltage should be approximately 0.6 V @ 30 kPa, (approximately 1.0 V @ 50 kPa), etc.



COMPONENT	METER SETTING	TEST CONNECTIONS	SPECIFICATIONS (±10%)
+5 VDC reference voltage (BN/RD) to TMAP connector.	DC Volts	Red DMM lead to pin 3 of TMAP. Black DMM lead to ground.	Re-connect ECM 60 pin connector. Disconnect TMAP connector from sensor. Turn key / stop switch ON. Verify 5 Volts DC present at pin 3 of connector. If Code 107 (Low voltage to MAP) code is present, jump pin 3 (5 V ref) to pin 4 (sigtrn). Does code go out? If yes, replace MAP Sensor. If no, check wiring.



FUEL SYSTEM / FUEL INJECTION

AIR TEMPERATURE SENSOR (ATS) DIAGNOSTICS

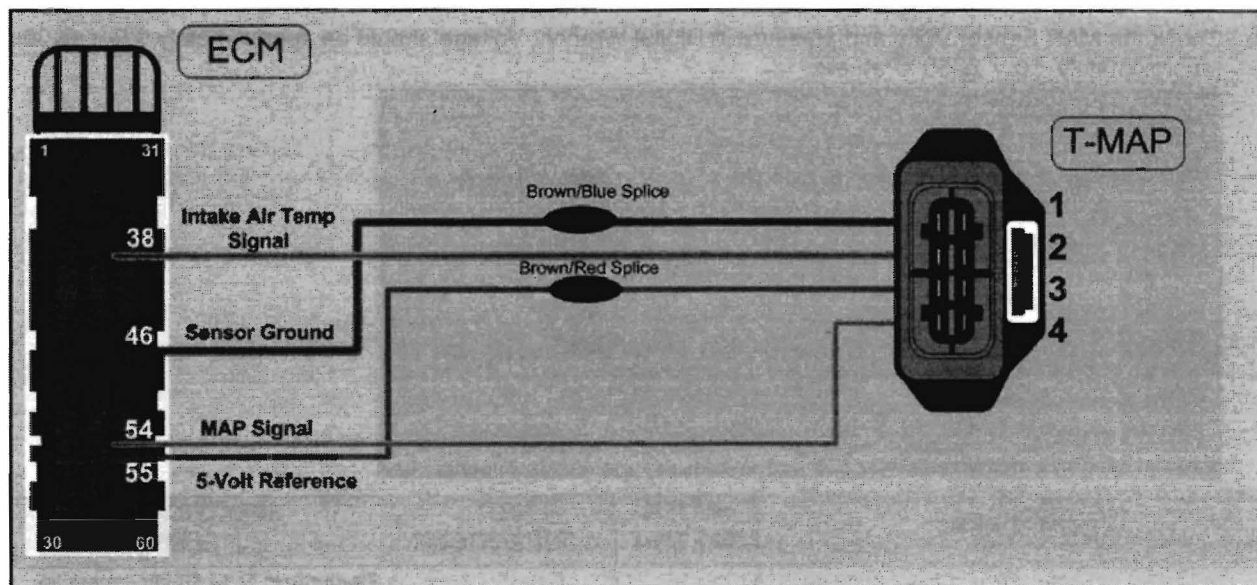
FAIL CODE: P0112 / P0113		
COMPONENT AFFECTED: Air Temperature Sensor		
INDICATES	INSPECT	LOCATION
Voltage received at ECM from ATS is outside of parameters.	Resistance readings at ECM connector (ECM disconnected). This test will inspect wiring, connectors, and Air Temperature sensor resistance.	On rear cylinder head intake port (in TMAP sensor).

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

1. Disconnect ECM 60 pin connector (page 5.34).
2. Attach test lead adapters to meter leads.
3. Set DMM to measure resistance.
4. Place meter leads in pins 38 and 46 of connector (**not the ECM**) and compare to specification below.

NOTE: Temperature of engine / sensor must be as specified.

5. If reading is outside of specifications, disconnect air temperature sensor connector and verify wires have good continuity back to the 60 pin connector.
6. If wiring is correct, measure the sensor resistance directly at the sensor. In addition, ATS data can be viewed as a temperature value in Digital Wrench™ diagnostic software. The sensor should display a temperature close to ambient room temperature.
7. Replace TMAP sensor if out of specified range.



COMPONENT	METER SETTING	TEST CONNECTIONS	SPECIFICATIONS (±10%)
AIR TEMPERATURE SENSOR signal return (BN / DB) to OR / GN	OHMS	Pin #46 to #38	2.5 K Ohms +/- 5% at 20° C (68° F)

5.36



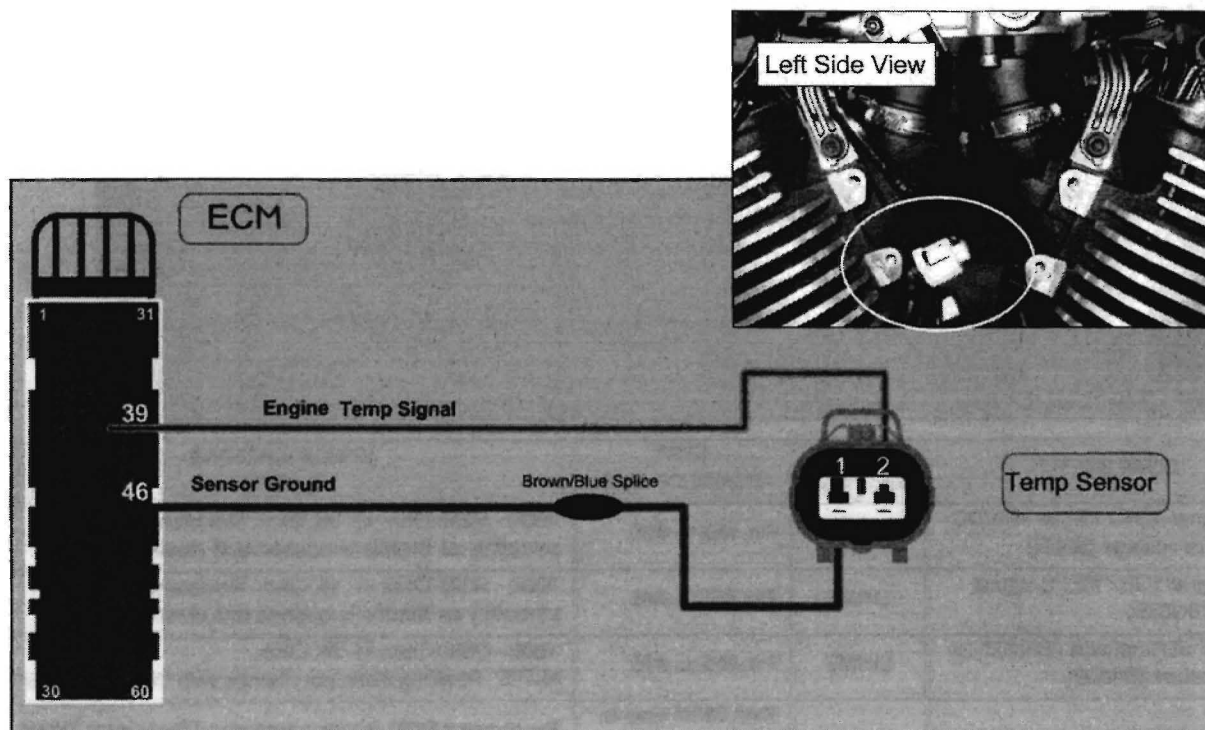
CYLINDER HEAD TEMPERATURE SENSOR (CHT) DIAGNOSTICS

FAIL CODE: P0117 / P0118		
COMPONENT AFFECTED: Cylinder Head Temperature Sensor (Engine Temperature)		
INDICATES	INSPECT	LOCATION
Voltage received at ECM from CHT sensor is outside of parameters.	Resistance readings through sensor and wiring at ECM connector (ECM disconnected). This will test will inspect the wiring, connectors, and CHT sensor resistance.	Left side under front cylinder intake port.

5

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

1. Disconnect ECM 60 pin connector (page 5.34).
2. Attach test lead adapters to meter leads.
3. Set DMM to measure resistance.
4. Measure resistance between pin 46 and pin 39 of the ECM connector and compare to specification.
5. If resistance is out of specified range, disconnect sensor and measure the resistance through each wire from ECM connector to the sensor connector. Resistance should be less than 1 Ohm (good continuity).
6. If Step 5 continuity is good, measure the resistance through the sensor and compare to specification.



TEST #	COMPONENT	METER SETTING	TEST CONNECTIONS	SPECIFICATIONS (±10%)
	CYLINDER HEAD TEMPERATURE SENSOR	OHMS	Pin #46 to #39	30.5 K Ohms +/- 13% @ 25° C (77° F)



5.37

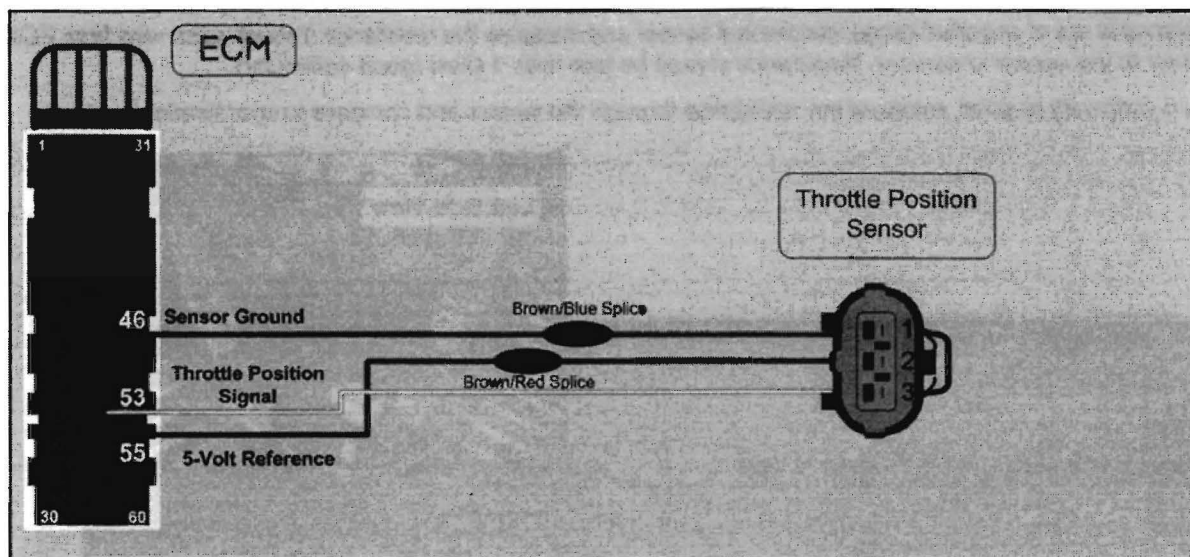
FUEL SYSTEM / FUEL INJECTION

THROTTLE POSITION SENSOR (TPS) DIAGNOSTICS

FAIL CODE: P0122 / P0123		
INDICATES	INSPECT	LOCATION
Voltage received at ECM from TPS is outside of parameters.	Resistance readings at ECM connector. This test inspects TPS and wiring.	Left side throttle body

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

1. Disconnect ECM 60 pin connector (page 5.34).
2. Attach test lead adapters to meter leads and set DMM selector to measure resistance.
3. Carefully place test leads in open side of ECM connector (**not the ECM**).
4. If results are outside of specifications, disconnect TPS.
5. Inspect wires for good continuity (low resistance) from ECM connector to TPS connector.
6. If good continuity exists, test TPS separately. Compare to chart below.



COMPONENT	METER SETTING	TEST CONNECTIONS	SPECIFICATIONS ($\pm 10\%$)
TPS signal (OR / YE) to +5 VDC reference voltage (BN/R)	OHMS	Pin #53 to #55	1000 - 5000 Ohm +/- 1K Ohm. Resistance changes smoothly as throttle is opened and closed. No gaps.
TPS signal (OR / YE) to signal return (BN/DB)	OHMS	Pin #53 to #46	1000 - 5000 Ohm +/- 1K Ohm. Resistance changes smoothly as throttle is opened and closed. No gaps.
TPS +5 VDC ref wire (BN/RD) to signal return (BN/DB)	OHMS	Pin #55 to #46	1000 - 5000 Ohm +/- 1K Ohm. NOTE: Reading does not change with throttle position
+5 VDC reference voltage (BN/RD)	DC Volts	Red DMM lead to pin 3 of TMAP sensor. Black to ground.	Re-connect ECM 60 pin connector. Disconnect TMAP sensor connector at the sensor. Turn key and stop switch ON. Verify 5 Volts DC present at pin 3 of connector.
NOTE: Resistance readings may vary slightly from vehicle to vehicle. The important thing to remember when testing the TPS is to look for a smooth, uninterrupted sweep between closed and open throttle. Sweep can also be checked using Digital Wrench™ diagnostic software.			

5.38



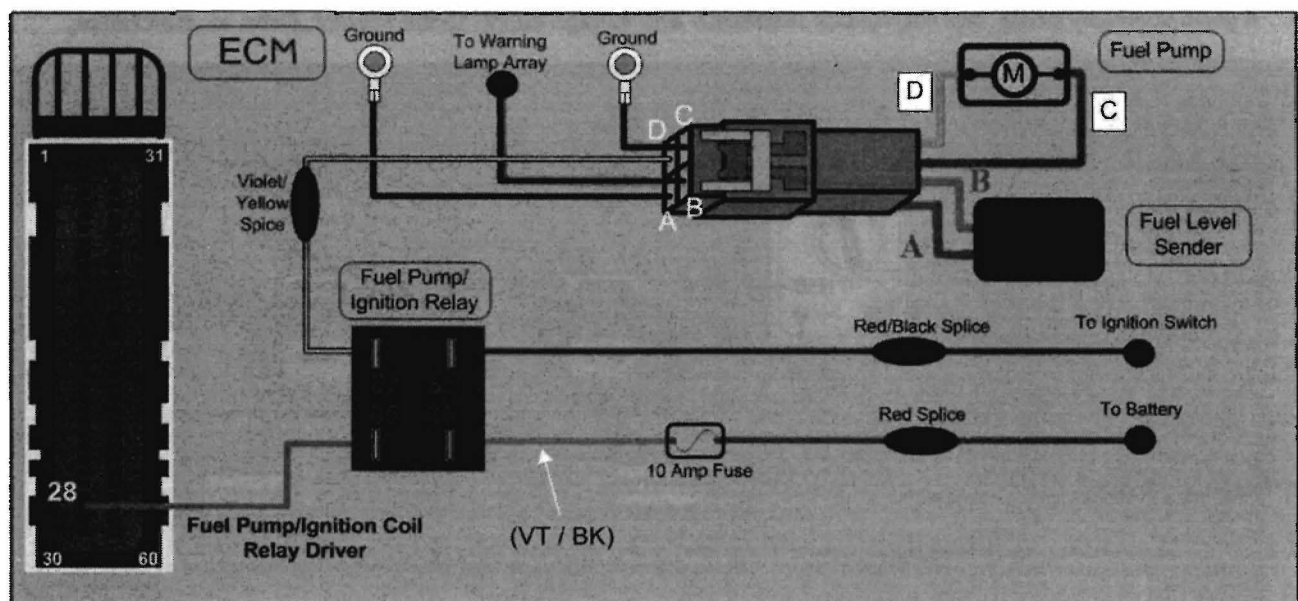
FUEL PUMP CIRCUIT DIAGNOSTICS

FAIL CODE: P0230 / P0231 / P0232		
INDICATES	INSPECT	LOCATION
P0230 - Fuel pump circuit open or shorted to ground. P0231 - Fuel pump circuit shorted to ground P0232 - Fuel pump circuit shorted to battery voltage.	Circuit connections. Wire harness routing / damage. Continuity between circuit components. Fuel pump function and electrical tests.	Inside fuel tank. Connector under rear of fuel tank.

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

5

1. Perform the following tests:
 - Check wire harness closely for physical damage that could cause opens or shorts (broken / pinched / cut wires).
 - Inspect all wire connectors related to the fuel pump circuit shown below and on page 5.19.
 - Fuel pressure test - page 5.23
 - Fuel pump test - page 5.21



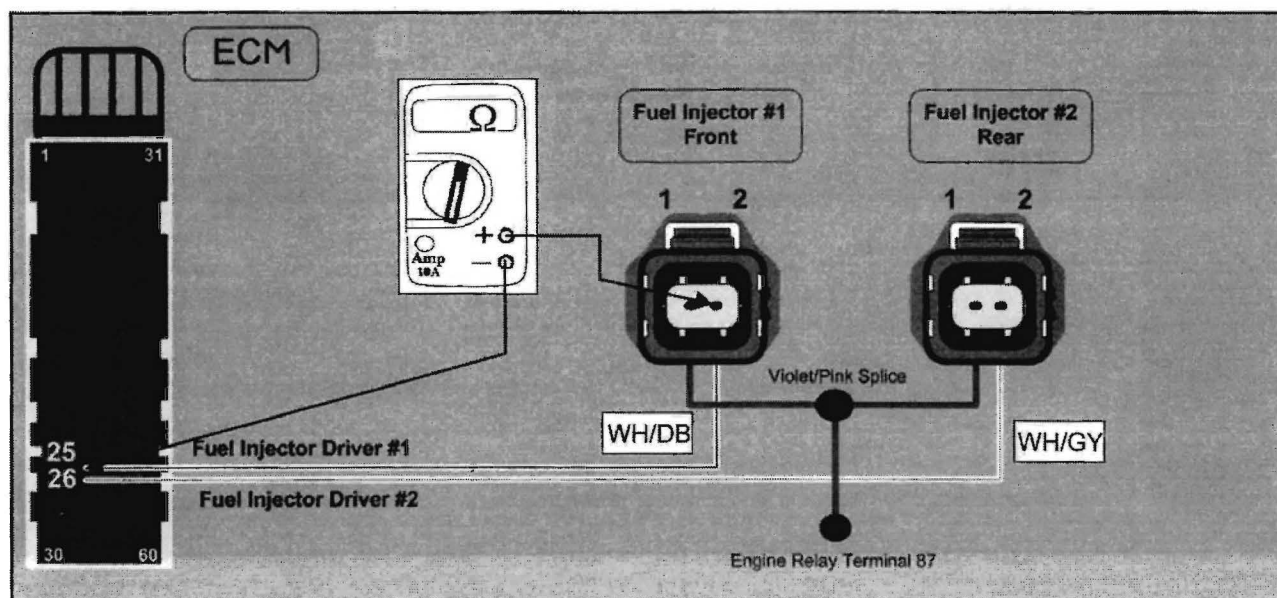
FUEL SYSTEM / FUEL INJECTION

FUEL INJECTORS

FAIL CODE: P0261 / P0262 / P0264 / P0265		
INDICATES	INSPECT	LOCATION
P0261 - Fuel injector #1 (front cyl) driver circuit open or shorted to ground. P0262 - Fuel injector #1 (front cyl) driver circuit shorted to battery voltage. P0264 - Fuel injector #2 (rear cyl) driver circuit open or shorted to ground. P0265 - Fuel injector #2 (rear cyl) driver circuit shorted to battery voltage.	Continuity - ECM to injector. Injector resistance. Voltage supply from relay to injector.	Cylinder head intake port.

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

1. Disconnect ECM 60 pin connector (page 5.34) and disconnect harness from injector to be tested.
2. Attach suitable test lead adapters to meter leads and set DMM to measure resistance.
3. Carefully place one test lead in open side of ECM connector pin 25 or pin 26 (**not the ECM**) and the other lead in the injector harness pin 2 (W/GY or W/BU). Resistance of the circuit wires should be less than 1 Ohm.
4. If good continuity exists, test the injector resistance and voltage supply to the injector. Refer to chart below.



COMPONENT	METER SETTING	TEST CONNECTIONS	SPECIFICATIONS (± 10%)
Injector Resistance	OHMS	Across injector pins 1 & 2	11.4 - 12.6 Ohms at room temperature
Voltage Supply To Injector	DCV	Pin 1 of injector harness (VIO/PK)	Re-connect ECM 60 pin connector. Disconnect wire harness from injector. Turn ignition key and engine kill switch ON. Check for battery voltage at pin 1 of injector harness connector.

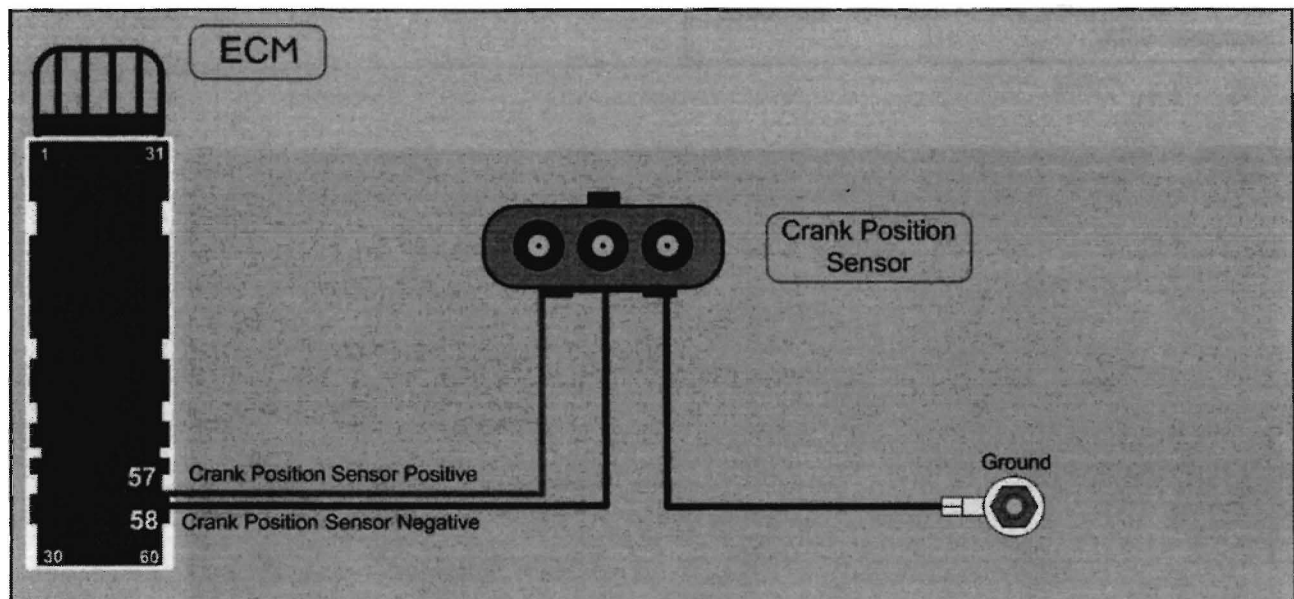
5.40



CRANKSHAFT POSITION SENSOR DIAGNOSTICS

FAIL CODE: P0336		
INDICATES	INSPECT	LOCATION
P0336 - Crankshaft Position Sensor fault - missing tooth signal was not detected in CPS signal within the correct period of time.	See Chapter 17 for complete CPS test procedure. Resistance of coil: 280 Ohms @ 20°C (68°F)	Under right side lower engine cover (timing cover).

5



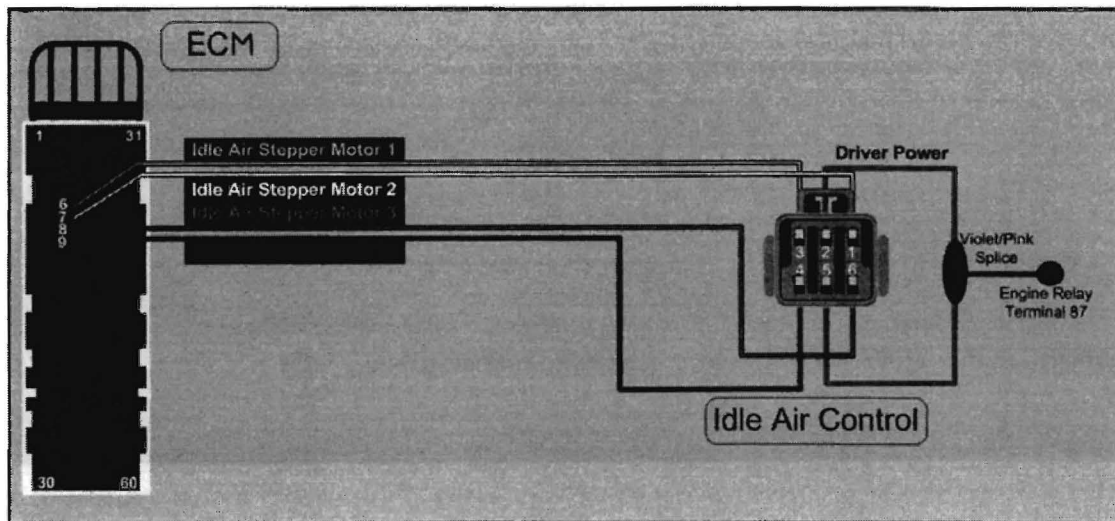
FUEL SYSTEM / FUEL INJECTION

IDLE AIR CONTROL

Air leaks or air restrictions in the IAC air supply or delivery hoses will not cause a trouble code in the system, but are the most common cause of idle control problems. Always be sure hoses are connected properly and securely when idle control problems exist. If an IAC code is present, perform the following circuit tests.

FAIL CODE: P0508 / P0509

INDICATES	INSPECT	LOCATION
<p>P0508 - IAC circuit or IAC motor shorted to ground. P0509 - IAC circuit or IAC motor open or shorted to battery voltage. P0519* - IAC position out of range *This code can appear as historical (MIL light not ON) if battery / system voltage falls below a set minimum. If code P0519 appears as historical and no running condition problem is reported, charge and inspect battery, clear the code, and re-test. See Fault Code Description 5.33.</p>	<p>Connector pin visual inspection. Continuity - Verify ECM to IAC motor harness connector. Verify battery voltage is supplied to IAC motor on VIO/PK wire from Engine Relay.</p>	<p>IAC valve - under fuel rail cover. (Upper right side triangular cover)</p>



COMPONENT	METER SETTING	TEST CONNECTIONS	SPECIFICATIONS ($\pm 10\%$)
IAC Circuit Resistance	OHMS	ECM pin 6 to IAC connector pin 3.	Less than 1 Ohm
IAC Circuit Resistance	OHMS	ECM pin 7 to IAC connector pin 1.	Less than 1 Ohm
IAC Circuit Resistance	OHMS	ECM pin 8 to IAC connector pin 6.	Less than 1 Ohm
IAC Circuit Resistance	OHMS	ECM pin 9 to IAC motor harness connector pin 4.	Less than 1 Ohm
Voltage Supply To IAC Motor Harness Connector	DCV	DMM "+" lead to Pin 2 or pin 5 of IAC harness (VIO/PK). DMM "-" lead to ground.	Re-connect ECM 60 pin connector. Disconnect wire harness from IAC motor. Turn ignition key and engine kill switch ON. Check for battery voltage at pin 2 and pin 5 of IAC motor harness connector.

5.42

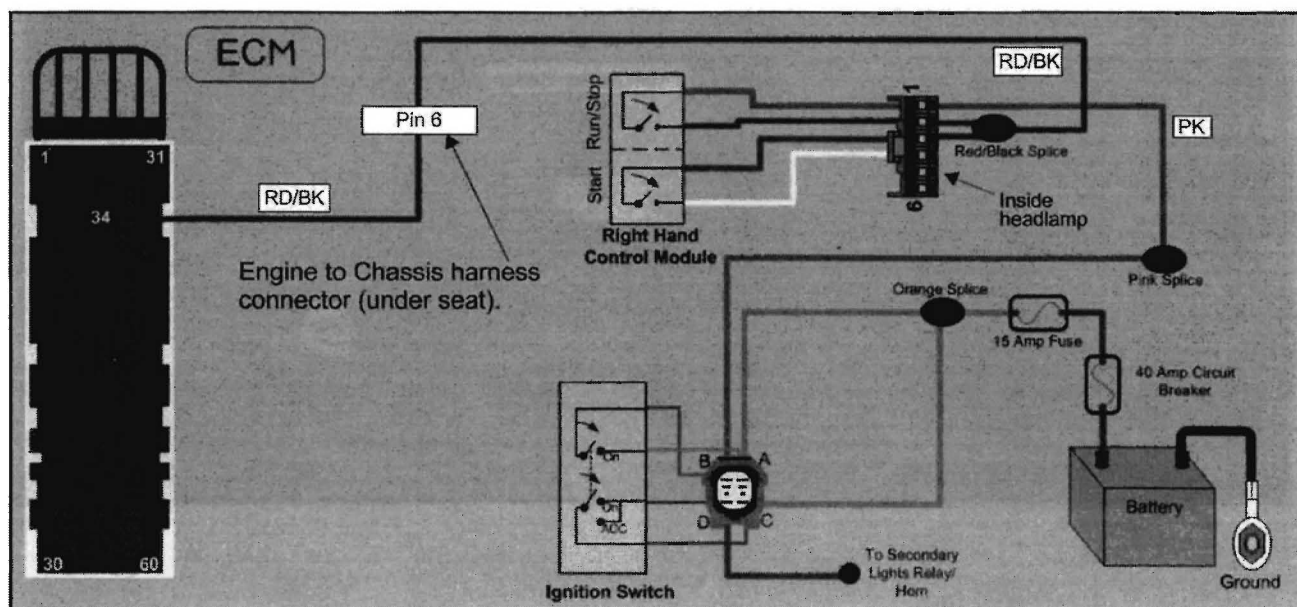


BATTERY VOLTAGE AT ECM DIAGNOSTICS

FAIL CODE: P0562 / P0563	
COMPONENT AFFECTED: Battery Voltage to ECM	
INDICATES	INSPECT
Voltage received at ECM is outside of parameters.	Vehicle Battery Voltage. Verify charging system operation. Inspect power supply to the ECM on the R/BK wire.

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

1. Turn the DMM selector dial to measure DC volts. Measure open circuit voltage at battery (Chapter 18).
2. Battery voltage must be 12.5Vdc or above. If below 12.5, charge or replace battery before proceeding.
3. Test charging system and voltage regulator / rectifier (beginning on page 16.17).
4. Inspect fuse.
5. Attach test lead adapters to the DMM leads, or use Fluke accessory probes.
6. Disconnect ECM 60 pin connector (page 5.34).
7. Check for battery voltage at ECM Pin 34 with ignition key ON and engine stop switch set to RUN.
8. If battery voltage is not reaching the ECM, re-connect the ECM harness.
9. Turn key and kill switch on. If the fuel pump cycles (for about 2-3 seconds) power is reaching the fuel pump relay on the RD/BK wire (refer to chassis wiring diagram).
10. If the fuel pump does not cycle, check starter operation.
11. If starter operates, inspect harness between the headlamp shell and the Engine to Chassis harness connector pin 6.
12. If the starter does not operate, check the RH bar switch connector inside the headlamp.

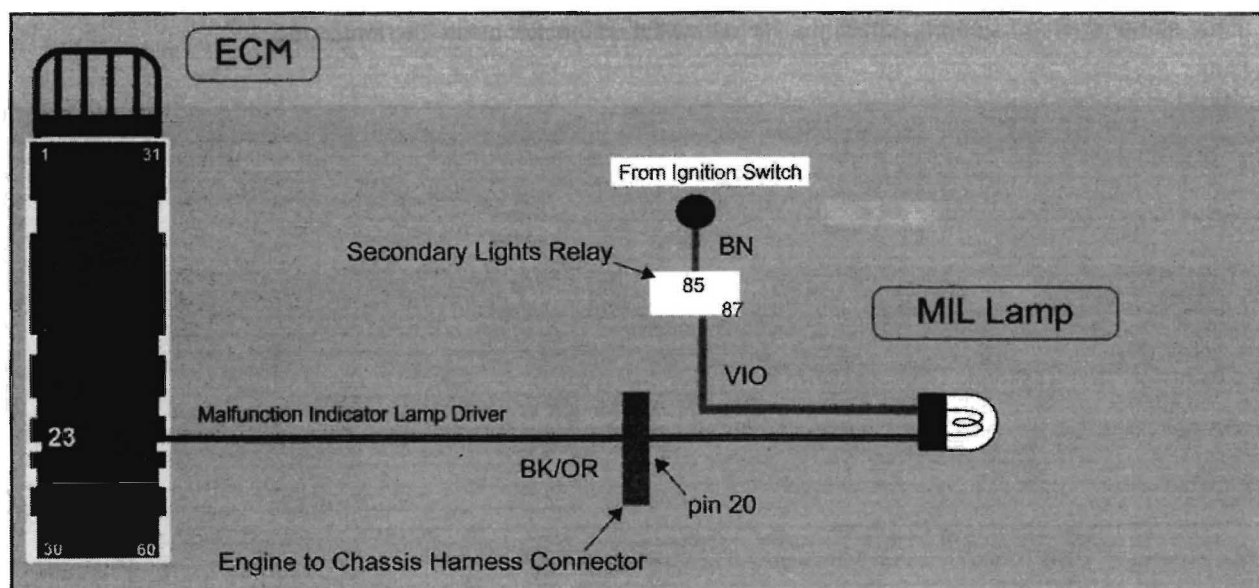


FUEL SYSTEM / FUEL INJECTION

MALFUNCTION INDICATOR LAMP (MIL)

FAIL CODE: P1651 / P1653	
COMPONENT AFFECTED: Check Engine Lamp (MIL Lamp)	
INDICATES	INSPECT
P1651 - MIL lamp driver circuit open or shorted to ground. P1653 - MIL lamp driver circuit shorted to battery voltage.	MIL Lamp circuit wiring for shorts, opens, grounds.

1. Visually inspect MIL lamp circuit (shown below) for shorts, opens, and grounds.
1. Disconnect ECM 60 pin connector (page 5.34).
2. Attach a suitable test adapter to a jumper lead and connect pin 23 of the ECM harness connector to a ground such as the negative battery terminal.
3. Turn the ignition key ON and engine kill switch ON. If the lamp does not light, check the MIL bulb and replace if necessary. If the bulb is OK, check for battery voltage supplied to the Secondary Lights Relay, and from the relay to the CHK Eng lamp on the indicator lamp panel.
4. Measure resistance between pin 23 of the ECM and the MIL lamp socket.
5. Carefully place one test lead in open side of ECM connector pin 23 (**not the ECM**) and the other lead in the MIL lamp socket. Test continuity of the BK/OR wire through pin 20 of the Engine to Chassis wire harness connector and to the bulb. Resistance of the BK/OR wire should be less than 1 Ohm. Isolate the BK/OR wire. It should not have continuity to ground (suspect only if MIL was on at all times without a logged trouble code).



5.44



MEMORY CHECK SUM ERROR

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

FAIL CODE: P0601	
COMPONENT AFFECTED: ECM	
INDICATES	INSPECT / ACTION
Module Memory Check Sum Error when installing new ECM.	Clear code and check to see if code re-appears

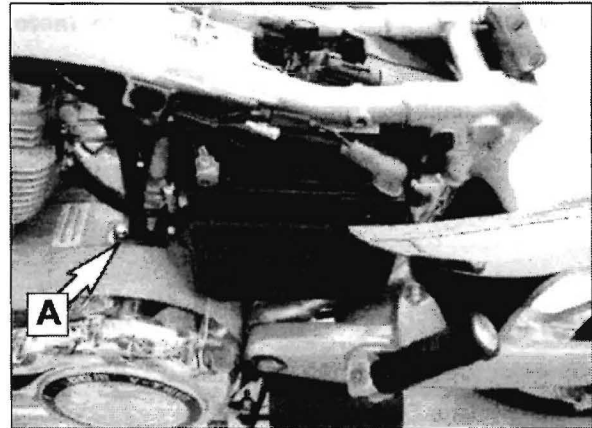
NOTE: All new ECMs have the "Memory Check Sum Error" at first power-up after the memory is loaded into the ECM. This code must be cleared when the ECM is initialized. If this code appears when using the diagnostic software, it is possible that a new ECM was not cleared successfully. If this is the case, the code may be present without an actual fault.

1. If Trouble Code message P0601 (Internal Control Module Memory Check Sum Error) is present when using the diagnostic software, first record any other faults present, then try clearing the P0601 trouble code.
2. If the code reappears, further inspection is required; however, it is more likely the code was not cleared from memory during initialization, and will not be present after it is cleared.

VEHICLE SPEED SENSOR TEST

To view and clear trouble codes refer to page 5.31. See page 5.30 for wire colors / pin number in connector.

1. Refer to page 19.12 to test the speed sensor, located on the crankcase behind the rear cylinder (A).



5

CRUISE CONTROL

See Chapter 19 for Accessory Cruise Control information, diagnostics, cruise control cable, and module replacement.

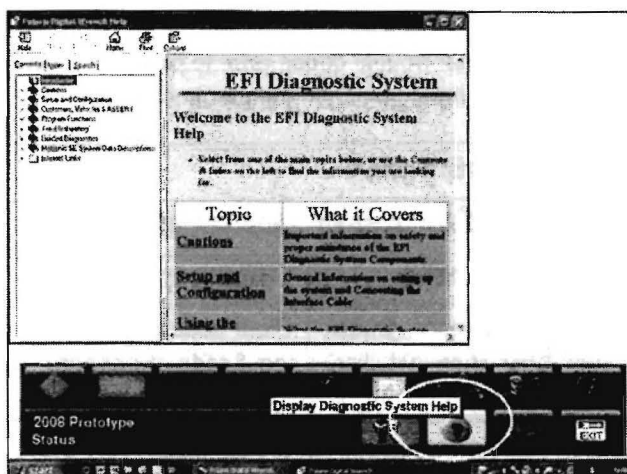


DIGITAL WRENCH

USING DIGITAL WRENCH™ DIAGNOSTIC SOFTWARE

Refer to the Instruction Manual provided in the Diagnostic Tool Kit PV-46085-B to install the Polaris Digital Wrench™ software on a laptop computer. Once installed, select the HELP icon (?) for more information.

Smart Link cable pin connections are shown on page 5.46.



TOOLS

DIGITAL WRENCH DIAGNOSTIC SOFTWARE	PART NUMBER
Victory/Polaris Diagnostic Tool Kit	PV-46085-B
PV-46085-B (above) INCLUDES:	Digital Wrench Software: PU-47052-G
	Standard Interface Cable: PU-47151
	Victory Adapter: PV-46085-2
	SmartLink Interface Kit: PU-47471
Fuel Pressure Gauge	PU-43506-A
Fuel Pressure Gauge Adapter	PV-48656
Fluke 73 Digital Multi-Meter or Fluke 77 DMM	(Fluke 77 - PV-43568)
Electrical Connector Test Adapter Kit	PV-43526
Laptop Computer (Refer to diagnostic software user manual or HELP section for minimum specifications)	Commercially Available

DIAGNOSTIC SOFTWARE VERSION

Always be sure you are using the most current version of Digital Wrench to ensure you have the latest enhancements. Reprogramming files are added to file sets as required for new models, new accessory kits, and fuel/ignition map changes. For information on how to determine if you have the latest file set download available, see Reprogramming Tips on page 5.51.

TPS CALIBRATION NOT REQUIRED

The TPS *does not require calibration* in the closed loop EFI system as in earlier systems, either as a baseline setting component or after reprogramming of the ECM. TPS Calibration is not a menu option in Digital Wrench for 2008 - current models.

ECM REPLACEMENT

Although the need for ECM replacement is unlikely, a specific replacement procedure is required to ensure that all essential data contained within the original ECM is transferred to the replacement ECM. Be sure to verify the VIN number of the unit you are working on and the VIN number on the Vehicle Identification page of Digital Wrench are identical after reprogramming an ECU.

Refer to procedure and carefully follow all instructions provided in Digital Wrench.

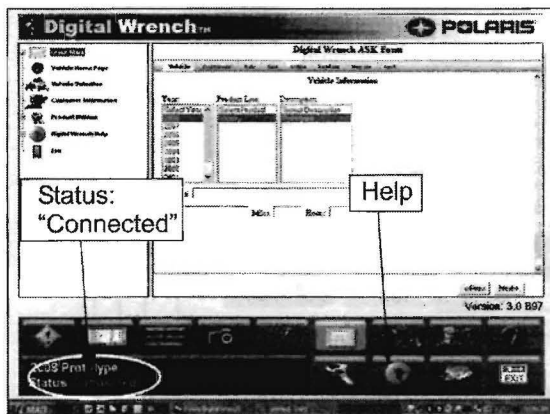
5.46



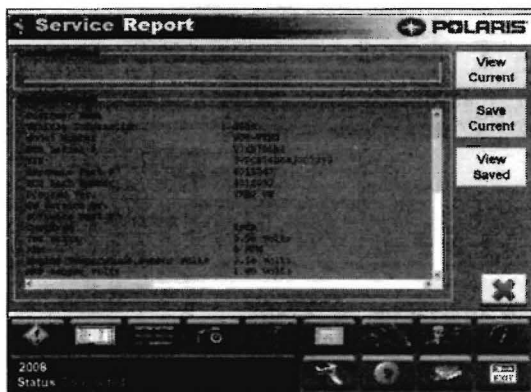
DIGITAL WRENCH™ FEATURES

Once connected to Digital Wrench™, a variety of features are available for reference or to use as diagnostic tools.

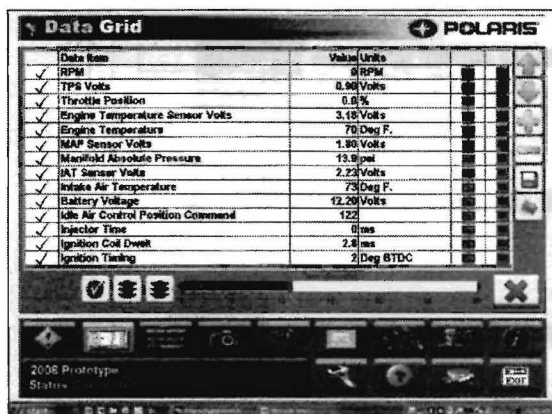
You do not have to be connected to a vehicle to use the help feature.



Vehicle specific service reports can be saved for future reference.



Data grids with typical or "normal" sensor values can be saved for future reference. Some examples are shown on the following pages.



DIGITAL WRENCH™ GUIDED DIAGNOSTICS

Guided diagnostics are available within Digital Wrench™ for all supported Trouble Codes (that is, any fault that will turn on the CHK ENG light).

In addition, guided diagnostics are also available for many other electrical sub systems.

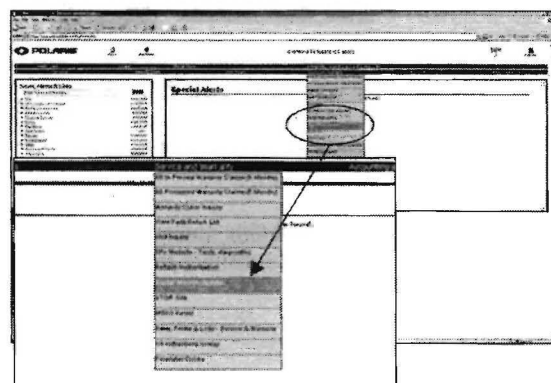
Diagnostic modules are added to subsequent versions of Digital Wrench™ as they become available. Check your release version often and upgrade to be sure you're using the most current tools available.

DIGITAL WRENCH™ COMMUNICATION ERRORS

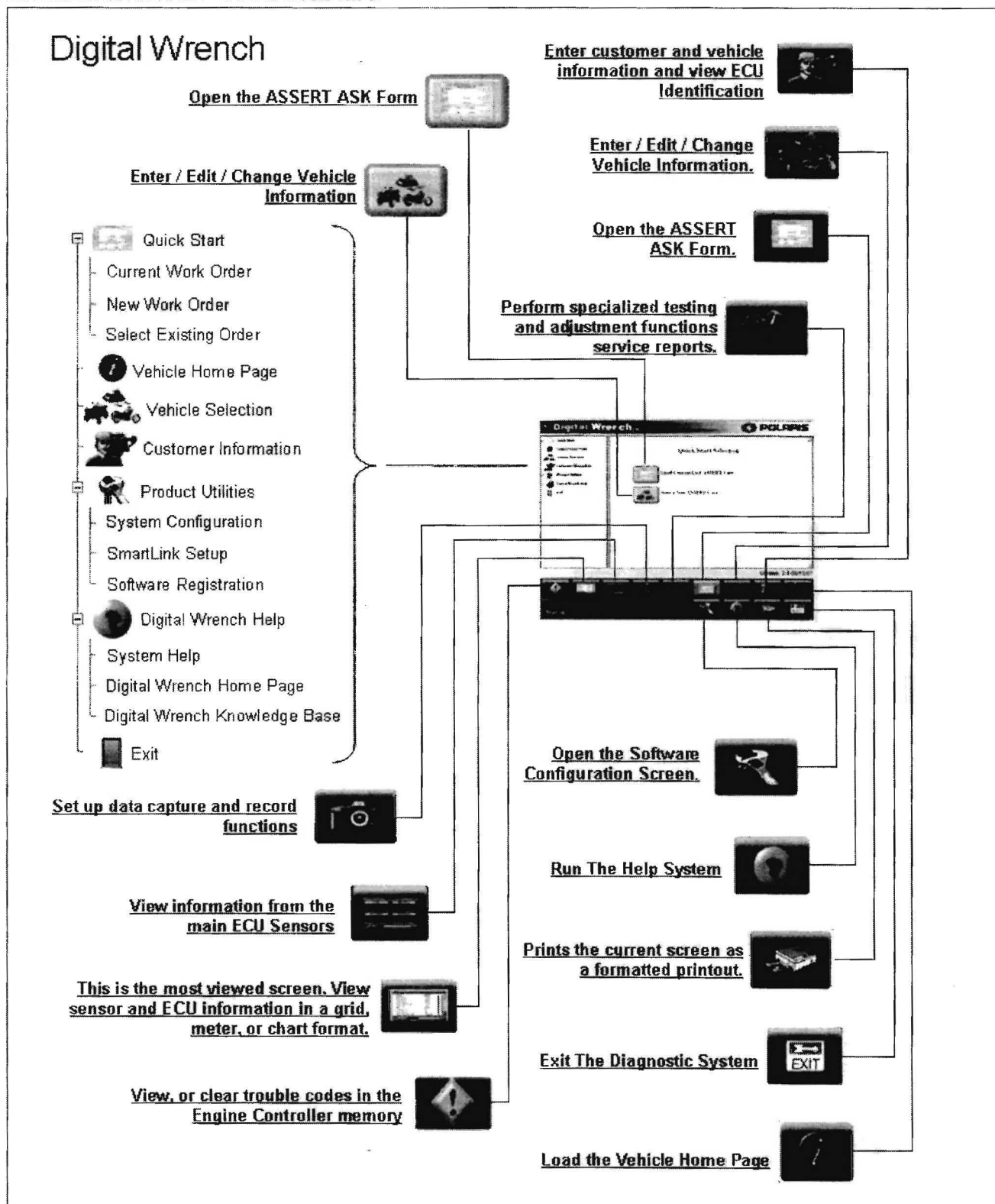
If you experience problems connecting to a vehicle or any Digital Wrench related problem, visit the Digital Wrench Knowledge Base for the most current troubleshooting information, FAQs, downloads and software updates at: <http://polaris.diagsys.com/>.



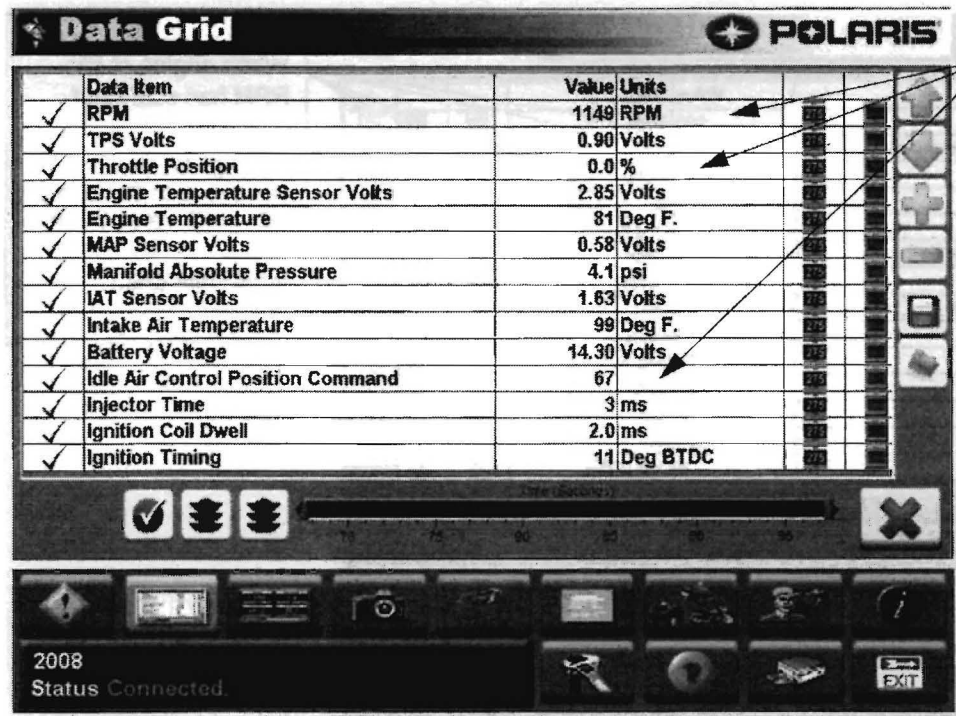
Victory dealers can access the Digital Wrench site by visiting www.polarisdealers.com and clicking on the Digital Wrench Updates link in the Service and Warranty drop down menu.



DIGITAL WRENCH™ FEATURE MAP

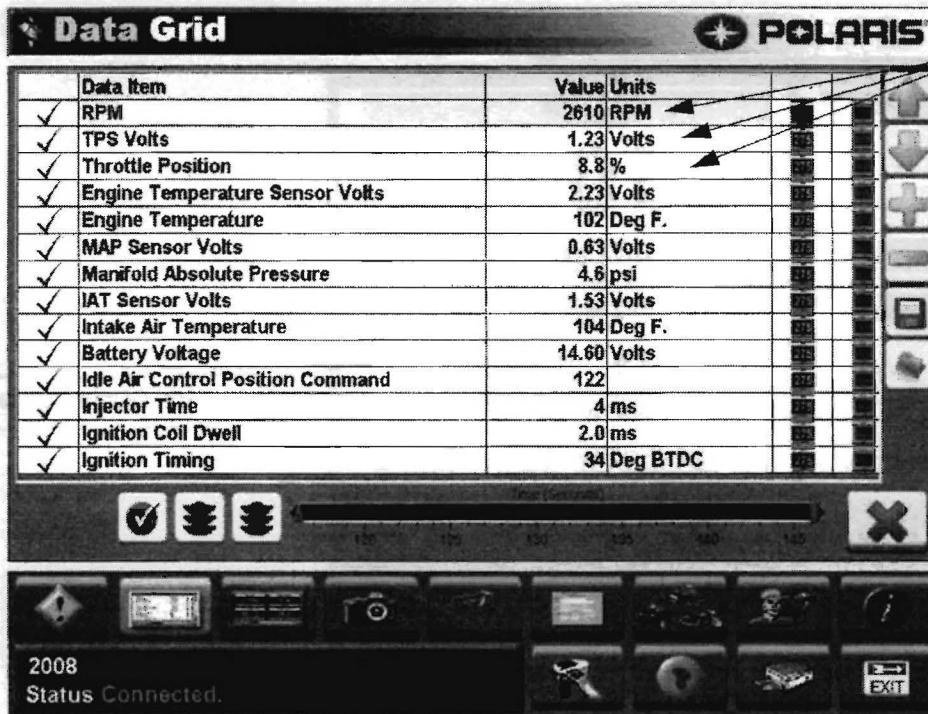


DIGITAL WRENCH SCREEN EXAMPLES



Cold engine at idle during warm up.

5




Throttle partially open. TPS voltage value has increased.



FUEL SYSTEM / FUEL INJECTION

DIGITAL WRENCH SCREEN EXAMPLES

Data Grid 

✓	Data Item	Value	Units
✓	RPM	900	RPM
✓	Idle Air Control Position Command	37	
✓	TPS Volts	0.89	Volts
✓	Throttle Position	0.0	%
✓	Engine Temperature	237	Deg F.
✓	Engine Temperature Sensor Volts	0.30	Volts
✓	MAP Sensor Volts	0.60	Volts
✓	Manifold Absolute Pressure	4.6	psi
✓	IAT Sensor Volts	0.58	Volts
✓	Intake Air Temperature	169	Deg F.
✓	Battery Voltage	14.20	Volts
✓	Injector Time	2	ms
✓	Ignition Coil Dwell	2.0	ms
✓	Ignition Timing	5	Deg BTDC

Time (seconds): 2110 2115 2120 2125 2130 2135

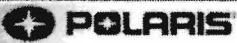
2008 Status Connected.

EXIT

Warm engine at idle. RPM has stabilized

Change the position of various data items in the table with these buttons.

Save data grid.

Meter Display 

TPS Volts <div>0.89</div> Volts	RPM <div>1026</div> RPM
Engine Temperature Sensor Volts <div>1.25</div> Volts	MAP Sensor Volts <div>0.60</div> Volts

Time (seconds): 125 130 135 140 145 150

2008 Status Connected.

EXIT

Meter Grid Display Items

5.50



REPROGRAMMING THE ENGINE CONTROL MODULE (ECM)

PROCESS OVERVIEW

The Digital Wrench™ Engine Controller Reprogramming (or "Reflash") feature allows reprogramming of the ECM fuel and ignition map. To successfully reprogram the ECM, an Authorization Key must be obtained by entering a Request Code in the box provided on the Reflash Authorization site. The Request Code is automatically generated by Digital Wrench during the reprogramming process. The Reflash Authorization site is located under the *Service & Warranty* drop down menu on the dealer website at www.polarisdealers.com.

The Auxiliary Controller Reprogramming feature of Digital Wrench allows reprogramming of the main radio, CB radio, or Instrument Cluster in the same manner as the ECM. See Chapter 19 for *Auxiliary Controller Reprogramming*.

NOTICE: Failure to follow instructions completely can result in an engine that does not run! Review all of the *Reprogramming Tips* that follow to reduce the chance of reprogramming problems.

REPROGRAMMING TIPS

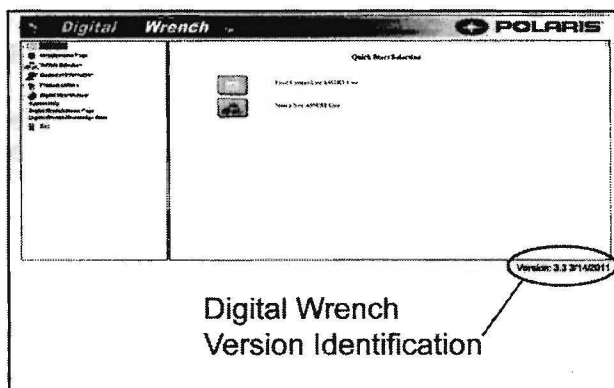
The reprogramming feature is in the Special Tests menu on the Digital Wrench™ screen. Simply start Digital Wrench and click on the Special Tests menu icon (the red tool box). A technician should be familiar with the process and with computer operation in general before attempting to reprogram an ECM.

If you have not yet installed the software, read the *Install Instructions* in the *Getting Started* section of the Diagnostic System Installation Guide and User Manual. Laptops that fit the *System Requirements* guidelines listed in the User Manual can be used for reprogramming. Pay close attention to system requirements listed for the Windows version on your laptop.

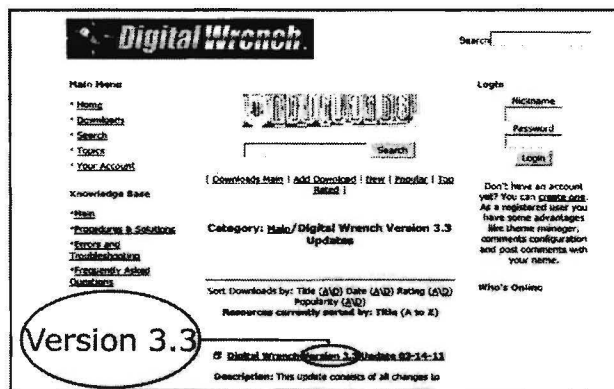
1. **BATTERY VOLTAGE:** The majority of problems with reprogramming can be attributed to a low battery. Be sure the battery voltage (no load) is at least **13 volts** and at least **12.5 volts** with the key ON. It is recommended to leave a battery charger connected throughout the ECM reprogramming process. If "Key ON" voltage is marginal, it may help to remove the headlamp relay in the fuse box.

2. **DEDICATED LAPTOP:** Best results are obtained using a laptop computer that is "dedicated to Polaris/Victory service". A laptop that is used by a variety of people and in several applications around the dealership is more likely to cause a reprogramming problem than one dedicated to Digital Wrench™ diagnostics only.
3. **OBTAINING THE LATEST FILE SET:** Reprogramming file sets are updated frequently and contain the most recent calibrations for both Stock and Performance updates.

To verify the version of Digital Wrench currently installed, start Digital Wrench and check the right side of the screen just above the icon bar.



Compare your version with the version listed in the Downloads area at www.diagsys.com. If a later version is available, follow the instructions to download the most current version of Digital Wrench.



4. CLOSE NON-ESSENTIAL PROGRAMS:

Victory recommends that you DO NOT install non-essential programs on a Service Department laptop. Camera detection software, Virus Scanners, Tool Bars, etc. may clog up memory if running in the background and make it harder for the diagnostic software to operate. A good "quick check" is the number of icons in the system tray, (icons in the task bar next to the clock). More than 4, or 5 items is a potential problem. Things to watch out for include:

- Video playing software
- Automatic programs started by your ISP.
- Financial software (checking account, business operations and accounting, tax reporting software etc.)
- All "shareware" & "freeware" downloaded from the internet
- Personal hand-held PC links (can prevent diagnostic software / reprogram procedure from working)
- Internet firewalls set to "high security mode" or virus scanning software running in the system tray.

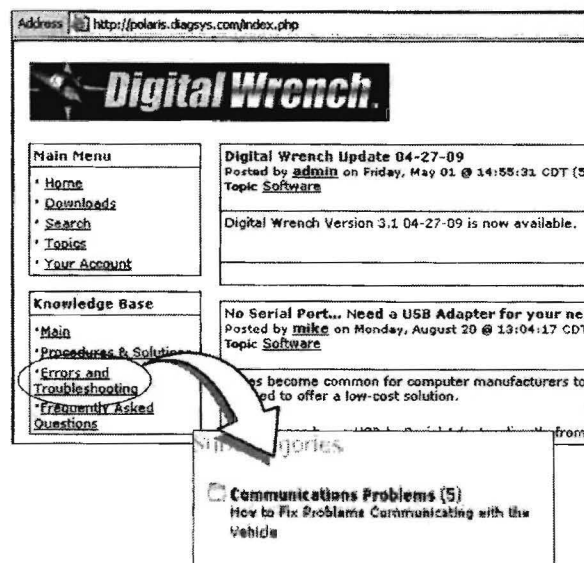
A good rule to follow is that if a particular piece of software wasn't installed when Windows was installed, it has the potential to create problems if it's running at the same time as the diagnostic software. If you're having problems, click on the icons of *non-essential* programs and close, quit, or exit them before starting the reprogramming procedure.

5. **KNOW THE PROCESS:** If you are not familiar with the entire reprogramming process, review the **HELP** section of the diagnostic software before you attempt reprogramming. Click on the ? on the toolbar or press F11. The information in the on-line help is the most current and complete information available. This should be your first step until you are familiar with the process.

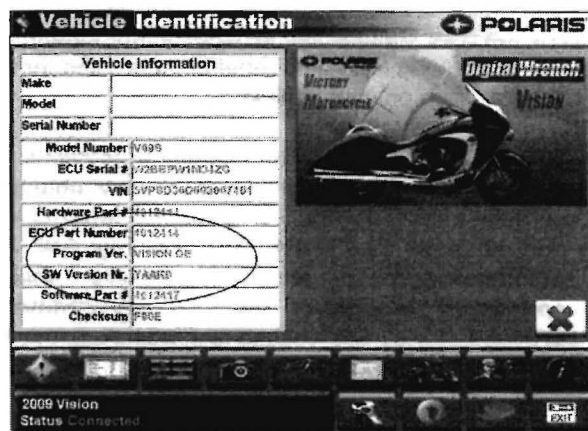


6. **COMMUNICATION PROBLEMS:** If you have had problems communicating with a vehicle while performing diagnostic functions, do not attempt reprogramming until the cause has been identified and fixed. Check all connections, and be sure battery voltage is as specified in Step 1.

Go to www.diaagsys.com for specific information and FAQs on how to troubleshoot communication problems.



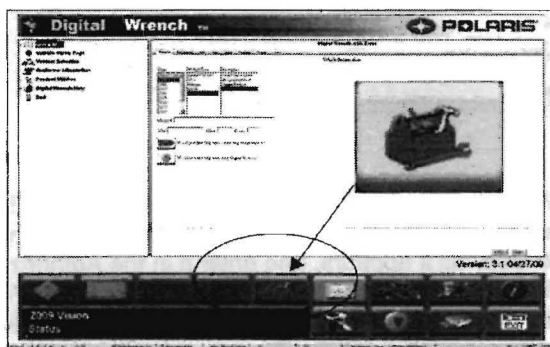
7. **DON'T DISTURB THE PC:** when a reprogramming is in progress. Don't move the mouse, and don't touch the keyboard. The process only takes a few seconds, and is best left alone until complete.
8. You can select Vehicle Information from the Special Tests menu to view the part number of the software (map) installed when reprogramming is completed.



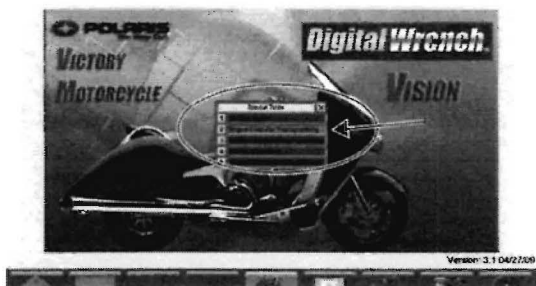
REPROGRAMMING PROCESS

If you are not familiar with the reprogramming process, review tips beginning on page 5.51 before you begin. Following is an overview of the reprogramming process. Follow the on-screen instructions as you progress through the steps. If you encounter a problem, always check the On-Line help for current tips and information.

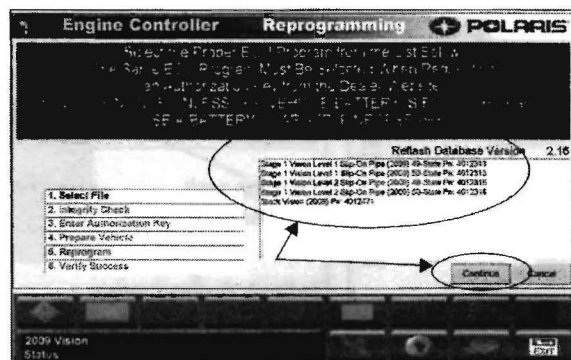
1. Connect the communication cable to the vehicle.
2. Start the Digital Wrench™ program.
3. Select the year, product, and model from the menus, then click the tool box icon to open the Special Tests menu.



4. Select Engine Controller Reprogramming.

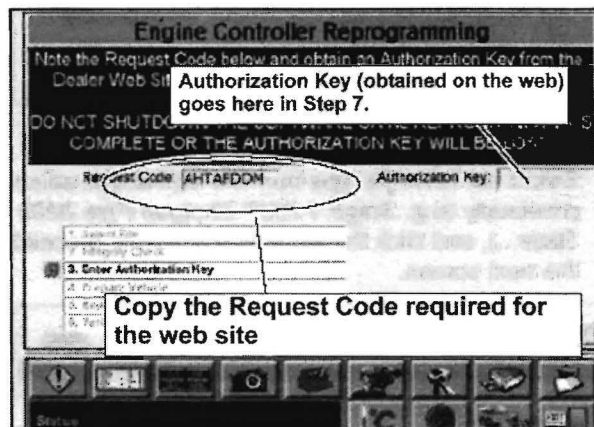


5. Select the file you want to load into the ECM then click CONTINUE to proceed to the Integrity Check and obtain a Request Code.



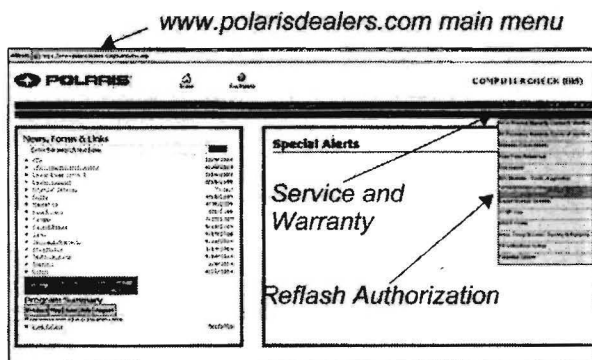
6. The Request Code will be required in the next step. Copy the Request Code, making sure not to close Digital Wrench or the Request Code will be invalid. Please note that the Request Code are letters, there are no numbers generated.

NOTE: Request Codes, Calibration I.D. numbers (for accessory exhaust) and Authorization Keys must be entered EXACTLY as they appear on the screen.

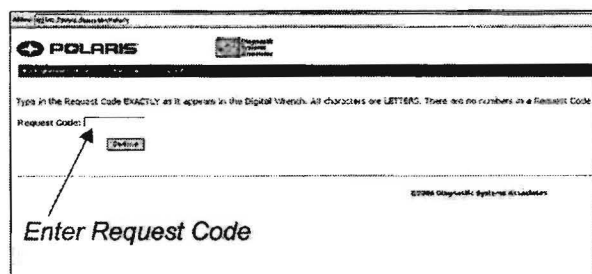


FUEL SYSTEM / FUEL INJECTION

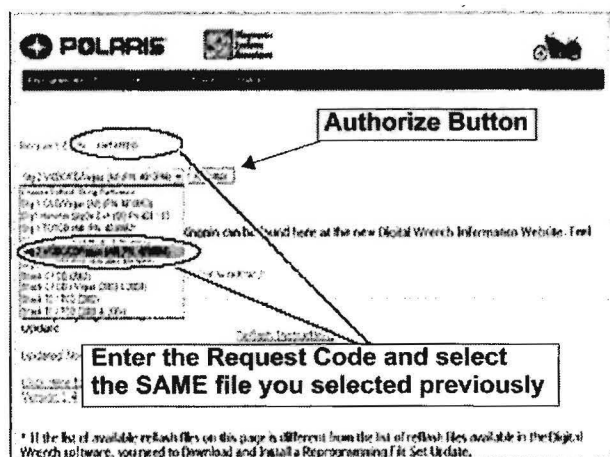
- Go to www.polarisdealers.com and click on "Re-Flash Authorization" from the *Service and Warranty* drop-down menu.



- (See III. 3) Enter (or paste) the Request Code into the box.

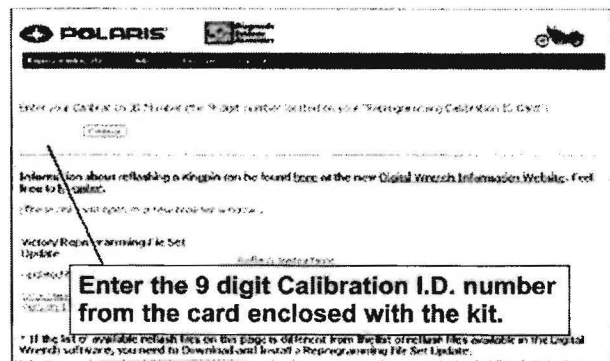


- Select the same file type from the list that you selected previously (e.g. *Stage 1 H/JP Shotgun Pipe 2009 49 State...*), and click the **Authorize** button to proceed to the next screen.



- In the empty box provided on the screen, enter the 9 digit Calibration I.D. number from the card enclosed with the accessory kit, then click "Continue".

NOTE: Stock reprogramming files do not require a Calibration I.D. number. An Authorization Key will appear after clicking the Authorize button in Step 9.



- An 8-digit "AUTHORIZATION KEY" will appear in the upper left corner of the screen. Copy this number exactly as it appears, and enter it in the Authorization Key box on the Digital Wrench™ screen. Follow instructions provided on the screen to complete the reprogramming procedure.



TROUBLESHOOTING

FUEL SYSTEM TROUBLESHOOTING

5

PROBLEM	POSSIBLE CAUSE	AFFECTED PART(s)	REPAIR RECOMMENDED
Engine turns over with electric starter, but won't start	Compression too low	See engine section	
	No spark at spark plugs	See ignition system	
	No fuel reaching intake tract	Out of fuel Blown Fuse Plugged fuel filters / lines Fuel pump not working Fuel pressure regulator Faulty fuel pump relay Open wiring / connector Faulty connection at ECM	Add Fuel Replace Clean/Replace Test / Replace Test / Replace Test / Replace Inspect / Repair Inspect / Repair
	Excessively rich or lean fuel mixture	Fuel pump Fuel pressure regulator Crank Position Sensor Low Battery TMAP sensor CHT sensor Fuel Injector	Test / Replace Test / Replace Test / Replace Test / Replace Test / Replace Test / Replace Test / Replace
	Spark at wrong time or no spark. Fuel delivery timing incorrect.	Timing Wheel or CPS installed incorrectly, damaged, or dirty; faulty CPS	Install correctly, inspect for proper air gap (gap is preset but cover, sensor, and timing wheel must be clean and in good condition).
Poor idle	Excessively rich or lean fuel mixture	Air Leaks Air restriction in IAC Fuel Pump Fuel injector or fuel rail obstructed or leaking Air Filter Wrong Fuel / Old Fuel Crank Position Sensor	Inspect IAC system Inspect IAC hoses and fittings Inspect fuel pressure Replace Replace Inspect / Replace Inspect / Replace
Poor Running in Higher RPM Range	Air intake restriction Oil Overfilled Ignition problems Low Battery Voltage Loose, corroded, or wet connector(s) Valve train problems	Air filter - Ignition Coil(s) / plug wires Battery ECM and wiring harness Valve springs, valve, head	Inspect Inspect oil level and condition Refer to ignition section. Charge or replace Unplug connections - inspect Inspect cylinder head & valves



FUEL SYSTEM / FUEL INJECTION

FUEL SYSTEM TROUBLESHOOTING (cont.)

PROBLEM	POSSIBLE CAUSE	AFFECTED PART(s)	REPAIR RECOMMENDED
Engine Stalls	Fuel Pump Problem	Low battery voltage Faulty fuel pump No signal from ECM Wiring problem	Battery/Charging system Check fuel pressure Repair Wiring Repair/Chk Pump Relay
	Excessive rich or lean fuel/air mixture	TMAP Sensor Plugged fuel filter Fuel pump (pressure) Fuel pressure regulator Vacuum leak Wiring problem Air Filter Low battery voltage	Repair / Replace Replace Test / Replace Test / Replace Pump Assembly Repair / Replace hoses Repair Replace Ck battery & charging system
	Control Circuit/Sensors not functioning correctly	Fuel pressure regulator TPS Engine speed sensor Fuel pump relay Rotor Fuse ECM Relay Low battery voltage ECM	Test Pressure / Replace Test / Replace Test / Replace Test / Replace Inspect / Install correctly Replace Replace Inspect Charging system
	Valve train problems or Compression low	Refer to chapter 7	
Backfiring	Low Battery Voltage Ignition Problem	Battery, spark plug fouled, poor wire connection for ignition or fuel injection, loose pin in multi-pin connector for ECM or wiring harness	Refer to battery section Replace plugs / diagnose Inspect wiring connections Disconnect and check pin connections
	Air leaks	Inlet and Exhaust	Seal intake or exhaust leaks
	Restricted air intake or throttle body	Intake tract / Throttle body	Clean air inlet tract and throttle body



FUEL SYSTEM TROUBLESHOOTING (cont.)

PROBLEM	POSSIBLE CAUSE	AFFECTED PART(s)	REPAIR RECOMMENDED
Poor Running in upper rpm ranges	Control Circuit/ Sensors not functioning correctly	Engine speed sensor TPS Air temperature sensor Manifold Absolute Pressure sensor Intermittent wiring / connector problem ECM	Test / Replace Test / Replace Test / Replace Test / Replace Repair/Replace Test / Replace
	Fuel delivery incorrect	Plugged or kinked fuel and/or vent hoses Fuel pump Fuel regulator Fuel filter Battery/Charging System Fuel Injector plugged Contaminated fuel (water, additives, etc.) Inadequate octane Defective throttle valve Low battery voltage	Repair/Replace Test / Replace Test Pressure / Replace Test / Replace Charge/Replace Clean/Replace Clean/Replace Use correct fuel Replace throttle body Charging system
	Air intake restriction	Dirty Air Cleaner Intake restriction	Clean Repair
	Air Leak	Throttle body gasket surfaces Intake manifold Throttle body	Repair/Replace Repair/Replace Repair/Replace
Engine lacks power	Engine component problems Ignition problems Overfilled with oil	See chapter 7, 8 See chapter 17 See chapter 2	
	Improper fuel delivery	Plugged fuel injector TPS Dirty air cleaner Vacuum leaks Fuel pump Fuel pressure regulator Air temperature sensor Engine speed sensor TMAP sensor Plugged vent hose Low battery voltage ECM	Replace Inspect / Replace Replace Repair / Replace Test / Replace Test / Replace Test / Replace Test / Replace Test / Replace Charge Battery / Replace Test batt./Charging system Test / Replace



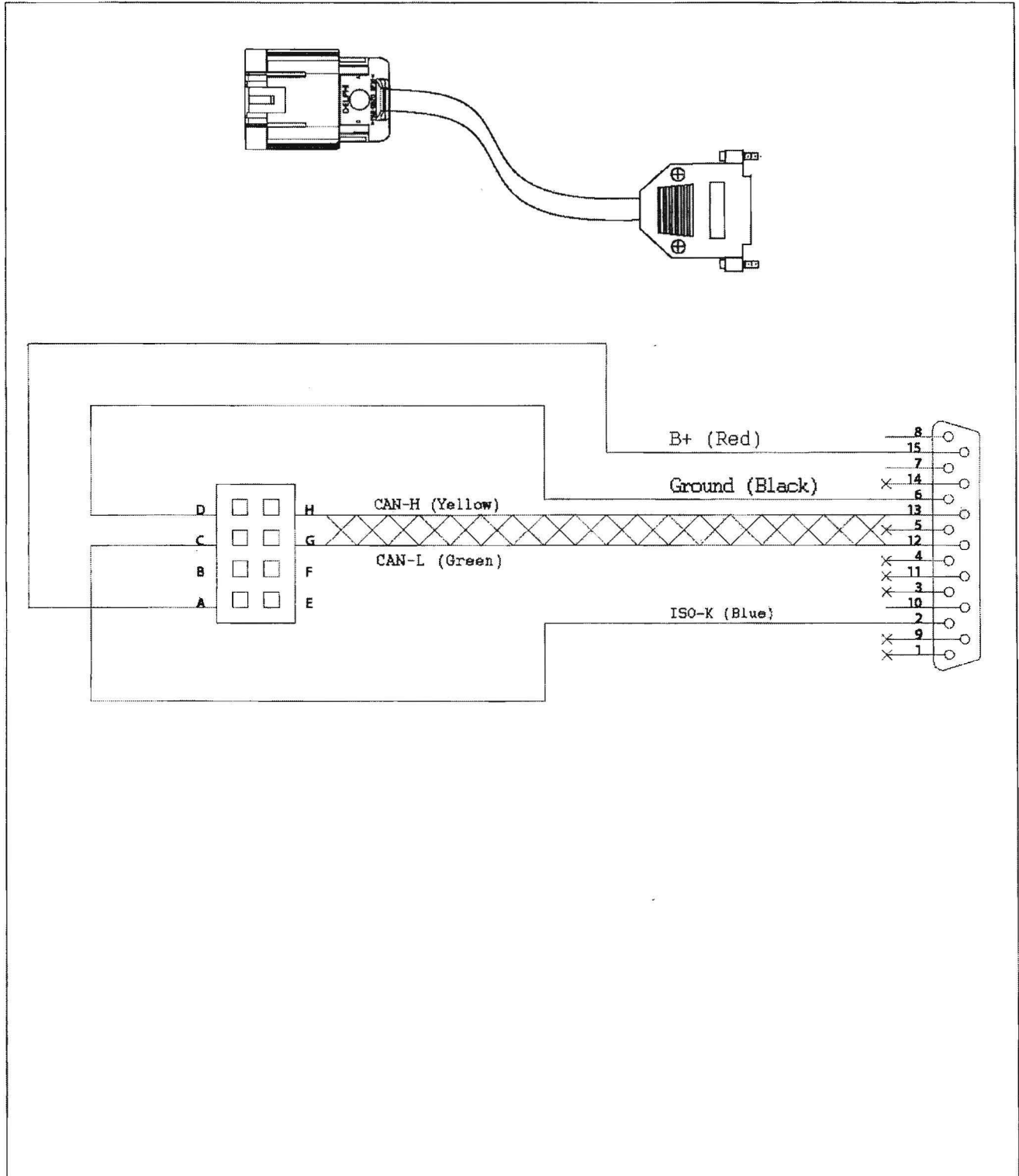
FUEL SYSTEM TROUBLESHOOTING (cont.)

PROBLEM	POSSIBLE CAUSE	AFFECTED PART(s)	REPAIR RECOMMENDED
Engine overheats	Internal Engine Parts Lubrication & Cooling system Low or incorrect oil Brakes dragging Drive belt too tight Ignition timing incorrect	Cooling System Cooling System Engine Oil Brake systems Drive Belt Ignition Coils Faulty coolant temperature sensor Faulty engine speed sensor Faulty ECM Heat range incorrect Charging System Faulty Battery Faulty Wiring	Refer to chapter 4 Refer to chapter 4 Refer to chapter 3 Refer to chapter 15 Refer to chapter 3 Refer to chapter 17 Replace Replace Replace Replace Refer to charging section Replace Repair
	Lean Air/Fuel mixture	Fuel pressure regulator vacuum hose kinked or plugged Air leak Fuel injector plugged Coolant temperature sensor Vent hose plugged/ kinked Air leak at throttle body to manifold seal	Repair/Replace Repair Clean/Replace Replace Repair Repair
Won't Accept New Calibration	Non-Current Calibration File Set Low Battery Voltage Attempting Re-Flash Without Proper VIN, Calibration I.D. number, or calibration authorization code		Go to Dealer website (Victory Re-Flash) and download the most current Victory Calibration File Set Attach Battery Charger During Re-Flash, and Re-Charge Battery When Re-Flash Is Completed Enter Authorization Code Sent With Accessory Kit



SMART LINK CABLE

Pin connection and function of the Smart Link Cable is shown below.



NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

CHAPTER 6

ENGINE REMOVAL & INSTALLATION

OVERVIEW - ENGINE REMOVAL	6.2
GENERAL	6.2
SPECIFICATIONS	6.2
SPECIAL TOOLS	6.2
TORQUE VALUES	6.3
ENGINE MOUNTING	6.3
SUSPENSION MINOR PIVOT (SPIDER BRACKET) / REAR ENGINE.....	6.4
ENGINE REMOVAL	6.5
PREPARATION FOR ENGINE REMOVAL	6.5
REMOVING ENGINE FROM FRAME	6.8
INJECTOR REMOVAL	6.8
ENGINE INSTALLATION	6.9
PREPARATION	6.9



ENGINE REMOVAL & INSTALLATION

OVERVIEW - ENGINE REMOVAL

GENERAL

A floor jack or commercially available motorcycle engine lift or hoist is required for engine removal. Arrange for assistance when removing and installing the engine.

Once engine is removed from frame, an engine stand is recommended for engine disassembly and assembly.

Engine removal and installation methods may differ slightly depending on available equipment, but always be sure the engine and chassis are securely supported at all times.

REQUIRES ENGINE REMOVAL FOR SERVICE	CAN BE SERVICED WITH ENGINE IN FRAME
Airbox Removal	Voltage Regulator, Stator, Rotor (Flywheel)
Camshaft	Cam Chain Tensioner
Camshaft Chain / Guide / Tensioner Blade	Clutch
Crankcase Breather Reed Valve	Fuel Injectors / Throttle Body / Fuel Rail
Crankshaft & Crankshaft Component Service	Gearshift Linkage (External)
Cylinder Heads	Ignition System
Valve Covers	Output Shaft Seal
Oil Pump	Starter, Starter One-Way Clutch, Starter Torque Clutch,
Oil Pump Drive/ Balance Shaft	Torque Compensator Assembly
Piston/Cylinder	Timing Wheel, Crankshaft Position Sensor
Transmission/All Internal Transmission Parts	

SPECIFICATIONS

ENGINE WEIGHT and OIL CAPACITY	
Item	Specifications
Engine Dry Weight	Approximately 120 Kilograms (265 lbs)
Oil Capacity	Approximately 4.75 Liters (5.0 Quarts)

SPECIAL TOOLS

Motorcycle table lift with wheel vise (commercially available)

Two stable platform jacks with minimum 12 x 12 inch platform (commercially available)

Engine hoist or "cherry picker" style hoist (commercially available)

Engine stand (commercially available)

6.2

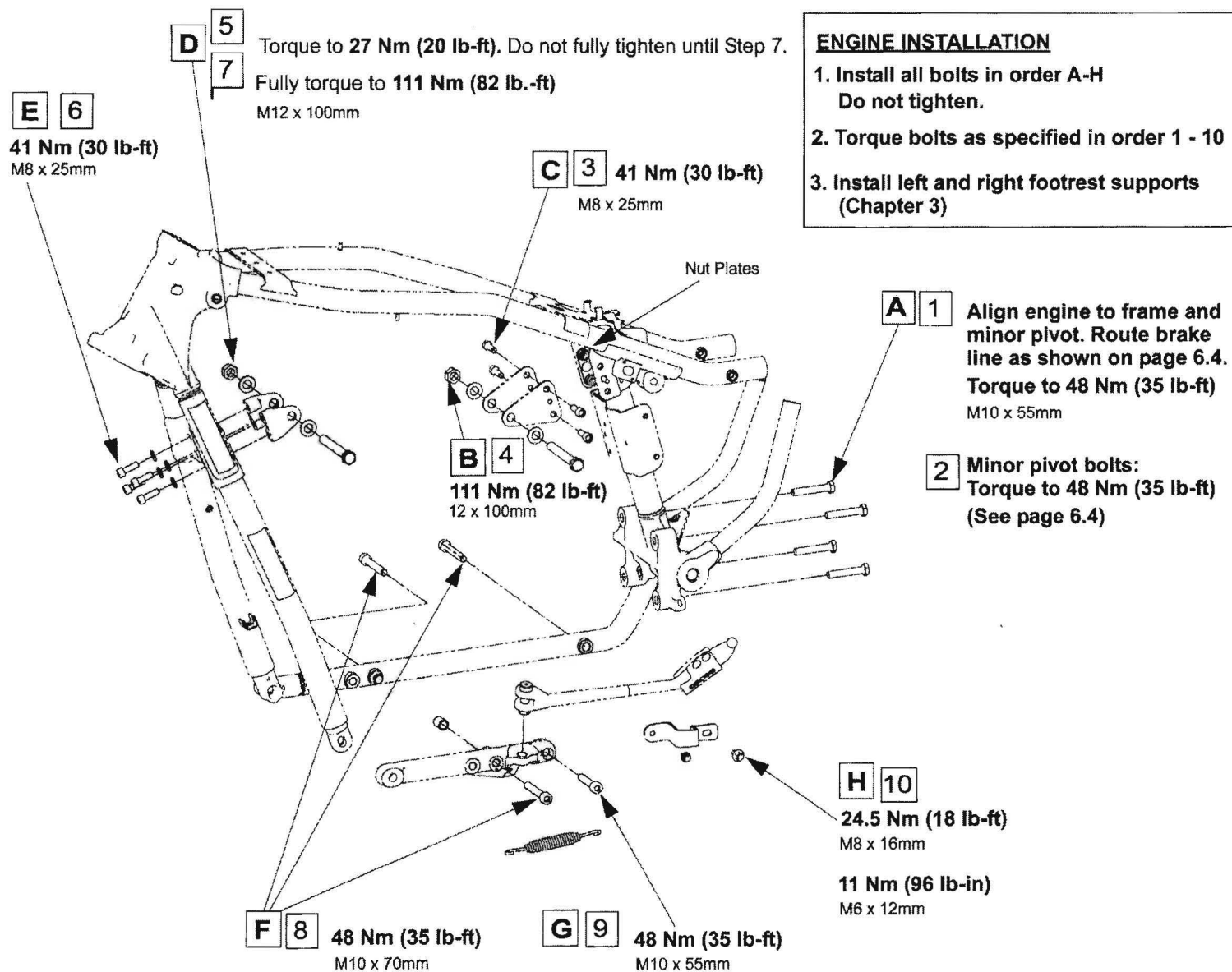


TORQUE VALUES

ENGINE MOUNTING

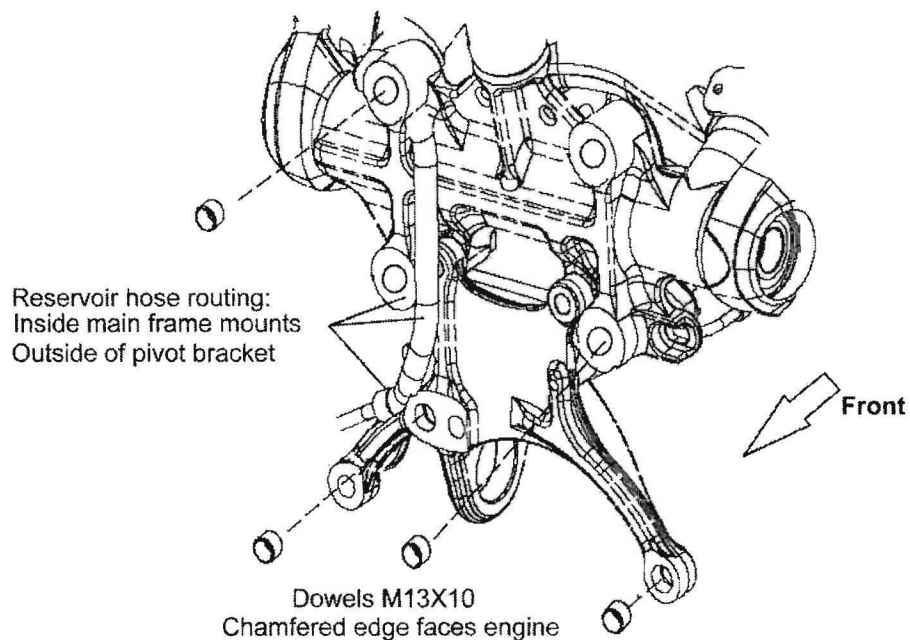
ENGINE INSTALLATION

1. Install all bolts in order A-H
Do not tighten.
2. Torque bolts as specified in order 1 - 10
3. Install left and right footrest supports
(Chapter 3)

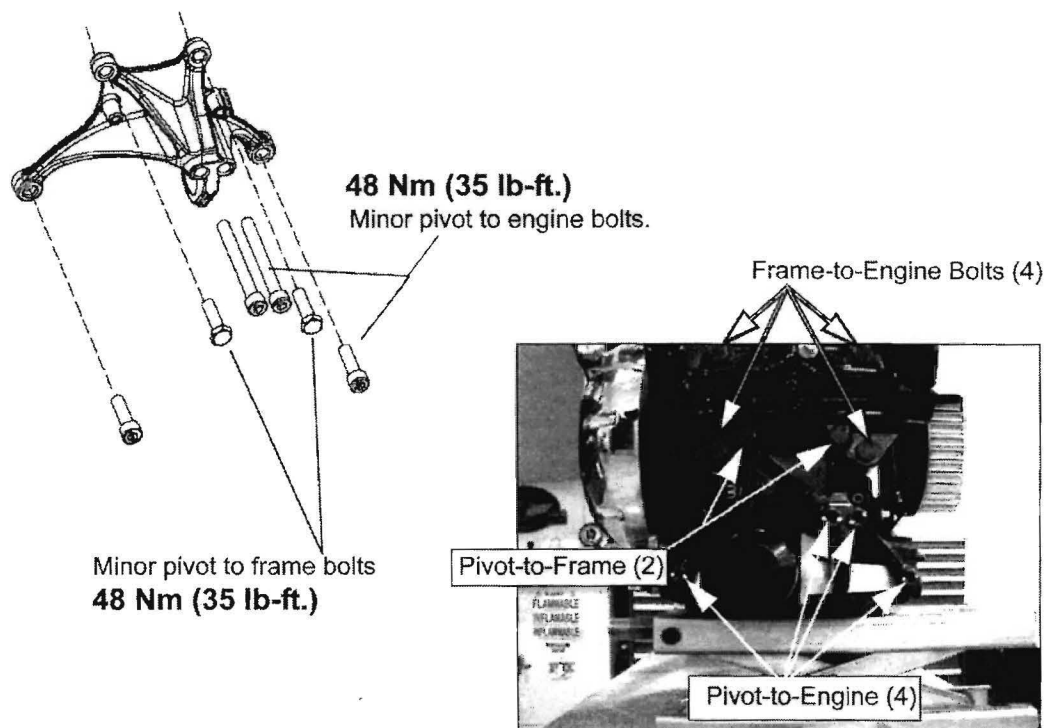


ENGINE REMOVAL & INSTALLATION

SUSPENSION MINOR PIVOT (SPIDER BRACKET) / REAR ENGINE



Suspension minor pivot can remain on frame or engine when engine is removed.



6.4



ENGINE REMOVAL

PREPARATION FOR ENGINE REMOVAL

Different methods can be used to remove the engine depending on the equipment available to the technician. All methods require the front wheel to be held stationary and securely to allow the rear of the motorcycle to be elevated at least 10-12 inches above the surface of the lift.

Refer to illustrations on page 6.3 - 6.4, and routing diagrams in Chapter 1 for locations of electrical connectors.

1. Support motorcycle securely in an upright position. Clamp front tire securely in a wheel vise of lift bench, so rear tire and chassis can be raised 10-12 inches off the bench to allow engine removal.

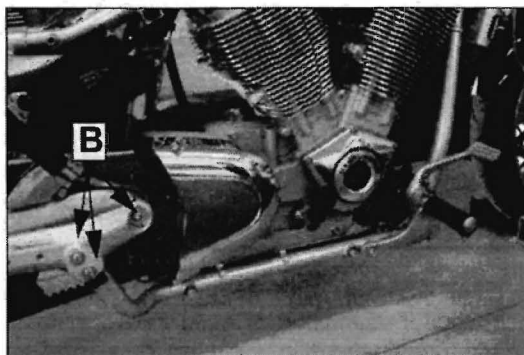
PRECAUTIONS:

- Protect frame down tubes (A) and other areas from scratches with tape or a protective wrap.



- Clean areas where items (such as oil lines) attach to the engine before you remove them to prevent debris from entering. Cover any openings during and after engine removal as required.
- Note routing of wires, cables and hoses. Refer to routing diagrams in Chapter 1.

- Side covers (page 3.3)
- Seat(s) (page 3.6)
- Fuel tank (page 5.12)
- Ignition switch and IAC cover (page 3.3)
- Battery: Remove negative (-) cable first (page 2.22)
- Exhaust system (page 3.10 - 3.11)
- Exhaust support bracket (B)



NOTE: If you plan to disassemble the engine crankcase, remove drive sprocket cover and drive sprocket (Chapter 11).

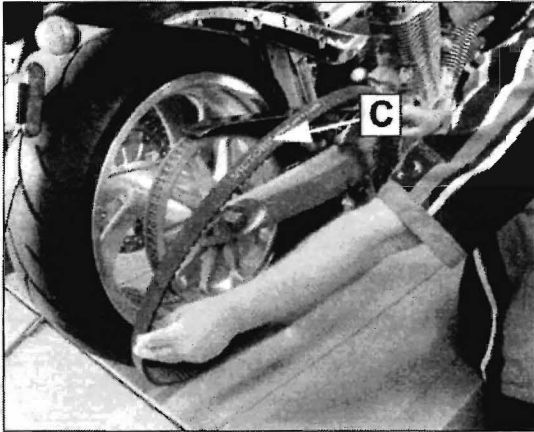
- Breather hose with clamp and guide. Cover breather opening.
- Speed sensor harness connector.
- Clutch cable or pull rod from release arm
- Clutch cable bracket from crankcase (remove slave cylinder assembly - hydraulic clutch models).
- Engine ground cable (rear left corner of engine).
- Drive belt guard.

REMOVE:



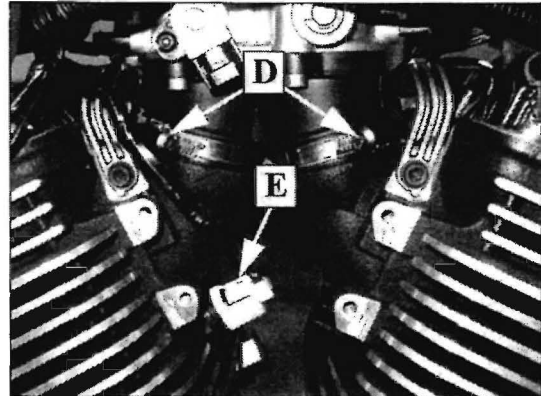
ENGINE REMOVAL & INSTALLATION

- Drive belt sprocket cover and drive belt.
Note: Direction belt is installed with "VICTORY" readable from right side (C). Make sure not to kink or twist the drive belt.



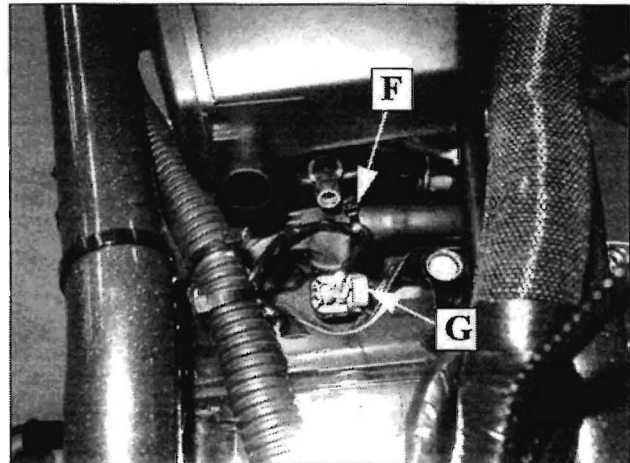
- Gear position and CPS switch wire harness, guides, P-clamps, and tie straps. Note the location and orientation of all fasteners for assembly.
- Rear brake light switch bracket at left rear corner of engine.
- Oil pressure switch wire.
- Cut any tie straps and note location for assembly.
- Oil cooler and lines (page 4.6).
- **IMPORTANT!** Remove Regulator / Rectifier from front of engine to prevent damage upon engine removal (Chapter 16).
- Right lower frame rail assembly. Do not allow assembly to hang by brake lines.
- Linkage arm from shift shaft and left lower frame rail.
- Disconnect TPS and TMAP sensor.
- Loosen inlet manifold hose clamps (D).

- Disconnect engine temperature sensor wire (E).



- Cut each tie strap (F) that secures the front and rear injector wire harness to the fuel rail.
- Disconnect injector wires from injector.

NOTE: This is a double-lock connector. Pull the lock tab (G) out of the connector, then depress the tab to remove harness from injector.



- Drain engine oil
- Clean oil filter area. Remove oil filter. Cover opening to prevent debris from entering.

NOTE: Oil filter can remain installed if engine can be lowered far enough on jack to clear the lower left corner of suspension minor pivot ("spider") bracket.

- Secure air box to upper frame tubes to support it when engine is lowered.

6.6

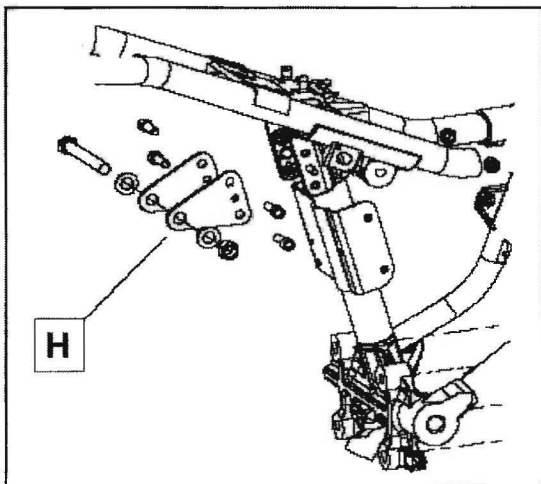


- Place a platform jack or lift hoist under the engine in a position that will center the load. Apply slight upward pressure on lift or jack until engine is supported.

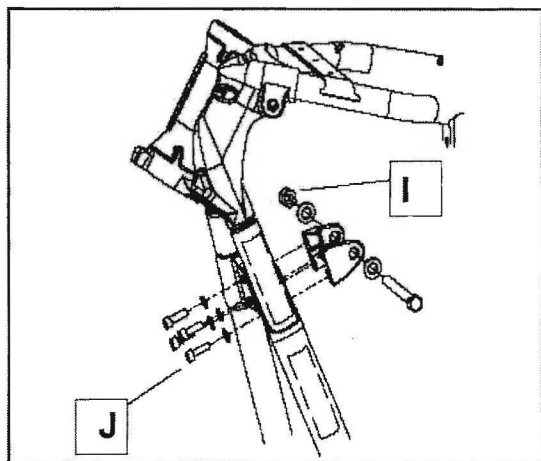
CAUTION

Arrange to have assistance when engine is ready to be removed from frame. The engine is very heavy and could cause severe personal injury if not handled properly. Be sure engine, front wheel, and frame are properly secured and supported before proceeding.

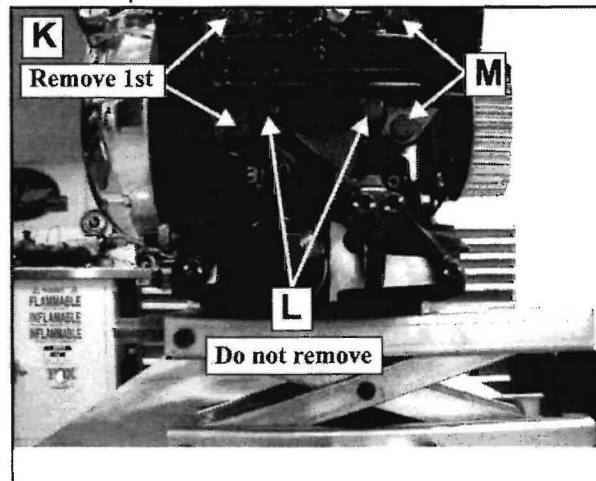
- Remove rear upper engine mounting bolt and both left and right brackets (H).



- Loosen, but do not remove front upper mount bolt (I) and (4) bracket bolts (J).



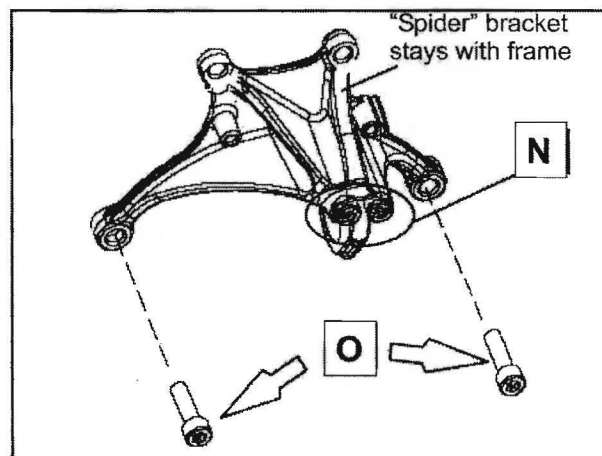
- Remove LEFT side main frame-to-engine bolts (K). Do not remove bolts (L) that hold suspension minor pivot bracket to frame.



REAR SHOCK / LINKAGE REMOVAL

NOTE: Rear shock removal allows easy access to the right side frame-to-engine bolts (M in photo above) and suspension minor pivot bracket-to-engine bolts.

- Lift engine / frame slightly to remove weight from rear shock absorber and linkage.
- Remove rear shock absorber and linkage pin in swingarm (Chapter 13).
- Remove RIGHT side frame-to-engine bolts (M).
- Remove center spider bolts (N) and outer bolts (O).



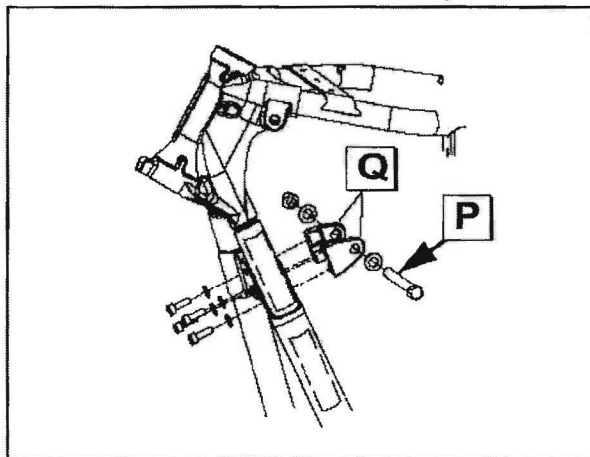
NOTE: When all rear bolts are removed, re-install rear shock absorber and linkage loosely to support frame and suspension.



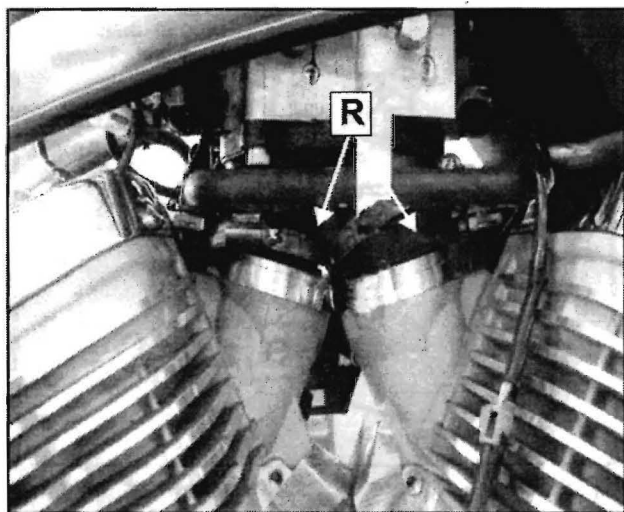
ENGINE REMOVAL & INSTALLATION

REMOVING ENGINE FROM FRAME

- With suspension re-installed, raise the engine jack until weight of engine is fully supported.
- Remove front upper engine mount bolt (P) and both brackets (Q).

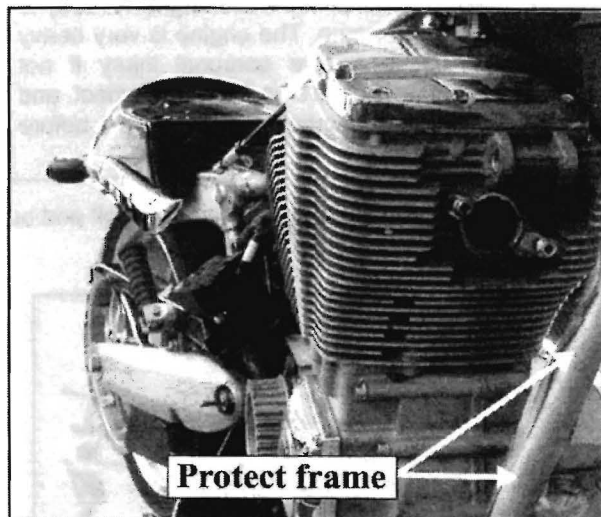


- When all fasteners have been removed, check to be sure all hoses, wiring, and components have been disconnected or removed to allow engine removal.
- Lower engine jack slightly until throttle body can be released from intake adapters (R).

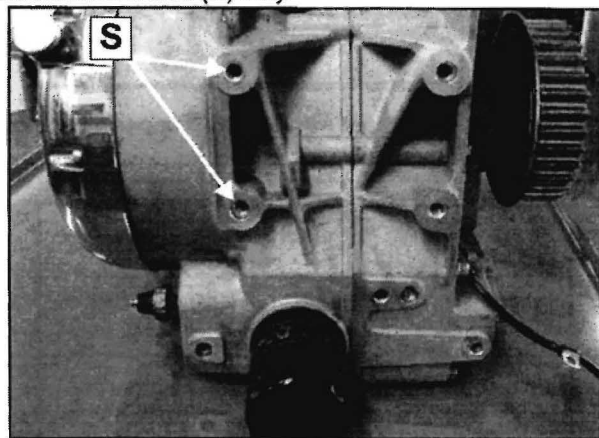


- Move engine back and forth slightly to release engine from alignment pins at rear of crankcase.

- Slide engine forward until dowel pins on frame and suspension bracket are dislocated.
- Elevate the rear of the motorcycle to help engine clear the frame tubes in front and bracket in back.
- Rotate engine carefully and remove from right side of frame.



NOTE: Attach engine securely to an engine stand to prevent damage and for ease of disassembly. Use spacers as needed for the stand you are using. If crankcases will be separated, use the two left crankcase mounts (S) only.



INJECTOR REMOVAL

NOTE: IMPORTANT! Debris could have collected in and around injector cavities. If injector removal is required, clean cavity and surrounding area with compressed air before removing injectors. If removed, Injectors must be indexed properly to the fuel rail (aligned) to ensure proper spray pattern. See Chapter 5.

ENGINE INSTALLATION

PREPARATION

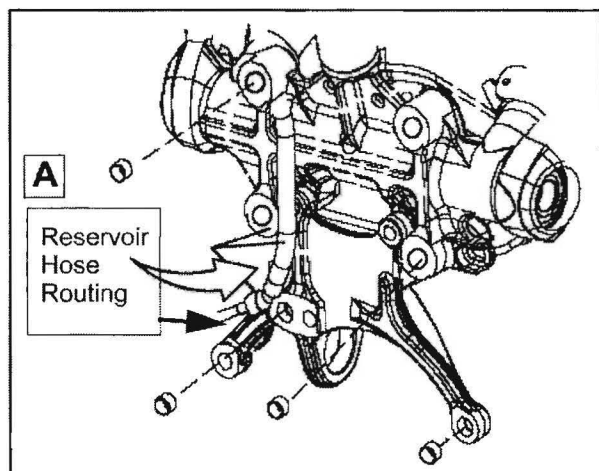
Refer to page 6.3 - 6.4 for torque values and assembly views.

CAUTION

Arrange for assistance when installing engine. The engine must be held securely to prevent damage to engine, frame, wiring, or hoses. The engine is very heavy and could cause severe personal injury if not handled properly. Be sure engine is properly supported before proceeding.

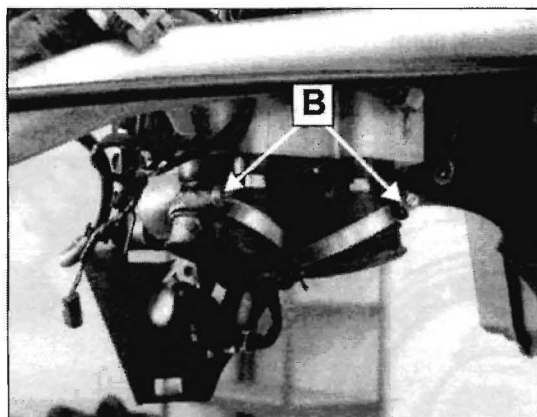
NOTE: IMPORTANT! Be sure alignment dowel pins are in place on frame, frame cradles and suspension bracket.

1. Clean mating surfaces of frame, suspension bracket, and engine crankcase. Grease dowel pins.
2. Be sure reservoir hose (A) is routed below frame and above leg of bracket.

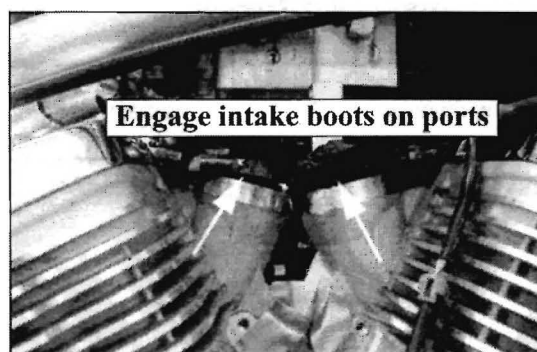


3. Raise rear wheel / frame off the bench to increase clearance of engine to frame tubes and bracket.

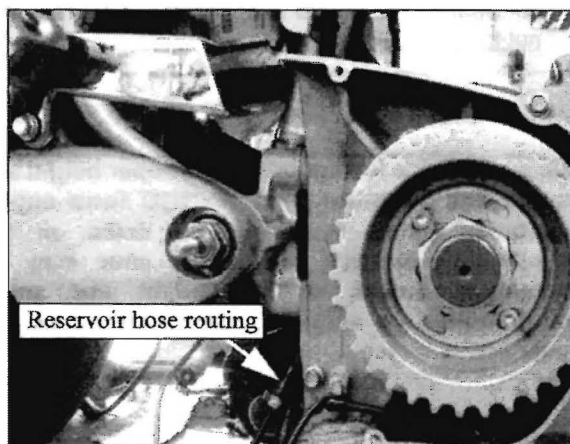
4. Place clamps (B) in position on intake boots.



5. Slide and rotate engine into frame and position engine to center of frame. Adjust height of engine as needed to align rear mounts and dowel pins.

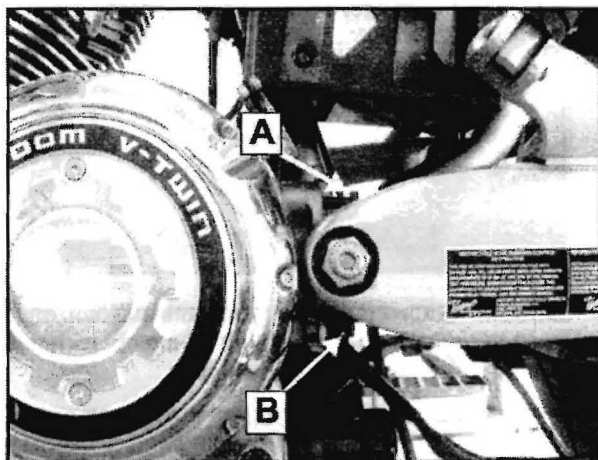


6. Raise engine and start intake boots on intake ports.
7. Slide engine back onto dowel pins and adjust engine height as needed to align the pins and fully seat the intake boots on intake ports.
8. Be sure all wiring and hoses are properly routed before installing rear mounting bolts.

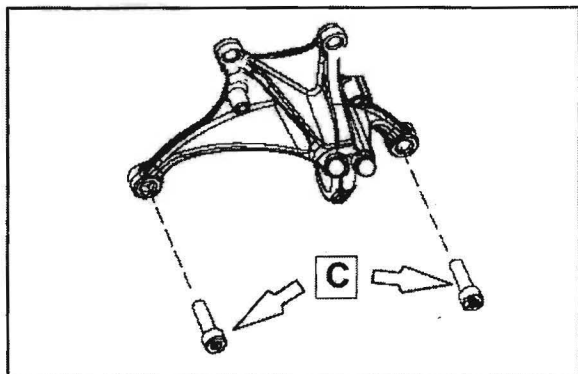


ENGINE REMOVAL & INSTALLATION

9. Loosely install all accessible rear engine mounting bolts in frame (2 left side) and spider bracket (lower left and right).
10. Carefully and evenly draw engine back onto dowel pins using the left side main frame bolts (A & B)...



...and the lower bolts (C) on the suspension pivot.



11. Tighten bolts A, B, and C evenly until engine is drawn flat against frame and suspension pivot bracket. Do not torque fully at this time.

CAUTION

Be sure engine is aligned at the proper height and angle with the dowel pins. **DO NOT** force engine alignment using the mounting bolts, or the suspension bracket and dowel pins may be damaged! Adjust engine height and angle continuously as required while drawing up the bolts.

12. Loosely install all bolts in the sequence shown on page 6.3, removing and replacing the shock to access the right side bolts as in removal process (refer to Chapter 13 for rear suspension fastener torque).
13. **Install starter motor (if crankcase was disassembled the starter motor should be torqued to the crankcase during engine reassembly):**
Long bolt is installed in bottom hole (8x135) and shorter bolt (8x110) in top hole. Torque first to 15 lb-ft. then to 22 lb-ft.
14. Install footrest supports (Chapter 3).
15. Be sure inlet boots are sealed properly to cylinder head intake ports. Torque clamps to 2.2 Nm (20 lb-in).
16. Install new tie straps on injector wires and secure them to the fuel rail.
17. Install remaining parts, reversing the order of removal.
18. Install new oil filter and fill crankcase to the proper level with Victory engine oil (Chapter 2).
19. Inspect operation of all controls and adjust as necessary (Chapter 2).
20. Prime the fuel system (Chapter 5).
21. Start engine, inspect for oil leaks.
22. Test brakes to be sure level and pedal pressure are normal.
23. Test ride the motorcycle, inspect for proper operation, fluid leaks.
24. Inspect oil level and adjust if necessary.



CHAPTER 7

CYLINDER HEAD & VALVE TRAIN

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GENERAL INFORMATION

IMPORTANT NOTES

- This section covers service of the cylinder heads, camshafts, cam chains and tensioners, cam chain guides and rocker arms. Cam chain tensioners can be serviced with the engine in the frame. Most other cylinder head components require engine removal.
- Refer to Chapter 6 for engine removal and installation.
- Head and base gasket replacement is recommended if camshaft carrier fasteners are loosened or removed. The 1-piece camshaft carrier design uses common fasteners for the carrier, the cylinder head, and the cylinder.
- Mark and store all mating parts for correct engine assembly.
- Use Moly Assembly Paste P/N 2871460 or Victory Semi-Synthetic 20W/40 Engine Oil P/N 2872176 to lubricate parts where indicated.
- Handle and store all parts in such a way that they will not be damaged or contaminated.
- Some fasteners have a pre-applied locking agent, and must be replaced if loosened or removed. Always replace fasteners that have a pre-applied locking agent or as directed in this service manual.
- There are some precision machining steps to be performed in this section. If you are not sure of your capabilities in these areas, have a competent machinist perform these operations.
- Valve guide and seat reconditioning should be performed by a technician proficient in cylinder head reconditioning techniques using high quality equipment with grinding stones. Do not attempt cylinder head repair without the proper equipment or experience in cylinder head reconditioning techniques.
- The intake and exhaust valves cannot be re-faced.
- Cleanliness of parts is critical to engine life and accurate parts inspection. Use clean solvent to clean all disassembled parts. Dry parts with compressed air and lubricate before engine inspection and engine assembly.

SPECIAL TOOLS

- Valve Spring Compressor PV-1253 or PV-4019 with adapter PV-43513-A
- Crankshaft Rotation Socket PV-48736
- 8mm or 5/16 pin punch (Commercially available)
- Engine lock Tool: PV-43502-A

7.2



DATA - CYLINDER HEAD

SPECIFICATIONS - 106 C.I. ENGINE

CAMSHAFT DATA	106 C.I.	
	Valve Train	Single Overhead Cam / 4 valves per cyl 2 Intake valves / 2 Exhaust valves
	Intake Valve Opens At 1 mm Lift	3.5° BTDC
	Intake Valve Closes At 1 mm Lift	41.5° ABDC
	Exhaust Valve Opens At 1 mm Lift	39° BBDC
	Exhaust Valve Closes At 1 mm Lift	-3° ATDC (3° BTDC)
	Max Lobe Lift (In / Ex)	7.26 mm / 7.07mm
	Max Valve Lift (In / Ex)	10 mm / 10 mm

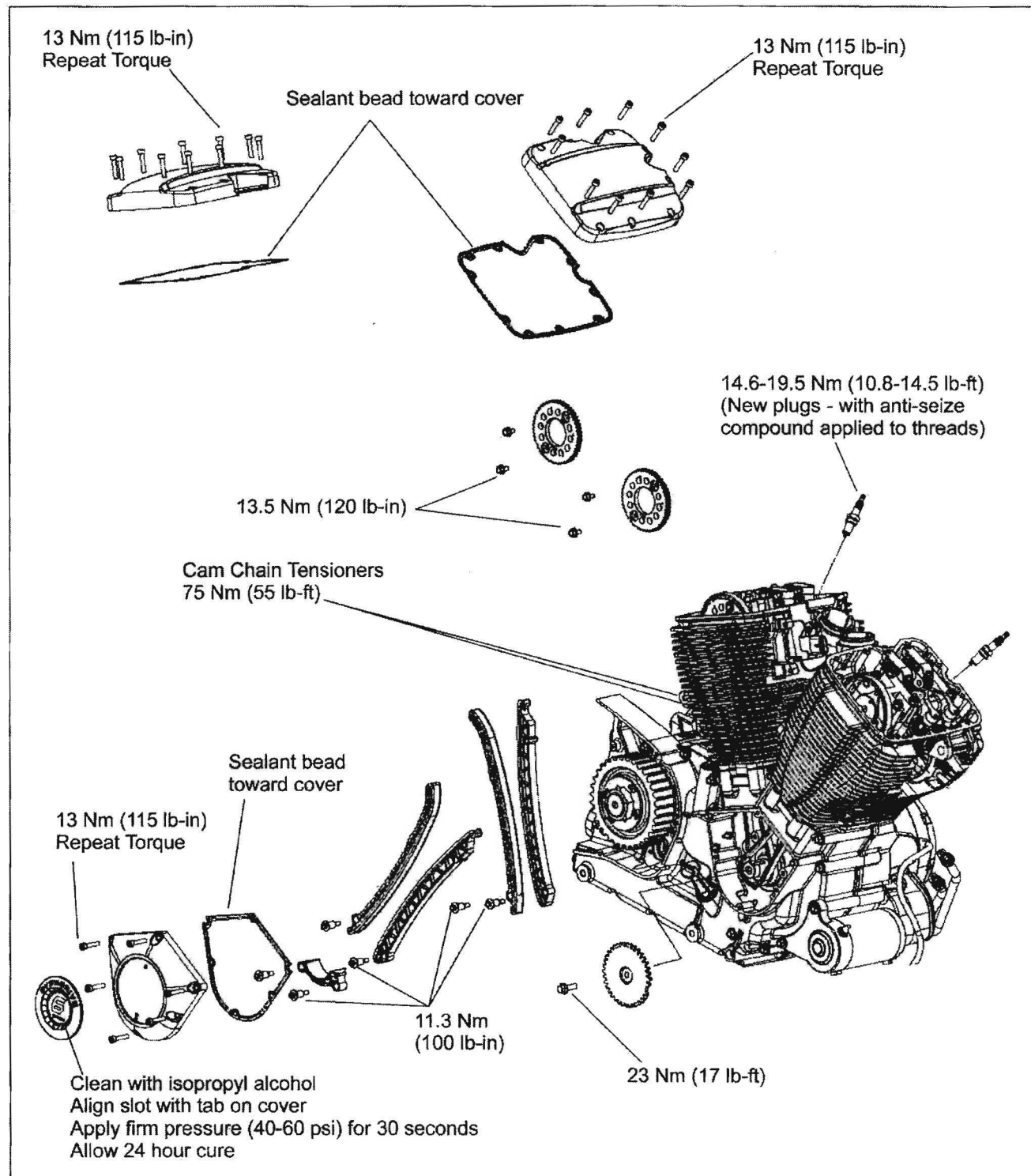
CYLINDER HEAD & VALVE TRAIN - 106 C.I.

Item		Standard	Service Limit
Cam Chain Tensioner	(Hydraulic)	-	-
Cam Shaft	Lobe Height	IN 40.259 mm (1.5850") EX 40.060 mm (1.5772")	40.159 mm (1.5811") 40.02 mm (1.5732")
	Oil Clearance	.036 mm - .086 mm (.0014" - .0034")	
	Journal O.D. (Small)	23.96 - 23.98 mm (.943 - .944")	23.93 mm (.942")
	Journal O.D. (Large)	48.464 - 48.484 mm (1.9080 - 1.9088")	48.434 mm (1.9068")
Cylinder Head	Warpage (Distortion)	-	.10 mm max. (.004")
Rocker Arm, Shaft, & Lifter	Rocker Arm Bore I.D.	IN/EX 12.01 - 12.03 mm (.473 - .474")	12.065 mm (.475")
	Rocker Arm Shaft O.D.	IN/EX 11.974 - 11.986 mm (.471-.472")	11.944 mm (.470")
	Rocker Arm to Rocker Arm Shaft Clearance	IN/EX .024 - .056 mm (.001 - .0022")	.156 mm (.006")
Valve, Valve Guide, Valve Seat	Valve Clearance	Hydraulic/Self Adjusting	
	Valve Guide Installed Height (See illustration on page 7.19)	12.2-12.8mm (.480-.504")	41.40 mm (1.630")
	Valve Stem O.D.	IN 6.953 - 6.973 mm (.2737 - .2745") EX 6.950 - 6.970 mm (.273 - .274")	6.933 mm (.2729") 6.928 mm (.2727")
	Valve Stem Deflection	-	.13 mm max. (.005")
	Valve Seat Width	Intake 1.2 mm (.047")	-
	Valve Seat Width	Exhaust 1.75 mm (.068")	-
	Valve Stem Runout	-	.13 mm max. (.005")
	Valve Head Radial Runout	-	.05 mm max. (.002")
	Valve Installed Height (See illustration on page 7.19)	INTAKE: 49.31 - 50.31 mm (1.941 - 1.981") EXHAUST: 48.78 - 49.78 mm (1.920 - 1.960")	-
Valve Spring	Free Length	IN/EX 43.36 mm (1.708")	41.40 mm (1.630")
	Intake Valve Maximum Lift	10.0 mm (.393")	-
	Exhaust Valve Maximum Lift	10.0 mm (.393")	-
	Spring Installed Height (See illustration on page 7.19)	34.20 - 36.20 mm (1.346 - 1.425")	-



TORQUE VALUES AND ASSEMBLY VIEWS

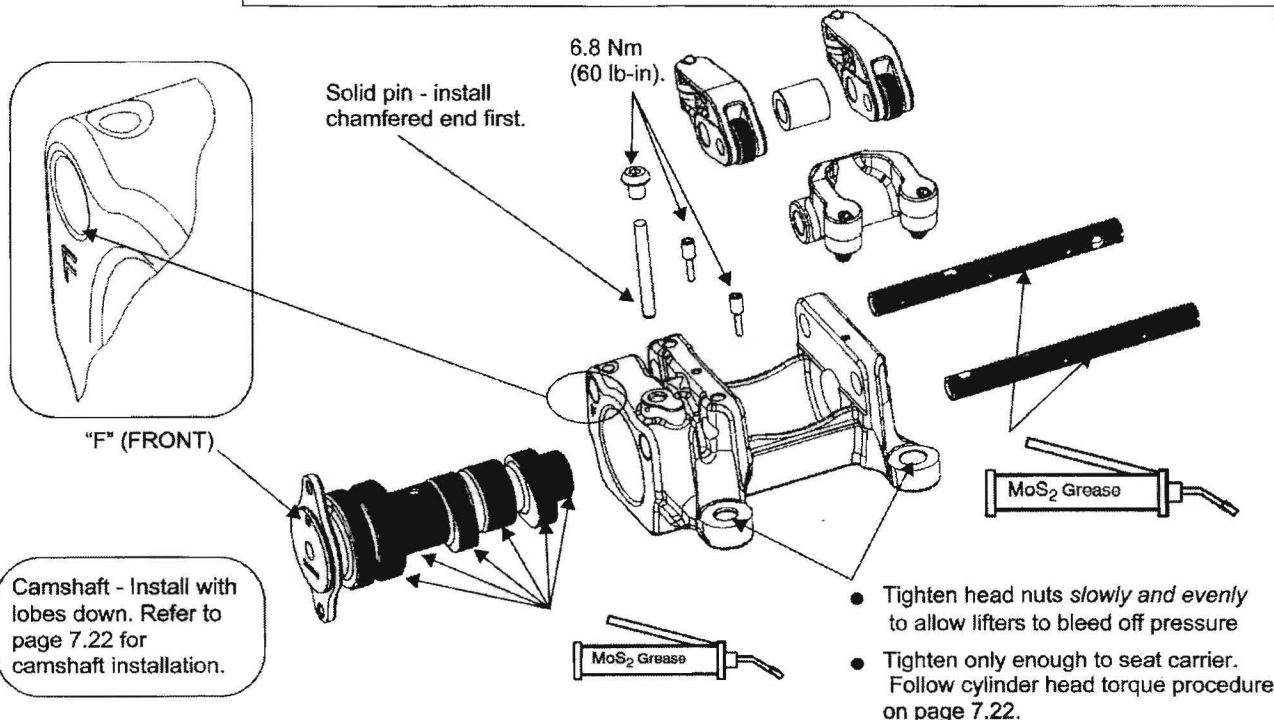
CAM DRIVE & VALVE COVER



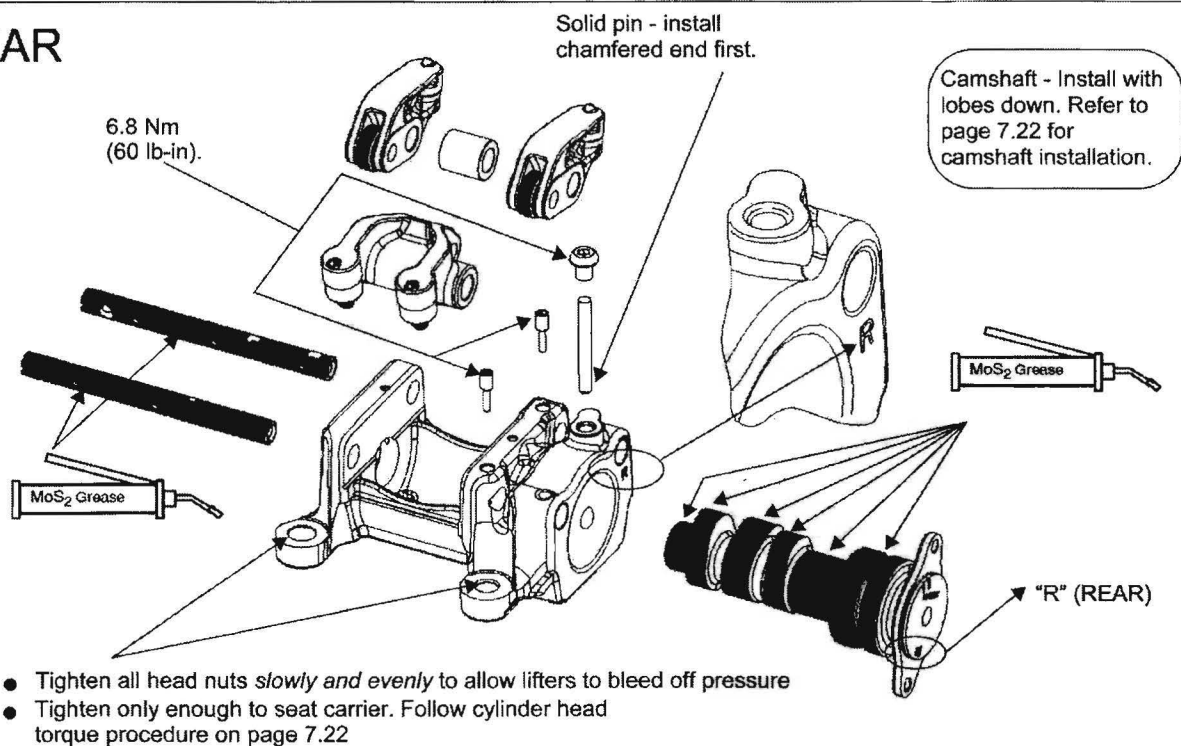
CAMSHAFT CARRIER / ROCKER ARM

FRONT

After assembly, rotate cams back and forth slightly to verify free rotation. Allow time for lifters to bleed down before performing this inspection.

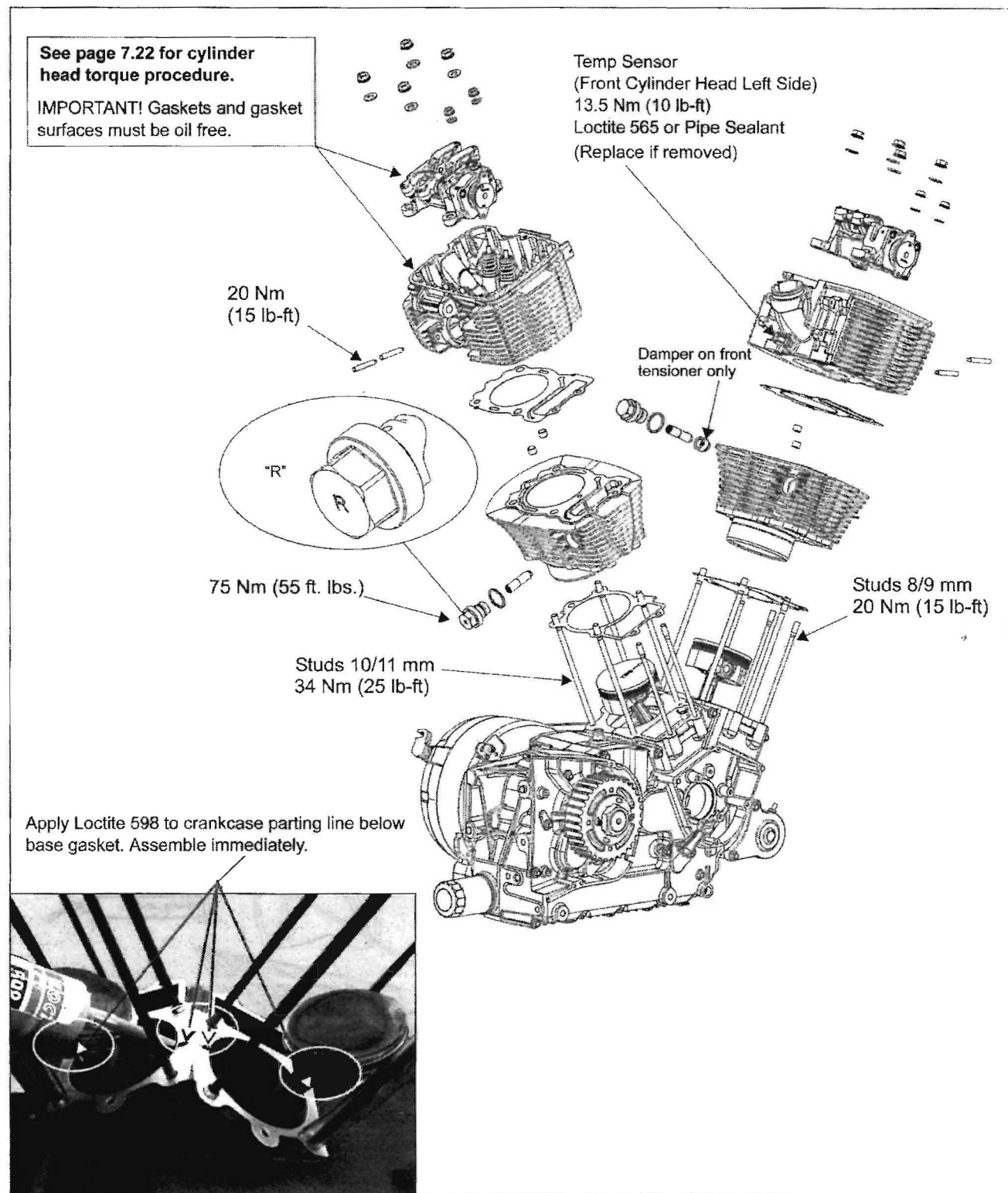


REAR



CYLINDER HEAD & VALVE TRAIN

CYLINDER HEAD



7.6



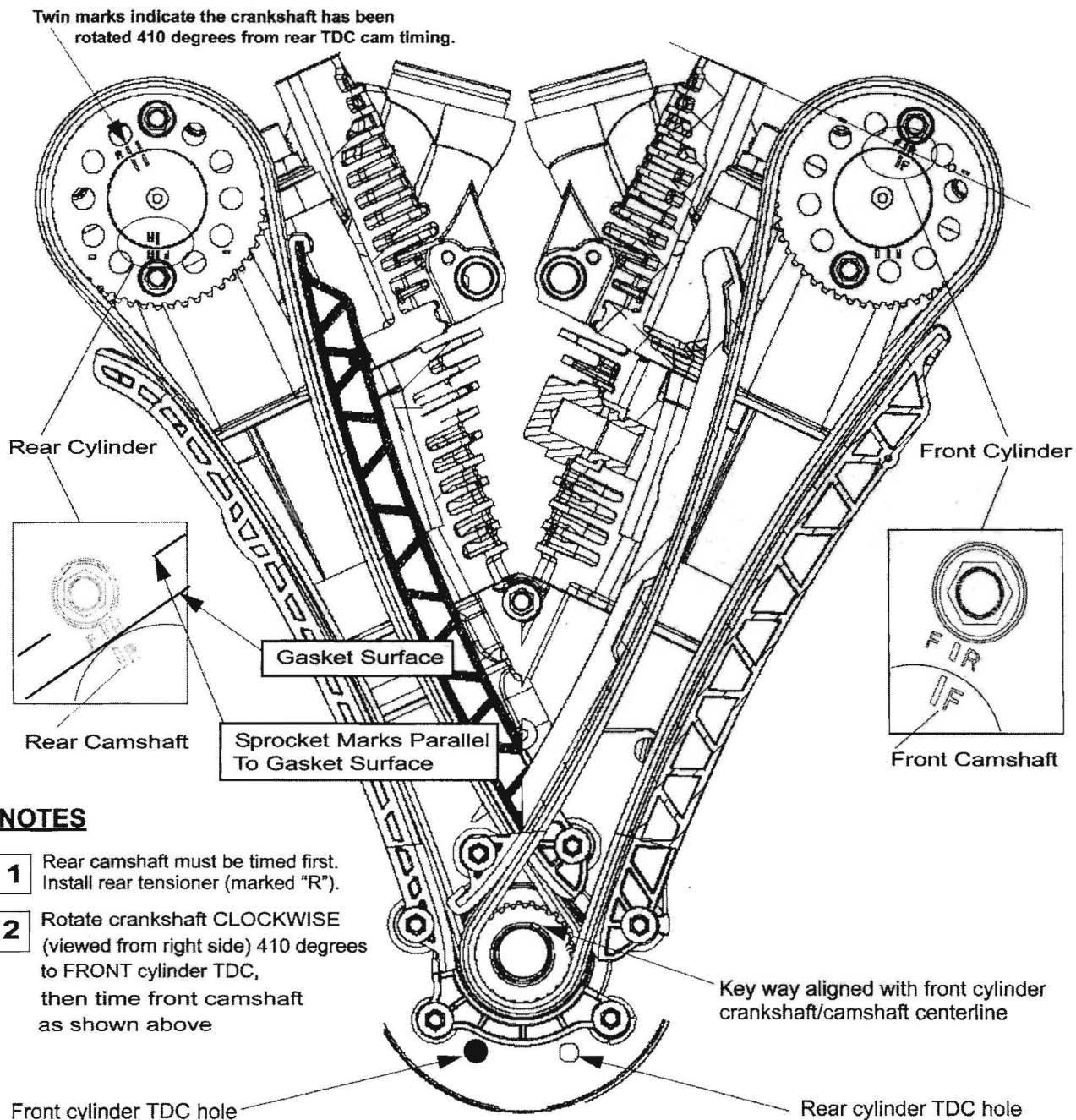
CAMSHAFT TIMING QUICK REFERENCE

Use this page as a reference **ONLY** if you are familiar with the cam timing procedure.

Refer to Page 7.24 for complete camshaft timing procedure

The illustration below shows final cam timing configuration.

The rear cylinder has been timed and the crankshaft rotated 410 degrees from rear TDC.

**NOTES**

- 1** Rear camshaft must be timed first. Install rear tensioner (marked "R").
- 2** Rotate crankshaft **CLOCKWISE** (viewed from right side) 410 degrees to **FRONT** cylinder TDC, then time front camshaft as shown above

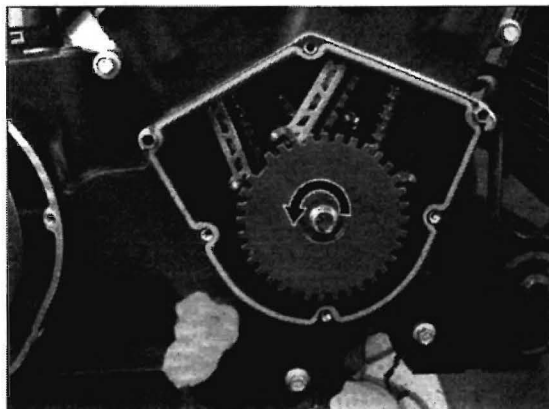
III. 1



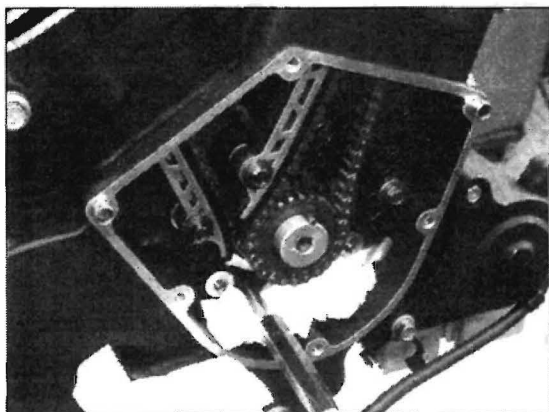
CYLINDER HEAD SERVICE

CAMSHAFT DRIVE COVER

1. Remove cam drive cover.
2. Remove CPS timing wheel.



3. Place a clean shop towel in the cavity below the cam drive sprocket to prevent objects from falling into crankcase.



4. Rotate engine to front or rear TDC using Crankshaft Rotation Tool PV-48736.
5. Insert 8mm (5/16) pin at front or rear cylinder TDC to prevent engine rotation. See page 7.7.

CAUTION

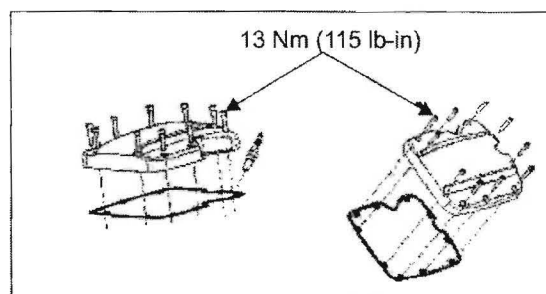
Do not rotate engine with cam chain tensioner(s) removed.

VALVE COVER REMOVAL

1. Engine removal is required. Refer to Chapter 6.
2. Remove all valve cover screws.
3. Tap lightly on cover with a soft faced hammer to loosen.
4. Remove cover and gasket.

VALVE COVER INSTALLATION

1. Install gasket with sealant bead UP (toward cover) on clean, dry surfaces.
2. Install all screws and tighten evenly in a cross pattern to 13 Nm (115 lb-in). Repeat torque once.

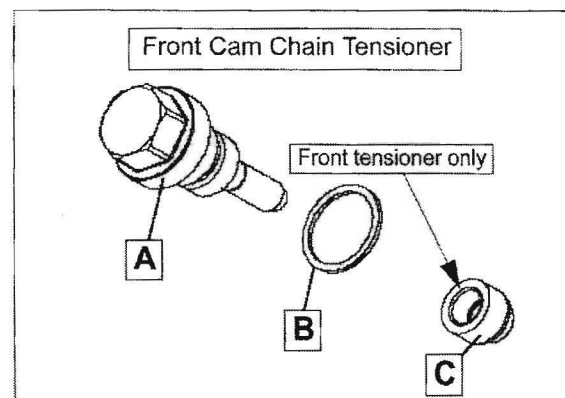


CAM CHAIN TENSIONER REMOVAL

CAUTION

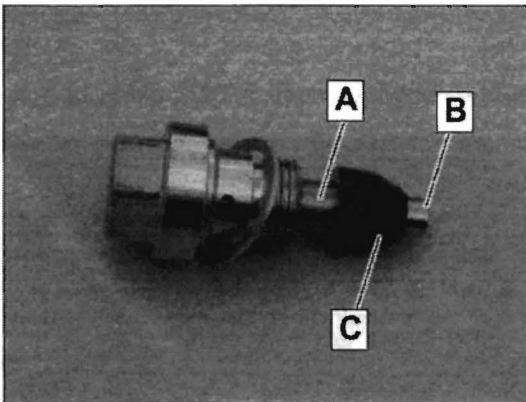
Do not rotate engine with tensioner(s) removed.

1. Remove tensioner body (A), sealing washer (B) and damper sleeve (C) (damper on FRONT cylinder only).
2. Inspect tensioner parts.



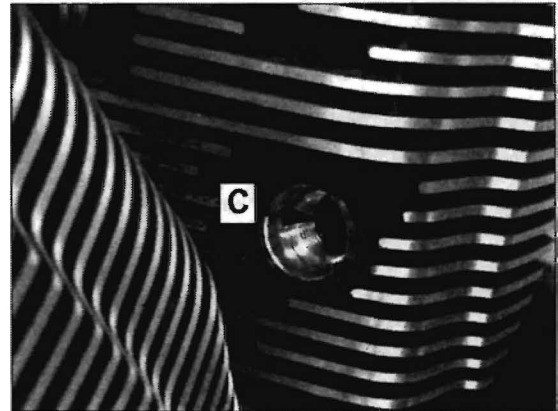
CAM CHAIN TENSIONER INSPECTION

1. Visually inspect inner plunger (A) for damage, scoring, or burrs.
2. Lubricate inner plunger with engine oil. Move plunger in and out of outer plunger (B) to check for smooth movement without binding.
3. Inspect damper (C) on FRONT tensioner. It should slip over the inner plunger with noticeable drag, not a loose fit.
4. Replace tensioner assembly or damper if worn or damaged.



CAM CHAIN TENSIONER INSTALLATION

1. Lubricate all parts with engine oil.
2. Install damper (C) squarely into tensioner bore in cylinder, and push it past the first 4 or 5 threads.



3. Install tensioner body with a new sealing washer.
4. Torque tensioner body to 75 Nm (55 lb-ft).

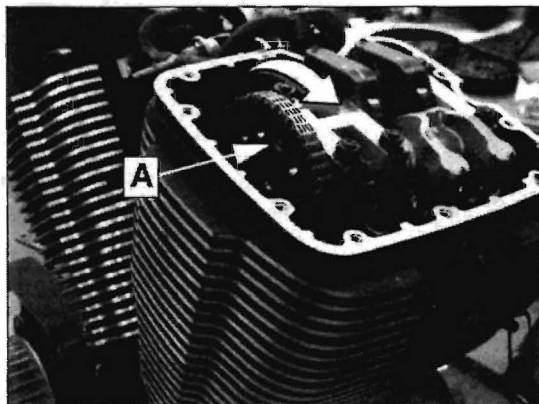


CYLINDER HEAD & VALVE TRAIN

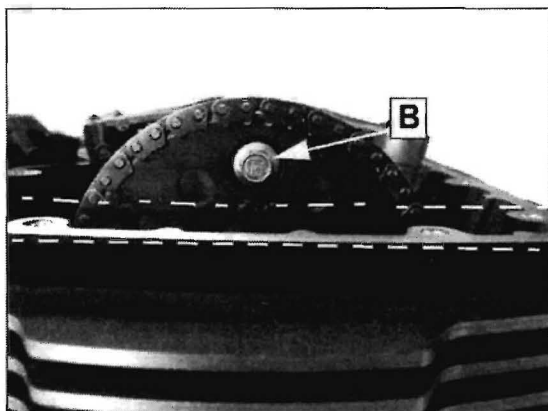
CAMSHAFT CHAIN & SPROCKET REMOVAL

1. Remove camshaft drive cover and CPS timing wheel (page 7.8).
2. Rotate crankshaft clockwise, past TDC on the compression stroke for front cylinder until bottom sprocket bolt (A) is accessible and remove it.

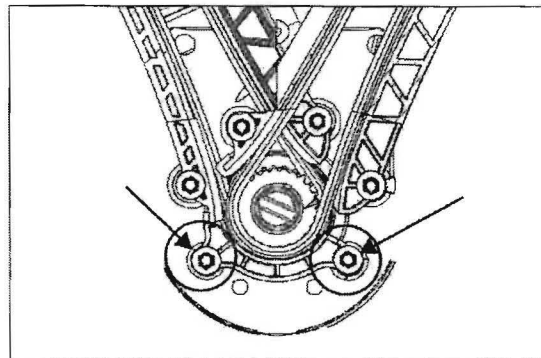
Crankshaft Rotation Socket: PV-48736



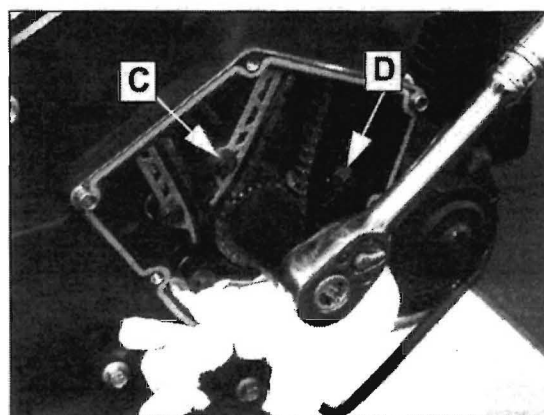
3. Rotate crankshaft clockwise back to front cylinder TDC (camshaft marks aligned with cylinder head surface).
4. Remove front cylinder cam chain tensioner (page 7.8).
5. Remove top sprocket bolt (B).



6. Remove lower cam chain guide.



7. Remove tensioner blade bolt (C) and guide bolt (D).



8. Remove cam chain and sprocket from camshaft and lower it between tensioner blade and guide, then remove chain from drive sprocket on crankshaft.
9. Lift chain, sprocket, tensioner blade, and guide out of engine.
10. Repeat steps for the rear cylinder.

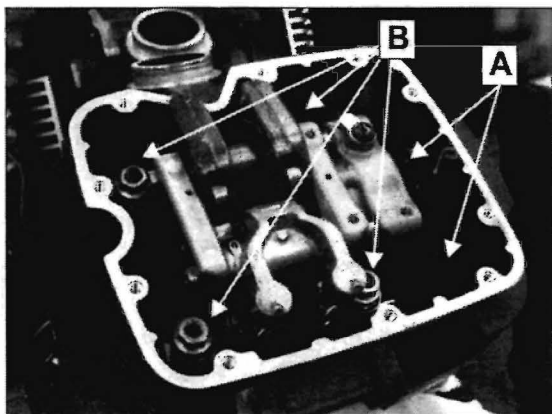
7.10



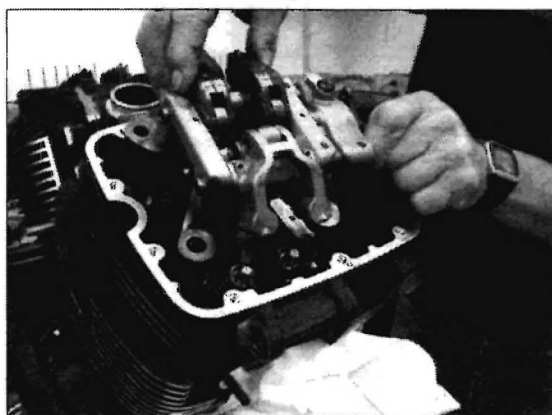
CAMSHAFT CARRIER REMOVAL

NOTE: Base and head gasket seal is released when removing camshaft carrier. Replacement of both head and base gasket is recommended to prevent oil leaks. Keep mated parts together.

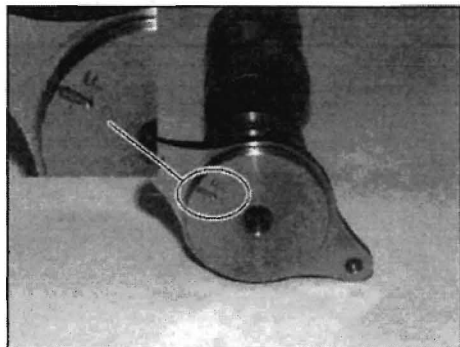
1. Remove M8 nuts (A) with washers and loosen camshaft carrier / cylinder head nuts (B) 1/2 turn at a time using a cross pattern until loose.



2. Remove carrier nuts and washers, then remove carrier with camshaft and rocker arms as an assembly.

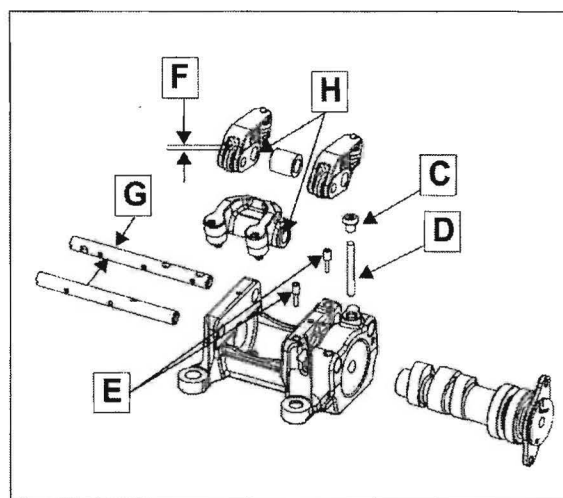


3. Note markings "F" or "R" on drive end of camshafts. Front and Rear cylinder heads use different camshafts.



ROCKER ARM & SHAFT INSPECTION

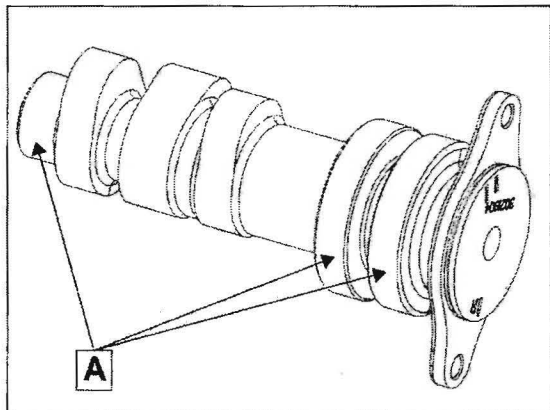
1. Remove button head screw (C) and pin (D). Slide camshaft out of carrier.
2. Remove dog point screws (E) and tap rocker shafts out of carrier.
3. Visually inspect rocker arms and rocker arm shafts for wear, scoring, or damage.
4. Inspect all oil passages and clean thoroughly. Use only clean solvent. Do not allow debris to contaminate hydraulic lifters on rocker arms.
5. Rotate rocker arm on shaft. Rocker arm should fit tightly on shaft without excessive play, and rotate smoothly on shaft without binding. Check roller for excessive radial movement (F), and must rotate smoothly.
6. Measure O.D. of each rocker arm shaft (G) and compare to specification.
7. Measure I.D. of each rocker arm (H) and compare to specification.
8. Subtract rocker arm shaft O.D. from its matching rocker arm I.D. to determine clearance. Compare to specification on page 7.3.
9. Replace parts worn beyond service limits.



CYLINDER HEAD & VALVE TRAIN

CAMSHAFT INSPECTION

1. Visually inspect camshaft journal surfaces (A) for scoring or signs of insufficient lubrication. Replace camshaft if heavy scoring or damage is noted.



2. Measure O.D. of each camshaft journal.

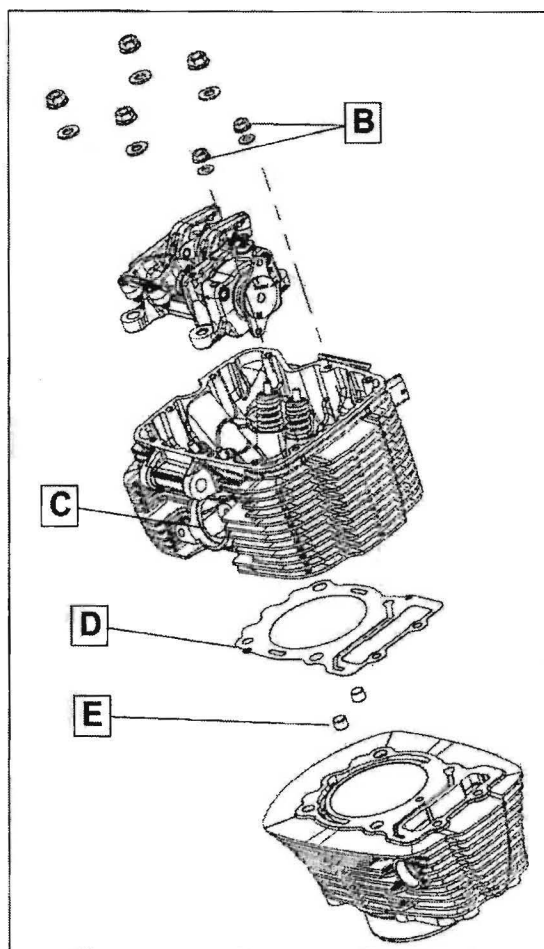


3. Inspect height of each cam lobe.



CYLINDER HEAD REMOVAL

1. Remove engine (Chapter 6), valve covers (page 7.8), and camshaft sprockets (page 7.10)
2. Remove camshafts (page 7.11).
3. Remove cylinder head nuts and washers (B).
4. Remove cylinder head (C) head gasket (D) and alignment pins (E).



CYLINDER HEAD DISASSEMBLY

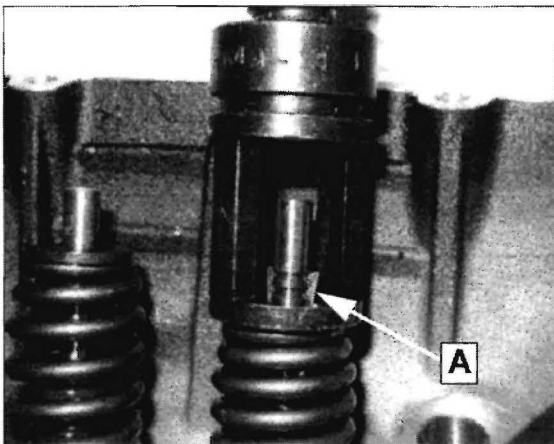
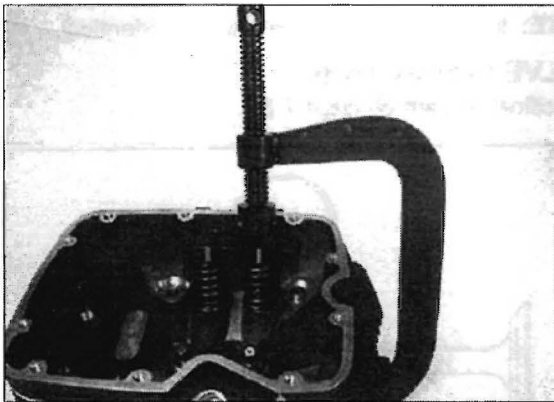
CAUTION

Wear eye protection while removing valve springs.

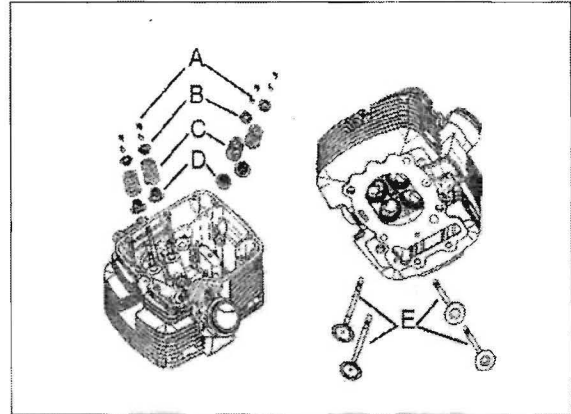
NOTE: Keep mated parts together for assembly. It is important to put cylinder head parts back in the same location.

Valve Spring Compressor: PV-1253 (or PV-4019 with adapter PV-43513-A)

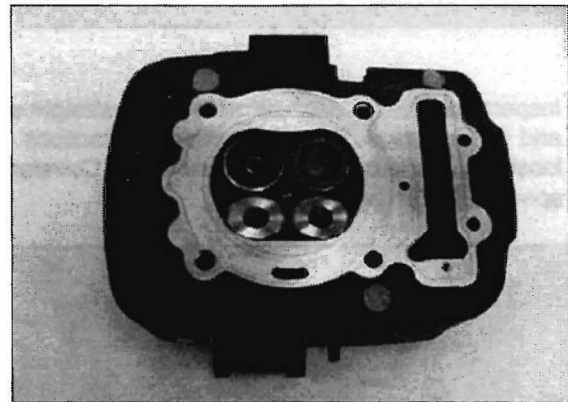
1. Remove the valve keepers (A) using a valve spring compressor tool. Use a pencil magnet to remove valve keepers.



2. Remove upper valve spring retainers (B), springs (C), and valves (E).



3. Remove and discard valve guide seals (D).
4. Clean carbon deposits from combustion chamber.

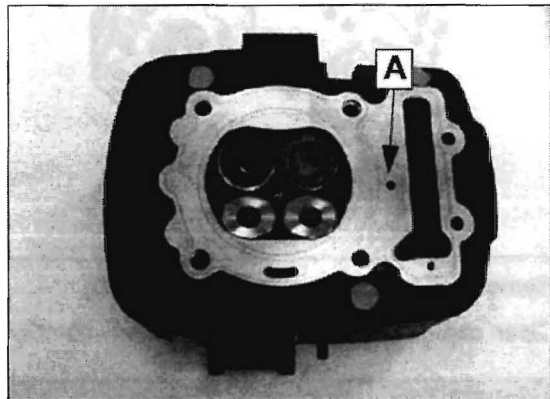


5. Clean gasket surfaces.

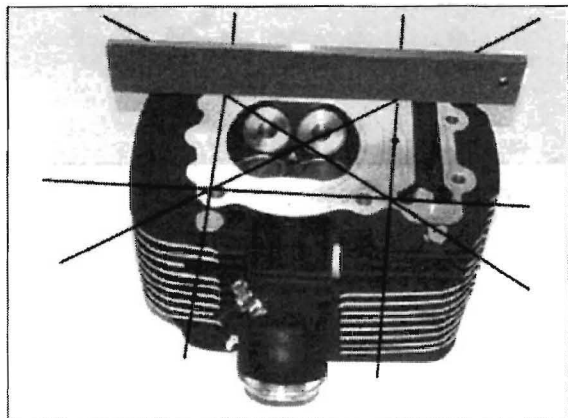
CYLINDER HEAD & VALVE TRAIN

CYLINDER HEAD INSPECTION

1. Visually inspect cylinder head for cracks or damage. Pay close attention to the areas around spark plug and valve seats.
2. Be sure oil passage (A) in cylinder head is unobstructed.

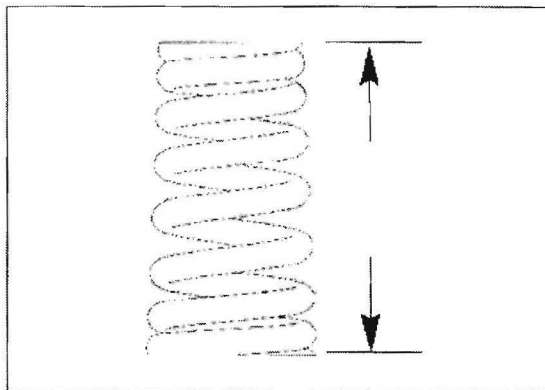


3. Inspect cylinder head for distortion with a straight edge and feeler gauge. Check in different directions and locations on the cylinder head as shown. Compare to specification on page 7.3.



VALVE SPRING FREE LENGTH INSPECTION

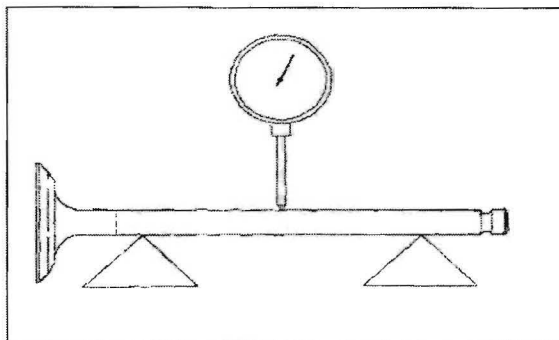
1. Measure free length of valve springs. Replace springs that do not meet specification on page 7.3.



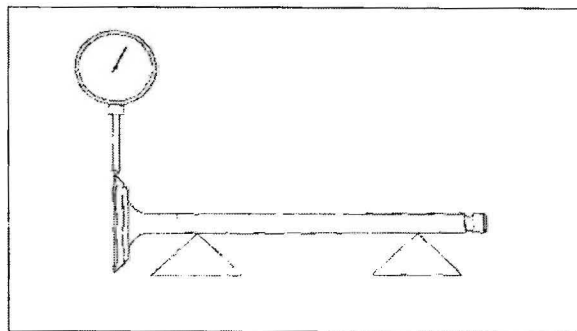
NOTE: Intake and exhaust springs are identical.

VALVE INSPECTION

Specifications are on page 7.3.



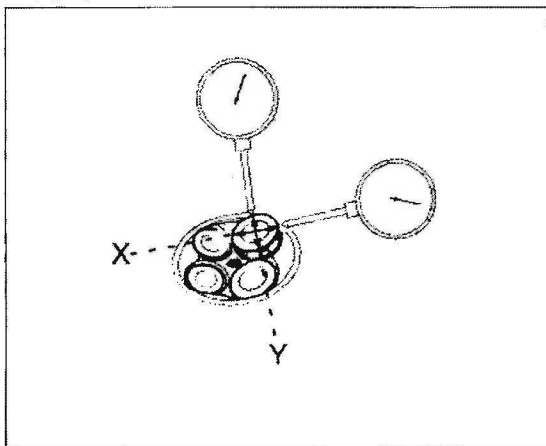
1. Place valves on V-blocks as shown and measure valve stem runout.
2. Inspect the valve face for damage from burning, pitting or uneven contact.
3. Place valves on V-block as shown and inspect valve head radial runout.



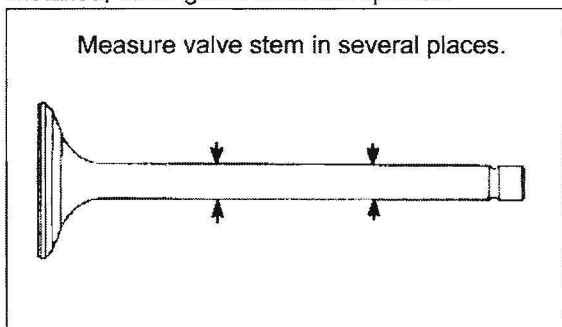
4. Insert valves into their original locations in cylinder head.



5. Inspect that each valve moves up and down smoothly without binding in guide.
6. Measure valve stem deflection for each valve to determine if valve or valve guide requires replacement.
 - A. Raise valve 10mm (0.400") off of seat.
 - B. Position dial indicator as shown. Measure deflection in two directions perpendicular to each other (X & Y axis).
 - C. If valve deflection exceeds service limit measure valve stem



7. Replace valve and repeat step 6 if valve stem O.D. measures outside standard range. If valve stem deflection exceeds service limits with a new valve installed, valve guide must be replaced.

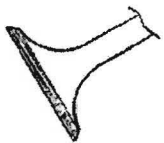
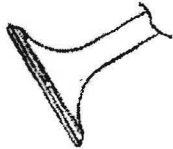
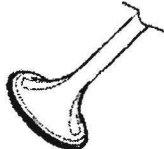
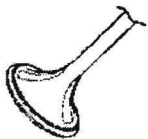

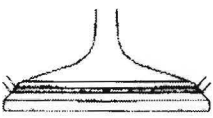
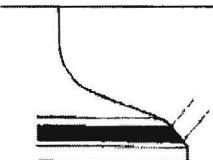


8. Installation of new valve guides and/or new valves requires valve seat reconditioning. This work should be performed by an experienced technician properly equipped to perform cylinder head reconditioning.



CYLINDER HEAD & VALVE TRAIN

VALVE INSPECTION

VALVE INSPECTION			
CONDITION	ILLUSTRATION	POSSIBLE CAUSE	CORRECTIVE ACTION
Uneven seat width		Bent valve stem, worn valve guide	Replace valve and reface seat
Damaged valve face		Burnt, pitted, foreign material damage	Replace valve and reface seat
Contact area too high		Wear, settling of valve seat	Lower with 30° stone
Contact area too low		Wear, settling of valve seat	Raise with 60° stone
Contact area too wide		Wear, settling of valve seat	Narrow with both 30° stone and 60° stone
Contact area too narrow			Use 45° stone
Contact area free of pitting and damage, centered in seat, proper width.		Correct	None

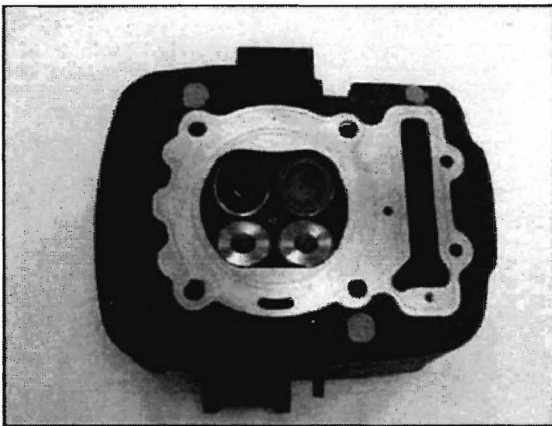
7.16



VALVE GUIDE REMOVAL / INSTALLATION

CAUTION

Replacement of valve guides requires an oven, special equipment and experience to do the job correctly. If you are unsure of your ability to do the repair professionally it is best to sublet the labor to a competent machinist. Valve seat reconditioning is required when valve guides are replaced.



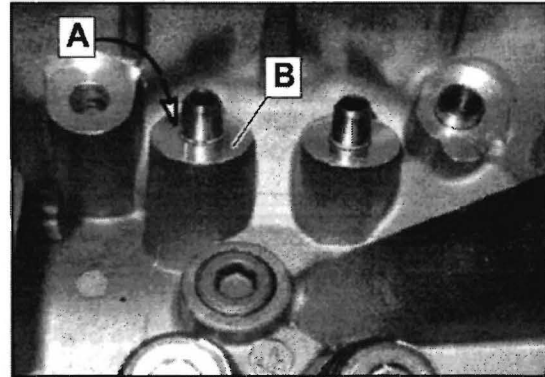
1. Support cylinder head and place valve guide remover into valve guide from the combustion chamber side.
2. Drive or press old valve guides out of cylinder head.

CAUTION

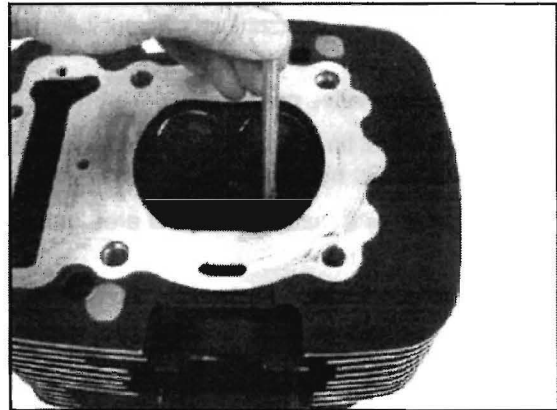
The cylinder head can be easily damaged if the procedure is done carelessly.

3. Apply 90 weight oil to outside of new valve guides.

4. Drive or press new guides from camshaft side of head. Drive or press guides in until circlip (A) seats against head surface (B).



5. Measure valve guide height from spring seat:
GUIDE INSTALLED HEIGHT: 12.20-12.80 mm
6. Ream new valve guides to size to obtain specified stem-to-guide clearance. Ream from combustion chamber side of head.



CAUTION

Do not tilt the reamer while reaming the guide. Always rotate the reamer in a clockwise direction.

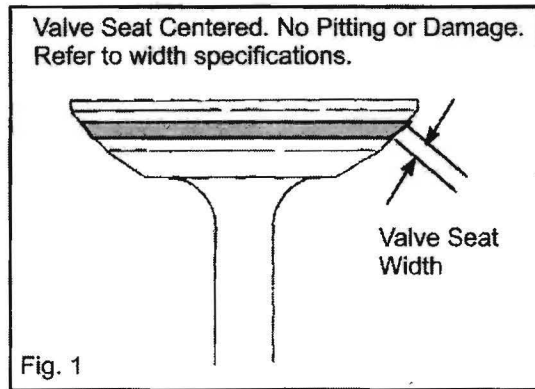
7. Clean cylinder head thoroughly with clean solvent.
8. Inspect and recondition valve seats.

7



VALVE SEAT INSPECTION

1. Remove carbon deposits from valves and seats.
2. Inspect valve face for burning, pitting or uneven contact. (Fig. 1)



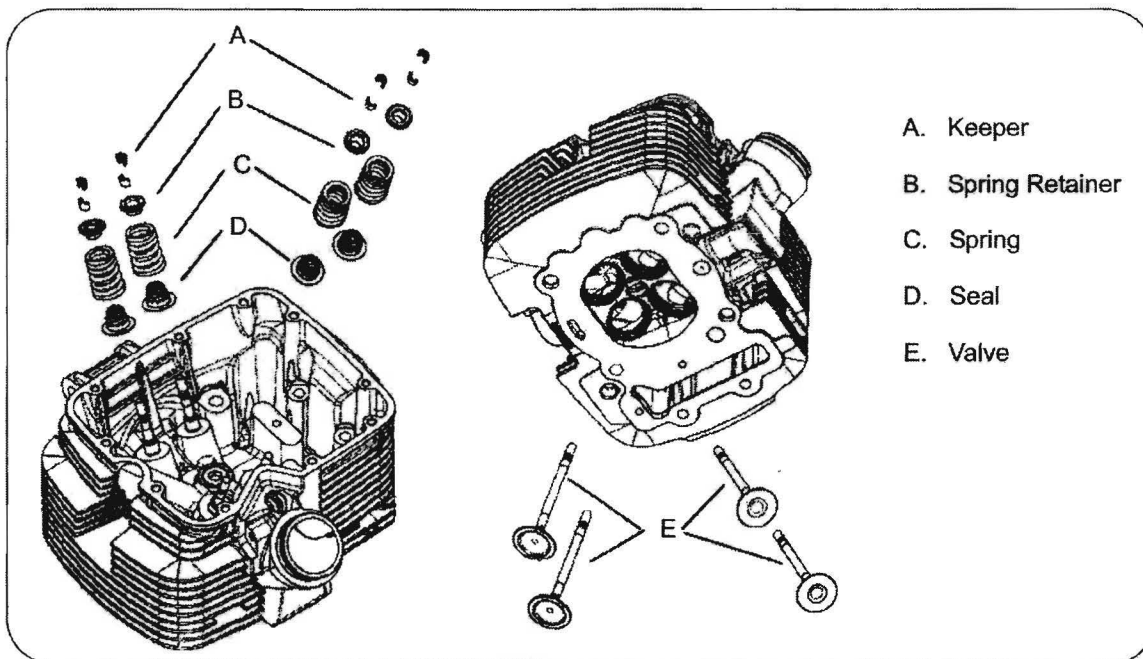
NOTE: Valves cannot be ground. If valve face is burned or badly worn, replace the valve.

3. Apply a light coating of machinist's layout fluid or paste to valve face.
4. Install valve into valve guide.
5. Tap valve several times to make a clear impression on the valve face. Do not rotate valve.
6. Remove valve and measure contact area (valve seat width).
7. If valve seat is incorrect, recondition as needed.

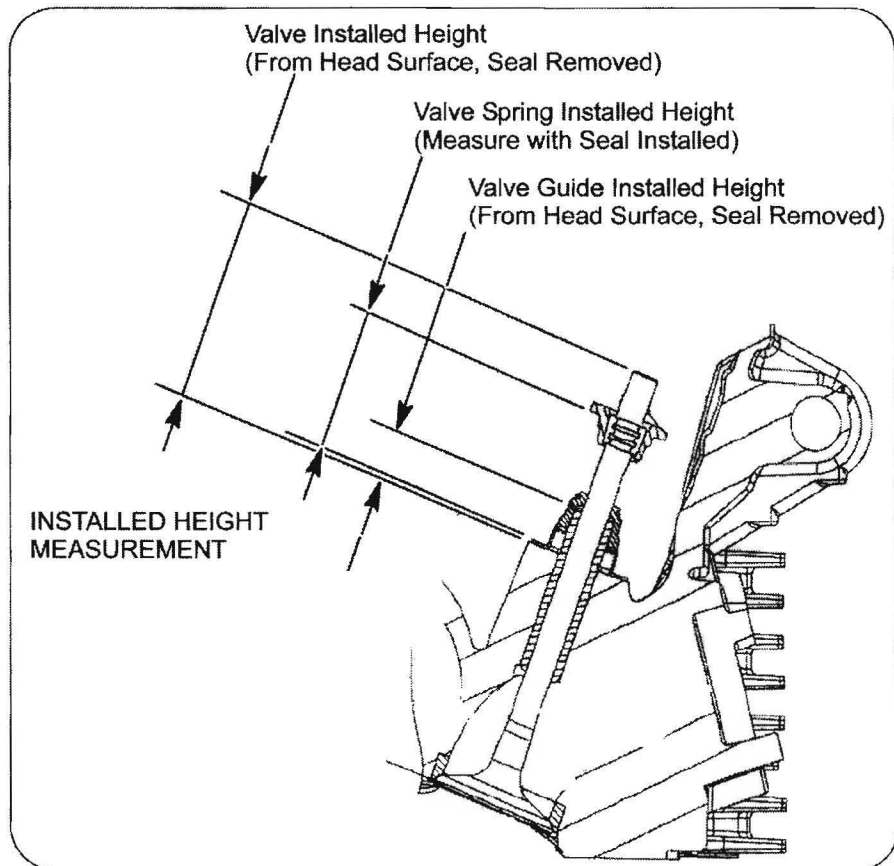
VALVE SEAT RECONDITIONING

NOTE: Valve seat reconditioning should be performed by a technician proficient in cylinder head reconditioning techniques using grinding stones. The use of carbide cutters is not recommended. Follow recommendations of the manufacturer of the valve seat reconditioning equipment being used. Do not grind seats more than necessary to provide proper seat width and contact point on valve face.

CYLINDER HEAD ASSEMBLY



REFER TO PAGE 7.3 & 7.4
FOR SPECIFICATIONS

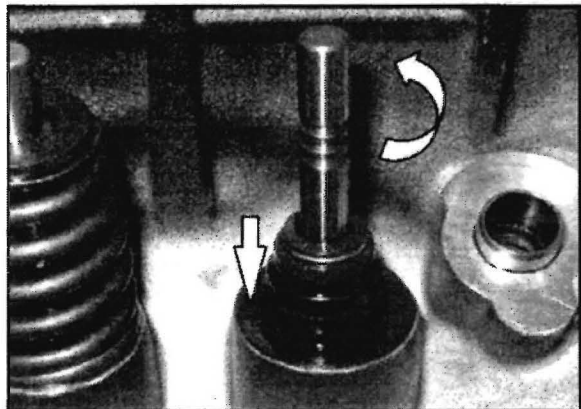


CYLINDER HEAD & VALVE TRAIN

CYLINDER HEAD ASSEMBLY

CAUTION

Wear eye protection during assembly.



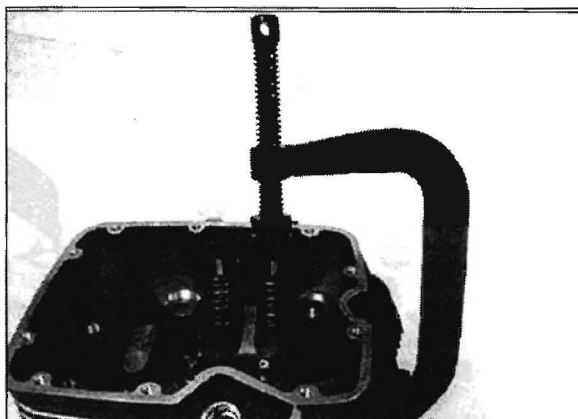
1. Lubricate valve stems with assembly lube.
Moly assembly paste PN: 2871460
2. Install valve in head before installing seal. Hold valve against seat wipe off the portion that extends above the guide.
3. Apply Victory engine oil to valve guide seal and install seal on valve, rotating the seal as you install it.
4. Press seal firmly in place on top of guide. Be careful not to dislodge spring from seal.
5. Install valve spring and upper retainer.

CAUTION

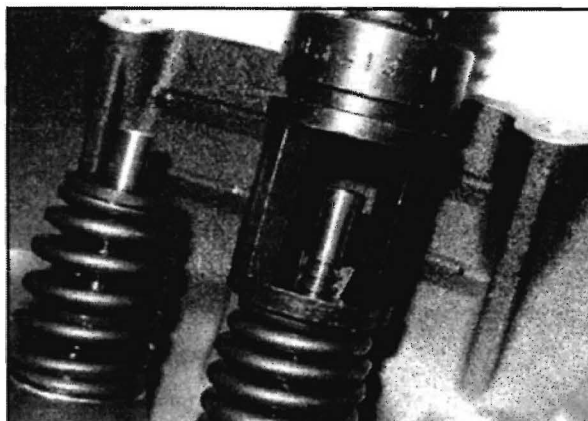
Support cylinder head so valves will not be damaged.

Do not compress valve springs more than necessary to install keepers.

6. Compress valve springs using a valve spring compressor and adapter.



7. Apply a small amount of grease to both sides of a valve keeper.



8. Insert both valve keepers in place on valve.
9. Remove spring compressor.
10. Repeat previous steps for remaining valves.
11. Be sure all keepers are fully seated in groove.

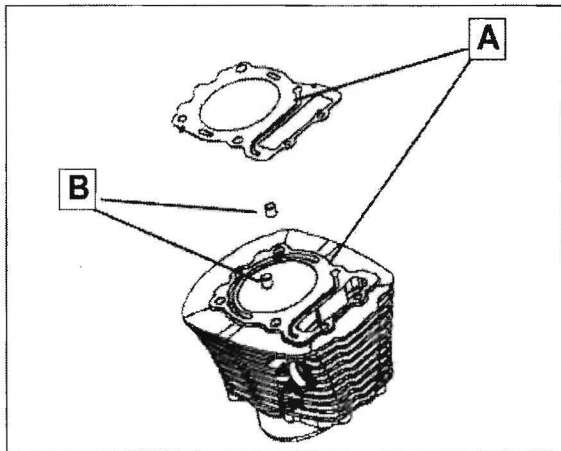


CYLINDER HEAD INSTALLATION

NOTE: The base gasket seal is broken when the cylinder head is removed and must be replaced. Refer to Chapter 8 for cylinder base gasket replacement.

1. Thoroughly clean cylinder and cylinder head gasket surfaces.

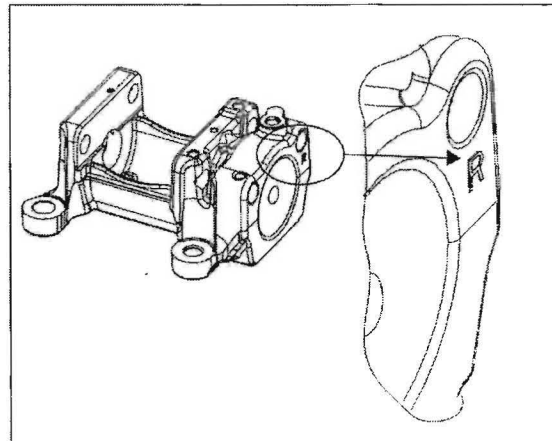
IMPORTANT: Gaskets and gasket sealing surfaces (A) must be free of oil and grease during assembly.



2. Install dowel pins (B).
3. Install a new head gasket.

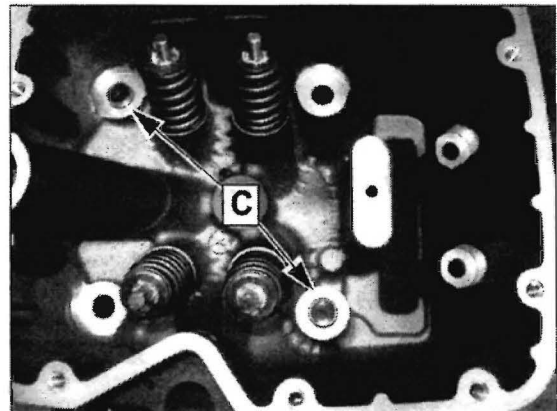


4. Clean gasket surface on cylinder head and set cylinder head in place on cylinder.
5. Camshaft carriers are marked "F" (FRONT) or "R" (REAR) for installation in their respective cylinder heads (D).



7

6. Apply Moly Assembly Paste (P/N 2871460) to lobes and main journals of camshaft.
7. Install camshaft marked "R" into rear cam carrier and camshaft marked "F" into front cam carrier.
8. Be sure alignment pins (C) are in place and fully seated in cylinder head.

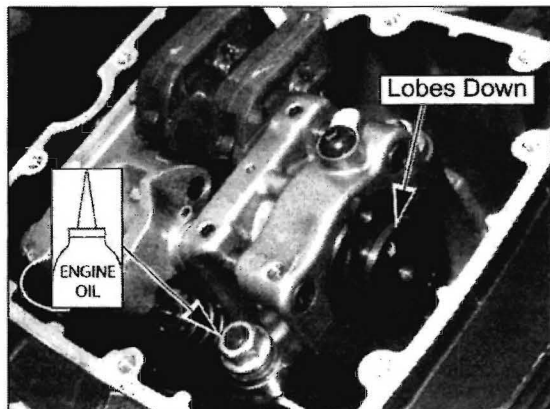


9. Turn camshaft until lobes are pointing down (away from cam follower rollers).
10. Inspect each rocker arm and position flat side of hydraulic lifter DOWN.
11. Set camshaft carrier on cylinder head.



CYLINDER HEAD & VALVE TRAIN

12. Apply engine oil to 10mm studs, nut threads, nut bases and washers.
13. Install washers and nuts on cylinder studs. Tighten finger tight.



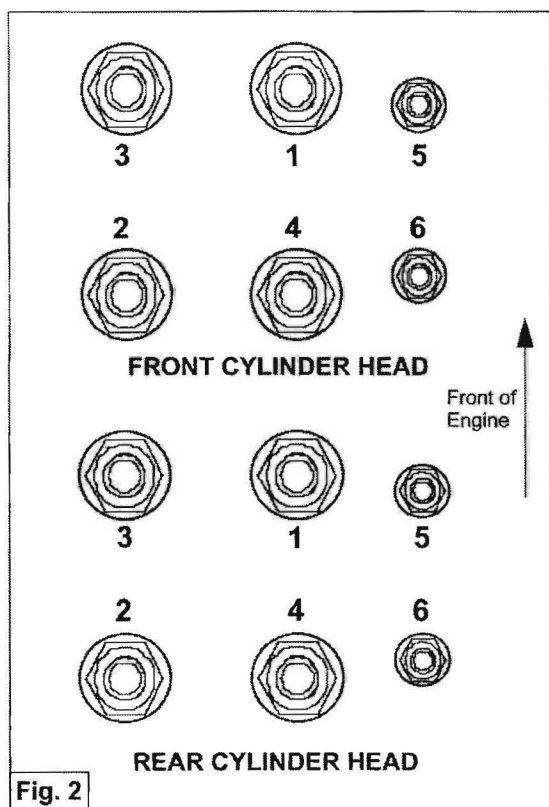
14. *Slowly and evenly* tighten cylinder head nuts following torque sequence in Fig. 2. This allows hydraulic lifters to bleed off pressure. Tighten only enough to seat cam carrier on head.

15. Fully torque cylinder head following the procedure below to ensure accurate final torque:

CYLINDER HEAD TORQUE PROCEDURE

(Camshaft carriers installed and seated in head)

- Step 1** Lubricate 8mm studs, washers, and nuts with engine oil and install hand tight.
- Step 2** Follow torque pattern shown in Fig. 2.
- Step 3** Tighten 10 mm nuts (1-4) to 30 Nm (22 lb. ft.)
- Step 3** Back off completely
- Step 4** Tighten 10 mm nuts (1-4) to 54 Nm (40 lb. ft.)
- Step 5** Repeat the 54 Nm (40 lb-ft) torque on 1-4.
- Step 6** Torque 8mm nuts (5-6) to 24.5 Nm (18 lb-ft).
- Step 7** Verify that camshaft rotates freely in carrier after hydraulic lifters have had time to bleed down.
- Step 8** Repeat Steps 1-7 for other cylinder head.



7.22



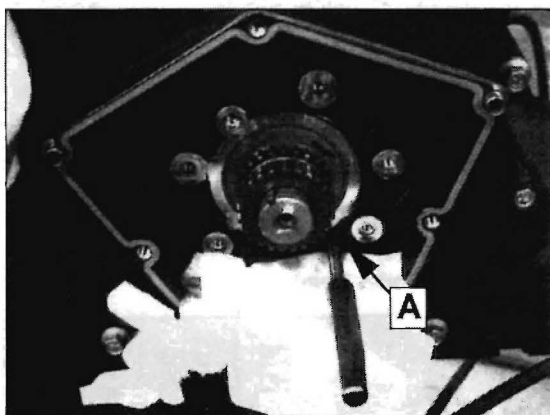
CAMSHAFT TIMING - REAR CYLINDER

NOTE: Rear cam chain must be installed first.

1. Rotate crankshaft clockwise to TDC (rear cylinder) using crankshaft rotation tool PV-48736.

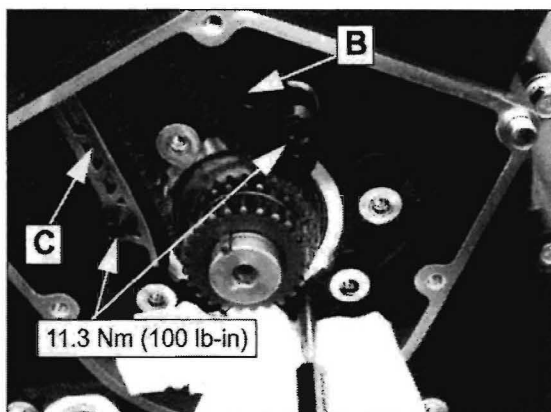
Crank Rotation Socket PV-48736

2. Hold crankshaft at rear TDC by inserting an 8 mm (or 5/16") locating pin through crankcase hole (A) into crankshaft.

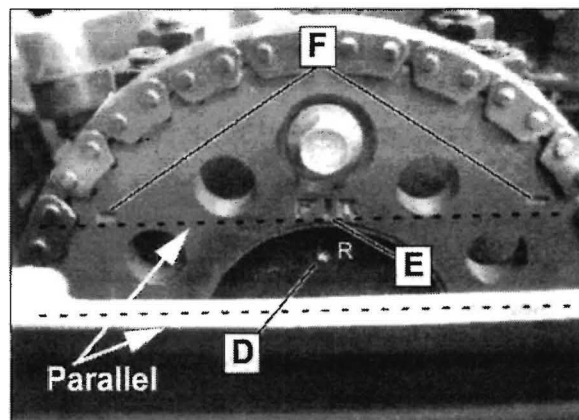


CAMSHAFT CHAIN GUIDE INSTALLATION

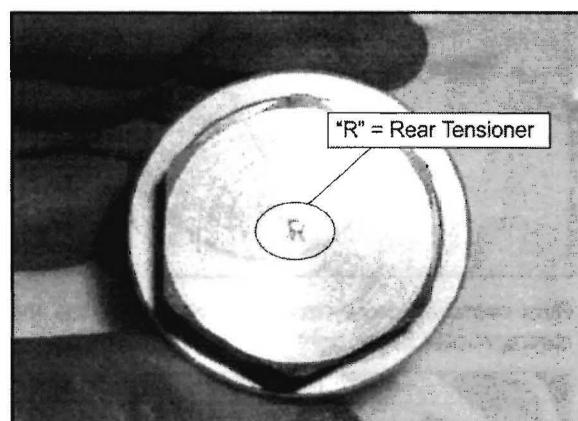
1. Place cam chain around rear camshaft sprocket and lower it into chain cavity along with the cam chain guide (B).
2. Seat upper pins of guide in the cylinder head recess, and install cam chain over innermost sprocket on crankshaft.
3. Install rear tensioner blade (C).
4. Torque guide and tensioner blade bolts to specification.



5. Be sure rear camshaft lobes are pointing down. The single mark on cam (D) must be facing UP as shown below.
6. Inspect marks before installing sprocket on camshaft. Mark on sprocket (E) must align with camshaft "R" mark (D). Outer marks (F) must be parallel with valve cover gasket surface.



7. Align camshaft with sprocket hole and install top sprocket bolt finger tight.
8. Apply engine oil to rear cam chain tensioner. Tensioners are not interchangeable due to the length of the tensioner body. The rear tensioner is stamped with a "R".



9. Install tensioner with a new sealing washer. Torque to 75 Nm (55 lb-ft.).
10. Torque top sprocket bolt to 13.5 Nm (120 lb-in).



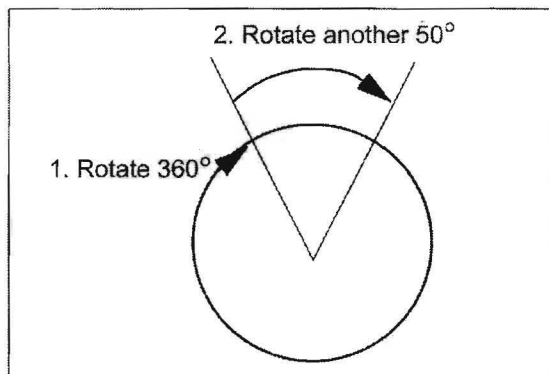
CAMSHAFT TIMING - REAR CYLINDER (cont.)

11. Check carefully to be sure rear cylinder camshaft timing is correct before proceeding:
 - Crankshaft secured by pin and locked in the rear cylinder TDC position.
 - Rear camshaft lobes facing down ("R" mark on cam aligned with "F/R" mark on sprocket).
 - Rear tensioner (stamped "R") is installed and tight.
 - Outer marks on camshaft sprocket are parallel to valve cover gasket surface.
12. Remove locating pin from crankshaft and proceed to Step 13.

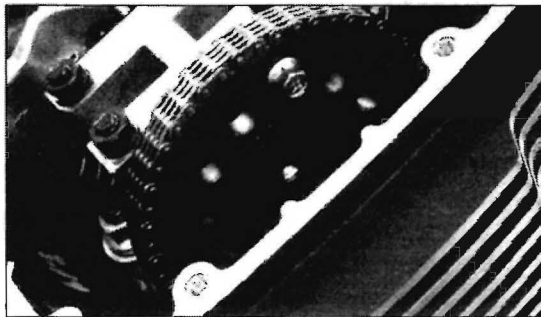
CAMSHAFT TIMING - FRONT CYLINDER

NOTE: Rear camshaft must be properly timed as shown in Step 6 on page 7.23 before you begin the front cylinder camshaft timing procedure.

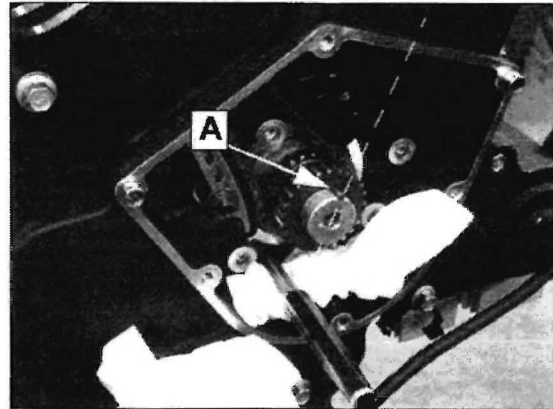
13. Rotate crankshaft **clockwise 410°** to TDC on the front cylinder (exactly one full turn, plus an additional 50°).



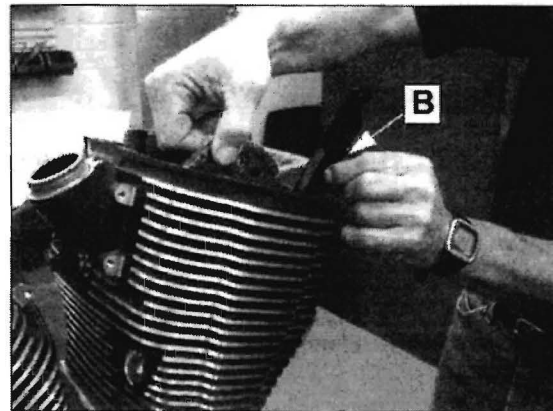
14. Rear camshaft double marks are now at the top. Install cam sprocket finger tight.



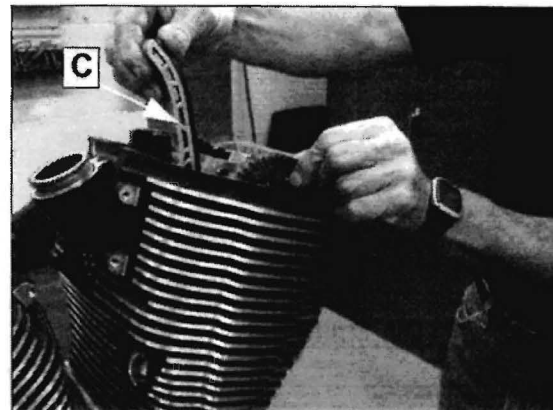
15. Insert an 8 mm (5/16") pin through crankcase hole to hold the crankshaft in position at front cylinder TDC. Timing sprocket key (A) will be aligned with pin and front cylinder centerline.



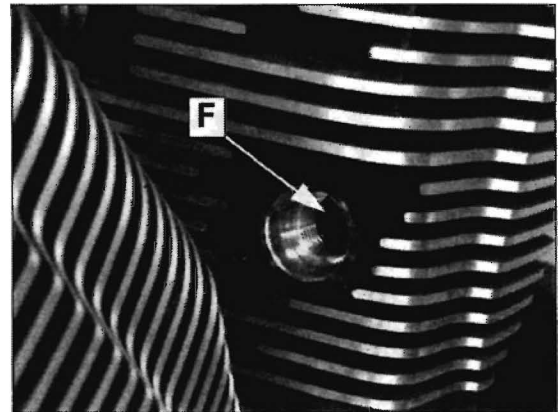
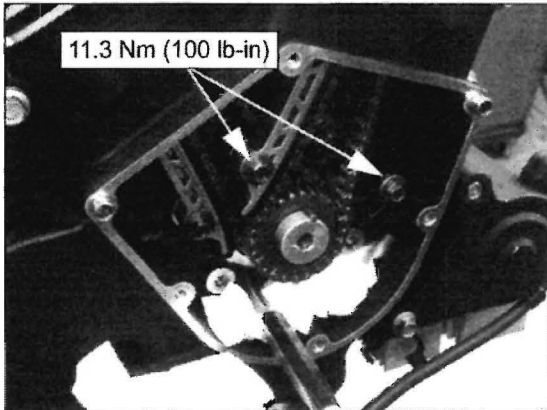
16. Install cam chain guide with front cylinder cam chain and sprocket. Insert pins (B) on upper end of guide into recess in cylinder head.



17. Install front cam chain over crankshaft sprocket.
18. Install front tensioner blade (C).

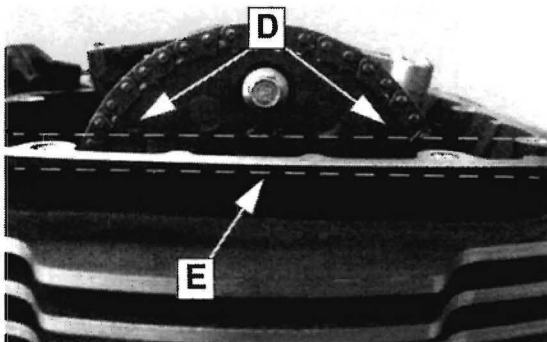


19. Torque guide and tensioner blade bolts to specification.
24. Apply engine oil to front cam chain tensioner and damper. Push damper (F) squarely into tensioner bore in cylinder, and push it past the first 4 or 5 threads.



7

20. After pin is installed, torque the rear cam sprocket bolt (installed in Step 14) to 13.5 Nm (120 lb-in.)
21. Rotate front camshaft slightly so lobes are pointing DOWN.
22. Install sprocket on camshaft with two lines on sprocket (D) parallel to valve cover gasket surface (E).
25. Install tensioner with a new sealing washer. Torque to 75 Nm (55 lb-ft).



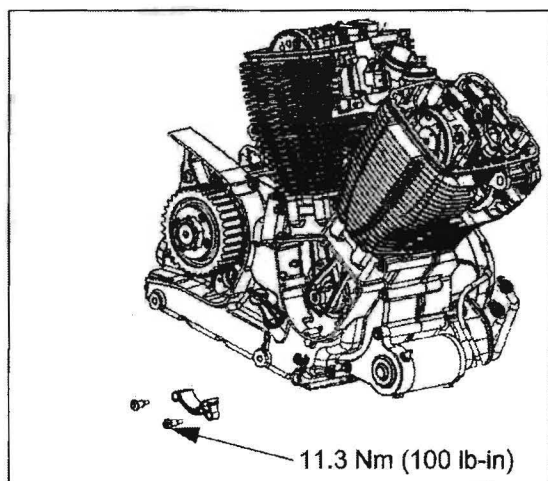
23. Install top camshaft sprocket bolt finger tight. Do not torque the bolt until front tensioner is installed.

26. Torque sprocket bolt to 13.5 Nm (120 lb-in.).
27. Verify camshaft timing by comparing to Ill. 1 on page 7.7.
28. Remove TDC locating pin from crankcase and rotate engine clockwise until the remaining front camshaft sprocket bolt hole is accessible.
29. Install sprocket bolt. Torque to 13.5 Nm (120 lb-in.).
- NOTE:** Be sure all camshaft sprocket bolts have been installed and properly tightened.
30. Fill cam carrier area of both front and rear cylinders with Victory engine oil.
31. Rotate crankshaft clockwise approximately three complete revolutions and stop on front cylinder TDC on the compression stroke.

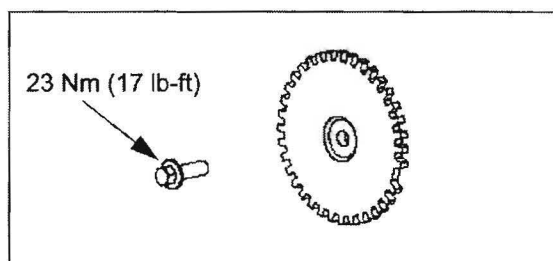


CYLINDER HEAD & VALVE TRAIN

32. Again compare camshaft timing to Ill. 1 on page 7.7 to verify the timing is correct.
33. Install valve covers (page 7.8).
34. Install bottom cam chain guide. Torque screws to 11.3 Nm (100 lb-in).



35. Clean threads of crankshaft and retaining bolt with Loctite® Primer N.
36. Apply 2 drops of Loctite 262 (red) to bolt threads (not required if using a new bolt which has a pre-applied locking agent).
37. Install ignition timing wheel and torque bolt to specification. Allow adequate cure time for Loctite 262 as directed on container.



38. Install cam drive cover.

7.26



TROUBLESHOOTING, CYLINDER HEAD AND VALVE TRAIN

Cylinder head, valve train and piston/cylinder problems are usually detected by an engine compression test. Other problems associated with this area of the engine are external fluid leaks, excessive oil consumption or abnormal noises.

The troubleshooting tables that follow list *possible* causes of engine mechanical problems. Always thoroughly investigate before disassembling an engine.

PROBLEM	POSSIBLE CAUSE	PART(s) AFFECTED	REPAIR RECOMMENDED
Hard Starting Won't Start	Low Compression	Worn Valve Guide(s)	Replace Valve Guide(s).
		Poor Seating of Valve(s)	Repair or Replace
		Broken Valve Springs	Replace
		Spark Plug Not Seated	Torque to Specifications
		Incorrect Valve Timing	Repair
		Valve Stuck Open	Repair
		Cylinder Head Gasket Leak	Repair
		Slow Starter Motor	See Electrical Section
		Worn Rings, Piston, or Cylinder	See Cylinder/Piston Section
		Collapsed Hydraulic Lifter(s). Lifter Extremely Noisy.	Bleed Lifter Noise will typically stop after 10-15 minutes of high idle operation. If lifter will not bleed, replace lifter.
Electric Starter Straining to Turn Engine Over	High Compression	Excessive carbon build-up in combustion chamber.	De-carbon combustion chamber.
	Excessive Starter Load	Internal Engine / Drive Components Seized or Binding	Determine Cause of Seizure or Binding
Poor Idle Quality (Also see <i>Fuel System Troubleshooting</i> at the end of Chapter 5).	Low Compression	Collapsed Hydraulic Lifter(s). Lifter Extremely Noisy.	Air trapped in lifter. Noise will stop after 10-15 minutes of high idle operation. If air will not bleed, replace lifter.
		Poor Seating of Valve(s)	Repair or Replace
	Excessive Oil in Combustion Chamber	Valve guides	Replace
	Excessive Oil in Combustion Chamber	Worn Rings, Cylinder, or Piston	Refer to Chapter 8
		Engine Oil Overfilled	Correct



CYLINDER HEAD & VALVE TRAIN

PROBLEM	POSSIBLE CAUSE	PART(s) AFFECTED	REPAIR RECOMMENDED
Engine Noise	Valve Train Area	Hydraulic Lifter(s).	Air trapped in lifter. Noise will stop after 10-15 minutes of high idle operation. Replace if lifter will not bleed.
		Broken or Weak Valve Springs	Replace
		Worn Camshaft or Rocker Arm	Replace
		Rocker Arm Roller Bearing Damage	Replace
		Cam Journal Worn or Damaged	Replace
	Piston/Cylinder Area	Worn Pistons and/or Cylinders	Replace
		Worn Piston Pin, Piston Pin Bore and/or Small End of Connecting Rod	Replace
		Worn Piston Rings or Piston Ring Lands.	Replace
Engine Noise	General (May apply to all areas below)	Exhaust leak	Remove exhaust and seal
	Timing Chain Area	Chain / sprocket worn	Replace
		Chain tensioner not working	Inspect / Replace
	Bottom End Area	Main Bearings	Refer to Chapter 10
		Rod Bearings	Refer to Chapter 10
		Loose Side Clearance	Refer to Chapter 10
	Transmission Area	Bearings	Refer to Chapter 10
Poor high speed running	Air Intake Problem		Refer to Chapter 5
	F.I. System Problem		Refer to Chapter 5
	Ignition Problem		Refer to Chapter 17
	Valve Float	Weak Valve Springs	Replace
	Insufficient Valve Travel	Worn Camshaft/Rocker Arms	Replace
	Valves Opening & Closing at Wrong Time	Incorrect Valve Timing	Correct
Lack of power in all RPM ranges	Low compression	Worn Piston, Rings, Cylinder, Poor Valve Sealing	Repair / Replace
	Valve timing incorrect	Camshaft chain and sprockets	Correct
	Valve float	Weak / broken valve springs	Replace
	Insufficient valve lift	Worn camshaft / rocker arms	Replace
	Ignition / fuel injection	Ignition / F.I. System	Refer to Chapter 5 & 17
	Oiling problem	Oil Overfilled	Correct



CHAPTER 8

CYLINDER & PISTON

CYLINDER & PISTON	8.2
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PISTON RING PROFILE AND ORIENTATION	8.2
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TROUBLESHOOTING (CONT.)	8.12



CYLINDER & PISTON

CYLINDER & PISTON

GENERAL

NOTE: Clean the machine thoroughly before removing engine from frame.

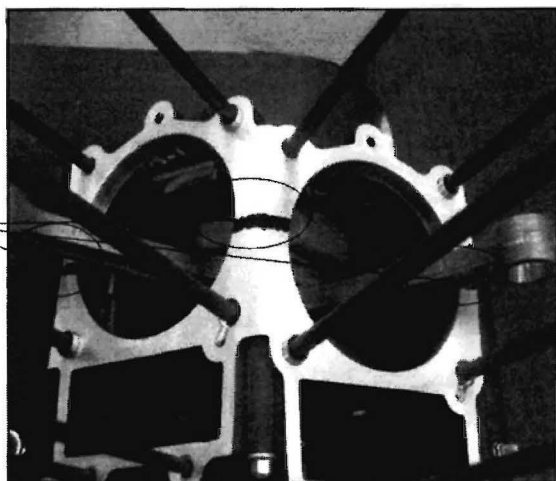
- This section covers service of the cylinder, piston and rings. The engine must be removed from the frame to perform the procedures in this section. Refer to Chapter 6 for engine removal and installation.
- Mark and store all mated parts for assembly. Assemble engine by putting used parts that pass inspection back in the same location.
- Machined and mated surfaces are very delicate. Handle and store all parts in such a way that the mating surfaces will not be damaged.
- Many parts require assembly lubrication. Follow the assembly lubrication procedures carefully.

Moly assembly paste PN: 2871460

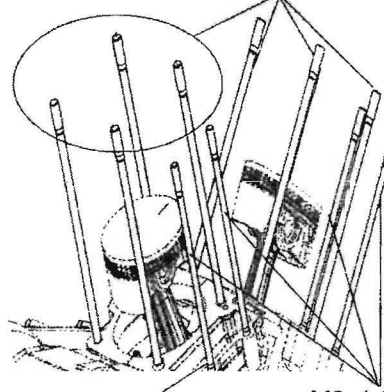
- There are many precision measuring steps in this section. If you are not sure of your capabilities in these areas, have a competent machinist perform the precision part inspection operations.
- Cleanliness of parts is critical to engine life and proper parts inspection. Use clean solvent and hot, soapy water to clean parts. Dry with compressed air before inspection and engine assembly. Coat parts with fresh lubricant to prevent oxidation after cleaning.

BASE GASKET SEALING & CYLINDER STUD TORQUE

Apply sealant to case parting line before installing base gasket



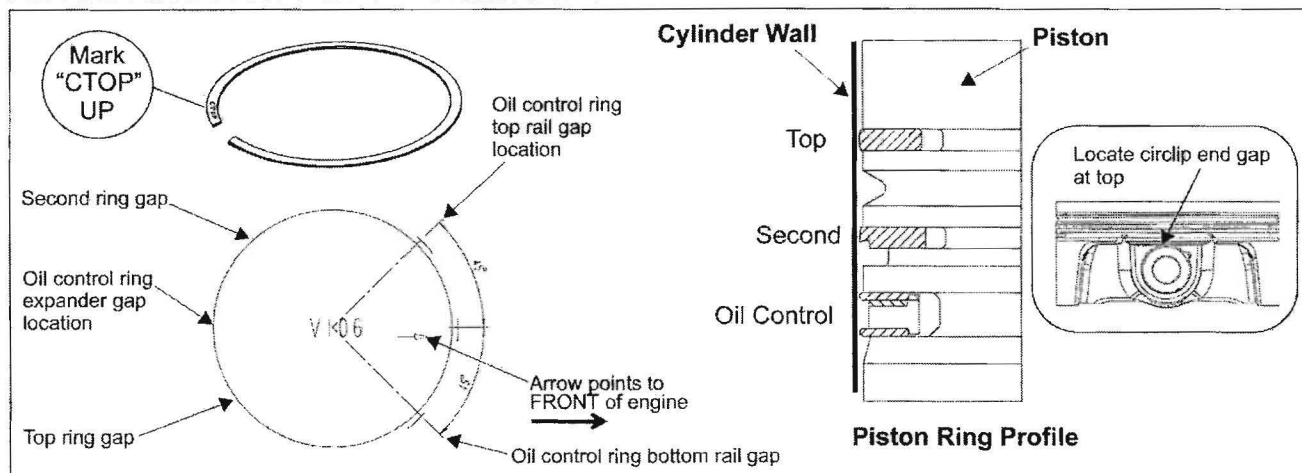
M10x1.5 mm Studs 34 Nm (25 lb-ft)
(M11x1.50 thread to case)



M9x1.25 thread to case

M8x1.25 mm Stud
20 Nm (15 lb-ft)

PISTON RING PROFILE AND ORIENTATION



8.2



SPECIFICATIONS - 106 C.I.

CYLINDER & PISTON			
Item		Standard	Service Limit
Cylinder	I.D.	100.987 - 101.013 (3.9759" - 3.9769")	Check taper and out-of-round
	Out of Round	Measure 66mm up from base gasket surface	0.05 mm (.002")
	Taper		0.05 mm (.002")
	Gasket Surface Warpage	--	.1mm max. (.0039")
Piston	Piston Mark Direction	Piston orientation is determined by arrow on piston crown. Position BOTH pistons so arrows point to front of engine.	
	Piston O.D. (Nominal) (Measured 10mm up from bottom of skirt, 90 degrees to pin)	100.946 - 100.964mm (3.9742 - 3.9750")	Replace if piston-to-cylinder clearance is excessive with good cylinder
	Piston Pin Hole I.D.	22.006 - 22.012 mm (.8664 - .8666")	22.047 mm (.8680")
	Piston Pin O.D.	21.995 - 22.000 mm (.8659 - .8661")	21.96 mm (.864")
	Piston to Cylinder	.023 - .067 mm (.0009 - .0026")	.15 mm (.006")
	Piston to Piston Pin	.006 - .017 mm (.0002 - .0007")	.035 mm (.0014")
Piston Ring Clearances	Ring End Gap - Top (Installed)	.15 - .40 mm (.006 - .016")	.80 mm (.031")
	Ring End Gap - 2nd (Installed)	.33 - .53 mm (.013 - .021")	1.11 mm (.043")
	Ring End Gap - 3rd (Oil Control Rails) (Installed)	.15 - .35 mm (.006 - .014")	.80 mm (.031")
	Piston Ring Marks	--	"CTOP" mark must face UP on all rings. page 8.2
Piston Ring to Ring Land			
	Top Ring (1.2mm ring thickness)	.02 - .060 mm (.0008 - .0024")	.11 mm (.0043")
	2nd Ring (1.2mm ring thickness)	.02 - .060 mm (.0008 - .0024")	.11 mm (.0043")
	Oil Control Ring	.03 - .17 mm (.001 - .0067")	.26 mm (.010")

SPECIAL TOOLS

Piston ring compressor pliers: PV-43570-1

Piston ring compressor band: PV-43570-2

Cylinder bore gauge: PV-3017

Straightedge, feeler gauge, precision measuring instruments: Refer to Chapter 1 or Commercially available

Protective sleeves for pistons / studs: Commercially available



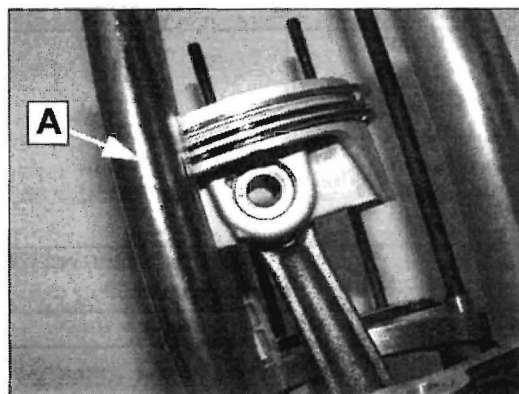
CYLINDER & PISTON

CYLINDER REMOVAL

1. Remove engine from frame (Chapter 6).
2. Remove cylinder head(s) (Chapter 7).



3. Remove cylinder(s). Support pistons to prevent damage. A section of hose (A) will protect piston rings from contact with studs.
4. Clean gasket surfaces of cylinders thoroughly.



CAUTION

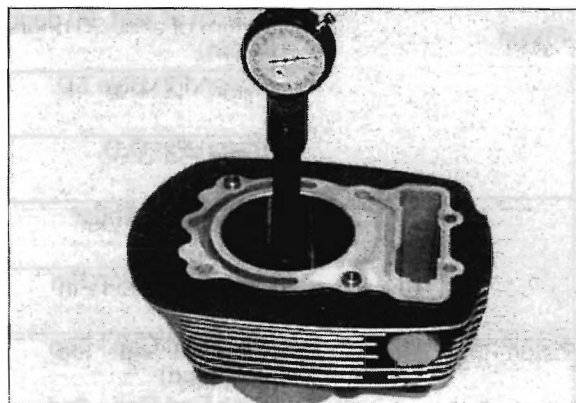
Careless handling of cylinder, pistons or rings may cause irreparable damage. Do not damage gasket surfaces during cleaning.

CYLINDER INSPECTION

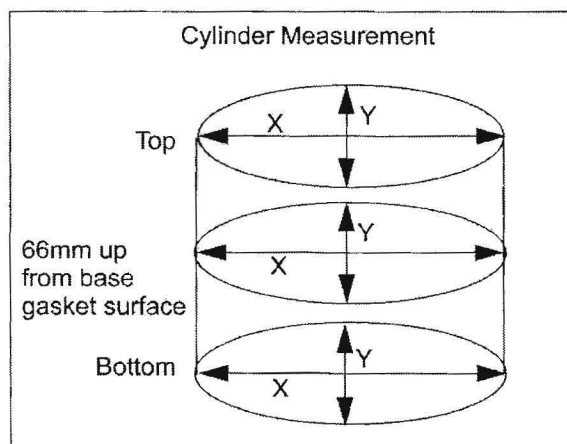
1. Visually inspect cylinder bores for scratches and wear.
2. Inspect gasket surfaces for scratches or other damage that may cause an oil leak.

CYLINDER BORE MEASUREMENT

1. Measure each cylinder bore in 6 places to determine:
 - Cylinder Bore Inside Diameter
 - Cylinder Taper and Out of Round



2. Use maximum measurement to determine wear.
3. Use the worksheet provided on page 8.5 to record measurements and calculate the clearance.



PISTON TO CYLINDER CLEARANCE WORKSHEET

Front Cylinder	Recorded Measurement	Specification
Top "X"		
Middle "X"		
Bottom "X"		
Top "Y"		
Middle "Y"		
Bottom "Y"		
Difference between largest "Y" measurement and smallest "Y" measurement	Taper for "Y" axis:	Taper Service Limit: .05mm (.002")
Difference between largest "X" measurement and smallest "X" measurement	Taper for "X" axis:	
Largest difference between any "X" axis measurement and "Y" axis measurement	Cylinder Out-of-Round:	Out-of-Round Service Limit: .05mm (.002")
Piston Skirt Measurement (page 8.6)		
Difference between largest "X" axis measurement and piston measurement	Piston-to-Cylinder Clearance*	Piston-to-Cylinder Clearance Service Limit: .15 mm (.006")

8

Rear Cylinder	Recorded Measurement	Specification
Top "X"		
Middle "X"		
Bottom "X"		
Top "Y"		
Middle "Y"		
Bottom "Y"		
Difference between largest "Y" measurement and smallest "Y" measurement	Taper for "Y" axis:	Taper Service Limit: .05mm (.002")
Difference between largest "X" measurement and smallest "X" measurement	Taper for "X" axis:	
Largest difference between any "X" axis measurement and "Y" axis measurement	Cylinder Out-of-Round:	Out-of-Round Service Limit: .05mm (.002")
Piston Skirt Measurement (page 8.6)		
Difference between largest "X" axis measurement and piston measurement	Piston-to-Cylinder Clearance*	Piston-to-Cylinder Clearance Service Limit: .15 mm (.006")

Compare recorded measurement to specifications. If measured value exceeds service limit replace the appropriate part.

NOTE: The cylinders are Ni-SiC plated and cannot be reconditioned by boring or honing. If excessive surface damage, taper or out-of-round exists, the cylinder must be replaced.

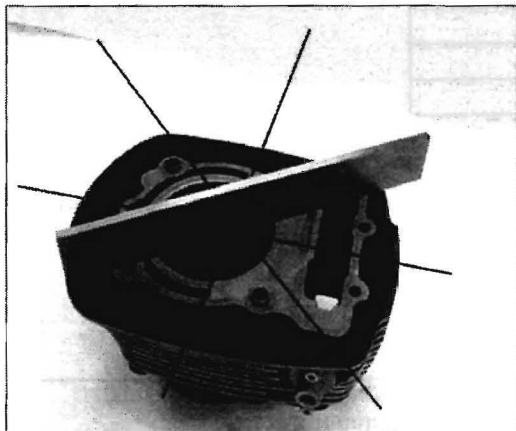
- If the piston-to-cylinder clearance exceeds the service limit, **measure a new piston and recalculate the clearance.** If the piston-to-cylinder clearance exceeds the service limits with a new piston, the cylinder must be replaced.



CYLINDER & PISTON

CYLINDER WARPAGE MEASUREMENT

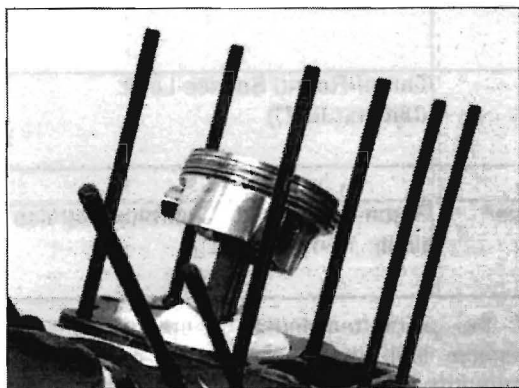
1. Inspect cylinder for warpage at cylinder head surface and base gasket surface.



2. Place a straight edge diagonally across cylinder mating surfaces in several positions. Attempt to slide a .05mm (.002") feeler gauge under the straight edge in each position.
3. Replace cylinder if warped beyond the service limit.

PISTON & PISTON RING REMOVAL

1. Cover crankcase with a clean shop towel to prevent piston clip from falling into the crankcase.
2. Remove the left piston pin circlip.
3. Push piston pin out to left side of engine and remove the piston.

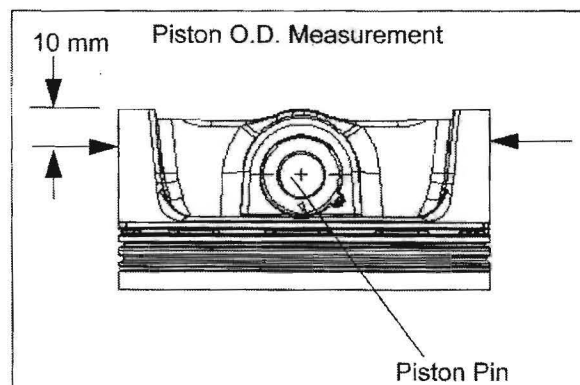


4. Rotate rings in piston grooves. Rings should rotate freely in grooves.
5. Clean carbon deposits from piston.

6. Spread rings only wide enough to remove them from piston. Spreading rings too wide will damage them.
7. Clean piston ring grooves. Break or cut a piston ring in half. File or grind one edge square and remove all burrs. Use this piston ring to carefully clean piston ring grooves.

NOTE: A soft wire brush may be used to only clean the top of the piston. Do not use a wire brush to clean the sides of piston or the piston ring grooves.

PISTON & PISTON RING INSPECTION



1. Visually inspect piston for cracks, excessive wear, scoring, etc.
2. Measure piston skirt O.D. (90° to pin and 10 mm from bottom of piston skirt). Compare to specifications on page 8.3. Replace piston if worn beyond the service limit.
3. Calculate Piston to Cylinder Clearance. Subtract piston O.D. from cylinder bore I.D. and compare to specification listed on page 8.3.

Piston to Cylinder Clearance Calculation

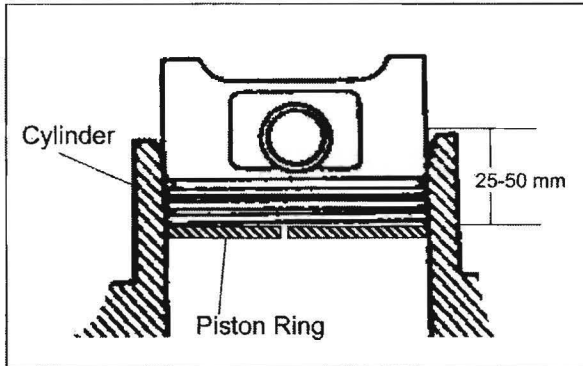
$$\begin{array}{r} \text{Cylinder I.D.} \\ - \text{Piston O.D.} \\ \hline = \text{Piston to Cylinder Clearance} \end{array}$$

4. Replace parts that do not meet specification.

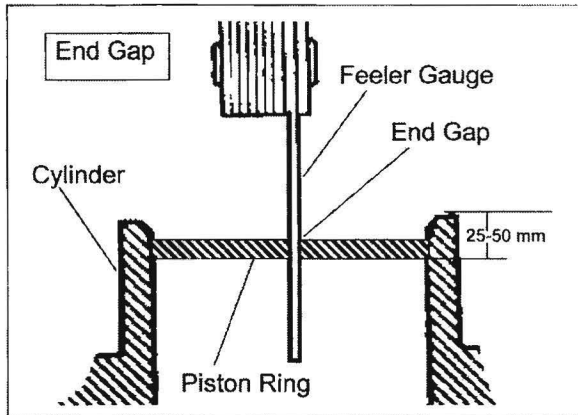
NOTE: If piston-to-cylinder clearance exceeds service limit, **measure a new piston and re-calculate clearance.** If piston-to-cylinder clearance exceeds service limits with a new piston, cylinder must be replaced.



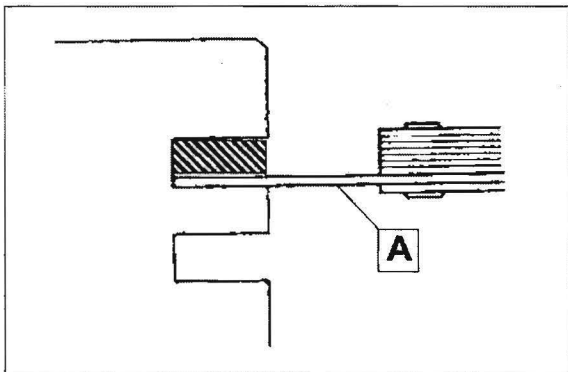
- Use a piston to push each ring squarely into cylinder bore from bottom (push rings 25-50mm into cylinder).



- Measure installed ring end gap with a feeler gauge and compare to specification listed on page 8.3.

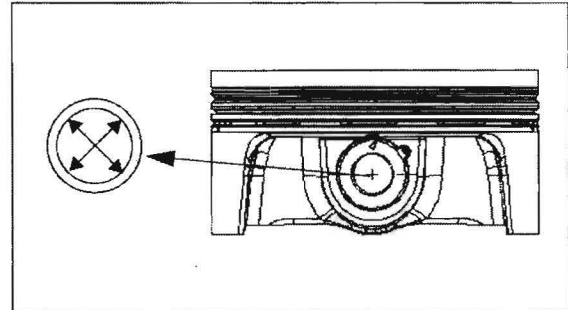


- Install rings onto a clean piston. Push rings in until they are flush with piston. Using a feeler gauge (A), measure side clearances for the 1st & 2nd rings.
- Replace parts that exceed service limit.

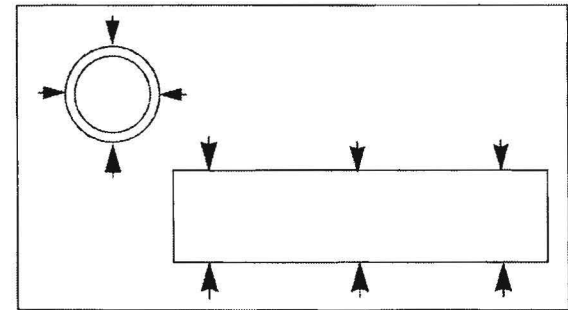


PISTON PIN / PIN BORE INSPECTION

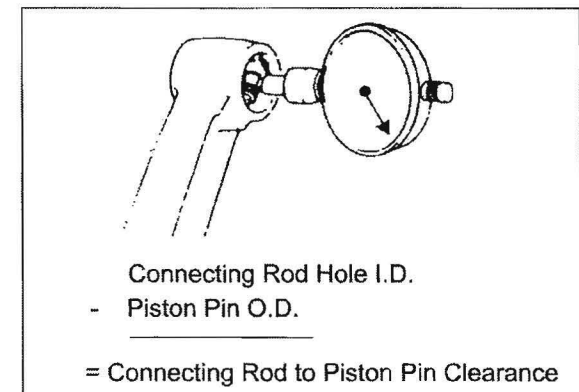
- Measure piston pin hole I.D. in four locations with a telescoping gauge. Record the smallest.



- Measure piston pin O.D. at three locations. Record largest measurement.



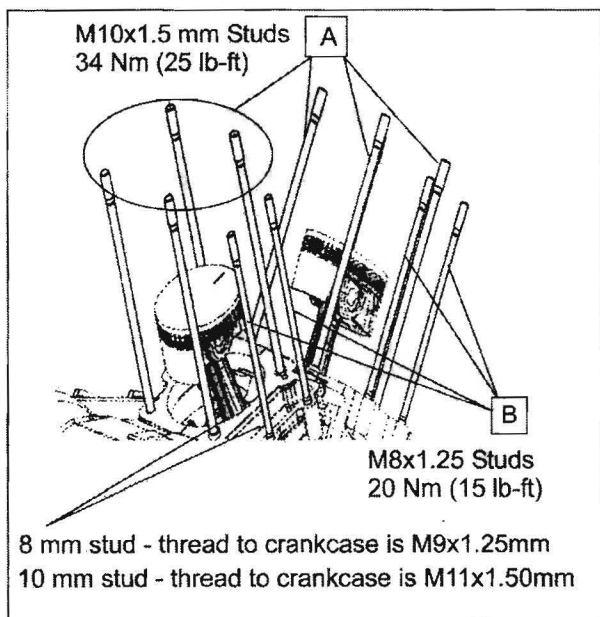
- Calculate piston pin-to-piston clearance. Subtract pin O.D. from pin hole I.D.
- Measure connecting rod small end I.D. at two locations.
- Calculate connecting rod-to-piston pin clearance by subtracting pin O.D from rod hole I.D.



- Compare measurements to specifications listed on page 8.3 and replace any worn parts.

CYLINDER STUD REPLACEMENT

1. Use a stud remover to remove 10mm studs (A) and 8mm studs (B).



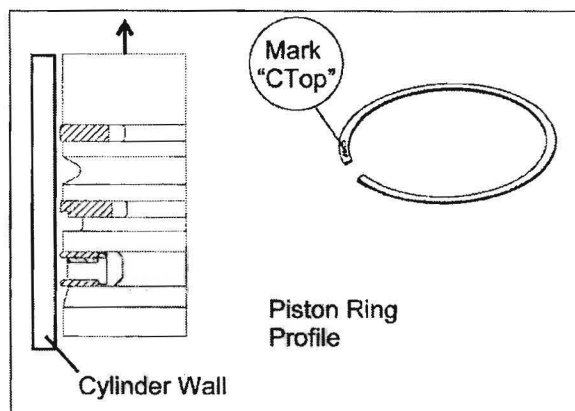
2. Clean threads in cases thoroughly.
3. Apply engine oil to stud threads.
4. Install studs and torque them to specification.

PISTON RING INSTALLATION

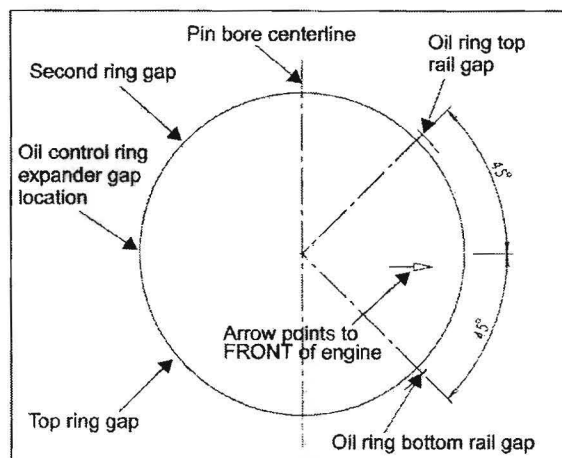
CAUTION

The rings may be damaged if they are over expanded during installation.

1. Lubricate all rings with engine oil.
2. Carefully install oil control ring expander with end gap located as shown.
3. Install top and bottom rails with end gap located as shown.
4. Install top and second rings with "CTOP" mark facing UP.

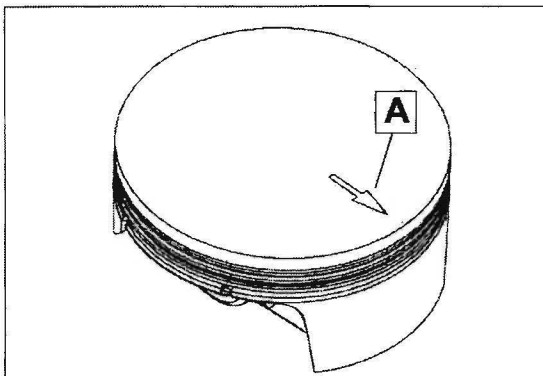


5. Compress each ring by hand and rotate to be sure they rotate freely in grooves.
6. Locate ring end gaps as shown below in relation to arrow on piston crown.



PISTON INSTALLATION

The pistons are marked with an arrow on the crown. Install pistons on connecting rods with arrow (A) facing the FRONT of the engine.



5. Push piston pin through rod and piston pin hole until it is stopped by circlip.
6. Install remaining circlip with end gap facing up (12:00 position.)
7. Make sure both piston circlips are seated properly in the groove.

1. Place a clean shop towel over crankcase to prevent foreign material from entering crankcase.
2. Install a new circlip on one side of the piston with end gap facing UP (12:00 position).

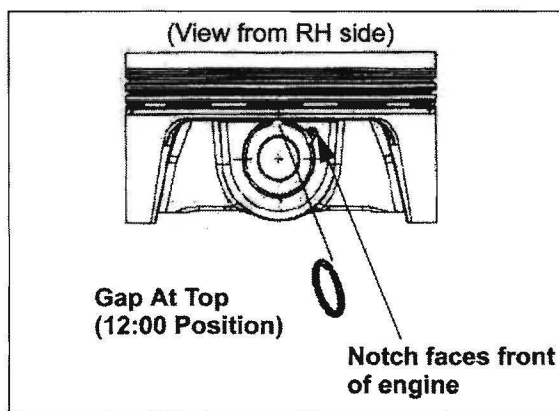
CAUTION

Never reuse piston pin circlips.

3. Lubricate piston pin and I.D. of connecting rod small end with engine oil.

Moly assembly paste PN: 2871460

4. Install piston over connecting rod with arrow on piston crown facing FRONT of engine.

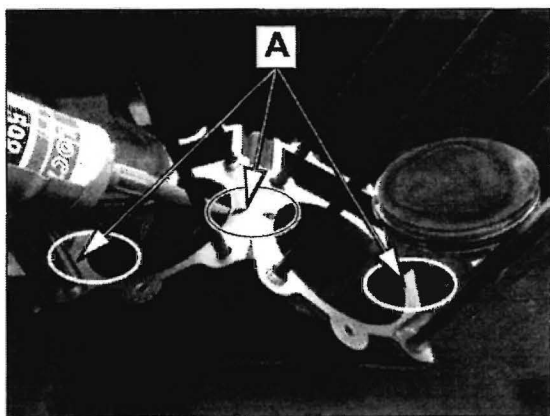


CYLINDER & PISTON

CYLINDER INSTALLATION

NOTE: Be sure all top end parts are ready for assembly. Sealant on crankcase parting line must not be allowed to dry before top end is assembled and torqued.

1. First wash cylinders with clean solvent, then with hot soapy water.
2. Rinse the cylinders with clear water and immediately dry with compressed air. Cylinder bore should be wiped with a clean white shop towel and engine oil.
3. Apply a light coat of engine oil to piston and rings.
4. Ensure cylinder alignment dowel pins are in place and gasket surfaces are clean and oil-free.
5. Apply a small amount of crankcase sealant to the crankcase parting lines on base gasket surface (A).



6. Install new cylinder base gaskets onto crankcase.

NOTE: Inspect all sealing surfaces carefully for scratches or imperfections. **DO NOT allow oil or grease to contact gaskets or sealing surfaces during the assembly process.**

7. Apply a small amount of engine oil to inside surfaces of a piston ring compressor band.

Piston Ring Compressor Band: PV-43570-2

Piston Ring Compressor Pliers PV-43570-1

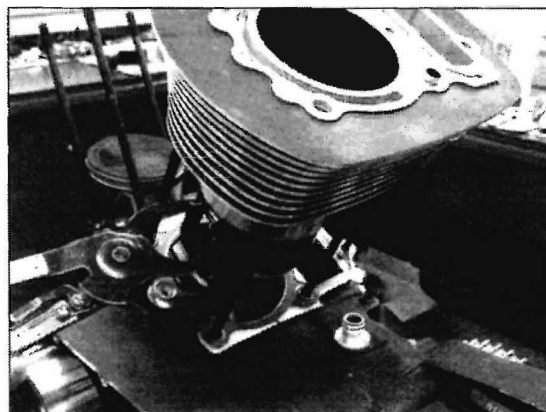
8. Install piston ring compressor over rings and compress rings into ring grooves.

CAUTION

Be sure compressor band end gap does not align with any ring end gap when compressing the rings.

NOTE: Install cylinders in their original locations.

9. Remove protective covering from crankcase.
10. Carefully install cylinder(s) over piston/ring assembly. Do not force cylinder over piston. Monitor rings carefully. If a piston ring becomes dislodged from the ring compressor; remove cylinder, inspect ring carefully for damage.



11. Remove piston ring compressor when rings are fully captive in cylinder.
12. Slide cylinder down over piston until seated to base gasket and crankcase surface.
13. Repeat for other cylinder.
14. Install cylinder head(s). (Chapter 7).



TROUBLESHOOTING, CYLINDER & PISTON

PROBLEM	POSSIBLE CAUSE	AFFECTED PART(s)	REPAIR RECOMMENDED
Engine Hard Starting (or) Engine Will Not Start	Low Compression	Leaking cylinder head gasket	Repair
		Slow starter motor / low battery	Refer to Chapter 18
		Worn cylinder, pistons and/or rings	Replace parts that do not meet specification
		Valve sticking or debris on valve seat	Refer to Chapter 7
		Ignition problem	Refer to Chapter 17
		Fuel problem	Refer to Chapter 5
		Incorrect valve timing (assembled incorrectly)	Refer to Chapter 7
Poor high speed performance	Valve Float	Weak / broken valve spring	Refer to Chapter 7
	Insufficient Valve Travel	Worn camshaft / rocker arm	Refer to Chapter 7
	Valves Opening & Closing at Wrong Time	Incorrect valve timing (assembled incorrectly)	Refer to Chapter 7
	Ignition Problem	-	Refer to Chapter 18
	F.I. System or Air Intake Problem	-	Refer to Chapter 5
	Breather system restricted	-	Refer to Chapter 2
Lack of power in all RPM Ranges	Valve Float	Weak / broken valve spring	Refer to Chapter 7
	Valves Opening & Closing at Wrong Time	Incorrect valve timing (assembled incorrectly)	Refer to Chapter 7
	Ignition Problem	-	Refer to Chapter 18
	F.I. System or Air Intake Problem	-	Refer to Chapter 5
Engine hard starting or will not start	Fuel Delivery Problem	Low Fuel Pressure	Refer to Chapter 5
	Ignition Problem	No Spark or Weak Spark	Refer to Chapter 17



CYLINDER & PISTON

TROUBLESHOOTING (Cont.)

PROBLEM	POSSIBLE CAUSE	AFFECTED PART(s)	REPAIR RECOMMENDED
Engine Idles Poorly	Fuel Management Incorrect	Air leaks intake tract	Refer to Chapter 5
		IAC system malfunction, air leak, or restriction	Refer to Chapter 5
	Low Compression	Poor valve sealing	Refer to Chapter 7
		Worn cylinder, pistons or rings	Replace parts that do not meet specification
Leaks	Improper Assembly	Cylinder, gaskets, gasket surface	Perform white powder test to determine leak path.
		Incorrect Fastener Torque	Assemble parts clean and free of oil, grease, or debris. Torque fasteners properly
	Damaged gasket sealing surface(s)	Cylinder / crankcase	Repair surface or replace part
Noise	Exhaust Leak	-	Inspect seal of exhaust system at cylinder head
	Excessive piston to cylinder clearance	Piston / cylinder	Replace parts that are worn beyond the service limit
	Excessive piston pin clearance (to piston or connecting rod)	Piston / pin / connecting rod	Replace parts that are worn beyond the service limit



CHAPTER 9

CLUTCH, PRIMARY, & SHIFT LINKAGE

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CLUTCH, PRIMARY, & SHIFT LINKAGE

GENERAL

SERVICE INFORMATION

- Clutch and external transmission shift linkage service can be accomplished with the engine in the frame.
- Internal transmission or internal shifting mechanism service requires engine removal and crankcase separation.
- Oil additives of any kind are not recommended by Victory. Using oil additives or oil of the wrong viscosity can have a detrimental affect on clutch performance, operation, and service life.
- Burnt clutch plates are not an indication of defective clutch plates. Burnt clutch plates indicate that a problem exists within the clutch system, the clutch has been used improperly, or plates were contaminated by improper oil or additives.
- Victory 20W/40 motorcycle oil is recommended for all operating temperatures. If Victory 20W/40 oil is not available, a high quality 20W/40 motorcycle oil suitable for use in wet clutch transmissions can be used.
- Lubricate parts during assembly as described in the procedures.
- Corroded or sticking shift linkage pivot points can cause abnormal shifting. Replace any linkage components that are damaged or do not move freely, and lubricate at regular intervals.

SPECIFICATIONS

GENERAL

	Item	Specifications
Clutch, Gear Shift, and Linkage	Clutch Type	Wet, Multi-Disk
	Clutch Operating Mechanism	Manual / Cable Operated
	Torque Compensator	Belleville Spring Loaded Cam Assembly
	Primary Reduction Ratio	1.5 : 1
	Transmission Shift Mechanism	Manually Operated, Spring Centered
	Gearshift Pattern	1-N-2-3-4-5-6
	Clutch Spring (Diaphragm Type)	145 lb. (Green Paint Mark)

SERVICE / MAINTENANCE

CLUTCH / GEARSHIFT / LINKAGE		
Item	Standard	Service Limit
Clutch Lever Free Play (Cable Clutch)	.50-1.50 mm (.020-.060")	←

SPECIAL TOOLS

PRIMARY DRIVE SPECIAL TOOLS

Crankshaft Rotation Socket 2008: PV-48736

Clutch Shaft Holder: PV-45028

Clutch Spring Compressor: PV-45032

Engine Lock Tool: PV-43502-A

Rotor (Flywheel) Puller: PV-43533

5/16 inch (or 8mm) Pin Punch (Commercially available)

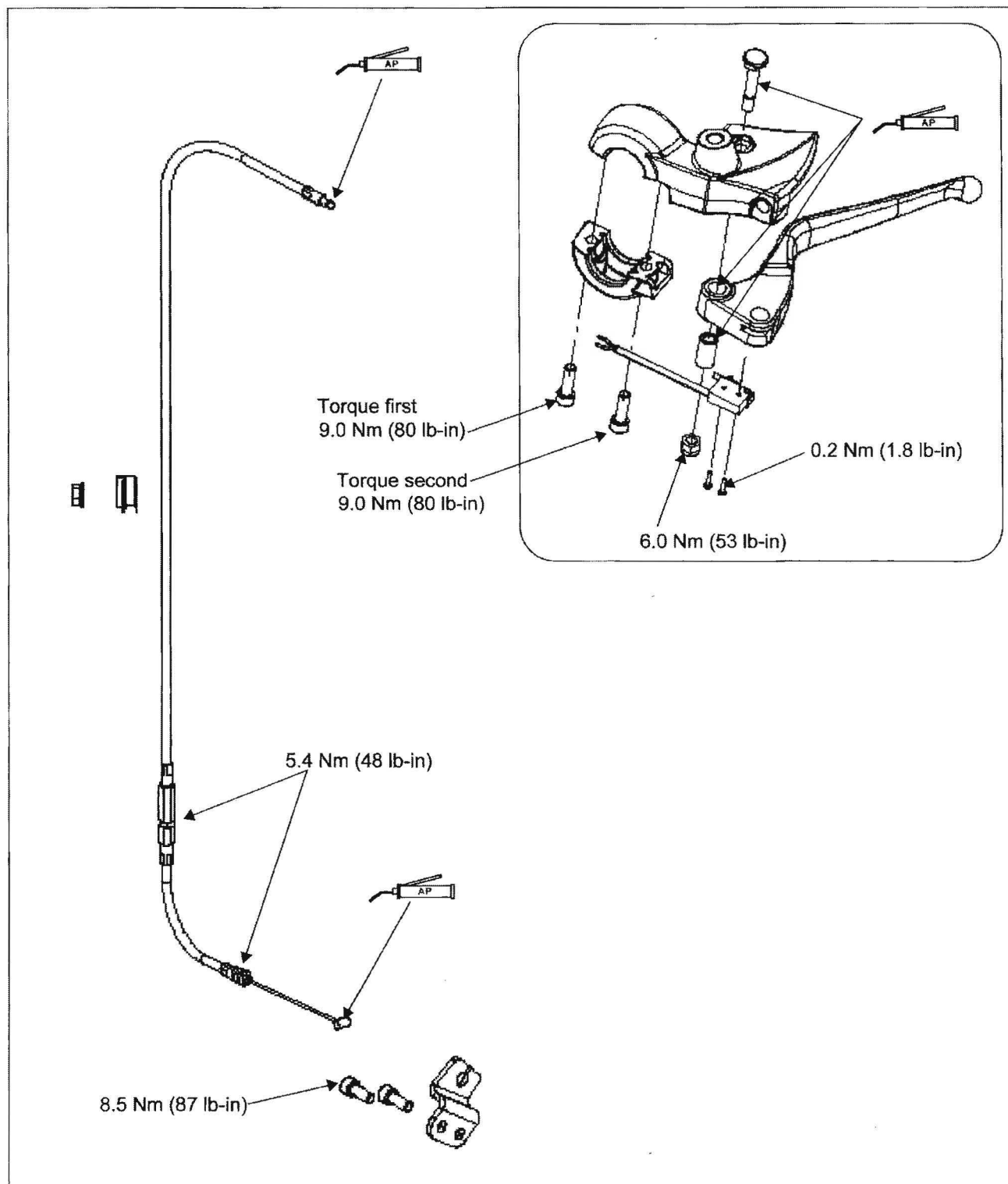
Moly Assembly Paste (P/N 2871460)

9.2



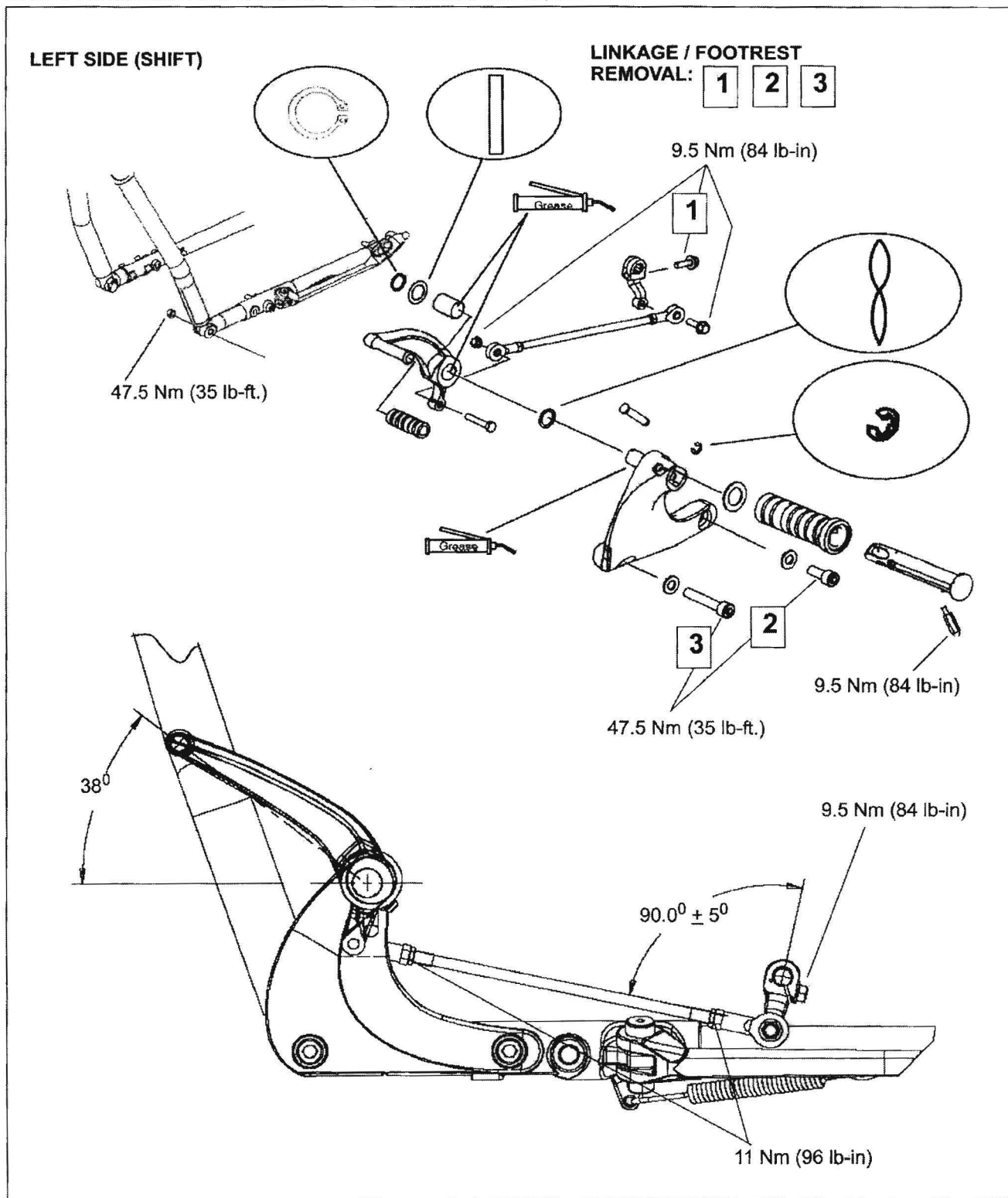
ASSEMBLY VIEWS & TORQUE VALUES

CLUTCH (CABLE)



CLUTCH, PRIMARY, & SHIFT LINKAGE

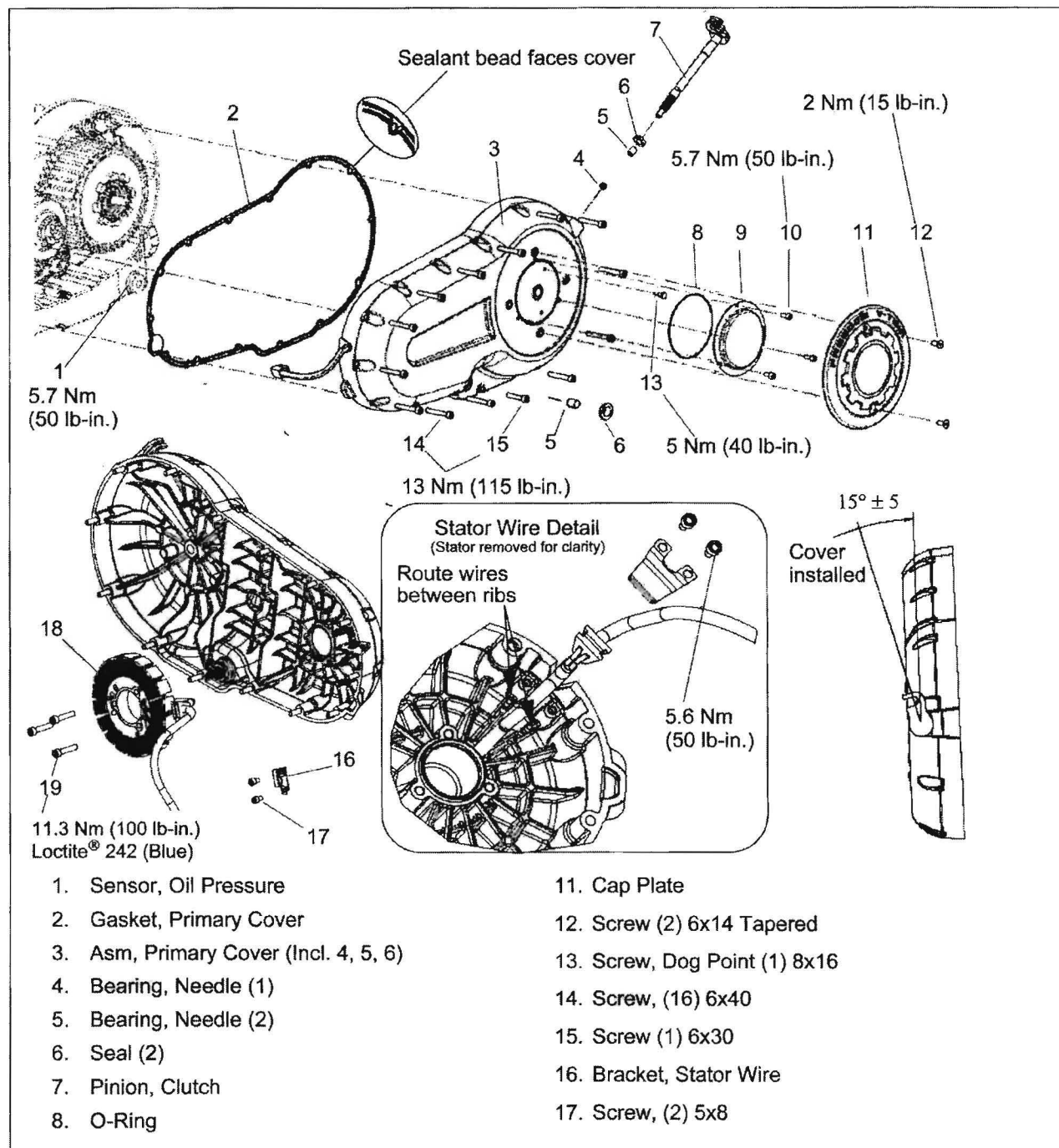
SHIFT LINKAGE / FOOTREST - FASTENER TORQUE



9.4



PRIMARY COVER

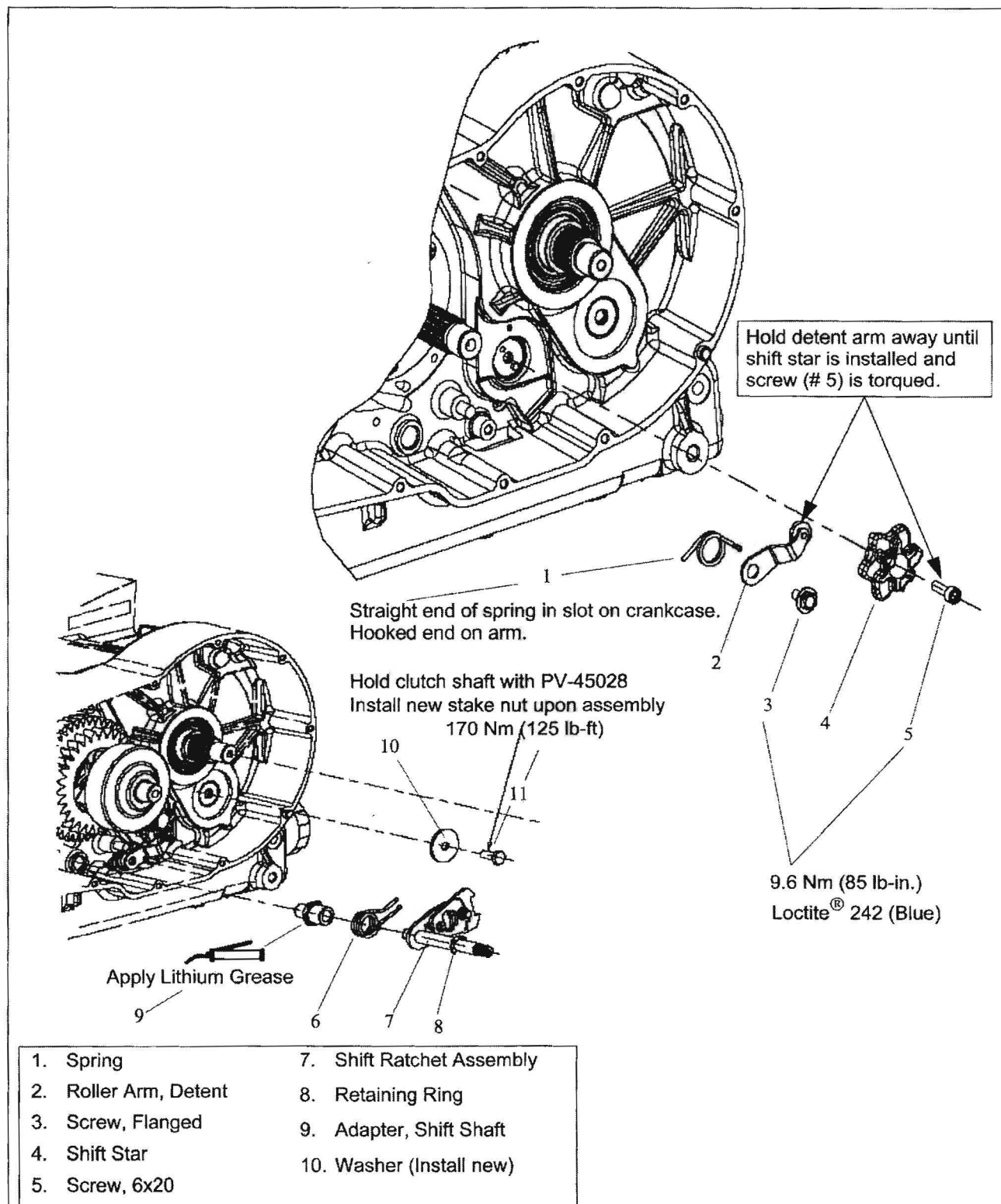


CAUTION

The rotor contains powerful magnets. Use caution when installing primary cover to avoid personal injury.



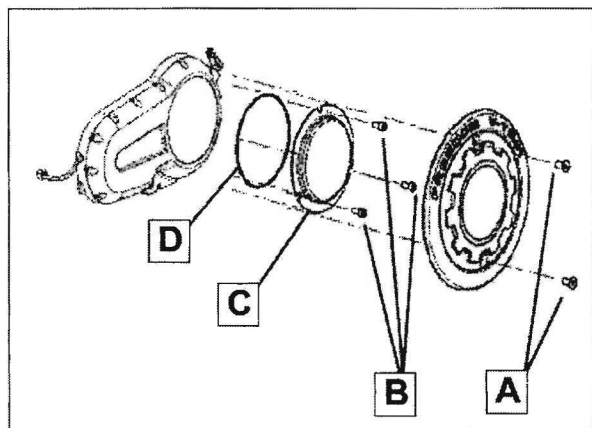
SHIFT MECHANISM



SERVICE PROCEDURES

CAP PLATE & CAP PLATE SEAL REMOVAL

1. Remove screws (A) and cap plate.
2. Remove three screws (B), cover (C), and O-ring (D).

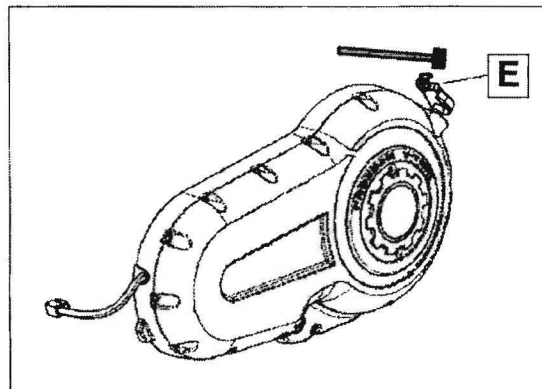


CAP PLATE & CAP PLATE SEAL INSTALLATION

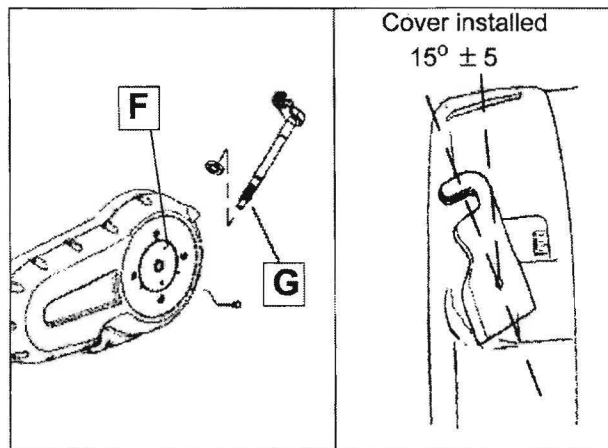
1. Install new O-ring (D).
2. Install cover (C).
3. Torque screws (B) to 5.6 Nm (50 in.-lb.).
4. Install cap plate with screws (A) and torque to 1.7 Nm (15 in.-lb.).

CLUTCH PINION SHAFT REMOVAL

1. Protect finish of pinion shaft (E). Use an adjustable wrench to rotate arm inward and remove cable from pinion shaft.



2. Remove primary cover cap plate, cover plate, and O-ring.
3. Remove dog point screw (F).
4. Pull clutch pinion shaft out of primary cover.



5. Inspect pinion shaft gear teeth (G) for cracks, broken teeth, or wear.

CLUTCH PINION SHAFT BEARING INSPECTION

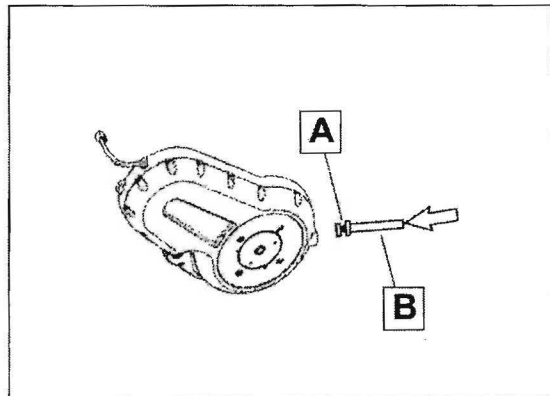
1. Apply engine oil to the bearings.
2. Temporarily install pinion shaft into primary cover.
3. Turn shaft by hand. Replace bearings that feel rough, notched, or loose.



CLUTCH, PRIMARY, & SHIFT LINKAGE

CLUTCH PINION SHAFT SEAL REMOVAL & INSTALLATION

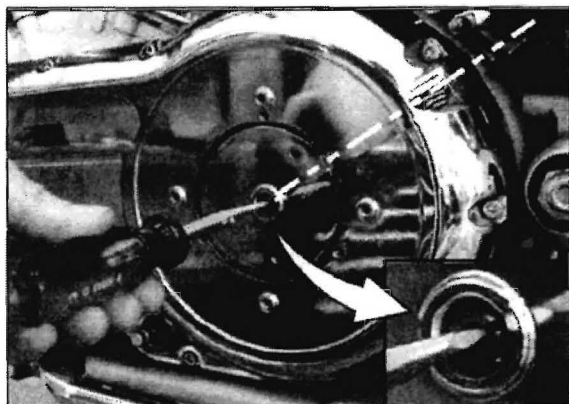
1. Remove clutch pinion shaft (page 9.7).



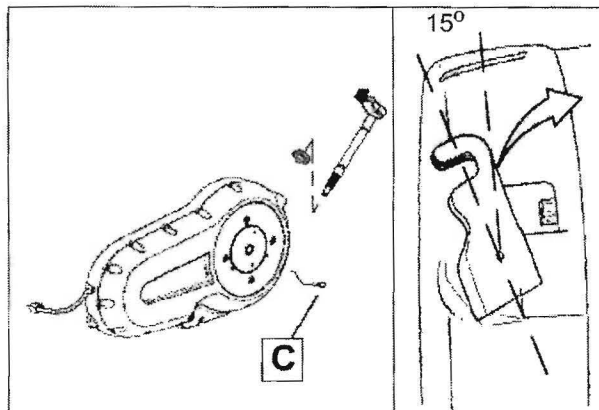
2. Carefully pry seal (A) out of primary cover.
3. Lubricate outer edge of new seal with engine oil and sealing lip with grease.
4. Drive seal into place with a suitable driver (B).

CLUTCH PINION SHAFT INSTALLATION

1. Lubricate and install clutch pinion shaft. Rotate release rack with screwdriver until flat side of rack is UP and rack teeth align with teeth of pinion shaft.
2. Push pinion shaft into cover until seated.



3. Push lightly inward by hand on the clutch arm until it stops. The arm must be positioned at a $15^{\circ} \pm 5^{\circ}$ angle to primary cover parting line when it stops. If angle is not correct, lift arm, rotate as needed, and re-install until angle is correct.
4. Install dog-point screw (C) to 4.5 Nm (40 lb-in).

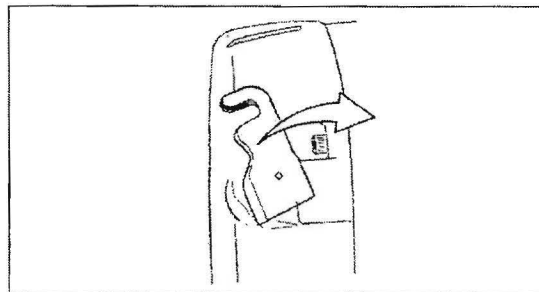


PRIMARY COVER REMOVAL

1. Refer to exploded view on page 9.8.
2. Remove shift linkage and footrest as an assembly (page 9.4). Note dots on arm and shaft must be aligned for assembly

Pull Rod / Cable Removal From Release Arm

3. Protect finish of pinion shaft release arm and use an adjustable wrench to rotate arm toward primary cover.
4. Remove pull rod or cable end from release arm. Do not bend pull rod or kink cable.



5. Remove cap plate and cap plate seal (page 9.7).
6. Remove clutch pinion shaft (page 9.7).

NOTE: Pinion shaft removal is not required for primary cover removal unless pinion shaft service is required.

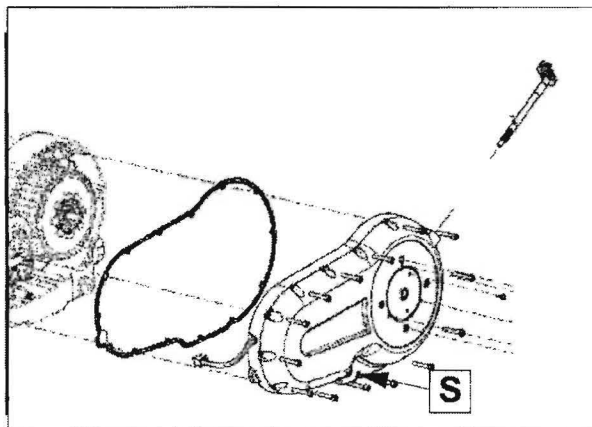


7. Drain engine oil into suitable container.

NOTE: Primary cover can be removed without draining engine oil by safely leaning and supporting motorcycle at an angle to the right.

8. Remove primary cover screws.

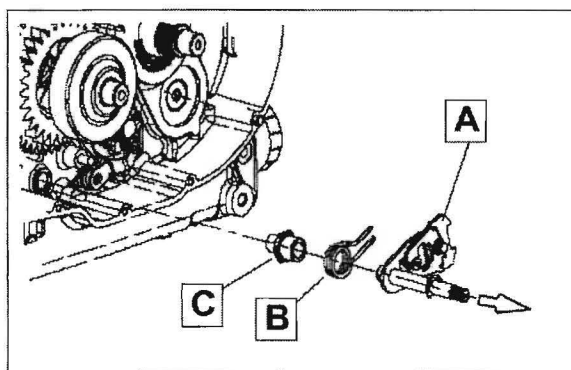
NOTE: Note position of shorter screw (S) in the hole just to the rear of the shift shaft.



9. Tap cover with a soft face hammer to loosen.
10. Pull primary cover outward evenly at front and rear of cover to remove.

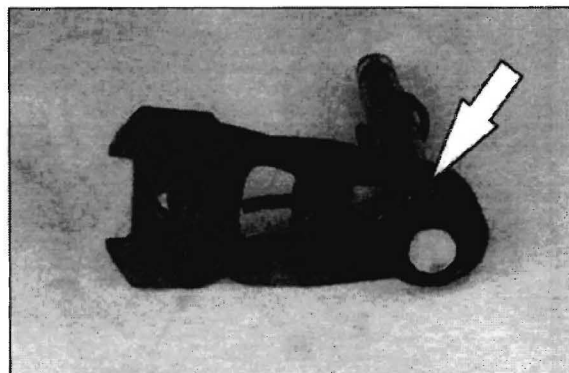
SHIFT RATCHET REMOVAL & INSPECTION

1. Shift transmission into neutral.

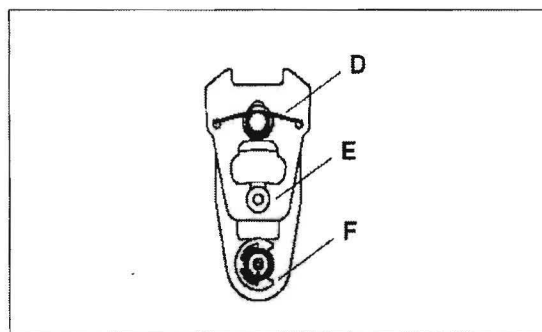


2. Remove primary cover (page 9.8).
3. Pull straight outward on shaft to remove the shift ratchet assembly (A) with return spring (B) attached.

4. Inspect shift shaft adapter (C) on crankcase for wear and verify it is tight.
5. Inspect shift shaft return spring for cracks or loss of tension. The spring should have enough tension to keep the shift shaft centered.



6. Inspect shift shaft for wear or damage.
7. Inspect compression spring (D) for tension. The spring should apply enough tension on the shift ratchet mechanism to keep it extended.
8. Inspect fit of rivet (E) on shift ratchet assembly. It should allow for free movement, but not be excessively loose.
9. Inspect fit of locating retainer clip (F) and all parts of ratchet for cracks or damage.

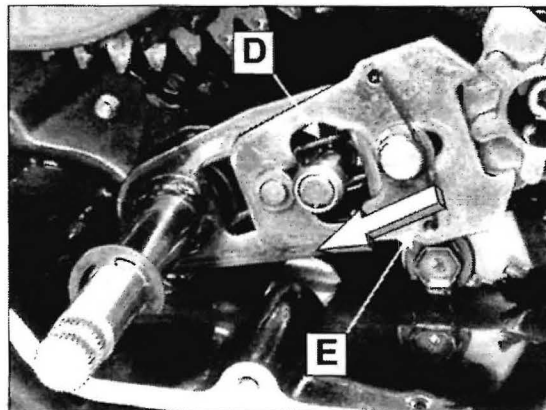
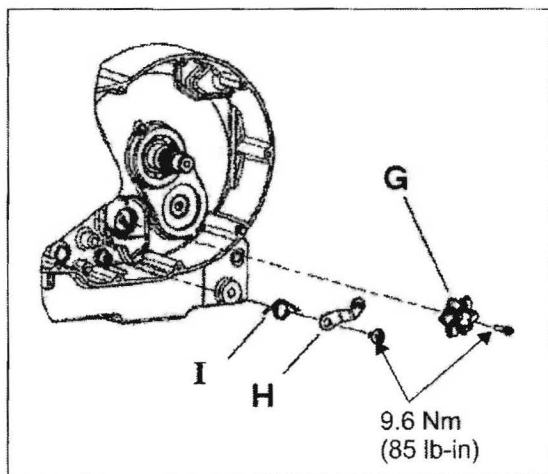


10. Inspect cases around shift shaft adapter for cracks.
11. Use a pin punch to hold detent roller away and remove shift star (G) from shift drum.
12. Inspect shift star.



CLUTCH, PRIMARY, & SHIFT LINKAGE

13. Inspect detent roller arm (H) for wear or damage.
 14. Inspect spring (I) for proper tension.
 15. Remove detent roller arm and spring.
6. Install shift ratchet into shift shaft adapter with centering spring (D) attached. Slide ratchet fork (E) away from shift star and hold. Center the legs of ratchet return spring on pin and push ratchet in until seated.

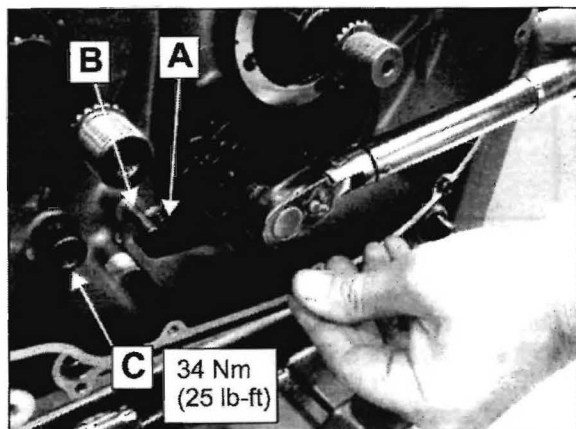


7. Release ratchet fork to engage ratchet with shift star.
8. Install clutch (page 9.20).

SHIFT RATCHET INSTALLATION

Refer to Shift Mechanism Assembly View on page 9.6.

1. Apply Loctite 242 (Blue) to clean threads of detent roller screw. Install detent roller arm (A) with spring and torque screw to 9.6 Nm (85 lb-in).
2. Be sure balance gear oiler pin (B) is tight in crankcase.
3. Torque shift shaft adapter (C) and apply a small amount of lithium grease to shift shaft bore.
4. Clean threads of shift star screw with Loctite Primer N and apply a few drops of Loctite 242 (Blue) to threads.
5. Hold detent roller away with a pin punch and install shift star. Torque screw to 9.6 Nm (85 lb-in).

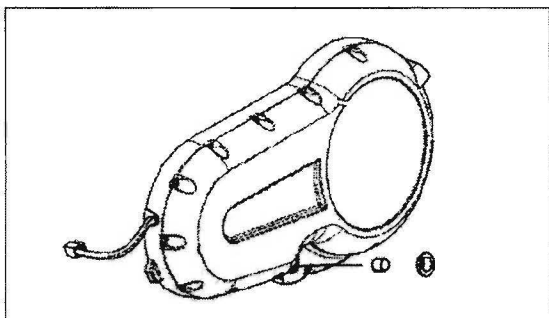


9.10



SHIFT SHAFT BEARING & SEAL REPLACEMENT

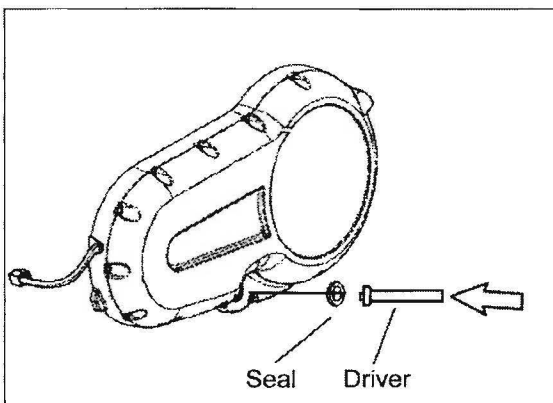
1. Remove primary cover (page 9.8). Carefully pry shift shaft seal from cover.



2. Using a suitable arbor and arbor press, press bearing from inside of cover to outside.
3. Apply assembly lube to inner & outer surfaces of new bearing.

Moly assembly paste PN: 2871460

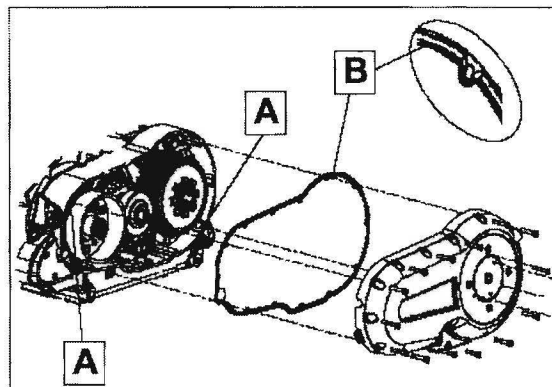
4. Press bearing into place with numbered side out until fully seated.



5. Apply a small amount of grease to lip of seal and apply engine oil to outside of seal.
6. Drive seal into place with a seal driver slightly smaller than the O.D. of seal.
7. Install primary cover (page 9.11).
8. After installing primary cover, be sure shift shaft returns freely to the centered position after rotating up or down.

PRIMARY COVER INSTALLATION

1. Clean gasket surfaces of crankcases and cover.
2. Verify alignment pins (A) are in position and pinion shaft is removed from cover.
3. Place new primary cover gasket on crankcase with sealant bead (B) out (toward cover). Loctite® 534 can be used to hold gasket in place.



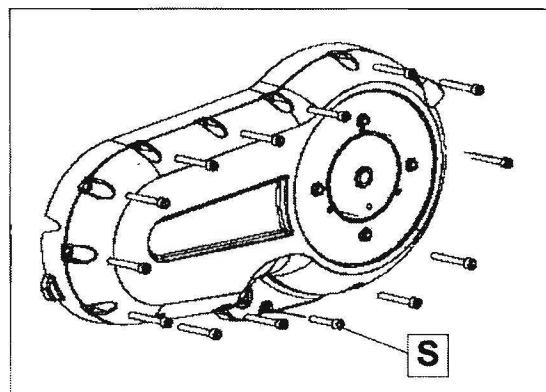
4. Install cover keeping it parallel to crankcase to prevent binding on shift shaft.

CAUTION

The rotor magnets have considerable energy. **DO NOT** place fingers between primary cover gasket surface and other parts or they may be pinched.

5. Install primary cover screws.

NOTE: Short screw (S) is placed in hole just behind shift shaft.

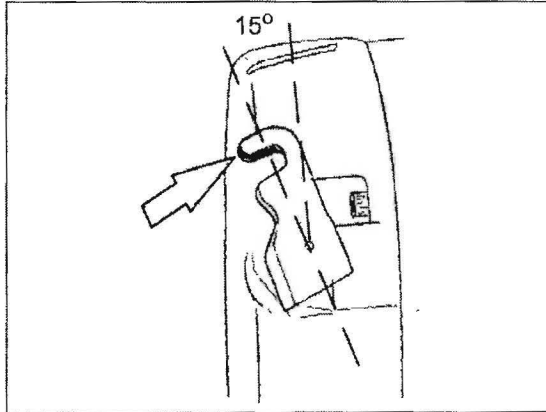


6. Torque screws in two steps to 13 Nm (115 lb-in). Repeat torque on all screws.



CLUTCH, PRIMARY, & SHIFT LINKAGE

7. Install pinion shaft (page 9.8).
8. Install cap plate with seal (page 9.11).
9. Lubricate clutch lever pivots and cable ends (page 2.11).
10. Install clutch cable on pinion shaft arm.
11. Install shift linkage arm on shift shaft with dots aligned and install left footrest assembly. Torque linkage arm pinch bolt to 9.5 Nm (84 lb-in).

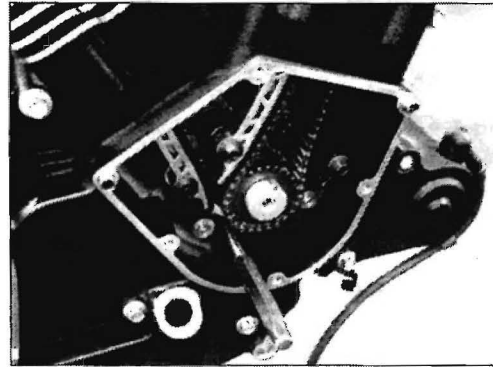


12. Check engine oil and fill to proper level (Chapter 2).

LOCKING THE CRANKSHAFT

Service procedures described in this chapter require locking of the gears or shafts to prevent rotation while removing or installing the retaining nuts. Engine Lock Tool PV-43502-A is described in most procedures; however, in some cases it is preferable to lock the engine crankshaft (shown below) or the clutch shaft using tool PV-45028.

- Remove RH lower engine cover.
- Remove crankshaft position timing wheel.
- Rotate engine to front or rear cylinder TDC with tool PV-48736 until 8mm (5/16 inch) pin punch can be inserted into the crankshaft TDC location hole.



9.12



CLUTCH SERVICE

CLUTCH ASSEMBLY VIEW & TORQUE

1. Clip, External
 2. Asm., Gear/Basket
 3. Bearing, Ball
 4. Snap Ring, Internal
 5. Hub, Clutch
 6. Seat, Judder Spring
 7. Spring, Diaphragm
 8. Plate, Friction Judder (1)
 9. Plate, Friction (8)
 10. Plate, Separator (9)
 11. Plate, Friction Clutch
 12. Plate, Pressure
 13. Spring, Clutch, Diaphragm
 14. Ring Seat, Snap Ring
 15. Circlip, Internal
 16. Asm., Clutch
 17. Washer, Flat
 18. Washer, Belleville
 19. Nut, Stake
 20. Asm., Clutch Lifter
 21. Ring, Retaining

Install new stake nut
 125 ft. lbs. (170 Nm)

Serviced as an assembly

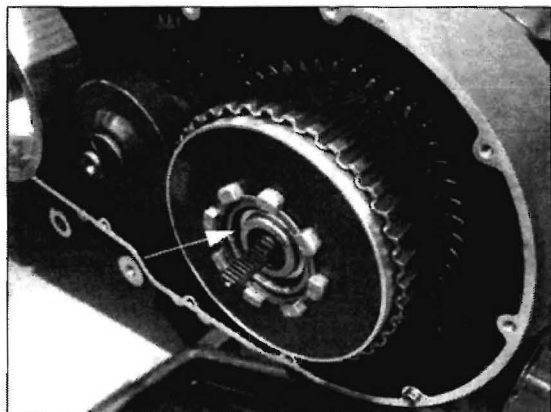
85 in. lbs. (9.6 Nm)



CLUTCH, PRIMARY, & SHIFT LINKAGE

CLUTCH REMOVAL

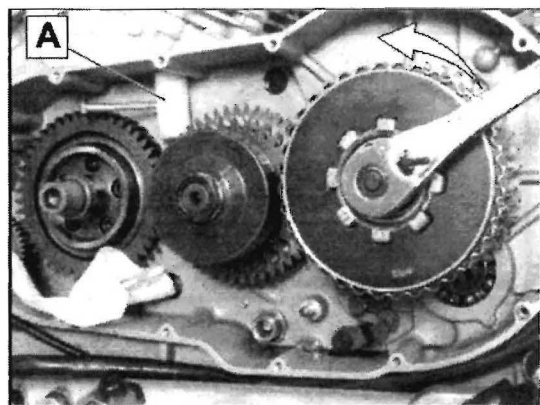
1. Remove primary cover (page 9.8).
2. Using an internal snap ring pliers, remove clutch rack.



3. Install engine lock tool (A) between crankcase and split gear as shown below to prevent gear rotation and loosen clutch nut (rotor / starter gear removal is not required).

NOTE: An alternate method of preventing gear rotation is to lock the crankshaft as shown on page 9.12.

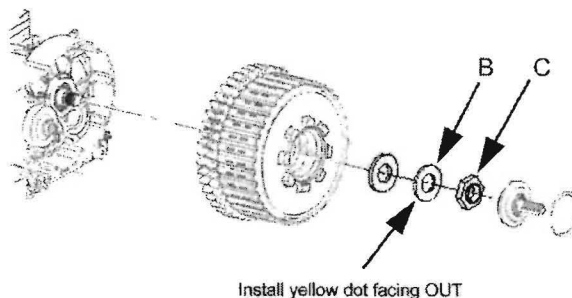
Special tool: Engine lock tool PV-43502-A



CAUTION

Use caution when removing nut and keep hands and body clear in case tool slips off gears.

4. Remove clutch nut, lock washer, and flat washer. Discard lock washer and nut.
5. Remove clutch assembly from clutch shaft.
6. A new spring washer (B) & Stake nut (C) must be installed upon assembly.



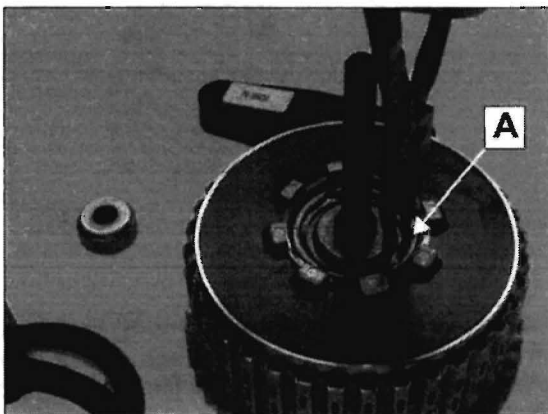
CLUTCH DISASSEMBLY

Special tool: Clutch spring compressor PV-45032

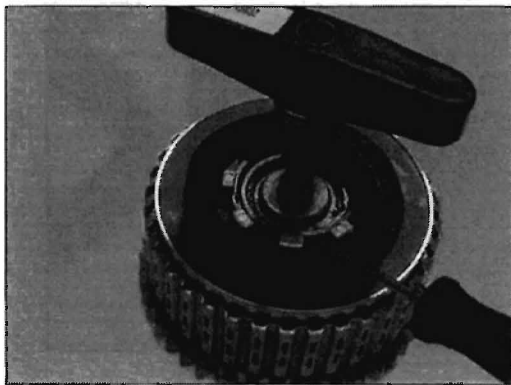
CAUTION

Clutch is under spring pressure. WEAR EYE PROTECTION.

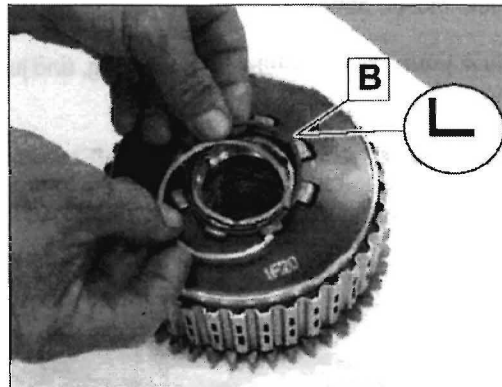
1. Install clutch spring compressor threaded rod and secure it with the snap ring (A).



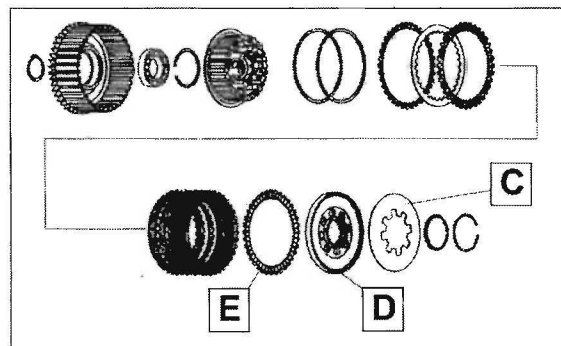
2. Install compressor bridge, bearing, and T-handle over threaded post.
3. Compress clutch spring and remove snap ring.



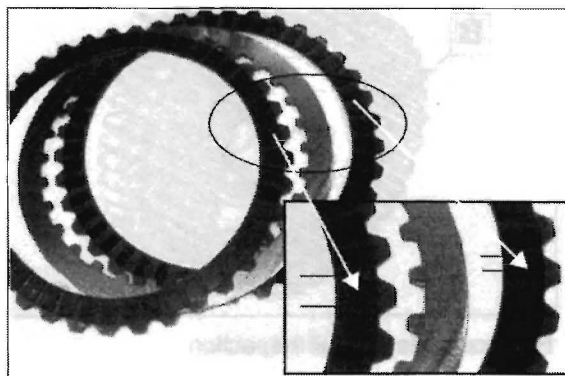
4. Remove retaining ring seat (B) (stepped washer).



5. Remove tool from clutch.
6. Refer to exploded view on page 9.13.
7. Disassemble clutch, laying parts out in order of removal and keep them in order.
8. Remove clutch spring (C) and pressure plate (D).
9. Remove (1) special friction plate (E) that is placed outermost against pressure plate.



10. The outermost plate can be identified by the wider pads on the friction material.

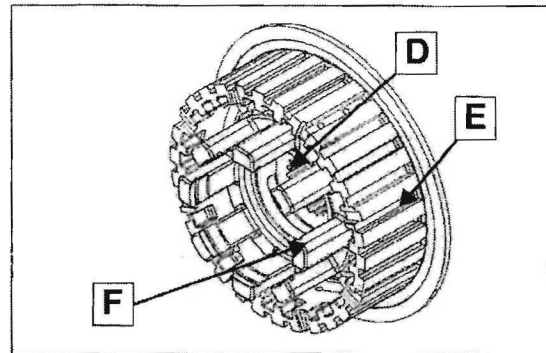
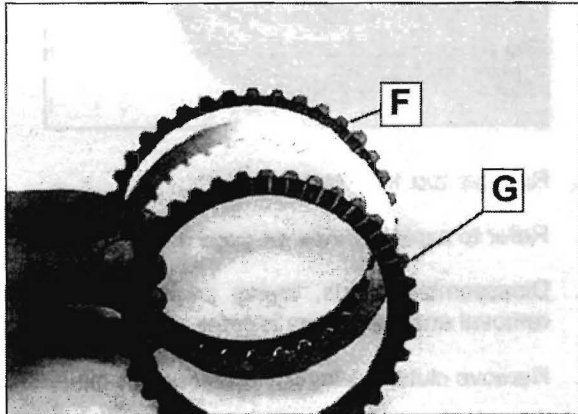


CLUTCH, PRIMARY, & SHIFT LINKAGE

11. Remove (9) identical steel plates that separate the (8) identical friction plates.
12. Remove judder friction plate, judder spring, and judder spring seat.
13. Note difference between judder plate (F) and next friction plate (G). The judder plate is the innermost friction plate on the clutch hub.
5. Rotate hub bearing. Check for smooth rotation. Inner race should have no detectable radial movement (C).
6. Lubricate bearing with engine oil.

Clutch Hub

7. Inspect spline teeth (D) for wear, cracks or damage.



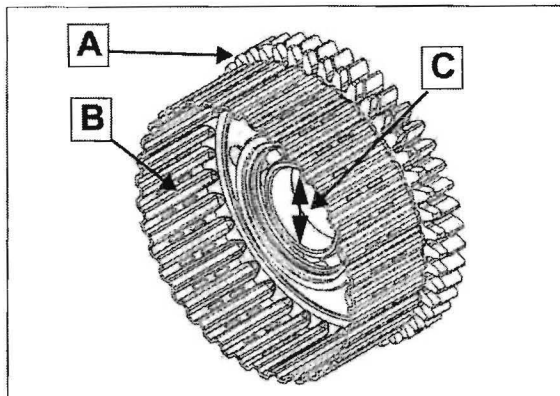
8. Inspect surface of steel plate guides (E) on outer edge of hub for wear, grooves, or damage. Check all posts (F) for cracks or damage. Check the snap ring groove for wear.
9. Visually inspect friction and steel plates for wear or damage on both surfaces. Replace plates as a set if any plate is worn or damaged.

CLUTCH INSPECTION

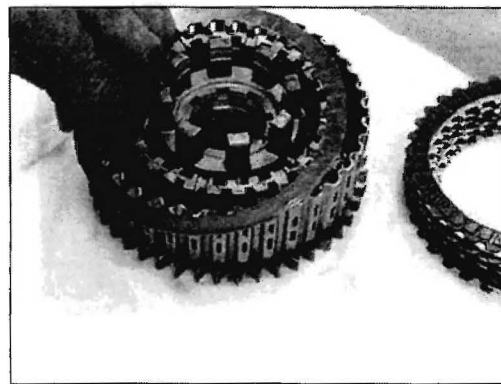
1. Clean clutch plates, inner hub, and outer basket.

Clutch Basket

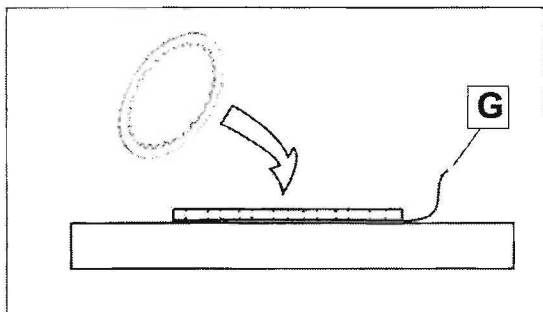
2. Inspect clutch gear teeth (A) for wear, cracks or damage.
3. Inspect inside surfaces (B) of basket for cracks or wear (grooves) from clutch plates.



4. Replace parts that fail inspection

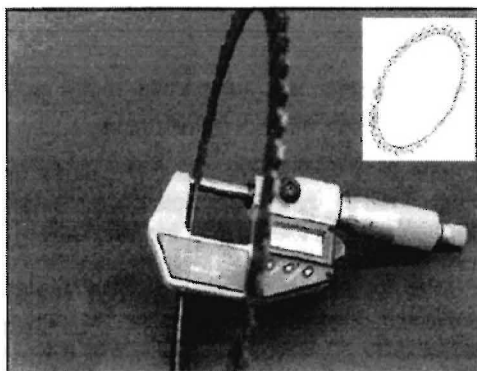


10. Replace steel plates if grooved, distorted or discolored. Inspect plates for distortion by placing each plate on a precision flat surface. Insert a feeler gauge (G) between plate and flat surface in several places.



Clutch Steel Plate Warp Service Limit: .20mm (.008in)

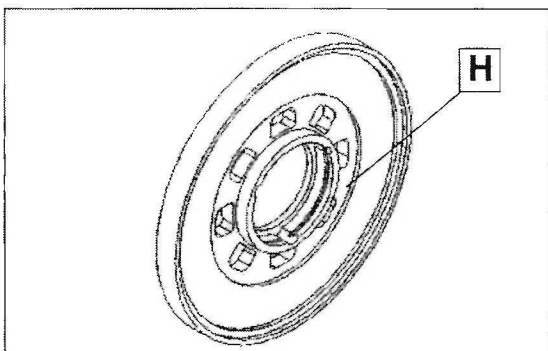
11. Measure thickness of friction plates in several places. Thickness should be the same at each place. Replace plates that fail inspection.



Friction Plate Thickness Minimum): 2.00 mm (.078 in)

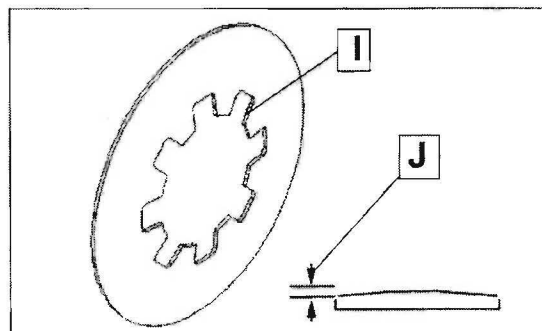
Clutch Pressure Plate

12. Inspect pressure plate for cracks, scoring, or wear on friction surface.
13. Inspect lifter retaining ring groove (H) for cracks or chips. Replace pressure plate if it fails inspection.



Diaphragm Spring

14. Inspect clutch diaphragm spring (I) for cracks or distortion.
15. Inspect inner and outer edges of spring carefully for unusual wear or damage. Outer edge should lay flat against a surface plate and inner tabs should be even in height (J).



Clutch Release Rack and Bearing

NOTE: Clutch rack is serviceable as an assembly only.

16. Inspect clutch rack for broken or damaged teeth.



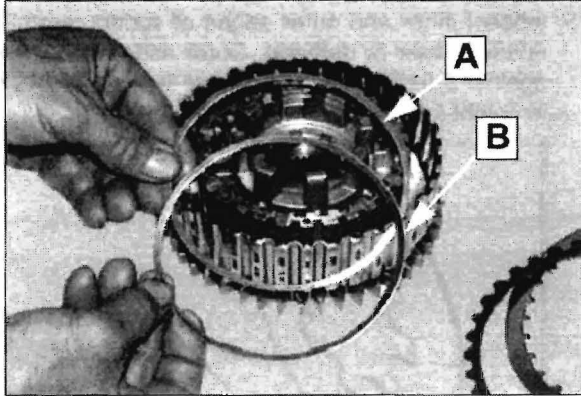
17. Inspect lifter bearing visually for any signs or wear or discoloration. Rotate bearing inner race with your finger and check for smooth movement and no play.
18. Replace clutch rack assembly if necessary.



CLUTCH, PRIMARY, & SHIFT LINKAGE

CLUTCH ASSEMBLY

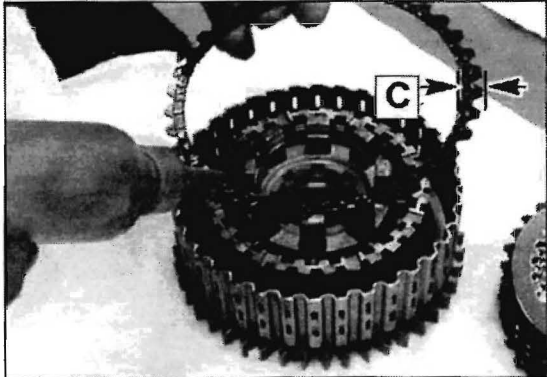
1. Refer to exploded views on page 9.13. Apply engine oil to judder spring seat (A) and spring (B).



2. Install judder spring seat (flat ring), then judder spring.

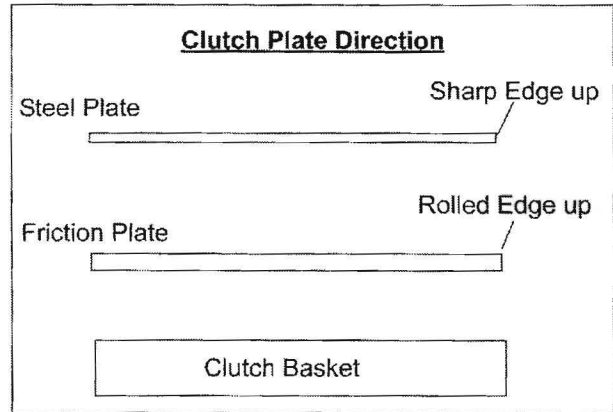
NOTE: Judder spring must be installed with concave side facing UP (toward outside of clutch). The tallest edge of spring will be outermost.

3. Apply engine oil to judder friction plate and install.



NOTE: This plate has a thinner profile (C) than the rest of the friction plates.

NOTE: Feel the edge of steel plates and friction plates with your finger. One side of plate is machined at the edges and the other side is a rolled edge (rounded). Install steel plates with **machined edge facing UP**. Install friction plates with **rolled edge facing UP**.



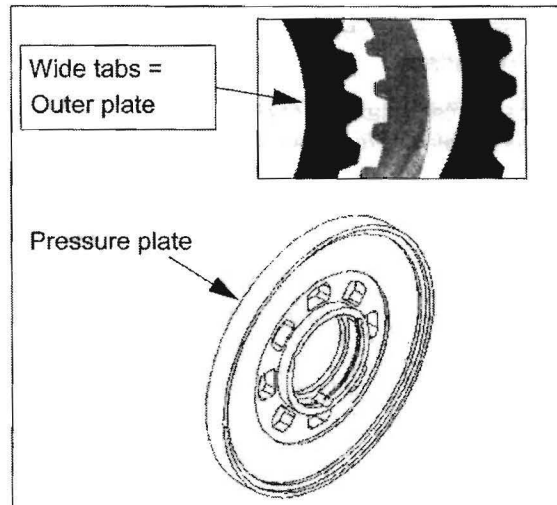
4. Place an oiled steel plate into clutch basket with machined edge UP.

NOTE: If friction plates are new, soak them in clean engine oil for a few minutes before installing.

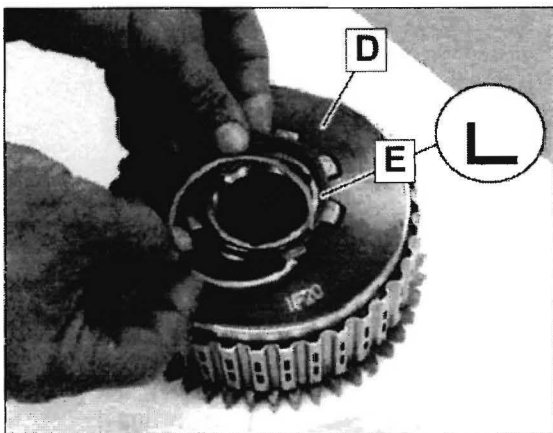
5. Continue stacking oiled clutch plates into clutch basket alternating friction and steel plates until all are installed, ending with the special friction plate.

NOTE: Be sure to install special friction plate last (against pressure plate). As noted in Disassembly, the friction material on this plate has wider pads than the other (8) common friction plates. See illustrations on page 9.13 and photo below.

6. Install clutch pressure plate on top of clutch packing.



7. Install clutch diaphragm spring (D) with concave side down on top of pressure plate.
8. Place retaining ring seat (E) and retaining ring over clutch assembly before installing clutch spring compressor tool. Flange on inner edge of seat faces UP as shown.



CAUTION

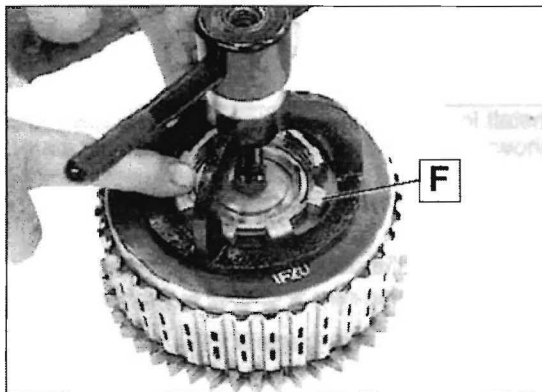
Tool will be under spring pressure.
WEAR EYE PROTECTION.

9

9. Install compressor tool and compress spring so ring seat can be positioned and retaining ring installed.

Special Tool: Clutch Spring Compressor PV-45032

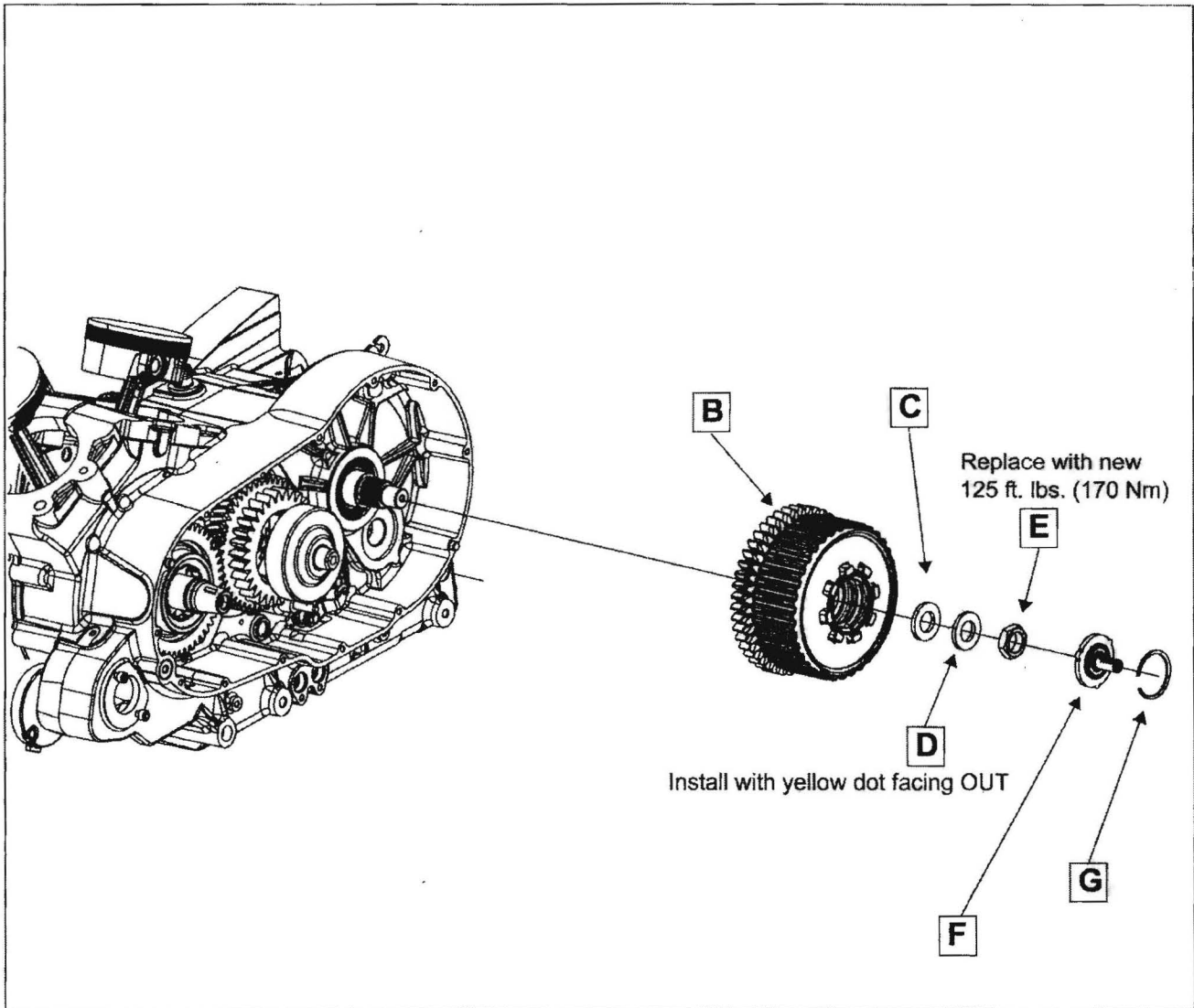
10. Install retaining ring with machined (sharp) edge up. Position retaining ring so one end of retainer is located on one of the posts (F).



11. After retaining ring is installed, slowly release pressure from tool and guide flange into position under the retaining ring.
12. Remove spring compressor tool. Inspect retaining ring to be sure it is fully expanded and seated in groove.



CLUTCH INSTALLATION

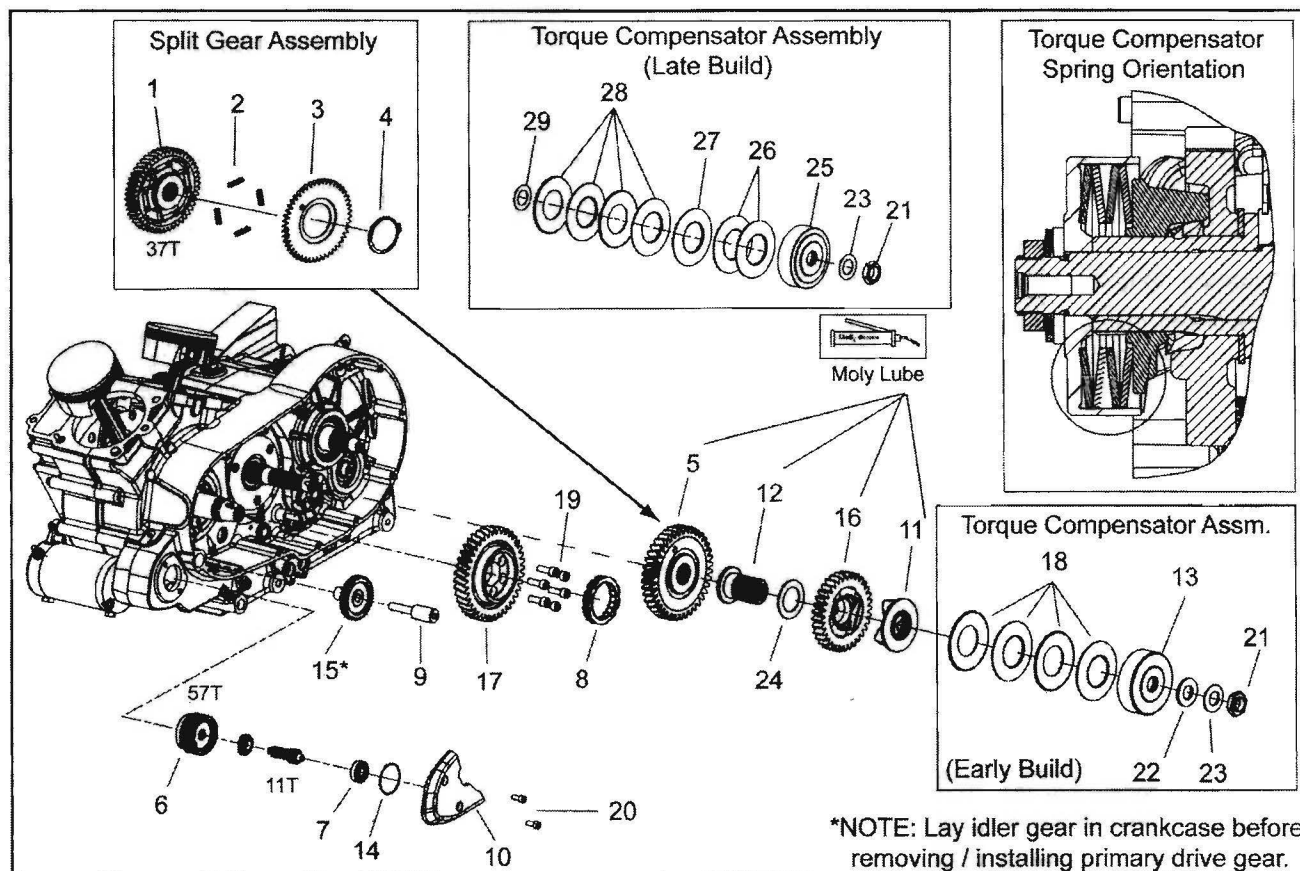


1. Pry back split gear (B) to align teeth and push clutch assembly onto clutch shaft until gear is fully engaged with torque compensator gear.
2. Clean clutch shaft threads with Loctite™ Primer N to remove all grease, oil, or old locking agent.
3. Install washer (C), a new spring washer (D) and a new stake nut (E). Install spring washer with yellow dot facing OUT. See chapter 10 for stake nut installation.
4. Install lock tool under split gear or lock crankshaft as shown on page 9.12. Torque nut to specification.
5. Install clutch lifter assembly (F) and retaining ring (G). Be sure retaining ring is seated in groove.
6. Install primary cover (page 9.11).
7. Check engine oil and fill to proper level.

Engine lock tool PV-43502-A



PRIMARY DRIVE ASSEMBLY VIEW & TORQUE



- | | |
|---|---|
| 1. Gear, Split, 37T | 20. Screw, Socket Head, M6 x 15 |
| 2. Spring, Split Gear (4) | 21. Stake Nut 170 Nm (125 lb-ft) <i>Single use fastener</i> |
| 3. Gear, Split, Backlash | 22. Flat Washer |
| 4. Retaining Ring | 23. Spring Washer |
| 5. Assembly, Split Gear (incl. items 1-4) | 24. Crankshaft Gear (Primary Drive Gear) |
| 6. Torque Limit Clutch, Starter | 25. Retainer, Compensator (Late Build) |
| 7. Bearing | 26. Compensator Spring, Belleville (0.9 mm) |
| 8. Starter Drive Clutch | 27. Spacer |
| 9. Shaft, Idler Gear | 28. Compensator Spring, Belleville (2.54 mm) |
| 10. Cover, Limit Clutch | 29. Retainer Spacer |
| 11. Slider, Compensator | |
| 12. Shaft, Compensator | |
| 13. Retainer, Compensator | |
| 14. O-ring | |
| 15. Idler Gear, Starter (See 15*NOTE above) | |
| 16. Compensator Drive Gear | |
| 17. Crankshaft Gear | |
| 18. Compensator Spring, Belleville (4) | |
| 19. Screw, 41Nm (30lb-ft) <i>Single use fasteners (6)</i> | |



CLUTCH, PRIMARY, & SHIFT LINKAGE

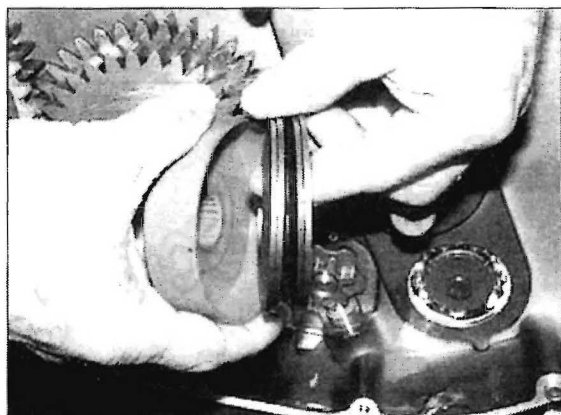
TORQUE COMPENSATOR REMOVAL

See Torque Compensator Assembly View (page 9.21). If split gear removal is required, see page 9.25 after compensator is removed.

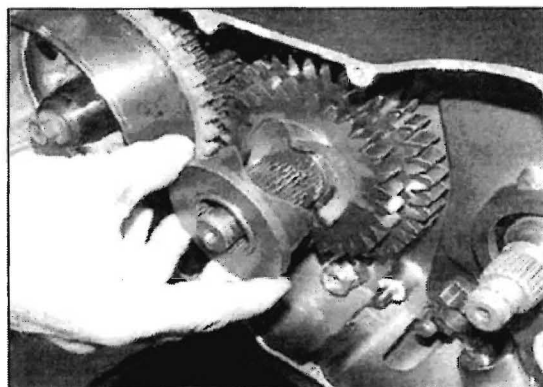
1. Remove primary cover (page 9.8).
2. Lock the engine to prevent rotation with the lock tool or lock the crankshaft as described on page 9.12.

Engine lock tool PV-43502-A

3. Remove torque compensator stake nut and discard.
4. Remove retainer plate and Belleville springs. Note orientation of washers (concave edges of washers face each other) for installation.



5. If working on a late build type compensator (see "PRIMARY DRIVE ASSEMBLY VIEW & TORQUE" on page 9.21 for identification), collect the spacer off of the balance shaft, beneath the retainer plate.
6. Remove outer ramp.



7. Remove compensator sleeve, washer and gear as an assembly.

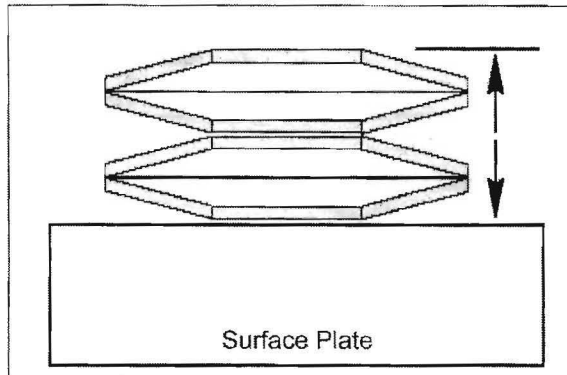


TORQUE COMPENSATOR INSPECTION (Early Build)

1. Inspect all parts for excessive galling or damage.

NOTE: Some polishing will be evident between the compensator gear and the compensator slider and is a normal condition. Replace assembly if ramps are worn.

2. Measure free length of torque compensator spring stack.



Specification: Compensator Spring Stack Height
Standard: 17.68-18.08mm
(.696 - .712 inch)

9.22

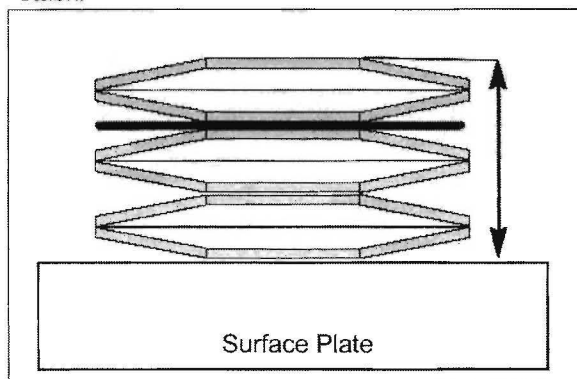


TORQUE COMPENSATOR INSPECTION (Late Build)

1. Inspect all parts for excessive galling or damage.

NOTE: Some polishing will be evident between the compensator gear and the compensator slider and is a normal condition. Replace assembly if ramps are worn.

2. Measure free length of torque compensator spring stack.

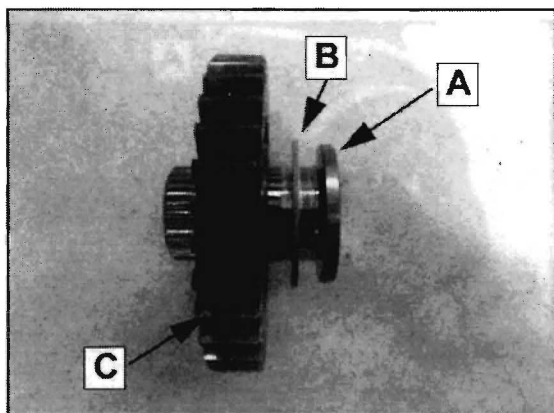


Specification: Compensator Spring Stack Height
Standard: 22.67mm (.893 inch)

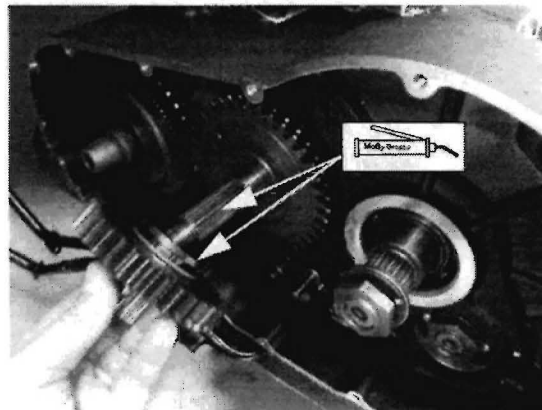
TORQUE COMPENSATOR INSTALLATION

NOTE: Make sure that the driven split gear is fully engaged with the drive (crankshaft) gear before proceeding.

1. Assemble the torque compensator sleeve (A), washer (B) and gear (C) as shown.

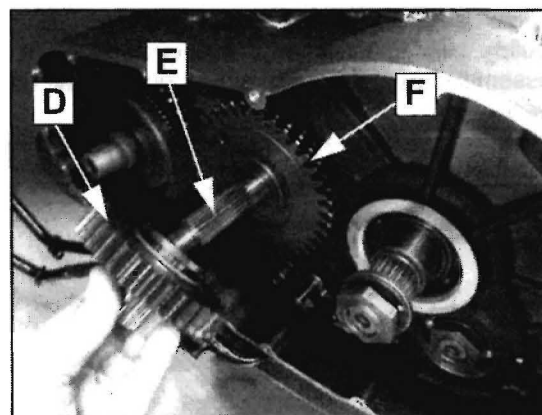


2. Apply Moly Assembly Paste 2871460 to shaft splines, sleeve, washer and back side of gear.

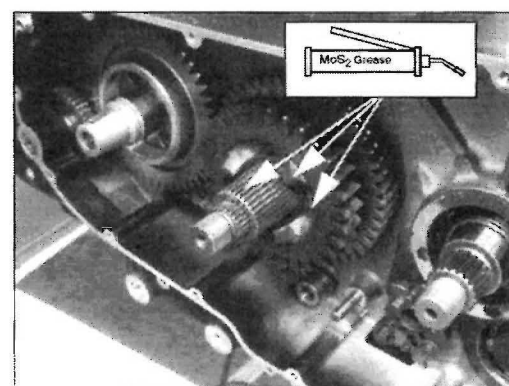


Moly Assembly Paste: 2871460

3. Slide torque compensator gear assembly (D) onto balance shaft (E) and seat it firmly against split gear (F).

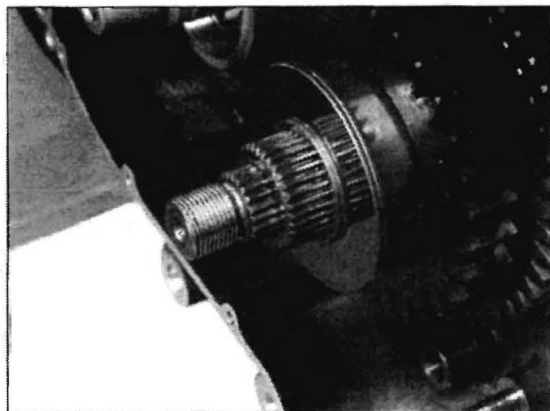


4. Grease the peaks and valleys gear, sliding ramp, and splines of sleeve.

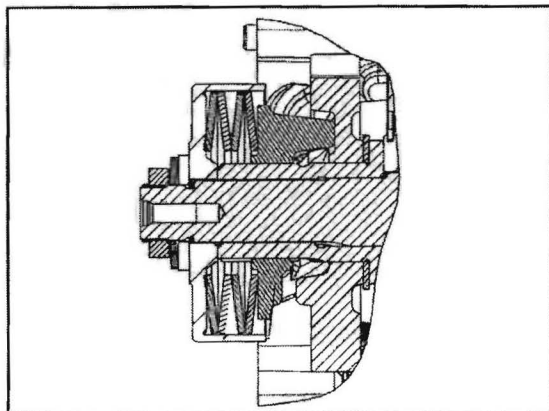


CLUTCH, PRIMARY, & SHIFT LINKAGE

5. Install sliding ramp.

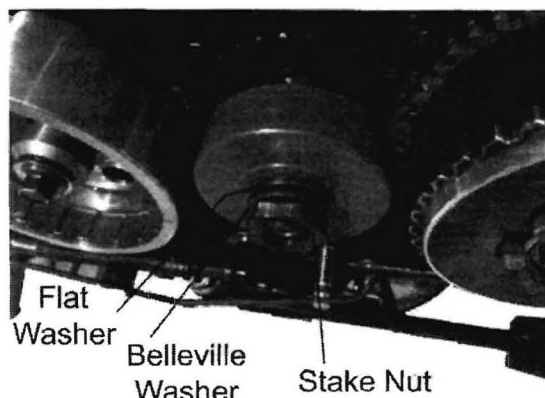


6. If working on a late build type compensator (see "PRIMARY DRIVE ASSEMBLY VIEW & TORQUE" on page 9.21 for identification), place the spring retainer spacer on the end of the balance shaft.
7. Grease edges of springs and retainer plate. Illustration below shows correctly assembled springs (Early Build), with concave edge facing each other. The assembled sets of spring washers are stacked back to back.



8. Install retainer plate and Belleville spring assembly, pushing it onto splines as far as possible.
9. **Clean balance shaft threads thoroughly** to remove all old locking agent, oil, or grease.

10. **Early Build** (shown below)- Install the flat washer, Belleville washer and a new stake nut.
Late Build - Install the Belleville washer and a new stake nut.



11. Hold shaft by inserting lock tool or pin the crankshaft.
12. Torque nut to 170 Nm (125 lb-ft.).

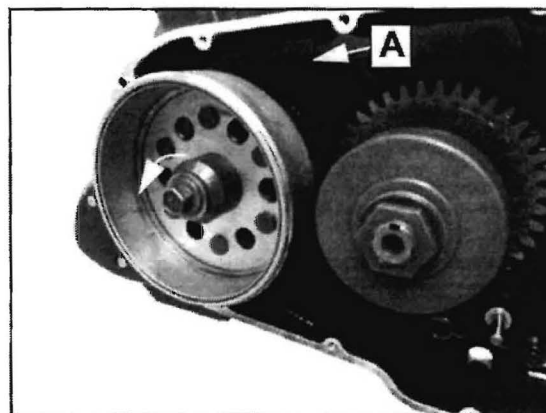
Engine Lock Tool PV-43502-A

TORQUE: Compensator Nut
170 Nm (125 lb-ft)

13. Install primary cover (refer to page 9.11).
14. Fill engine oil to proper level.

ROTOR (FLYWHEEL) REMOVAL

1. Remove primary cover (page 9.8) and rotor retaining bolt (counterclockwise). Lock the engine to prevent rotation with the lock tool (insert at point A) or lock the crankshaft as described on page 9.12.

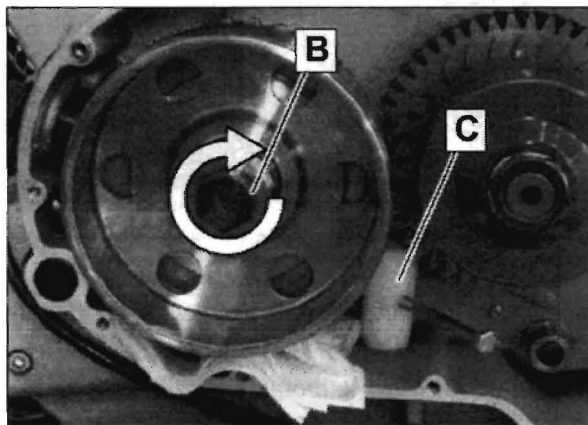


Engine lock tool PV-43502-A

CAUTION

Use caution when removing nut and keep hands and body clear in case tool slips off gear.

2. Remove lock tool.
3. Cover crankcase cavity under rotor with a clean shop towel to prevent parts from falling into case.



4. Install puller (B). Install lock tool (C) on bottom of gear and rotate puller clockwise to remove rotor.

Rotor Puller PV-43533

5. Remove rotor and key.

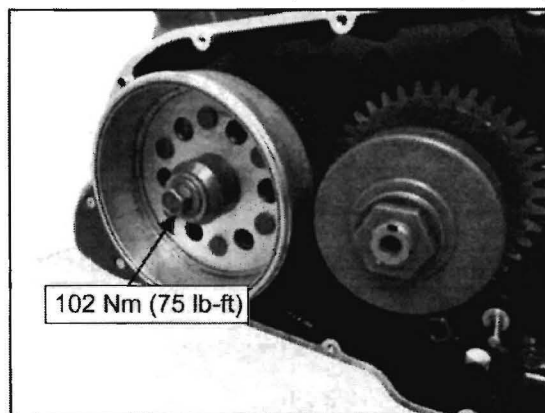
ROTOR (FLYWHEEL) INSTALLATION

1. Clean taper of rotor and crankshaft thoroughly.
2. Install key in key way on crankshaft.
3. Align rotor key-way and install rotor on crankshaft.

Engine Lock Tool PV-43502-A

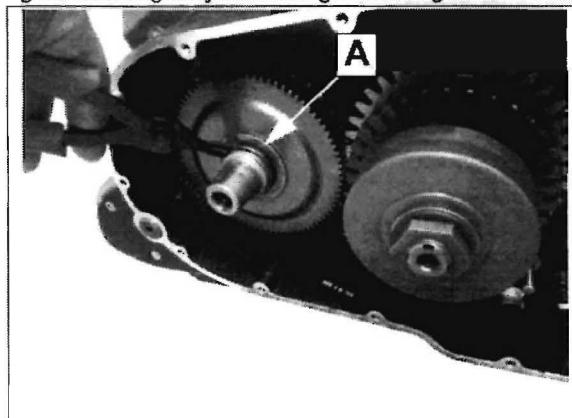
4. Position the lock tool as for rotor removal (C, previous photo) or lock the crankshaft as described on page 9.12.

5. Install washer & bolt. Torque to 102 Nm (75 lb-ft).



SPLIT GEAR REMOVAL

1. Remove primary cover (page 9.8).
2. Remove rotor (page 9.24).
3. Remove clutch assembly (page 9.14).
4. Remove torque compensator (page 9.22).
5. Remove starter gear retaining ring (A) with a flat-billed external ring pliers. Remove any burrs from crankshaft ring groove before removing starter gear, or starter gear bushing may be damaged when gear is removed.

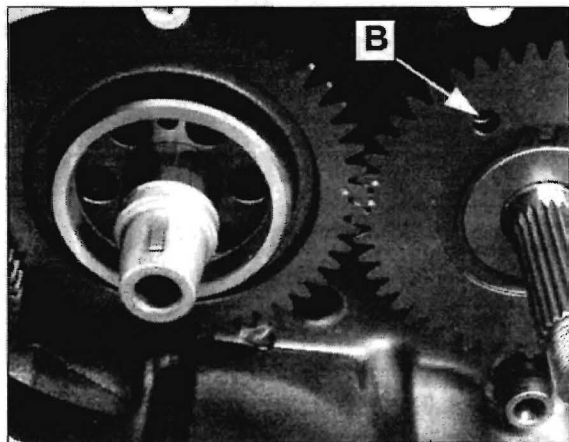


6. Remove torque compensator (page 9.22).
7. Temporarily install rotor to rotate engine until key is pointing up, and timing marks on split gear are aligned with mark on crankshaft gear.



CLUTCH, PRIMARY, & SHIFT LINKAGE

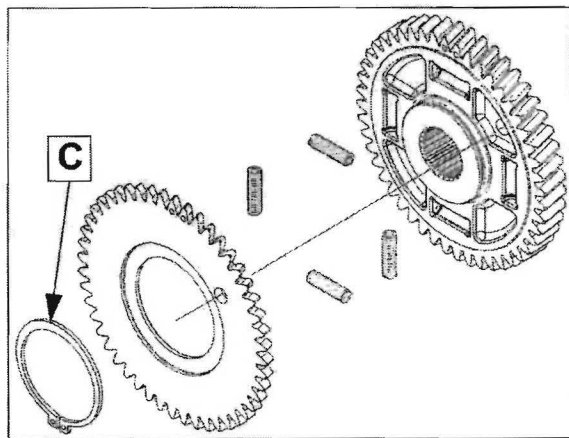
8. Insert a 1/4" pin punch in gear alignment hole (B) to relieve spring pressure on gear teeth.



9. Pull split gear off balancer shaft.

SPLIT GEAR INSPECTION

1. Remove retaining ring (C) from split gear hub and separate outer gear from inner gear. Visually inspect contact surfaces of gears, springs, spring channels, and gear teeth.

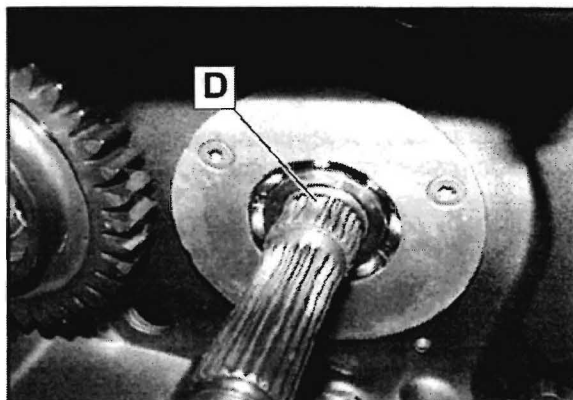


NOTE: Some normal polishing may be evident in the spring channels of gears. Replace the gear assembly if wear is evident.

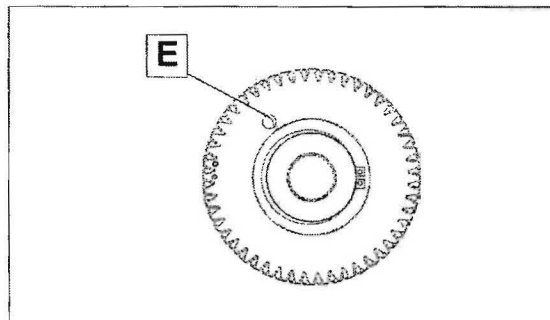
2. After assembly, outer gear must rotate and return freely without binding on inner gear.

SPLIT GEAR INSTALLATION

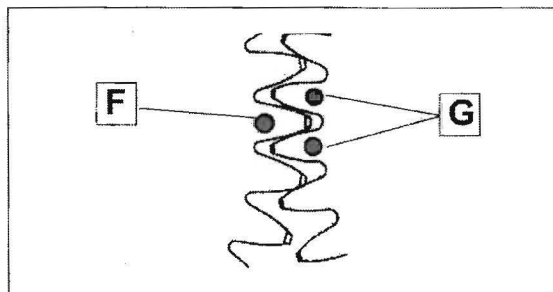
1. Rotate balance shaft until "boss" spline (D) (double wide spline) is at 12:00 o'clock position.



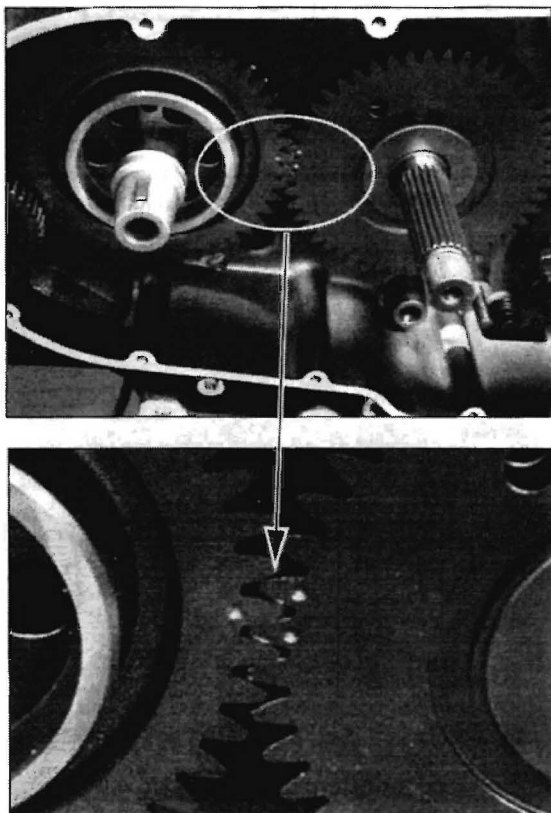
2. Apply grease to balance shaft and back of split gear assembly.
3. Line up teeth of split gear assembly with 1/4" straight pin in hole (E). Leave pin in place.
4. Do not allow pin to protrude out the back of the split gear assembly.



5. Place split gear on balance shaft with alignment dots at the 9:00 o'clock position.
6. Align "boss" splines of balance shaft and split gear while engaging crankshaft gear with split gear. Dot on crankshaft gear (F) must be between the 2 dots on balance gear (G).



7. Push split gear inward until fully seated and flush with crankshaft gear. Verify proper balance shaft timing.



8. Install torque compensator (page 9.22), starter gear (page 9.29), rotor (page 9.25), clutch (page 9.20), and primary cover (page 9.11).

STARTER DRIVE

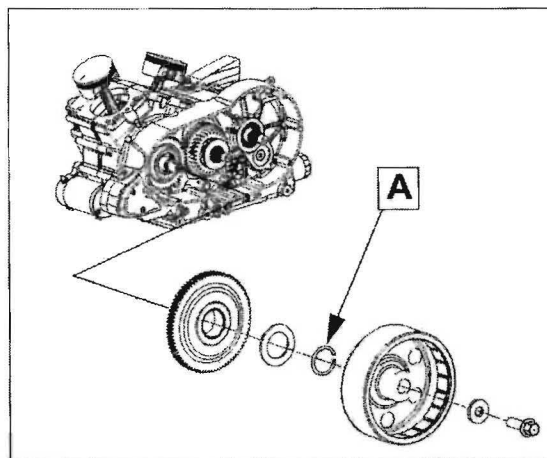
STARTER DRIVE REMOVAL

NOTE: The starter gear and primary drive (crankshaft) gear must be removed before the starter idler gear or starter torque limiter clutch and shaft can be removed from crankcase.

1. Remove primary cover (page 9.8).
2. Remove rotor (page 9.24).

Rotor Puller PV-43534

3. Place a shop towel in the crankcase cavity.
4. Remove starter gear retaining ring (A) with a flat-billed external ring pliers. Remove any burrs from crankshaft ring groove before removing starter gear, or starter gear bushing may be damaged when gear is removed.

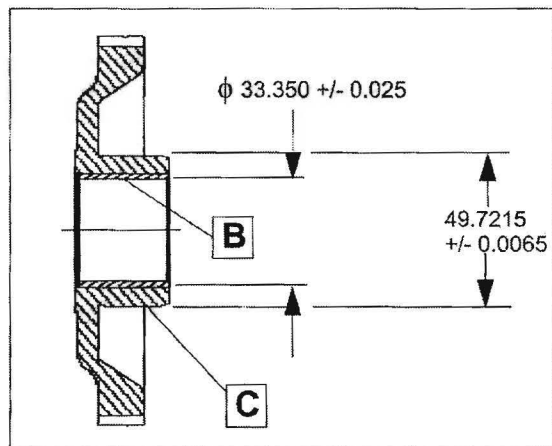


5. Remove flat washer and gear.

CLUTCH, PRIMARY, & SHIFT LINKAGE

STARTER GEAR INSPECTION

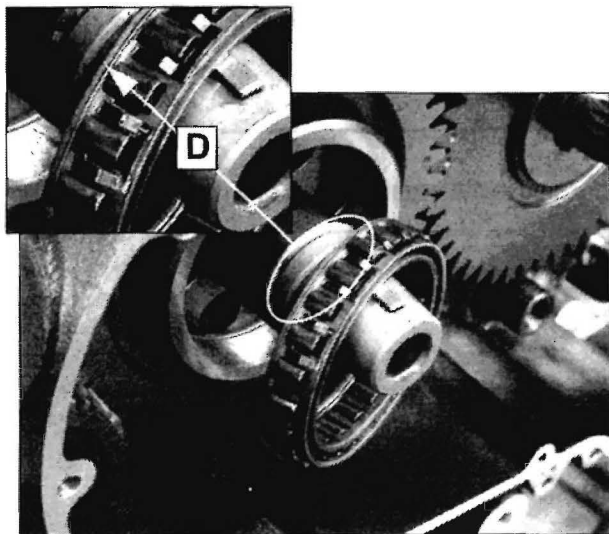
1. Inspect gear teeth for chips, cracks or excessive wear.



2. Inspect bushing (B) for excessive wear and scoring.
3. Inspect one-way clutch hub (C) for wear, scoring or rough surface.
4. Measure I.D. of bushing and O.D. of one-way clutch hub and compare to specification.
5. Replace gear if wear or damage is evident.

STARTER CLUTCH REMOVAL / INSPECTION

1. Remove one-way clutch from primary drive gear.
2. Note direction of one-way clutch with flanged side (D) inward (toward engine) for reassembly.

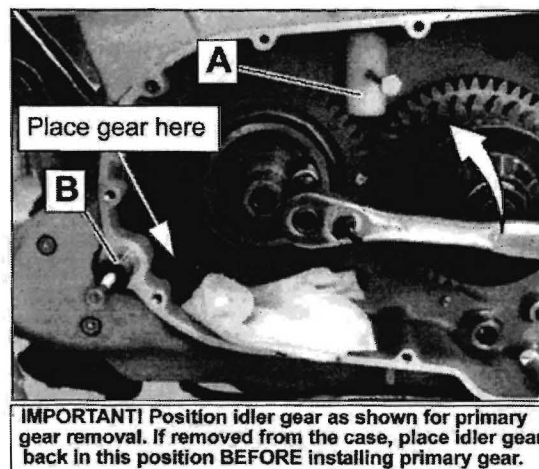


3. Inspect cage for cracks. Check band springs for tension and proper function.
4. Inspect clutch lobes for wear, galling, or rough surface.
5. See "STARTER GEAR / STARTER CLUTCH INSTALLATION" on page 9.30

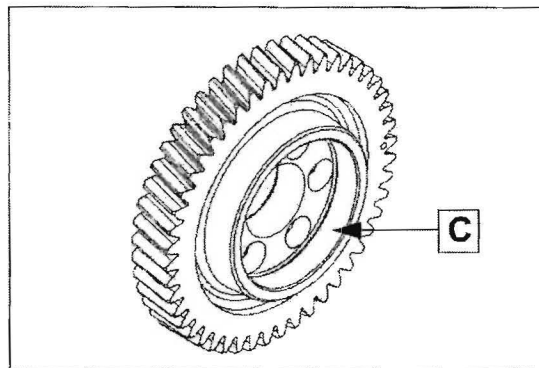
PRIMARY DRIVE GEAR

PRIMARY DRIVE GEAR REMOVAL / INSPECTION

1. Install engine lock tool in position (A) to hold crankshaft gear stationary while removing bolts.
2. Remove primary gear screws. NOTE: Install new screws with pre-applied locking agent upon assembly.
3. Use a primary cover screw to pull idler gear shaft (B).



4. Pull primary drive gear off crankshaft.
5. Remove idler gear from crankcase.
6. Inspect clutch hub surface (C) inside primary drive gear for wear, scoring, nicks, or rough surface.



7. Inspect gear teeth on idler and primary drive gear for chips, cracks or excessive wear.
8. Remove starter drive cover.



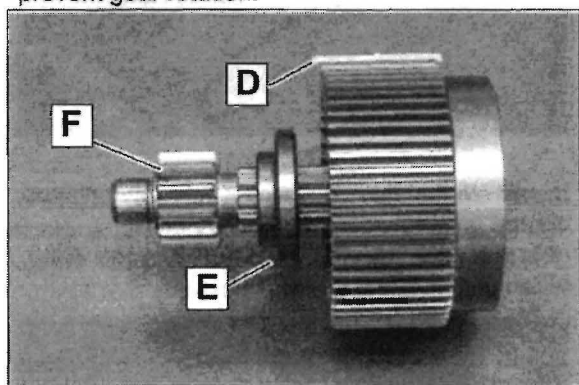
- Pull torque limiter clutch shaft out through cover opening with washer.

NOTE: Stepped side of washer faces out (toward gear) and flat side of washer is against limiter clutch (inset).

- Remove torque limit clutch.

STARTER TORQUE LIMIT CLUTCH INSPECTION

- Mount torque limit clutch in a soft jawed vise across entire gear face (D). Clamp only tight enough to prevent gear rotation.



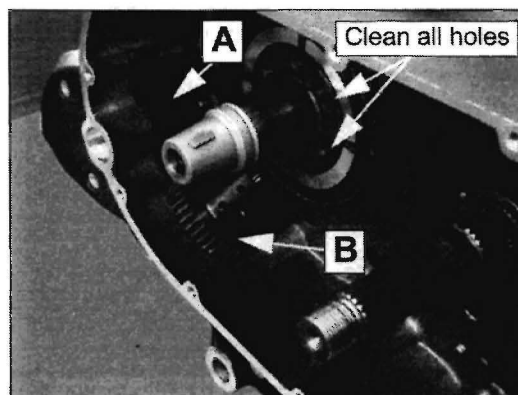
- Install shaft with spacer (E).
- Use a 19mm 12 point socket on gear (F).
- Read torque at point of clutch slip.

Limit Clutch Break-Away Torque:
Standard: 46-61 Nm (35-45 lb.-ft.)
Service Limit: 40 Nm (30 lb.-ft.)

PRIMARY DRIVE GEAR INSTALLATION

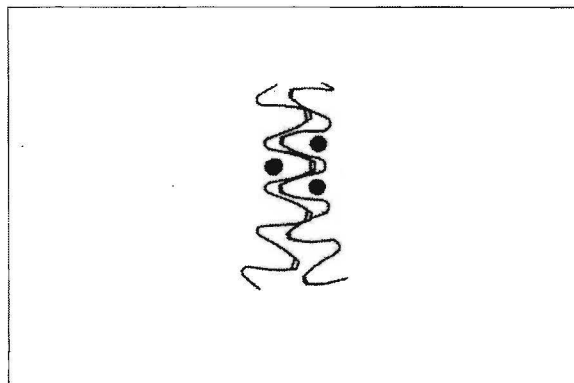
- Clean mating surfaces of crankshaft and gear.
- Clean screw threads in crankshaft to remove all locking agent, oil, and grease with Loctite™ Primer N and dry with low pressure air.

NOTE: Starter torque limit clutch (A) and idler gear (B) **MUST** be placed in the case **before** the primary drive gear is installed.



- Place idler gear in crankcase but do not install shaft.
- Temporarily install rotor to rotate engine until key is pointing UP. Remove rotor.
- Install primary gear on crankshaft with dot on gear at the 3:00 position (90 degrees to the rear).

9

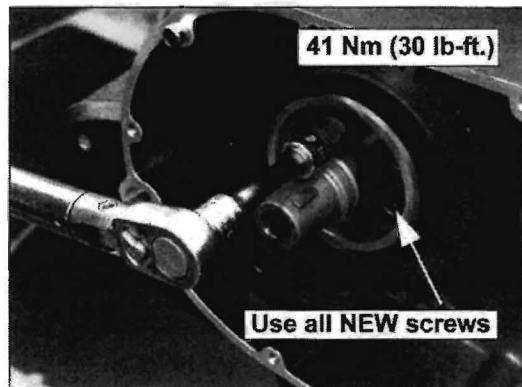


- Engage teeth of primary gear and split gear, with dot on primary gear between two dots on split gear.
- Place engine lock tool between bottom of inner split gear and crankcase.

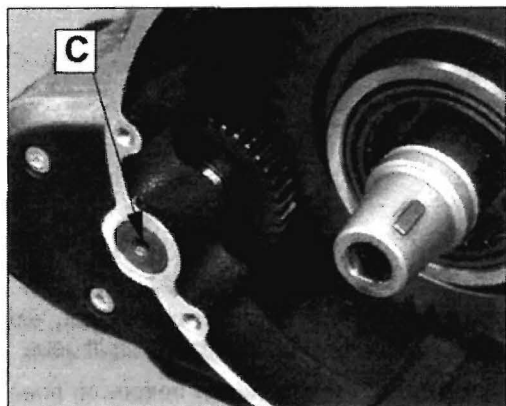


CLUTCH, PRIMARY, & SHIFT LINKAGE

8. Install drive gear. If split gear is installed, rotate drive gear clockwise against spring pressure until split gear teeth align. Push gear in and rotate until pin on crankshaft aligns with hole on the back of drive gear. Primary and split gear teeth will be flush if fully seated.



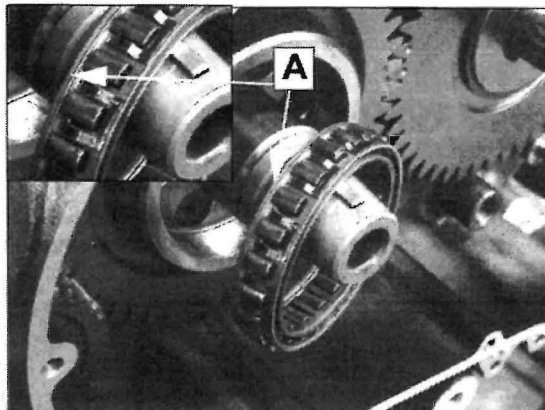
9. Install new primary drive gear screws. These screws have a pre-applied locking agent. Always replace these screws if loosened or removed.
10. Install screws and torque in 2 steps following a star pattern to 41 Nm (30 lb-ft.). Repeat final torque on all screws.
11. Install idler gear and shaft (C).



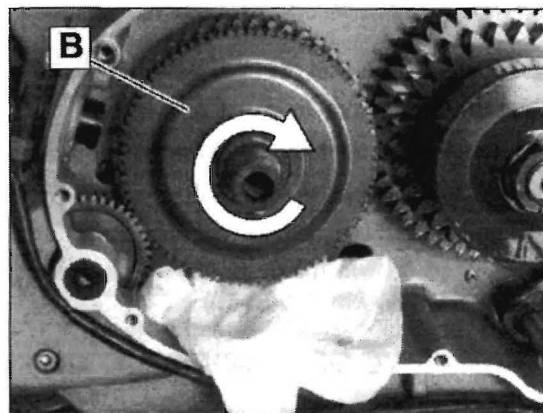
12. Install starter clutch and gear (page 9.30).

STARTER GEAR / STARTER CLUTCH INSTALLATION

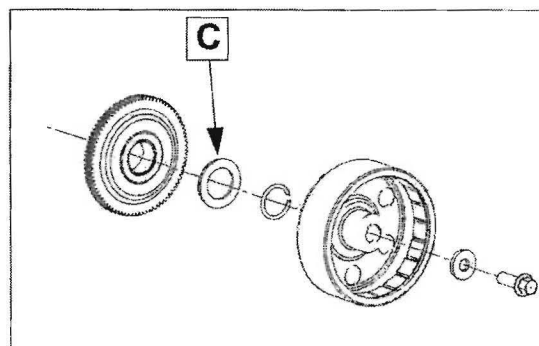
1. Install one-way clutch with raised edge (A) inward (toward primary gear).



2. Install starter gear (B). When properly installed, the starter gear should rotate smoothly in a clockwise direction and lock to the primary gear when you attempt to rotate it counterclockwise.



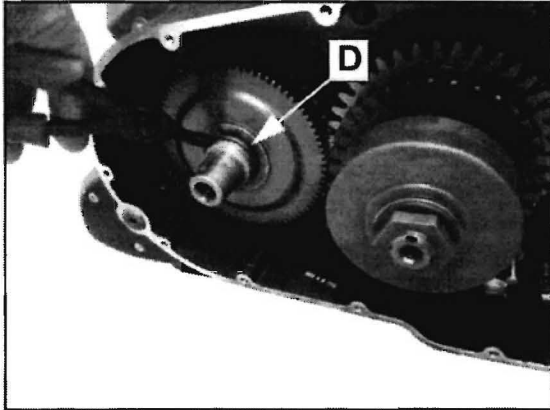
3. Install washer (C).



9.30



4. Install retaining ring (D).



5. Install rotor (page 9.30).
6. Install primary cover (page 9.11).
7. Check engine oil and fill to proper level.



TROUBLESHOOTING**TROUBLESHOOTING**

PROBLEM	POSSIBLE CAUSE	PART(s) AFFECTED	REPAIR RECOMMENDED
Clutch Lever Pulls Excessively Hard	Clutch lever pivot, bushings, ferrules need lubrication	Clutch lever pivot points	Lubricate
	Drive plates catching on primary driven gear basket	Clutch primary driven gear/clutch plates	Replace necessary parts
	Clutch lifter plate bearing damage	Clutch plate bearing lifter	Replace
	Damaged clutch lifter mechanism	Clutch release mechanism	Repair as necessary
Clutch Slips	Clutch spring weak	Clutch spring	Replace
	Clutch spring snap ring loose or broken	Clutch spring snap ring	Repair or replace as necessary
	Pressure plate worn, warped or distorted	Pressure plate	Replace
	Clutch plate(s) worn, warped or distorted	Driven plates or drive plates	Replace
	Clutch lifter mechanism sticking	Clutch lifter mechanism	Repair
	Engine oil level low	Oil level	Correct
	Oil additives present in oil or used previously	Oil quality	Replace oil & filter (clutch plates may need to be replaced)
Dragging Clutch (doesn't disengage completely, creeping, hard to find Neutral)	Clutch lever, pivot, cable, or lifter arm sticking	Lever, pivots, bushings, bearings, cable	Inspect
	Oil additives present in oil or used previously	Oil quality	Replace oil & filter (clutch plates may need to be replaced)
	Oil level too high	Oil level	Correct
	Oil viscosity too high	Oil quality	Replace oil & filter
	Pressure plate worn, warped or distorted	Pressure Plate	Replace
	Clutch plate(s) worn, warped or distorted	Driven plates and/or drive plates	Replace
	Weak clutch spring	Clutch springs	Replace all



PROBLEM	POSSIBLE CAUSE	PART(s) AFFECTED	REPAIR RECOMMENDED
Transmission Will Not Shift	Broken shift drum	Shift drum	Replace shift drum
	Bent shift forks	Shift fork	Replace shift forks
	Worn shift drum	Shift drum	Replace shift drum
	Broken gears	Transmission gears	Replace broken gear(s)
	Damaged/broken bearings	Transmission, shift cam bearings	Replace bearings that fail inspection
	Worn gear shift pawl ratchet mechanism	Shift pawl mechanism	Replace parts that fail inspection
	Broken or dislodged shift shaft return spring	Shift shaft return spring	Repair or replace
	Roller detent arm stuck	Roller detent arm	Repair or replace parts
	Bent shift shaft (internal)	Shift shaft	Repair or replace
	External shift linkage binding or damaged	External shift linkage	Repair or replace
	Bent or distorted shift forks	Shift fork	Replace
	Bent or distorted shift fork rails	Shift fork rail	Replace
	Broken transmission components	Transmission components	Repair or replace
Transmission Hard to Shift	Improper clutch operation	Clutch	Inspect, repair
	Incorrect oil viscosity	Oil quality	Replace engine oil
	Incorrect clutch cable adjustment	-	Adjust
	Shift shaft damaged	Shift shaft components	Repair or replace
	Sticking pivot point, bent external shift linkage	External shift linkage	Repair or replace
	Bent or distorted shift forks	Shift forks	Replace
	Damaged shift drum grooves	Shift drum	Repair or replace
	Shift detent plunger stuck	Shift detent plunger	Repair or replace
	Bent/binding shift fork rails	Shift fork rails	Repair or replace
Transmission Jumps Out of Gear	Broken / loose stop pin	Shift stop pin	Replace
	Worn shift drum or shift drum ratchet	Shift drum or shift linkage	Replace
	Broken shift return spring	Shift return spring	Replace
	Damaged shift drum grooves	Shift drum	Replace
	Bent or worn shift forks	Shift forks	Replace
	Bent/binding shift fork rails	Shift fork rails	Replace
	Worn engagement dogs on transmission gears	Transmission gears	Replace
Transmission Noise	Drive belt tension incorrect	Drive belt	Adjust or replace
	Clutch plates bind or drag when clutch is disengaged	Clutch plates / hubs	Adjust / repair / replace
	Gear/bearing wear/damage	Transmission components	Inspect / replace



NOTES

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CHAPTER 10

TRANSMISSION & CRANKSHAFT

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GENERAL

SERVICE INFORMATION

- Remove engine from frame to service internal transmission and/or crankshaft components (Chapter 6)
- The crankcase must be separated to access internal transmission components and crankshaft. Remove:
 - Cylinder heads
 - Cylinders & pistons
 - Gear shift linkage
 - Primary cover and components (as required depending on needed access to other components)
 - Regulator / Rectifier and Bracket
 - Starter motor
- Label and store parts neatly to speed the assembly process and ensure that matched parts like connecting rods, camshaft carriers and bearings can be installed in their original location
- Crankshaft main bearing replacement requires line boring. This procedure requires full machine shop capabilities and specialized knowledge. It is recommended that a qualified machine shop perform this procedure if it becomes necessary or replace the crankcase assembly
- Crankshafts and connecting rods are color coded for manufacturing tolerances with a white or red paint mark (or stamped "R" or "W"). See page 10.19
- All torque specifications are "dry" unless specified for oil or locking agent. Refer to exploded views
- When locking agents are required, use Loctite™ Primer N to clean fastener before applying locking agent
Primer N reduces cure time of thread locking agent in addition to preparing the surfaces

SPECIAL TOOLS

CRANKCASE / CRANKSHAFT / CONNECTING ROD SPECIAL TOOLS

Crankshaft Main Bearing Protector: PV-47207

Crankcase Separator: PV-47332B (MY11 complete new kit), or PV-47332A & PV-50371 (PV-50371 updates PV-47332A for MY11 engines).

Crankcase Assembly Tools:

Base Tool: PV-45030

Collar: PV-46299 (M36 x 1.50 thread for use with PV-45030)

Assembly Adapter: PVX-47429 (for use with PV-45030)

Drive Sprocket Seal Installer: PV-43505A

Clutch Shaft Installation Tool: PV-47331

SPECIFICATIONS

DRIVE TRAIN

Item		Specifications
Drive Train (General)	Transmission	6 Speed (Overdrive)
	Primary Reduction Ratio	1.48: 1
	Final Reduction Ratio (High-Ball)	2.12: 1 (2.0:1)
Drive Train (Gear Ratios)	Gear Ratio: 1st Gear	3.13: 1
	Gear Ratio: 2nd Gear	2.02: 1
	Gear Ratio: 3rd Gear	1.50: 1
	Gear Ratio: 4th Gear	1.20: 1
	Gear Ratio: 5th Gear	1.00: 1
	Gear Ratio: 6th Gear (Overdrive)	0.87: 1

10.2



CONNECTING ROD AND CRANKSHAFT SPECIFICATIONS

CRANKSHAFT and COMPONENTS			
Part	Part Specific	Standard	Service Limit
Connecting Rod	Connecting Rod to Crankshaft Side Clearance	.22 - .42 mm (.0087 - .0165")	.65 mm (.025")
	Connecting Rod Bearing to Crankshaft Oil Clearance	.0254 - .0635 mm (.001 - .0025")	.11 mm (.0043")
	Connecting Rod Small End I.D.	22.01 - 22.02 mm (.8665 - .8670")	22.09 mm (.8694")
	Connecting Rod Width	20.28 - 20.34 mm (.798 - .801")	20.03 mm (.788")
	Connecting Rod Big End I.D. (White)	50.84 - 50.85 mm (2.0016 - 2.0020")	50.89 mm (2.0031")
	Connecting Rod Big End I.D. (Red)	50.85 - 50.86 mm (2.0019 - 2.0024")	50.89 mm (2.0034")
Crankshaft Main Bearing / Rod Journals	Connecting Rod Journal Width	40.00 - 40.58 mm (1.5748 - 1.5976")	41.35 mm (1.627")
	Crankshaft Rod Journal O.D. (White)	47.970 - 47.978 mm (1.888 - 1.889")	47.94 mm (1.8871")
	Crankshaft Rod Journal O.D. (Red)	47.978 - 47.986 mm (1.8888 - 1.8891")	47.95 mm (1.8875")
	Main Bearing Oil Clearance	Left .013 - .060 mm (.0005 - .0023") Right .014 - .061mm (.0005 - .0024")	.10 mm (.004") .10 mm (.004")
	Left Main Bearing Journal O.D.	64.952 - 64.973 mm (2.5571 - 2.5579")	64.93 mm (2.556")
	Right Main Bearing Journal O.D.	59.952 - 59.973 mm (2.3603 - 2.3611")	59.93 mm (2.359")
	Crankshaft End Play	.05 - .30 mm (.0019 - .0118")	-
Balance Shaft	Journal O.D., Left (Primary Side) Journal O.D., Right (Oil Pump Drive Side)	29.980 - 29.992 mm 29.969 - 29.979 mm	-
Transmission			
Shift Fork	Shift Fork I.D. (Dimension A, page 10.9)	12.00 - 12.026 mm (.4725 - .4732")	12.05 mm (.4744")
	Shift Fork Pin O.D. (Dimension B, page 10.9)	6.036 - 6.136 mm (.2376 - .2416")	6.02 mm (.2370")
	Shift Fork Width (Dimension C1 & C2, page 10.9)	C1 5.70 - 5.90 mm (.2244 - .2322") C2 5.10 - 5.30 mm (.2007 - .2086")	C1 5.65 MM C2 5.05 MM
Shift Fork Rail	Shift Fork Rail O.D. (Dimension C, page 10.9)	11.948 - 11.972 mm (.4704 - .4713")	11.92 mm (.4693")
	Shift Fork Rail Runout	-	.025 mm (.001")
Shift Drum	Shift Drum Groove	-	Replace drum if any wear is evident

10

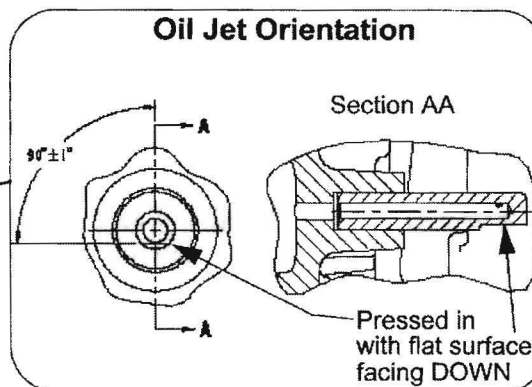
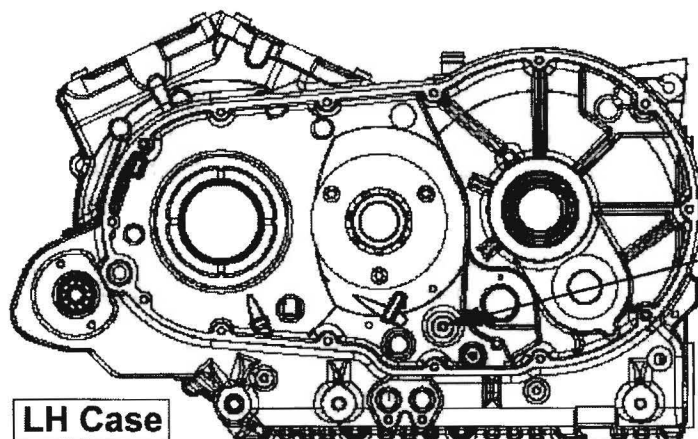
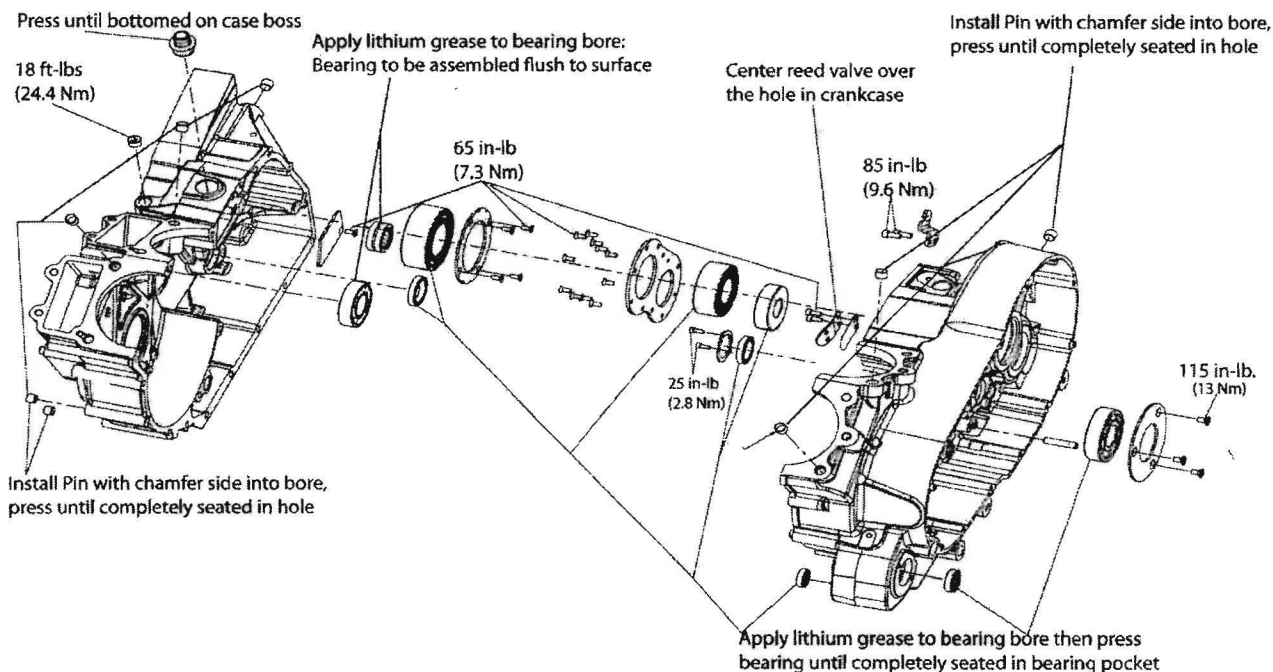


ASSEMBLY VIEWS & TORQUE VALUES

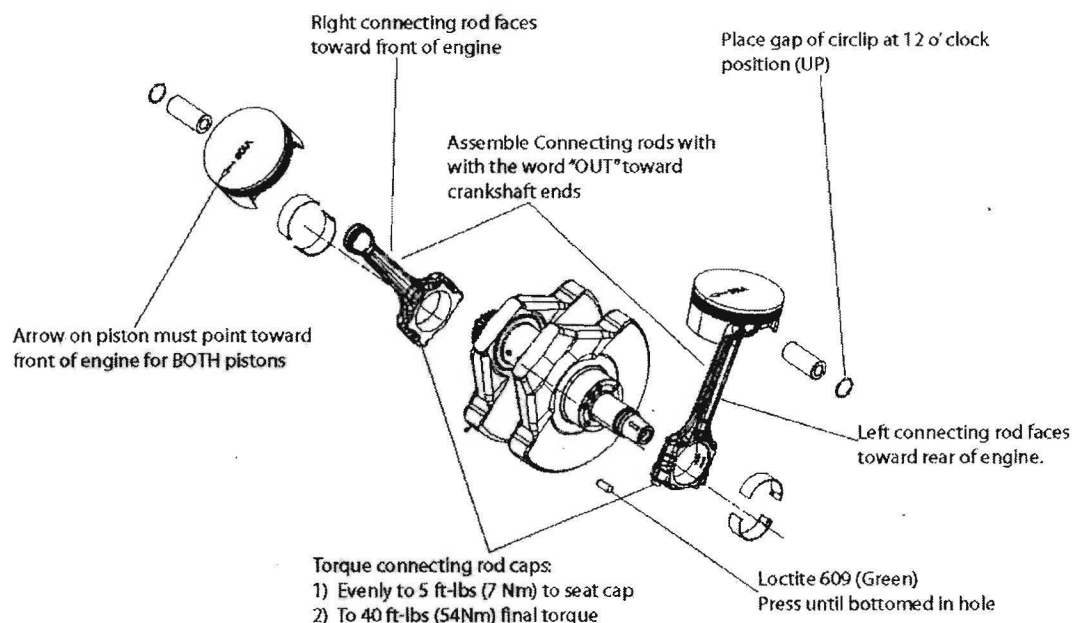
CRANKCASE COMPONENTS

Replace bearing retainer plate screws if removed!

Press bearings by outer race only!



CRANKSHAFT / CONNECTING ROD / CRANKCASE TORQUE PATTERN

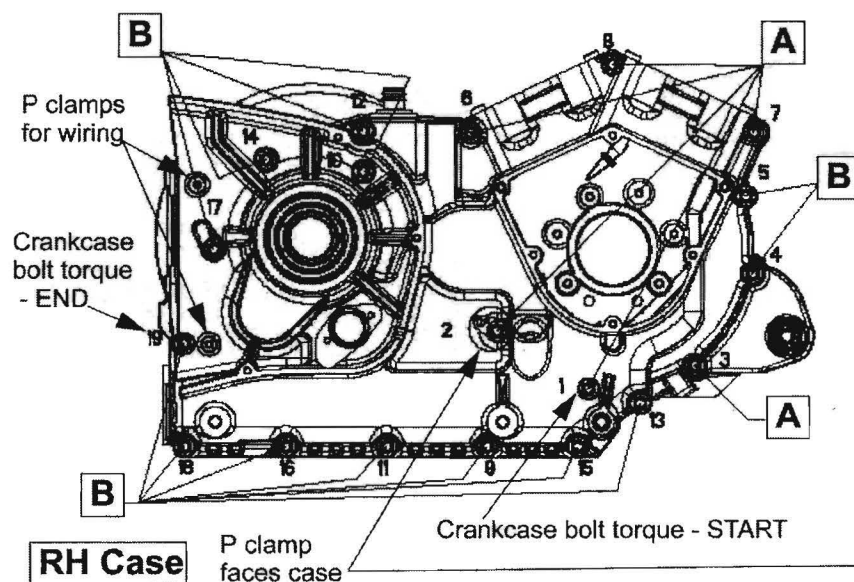


See Page 10.18 for bearing color codes, size chart, and paint numbers

10

CRANKCASE BOLT LENGTH AND TORQUE PATTERN

Crankcase Bolt Torque: Torque bolts in order 1-14 (shown below) in two steps to 30 Nm (22 lb-ft.). Repeat 30 Nm (22 lb ft. torque).



Crankcase Bolt Length:

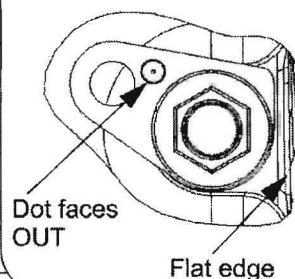
A = 8 x 135

B = 8 x 110

NOTE: Install starter motor with bolts #3 & #4

Bolt #2 (CPS wire guide):

Orient guide as shown below



SERVICE PROCEDURES

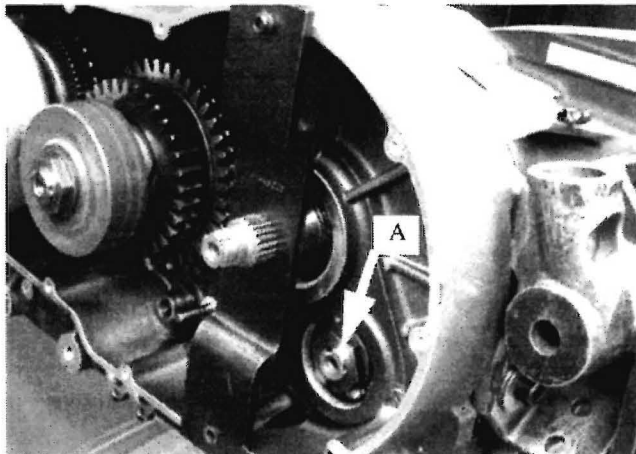
CRANKCASE SEPARATION

1. Drain engine oil.
2. Remove drive sprocket (Chapter 11).
3. Remove regulator / rectifier to avoid damage.
4. Remove engine and mount securely on an engine stand (Chapter 6).
5. Remove primary cover (Chapter 9).
6. Remove cylinder heads (Chapter 7), cylinders and pistons (Chapter 8).
7. Remove shift ratchet, clutch, alt. rotor and starter gear (Chapter 9).

NOTE: For transmission service only, remove:

- Clutch
- Shift drum star
- Countershaft retaining nut (A). Use clutch shaft holder PV-45028 to prevent shaft rotation.

This allows transmission removal after cases are split.



NOTE: For complete engine disassembly, refer to Chapter 9 to remove:

- Flywheel
- Torque compensator
- Starter gear & one way clutch
- Primary drive gear
- Starter idler gear and shaft

8. Remove starter motor.

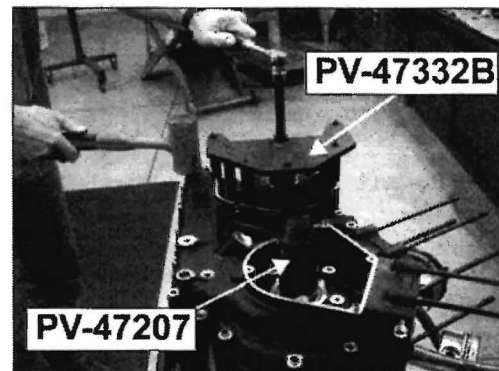
9. Loosen remaining crankcase bolts evenly and remove from case. Note the two different bolt lengths and the locations of each (page 10.5).

10. Install the crankshaft bearing protector over the cam chain drive gear on the crankshaft.

Special Tool: Crankshaft Bearing Protector PV-47207

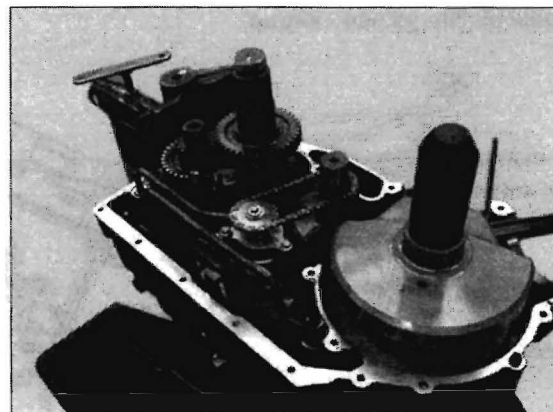
11. Install crankcase separator tool on crankcase over the main shaft and tighten screws. Tighten the center screw while tapping with a soft faced mallet.

Special Tool: Crankcase Separator PV-47332B (MY11 new kit) or PV-47332A & PV-50371 (PV-50371 updates PV-47332A for MY11 and newer engines).



12. Lift crankcase off and remove bearing protector from cam chain drive sprocket.

NOTE: Components such as the crankshaft, oil pump, balance shaft, transmission and shift drum can be removed individually for service.



Refer to the following pages as required:

- Crankshaft Service: Page 10.16
- Oil Pump Service: Page 4.9
- Balance Shaft: Page 10.24
- Shift Drum / Transmission: Page 10.13

10.6

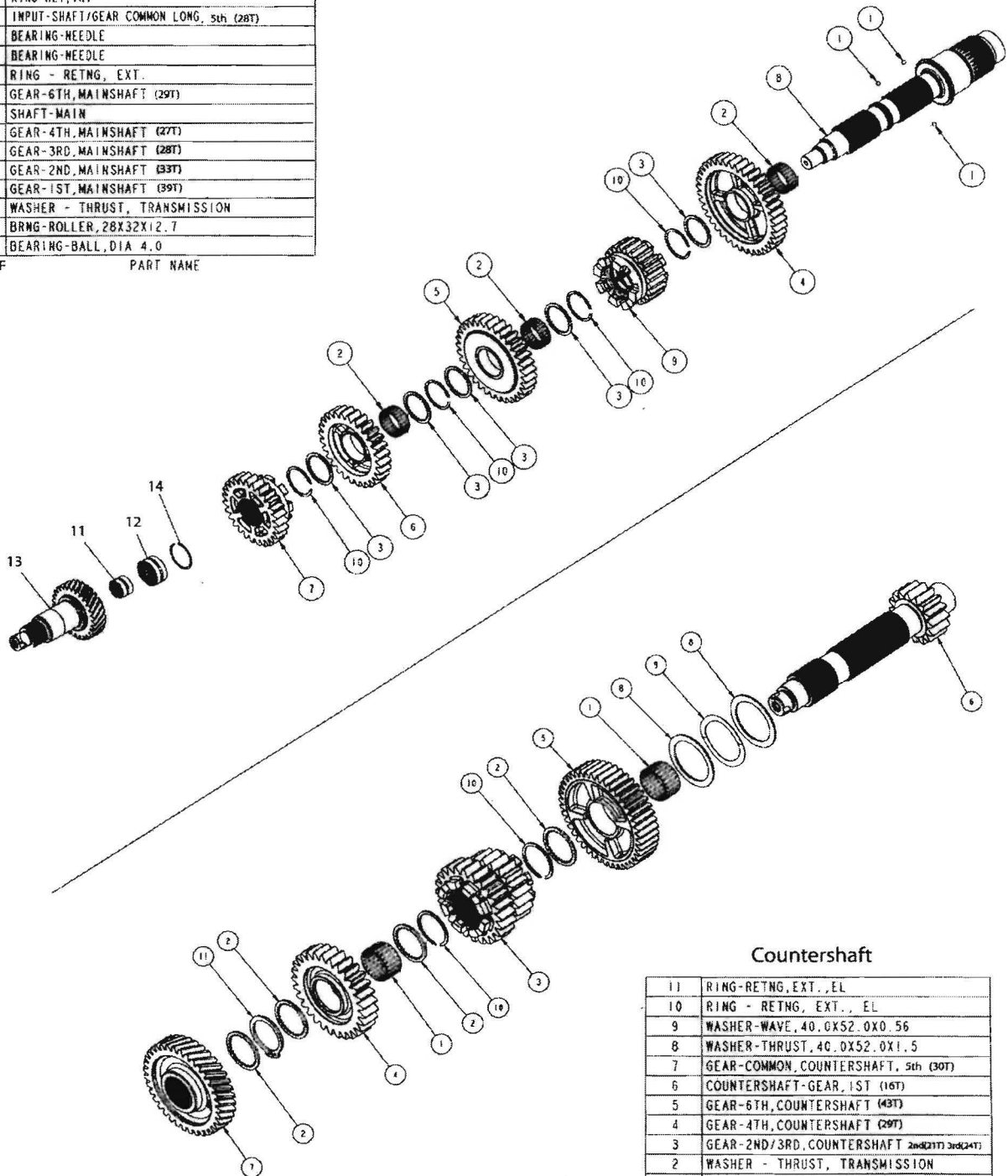


TRANSMISSION ASSEMBLY VIEW

Mainshaft/Clutchshaft

14	RING-RET, INT
13	INPUT-SHAFT/GEAR COMMON LONG, 5th (28T)
12	BEARING-NEEDLE
11	BEARING-NEEDLE
10	RING - RETNG, EXT.
9	GEAR-6TH, MAINSHAFT (29T)
8	SHAFT-MAIN
7	GEAR-4TH, MAINSHAFT (27T)
6	GEAR-3RD, MAINSHAFT (28T)
5	GEAR-2ND, MAINSHAFT (33T)
4	GEAR-1ST, MAINSHAFT (39T)
3	WASHER - THRUST, TRANSMISSION
2	BRNG-ROLLER, 28X32X12.7
1	BEARING-BALL, DIA 4.0

REF PART NAME



Countershaft

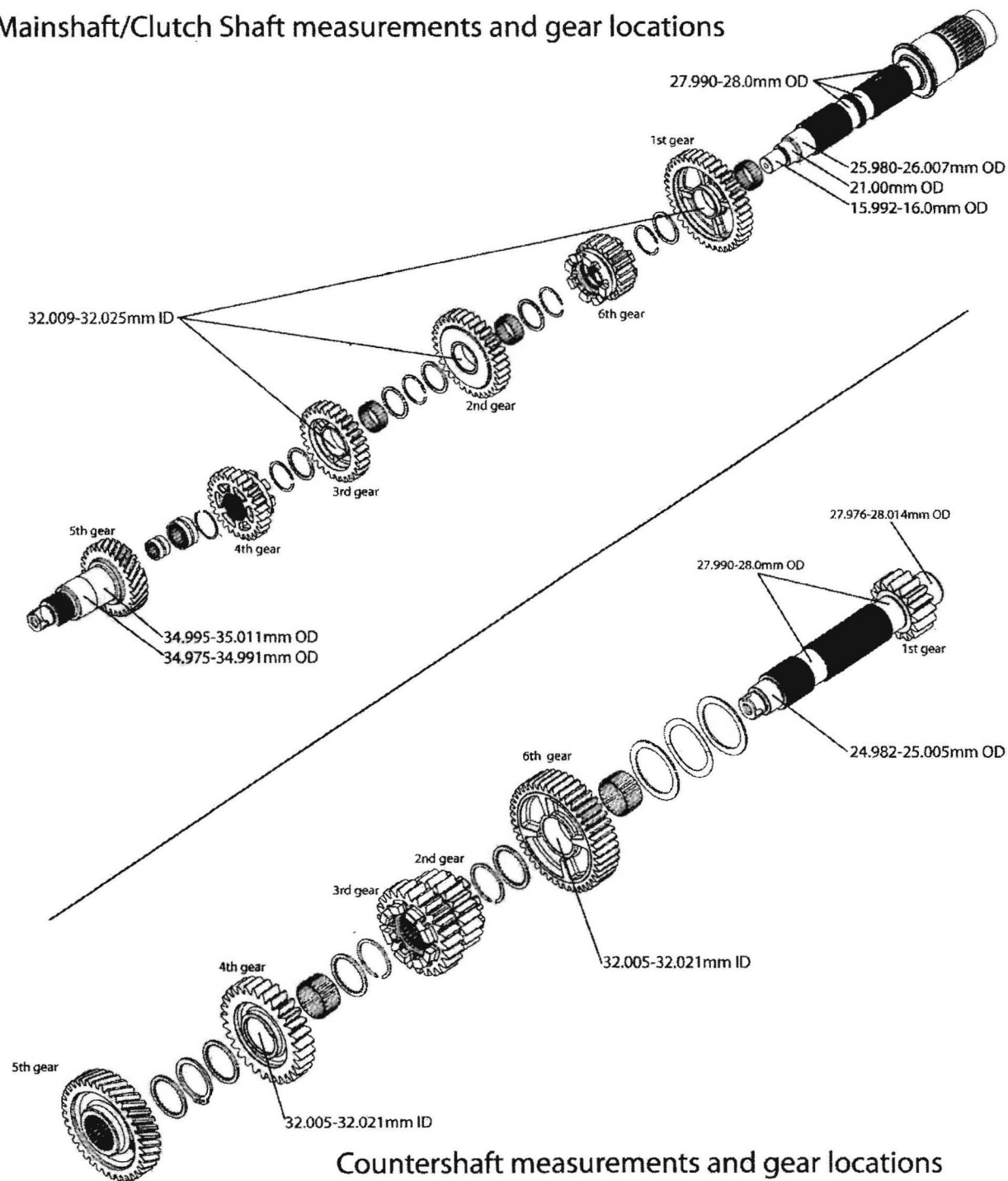
11	RING-RETNG, EXT., EL
10	RING - RETNG, EXT., EL
9	WASHER-WAVE, 40.0X52.0X0.56
8	WASHER-THRUST, 40.0X52.0X1.5
7	GEAR-COMMON, COUNTERSHAFT, 5th (30T)
6	COUNTERSHAFT-GEAR, 1ST (16T)
5	GEAR-6TH, COUNTERSHAFT (43T)
4	GEAR-4TH, COUNTERSHAFT (29T)
3	GEAR-2ND/3RD, COUNTERSHAFT 2nd(21T) 3rd(24T)
2	WASHER - THRUST, TRANSMISSION
1	BEARING-NEEDLE, SPLIT, 28X32X17

REF PART NAME



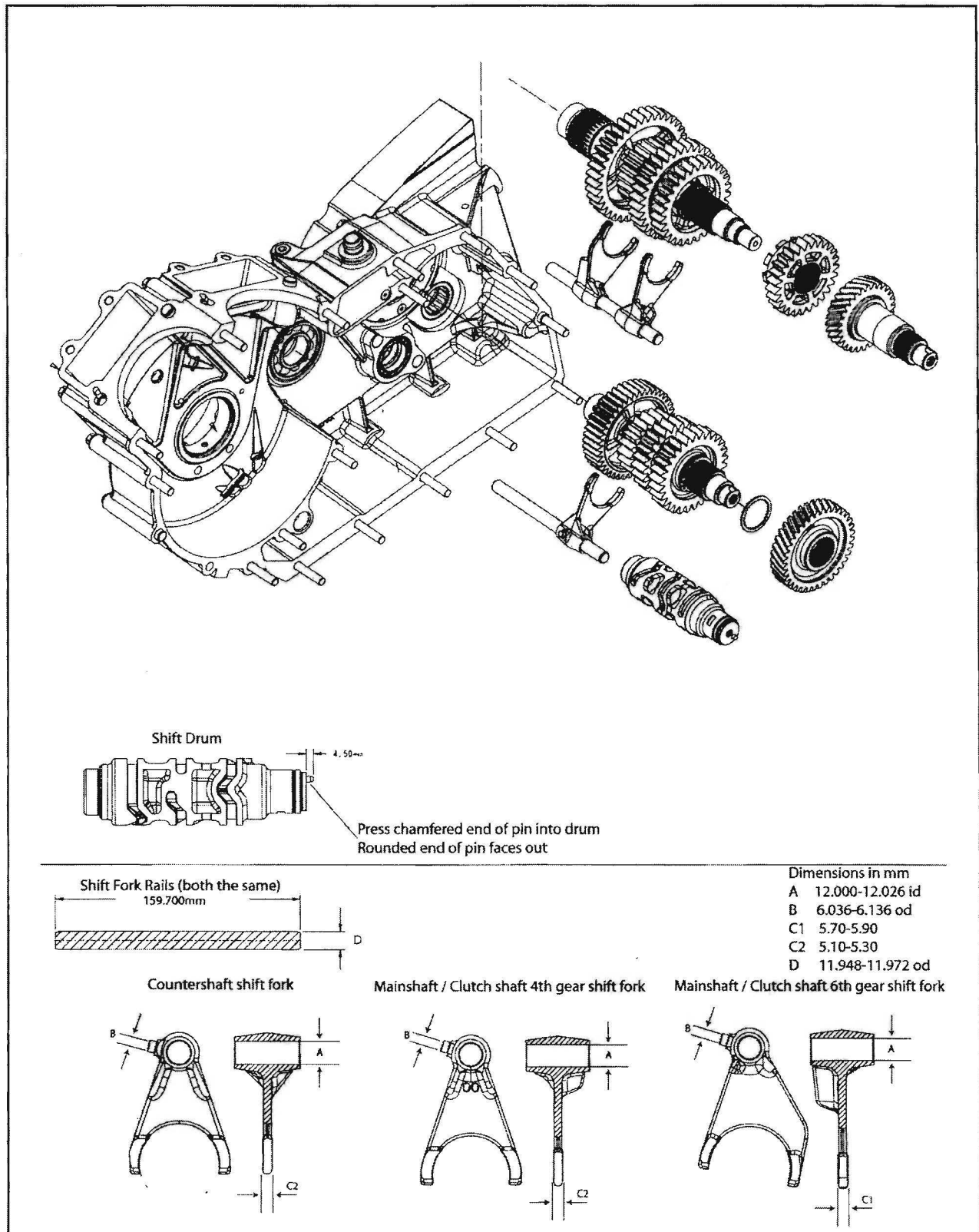
MAINSHAFT / CLUTCH SHAFT ASSEMBLY VIEW

Mainshaft/Clutch Shaft measurements and gear locations



Countershaft measurements and gear locations

SHIFT DRUM AND SHIFT FORK ASSEMBLY VIEW



10

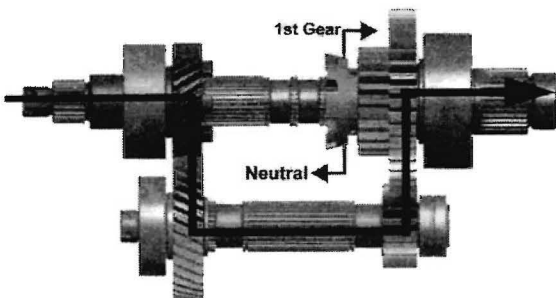


TRANSMISSION & CRANKSHAFT

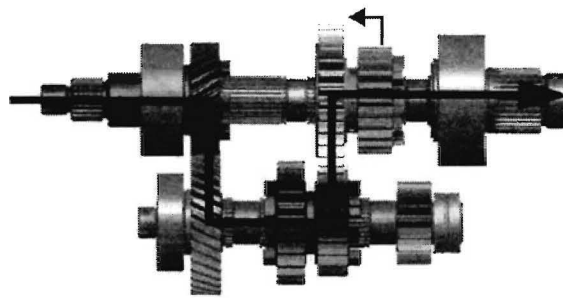
POWER DELIVERY (Typical 6-Speed)

↗ Indicates movement of sliding gear for engagement

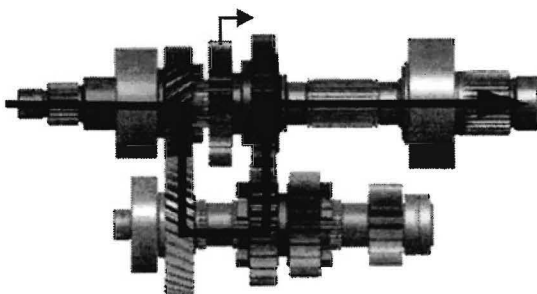
1st Gear & Neutral



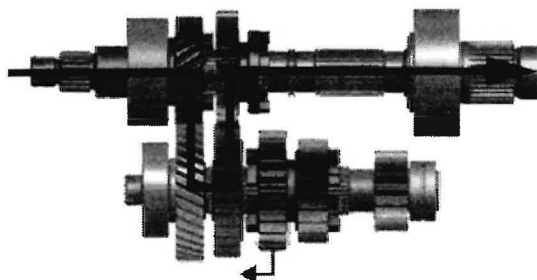
2nd Gear



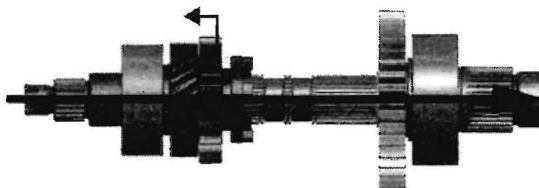
3rd Gear



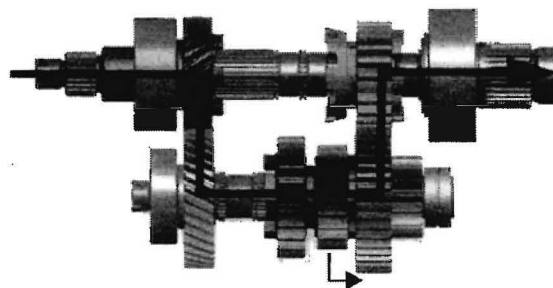
4th Gear



5th Gear



6th Gear (O/D)

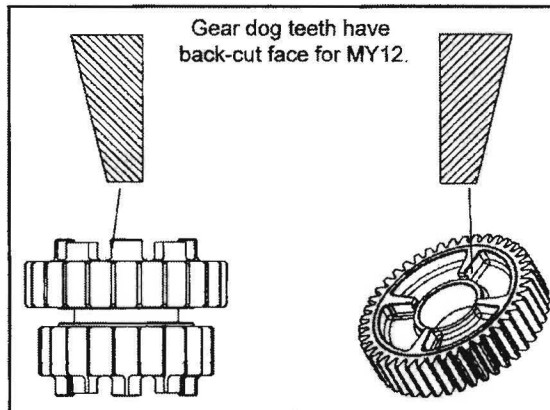
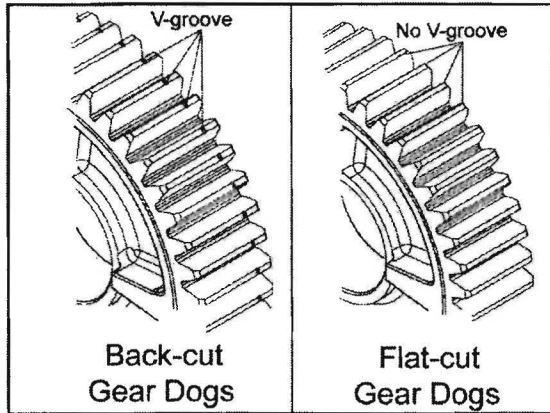


10.10



2012 Transmission Information

- Before replacing any transmission component, it is important to determine which gearset has been used. Transmissions with back-cut gear dogs can be identified by locating the cut v-groove around the outer diameter of any gear.



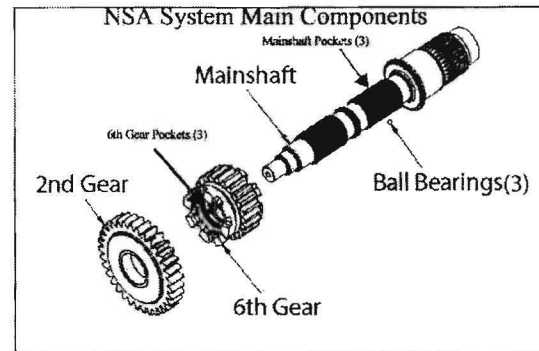
CAUTION

MY12 back-cut gears should not be used in conjunction with previous model year Victory transmission gears.

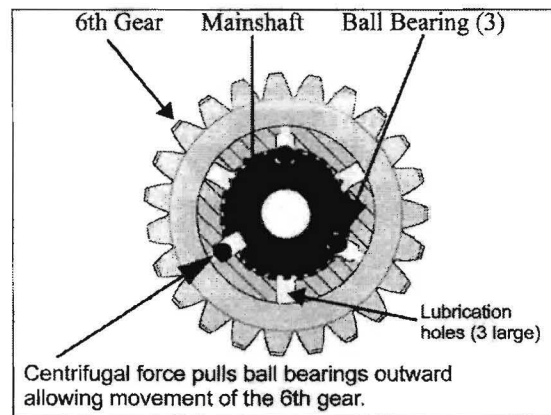
- Transmissions with back-cut gears do not require countershaft shimming upon reassembly.

NSA (Neutral Selection Assist) Transmission Information

- The NSA system assists the operator by preventing the unwanted engagement of 2nd gear when trying to locate neutral with the gear shifter. This system also prevents shifting into second gear from a stop when the vehicle is not moving forward.



- When the transmission is in first gear or neutral, not rotating or rotating slowly, the ball bearings are seated into pockets in the mainshaft, preventing 6th gear from sliding on the mainshaft. As the transmission speed increases in first gear, centrifugal force pulls the three ball bearings into pockets in the 6th gear, thus allowing the shift fork to move the 6th gear to allow engagement into 2nd gear.



NSA (Neutral Selection Assist) Transmission Component Removal.

- Remove mainshaft as outlined in this chapter and secure vertically.
- Remove 4th, 3rd & 2nd gear along with all applicable retaining rings, thrust washers and needle bearings from the mainshaft.

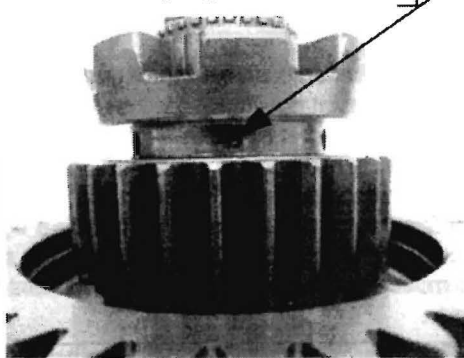


TRANSMISSION & CRANKSHAFT

3. All three ball bearings need to be seated outward in the 6th gear pockets for the 6th gear to slide up and off of the mainshaft. When the ball bearings are properly seated in the 6th gear for removal, they are visible through the hole in the gear. This can be accomplished by one of the following:

- Lift the 6th gear upward with a shift fork approx 3/8" & spin the mainshaft assembly so centrifugal force pulls all three of the ball bearings outward into the 6th gear pockets, then lift the gear upward off of the mainshaft.
- Abruptly tilt the main shaft at each 6th gear bearing pocket location until all three bearings are outward into the 6th gear pockets. Squirted Victory engine oil into the 6th gear pocket holes will aid getting the ball bearings to stay in the outward position.

Ball bearings visible through hole when positioned outward. Lube all 3 holes, here, with Victory engine oil, if needed.



When all 3 ball bearings are visible, slide 6th gear up and off of the mainshaft.

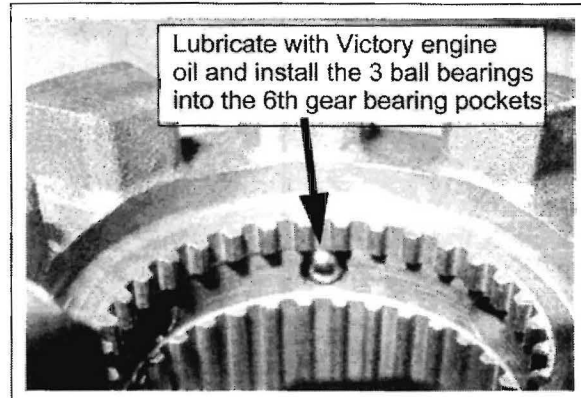


CAUTION

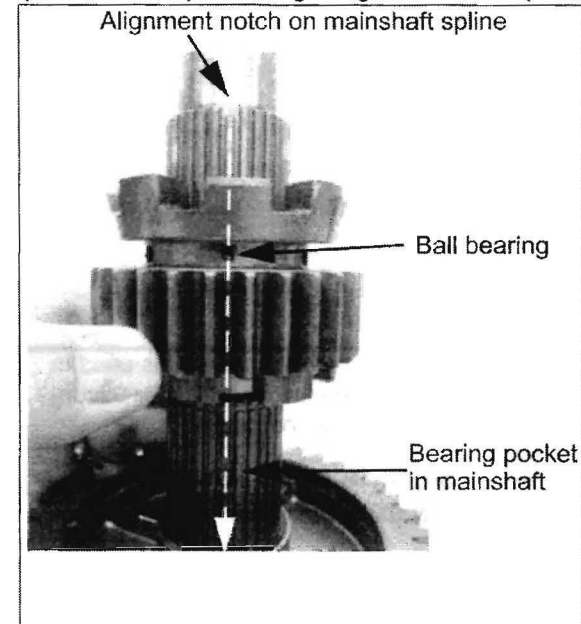
Only use Victory engine oil to lubricate transmission components. Using grease or other lubricants may cause incorrect operation of the NSA system.

NSA (Neutral Selection Assist) Transmission Component Installation.

1. To reinstall 6th gear onto the mainshaft, lubricate the inside 6th gear pockets and splines with Victory engine oil. Install the three ball bearings into the lubed 6th gear bearing pockets.



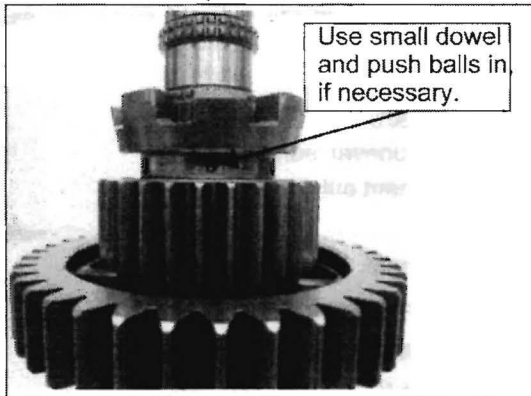
2. With the mainshaft secured vertically, rotate 6th gear so any one of the three bearing holes in the gear and the bearing pockets on the shaft are in alignment. Note the alignment notch on one spline of the mainshaft. Be sure the ball bearings do not fall out of the 6th gear pockets when positioning the gear onto the splines.



3. Slide 6th gear down onto the splines making sure that the pocket alignment is correct. If the ball bearings and mainshaft pockets do not line up, incorrect operation of the NSA system will result.



4. When 6th gear is fully installed, abruptly rock the mainshaft so the bearings move into the mainshaft pockets or use a small dowel to push the ball bearings into the mainshaft pockets. Check for proper NSA operation by trying to remove the 6th gear from the main shaft; the gear should not pull up and off of the mainshaft without performing steps 1-4 of the removal process.
5. If NSA operation is correct, reassemble mainshaft as outlined in this chapter.

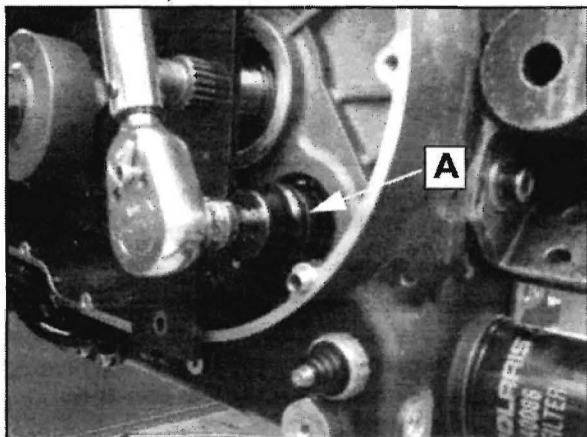


CAUTION

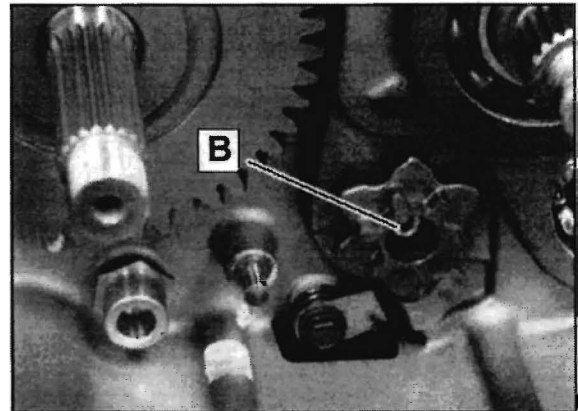
Only use Victory engine oil to lubricate transmission components. Using grease or other lubricants may cause incorrect operation of the NSA system.

TRANSMISSION REMOVAL

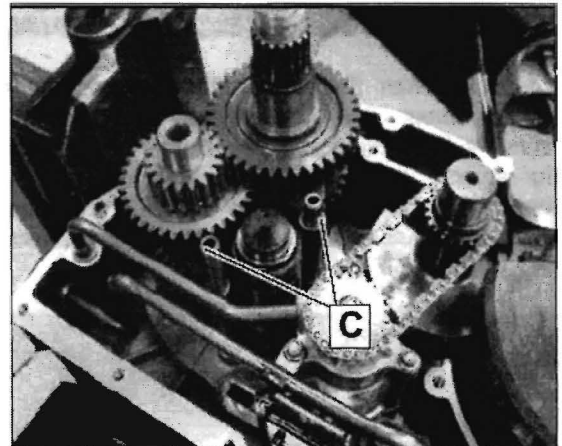
1. If not removed previously, remove countershaft locating nut and washer (A). Use clutch shaft holder PV-45028 to prevent shaft rotation.



2. Remove shift drum star (B).

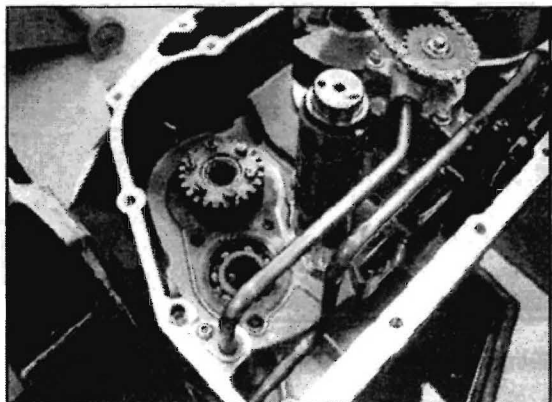


3. Remove shift fork shafts (C).
4. Disengage shift forks from grooves in the shift drum.



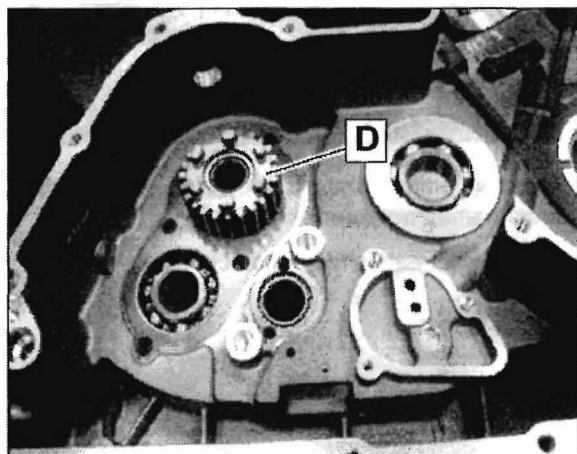
5. Remove shift forks, shift drum, mainshaft and countershaft from crankcase.
6. Carefully lift crankshaft out of left case.

7. Remove oil pump sprocket, chain, oil pipes and pump (Chapter 4).
8. Pull balance shaft from left case.



CLUTCH SHAFT INSPECTION / REMOVAL

1. The clutch shaft (D) (Mainshaft 5th) is press-fit in the bearing inner race. Inspect shaft and bearing with clutch shaft in the crankcase. Rotate gear and check for smooth movement and no play. Inspect gear, bearings, and shaft splines for wear or damage. Remove clutch shaft if bearing or gear service is required (Step 2).



2. Use an arbor press to push clutch shaft out of bearing from clutch side. Support crankcase and protect case mating surface during press operation. Replace bearing if clutch shaft is removed.

TRANSMISSION INSPECTION

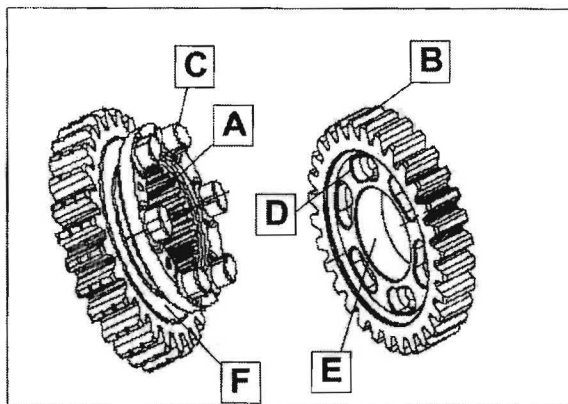
Refer to exploded views on page 10.7. Standard specifications for shaft and gears are on page 10.8 (main and clutch shaft) and page 10.8 (countershaft).

Shafts

1. Measure outside diameter of shafts and bearing areas for wear and concentricity as shown on page 10.8. Look closely at splines and retaining ring grooves of shafts for wear. Inspect ends of shafts for signs of wear:
 - Dull finish
 - Discoloration
 - Rough or uneven surface
 - Measurement outside of specification

Gears

1. Visually inspect:
 - Gear internal splines (A)
 - Gear teeth (B)
 - Gear dogs (C) for rounding, cracks, chips
 - Gear dog slots (D) for rounding
 - Bearing surfaces (E)
 - Shift fork grooves (F)



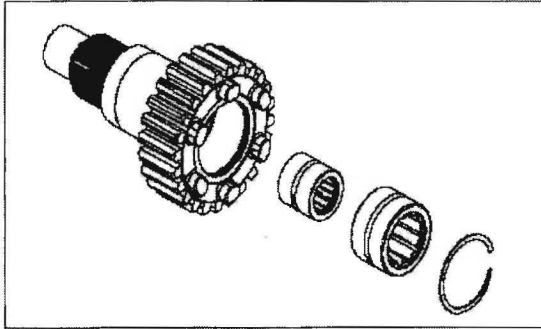
Check each gear for damage, cracks, wear (rounding of dogs or surfaces), or discoloration.

Clutch Shaft Bearings

1. Inspect clutch shaft needle bearings (inside) that support the mainshaft. The clutch shaft should spin freely and smoothly on the mainshaft. The bearings should support the shaft firmly with little or no detectable lateral movement.



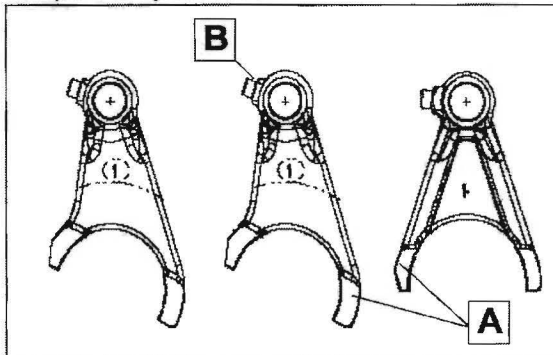
2. Replace clutch shaft assembly if bearings are worn or damaged.



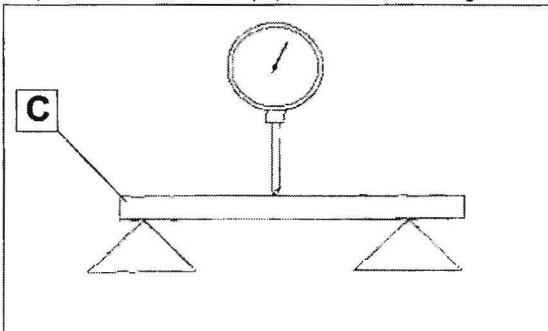
Shift Forks, Shift Fork Rails

Refer to specifications listed on page 10.3 and page 10.9.

3. Inspect all contact surfaces (A) of each shift fork. Replace a shift fork if any part is discolored (overheated), unusually scored, warped, or worn beyond service limit.
4. Inspect each shift fork pin (B) for wear or damage and compare to specifications.



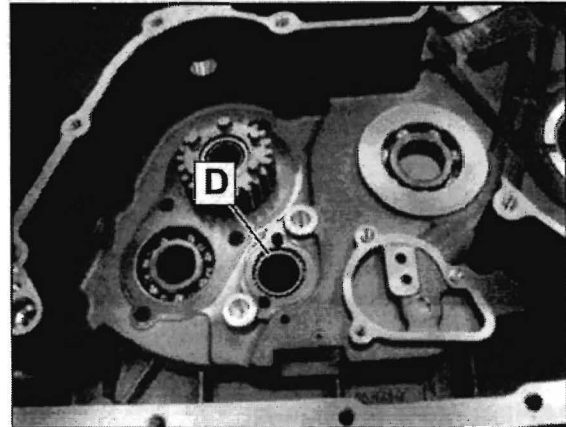
5. Inspect shift fork rails (C) for wear, scoring, or runout.



6. Measure shift fork rail O.D. for wear in 3 or 4 places along the length. The rail O.D. should be consistent over the entire length.

7. Slide rails into crankcase holes and check for a good snug fit.

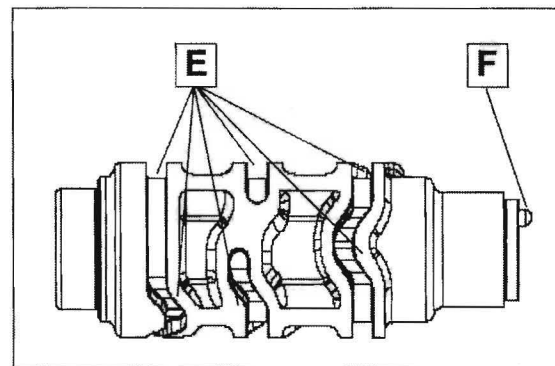
8. Visually inspect the shift drum bearing (D) in the left crankcase for wear or damage. The bearing must be fully seated in the case and held in position by the retaining plate. Replace the bearing if it is loose in the bore, or if any side play is detected.



9. Temporarily install shift drum into bearing and rotate, checking for smooth bearing operation. Also, inspect shift drum bearing pin in the right crankcase to ensure it is not loose or worn.

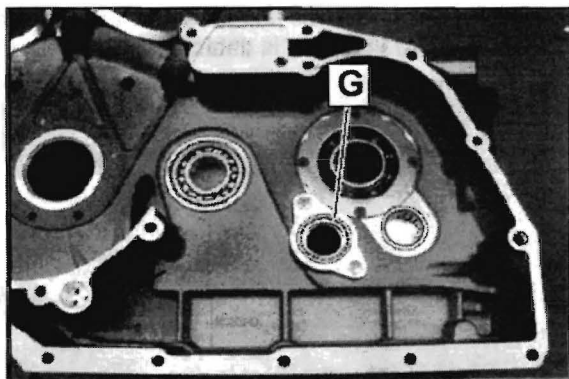
SHIFT DRUM INSPECTION

10. Inspect shift drum grooves (E) for wear. Pay close attention to corners of grooves where forks change direction.
11. Inspect shift drum star alignment pin (F). It should fit tightly in drum and shift star.



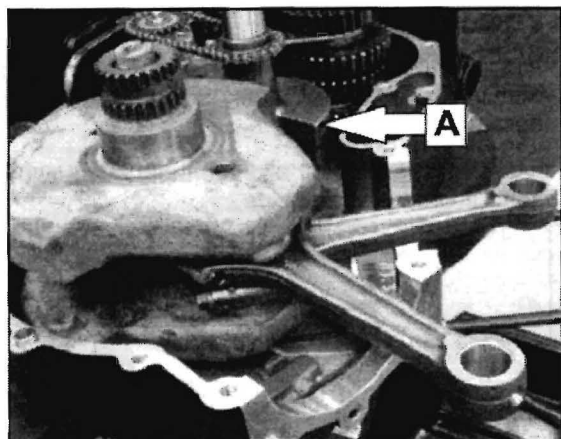
12. Inspect surface of shift drum star for excessive wear or damage.

13. Inspect right side shift drum bearing (G).
14. Temporarily install shift drum in right hand case bearing and inspect fit. Spin drum to check for smooth bearing operation.



CRANKSHAFT REMOVAL

1. Separate RH crankcase from LH case (page 10.6).
2. Rotate balance shaft (A) until counterweights are clear of crankshaft.

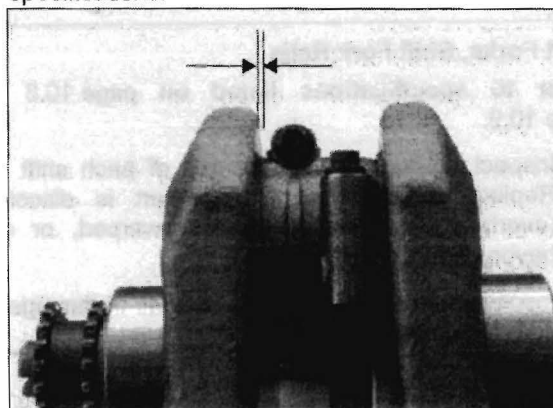


3. Lift crankshaft straight up until clear of case.

NOTE: Connecting rod bearings and main bearings are easily damaged. Be careful not to cause damage to these parts when servicing items within the crankcase.

CONNECTING ROD SIDE CLEARANCE INSPECTION

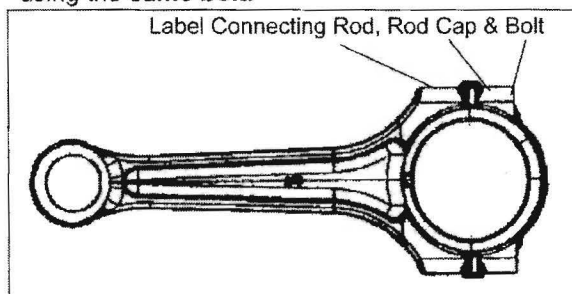
1. Move connecting rods to one side of crankshaft. Insert a feeler gauge between one connecting rod and the crankshaft. Compare measurement to specification on page 10.3.
2. If clearance recorded exceeds service limit, the crankshaft, connecting rod or both must be inspected and worn parts replaced. Refer to crankshaft inspection on page 10.20 and specifications on page 10.3 to determine which part(s) are outside of specifications.



CONNECTING ROD REMOVAL / IDENTIFICATION

NOTE: The connecting rod caps are marked from the factory, however it is recommended that an additional reference mark be added for clarity. Caps are matched to rods and must be installed with the proper orientation. DO NOT strike or stamp the connecting rod.

1. Use a permanent marker to mark orientation of connecting rods and rod bearing caps. **These parts must be installed in their original locations.** EXAMPLE: Right connecting rod must be assembled to the right with the bearing cap that was removed from it. The bearing cap and connecting rod must be assembled in the same direction as it was removed using the **same bolt**.

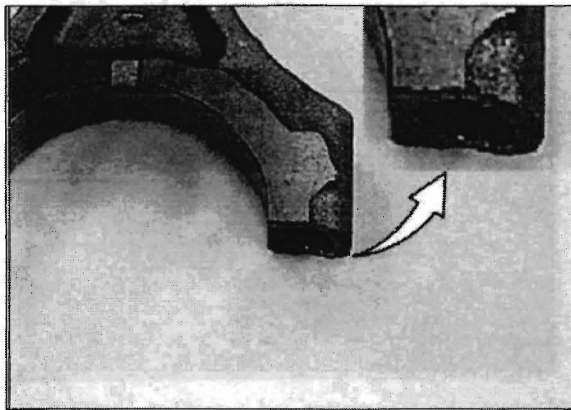


2. Remove connecting rod bolts and connecting rod bearing caps.

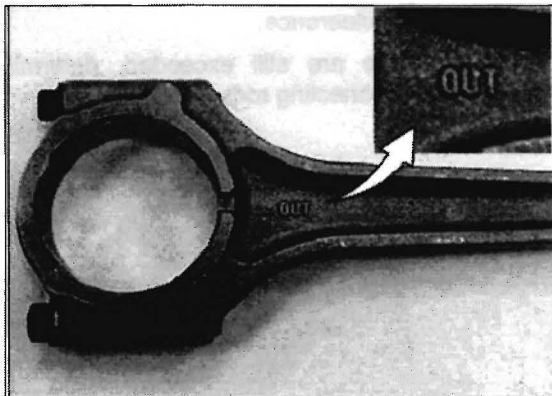
NOTE: It may be necessary to lightly tap the caps with a plastic mallet to loosen them.

⚠ CAUTION

The mating surface of connecting rod and cap is rough in appearance, which is a normal condition due to the manufacturing process. If rod caps are installed *incorrectly* and tightened, the precision mating surfaces will be damaged. Replace the connecting rod assembly if mating surfaces are damaged.



NOTE: Rods are marked OUT as shown in photo. "OUT" must face toward the **left** for the **left** connecting rod and must face toward the **right** for the **right** connecting rod (outside of the engine).

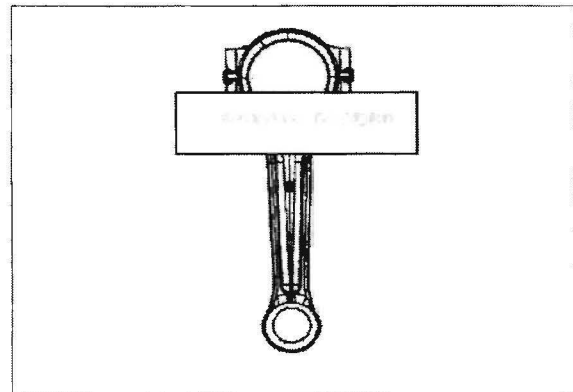


CONNECTING ROD INSPECTION (Big end)

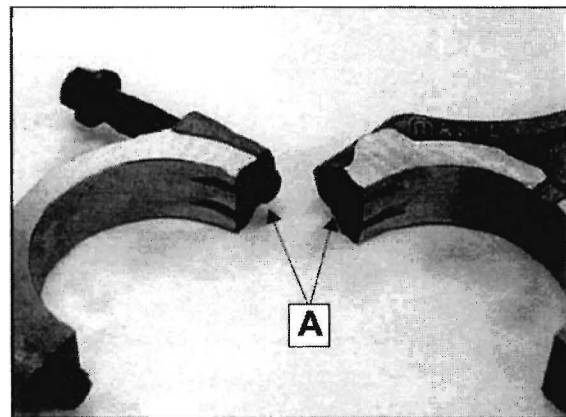
1. Refer to page 8.7 for connecting rod small end inspection.

⚠ CAUTION

Be sure to match connecting rod caps with their respective rod and orient the cap properly before installing the cap. Secure the big end of rods in a vise equipped with soft, protective jaws before torquing rod bolts.

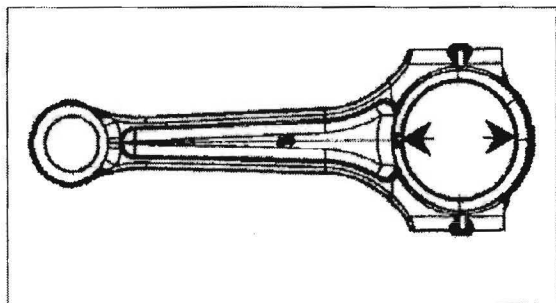


2. Remove bearings and install caps on connecting rods. Be sure mating surfaces (A) of rod and cap are clean.
3. Apply Victory engine oil to threads of rod bolts and nuts. Torque evenly in 2 steps to specification (page 10.20).



TRANSMISSION & CRANKSHAFT

4. Measure I.D. of connecting rod big end for size and out of round. Compare to specifications on page 10.3.



5. Visually inspect connecting rod upper and lower ends for scoring, damage, or excessive wear.

CONNECTING ROD BEARING INSPECTION

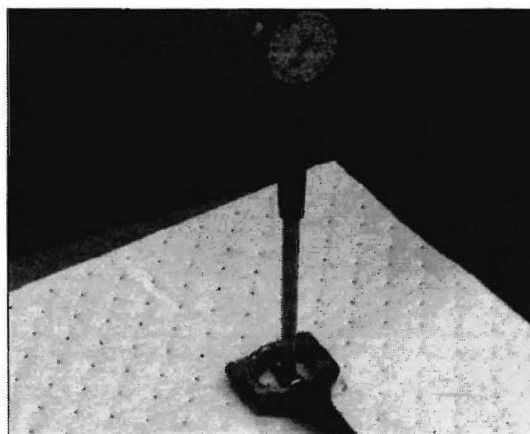
1. Inspect bearing inserts for unusual wear, peeling, scoring, damage etc. Replace as a set if damage is noted. Inspect bearing clearance and refer to Bearing Selection Chart (page 10.19).

CONNECTING ROD BEARING CLEARANCE INSPECTION (Typical)

1. Assemble the connecting rod cap with bearings and torque to specification below.

TORQUE: Connecting Rod Cap
7 Nm (5 lb-ft) (To Seat Bearing)
55 Nm (40 lb-ft) (Final Torque)

2. Measure the connecting rod big end bearing I.D. with a dial bore gauge and record.

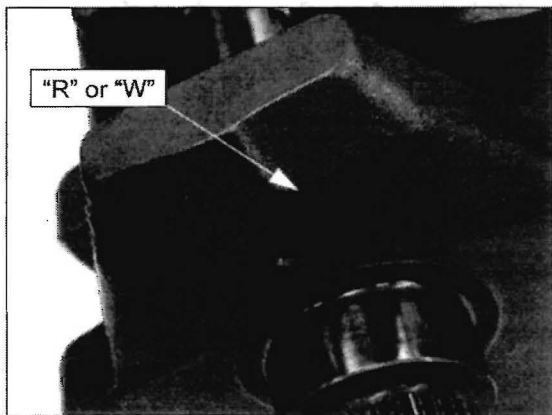


3. Measure the connecting rod journal on crankshaft and record.
4. Subtract the journal diameter from the connecting rod bearing diameter to calculate oil clearance and compare to specification (page 10.3).
5. If service limits are exceeded, install new rod bearings and recheck oil clearance.
6. If service limits are still exceeded, determine if crankshaft or connecting rods need to be replaced.

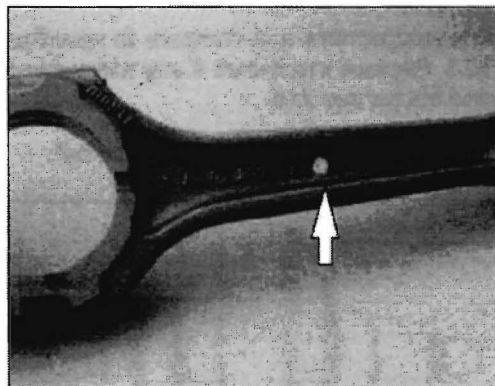


CONNECTING ROD BEARING SELECTION

1. There are 3 sizes of connecting rod bearings available: Black, Orange and Blue (see chart below).
2. To determine which bearing to use, look at the color code on RH end of crankshaft...



3. ...and the color code on the connecting rod.



4. Refer to the chart below to select the proper bearing insert.

FOR EXAMPLE: If the CONNECTING ROD paint mark is RED and the CRANKSHAFT stamp is W (white) (or not stamped), use BLUE bearing inserts.

Connecting Rod Bearing Selection Chart

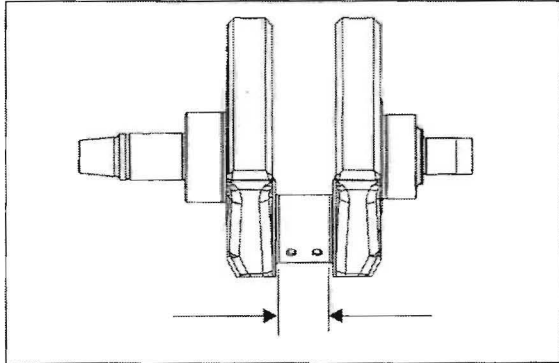
CON ROD COLOR / CRANKSHAFT	BEARING COLOR (P/N 3514390-xxx)	BEARING THICKNESS
WHITE Connecting Rod with RED ("R" Stamp) on Crankshaft	Black (- 067)	1.409- 1.415 mm
WHITE Connecting Rod with WHITE Crankshaft (or not stamped)	Orange (- 159)	1.413- 1.419 mm
RED Connecting Rod with RED Crankshaft	Orange (- 159)	
RED Connecting Rod with WHITE Crankshaft (or not stamped)	Blue (- 027)	1.417- 1.423 mm



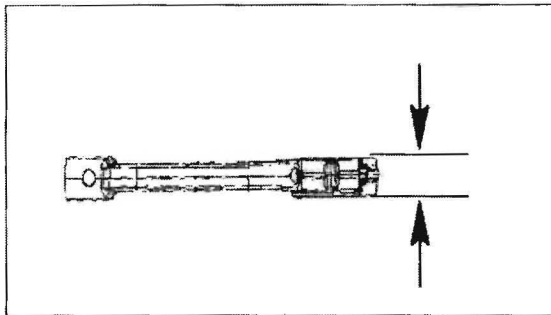
CRANKSHAFT INSPECTION

Record all measurements and compare to specifications on page 10.3. Replace crankshaft if any measurement is worn beyond the service limit.

1. Measure the width of the rod bearing journal.

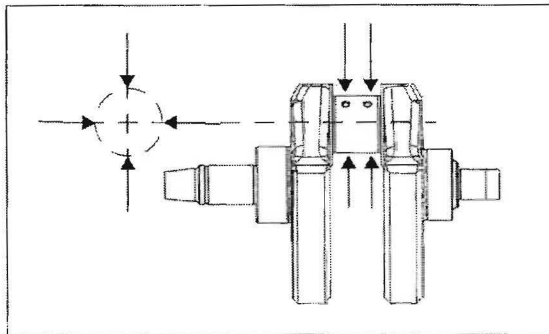


2. Measure width of connecting rods at big end.

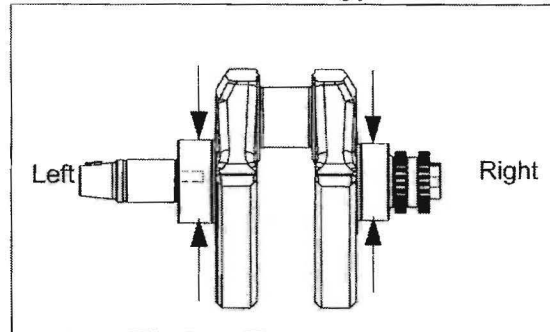


3. Visually inspect all bearing journals for scoring, damage or excessive wear.
4. Crankshaft and connecting rods are identified by color. Be sure to compare measurements to specification on page 10.3 for the proper color (or non-marked) connecting rod or crankshaft.

Measure O.D. of crankshaft rod journal in four places and compare to specifications.



5. Measure O.D. of main bearing journals.



CONNECTING ROD INSTALLATION

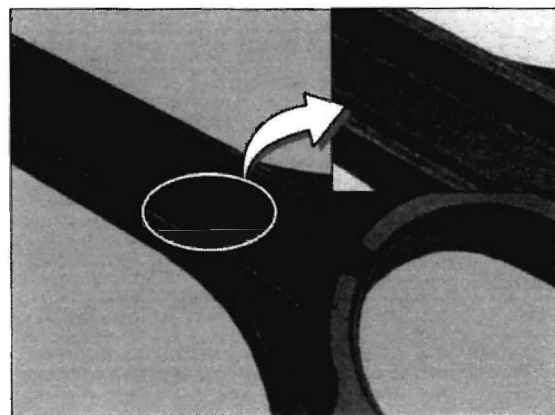
1. Make sure proper bearing clearance is achieved by using the correct colored bearing insert for a given color combination of connecting rod and crankshaft.
2. Clean all oil off connecting rod, connecting rod cap and bearing inserts.
3. Install bearing inserts into connecting rods and caps. First, install bearing tab into groove, then press the rest of the bearing into place.

NOTE: Procedure during disassembly called for marking of connecting rods and caps. Ensure that each part is installed in original location including rod cap bolts.

4. Apply assembly lube to connecting rod bearings and crank pin.

Moly Assembly Paste PN: 2871460

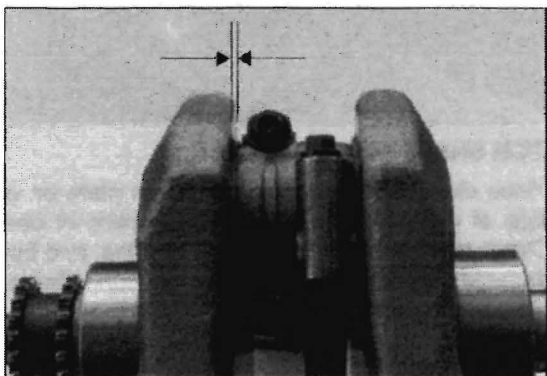
5. Install rods and caps onto the crankshaft, observing the "OUT" mark on the connecting rods. "OUT" must face toward the **left** for the **left** connecting rod and must face toward the **right** for the **right** connecting rod (outside end of crankshaft). Be sure the I.D. marks made previously are aligned.



6. Tighten rod cap bolts:

TORQUE: Connecting Rod Cap
7 Nm (5 lb-ft) (To Seat Bearing)
55 Nm (40 lb-ft) (Final Torque)

7. Check that the connecting rods rotate smoothly and freely on crankshaft journal.
8. If a connecting rod or crankshaft was replaced, re-measure side clearance (A) to be sure it is within specification listed on page 10.3 before assembly.



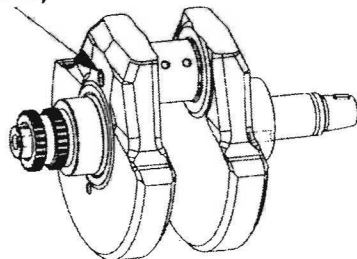
CRANKSHAFT CLEANING

1. Remove blind plugs from crankshaft to ensure that all passages are clear.

CAUTION

Blind plugs are installed with Loctite™ 262. Use localized heat (such as a soldering gun) when removing blind plugs.

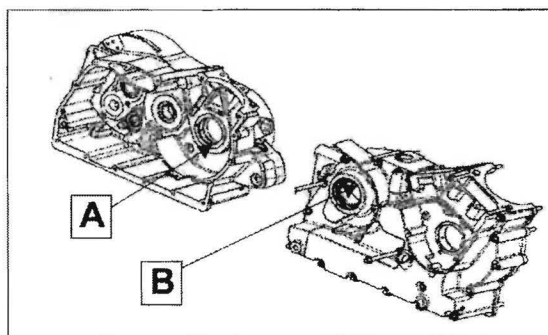
Plug: Loctite™ 262
20 Nm (15 lb-ft.)



2. After cleaning passages, apply Loctite™ 262 to blind plug threads and install plugs into crankshaft to specified torque (page 10.5). Plug should be flush with surface of crankshaft.
3. Install woodruff key(s). Install drive and alignment pins.

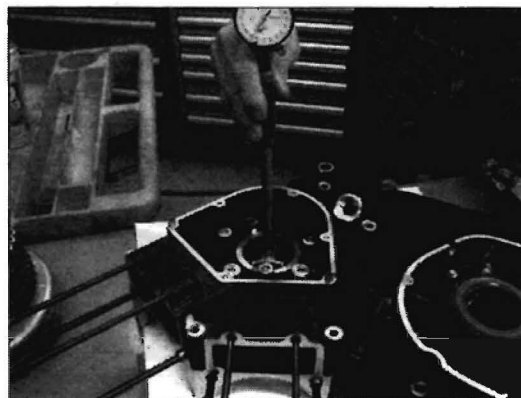
MAIN BEARING INSPECTION

1. Inspect crankcase main bearing surfaces for wear, peeling, scoring, or damage.
2. Inspect alignment of bearing lubrication hole (A) in left crankcase half or (B) in right case half. Holes must be aligned with their respective oil passage in crankcase.



MAIN BEARING OIL CLEARANCE INSPECTION

1. Measure main bearing I.D. and concentricity with a dial bore gauge for right and left side. Compare to specification (page 10.3). Subtract crankshaft main journal diameter from main bearing diameter to calculate oil clearance.



2. If crankshaft dimensions are within tolerances and oil clearances are incorrect, the crankcase set must be replaced or new main bearings installed and line-honed by a competent machinist.

NOTE: Replace crankcase halves as a set.

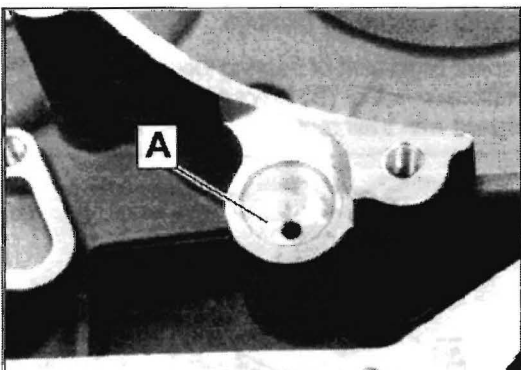
TRANSMISSION & CRANKSHAFT

LEFT CRANKCASE ASSEMBLY

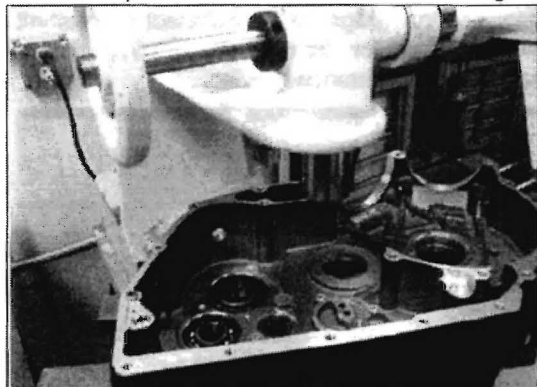
Prepare LEFT crankcase for assembly:

Refer to exploded view on page 10.4 for torque values, bearing press depth, and locking agent.

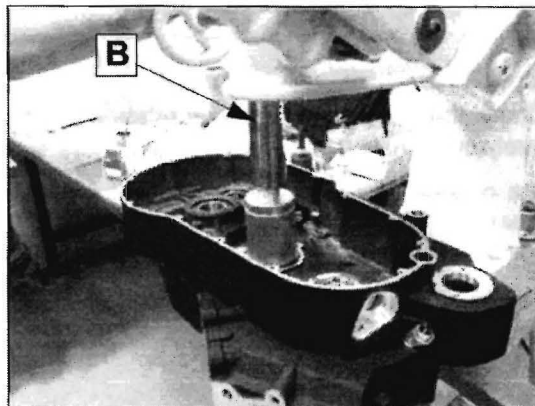
1. Clean crankcase and oil passage (A) thoroughly. Rinse and dry with compressed air.



- Install new bearings in crankcase as required
- Apply a film of lithium grease to outer race of bearings to prevent galling upon installation
- Press on outer race of bearings using an arbor press and a suitable arbor that is slightly smaller than bearing outside diameter
- DO NOT press on inner race of ball bearings



2. Press balance shaft bearing from the primary side using an arbor press (B).



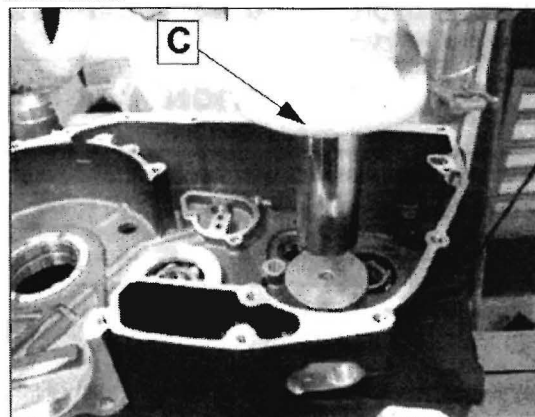
CLUTCH SHAFT INSTALLATION

3. Place clutch shaft support tool press plate on clutch side of crankcase to support inner race of bearing. Clutch shaft is a firm press-fit in bearing, and bearing damage may result if inner race is not supported during the press operation.

Special tool:

Clutch Shaft Bearing Support: PV-47331

4. Press clutch shaft until fully seated using an arbor press (C). Check for smooth, quiet operation after shaft is installed.

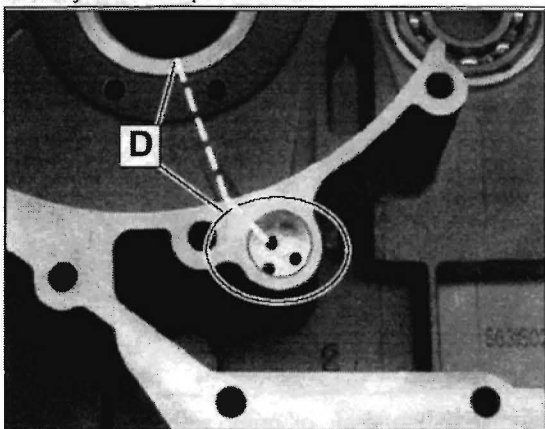


RIGHT CRANKCASE ASSEMBLY

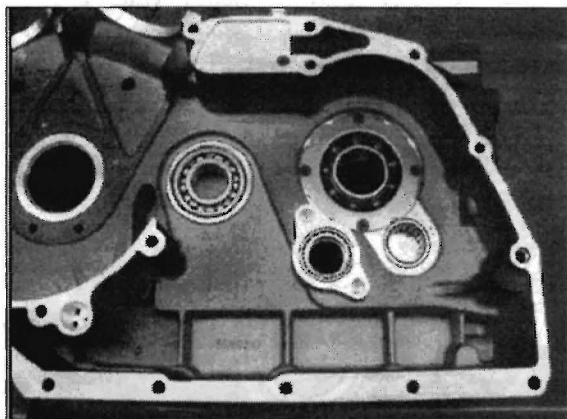
Prepare RIGHT crankcase for assembly:

Refer to exploded view on page 10.4 for torque values, bearing press depth, and locking agent.

1. Clean crankcase oil passages (D) thoroughly. Rinse and dry with compressed air.



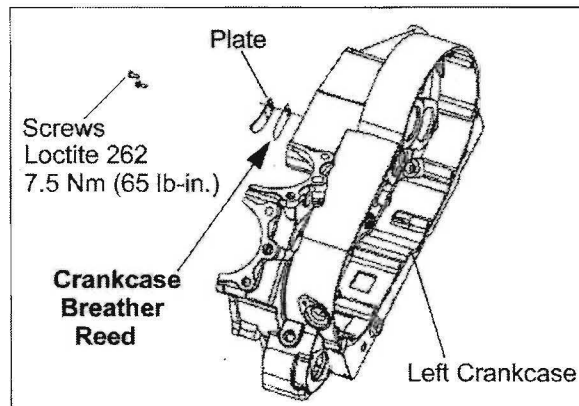
- Install new bearings in crankcase as required.
- Apply a film of lithium grease to outer race of bearings to prevent galling upon installation.
- Press on outer race of bearings using an arbor press and a suitable arbor that is slightly smaller than bearing outside diameter.
- DO NOT press on inner race of ball bearings.



2. If main bearings are replaced, they must be line-honed with the left side crankcase to proper finished size. Press operation and fitting must be performed by a qualified machinist.

CRANKCASE REED VALVE ASSEMBLY REMOVAL & INSPECTION

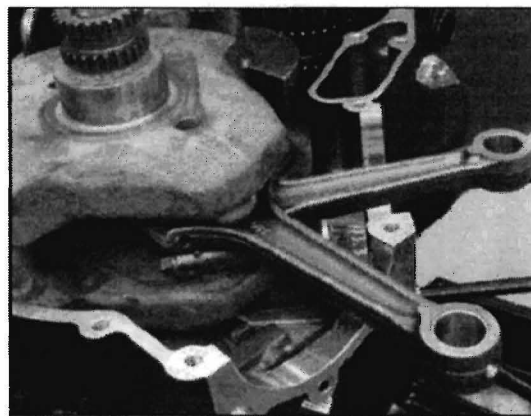
1. Separate engine cases (page 10.6).
2. Remove the retaining screws for the reed valve assembly. Remove breather valve assembly.
3. Inspect the reed valve for bending, pitting, or other damage at the sealing surface that would prevent a good seal.
4. Replace the reed valve as necessary.



CRANKSHAFT INSTALLATION

NOTE: Install left engine case onto an engine stand.

1. Apply assembly paste to main bearings.
- Moly Assembly Paste PN: 2871460**
2. Hold crankshaft over left crankcase and position rods so that left side rod is in cutout for rear cylinder and right side rod is in cutout for the front cylinder.
 3. Place crankshaft into left crankcase half.

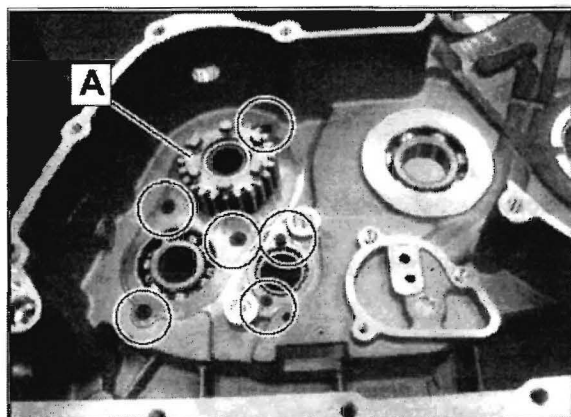


TRANSMISSION & CRANKSHAFT

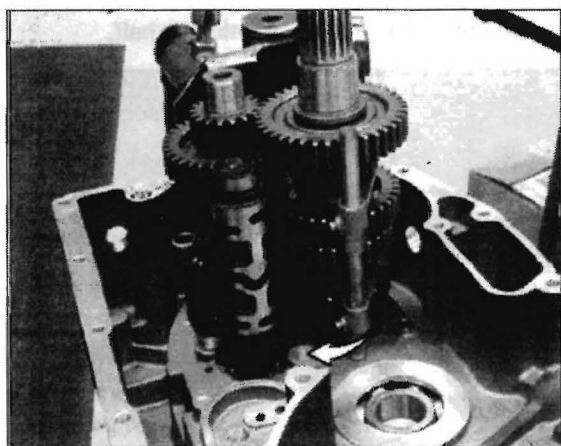
TRANSMISSION INSTALLATION

IMPORTANT: Transmission **MUST** be in 1st gear before engine case halves are assembled together.

1. Be sure all bearing retainer plate screws are installed and tightened to specification.
2. Be sure clutch shaft (A) is fully seated in bearing.



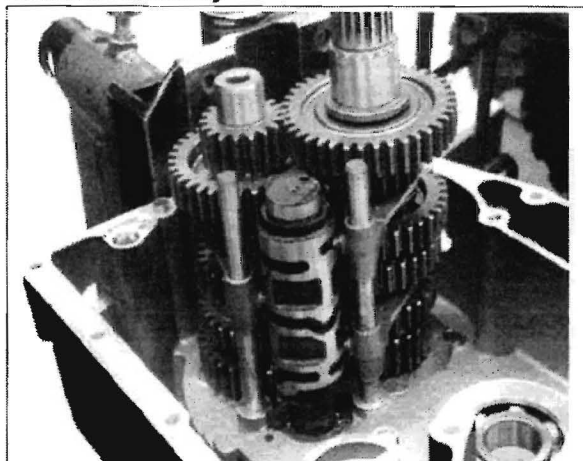
3. Lubricate parts with Victory engine oil. Apply Moly Assembly Paste (PN 2871460) to ends of transmission shafts.
4. Install countershaft and mainshaft into the left crankcase as an assembly, holding mainshaft 4th gear on shaft during assembly. Make certain both shafts are fully seated and rotate freely.
5. Install shift drum into case. Then install forks in grooves of sliding gears.
6. Install shift rails through forks.
7. Rotate shift drum to align proper grooves with forks.



8. Move shift fork pins into drum grooves and seat rails.

9. Photo shows transmission installed and shift forks engaged; shift rails seated.

NOTE: Shift transmission into 1ST gear for crankcase assembly

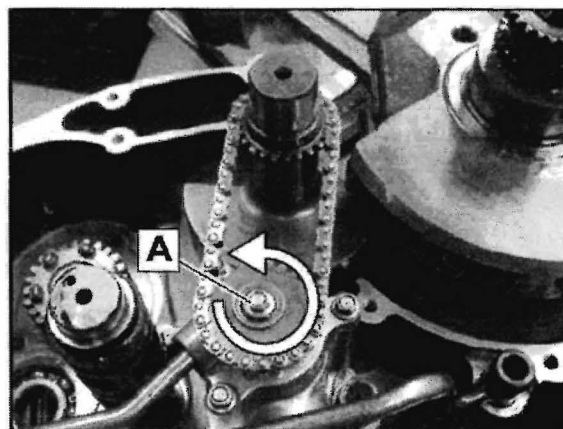


10. Install balance shaft, oil pump with pipes (Chapter 4), and crankshaft (page 10.23) if removed.
11. Refer to Crankcase Assembly on page 10.26

BALANCE SHAFT

BALANCE SHAFT REMOVAL & INSPECTION

1. Remove bolt (A) from oil pump drive sprocket. Use engine lock tool between balance shaft weight and crankcase to hold shaft.



2. Remove sprocket & chain from oil pump.
3. Remove chain from balance shaft sprocket.
4. Rotate balance shaft until counterweights are clear of crankshaft. Grasp balance shaft and remove it from case.

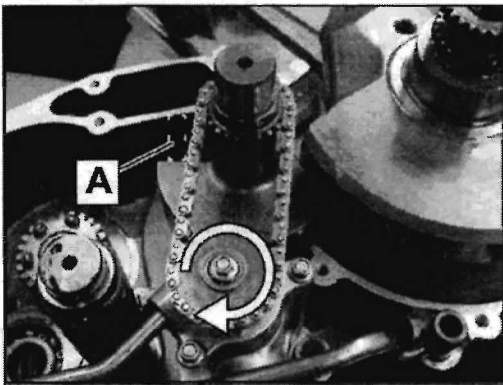
10.24



5. Inspect sprocket teeth for wear or damage.
6. Check shaft for runout, or twisting.
7. Rotate right and left balance shaft bearings by hand while observing bearing rotation. Bearings should run smooth and quiet and shaft should be a snug fit in bearing.
8. Visually inspect bearings for damage.

BALANCE SHAFT INSTALLATION

1. Lubricate balance shaft bearings with engine oil.
2. Insert threaded end of shaft into left crankcase bearing.
3. Install oil pump drive chain onto balance shaft.
4. Install chain and sprocket onto oil pump shaft. Align flats to seat sprocket.



10

5. Install engine lock tool between balance shaft weight and crankcase (A) to lock balance shaft.
6. Install oil pump sprocket bolt and torque to specification.

TORQUE:
9.6 Nm (85 in-lb)

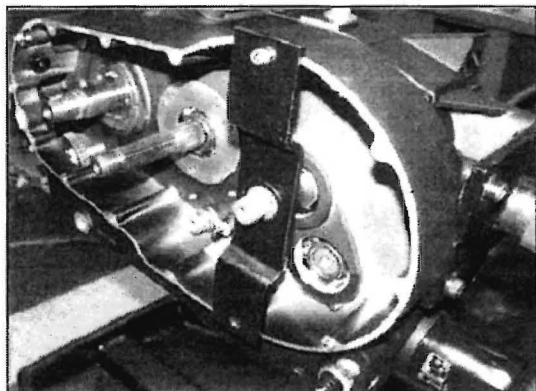


CRANKCASE

CRANKCASE ASSEMBLY & SEALING

NOTE: Place transmission in 1st gear prior to crankcase assembly.

1. Clean crankcase mating surfaces to remove all grease, oil, and old sealant.
2. Check to be sure all shafts are seated, and that all (new) O-rings, alignment dowel pins, oil pipes, etc. are in place.
3. Install the clutch shaft holding tool PV-45028.

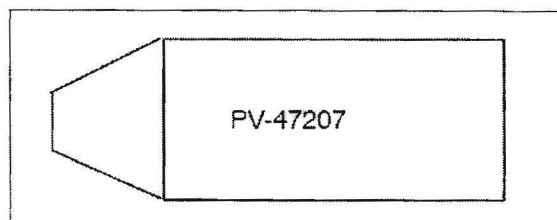


4. Apply an even bead of Loctite™ Ultra Black 598 to entire case sealing surface.
5. Spread out sealer into a thin even layer on entire case mating surface. Be sure all areas are covered. DO NOT ALLOW SEALANT TO DRY. CONTINUE ASSEMBLY UNTIL CASES ARE SEALED AND ALL BOLTS ARE TIGHT.

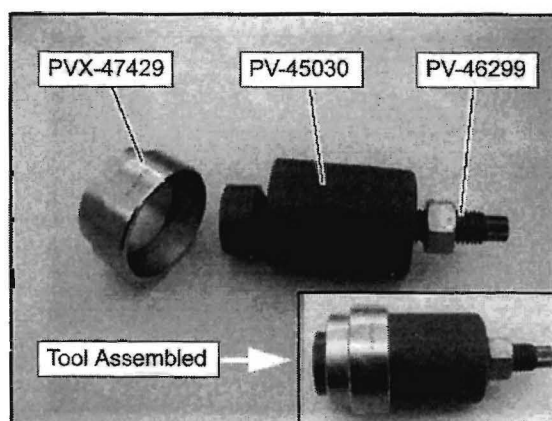


6. Install crankshaft bearing protector over the cam chain drive sprocket

Special Tool: Crankcase Bearing Protector PV-47207

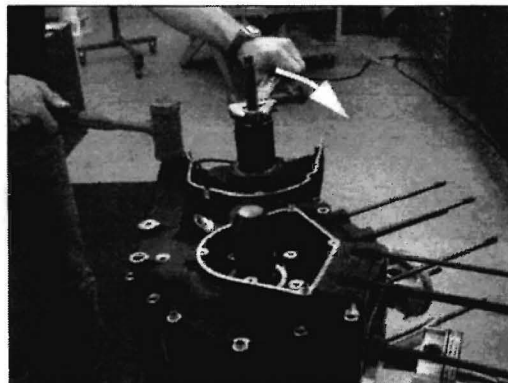


7. Assemble the Crankcase Installation Tool as shown. PVX-47429 is required if seal sleeve is not installed on output shaft.



8. Install crankcase installation tool onto the output shaft.
9. Pull crankcase together by tightening nut and tapping on crankcase with a soft mallet.
10. Remove the tool.
11. Install crankcase bolts with starter motor as shown below.

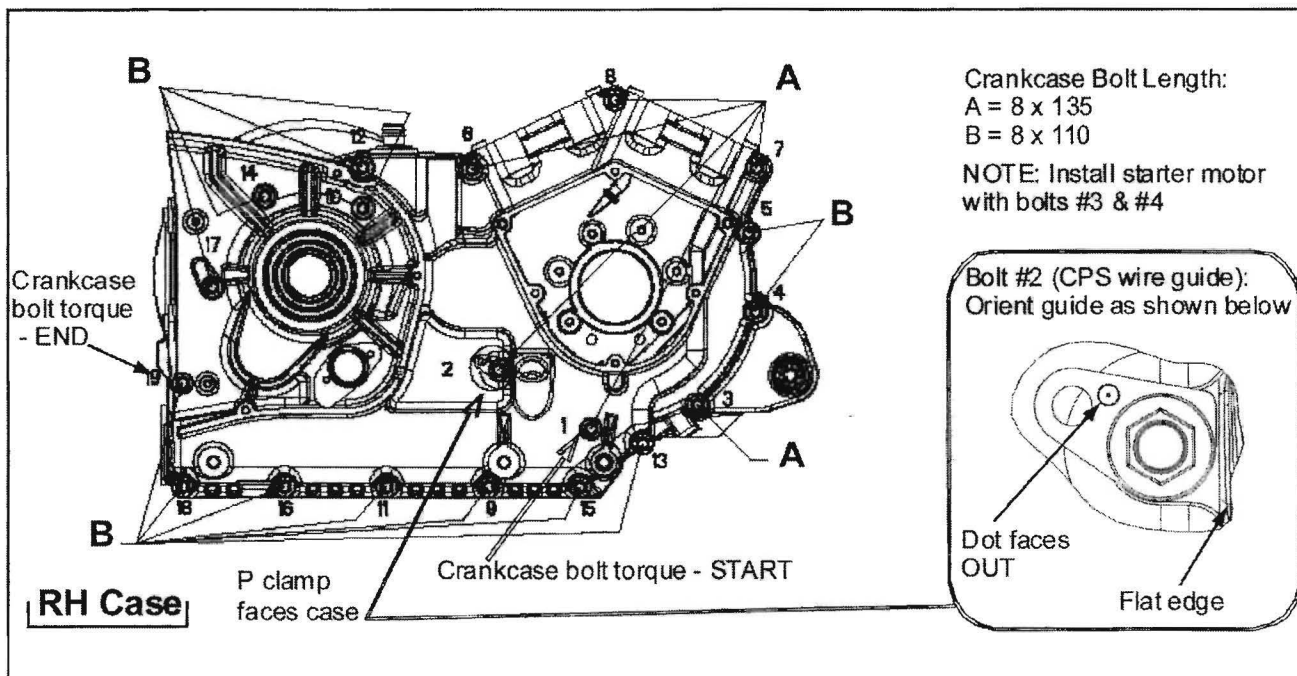
NOTE: The cases will mate before the mainshaft is drawn fully into bearing. IMPORTANT! Continue to turn nut and tap case and apply approximately 102-136 Nm (75-100 ft-lb.) torque to the nut).



12. Tighten crankcase bolts in two steps following the sequence shown below. Repeat the final torque.

TORQUE: Crankcase Bolts
(2 steps) 20 / 30 Nm (15 / 22 lb-ft) then repeat the 30 Nm (22 lb-ft.) torque

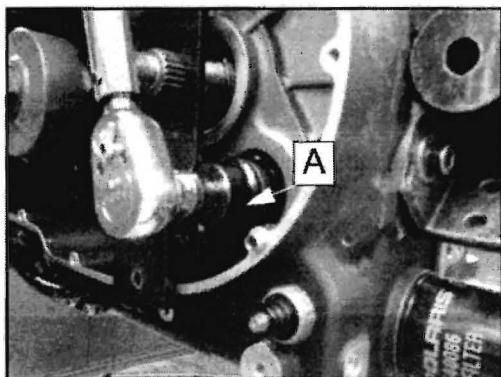
10



TRANSMISSION & CRANKSHAFT

13. Clean threads of countershaft. Install the washer and a NEW stake nut and tighten to specified torque. After assembly, stake the nut with appropriate staking tool as shown on page 10.29.

TORQUE: Countershaft Stake Nut
170Nm (125 lb-ft.)

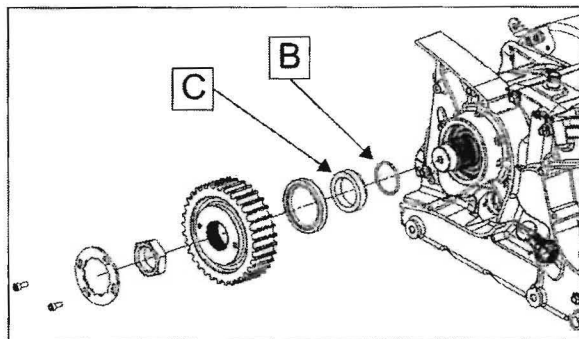


14. Remove tool from shaft and assemble shift mechanism, primary drive, and primary cover. Refer to Chapter 9.
15. Install a new mainshaft (output) seal in RH crankcase using seal installer.

Special tool:

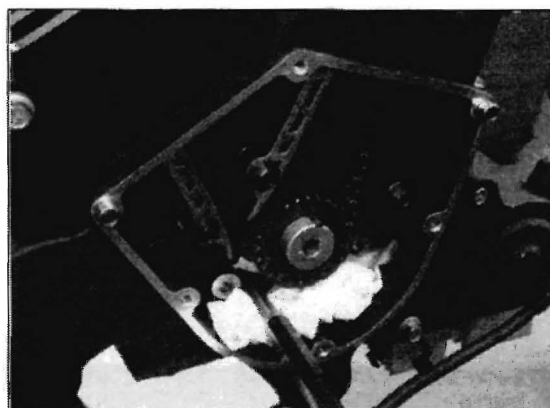
Final Drive Seal Installer PV-43505

16. Inspect output shaft seal sleeve for burrs, nicks or surface wear. The surfaces that contact bearing race and drive sprocket must be smooth and flat to prevent loosening of the drive sprocket.
17. Install O-ring (B), seal sleeve (C) with tapered edge toward O-ring, and drive sprocket.



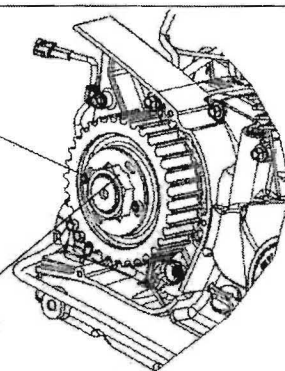
NOTE: Use an 8mm or a 5/16 diameter pin punch in timing hole and shift transmission into 1st gear to hold crankshaft while tightening sprocket nut.

TORQUE: Drive Sprocket Nut
244 Nm (180 lb-ft.)
Loctite 262



10 Nm (85 in-lb.)

244 Nm (180 lb-ft.)

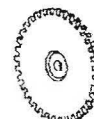


18. Install lock plate screws.

NOTE: The lock plate can be installed in many positions and either side of the plate can be used. If you cannot find a position that will work, flip the plate over and again try to install it. If the plate still does not align, tighten the sprocket nut slightly and try to fit the lock plate again.

19. Rotate the plate **CLOCKWISE** until it stops and hold it firmly against the nut.
20. Tighten the lock plate screws to specified torque.
21. Install CPS timing wheel.

23 Nm (17 lb-ft)



10.28




Stake Nut Installation

- Stake nuts are located on the mainshaft, balance shaft & countershaft
- It is important that they are torqued and staked correctly for proper function

IMPORTANT: Do not reuse or reinstall any previously used stake nut. A new stake nut needs to be installed every time the nut is removed or loosened.

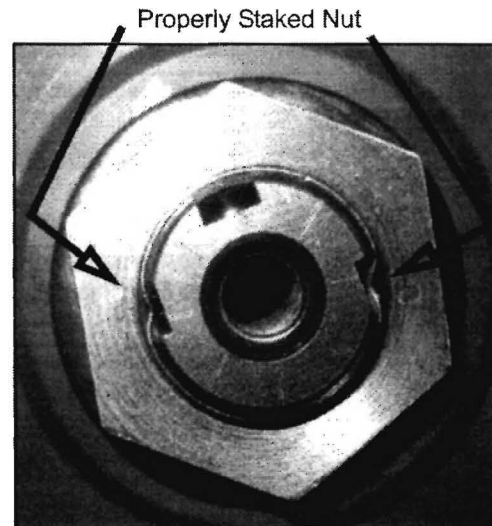
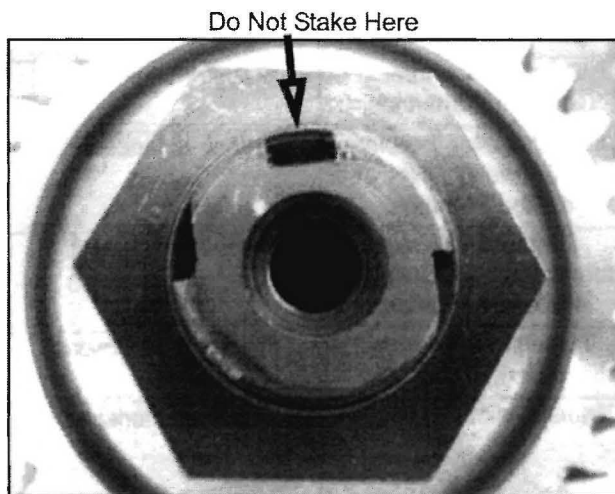
Use the following procedure to install the stake nuts correctly:

1. Clean threads on shaft so there is no oil or contaminants.
2. Thread NEW stake nut onto shaft finger tight.
3. Torque stake nut to 125 ft.lbs +/- 13 ft.lbs.

 = T	
Stake Nut Torque	125 ft.lbs +/- 13 ft.lbs

4. Stake the stake nut as shown below using round side of punch. Do not crack or tear staking lip. Do not use a sharp chisel to stake the nut.

**Be sure staking lip does not tear/crack in staking area.
Stake nut with round side of punch.**



10



NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

TROUBLESHOOTING

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	PART(s) AFFECTED	REPAIR RECOMMENDED
Transmission Will Not Shift	Broken Shift Cam	Shift Cam	Replace shift cam
	Bent Shift Forks	Shift Fork	Replace shift fork(s)
	Worn Gearshift Pawl	Shift Cam	Replace shift cam
	Broken Gears	Transmission Gears	Replace necessary parts
	Damaged/Broken Bearings	Transmission, Shift Cam Bearings	Replace necessary parts
	Worn Gear Shift Ratchet Mechanism	Shifter Ratchet	Refer to chapter 9
	Broken or out-of-place spring on shift ratchet	Shift Ratchet Spring	Refer to chapter 9
	Shift Detent Plunger Stuck	Shift Detent Plunger	Repair as necessary
	Seized Pivot Point, Bent External Shift Linkage	External Shift Linkage	Repair as necessary
	Bent or Distorted Shift Fork Rails	Shift Fork Rails	Replace Shift Fork Rails
	Debris From Broken Parts Locking Transmission	Transmission Components	Repair as necessary
Excessive Noise Related to Bottom End of Engine	Worn Main Bearings	Crankshaft and/or Crankshaft Bearings	Repair as necessary
	Worn Connecting Rod Bearings	Connecting Rod Bearings and/or Connecting Rod and/or Rod Bearings	Repair as necessary
	Worn Connecting Rod Small End Bushing	Connecting Rod, Connecting Rod Bushing, Piston Pin, Piston	Repair as necessary
	Worn, seized, chipped or broken gear teeth	Transmission Gears	Repair as necessary
	Worn, seized, chipped or broken Transmission Bearings	Transmission Bearings	Repair as necessary
	Originates from Primary Cover	Clutch, Torque Compensator, Flywheel, Starter Drive Assembly, Starter Clutch, Starter Motor	Refer to chapter(s) 9, 16, 17, 18
	Oil Pump	Oil Pump, Oil Pump Drive	Refer to chapter 4
	Cam Drive	Cam Chain, Cam Sprocket	Refer to chapter 7



CHAPTER 11

DRIVE LINE

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SPECIAL TOOLS

DRIVE LINE SPECIAL TOOLS

Output Shaft Seal Installation Tool: PV-43505

8mm (5/16") Pin Punch (to hold crankshaft for drive sprocket removal / installation): Commercially available

Torque Wrench with 250 Nm (185 lb-ft.) range: Commercially available

CAUTION

Some drive line repair or maintenance involves supporting the machine with the rear end elevated. Take precautions so the motorcycle is supported securely while the tire is off the ground to reduce the possibility of personal injury, or motorcycle damage.

- Replace belt and sprockets as a set if the drive system has been in service for 5000 miles or more (8000 Km).
- Refer to Chapter 2 for **MAINTENANCE** of drive belt.
- Refer to Chapter 14 for **TIRE REMOVAL, REPAIR, & BALANCING**.
- Refer to Chapter 15 for **BRAKE SYSTEM** service and repairs.

ASSEMBLY VIEWS & TORQUE VALUES

DRIVE LINE FASTENER TORQUES

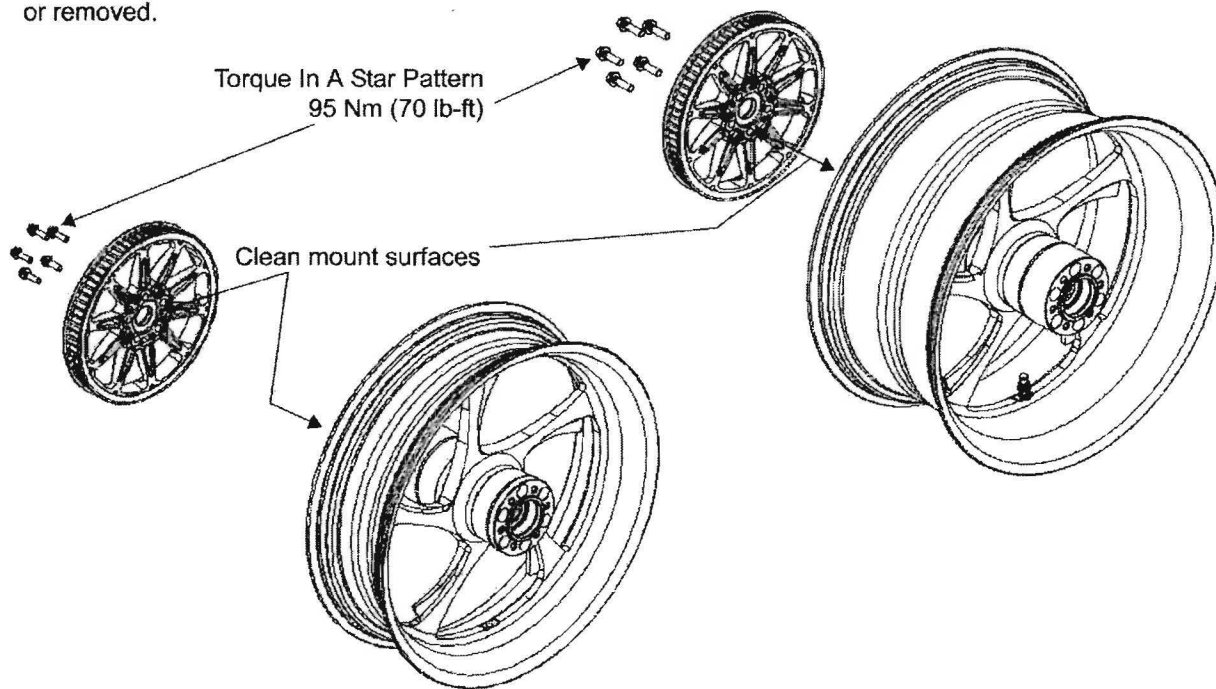
All surfaces and fasteners must be clean, dry, and oil free before assembly.

See Chapter 13 for Rear Wheel Removal / Installation.

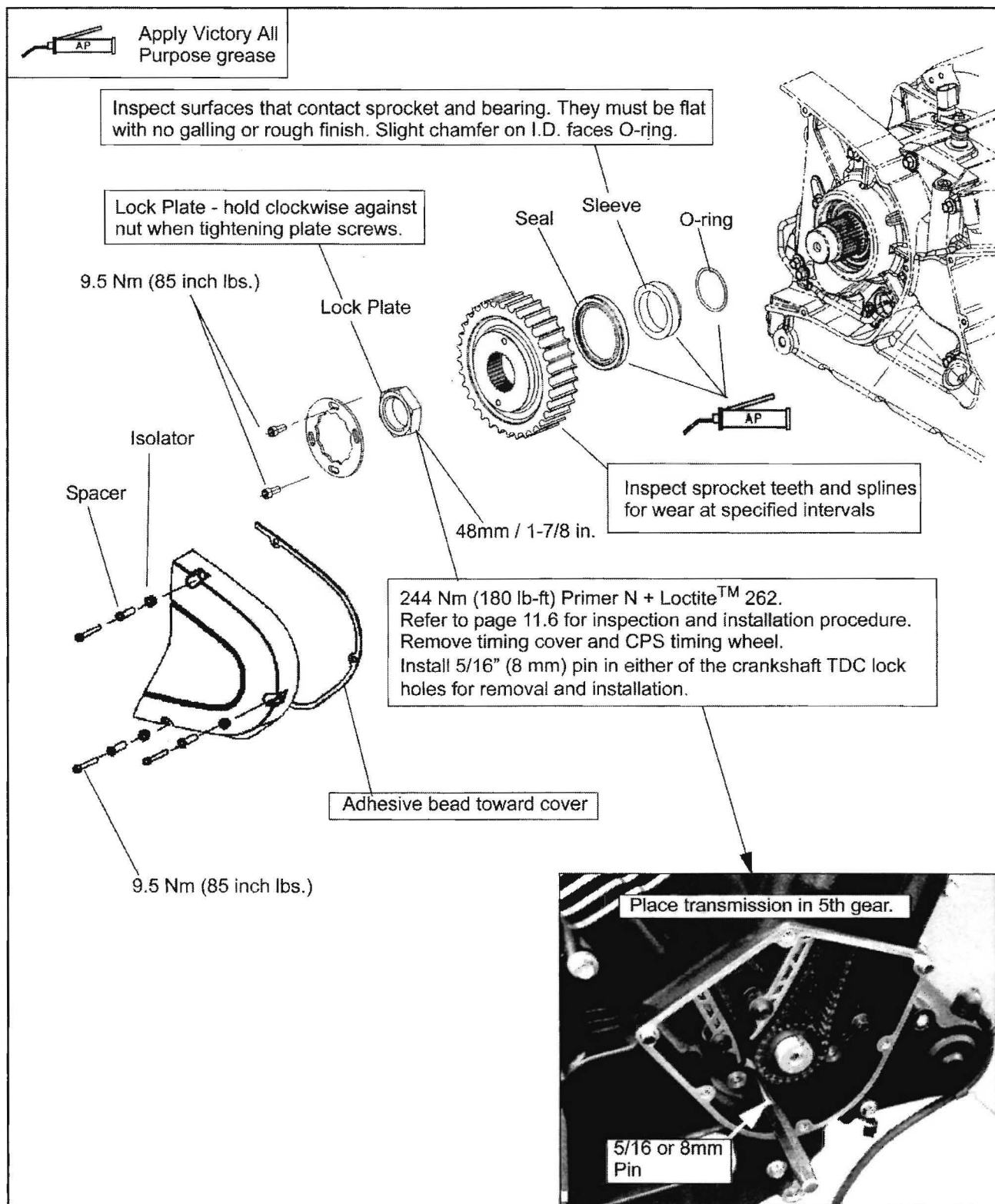
Replace bolts if loosened or removed.

Torque In A Star Pattern
95 Nm (70 lb-ft)

Clean mount surfaces



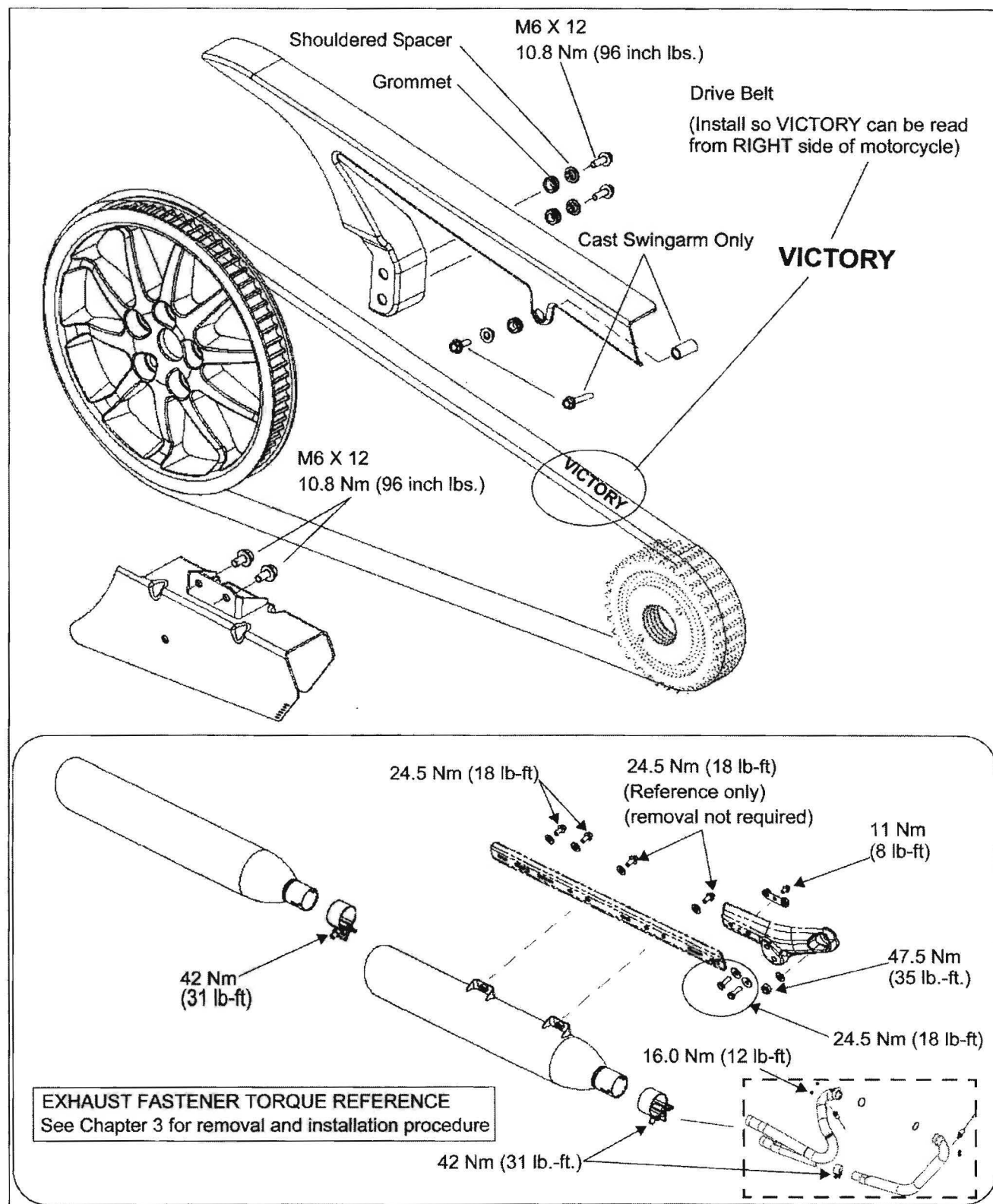
DRIVE SPROCKET FASTENER TORQUES



11



BELT GUARD FASTENER TORQUE



11.4



DRIVE BELT

BELT INSPECTION

1. See page 2.24 for inspection.
2. Inspect belt tension and adjust if necessary (page 2.26).
3. If one or more component is damaged, replace belt and both sprockets as a set if the drive system has been in service for 5000 miles or more (8000 Km).

BELT REMOVAL

NOTE: If you plan to remove the front sprocket, refer to Drive Sprocket Removal **page 11.5**.

NOTE: If belt is to be reinstalled, mark direction of rotation on the outer surface of belt. Reinstall belt in same direction as it was removed.

WARNING

A mis-aligned rear axle can cause drive line noise and damage the drive belt, which could cause belt failure and loss of control of the motorcycle.

WARNING

Care should be taken to be sure the motorcycle will not tip or fall while elevated. Severe personal injury or death may occur if the motorcycle tips or falls.

1. Remove exhaust system and exhaust mount bracket (page 3.10).
2. Remove drive sprocket cover.
3. Remove upper belt guard (page 11.4).
4. Remove rear axle (page 13.15).
5. Slide belt off rear sprocket, then remove belt from front sprocket.
6. Remove drive belt from motorcycle.

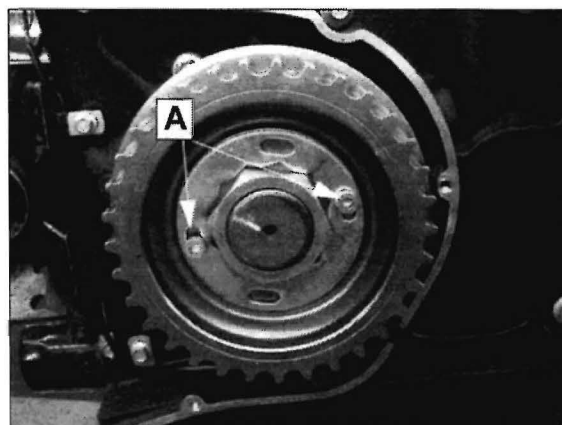
BELT INSTALLATION

1. Inspect sprockets and verify sprocket fasteners are tight (page 11.2 and 11.3).
2. Place belt onto drive sprocket and rear sprocket.
3. Install drive sprocket cover and belt guards. Torque fasteners to specification (page 11.4).
4. Install rear axle (page 13.22).
5. Adjust belt tension (page 2.26) and verify proper alignment (page 2.27).
6. Install exhaust (page 3.10).

DRIVE SPROCKET

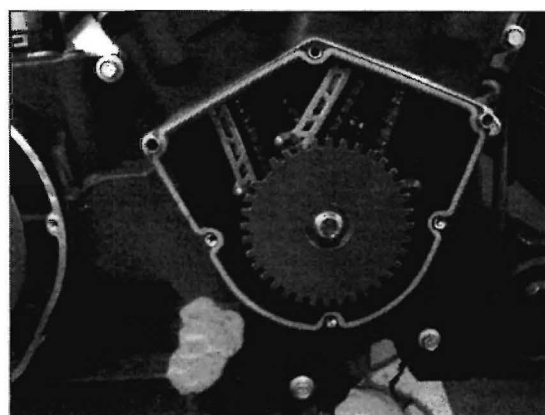
DRIVE SPROCKET REMOVAL

1. Remove exhaust system (page 3.10).
2. Remove drive sprocket cover and gasket.
3. Remove sprocket lock plate screws (A) and lock plate.

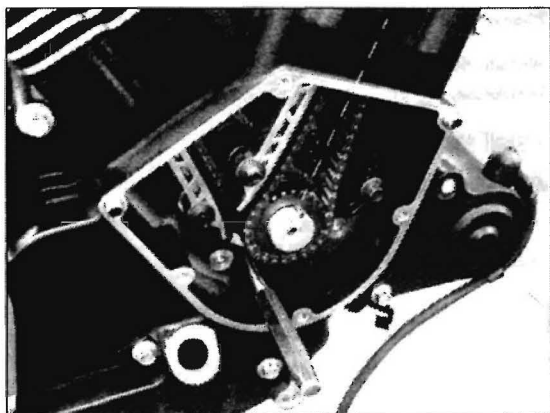


11

4. Place transmission in 5th gear.
5. Remove right side lower timing cover and CPS timing wheel.



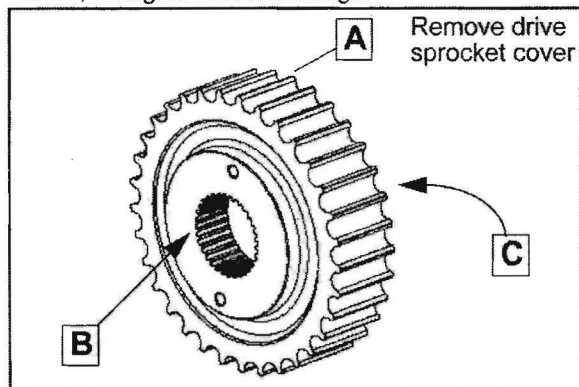
- Rotate crankshaft using Crankshaft Rotation Socket PV-48736 until crankshaft is aligned with one of the TDC holes in crankcase.



- Insert an 8mm or 5/16" diameter pin into crankcase hole and into crankshaft to hold shaft while loosening sprocket nut.
- Remove sprocket nut.
- Loosen rear axle nut.
- Loosen axle adjuster screw lock nut (on vehicles equipped with lock nut style adjusters).
- Loosen both axle adjuster screws evenly to move wheel forward until belt is loose.
- Pull belt off sprocket.
- Remove front sprocket, spacer, and O-ring from output shaft.

DRIVE SPROCKET INSPECTION

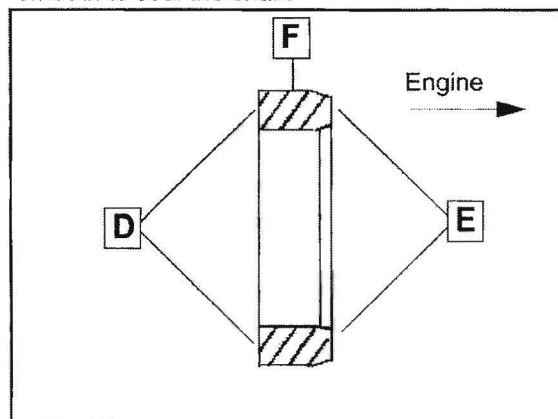
- Visually inspect sprocket teeth (A) for excessive wear, foreign material damage.



- Inspect splines (B) for a tight fit on output shaft splines.
- Inspect the back surface of sprocket hub (C) where it contacts the seal sleeve. Replace if worn or if surface is rough.

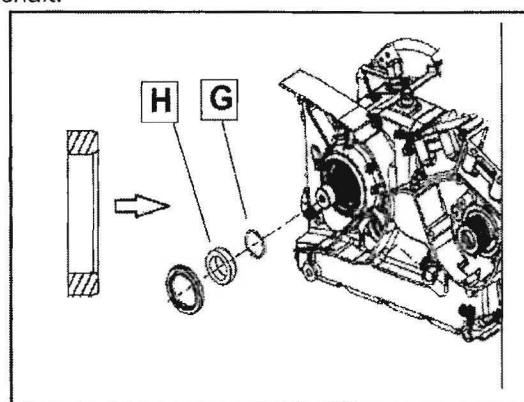
11.6

- Sprockets and belt normally exhibit a polished appearance due to normal operation. Belt replacement is not required unless uncharacteristic damage is noted, or if the mileage service interval is reached. Belt or sprocket damage is usually due to debris trapped between belt and sprocket, or from improper maintenance and adjustment. See belt inspection on page 2.24.
- Inspect outer surface (D), inner surface (E), and sealing surface (F) of seal sleeve. Surfaces must be flat without wear or galling. Replace the sleeve if worn, or if the surface appears rough or chafed. The O-ring sealing surface of slightly chamfered edge must be smooth to seal the shaft.



DRIVE SPROCKET INSTALLATION

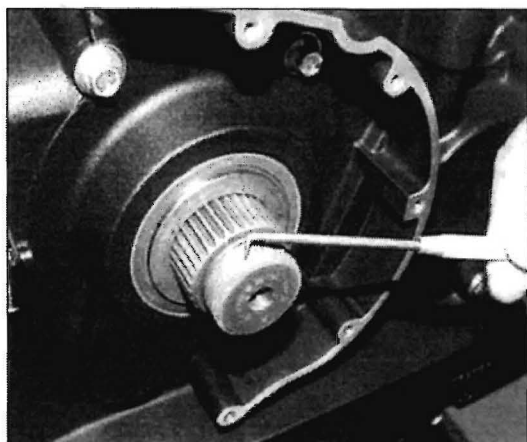
- Apply grease to a new O-ring (G) and install on output shaft.



- Install seal sleeve (H) with the chamfer on inside diameter of sleeve facing in, toward O-ring.

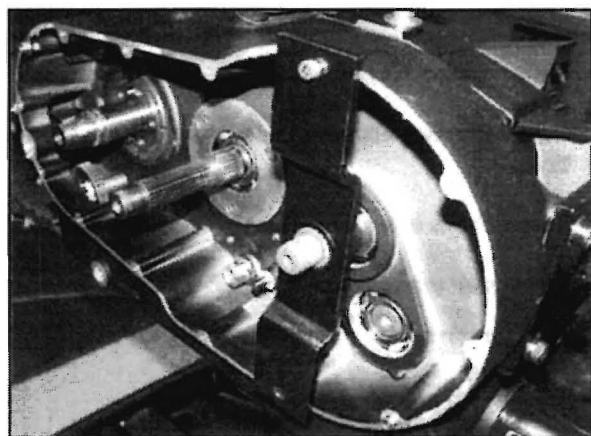


3. Clean shaft threads and sprocket nut to remove all previous thread locking agent and apply Loctite™ Primer N.



4. Apply a light film of anti-seize compound to splines of shaft. Place belt onto front sprocket, place sprocket over splines of output shaft.
5. Apply Loctite™ 262 to threads of shaft and nut.
6. Install drive sprocket nut.

NOTE: If primary is disassembled, shift transmission into 5th gear and install clutch shaft holding tool on clutch shaft to tighten sprocket nut.



NOTE: If primary is assembled, follow instructions to hold shaft as described for *Drive Sprocket Removal*, page 11.5.

7. Torque nut.

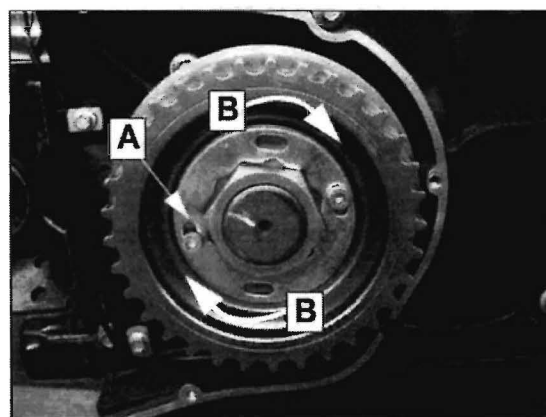
TORQUE: Drive Sprocket Nut
244 Nm (180 lb-ft.)
 Loctite™ 262

8. Install lock plate.

NOTE: The lock plate can be installed in many positions and either side of the plate can be used. If the plate still does not align, tighten sprocket nut slightly and try to fit the lock plate again.

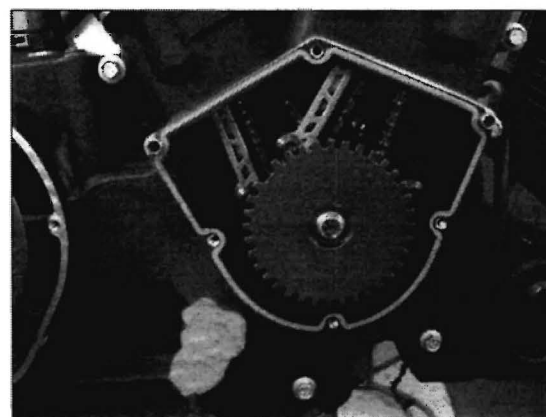
9. Install lock plate screws (A).

10. Rotate the plate **CLOCKWISE** (B) until it stops and hold it firmly against the nut.



11. Tighten the lock plate screws to 9.5 Nm (85 lb-in).

12. Install timing wheel. Torque bolt to 23 Nm (17 lb-ft).



13. Adjust belt tension (page 2.26) and wheel alignment (page 2.27).

14. Install drive sprocket cover with a new gasket (adhesive side of gasket faces cover). Torque cover screws to 9.5 Nm (85 lb-in).



REAR SPROCKET

REAR SPROCKET REMOVAL

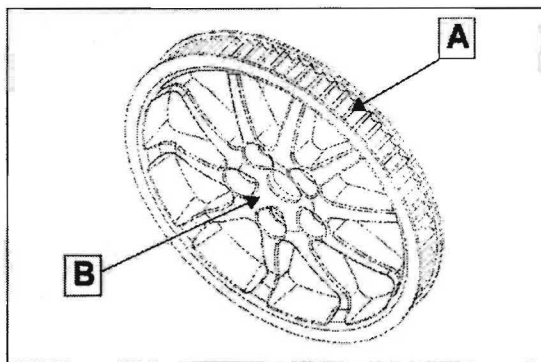
1. Remove rear wheel (page 13.15).
2. Loosen all sprocket bolts evenly in a star pattern and discard.
3. Remove sprocket.

CAUTION

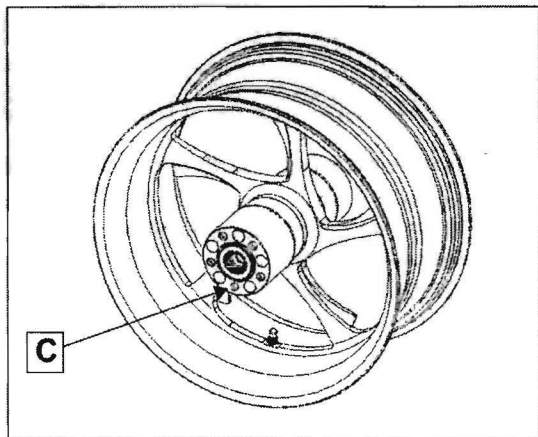
Protect brake disc surface while working on wheel.

REAR SPROCKET INSPECTION

1. Visually inspect sprocket teeth (A) for excessive wear and damage from foreign material or road debris. Inspect hub (B) for cracks or damage.

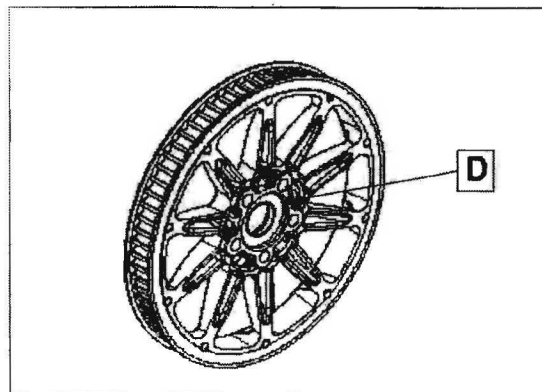


2. Visually inspect sprocket mounting surface (C) on wheel for wear.



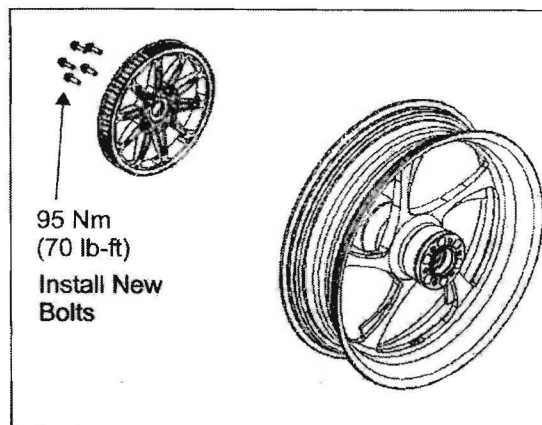
NOTE: If the drive system has been in service for 5000 miles or more, replace both front and rear sprockets along with the belt if any one item is damaged or worn beyond a normal polished appearance. Refer to the Periodic Maintenance Table in chapter 2 for drive system replacement interval.

3. Inspect sprocket mating surface (D) for galling, roughness, or cracks. Surface must be flat, with no burrs or surface irregularities.



REAR SPROCKET INSTALLATION

1. Clean sprocket bolt threads in hub to remove all grease or oil residue.
2. Clean mating surfaces of wheel and sprocket.
3. Install sprocket with new bolts. Do not reuse sprocket bolts.
4. Torque bolts in a star pattern to specified torque.
5. Install rear wheel (page 13.22).



TROUBLESHOOTING**TROUBLESHOOTING**

PROBLEM	POSSIBLE CAUSE	POSSIBLE REPAIR NEEDED
Belt Shows Excessive Wear On One Side	Out-of-Alignment	Align rear wheel
Belt Squeal	Out-of-Alignment	Align rear wheel
Belt Whine / Noise	Out-of-Alignment Belt Damage Incorrect Belt Tension	Align rear wheel Inspect Belt Adjust Tension
Broken Sprocket Teeth	Foreign material damage Loose drive belt or sprocket	Replace parts or repair as necessary
Broken or Torn Cogs on Belt	Foreign material damage, loose belt or sprocket	Replace parts as necessary
Belt Jumps Sprocket Teeth	Worn, damaged or out of adjustment belt or sprockets	Replace parts as necessary
	Belt Loose	Adjust Belt
Excessive Wear, Binding Suspension	Belt Tight	Adjust Belt
Broken Belt	Belt weakened by foreign material damage. Belt run excessively tight or loose for extended period	Replace Belt, Replace Sprockets



CHAPTER 12

FRONT SUSPENSION / CONTROLS

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FRONT SUSPENSION / CONTROLS

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12.2



GENERAL

IMPORTANT INFORMATION

WARNING

Victory motorcycles are produced using the designated tires listed as original equipment. This includes field testing to ensure stability and superior handling. The use of tires other than original equipment may cause instability which could lead to a crash, resulting in serious injury or death. Use only the recommended tires inflated to the recommended tire pressures based on load conditions as listed on the tire inflation decal.

Tubeless tires are used on certain Victory models. Operating the motorcycle with damaged rims creates a safety hazard including air pressure loss, steering imbalance and/or reduced steering control. Do not attempt to repair or straighten damaged rims.

CAUTION

Work performed to the front end of the motorcycle usually involves supporting the machine with the front end elevated. Take precautions so that the motorcycle is securely supported when the front tire is off the ground. This reduces the possibility of personal injury or damage to the motorcycle.

Leaking front fork seals are a safety hazard and should be replaced immediately if a leak is found. Fork oil could contaminate front brake components which could reduce stopping ability of the motorcycle. Contaminated brake discs or pads greatly reduce stopping force available & increase stopping distance. Brake discs can be cleaned using Victory brake cleaner. NEVER attempt to clean contaminated brake pads. Replace pads as a set.

- Refer to Chapter 2 for **MAINTENANCE** of front end components.
- Refer to Chapter 14 for **TIRE REMOVAL, REPAIR, & BALANCING**
- Refer to Chapter 15 for **BRAKE SYSTEM** service and repairs.

SPECIAL TOOLS

SPECIAL TOOLS

Fork Spring Compressor	PV-49463
Damper Rod Extension Tool	PV-47060 or PV-49453*
Cartridge Holder	PV-49452
Damper Rod Holder (Vegas / Jackpot)	PV-43517
Fork Oil Level Tool	PV-59000-A
Fork Seal Driver	PV-47035
Fork Seal Driver (Jackpot)	PV-47036
Fork Seal Guide	PV-47037
Wheel Bearing / Stem Bearing Race Installation Set	PV-43515
Spanner Socket (Steering Stem)	PV-43508
Spanner Wrench (Steering Stem)	PV-43509

MAINTENANCE PRODUCTS

MAINTENANCE PRODUCTS

Hand Grip Adhesive - Three Bond 1501 (10ml tube)	2872575
Fork Oil, KYB Inverted Cartridge (Kingpin & Hammer)	2877421
Fork Oil (Vegas & Jackpot)	2874568

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TORQUE SPECIFICATIONS

FASTENER TORQUE SPECIFICATIONS

Refer to Assembly Views for fastener torque specifications.



FORK SPECIFICATIONS

SPECIFICATIONS - HAMMER

Item		Standard	Service Limit
Axle Runout		-	.20 mm (.008")
Front Wheel Runout (Billet and Cast Type) 3.00" x 18"	Axial	.50 mm (.020")	2.0 mm (.080")
	Radial	.50 mm (.020")	2.0 mm (.080")
Fork Spring Free Length		383.7 mm (15.10")	
Fork Spring Pre-Load		38 mm (1.889")	
Fork Spring Spacer Length		100 mm (1.50")	
Fork Spring Rate (Dual Rate Spring)		7.1 - 17.98 N/mm (40 - 103 lb./inch)	
Fork Tube Diameter (Inner Tube)		43 mm	Not Applicable
Fork Tube Runout		-	.20 mm (.008")
Fork Oil Type / Weight		Victory Fork Oil (YELLOW) P/N 2877421	
Fork Oil Level From Top of Tube		118 mm (4.65")	(±1 mm) (± .040")
Fork Oil Capacity (per leg, dry)		NOTE: Oil level must be measured and adjusted to specification 516 cc (± 3 cc) (516 ml (± 3 ml)	Not Applicable
Steering Bearing Preload		Refer to procedure page 12.59	

SPECIFICATIONS - KINGPIN

Item		Standard	Service Limit
Axle Runout		-	.20 mm (.008")
Front Wheel Runout (Billet and Cast Type) 3.00" x 18"	Axial	.50 mm (.020")	2.0 mm (.080")
	Radial	.50 mm (.020")	2.0 mm (.080")
Fork Spring Free Length		383.7 mm (15.10")	
Fork Spring Pre-Load		38 mm (1.889")	
Fork Spring Spacer Length		100 mm (1.50")	
Fork Spring Rate (Dual Rate Spring)		7.1 - 17.98 N/mm (40 - 103 lb./inch)	
Fork Tube Diameter (Inner Tube)		43 mm	Not Applicable
Fork Tube Runout		-	.20 mm (.008")
Fork Oil Type / Weight		Victory Fork Oil (YELLOW) P/N 2877421	
Fork Oil Level From Top of Tube (Spring removed, tube fully compressed, preload spacer and spring guide installed)		118 mm (4.65")	(±1 mm) (± .040")
Fork Oil Capacity (per leg, dry)		NOTE: Oil level must be measured and adjusted to specification 516 cc (± 3 cc) (516 ml (± 3 ml)	Not Applicable
Steering Bearing Preload		Refer to procedure page 12.59	



SPECIFICATIONS - VEGAS MODELS

Item		Standard	Service Limit
Axle Runout		-	.20 mm (.008")
Front Wheel Runout (Billet and Cast Type) 2.15" x 21"	Axial	.50 mm (.020")	2.0 mm (.080")
	Radial	.50 mm (.020")	2.0 mm (.080")
Fork Spring Free Length		487.5 mm (19.193")	481.5 mm (18.957")
Fork Spring Pre-Load		58-60 mm (2.28"-2.36")	-
Fork Spring Pre-Load Spacer Length		150 mm (5.91")	-
Fork Spring Rate		6.0 N/mm (34.2 lb./inch)	Not Applicable
Fork Top-Out Spring Length		23.5-25.5 mm (.925-1.00")	21.5mm (.846")
Fork Tube Diameter		43 mm	Not Applicable
Fork Tube Runout		-	.20 mm (.008")
Fork Oil Type/Weight	Victory Fork Oil 2874568		
Fork Oil Level From Top of Tube (Spring removed, tube fully compressed, preload spacer and spring guide installed)		135 mm (5.31")	(±1 mm)
Fork Oil Capacity (per leg, dry)	NOTE: Oil level must be measured and adjusted to specification	545 cc (±3 cc) (545 ml ± 3 ml)	Not Applicable
Steering Bearing Preload	Refer to procedure on page 12.59		

SPECIFICATIONS - HIGH-BALL

Item		Standard	Service Limit
Axle Runout		-	.20 mm (.008")
Front Wheel Runout (Spoke Type) 3.5" x 16"	Axial	.50 mm (.020")	.80 mm (.031")
	Radial	.50 mm (.020")	.80 mm (.031")
Fork Spring Free Length		487.5 mm (19.193")	481.5 mm (18.957")
Fork Spring Pre-Load		58-60 mm (2.28"-2.36")	-
Fork Spring Pre-Load Spacer Length		150 mm (5.91")	-
Fork Spring Rate		6.0 N/mm (34.2 lb./inch)	Not Applicable
Fork Top-Out Spring Length		23.5-25.5 mm (.925-1.00")	21.5mm (.846")
Fork Tube Diameter		43 mm	Not Applicable
Fork Tube Runout		-	.20 mm (.008")
Fork Oil Type/Weight	Victory Fork Oil 2874568		
Fork Oil Level From Top of Tube (Spring removed, tube fully compressed, preload spacer and spring guide installed)		135 mm (5.31")	(±1 mm)
Fork Oil Capacity (per leg, dry)	NOTE: Oil level must be measured and adjusted to specification	545 cc (±3 cc) (545 ml ± 3 ml)	Not Applicable
Steering Bearing Preload	Refer to procedure on page 12.59		

12



FRONT SUSPENSION / CONTROLS

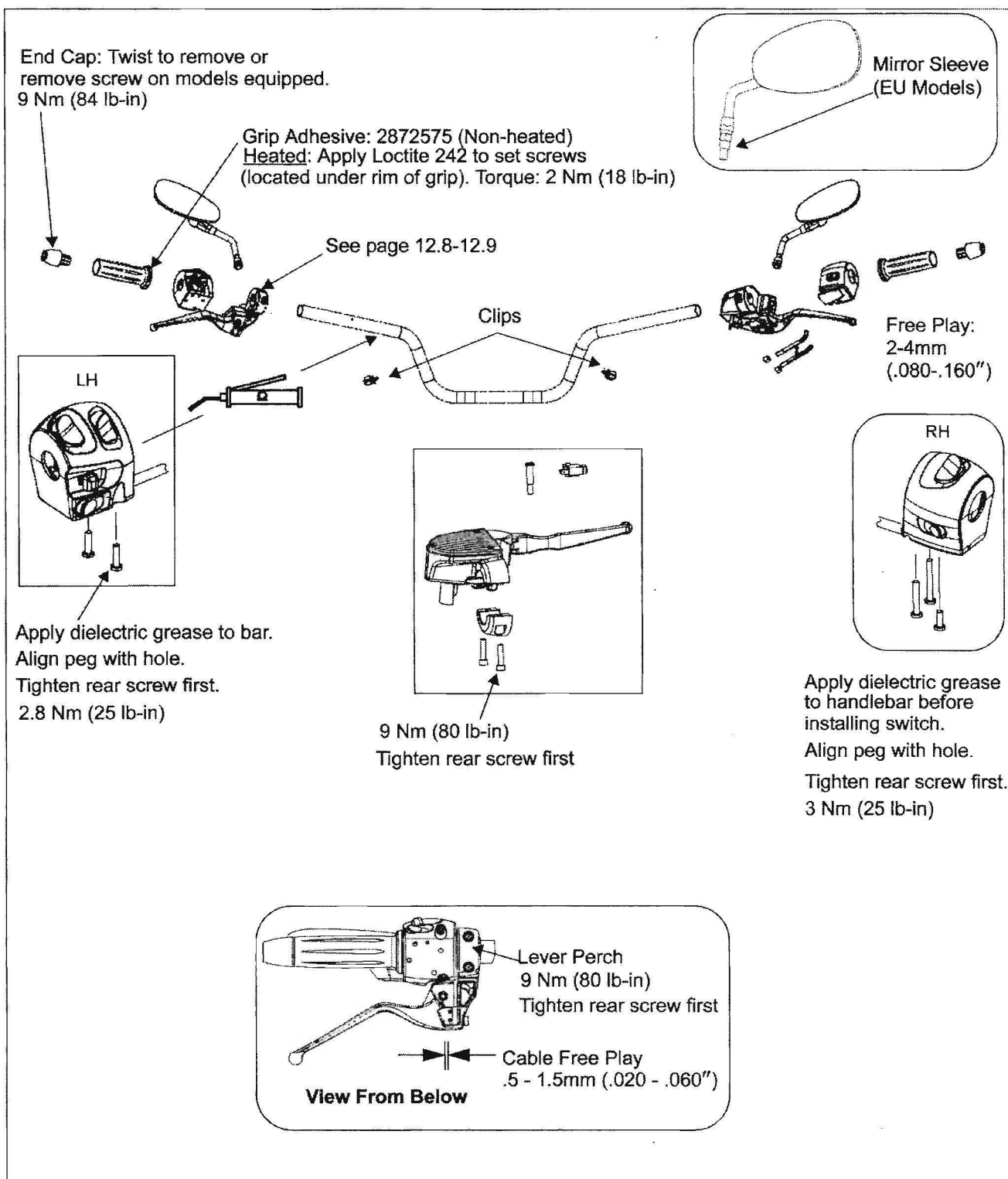
SPECIFICATIONS - JACKPOT MODELS

Item		Standard	Service Limit
Axle Runout		-	.20 mm (.008")
Front Wheel Runout (Billet and Cast Type) 2.15" x 21"	Axial	.50 mm (.020")	2.0 mm (.080")
	Radial	.50 mm (.020")	2.0 mm (.080")
Fork Spring Free Length		487.5 mm (19.193")	481.5 mm (18.957")
Fork Spring Pre-Load		58-60 mm (2.28"-2.36")	-
Fork Spring Pre-Load Spacer Length		150 mm (5.91")	-
Fork Spring Rate		6.0 N/mm (34.2 lb./inch)	Not Applicable
Fork Top-Out Spring Length		23.5-25.5 mm (.925-1.00")	21.5mm (.846")
Fork Tube Diameter		43 mm	Not Applicable
Fork Tube Runout		-	.20 mm (.008")
Fork Oil Type/Weight	Victory Fork Oil 2874568		
Fork Oil Level From Top of Tube (Spring removed, tube fully compressed, preload spacer and spring guide installed)		135 mm (5.31")	(±1 mm)
Fork Oil Capacity (per leg, dry)	NOTE: Oil level must be measured and adjusted to specification	545 cc (±3 cc) (545 ml ± 3 ml)	Not Applicable
Steering Bearing Preload		Refer to procedure on page 12.59	



ASSEMBLY VIEWS & TORQUE

ASSEMBLY VIEW - HANDLEBAR

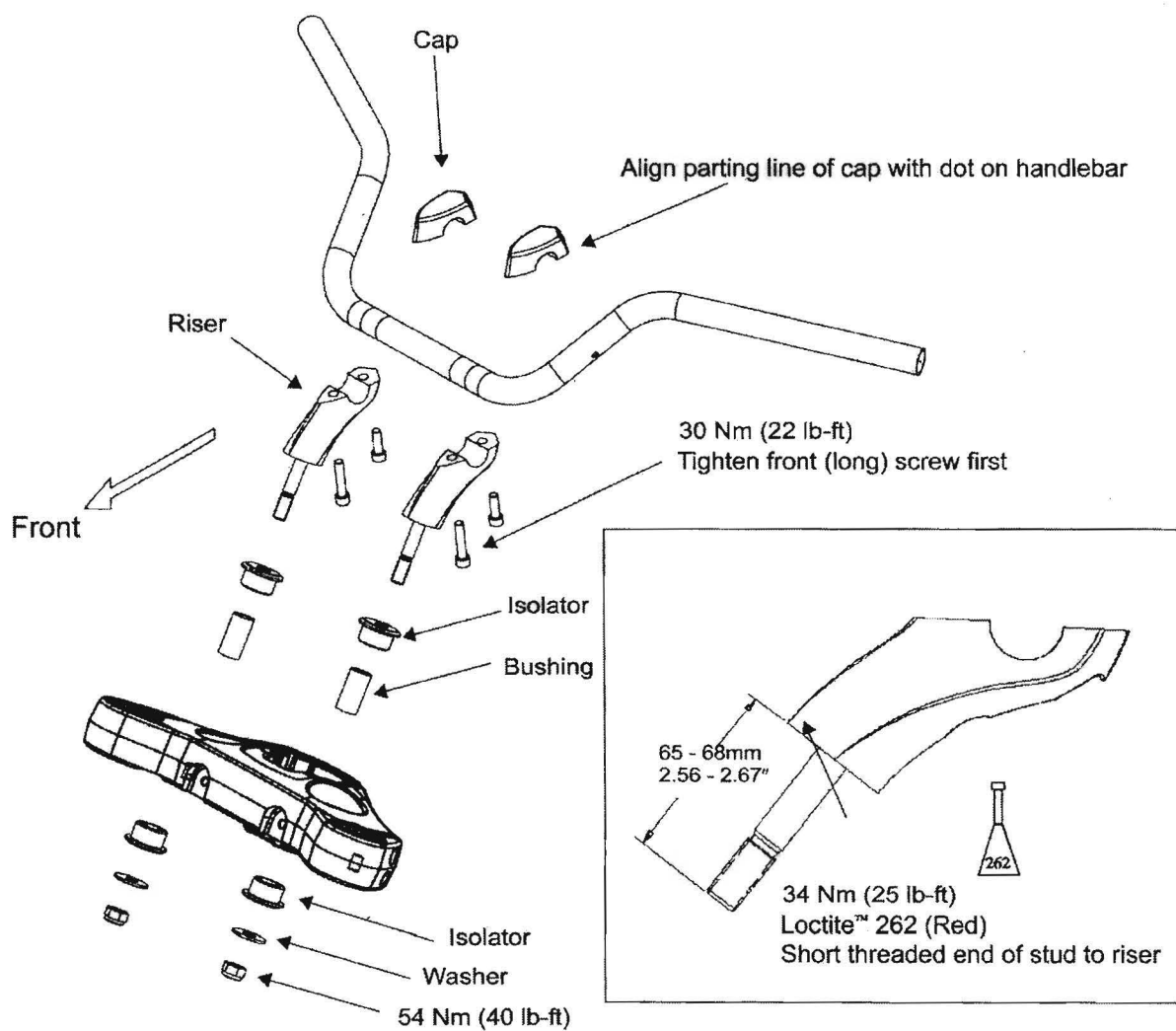


12

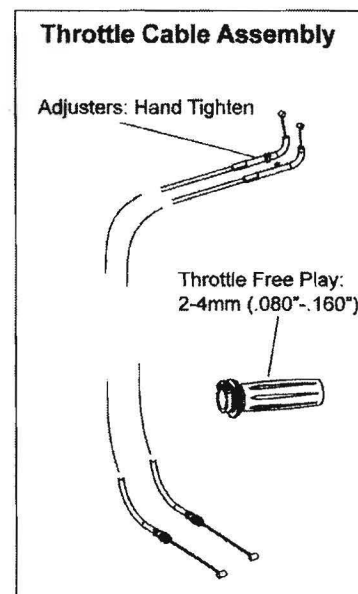
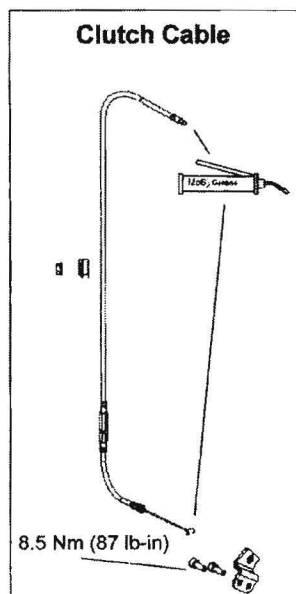
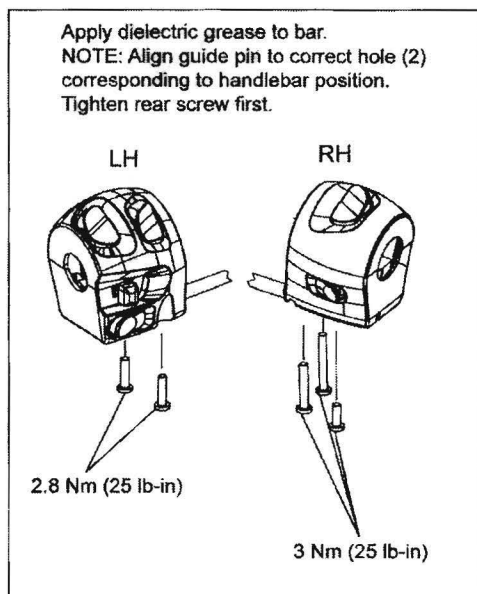
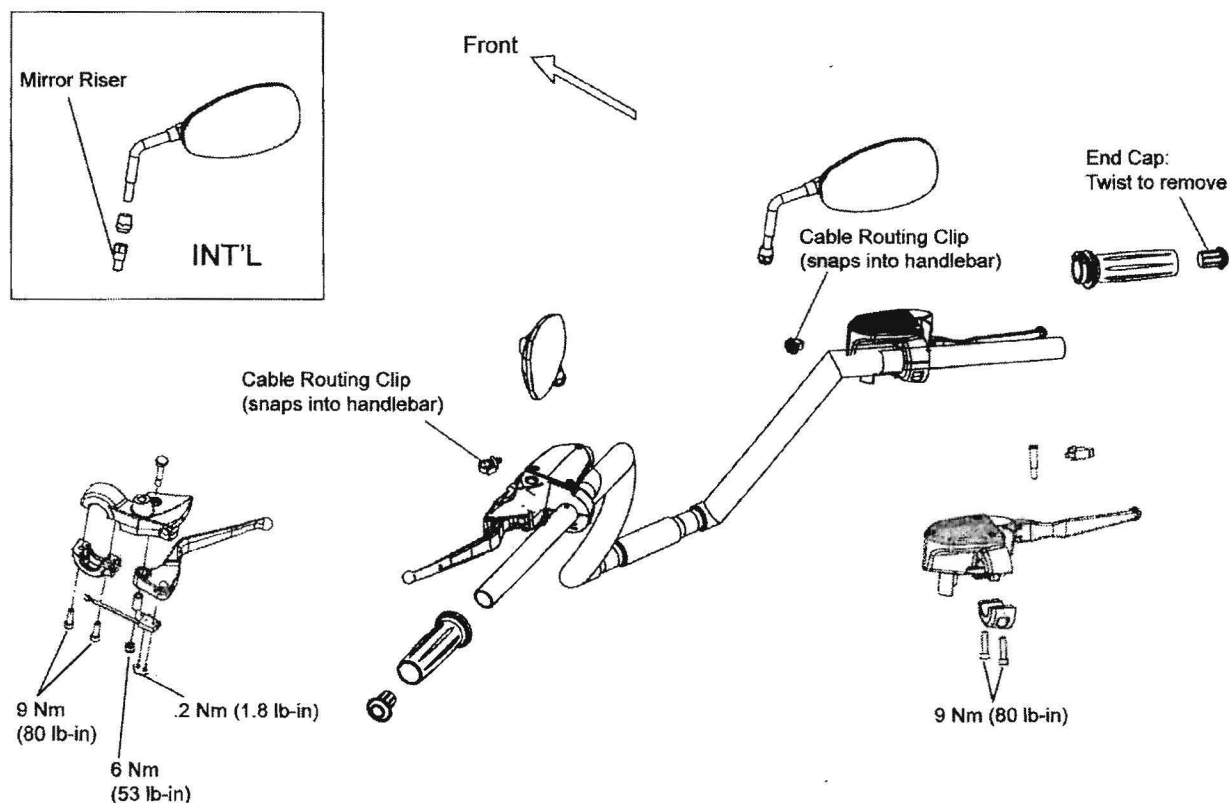


FRONT SUSPENSION / CONTROLS

ASSEMBLY VIEW - HANDLEBAR, / HANDLEBAR RISER

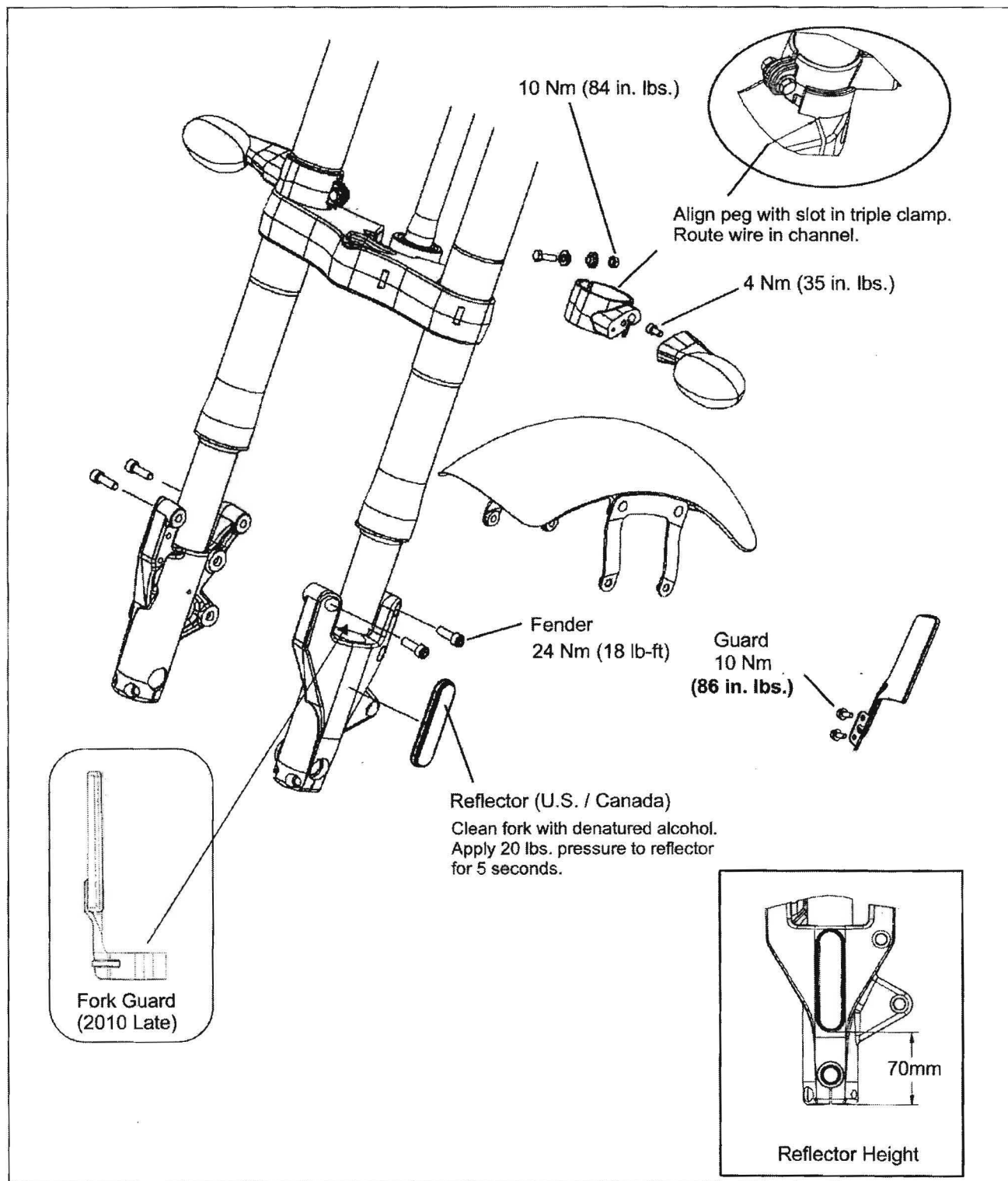


ASSEMBLY VIEW - HANDLEBAR /CONTROLS - HIGH-BALL



FRONT SUSPENSION / CONTROLS

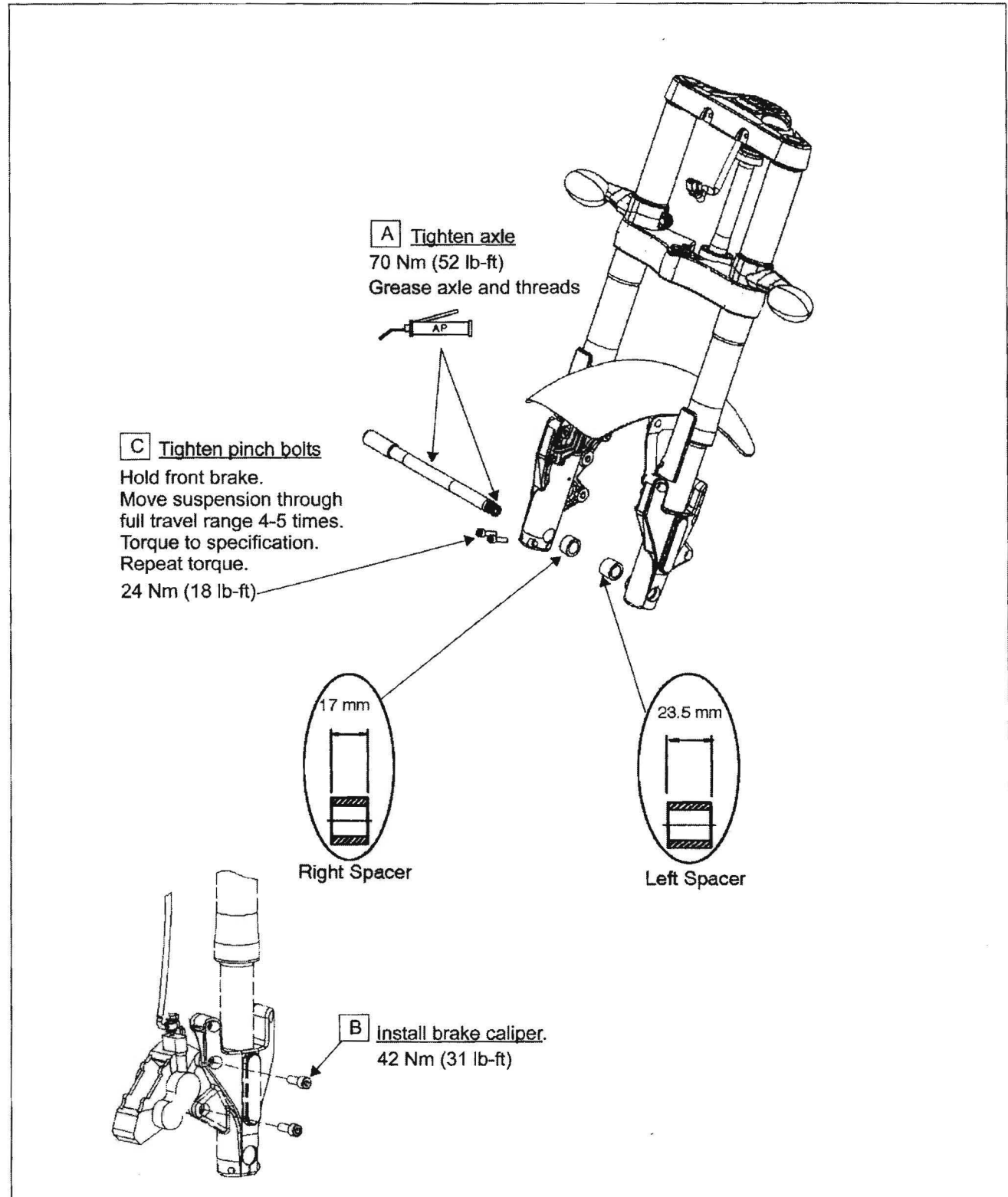
ASSEMBLY VIEW, FRONT FORK ATTACHMENTS - HAMMER MODELS



12.10

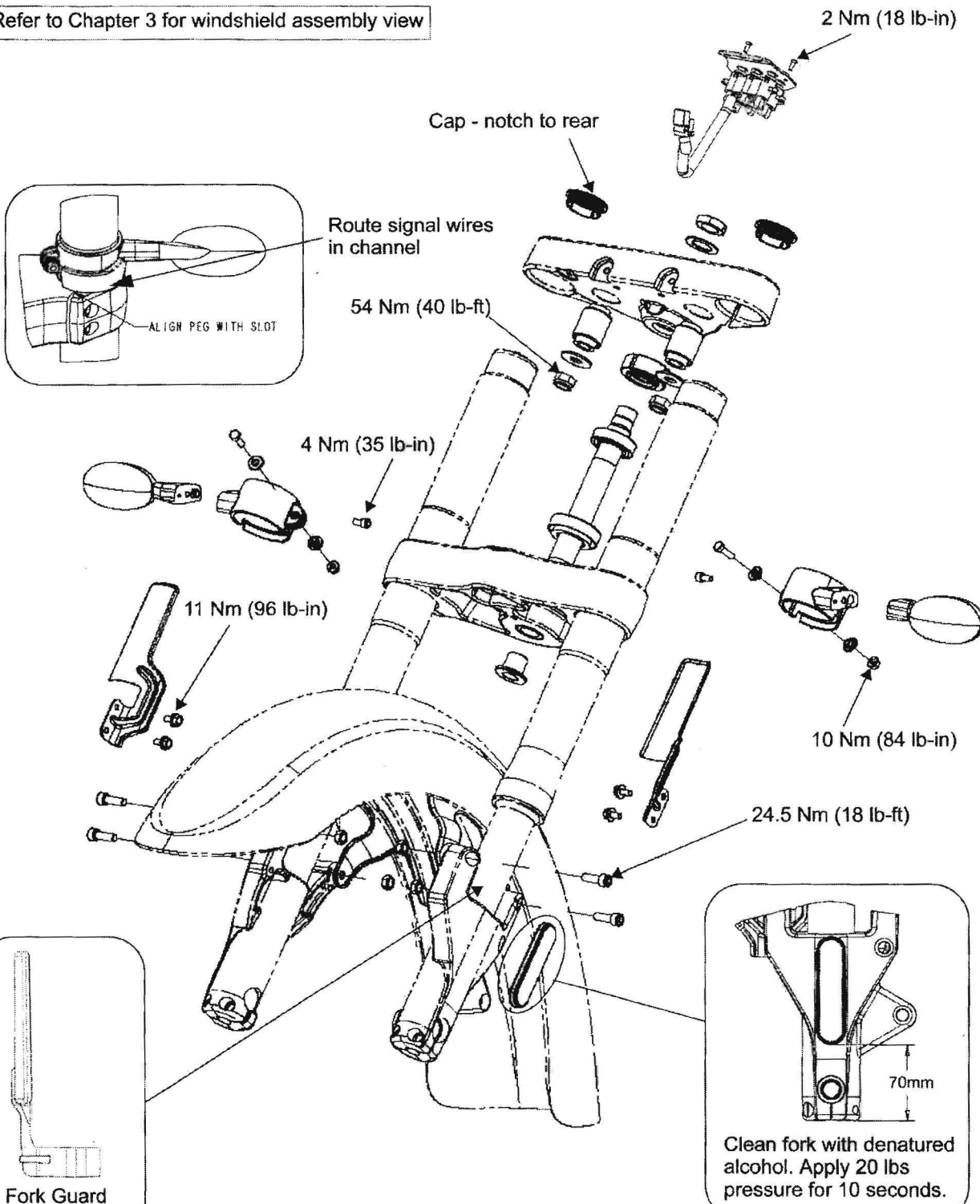


ASSEMBLY VIEW, FRONT AXLE - HAMMER MODELS



ASSEMBLY VIEW, FRONT FORK ATTACHMENTS - KINGPIN

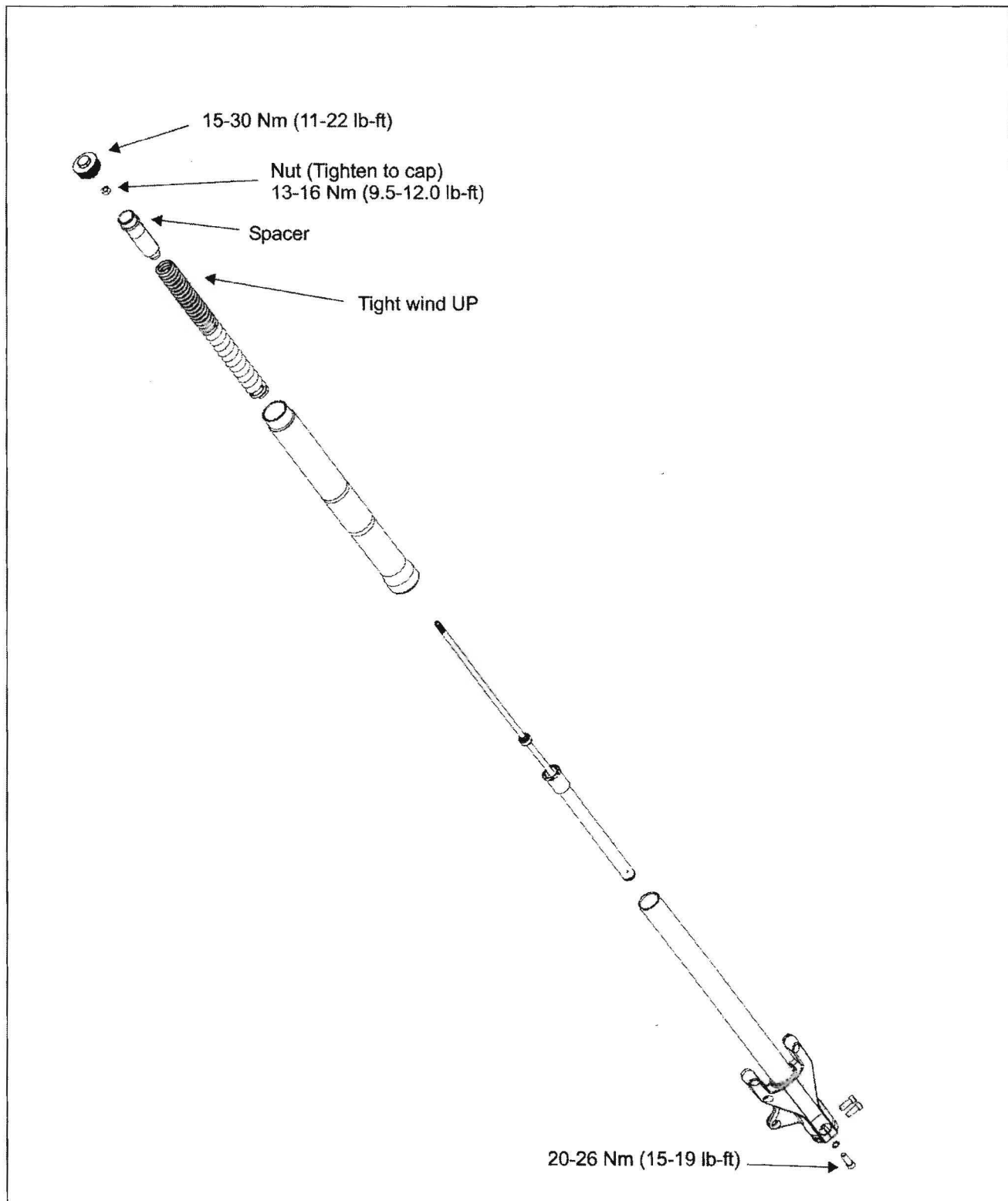
Refer to Chapter 3 for windshield assembly view



12.12



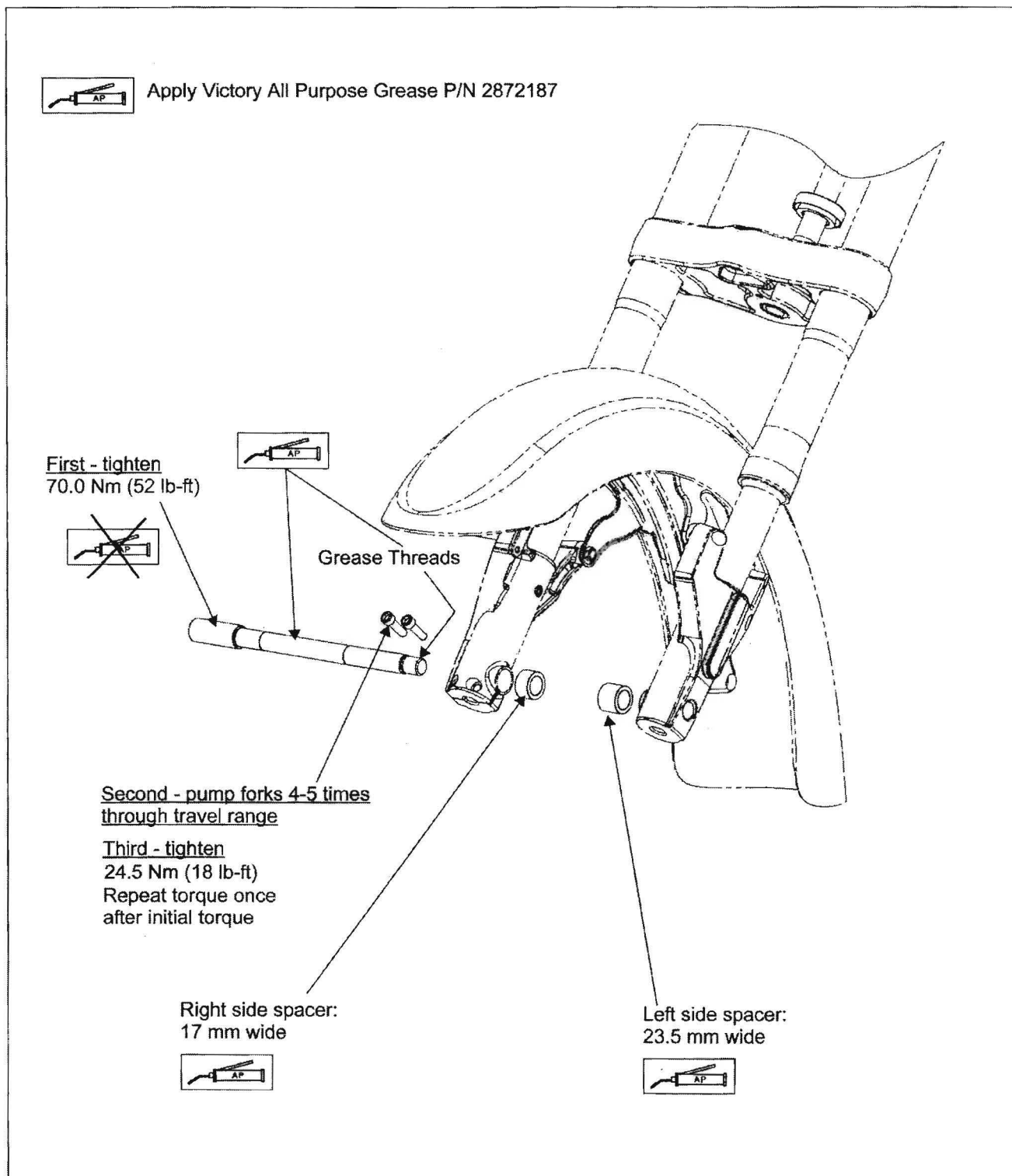
ASSEMBLY VIEW, FRONT FORK - HAMMER / KINGPIN



12



ASSEMBLY VIEW, FRONT AXLE - KINGPIN

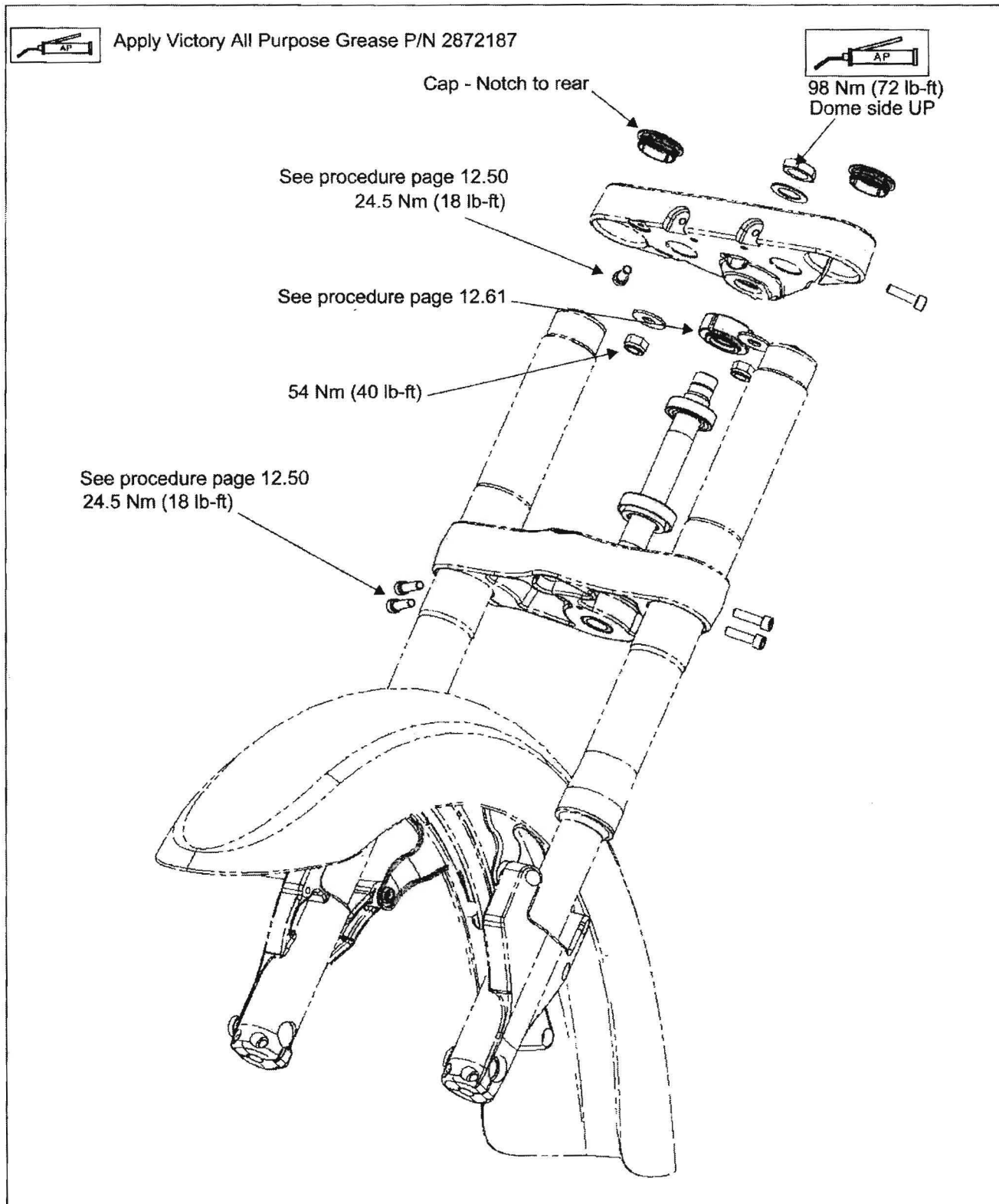


12



FRONT SUSPENSION / CONTROLS

ASSEMBLY VIEW, FRONT FORK / TRIPLE CLAMP - KINGPIN

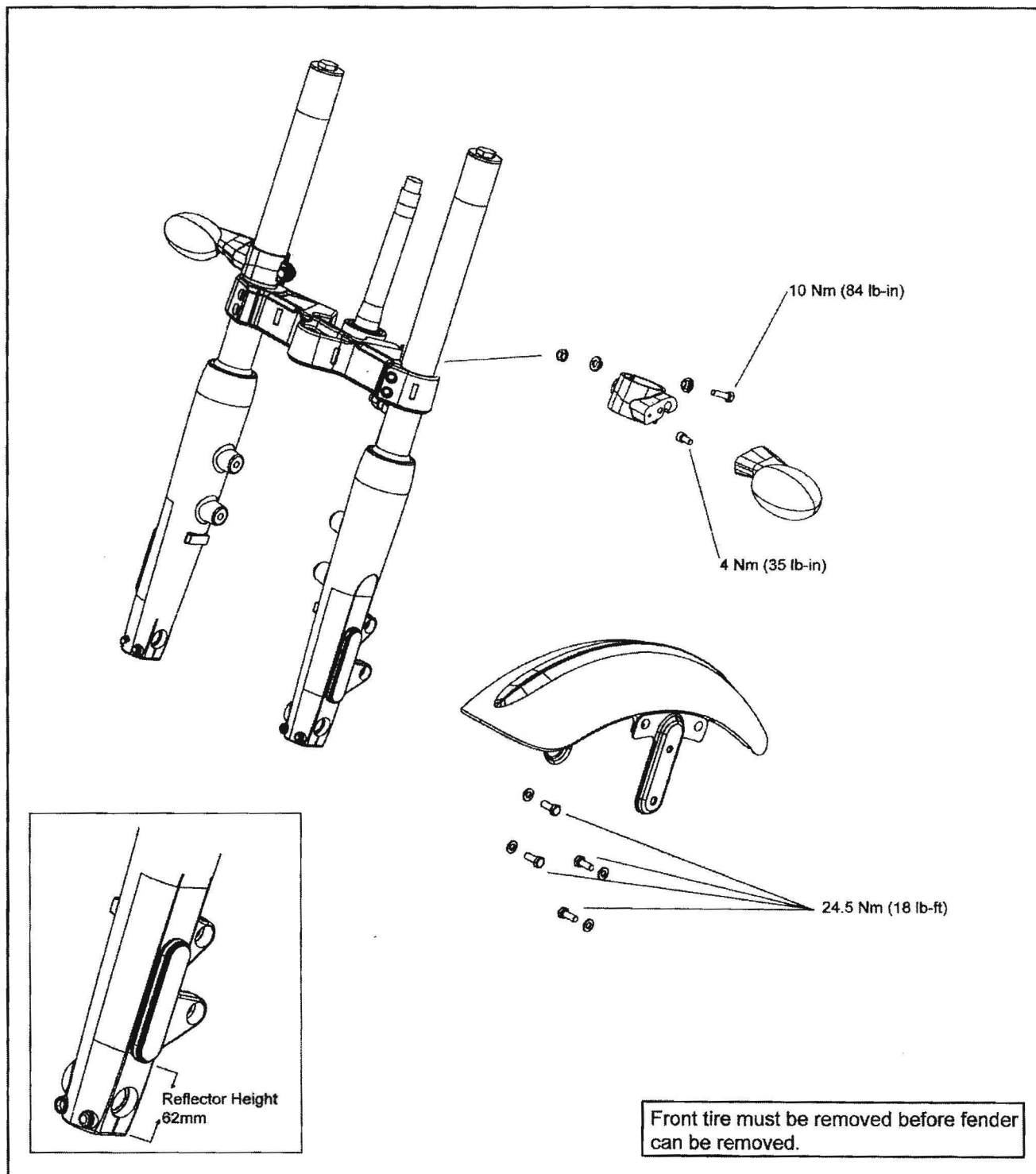


12.14



FRONT SUSPENSION / CONTROLS

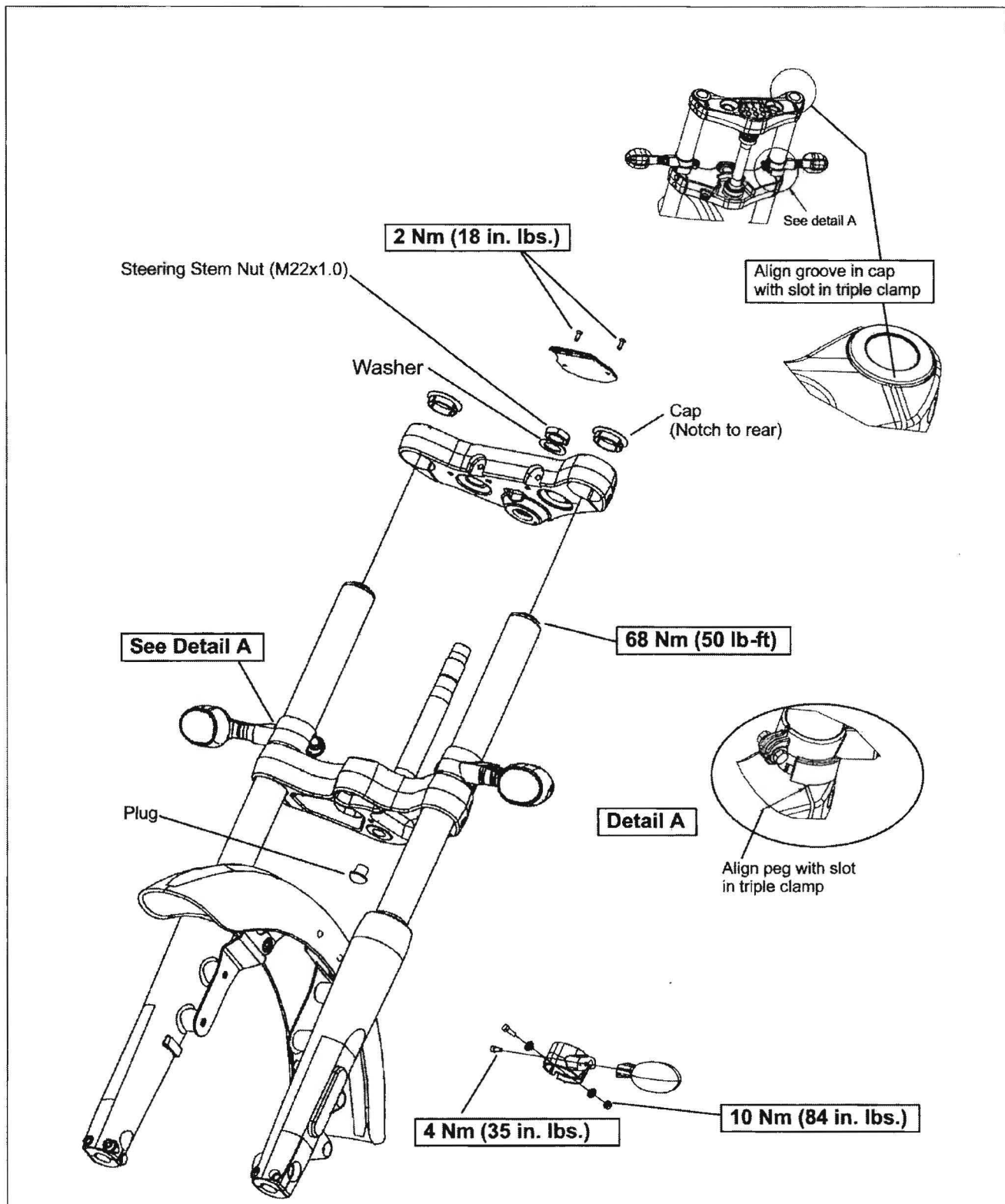
ASSEMBLY VIEW, FRONT FORK ATTACHMENTS - HIGH-BALL



12.16



ASSEMBLY VIEW, FRONT FORK ATTACHMENTS - VEGAS / JACKPOT

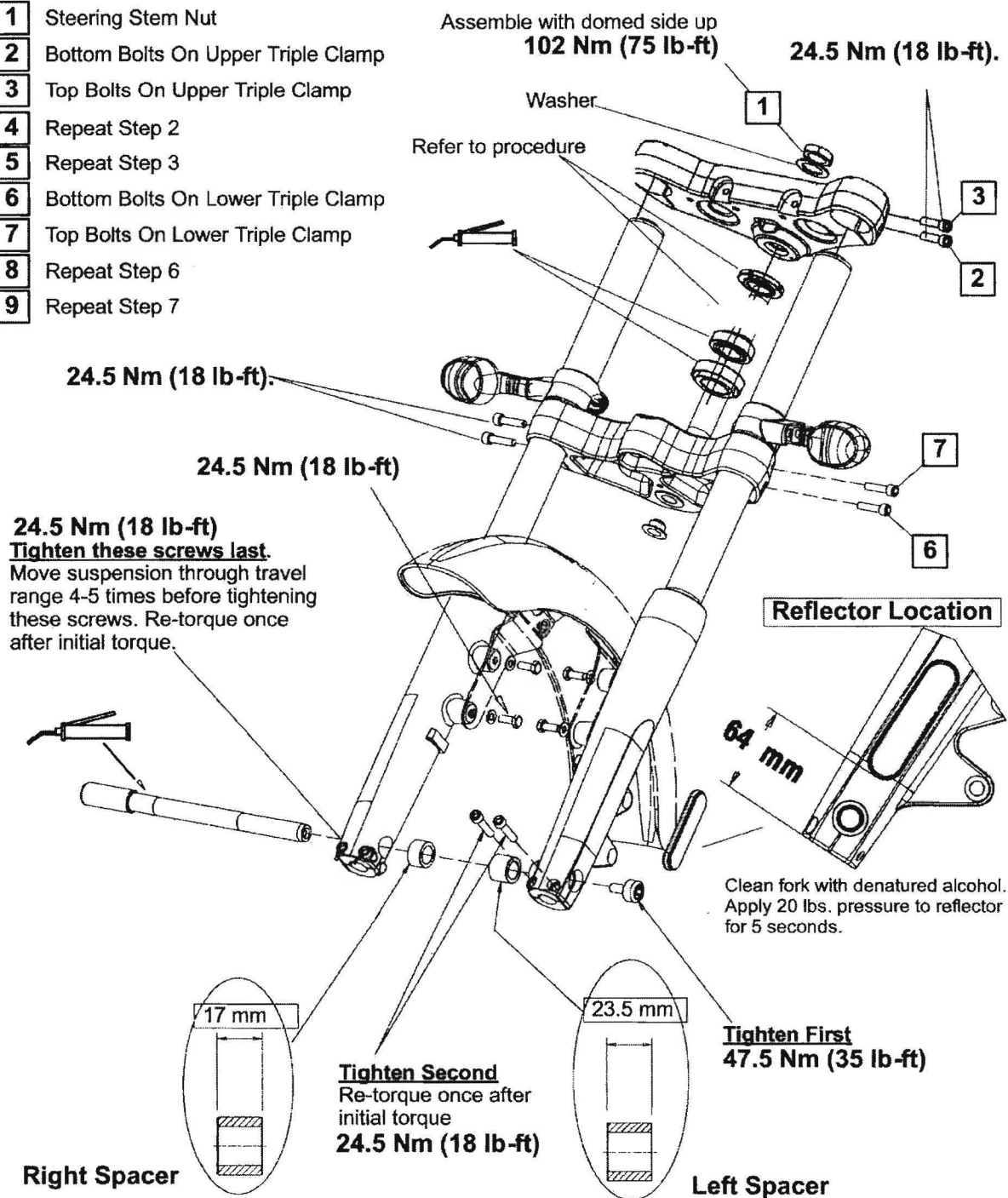


ASSEMBLY VIEW, TRIPLE CLAMP / FRONT AXLE - VEGAS / JACKPOT

Detailed front wheel installation procedure this chapter.

Tightening Sequence - Fork tube installation:

- 1 Steering Stem Nut
- 2 Bottom Bolts On Upper Triple Clamp
- 3 Top Bolts On Upper Triple Clamp
- 4 Repeat Step 2
- 5 Repeat Step 3
- 6 Bottom Bolts On Lower Triple Clamp
- 7 Top Bolts On Lower Triple Clamp
- 8 Repeat Step 6
- 9 Repeat Step 7



FRONT SUSPENSION / CONTROLS

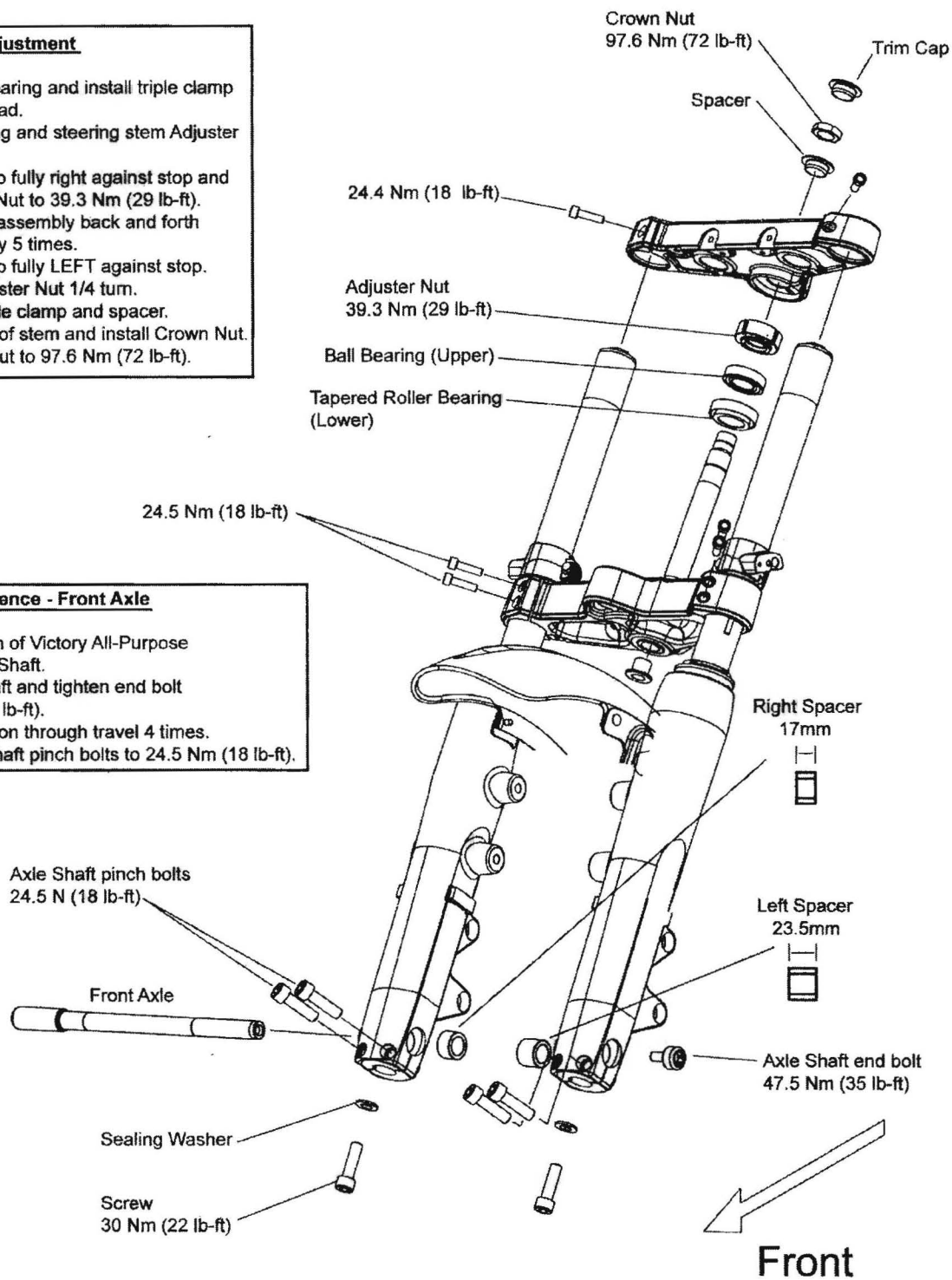
ASSEMBLY VIEW, TRIPLE CLAMP / FRONT AXLE - HIGH-BALL

Steering Head Adjustment

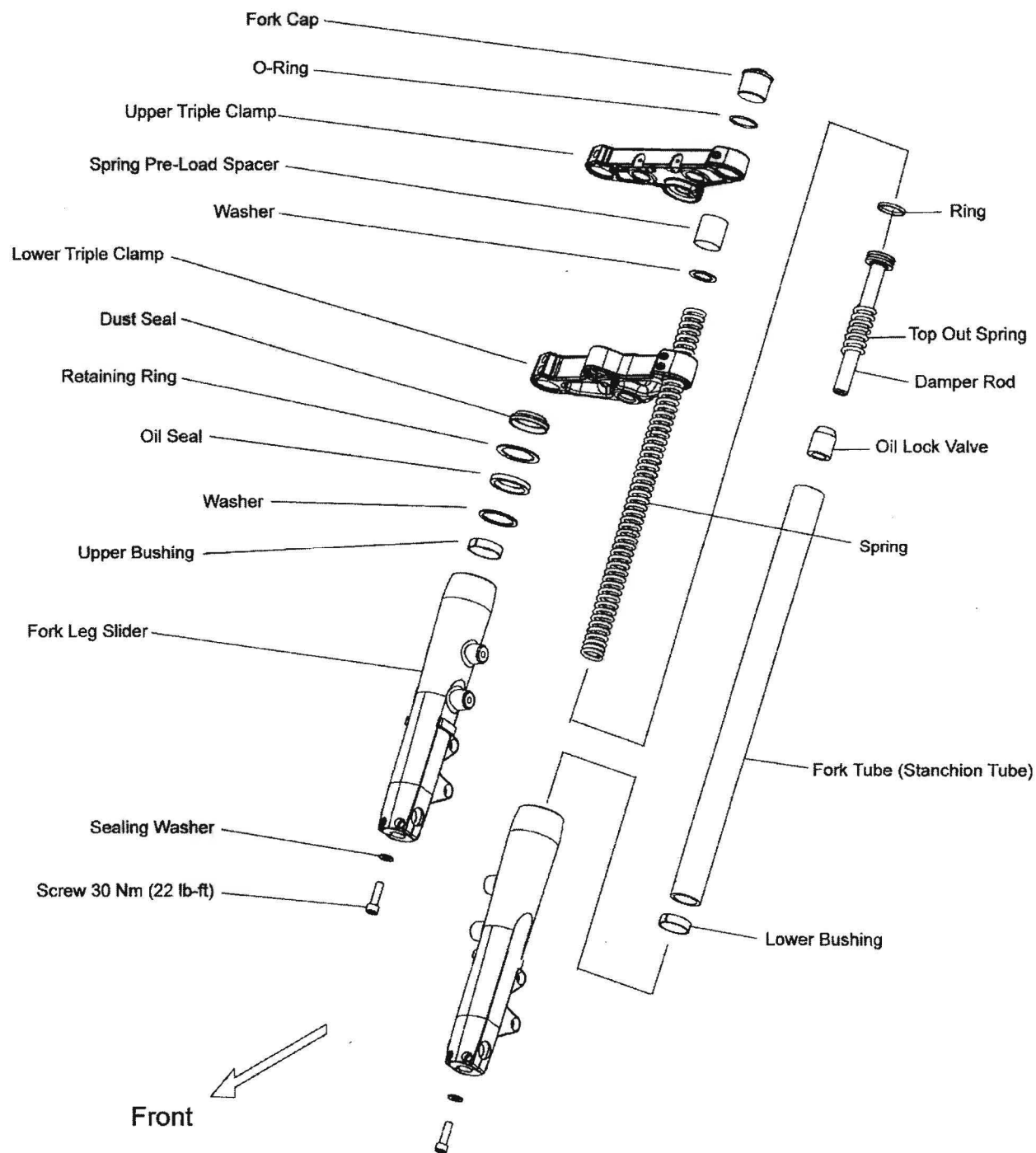
1. Grease lower bearing and install triple clamp onto steering head.
2. Install top bearing and steering stem Adjuster Nut finger tight.
3. Turn lower clamp fully right against stop and torque Adjuster Nut to 39.3 Nm (29 lb-ft).
4. Rotate steering assembly back and forth (lock to lock) fully 5 times.
5. Turn lower clamp fully LEFT against stop.
6. Loosen the Adjuster Nut 1/4 turn.
7. Install upper triple clamp and spacer.
8. Grease threads of stem and install Crown Nut.
9. Torque Crown Nut to 97.6 Nm (72 lb-ft).

Tightening Sequence - Front Axle

1. Apply a thin film of Victory All-Purpose grease to Axle Shaft.
2. Install Axle Shaft and tighten end bolt to 47.5 Nm (35 lb-ft).
3. Move suspension through travel 4 times.
4. Tighten Axle Shaft pinch bolts to 24.5 Nm (18 lb-ft).



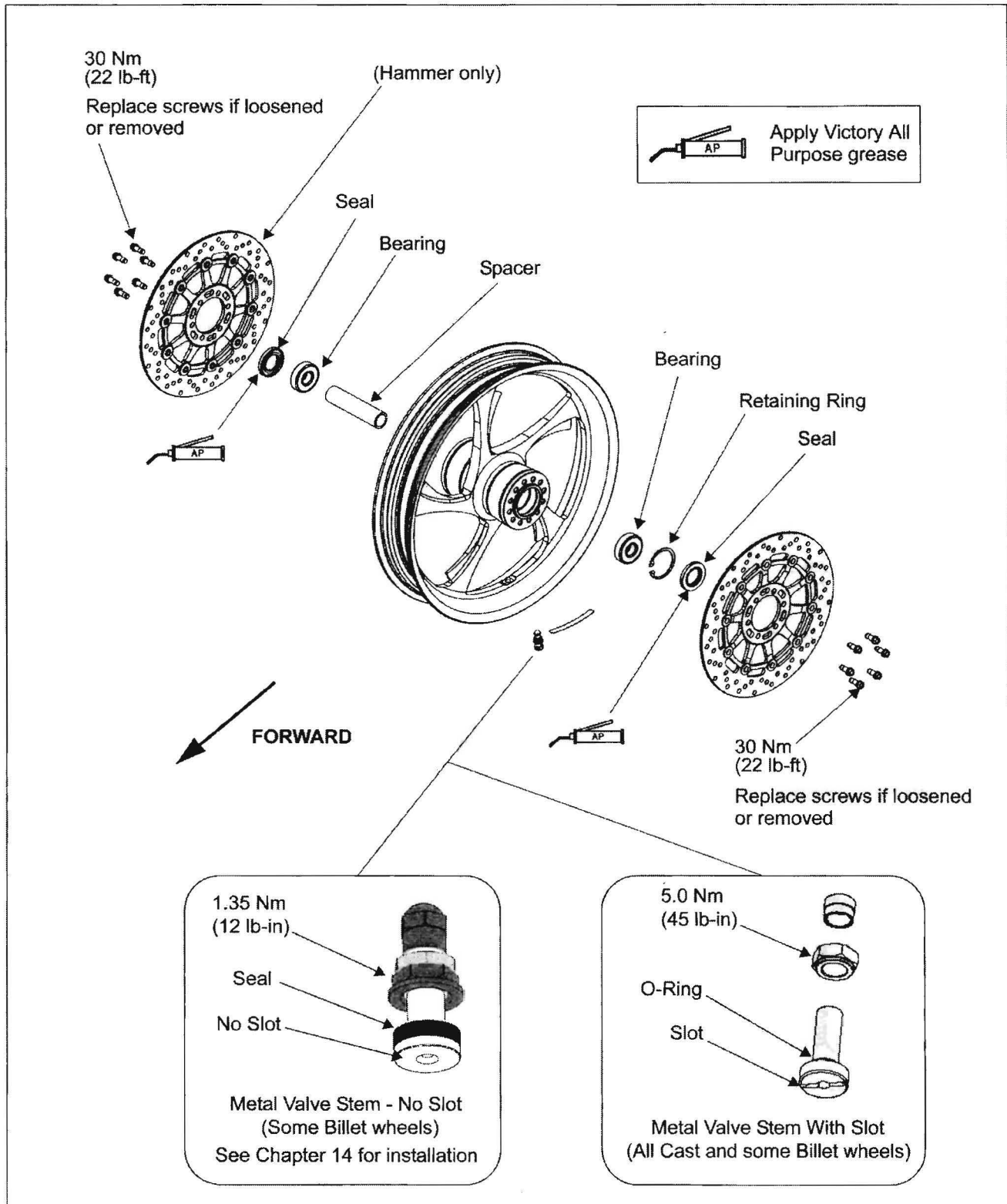
ASSEMBLY VIEW, FRONT FORK - HIGH-BALL / VEGAS / JACKPOT



12.20

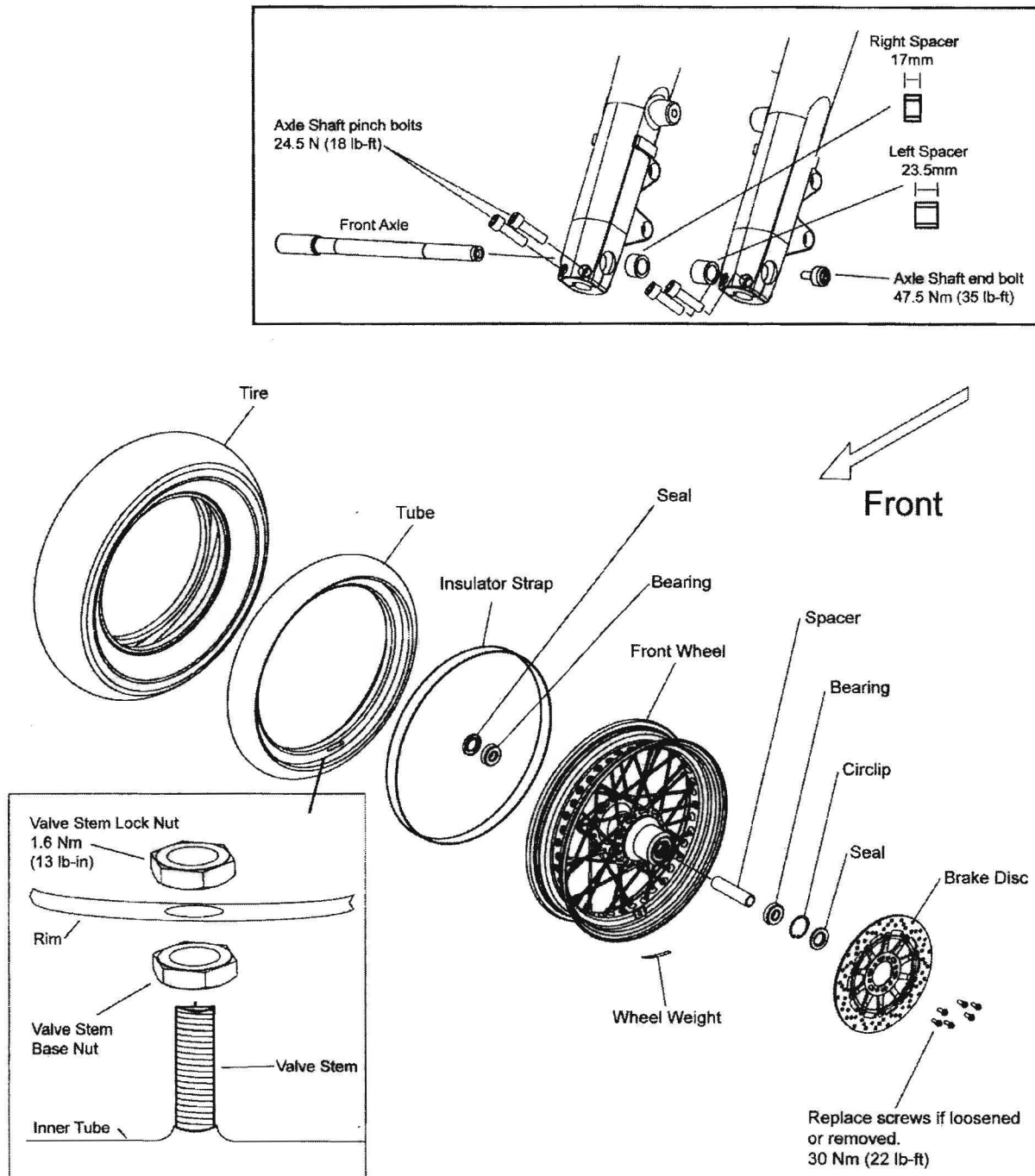


ASSEMBLY VIEW, FRONT WHEEL - HAMMER / KINGPIN



FRONT SUSPENSION / CONTROLS

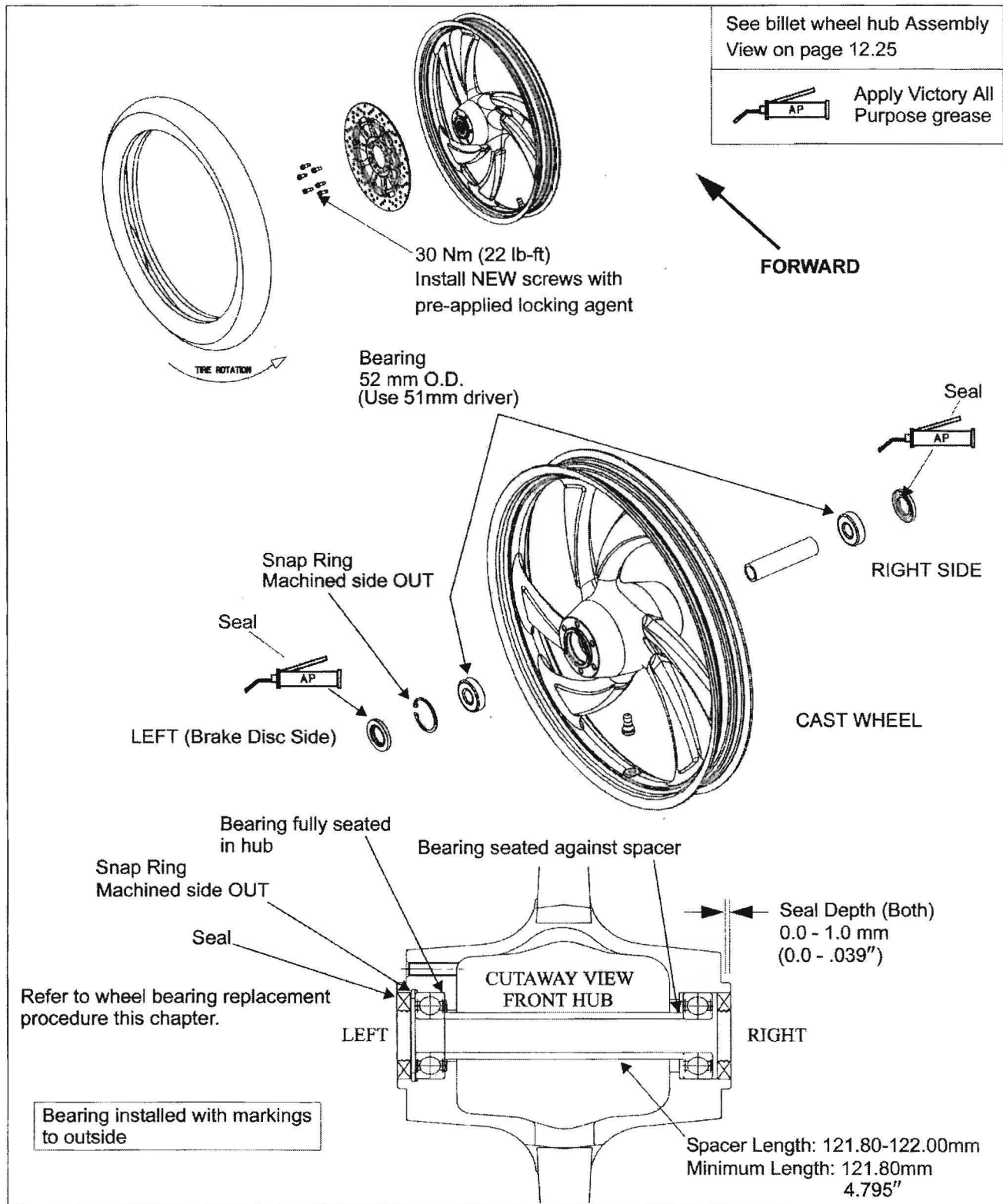
ASSEMBLY VIEW, FRONT WHEEL - HIGH-BALL



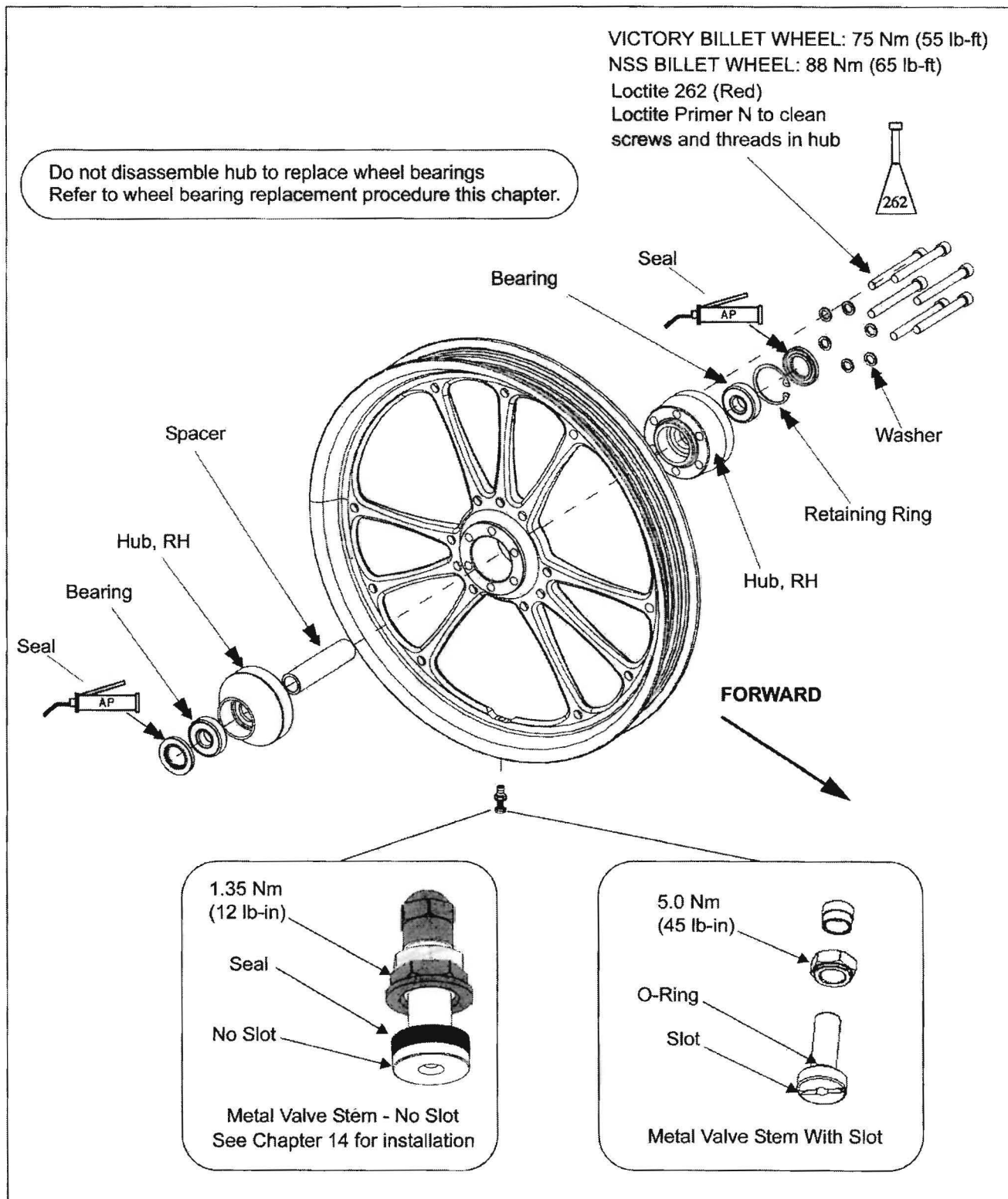
12.22



ASSEMBLY VIEW, FRONT WHEEL - VEGAS / JACKPOT



ASSEMBLY VIEW, BILLET FRONT WHEEL HUB (ALL)

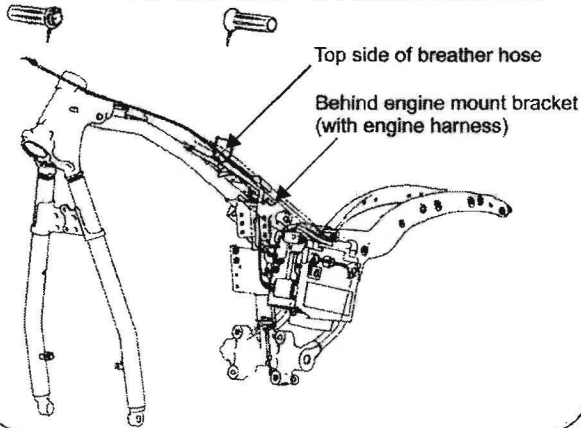


12.24

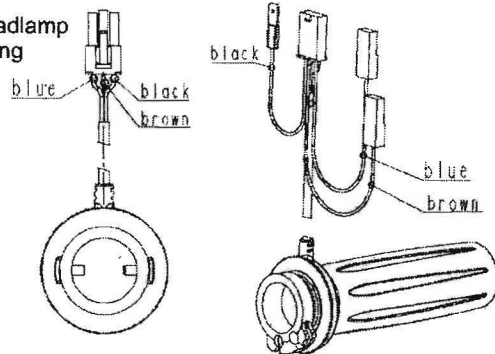


HEATED GRIPS

HEATED GRIP HARNESS ROUTING



In Headlamp Housing



Individual Grip Wire Resistance:

Black - Brown: 13 Ohms

Black - Blue: 8 Ohms

TROUBLESHOOTING:

Measure Grip Resistance at Switch:

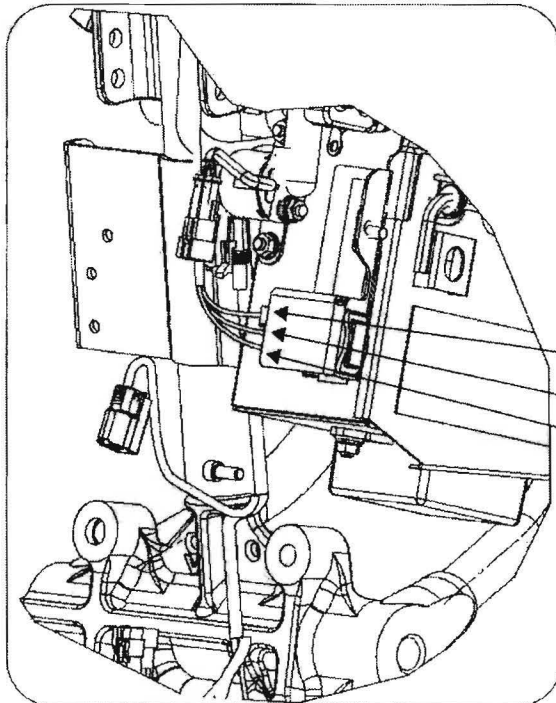
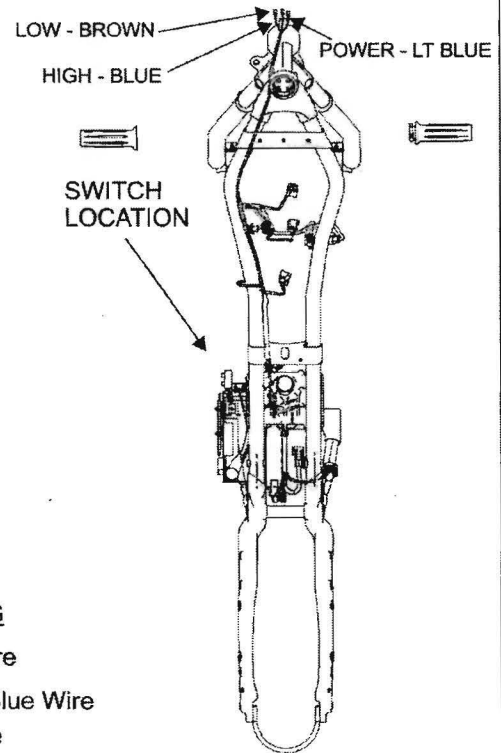
(This test measures the resistance of both grip heater grids in parallel).

Disconnect BU (High) and BN (Low) wires from switch.

Measure the resistance between BU wire and ground: Approx 4 Ohms

Measure the resistance between BN wire and ground: Approx 6.5 Ohms

If resistance is out of range, test each grip resistance individually.

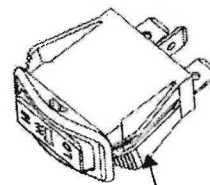
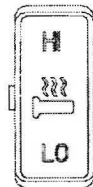


SWITCH WIRING

LOW - Brown Wire

POWER - Light Blue Wire

HIGH - Blue Wire



Compress both tabs to remove switch

SWITCH CONTACT

Wire Color	BN	LtBU	BU
HIGH		●	●
OFF		●	
LOW	●	●	



SERVICE PROCEDURES

HANDLEBAR REMOVAL (ALL MODELS)

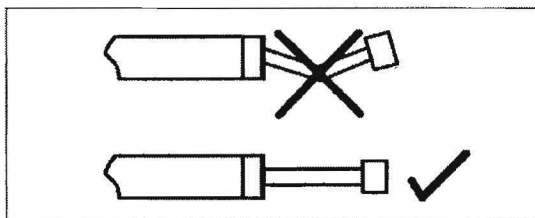
WARNING

Control cables must be routed, installed, and adjusted correctly to function properly. Note the way each cable is routed and secured before removing the cable. Permanent cable damage may result if the inner cables are bent or twisted during installation. If cables are incorrectly routed, installed, or adjusted, serious injury or death may occur.

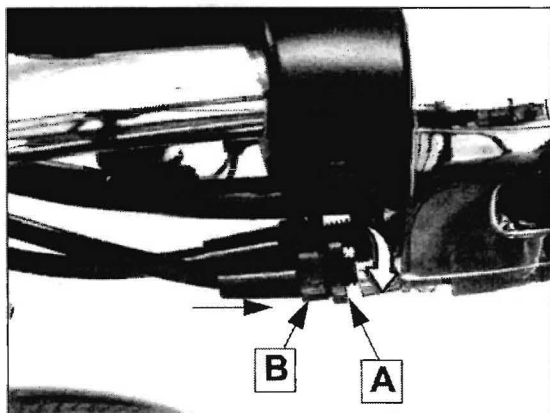
CAUTION

Left handlebar grip and grip end may be damaged during removal. Plan on replacing left grip and grip end if grip must be removed. Cover painted or chrome parts to prevent damage. Use care to protect fuel tank and front fender. Tank removal is recommended (Chapter 5). Secure, set aside, or support parts as they are removed.

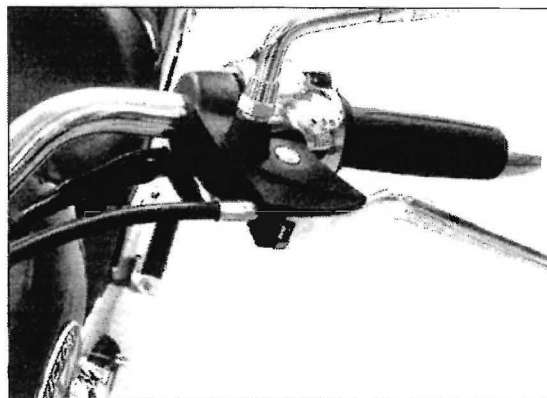
NOTE: Refer to illustrations on page 12.7 and 12.8.



1. Remove handlebar switch harnesses from dart clips on handlebars and any tie straps. Note location of straps for assembly.
2. Loosen lock nut (A) and turn adjuster (B) toward switch housing to obtain maximum cable free play.



3. Remove clutch lever perch (cable) or clutch master cylinder bracket.
4. Remove left hand switch.



LEFT HANDLEBAR GRIP REMOVAL

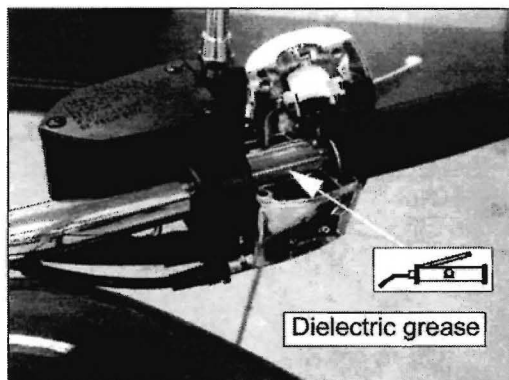
5. Grasp left grip end cap firmly. Twist while pulling to remove; or remove bar end screw if equipped.
6. Remove left-hand grip from the handlebar.

RIGHT SWITCH / THROTTLE CABLE HOUSING

7. Remove lower cover from right handlebar switch housing (2 screws). Note how cables are positioned in housing guides.
8. Remove remaining switch housing screw. Note length of screw and location for assembly.



9. Separate the switch halves.



FRONT MASTER CYLINDER REMOVAL

10. Remove brake master cylinder clamp and master cylinder assembly. Temporarily secure master cylinder to the vehicle, keeping reservoir in an upright position.

CAUTION

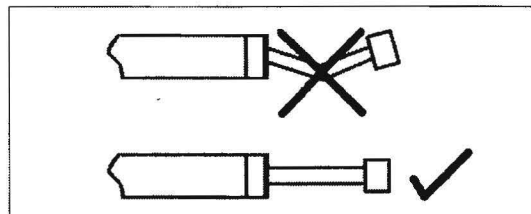
Keep brake reservoir in an upright position to prevent air from entering the system. Bleeding is required if air enters the system.

11. Place a soft piece of cloth or padded material on the top of the fuel tank if tank has not been removed.
12. **HAMMER & NESS JACKPOT:** Remove two nuts and washers that fasten handlebars to the isolators on upper triple clamp.
13. **VEGAS / KINGPIN / JACKPOT:** If risers will be removed, remove handlebars / risers as an assembly. If risers will not be removed, hold the handlebars in place and loosen the rear handlebar clamp screws, and then the front.
14. Lift handlebars out of clamps or the studs out of the isolators and slide throttle grip assembly off the right handlebar end.

HANDLEBAR INSTALLATION

NOTE: Also refer to illustrations page 12.7 & 12.8.

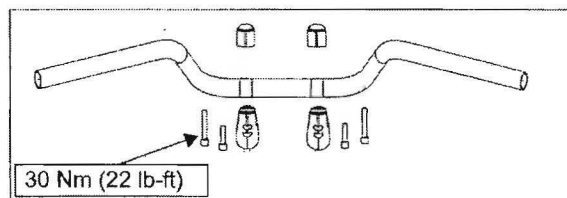
1. Do not bend or kink cables during installation.



2. Clean inside of throttle grip assembly and throttle grip area on handlebar. Lightly grease cable ends and install in grip.

NOTE: On metal throttle twist grips, apply a thin film of **Victory multi-purpose grease** to the right handlebar before installing the twist grip.

3. Slide throttle grip assembly onto handlebar.
4. Insert handlebar through isolators.
5. **VEGAS / KINGPIN / JACKPOT:** Install bars onto riser clamps. Loosely install clamps and screws. Align dot on bars with parting line of clamps. Hold in position and tighten front (long) clamp screws then rear (short) screws.



6. Apply a light film of dielectric grease to the bar surface before installing switch. Install right handlebar switch housing onto handlebar and install screws. **Align locating pin with hole in handlebar.** Torque screw to 3 Nm (25 lb-in).
7. Be sure throttle cable elbows are aligned in the housing. Install bottom cover and remaining screws. Torque to 3 Nm (25 lb-in).
8. Install master cylinder and clamp with screws. Align parting line of clamp with dot on handlebar. Torque rear screw (rider's side), then front screw.
9. Clean left-hand grip mounting surface on handlebar.



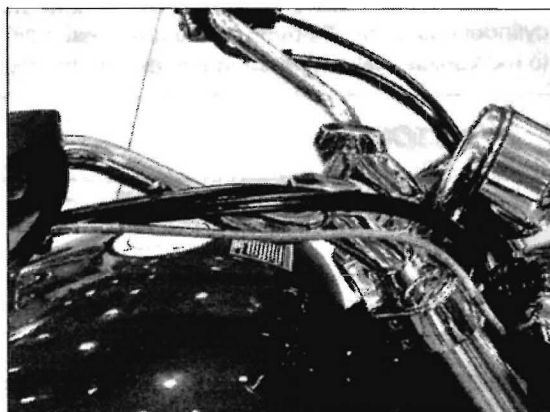
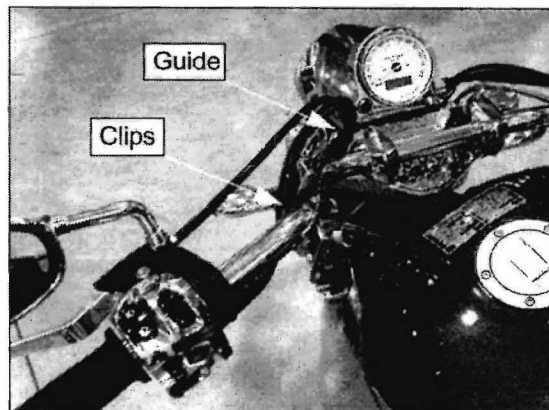
FRONT SUSPENSION / CONTROLS

10. Apply grip cement (P/N 2872575) to inside surface of new grip and slide grip onto handlebar. Make sure 10 mm of bar is exposed for end cap installation.
14. Secure wire looms to bars with dart clips and route harness and cables through guide.

CAUTION

Read and follow all instructions and pre-cautions on adhesive container.

11. Install new end cap with a twisting motion, carefully tapping it in with a rubber mallet. Do not use a hard faced hammer. If equipped with bar end screws, insert bar end and torque screw to 9 Nm (80 lb-in).
12. Install clutch lever bracket with clamp and screws. Align parting line of clamp with dot on handlebar. Torque rear screw first (rider's side), then front screw to 9 Nm (80 lb-in).
13. Apply a light film of dielectric grease to the bar surface before installing switch. Install left handlebar switch housing on handlebar. **Align locating pin with hole in handlebar.** Torque screws to 9 Nm (80 lb-in).

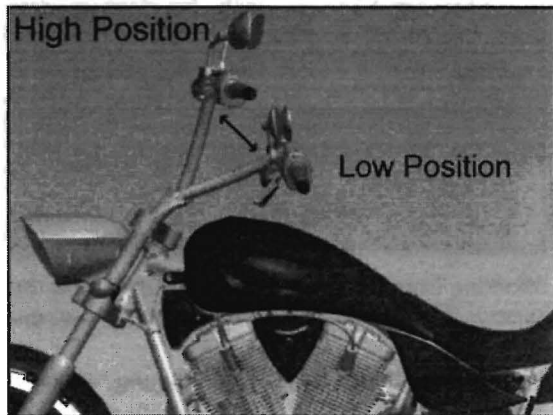


15. Check operation of cables, switches, controls. Check clutch and throttle cable free play. Adjust if necessary.



HANDLEBAR ADJUSTMENT - HIGH-BALL

NOTE: The Victory Vegas High-Ball handlebar has been designed to operate in two different positions. It is very important that the control levers (clutch, brake) and switch cubes are repositioned any time the handlebar position is changed.



WARNING

Handlebars adjusted to forward position may not be legal in all states or for all riders. Check state and local regulations. Consult owner's manual for proper procedure when adjusting handlebars.

WARNING

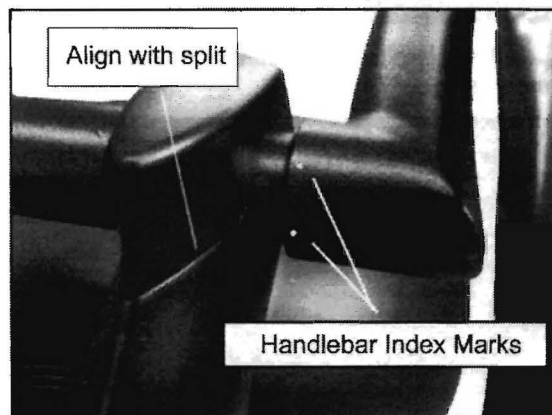
Control cables must be routed, installed, and adjusted correctly to function properly. Note the way each cable is routed and secured before removing the cable. Permanent cable damage may result if the inner cables are bent or twisted during installation. If cables are incorrectly routed, installed, or adjusted, serious injury or death may occur.

NOTE: Handlebar index marks indicate high and low handlebar positions. Index marks should be aligned with parting in handlebar clamp.

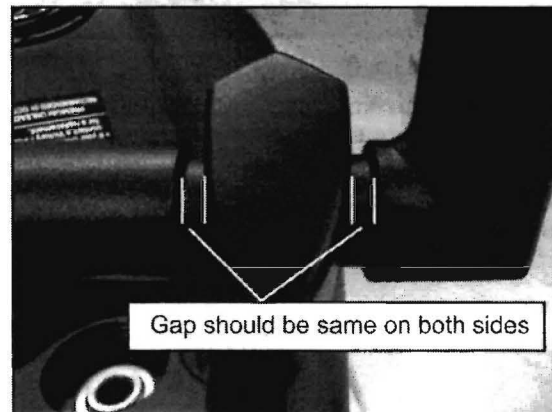
1. Taking care not to scratch the gas tank, loosen handlebar clamp bolts. The handlebar assembly should rotate freely in risers.



2. Carefully rotate handlebar into desired position making sure index mark is properly aligned with parting in handlebar clamp.

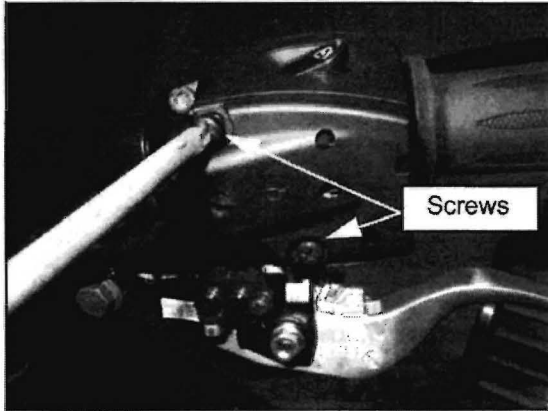


IMPORTANT: Visually inspect to see that the handlebar assembly is centered in the risers.

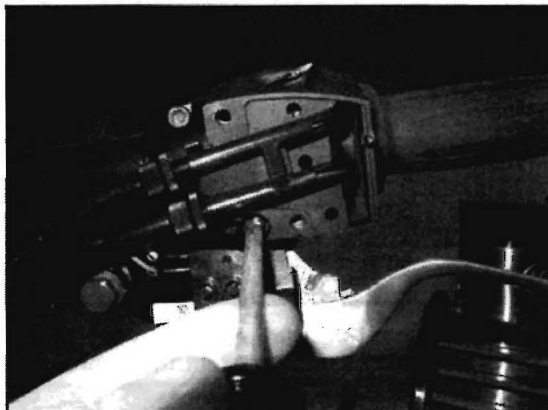


FRONT SUSPENSION / CONTROLS

3. Tighten the forward handlebar clamp bolts to 30 Nm (22 lb-ft).
4. Tighten the rear handlebar clamp bolts to 30 Nm (22 lb-ft).
5. Working from the RH side of the motorcycle, loosen two screws securing throttle cable access cover to switch cube and remove cover.

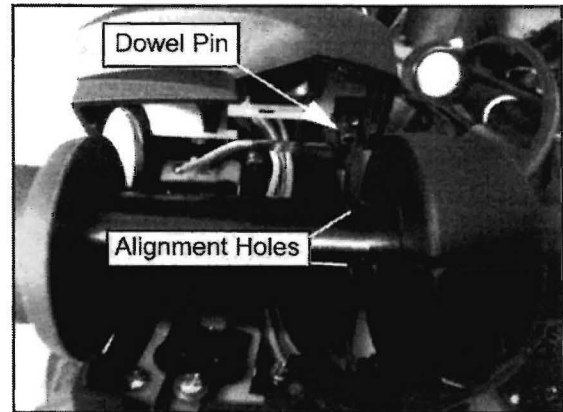


6. Locate the Phillips head screw beneath access cover and remove.



7. Split switch cube assembly.
8. Using a 5mm hex-head wrench, loosen bolts (2) securing front brake lever to handlebar. Lever should rotate freely.
9. Rotate front brake lever into desired position and, starting with the rear bolt, tighten to 9 Nm (80 lb-in)

10. Paying attention to switch cube dowel pin, align switch cube with correct alignment hole and tighten screws to 3 Nm (25 lb-in).



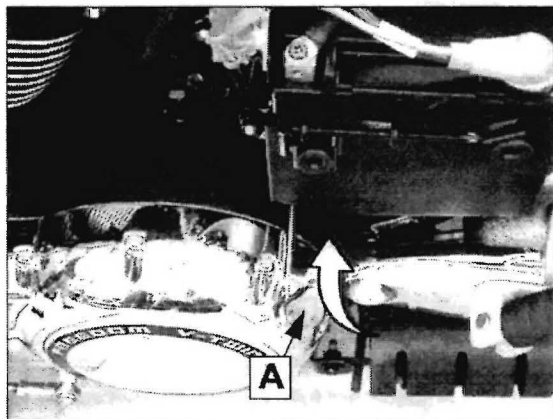
11. Working from the LH side of the motorcycle, remove screws (2) securing switch cube to handlebar and split switch cube.
12. Loosen hex-head bolts (2) securing clutch lever assembly to handlebar. Lever should rotate freely.
13. Rotate clutch lever into desired position and, starting with the rear bolt, tighten to 9 Nm (80 lb-in).
14. Paying attention to switch cube dowel pin, align switch cube with correct alignment hole and tighten screws to 3 Nm (25 lb-in).
15. Check throttle cable free play and ensure handlebar moves freely from left to right.
16. Adjust side mirrors.



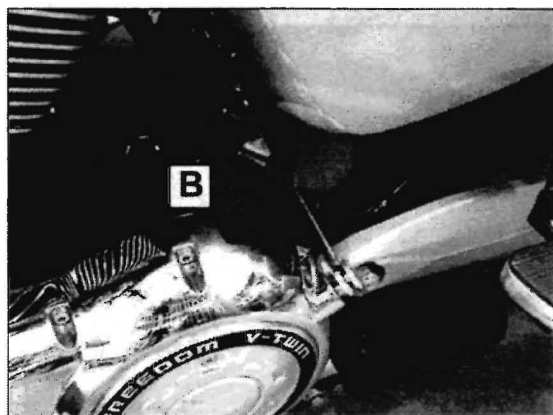
CLUTCH CABLE

Clutch Cable Removal

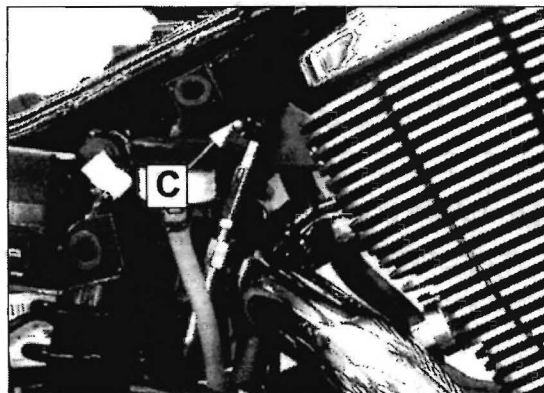
1. Protect the clutch release arm (A) with a shop towel. Using an adjustable wrench, rotate the release arm inward. Disconnect clutch cable from release arm.



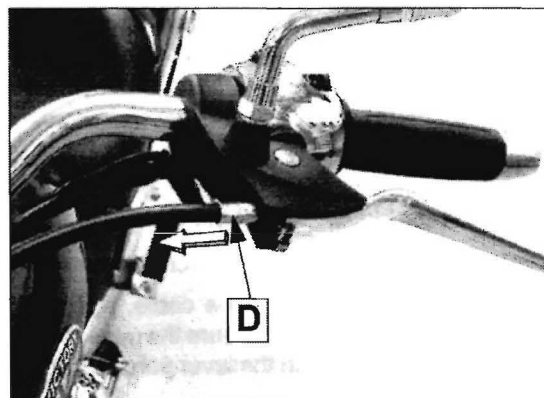
2. Loosen the cable locknut (B) and remove lower end of cable from the bracket on the left side of the crankcase.



3. Remove clutch cable guide (C) located on the rear upper engine mount plate. Pull lower end of clutch cable out right side.



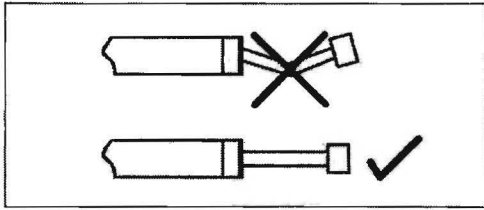
4. At the handlebar, pull the clutch cable casing (D) straight out until clear of lever perch and rotate cable outward to align inner cable wire with slot in lever.



5. Pull lever slightly until slotted opening in lever is clear of perch and slide cable barrel end down and out of lever.
6. Note routing of clutch cable through frame. Push upper cable through hole in front left side of frame and out to the right side of the motorcycle.



Clutch Cable Installation



CAUTION

Do not kink, bend, or twist the inner cable or outer cable casing during installation

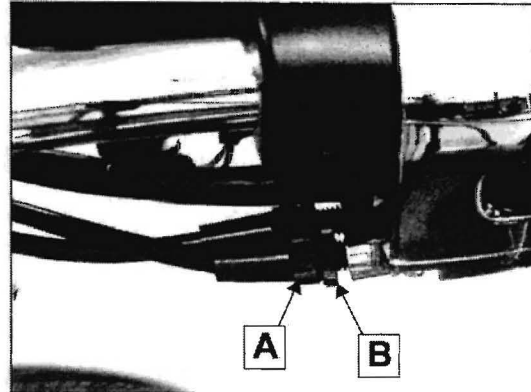
1. Route clutch cable in the same manner as removed. Do not route clutch cable through loop guide with left switch wire harness.
2. Install cable guide and torque mounting nut on engine plate to 87 lb-in. (10 Nm).
3. Install cable in lower bracket and tighten lock nut securely. Do not install the release arm end at this point, the upper (clutch lever) end must be installed first.
4. With clutch cable routed properly, apply Victory Multi-purpose grease to the barrel end of the cable and install it in the clutch lever at the handlebar.
5. Install the casing in the lever perch at the handlebar.
6. At the release arm end of the cable, pull the inner cable until fully extended. Be sure the upper end of the cable casing is seated in the lever perch at handlebar end
7. Apply Victory Multi-purpose grease to the lower barrel end of the cable.
8. Rotate the release arm inward (as in Step 1) until cable can be installed in release arm.
9. Adjust clutch cable free play (page 2.12).

**Clutch Cable Free Play
.5 - 1.5mm (.020-.060")**

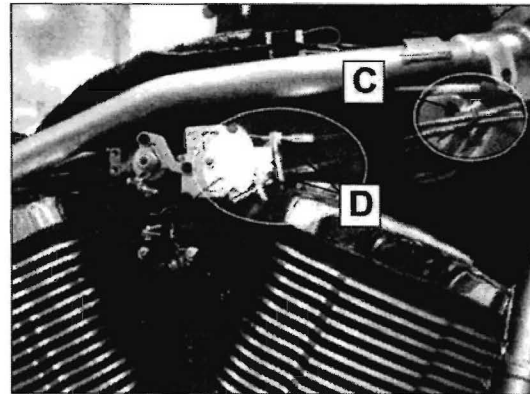
THROTTLE CABLE

Throttle Cable Removal

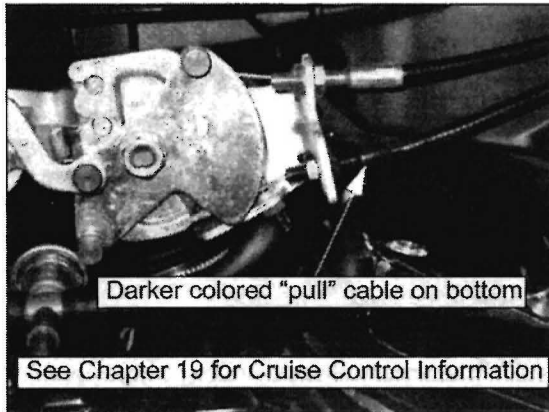
1. Hold upper cable adjuster (A) and loosen knurled lock nut (B).



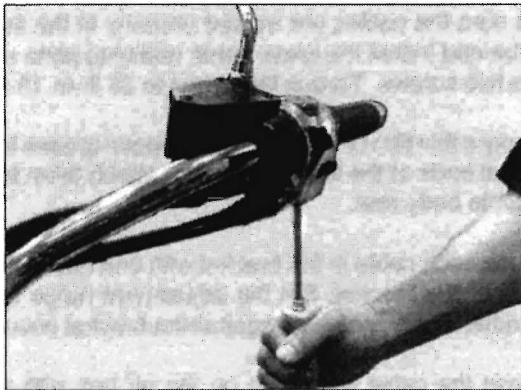
2. Turn the adjuster nut fully inward (toward switch block) to gain maximum cable free play.
3. Pull open the cable guide clip (C) on the right side of air box.
4. Loosen lock nuts (D) and remove cables from bracket.



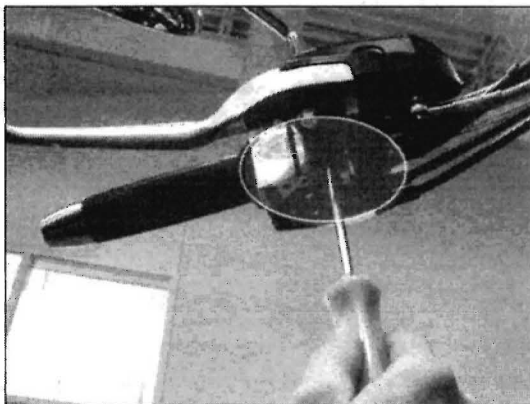
5. Remove the cable ends from the throttle body reel. Assembly note: The dark cable is mounted on the bottom of the bracket.



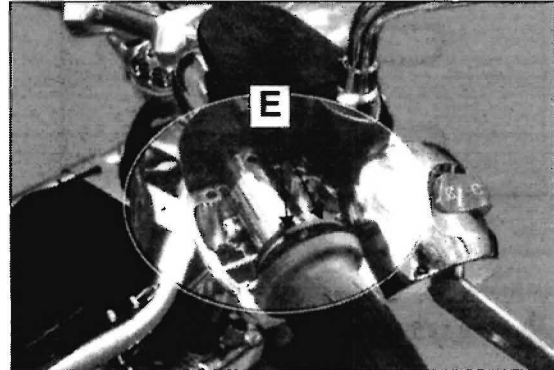
6. Remove both screws from the cable retaining cover plate on the bottom of the right handlebar switch cube.



7. Remove single screw from the front side of the right handlebar switch cube, and separate the switch halves to expose the throttle cables.

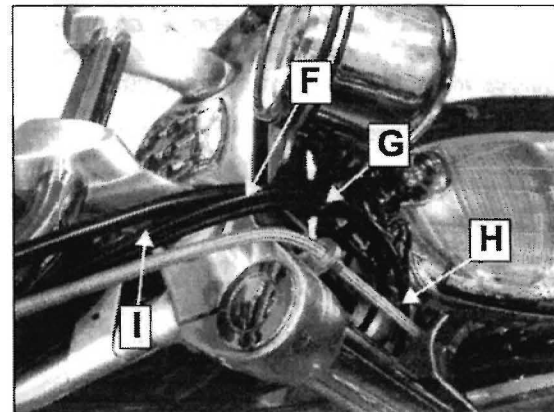


8. Remove both cable ends (E) from the throttle twist grip and slide the cables out of the switch cube.



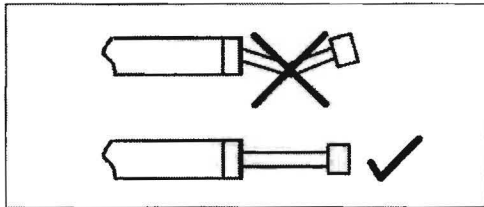
9. Take note of the cable routing between the brake line and the switch wire harness (F), through the cable guide loop (G), and between frame and the right brake line (H), then through the cable guide clip attached to the right side of the air box.

10. Remove cables. Save the dual clip (I) for reinstallation in the same position on the new cables.



FRONT SUSPENSION / CONTROLS

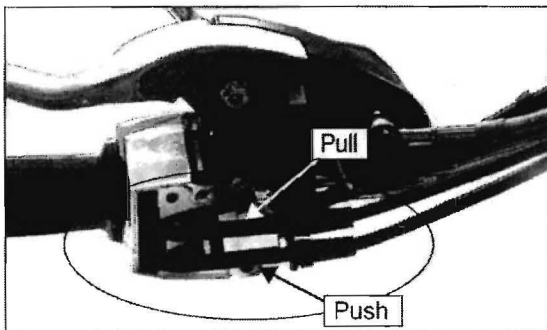
Throttle Cable Installation



CAUTION

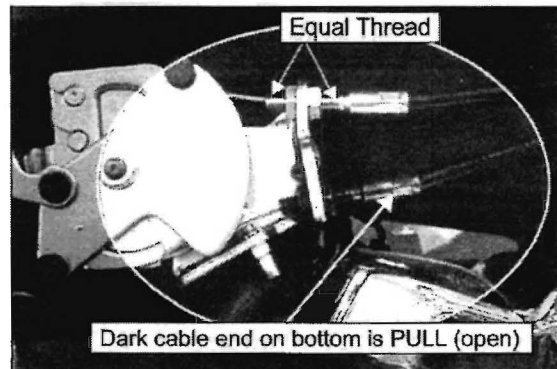
Do not kink, bend, or twist the inner cable or outer cable casing during installation

1. **CABLE IDENTIFICATION:** The throttle opening (pull) cable is darker in color at the throttle body end. It is the front-most cable in the switch cube and the lower-most cable in the throttle body bracket.
2. Route the cables as noted in Step 9 of removal.
3. Arrange the throttle opening (pull) cable toward the front of the right hand switch cube. Arrange the cables to route smoothly toward the throttle body through the guides without twisting around each other.



4. Feed the inner cables up through the switch cube.

5. Apply a thin film of Victory Multi-purpose grease to the barrel ends of the cables and carefully attach them to the twist grip.



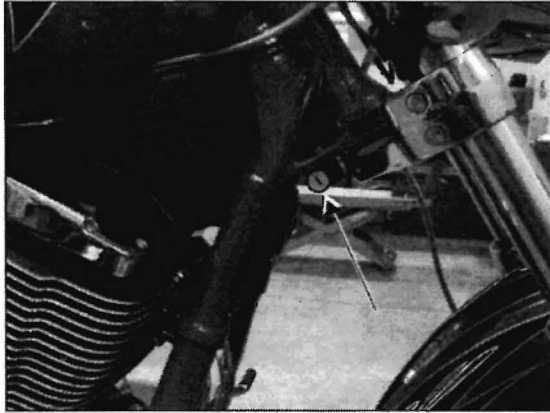
6. Install the upper half of the switch cube and torque the single screw to 25 lb-in. (3 Nm).
7. Be sure the cables are seated properly in the switch cube and install the lower cable retaining plate using the two screws. Torque the screw to 25 lb-in. (3 Nm).
8. Apply a thin film of Victory Multi-purpose grease to the barrel ends of the lower cable and attach them to the throttle body reel.
9. Place each cable in the bracket with one nut on either side of the bracket. Set the adjustment range in the middle. Tighten the nuts against the bracket securely.
10. Close the cable guide clip on the air box with push cable on top and pull cable on the bottom.
11. Adjust throttle cable free play to 3-6 mm (1/8-1/4 inch) (see procedure page 2.10).

Throttle Cable Free Play
3 - 6 mm (1/8 - 1/4")

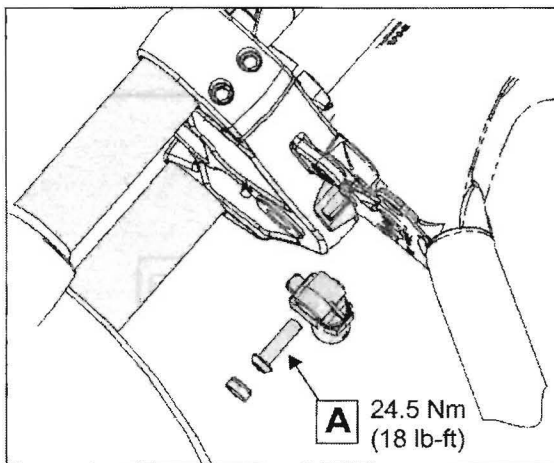


FORK LOCK (INTERNATIONAL MODELS)

1. If equipped with a fork lock, the lock mechanism should be lubricated periodically as described on page 2.31.



2. **Removal:** Use a 1/8 inch drill or a center punch to remove the anti-tamper plug from the lock assembly. Use care not to drill into the drive head of the screw.
3. Discard the removed plug.
4. Remove the screw (A).
5. **Installation:** Align the mounting hole and lock plunger and install lock with a new screw.

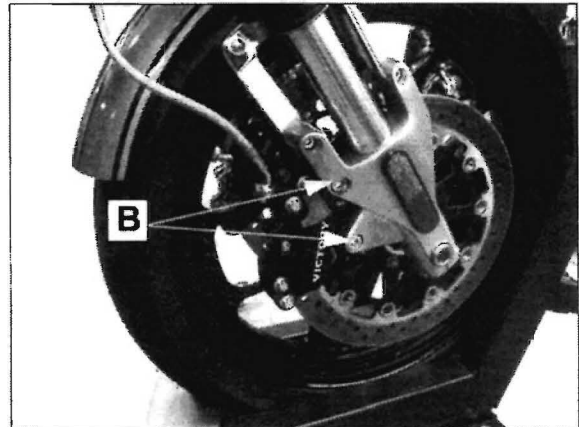


2. **HAMMER:** Remove right front brake caliper screws (B) and caliper.

CAUTION

Do not twist the brake hose or brake line. Do not allow caliper to hang from the brake hose. Secure caliper in such a way to avoid hose damage.

NOTE: Do not operate the front brake lever with the caliper or wheel removed.



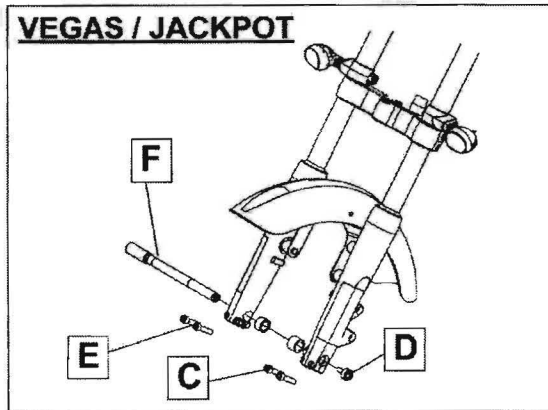
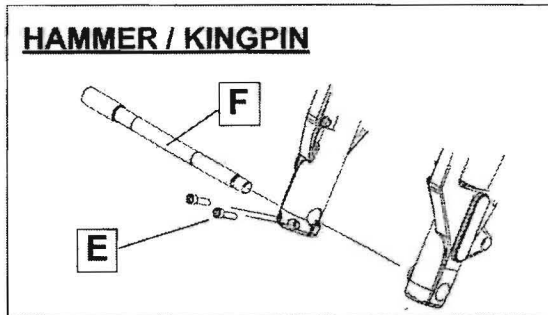
FRONT WHEEL REMOVAL

1. Also refer to appropriate illustrations at front of chapter for model and fork type.



FRONT SUSPENSION / CONTROLS

3. VEGAS, and JACKPOT ONLY: Loosen left side axle pinch bolts (C) and remove axle bolt (D).
4. All Models: Loosen axle pinch bolts on lower right fork leg (E).



5. Securely support front end of motorcycle so front wheel is off the ground.

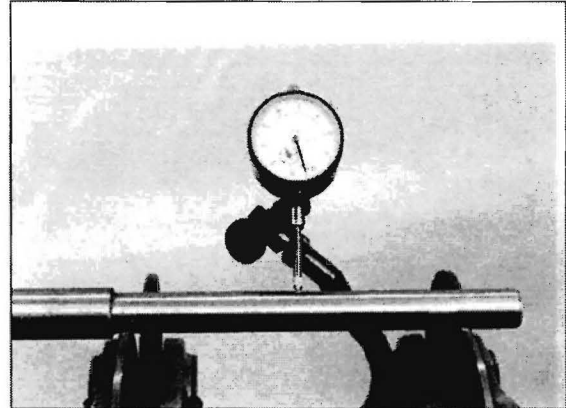
CAUTION

Take precautions so that the motorcycle is securely supported when the tire is off the ground.

6. Support wheel and remove axle (F). Be prepared to catch spacers on each side of the wheel and remove wheel.

FRONT AXLE INSPECTION

1. Place axle in V-blocks and inspect runout. Compare to specifications on page 12.4 - 12.5.



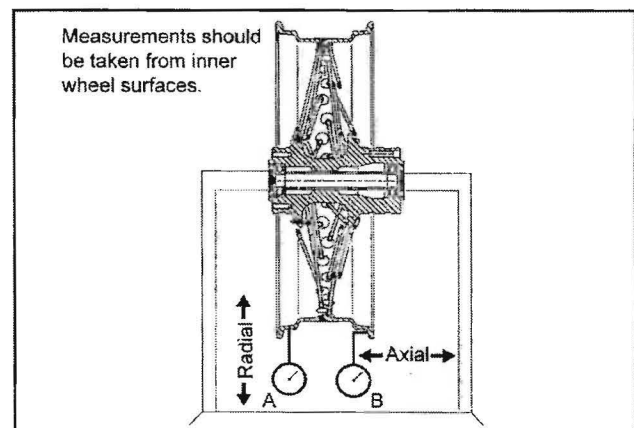
2. Replace axle if it fails inspection. Do not attempt to straighten a bent axle.

FRONT WHEEL INSPECTION

1. Install front wheel in truing stand.

NOTE: Bearings must be in good condition to accurately measure runout.

2. Set up a dial indicator to measure radial runout (up and down) (A) and compare to specifications on page 12.4 and 12.5.
3. Position dial indicator to measure axial runout (side to side) (B) and compare to specifications (page 12.4 and 12.5).

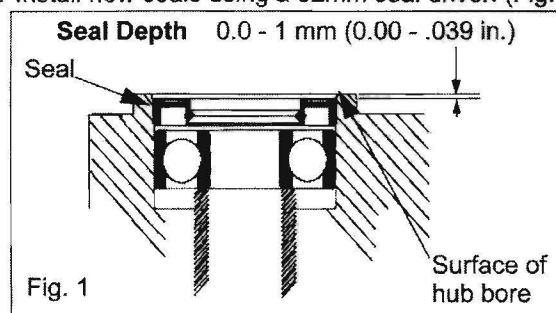


4. Visually inspect wheel for cracks.
5. Replace wheel if it fails visual or measured inspection. Do not attempt to straighten cast or billet wheels.

12.36



11. Install new seals using a 52mm seal driver. (Fig. 1)



12. Rotate inner races of bearings to check for free, smooth rotation.
13. Install discs (page 12.37). Wipe discs clean with Victory Disc Brake Cleaner.

CAUTION

Do not allow brake cleaner to contact painted surfaces.

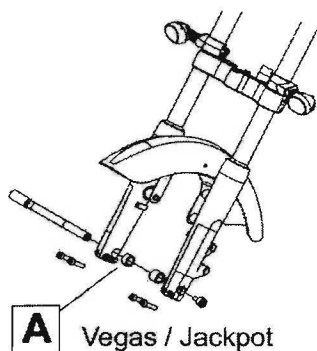
WARNING

Grease or oil on the brake disc will increase stopping distance which may lead to loss of vehicle control or an accident.

FRONT WHEEL INSTALLATION

NOTE: Refer to appropriate assembly view for model and fork type.

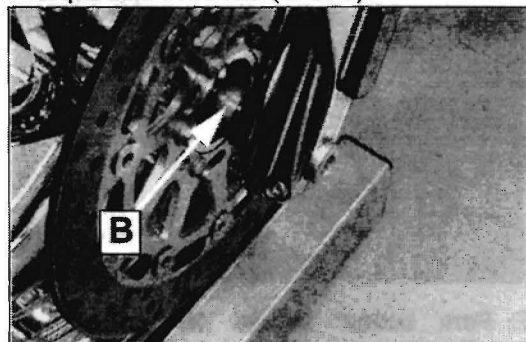
1. Apply a light film of grease to axle and both spacers. On inverted forks, lubricate axle threads also.
2. Install spacers in wheel hub.
3. Clean brake disc and install wheel, fitting brake disc between brake pads on caliper.
4. Install axle from right side through right fork leg into right side axle spacer (A).



5. Wipe any grease off right side axle clamping boss, then push axle through wheel, left axle spacer (B) and start into left fork leg.

6. **For inverted forks** (Hammer & Kingpin):

- Screw axle into left fork leg until seated.
- Torque axle to 70 Nm (52 lb-ft).



7. **HAMMER MODELS:** Separate brake pads and install caliper over disc. Torque caliper bolts to 41 Nm (31 lb-ft).
8. **ALL:** Lower front of machine and slowly pump front brake lever to seat pads against disc.
9. Apply and hold front brake.
10. Pump forks to move suspension through range of travel 4-5 times.



BRAKE DISC REMOVAL

NOTE: Disc must be inspected before removing from wheel.
Refer to Chapter 15 for disc inspection.

1. Remove front wheel (page 12.35).
2. Position wheel with brake disc facing up (protect the other disc and wheel when removing opposite disc on Hammer).
3. Remove and discard brake disc screws.
4. Remove brake disc from wheel.

BRAKE DISC INSTALLATION

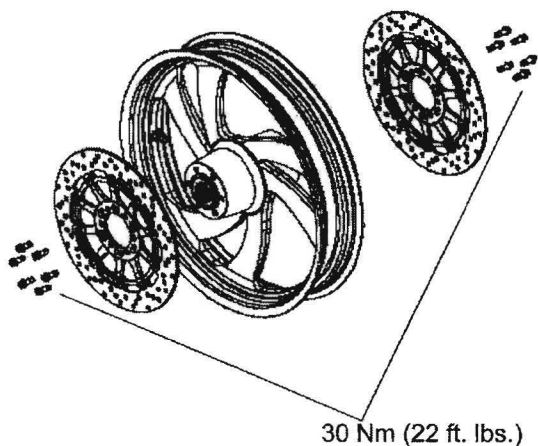
1. Clean screw hole threads with Loctite Primer N.
2. Clean surface of wheel and brake disc with Victory Brake Cleaner.
3. Install disc on wheel with part number facing OUT.
4. Replace screws with new screws which have pre-applied locking agent.

WARNING

Do not re-install brake disc screws. Use only new screws which have a pre-applied locking agent.

5. Install brake disc with part number to outside.

All surfaces and fasteners must be clean, dry, and oil free before assembly.

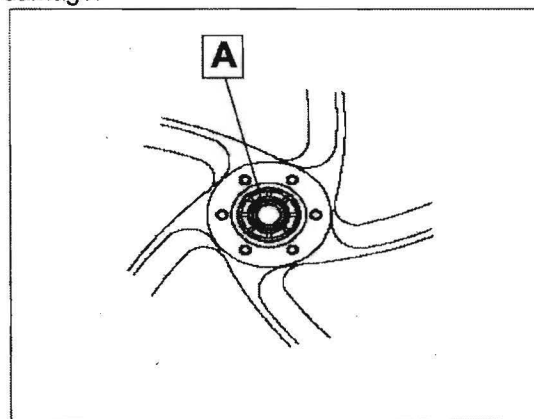


- Use new screws
- Install discs with part number facing OUT

FRONT WHEEL BEARING INSPECTION

NOTE: Inspect bearings installed in the wheel. Do not remove to inspect. Bearings cannot be repacked. Replace both wheel bearings if one or both fail inspection, or if either bearing was removed. For inspection with the wheel installed on the vehicle, refer to Chapter 2.

1. Visually inspect bearing seals on each side for wear or damage.



2. Check bearings by turning inner race (A) by hand.
 - Look for signs of discoloration, scoring, galling, or contamination from moisture or dirt. Replace bearings if any of the above are present.
 - Turn the inner race of the bearings. The bearings should turn smoothly and quietly. The inner race should be firm with minimal side to side movement and no detectable up and down movement.
3. Discard bearings that fail any of the above inspections.

CAUTION

Do not reuse bearings after removing them from the wheel. Removal damages the bearings internally.

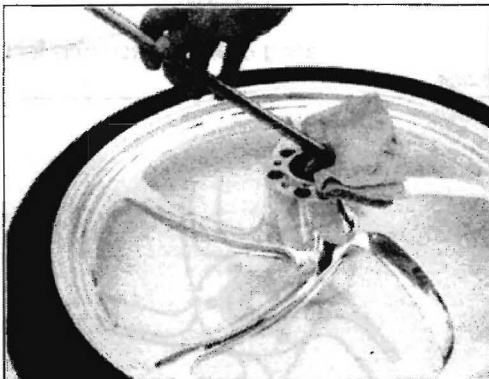
4. Inspect bearing fit into wheel hub. The outer race of the bearing must fit tightly into the bore. You should not be able to move it (or remove it) by hand. Replace the wheel if outer race of a new bearing does not fit tightly in the bore.



FRONT WHEEL BEARING REMOVAL

NOTE: Replace both wheel bearings as a set. Do not replace only one wheel bearing.

1. Place a shop towel over the edge of seal bore.



2. Carefully remove both seals using a pry-bar and discard. Be careful not to scratch the seal bore.
3. Remove retaining ring from left side.
4. Install bearing remover element into left side bearing and remove it.
5. Remove bearing spacer from wheel hub, measure the length and compare to specification. Replace spacer if it is worn beyond the service limit or if the bearing contact surface is damaged.
6. Drive out right side bearing using a suitable drift or extract the bearing with a bearing puller.

FRONT WHEEL BEARING INSTALLATION

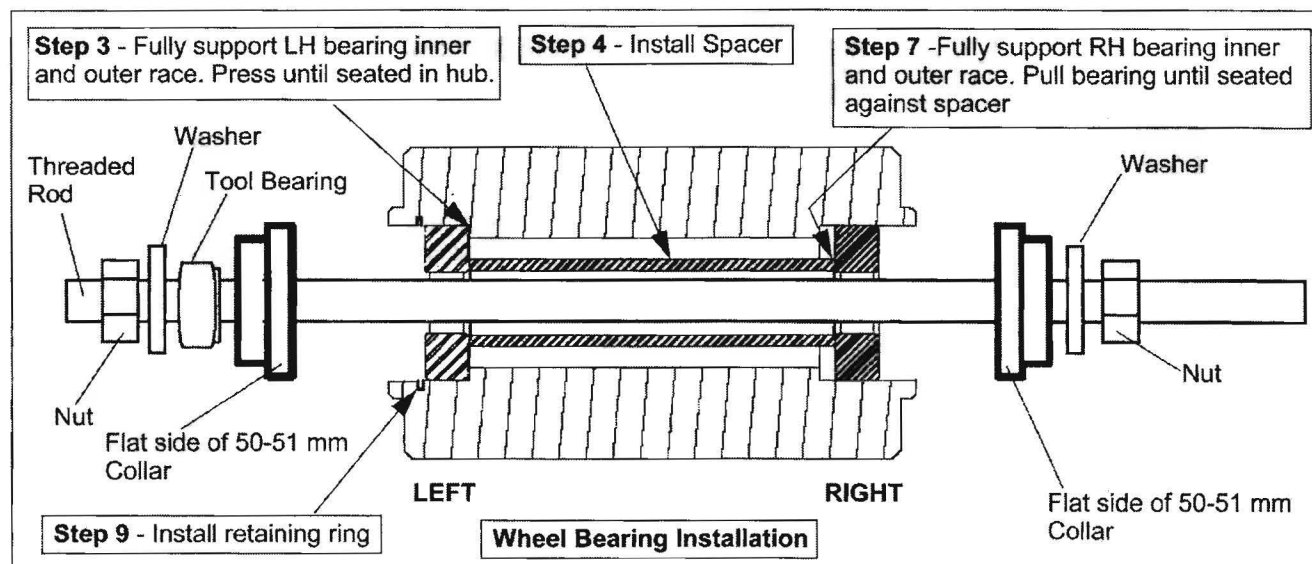
NOTE: Refer to illustration below for Steps 3-9.

1. Clean inside of wheel hub and bearing spacer. Replace spacer if any wear is evident on the ends.
2. Place new bearing into left hand side of wheel with markings facing up (toward outside of hub).
3. Assemble bearing collar with flat side of 50-51 mm collar against bearing. Collar must be slightly smaller than O.D. of bearing and must be flat to support inner and outer race equally. DO NOT pull or press on inner race of ball bearings or bearing will be permanently damaged! Assemble right side of tool as shown and pull bearing into hub until fully seated.

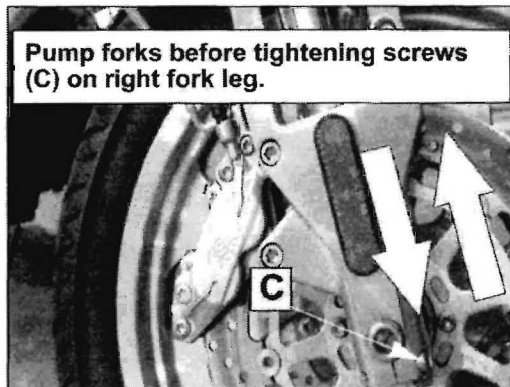
Bearing installation tool set: PV-43515

NOTE: Use of this special tool is shown with rear wheel bearing installation in Chapter 13.

4. Install bearing spacer.
5. Place new right wheel bearing onto wheel with markings facing out.
6. Install flat side of another 50-51 mm bearing collar against right bearing so both races are supported.
7. Pull bearing in to right side of wheel until seated against spacer.
8. Remove tool. Check that spacer is centered with bearings. **If not, center it by inserting front axle.** Repeat Step 7 to fully seat bearing on spacer.
9. Bearings must rotate smoothly after installation.
10. Install retaining ring. Be sure it is fully seated in the groove.



11. Torque pinch bolts (C) to 24 Nm (18 lb-ft). Re-torque once after initial torque.

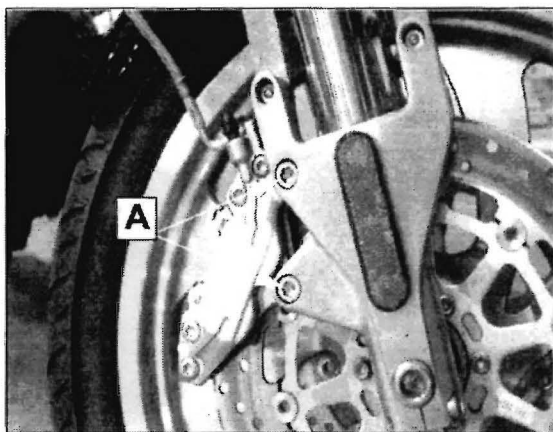


NOTE: Fork action should be smooth without binding. If problems are found, inspect for cause and correct as necessary.

12. Elevate front wheel and spin it to check for drag. Apply and release front brake. Wheel should spin freely and quietly without drag when brake lever is released.
13. Lower front of machine.
14. Inspect operation of front brake lever. Bleed front brake system if lever is not firm. (Chapter 15).

FRONT FORK REMOVAL (INVERTED FORK)

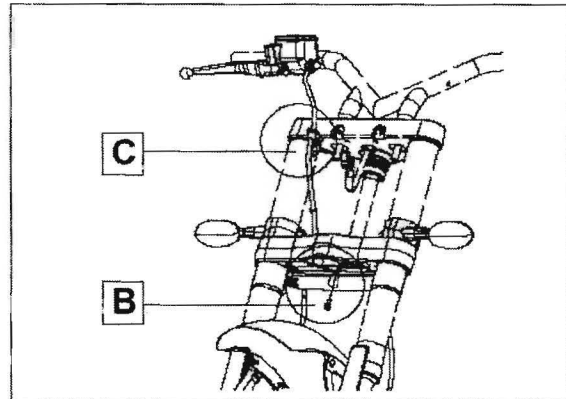
1. Remove both front brake caliper(s) (A). Secure caliper and brake lines out of the way.



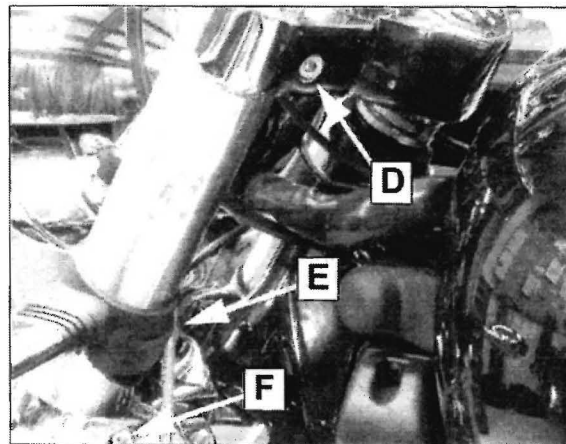
CAUTION

Do not twist the brake hose or brake line. Do not allow caliper to hang from the brake hose. Secure caliper in such a way to avoid hose damage.

2. Remove front wheel (page 12.35).
3. Remove front fender.
4. Remove front brake line manifold (B) from lower triple clamp and line guide (C) from upper triple clamp.



5. Loosen upper triple clamp pinch bolt(s) (D) for both left and right fork tubes.
6. Loosen turn signal mount screws (E) and lower triple clamp pinch bolts (F).
7. Slide fork legs down and remove turn signal mounts from tubes.



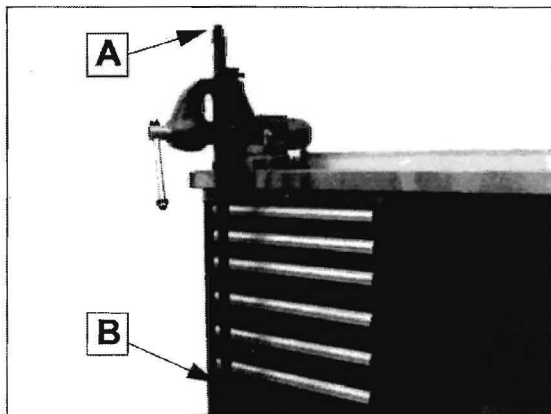
FRONT FORK DISASSEMBLY - INVERTED

NOTE: Refer to Front Fork Assembly Views for additional information.

1. Clean fork tubes thoroughly before disassembly.
2. Loosen fork cap and unscrew outer fork tube. Slide outer tube down enough to expose spacer. Keep fork upright.



3. Secure fork spring compressor (PV-49463) vertically in a vise with drive bolt (A) UP and support peg (B) at the bottom.

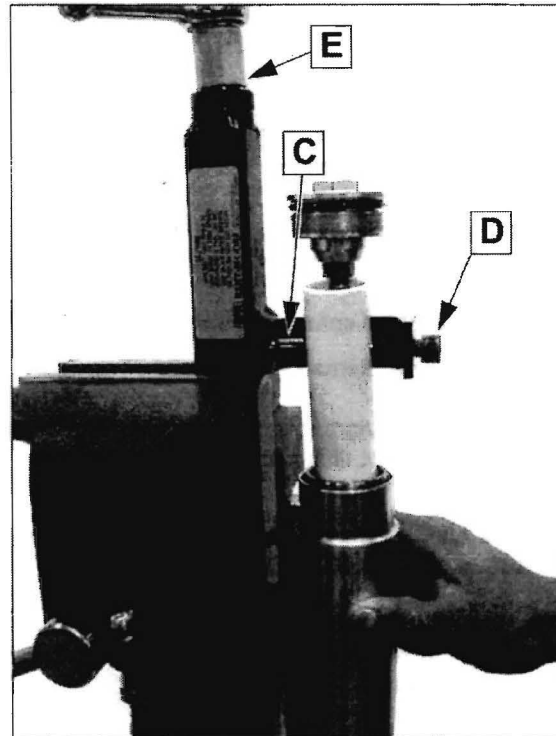


4. Place fork leg in spring compressor tool. Be sure hole in bottom of fork slider is over peg on bottom of tool.
5. Adjust tool length until stationary peg (C) aligns with hole in spacer and engage spacer hole with peg.
6. Adjust outer thumb screw (D) to fully engage the other hole in spacer.

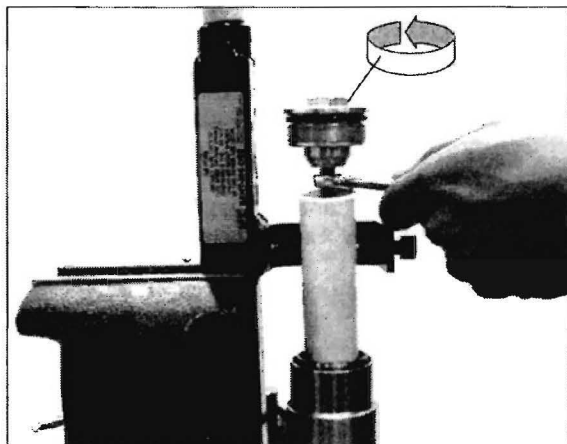
WARNING

Wear eye/face protection. Fork components are under spring pressure. Use hand tools only on spring compressor tool to apply and release spring pressure.

7. Turn drive bolt (E) until enough spring pressure is applied to hold the fork in position and jam nut is accessible.



8. Hold jam nut and remove cap.



9. Remove nut from cartridge shaft. NOTE: Nut can be removed later if it is not free on the shaft.

10. Slowly release all spring pressure.

11. Back adjustable screw out until clear of spacer.

12. Disengage stationary peg from spacer and remove fork leg from tool, lifting both inner and outer tubes together.

NOTE: DO NOT lift by outer tube only. Oil will spill if outer tube slides too far up inner tube.

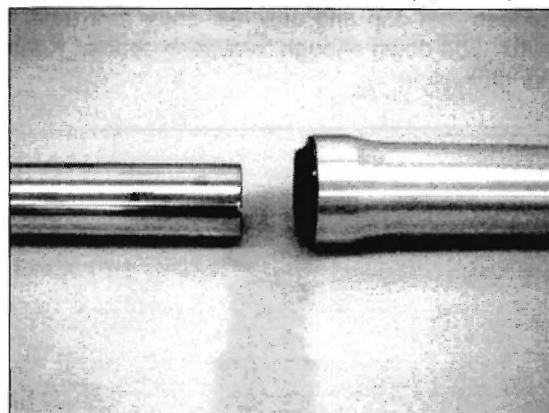
13. Pour fork oil out of tube. Move cartridge shaft through complete stroke several times to drain cartridge until damping is gone.

14. Proceed to *Fork Seal Removal / Tube Disassembly*. To change fork oil only, proceed to *Fork Oil Filling / Level Setting* (page 12.46).

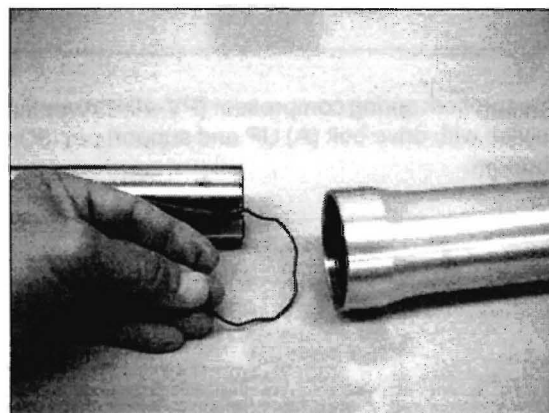
FORK SEAL REMOVAL / TUBE DISASSEMBLY

NOTE: Replace dust seal and fork seal upon assembly.

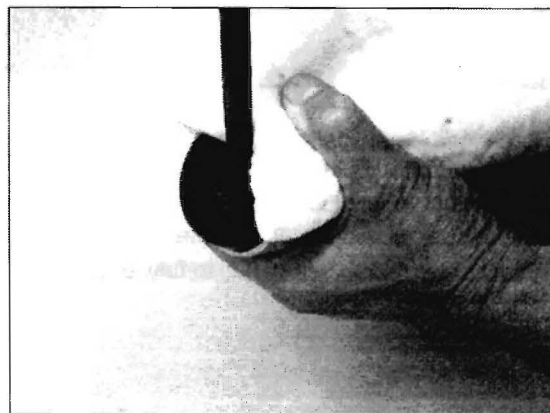
1. Separate tubes. Remove dust seal (by hand).



2. Remove seal retaining ring. Do not scratch tube.



3. Protect surface of outer tube. Carefully pry seal from outer tube. Do not scratch seal bore. Remove seal backing washer from outer tube.



12.42



BUSHING INSPECTION

1. Inspect bearing surface of bushings. Replace bushing if bronze material appears on more than 1/4 (25%) of the entire anti-friction surface coating.

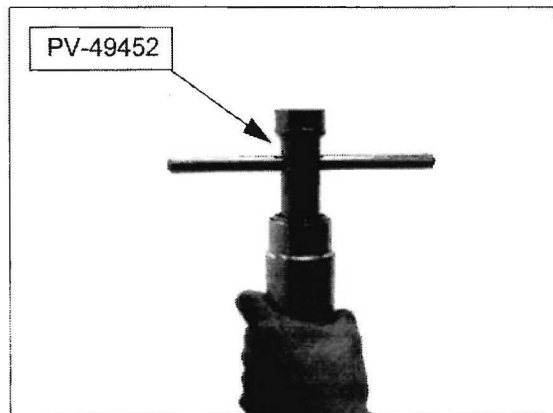
NOTE: Use a light to visually inspect bushings inside the outer fork tube.

CARTRIDGE REMOVAL

Cartridge removal is not required for fork oil change or for seal and bushing replacement. To clean cartridge, add clean fork oil to inner tube and pump damper rod to flush cartridge. Discard oil.

If cartridge removal is required proceed as follows:

2. Hold cartridge with holder PV-49452 using castellated end of tool (octagonal end UP as shown). Remove cartridge screw and sealing washer using an extended 8 mm hex socket.



3. Remove cartridge from inner tube.

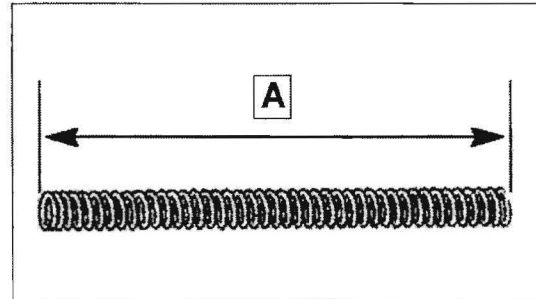
WARNING

DO NOT disassemble the cartridge. If damaged or worn, it must be replaced as an assembly.

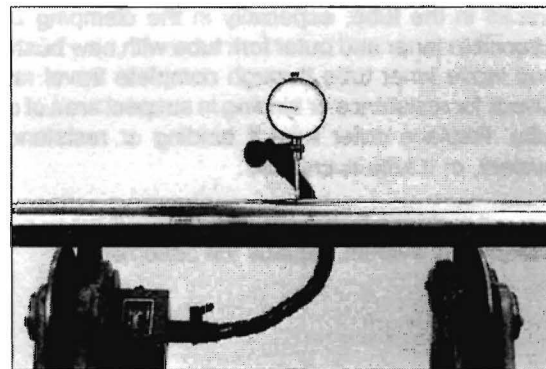
4. To clean cartridge, submerge oil holes in clean cartridge fork oil and pump the cartridge shaft.

FRONT FORK INSPECTION - INVERTED

1. Measure fork spring free length (A) and compare to specifications on page 12.4 and 12.5.



2. Inspect inner fork tube for scoring, heavy scratches, dents due to rocks or other road debris, or excessive wear. Replace tube if worn or damaged.
3. Place fork tube in V-blocks or truing stand and measure runout. Replace tube if runout exceeds service limit listed on page 12.4 and 12.5.



WARNING

Do not attempt to straighten bent fork tubes. Doing so will weaken the structural integrity of the forks and make the motorcycle unsafe to operate.



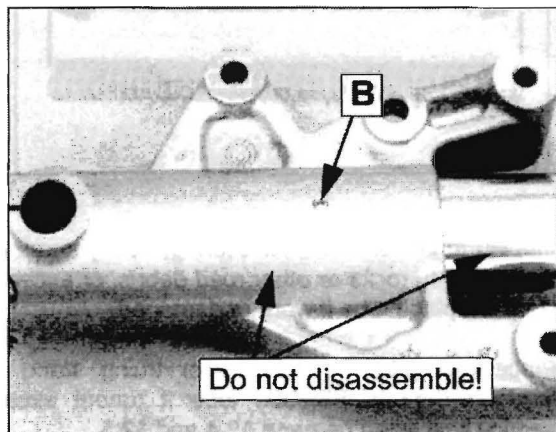
FRONT SUSPENSION / CONTROLS

FRONT FORK INSPECTION - ALL

4. **DO NOT** loosen or remove set screw (B).

WARNING

DO NOT disassemble the inner fork tube. If damaged or worn, the inner fork tube / lower casting must be replaced as an assembly.



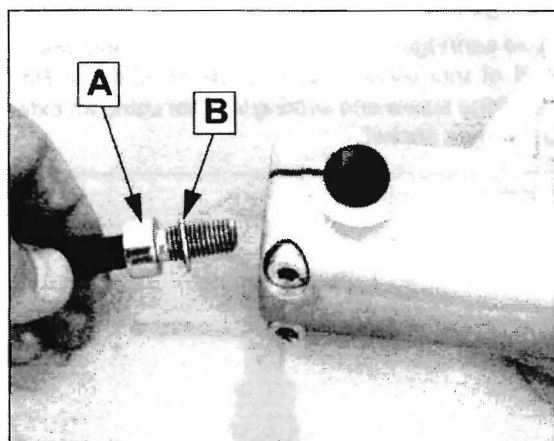
5. Inspect outer tube for dents or other damage. Look for cracks in the tube, especially in the clamping zone. Assemble inner and outer fork tube with new bushings and move inner tube through complete travel range. Check for resistance or binding in suspect area of outer tube. Replace outer tube if binding or resistance is evident, or if tube is cracked.
6. Inspect cartridge by moving shaft through travel range. If binding is evident, replace the assembly.

FRONT FORK ASSEMBLY - INVERTED

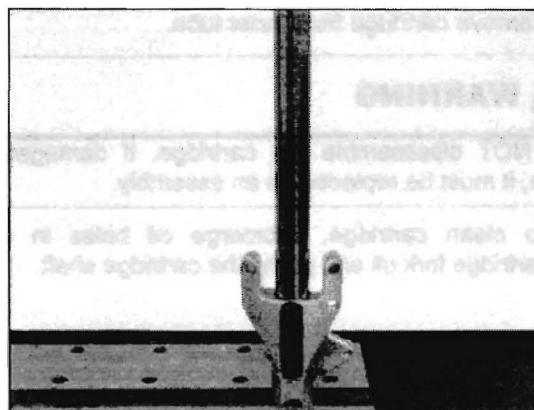
NOTE: Also refer to appropriate **FRONT FORK ASSEMBLY VIEW** for model and type.

Use fork oil where lubrication is specified.

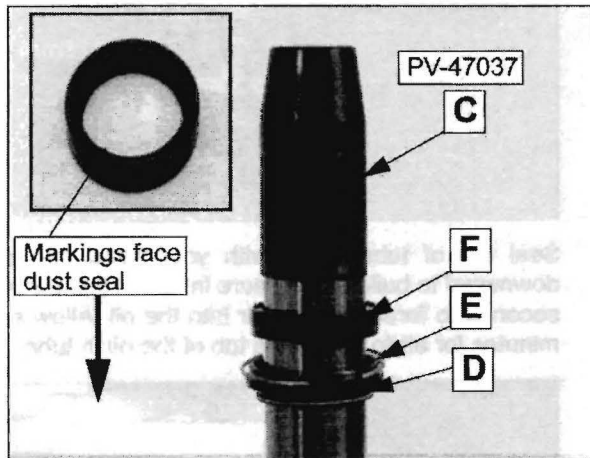
1. Be sure screw threads in bottom of cartridge are clean and not damaged.
2. Place cartridge assembly into inner fork tube. Hold cartridge with PV-49452.
3. Install a new cartridge screw (A) and new sealing washer (B).



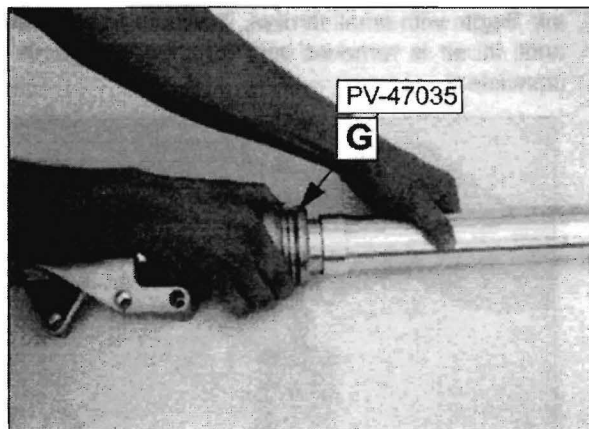
4. Secure fork assembly across axle bore in a soft jawed vise or work table.
5. Torque cartridge screw.
20-26 Nm (14.8 - 19.0 lb-ft).



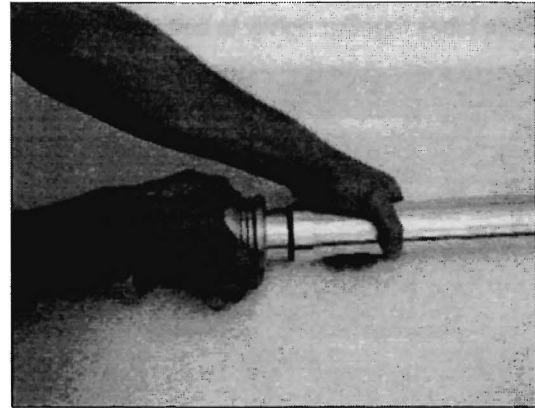
6. To prevent seal damage, install seal guide (C) over end of fork tube as shown lubricate surface of guide.
7. Carefully install a new dust seal (D) (external spring faces down) and slide it over seal guide.
8. Set new retaining ring (E) on dust seal.
9. Lubricate and install a new fork seal (F) with marks facing dust seal and retaining ring.



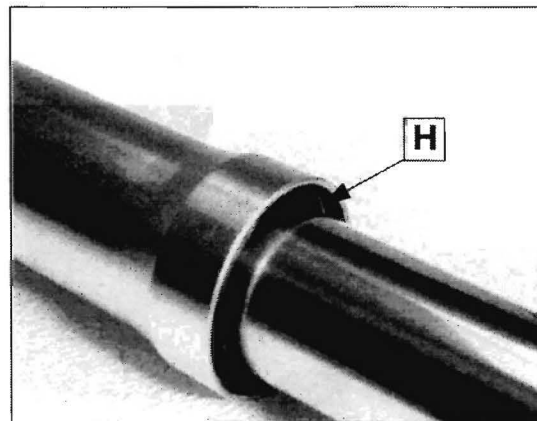
10. Remove seal guide and install new backing washer with machined face (flattest edge) facing UP (away from seal).
11. Install a new upper bushing.
12. Lubricate bushings and remove tube from vise.
13. Assemble outer tube to inner.
14. Using small side of seal driver (G) drive upper bushing and backing washer into outer tube until seated.



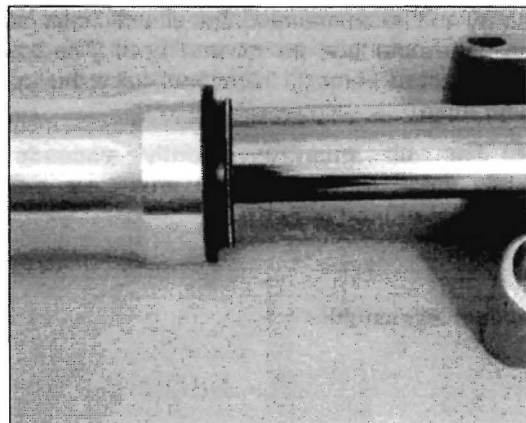
15. Drive seal into outer tube with large side of seal driver until fully seated (below retaining ring groove).



16. Install retaining ring (H) into groove of fork tube. Be sure it is completely seated around entire circumference of groove.

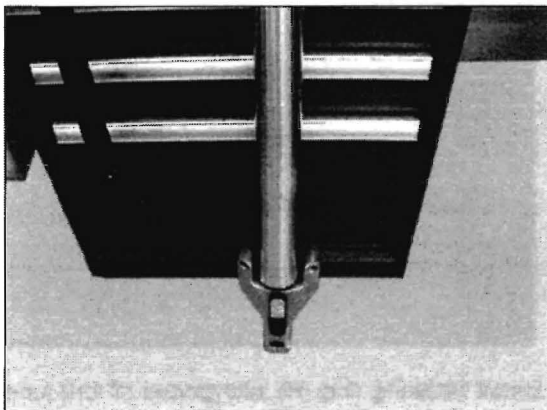


17. Wipe any excess oil from seal cavity and press dust seal in (by hand) until fully seated in outer tube.



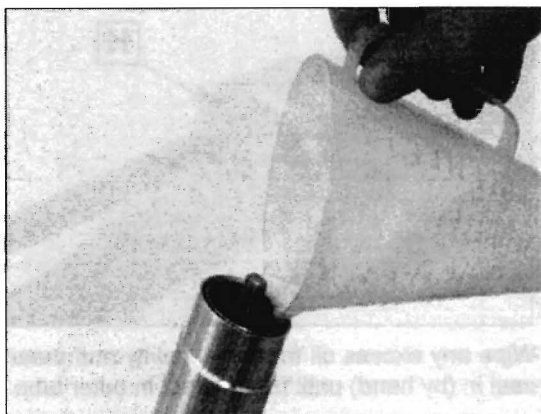
FORK OIL FILLING / LEVEL SETTING - INVERTED

1. Slide tubes together lightly to bottom of travel range.



2. Tip fork leg at an angle to reduce bubbles when adding fork oil.

About 516 cc of P/N 2877421 fork oil.

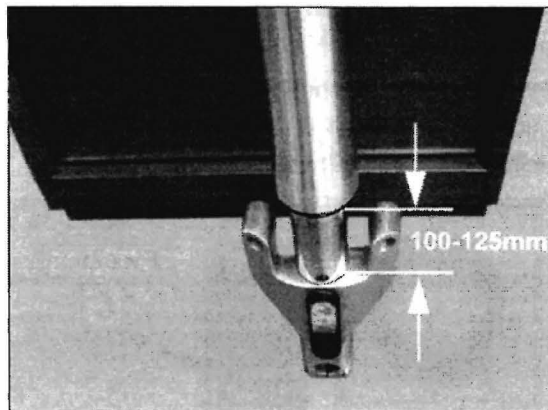


3. Slowly add recommended fork oil until holes near the top of the outer tube are covered by oil. (The holes are located about 35mm (1 1/2 inches) below the top of the outer tube).

NOTE: The oil quantity slightly exceeds fork capacity. Final fork oil level must be adjusted correctly as outlined later.

4. Set fork leg upright.

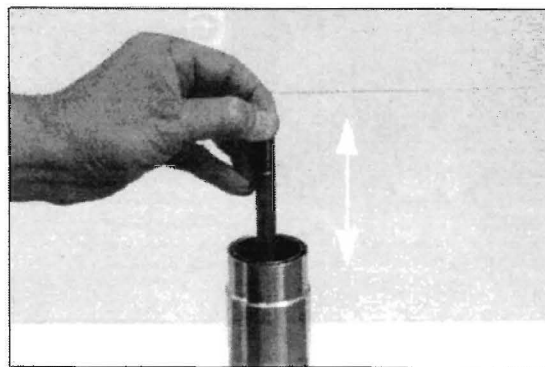
5. Lift outer tube up about 100-125mm (4-5 inches) from fully compressed position.



6. Seal top of tube firmly with your hand and push downward to build air pressure in tube. Hold for 10-15 seconds to force trapped air into the oil. Allow a few minutes for air to rise to the top of the oil in tube.

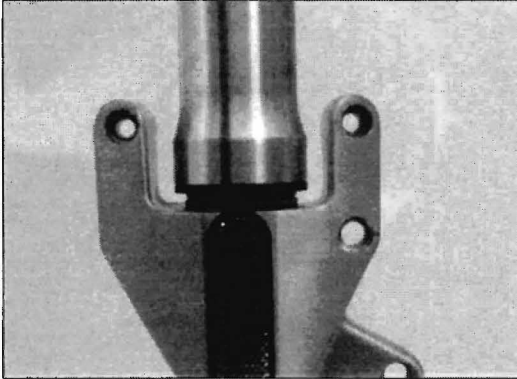


7. Bleed cartridge by moving shaft up and down to purge air. Begin with small strokes, increasing stroke length until all air is removed and damping is smooth and consistent.



OIL LEVEL ADJUSTMENT - INVERTED

8. Spring and spacer are not installed for oil level adjustment. Proceed to Step 26.
9. Slowly compress fork until it stops with dust seal against casting (at bottom of travel).

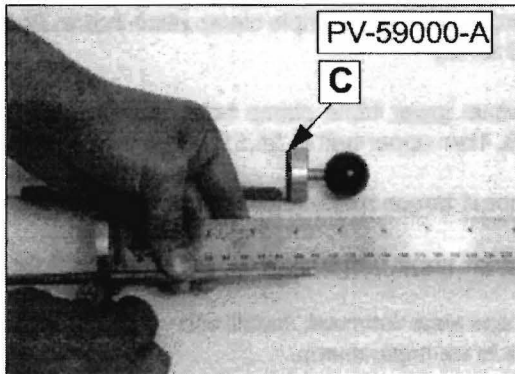


10. Adjust fork oil level tool (C) to specified level:

FORK OIL LEVEL:

118mm (4.65") +/- 1mm (.040")

Spring removed / tube fully compressed.



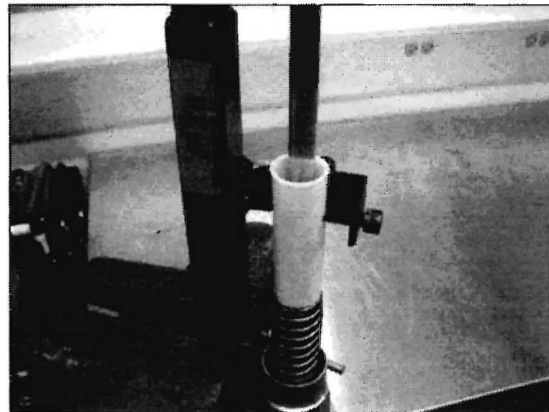
11. Insert tool into fork with plate squarely seated on top of tube. Be sure fork is upright and fully compressed.

12. Draw excess oil out to set proper oil level and discard.



FORK SPRING INSTALLATION / FINAL ASSEMBLY

1. Install spring with tightly wound coils UP, then install spacer on top of spring with holes UP.
2. Install cartridge shaft extension tool on damper rod. Use the tool to guide damper rod when spring is being compressed.
3. Place fork in compressor tool and compress spring in the same manner as for disassembly.

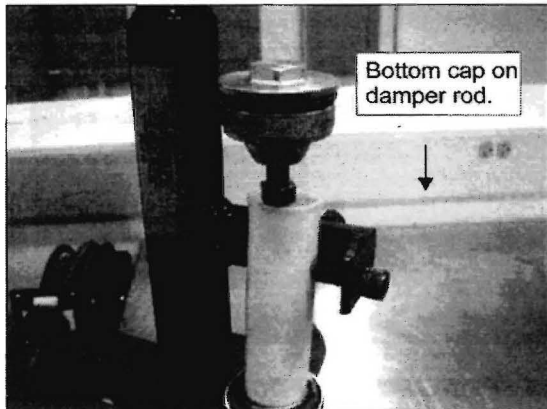


4. Hold damper rod up and remove cartridge shaft tool.
5. Install nut on cartridge shaft. Turn nut to bottom of damper rod threads.

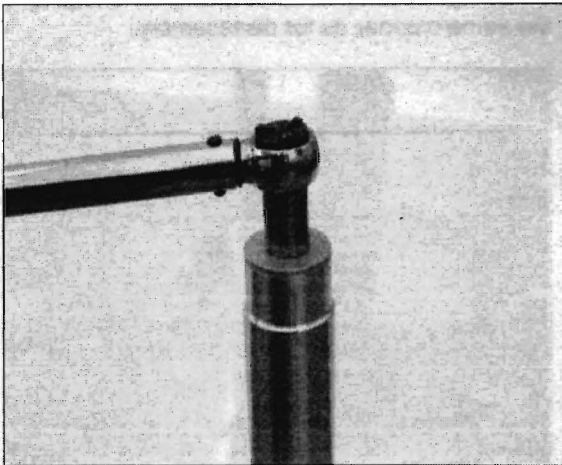
NOTE: Install nut with flat machined side UP (toward cap).



6. Install a new O-Ring on cap and lubricate. Install cap until bottomed lightly on cartridge shaft threads.



7. Screw nut upward until it contacts the cap.
8. *Tighten nut against cap.* Hold nut and torque cap to 13-16 Nm (9.5-12.0 lb.-ft).
9. Screw cap into outer tube and torque to specification: 15-30 Nm (11-22 lb.-ft).

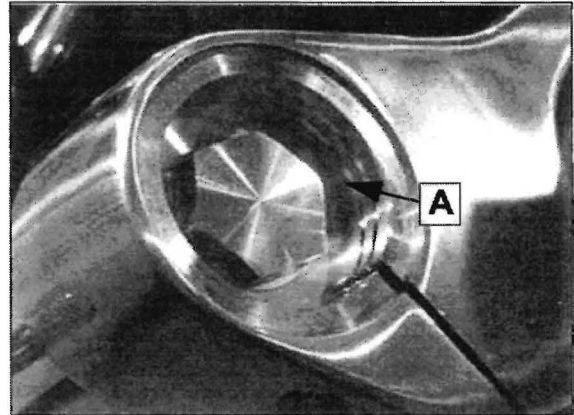


10. Wipe fork clean to remove all oil before installing in triple clamp.

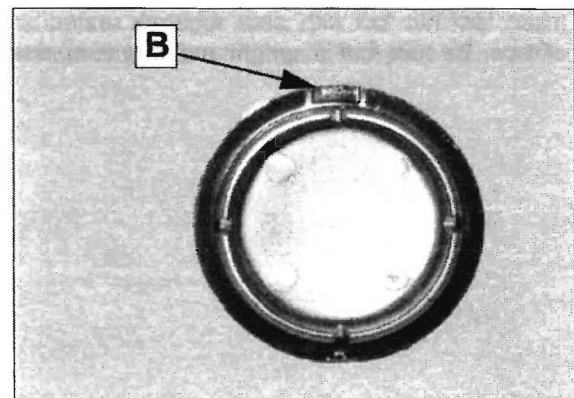
FRONT FORK INSTALLATION - INVERTED

Also refer to illustration on page 12.17.

1. Install one fork tube assembly into lower triple clamp.

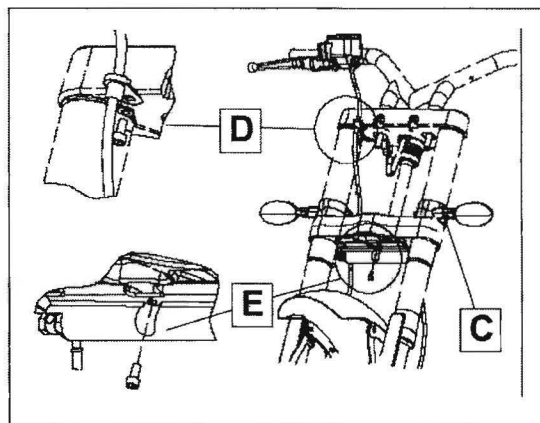


2. Place turn signal mount onto fork tube.
3. Continue to slide tube through lower triple clamp and into upper triple clamp until fully seated (A).
4. Torque each upper triple clamp pinch bolt to 24.5 Nm (18 lb.-ft.)
5. Torque lower triple clamp bolts, starting with lower bolt, then upper bolt to 24.5 Nm (18 lb.-ft.).
6. Repeat torque on both lower triple clamp bolts.
7. Repeat steps 1 through 5 for the other fork tube.
8. If caps were removed, install with notch (B) aligned to slot in top triple clamp.



9. Install front fender. Compress fender mounting area slightly to avoid scratches. Torque screws to 24.5 Nm (18 lb.-ft.)

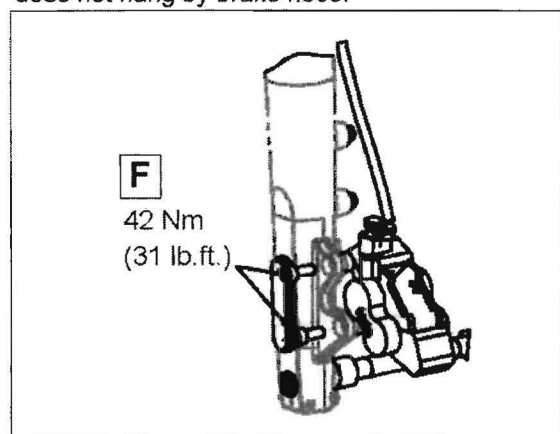
- Set turn signals against lower triple clamp (C) with wires properly routed in the channel. Align notch in mount with slot on triple clamp and torque screws to 10 Nm (84 in. lbs.)



- Install brake caliper(s). Torque screws to 41 Nm (30 lb-ft).
- Install front wheel (page 12.39).
- Install brake line clamp (D) and line manifold (E).
- Inspect all bolts for proper torque. Inspect hoses and wiring for proper routing.

FRONT FORK REMOVAL - CONVENTIONAL

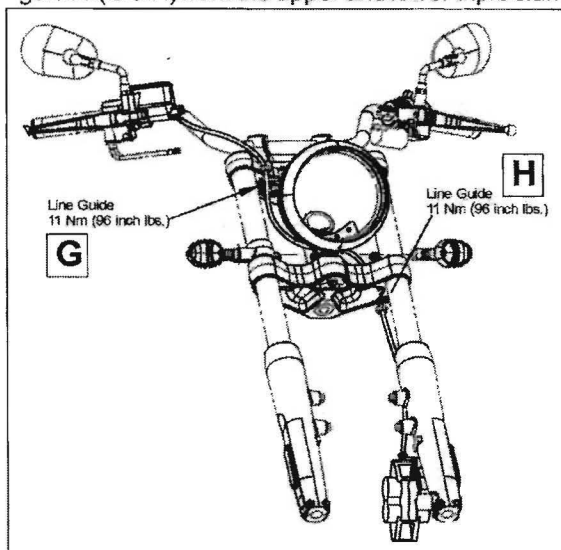
- Remove front brake caliper (F) and support so caliper does not hang by brake hose.



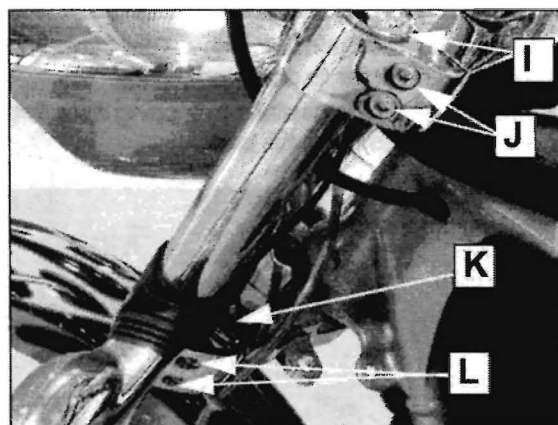
CAUTION

Do not twist the brake hose or brake line. Do not allow caliper to hang from the brake line or brake hose. Secure caliper in such a way to avoid hose damage.

- Remove front wheel (page 12.35).
- Remove front fender.
- If triple clamp will be removed, remove front brake line guides (G & H) from the upper and lower triple clamps.



- Carefully pry both fork caps (I) off the top of the tubes using a small screwdriver.
- Loosen upper triple clamp pinch bolts (J) for both left and right fork tubes.



- Loosen turn signal mount screws (K) and lower triple clamp pinch bolts (L).
- Slide fork legs down and remove turn signal mounts from tubes.



FRONT FORK DISASSEMBLY - CONVENTIONAL

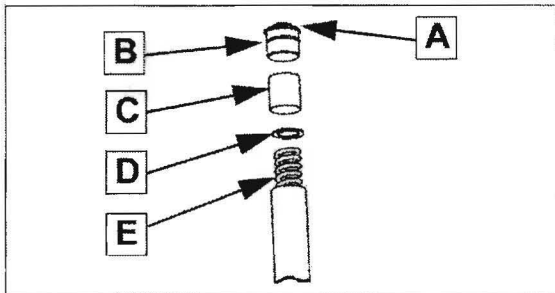
NOTE: Refer to appropriate Front Fork Exploded View. Clean fork tubes before disassembly.

1. Remove fork cap (A) with O-ring (B).

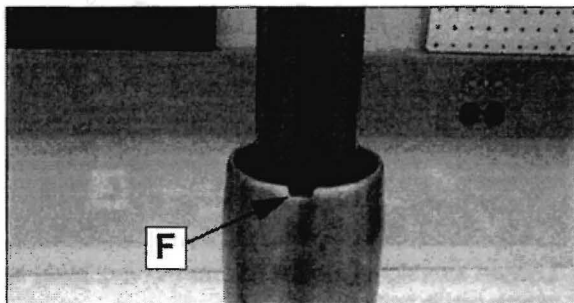
WARNING

Wear safety glasses and a face shield. The fork cap is under spring pressure. Apply firm downward pressure on fork cap and use extreme caution when removing the fork cap(s).

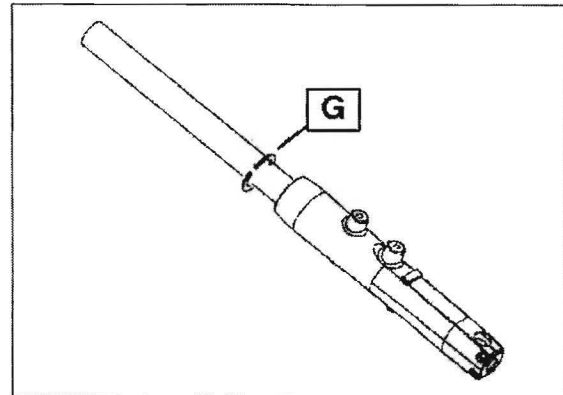
2. Clamp the fork tube in a soft jaw vise or work table vertically, with fork cap upward.
3. Remove spacer (C) washer (D) and spring (E).



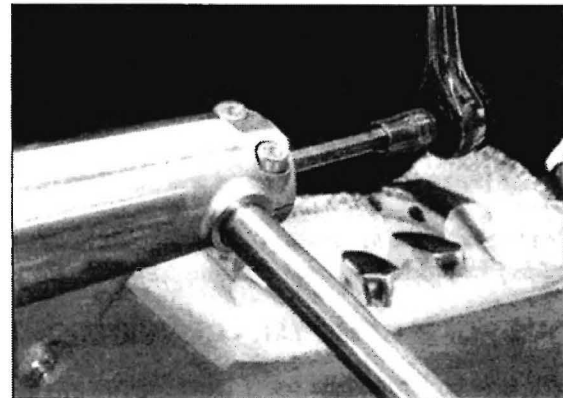
4. Pour fork oil into a drain pan. Move slider through entire stroke several times to drain completely.
5. Remove dust seal from slider by tapping it out through the access notch (F) in the back.



6. Remove oil seal retaining ring (G).



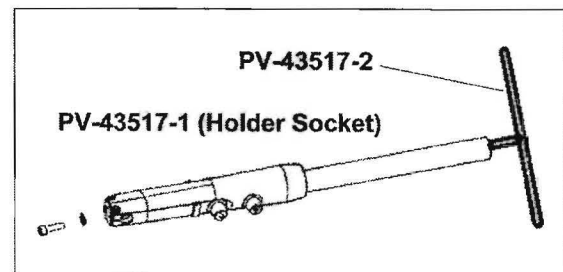
7. Insert the axle into the slider to keep it from turning and loosen the damper rod screw about 1 turn.



8. Remove damper rod screw and sealing washer.

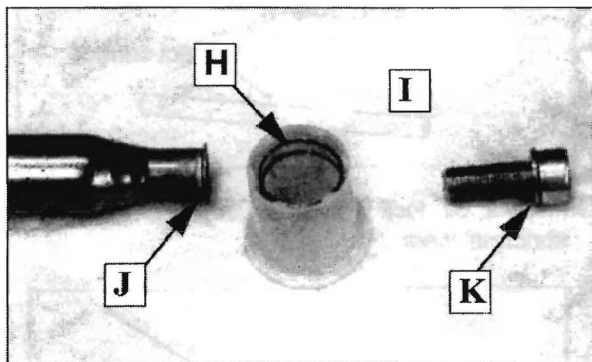
NOTE: If the damper rod spins while attempting to remove the damper rod bolt, it will be necessary to hold the damper rod with the special tool.

Damper rod holder: PV-43517-2 (Handle)

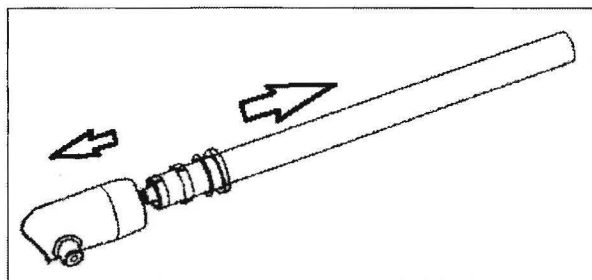


9. Pull the fork tube out of the slider until it stops against the slider bushing.

NOTE: Use care when separating the tube and slider. The small spring (H) located inside the oil lock valve (I) may catch on the bottom of the damper rod (J), which can damage the spring if the tube and slider are separated carelessly. Replace sealing washer (K) upon assembly.



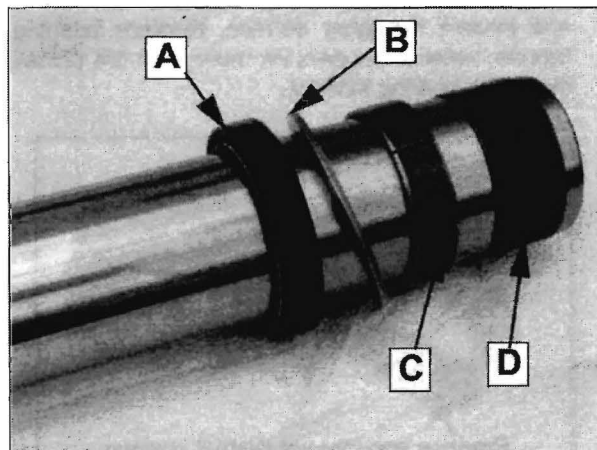
10. Alternately push and pull the tube to produce a slide-hammer effect and tap the seal from the slider.



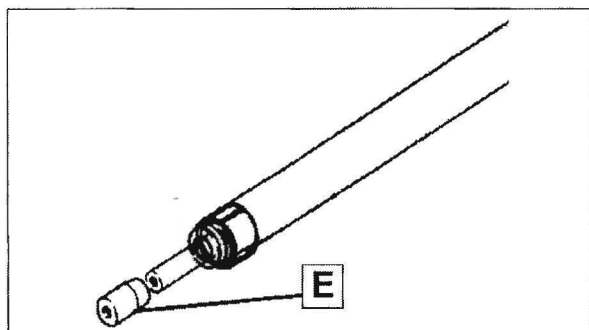
11. Remove tube from slider with fork seal (A), large washer (B), upper bushing (C) and lower bushing (D).

NOTE: Fork seal and retaining ring must be replaced if tubes are disassembled. Carefully inspect the fork bushings (both upper and lower) for nicks, burrs or other damage that can be caused by the disassembly process and replace if damaged.

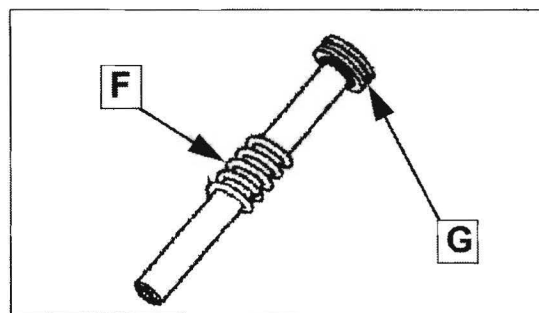
NOTE: The oil lock valve may stay in the bottom of slider. Remove it from the slider for inspection and cleaning.



12. Remove oil lock valve (E) from bottom of damper rod.



13. Remove damper rod from stanchion tube along with rebound spring (F) and piston ring (G).

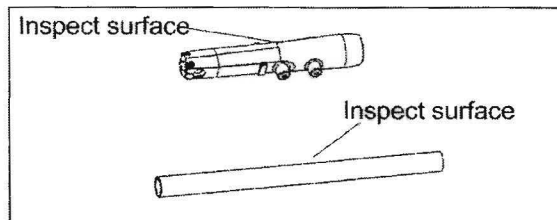
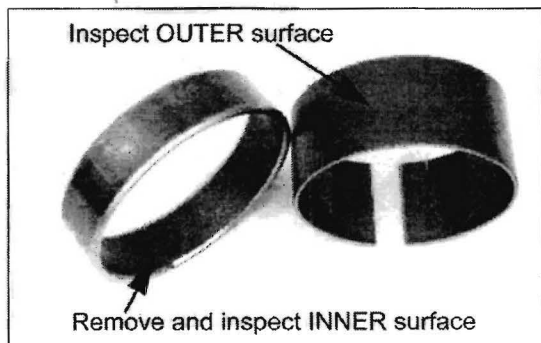


14. Spread fork tube (lower) bushing and remove it from stanchion tube.

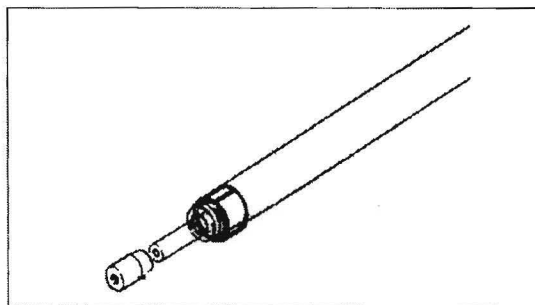
NOTE: Remove the lower bushing only if it will be replaced.

FRONT SUSPENSION / CONTROLS

15. Visually inspect the outer surface of the lower bushing. Replace bushing if bronze material appears on more than 1/4 (25%) of the entire bearing surface.
16. Remove the upper bushing from the stanchion tube and inspect the inner surface. Replace bushing if bronze material appears on more than 1/4 (25%) of the entire bearing surface.
3. Inspect slider for dents or other indentations due to rocks or other road debris or damage. If damage is found on exterior of slider, insert fork tube into slider and move the tube through the complete travel range. Check for resistance or binding in the damaged area. If binding or resistance is evident, replace the slider.

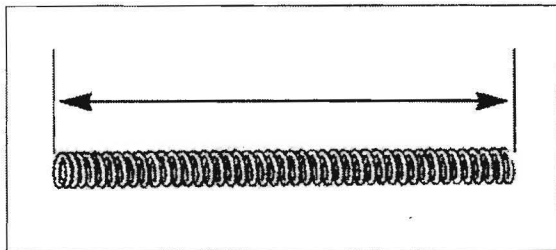


4. Inspect oil lock valve for scoring, excessive or abnormal wear.



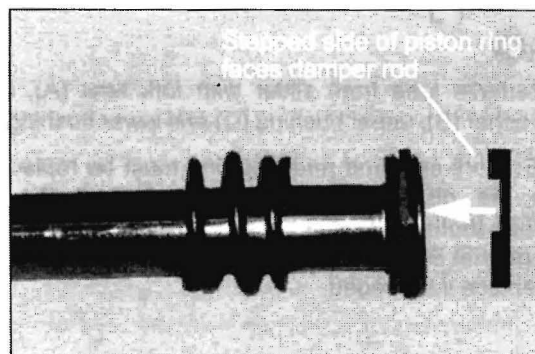
FRONT FORK INSPECTION - CONVENTIONAL

1. Measure fork spring free length and compare to specifications on page 12.5.



2. Inspect fork stanchion tube for scoring, heavy scratches, dents due to rocks or other road debris, or excessive wear. Replace tube(s) if deep scratches, pitting, or dents are found.

5. Visually inspect the damper rod piston ring. Replace ring if scoring, deep scratches and/or excessive wear is noted.

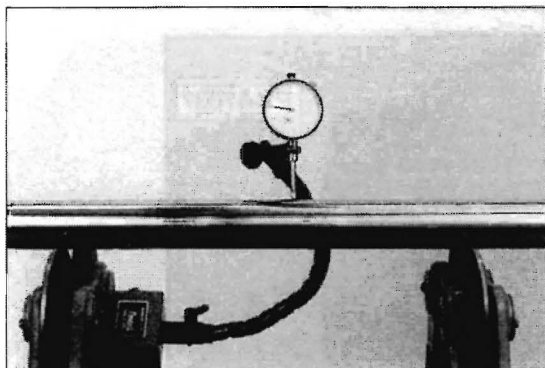


CAUTION

Ring is directional. Be sure to install it with stepped edge toward damper rod and top-out spring as shown.



6. Place fork tube in V-blocks and measure runout. Replace the tube if runout exceeds service limit listed on page 12.5.
7. Install oil lock valve (A) with spring (B) onto end of damper rod (C).



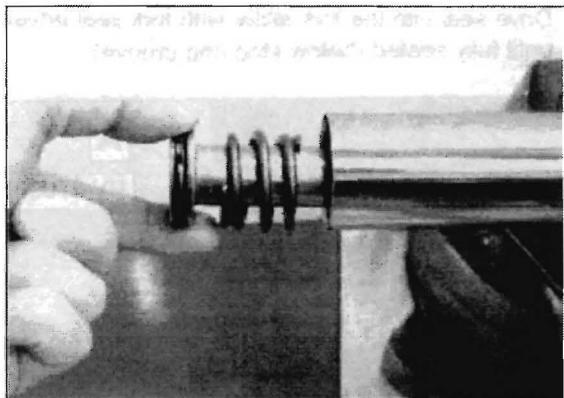
WARNING

Do not attempt to straighten bent fork tubes. Doing so will weaken the tube and make the motorcycle unsafe to operate.

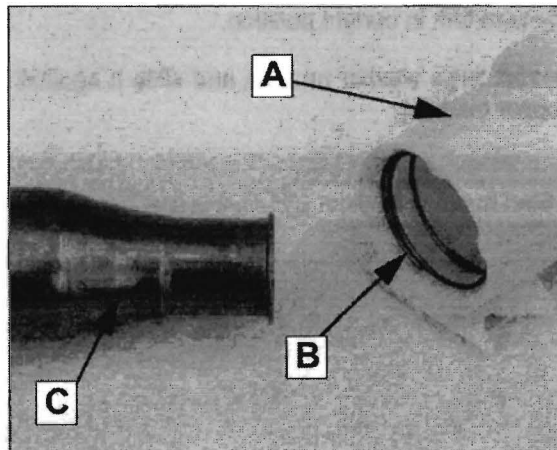
FRONT FORK ASSEMBLY - CONVENTIONAL

NOTE: Also refer to appropriate Front Fork Assembly View.

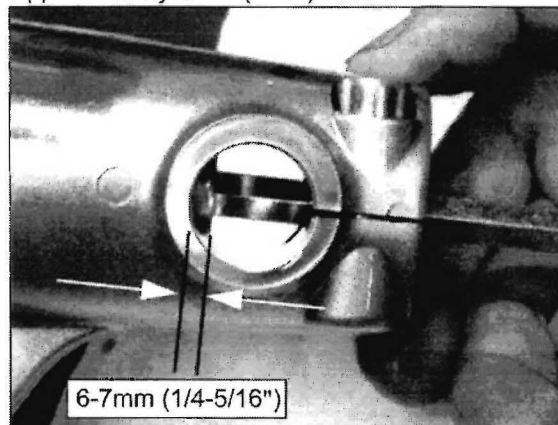
1. Clean all parts thoroughly with clean solvent.
2. If upper and/or lower bushings were removed, carefully install new bushings on fork stanchion tube.
3. Lubricate the damper rod piston ring with fork oil.
4. Install rebound (top-out) spring on damper rod.
5. Install damper rod assembly into fork stanchion tube.



6. Use damper rod holder tool PV-43517 to hold damper in place at bottom of stanchion tube.



8. Apply fork oil to the bushings.
9. Lower fork slider over stanchion tube.
10. Using a 1/8 inch pin punch or similar tool through the hole in the bottom of the slider, center the foot valve and damper rod with the fork slider. When properly aligned, the damper rod threads will be aligned with the hole in the slider.
11. Install the damper rod screw with a new sealing washer, and verify proper assembly of the oil lock valve. If the valve is centered properly on the damper rod, the head of the retaining screw will protrude approximately 3/16" (5mm) as shown.



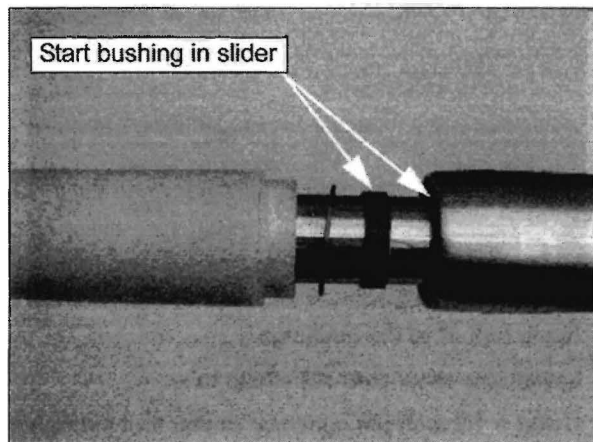
CAUTION

If screw head does not protrude or if it protrudes more than 1/4-5/16" (6 or 7 mm), disassemble tube and check for proper assembly.



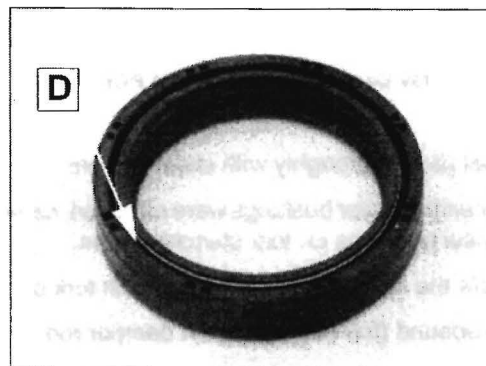
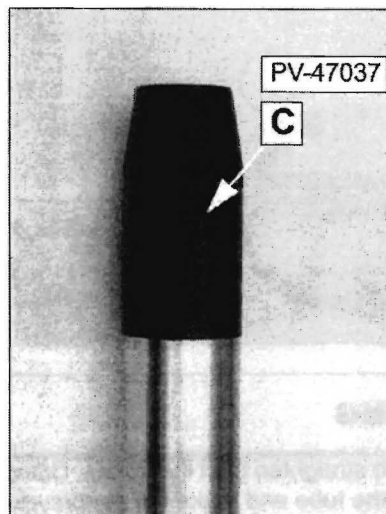
FRONT SUSPENSION / CONTROLS

12. Torque damper rod bolt to 30 Nm (22 lb.-ft.). Use tool PV-43517 to hold damper rod if necessary.
13. Secure fork in upright position.
14. Install large washer on tube and slide it against the upper bushing.

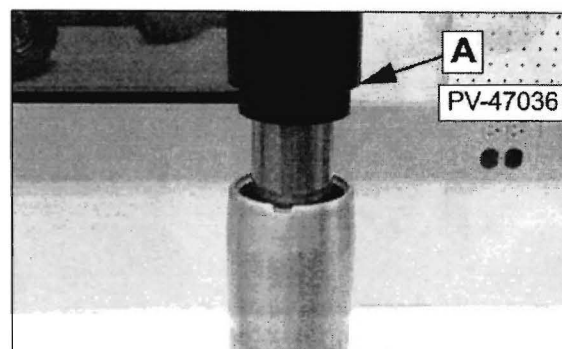


15. Start the bushing into the slider by hand, then use the 43mm seal driver to lightly tap the washer and bushing into place until fully seated.
16. Gently lower stanchion tube until it bottoms in slider. The tube should slide freely in and out of the slider. If it binds, loosen damper rod screw about 2 turns, rotate tube and slider, and re-tighten. If tube still binds, disassemble fork and inspect parts again as described in INSPECTION.
17. Lightly grease outside of new fork seal with Victory All-Purpose grease.
18. Lightly oil the sealing lips of seal with fork oil.

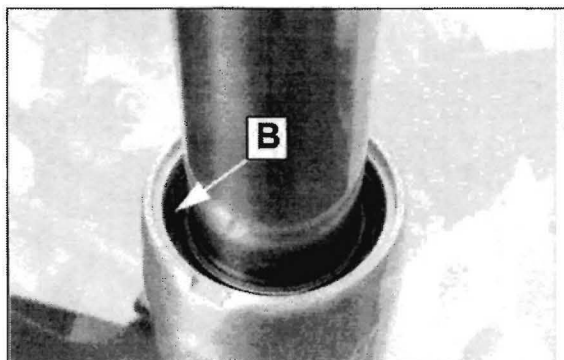
19. To prevent damage to fork seal, place the seal guide (PV-47037) (C) over stanchion tube and then install new seal with markings and spring (D) facing UP (toward retainer ring).



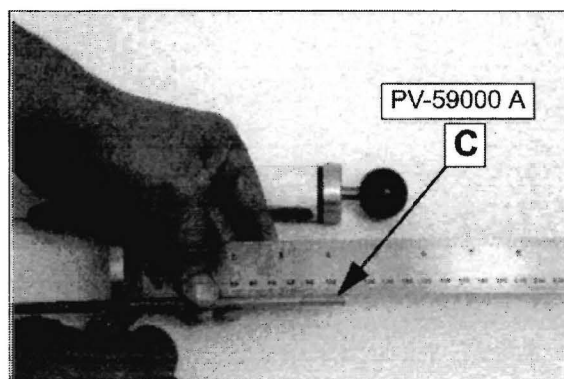
20. Drive seal into the fork slider with fork seal driver (A) until fully seated (below stop ring groove).



21. Slide fork tube fully into the slider so sealing surface of tube will not be exposed while installing the retaining ring. Install retaining ring (B) into groove of slider. Make sure ring is properly seated in groove.

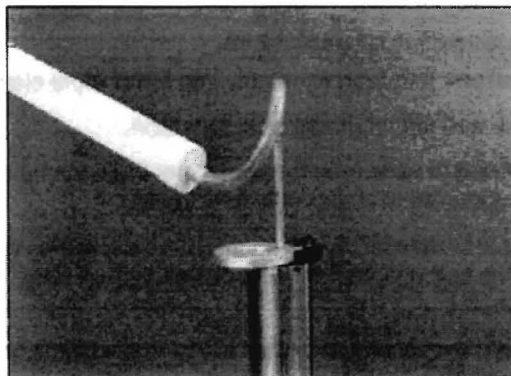


22. Tip the tube and *slowly* add about 550cc of fork oil to minimize bubble formation.
23. Move stanchion tube up and down several times to disperse oil and purge air.
24. Secure the fork tube assembly upright for several minutes to allow air bubbles to work to the surface before proceeding.
25. Slowly push the stanchion tube into the slider until bottomed (fully compressed).
26. Adjust tool (C) to specified oil level.

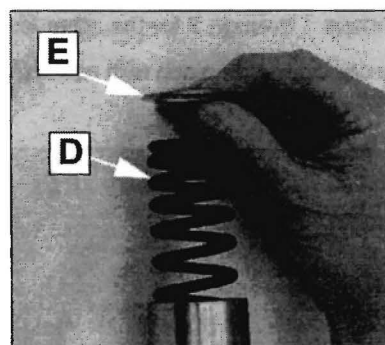


FORK OIL LEVEL (VEGAS / JACKPOT)
130 mm (5.118")
Spring removed / tube fully compressed

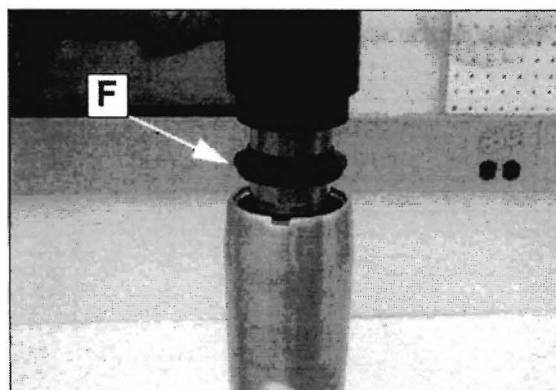
27. With tube vertical, insert tool and draw out excess oil until level is correct. Keep tube upright.



28. Fully extend fork to prevent oil leakage when spring is installed.
29. Install fork spring with tightly wound end (D) UP.
30. Install flat washer (E) between spring and spacer.



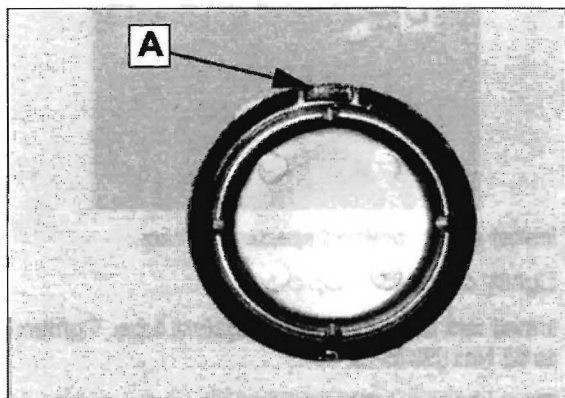
31. Install spring preload spacer and cap.
32. Lightly oil the fork cap o-ring.
33. Install fork cap until seated against tube. Tighten cap to 68 Nm (50 lb-ft).
34. Place dust seal (F) over stanchion tube and drive into place with the seal driver.



FRONT FORK INSTALLATION - CONVENTIONAL

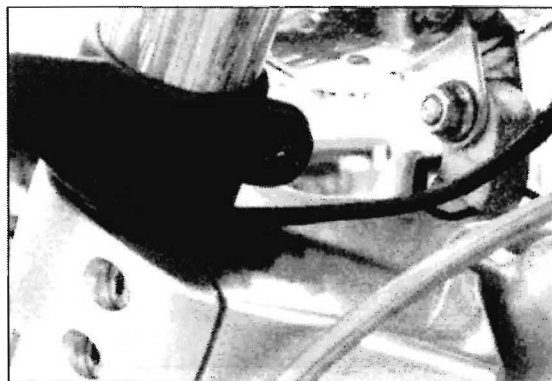
Refer to illustration on page 12.15.

1. Install one fork tube assembly into lower triple clamp.
2. Place turn signal mount onto fork tube.
3. Continue to slide tube through lower triple clamp and into upper triple clamp until fully seated.
4. Torque bottom pinch bolt on UPPER triple clamp, then the top bolt on UPPER triple clamp, to 24.5 Nm (18 lb.-ft.)
5. Repeat torque sequence on UPPER triple clamp bolts (repeat Step 4).
6. Torque the bottom pinch bolt on LOWER triple clamp, then torque the top pinch bolt on LOWER triple clamp to 24.5 Nm (18 lb.-ft.).
7. Repeat torque sequence on LOWER triple clamp bolts (repeat Step 6).
8. Repeat steps 1 through 7 for the other fork tube.
9. Install upper triple clamp cap with notch (A) aligned to slot in triple clamp.



10. Install front fender. Compress fender mounting area slightly to avoid scratches.
11. Torque fender screws to 24.5 Nm (18 lb.-ft.)

12. Set turn signals against lower triple clamp with wires properly routed in the channel. Align notch in mount with slot on triple clamp and torque screws to 10 Nm (84 in. lbs.)



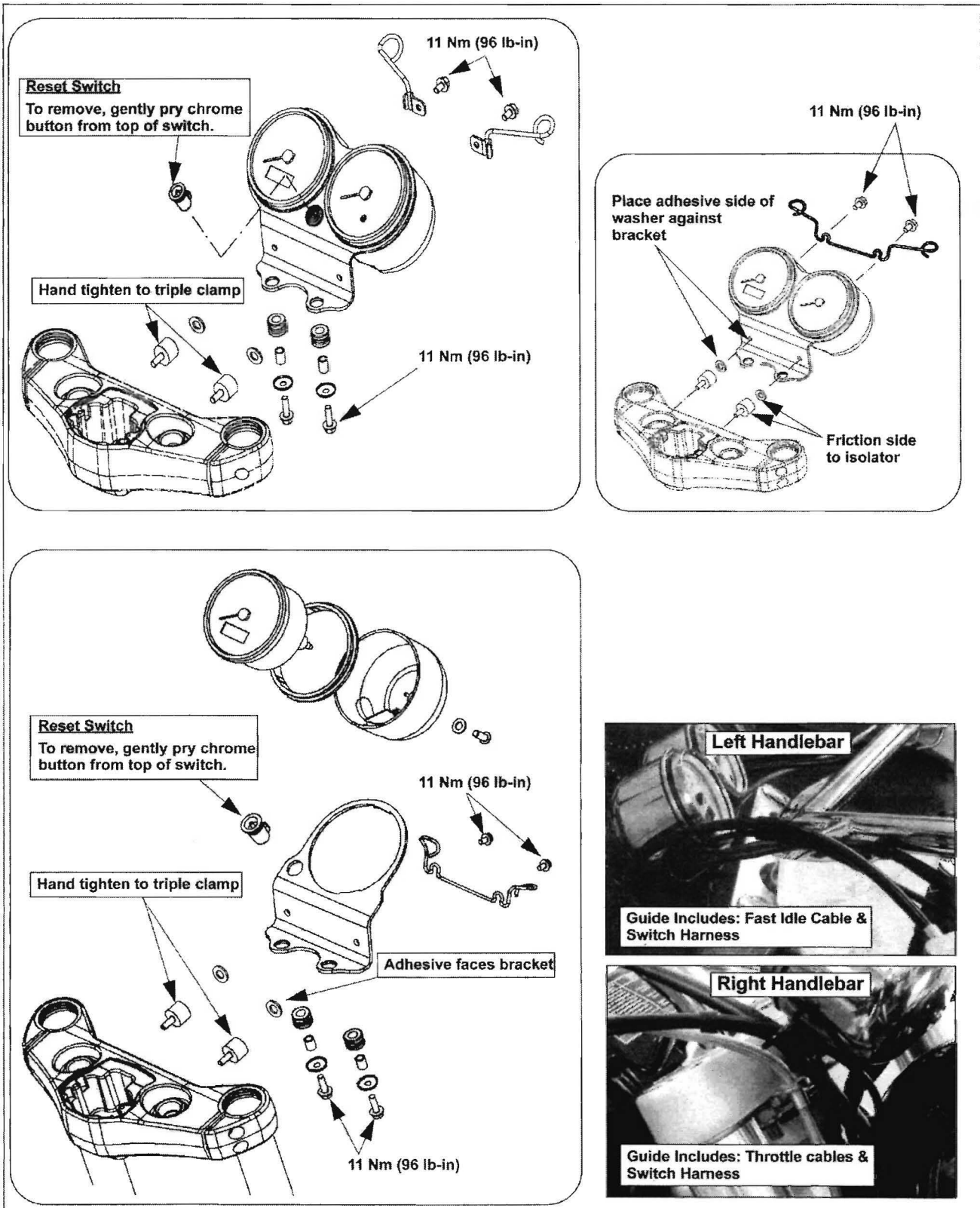
13. Install brake caliper. Torque screws to 41 Nm (30 lb-ft).
14. Install brake line guides (if removed). Refer to Chapter 15.
15. Install front wheel (page 12.39).
16. Inspect all bolts for proper torque. Inspect hoses and wiring for proper routing.

HEADLAMP REMOVAL

Refer to Chapter 19 for headlamp removal procedure.



SPEEDOMETER / TACHOMETER

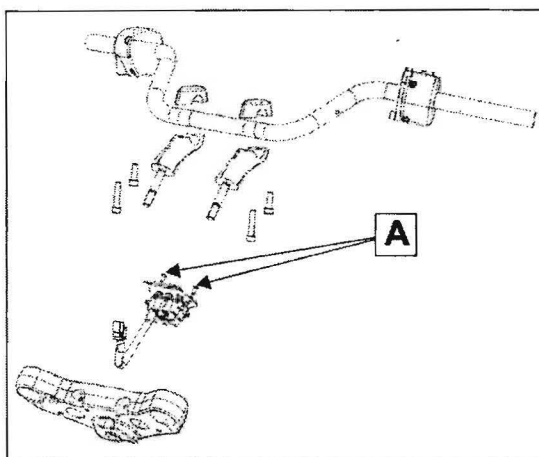


12



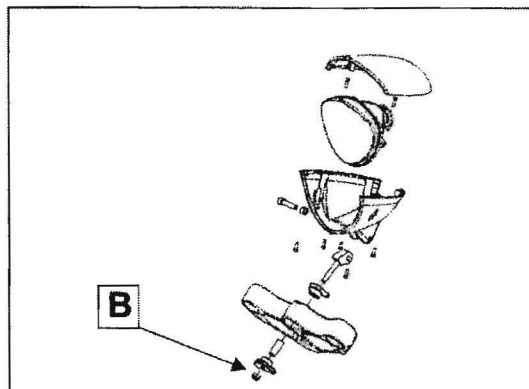
TRIPLE CLAMP REMOVAL

1. Elevate front of machine so that front wheel can be removed. Support machine securely in an upright position.
2. Remove fuel tank (Chapter 5).
3. Remove front wheel.
4. Remove fork tubes.
5. Remove brake line guides from upper and lower triple clamp.
6. Remove handlebars and set aside.
7. Remove two screws for the indicator light panel (A).

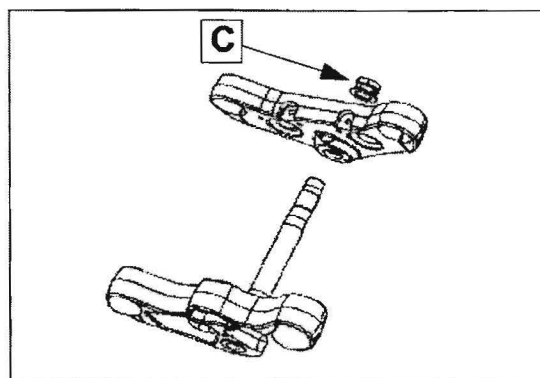


8. Remove headlamp lens, disconnect indicator light wires in headlamp housing and remove indicator lights from upper triple clamp.

9. Remove headlamp housing by removing nut (B) from lower triple clamp.



10. Remove speedometer and tachometer with bracket.
11. Loosen center nut (steering stem nut) (C) on upper triple clamp using a 30 mm socket.



12. Slide upper triple clamp off steering stem.
13. Remove stem adjuster lock nut on steering stem with Victory spanner socket (PV-43508). Hold adjuster nut with spanner wrench (PV-43509).

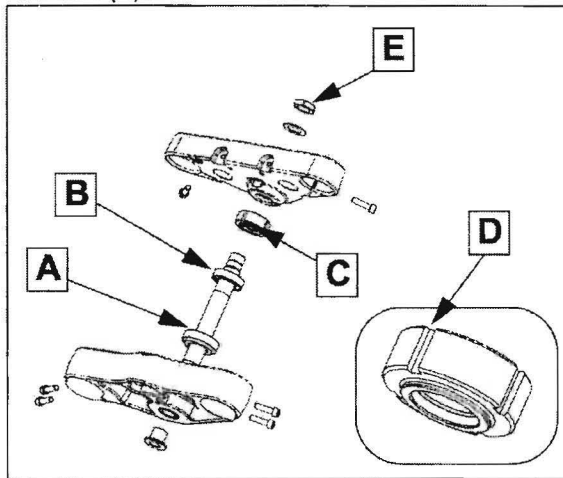
NOTE: Support lower triple clamp while removing the nuts.

14. Remove upper steering head roller bearing from the frame.
15. Remove lower triple clamp, with lower steering head bearing, steering stem, and lower bearing.
16. Inspect bearings and bearing races (page 12.59).



TRIPLE CLAMP INSTALLATION / STEERING HEAD BEARING ADJUSTMENT

1. Inspect both top and bottom bearing races for pitting, dents, or worn surface. Replace bearings and races as a set if bearing races are worn or damaged.
2. Be sure lower stem bearing (A) is seated against step on lower triple clamp. Apply Victory All Purpose grease to bearing and install lower triple clamp / stem to frame.
3. Grease and install upper bearing (B) onto stem and push it down until seated in upper bearing race.
4. Screw adjuster nut (C) (shoulder side down) onto the stem and turn triple clamps fully to the right.
5. Torque to 39 Nm (29 lb-ft) using Victory spanner socket PV-43508.
6. Place a mark on the frame, in alignment with one of the slots (D) on the steering stem nut for reference later.
7. Turn lower triple clamp from lock to lock five times and return to full right position.
8. Loosen adjuster nut 90 degrees (1/4 turn) so the reference mark on frame is aligned with the next one of the four slots on the stem nut.
9. Set upper triple clamp in place on stem. Install washer and nut (E).

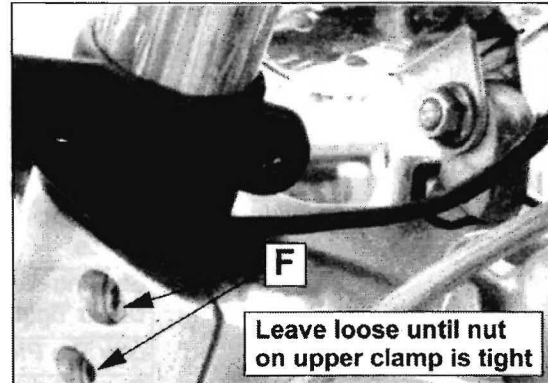


10. Tighten steering stem nut by hand.

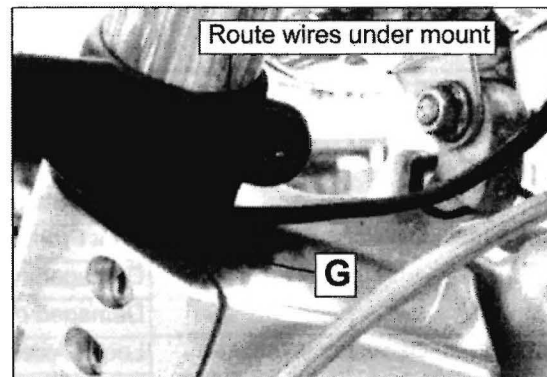
NOTE: Nut will be torqued after tubes are installed.

11. Install fork tubes through lower triple clamp and slide turn signal mounts over fork tubes.
12. Slide tubes into upper triple clamp until fully seated.

13. Torque pinch bolt(s) on upper triple clamp to 24.5 Nm (18 lb-ft). (VEGAS / JACKPOT MODELS: Torque upper bolt first, then lower bolt. Repeat torque on each bolt).
14. Leave lower triple clamp pinch bolts loose (F).



15. Torque steering stem nut to 97 Nm (72 lb-ft).
16. Torque lower triple clamp bolts, starting with the bottom bolts.
17. Repeat torque on both lower triple clamp bolts.
18. Install brake line guides, headlamp assembly, indicator light panel, handlebars, fender, and front wheel.
19. Adjust headlight aim (page 2.30).
20. Slide turn signal mounts against lower triple clamp, routing wires through channel in bottom of mount.
21. Align tab of mount with (G).



22. Verify all fasteners are installed and properly torqued.



TROUBLESHOOTING

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REPAIR RECOMMENDED
Heavy Steering	Steering Stem Nut Over Tightened	Torque to specification
	Damaged Steering Stem Bearings or Races	Replace
	Bent Steering Stem	Replace
	Front Tire Damaged or Worn	Replace
	Low Tire Pressure	Inflate to specification
Pulls to One Side or Wanders	Damaged Steering Stem Bearings or Races	Replace
	Steering Stem Nut Over Tightened or Under Tightened	Torque to specification
	Low Tire Pressure	Inflate to specification
	Rear Wheel Not Aligned Correctly	Align
	Bent Front Axle	Replace
	Damaged or Excessively Worn Front Tire / Incorrect Tire	Replace
	Damaged Wheel Bearings	Replace
	Damaged Swing Arm Bearings	Replace
	Loose Swing Arm Pivot Nut	Torque to specification
Handlebars Oscillate (Wobble)	Bent Front Axle	Replace
	Wheel Has Excessive Runout	Spoke: True or Replace (Billet)
	Tire Mounted Incorrectly	Check Mounting and Balance
	Damaged Tire / Worn Tire	Replace
	Loose Steering Stem Nut	Torque to specification
	Incorrect Tire	Replace
	Incorrect Tire Pressure	Correct
Noise Coming From Front Suspension	Worn Fork Bushings	Rebuild Forks
	Low Fork Fluid	Determine Cause/Replace Fork Oil
	Loose Fasteners	Torque to specification
	Loose Steering Stem Bearings	Determine Cause/Correct
Front Wheel Oscillates (Wobbles)	Bent Front Rim	Replace
	Damaged Front Wheel Bearings	Replace
	Damaged or Incorrect Tire	Replace
Front Wheel Oscillates (Wobbles)	Loose Axle or Axle Pinch Bolts	Torque to specification
	Fork Tube Height Unequal (L&R)	Install Correctly
	Fork Oil Level Unequal	Set Correctly
	Fork Spring Free Length Different Between Right & Left	Replace
	Wheel Assembly Out-of-Balance	Balance
	Low Tire Pressure	Inflate to specification



TROUBLESHOOTING (cont.)

PROBLEM	POSSIBLE CAUSE	REPAIR RECOMMENDED
Front Suspension Too Soft	Weak Fork Springs	Replace
	Low Fork Oil Level	Determine Cause/Replace Fork Oil
	Wrong Weight Fork Oil	Replace
	Contaminated and/or Deteriorated Fork Oil	Replace
	Low Tire Pressure	Set Correctly
Front Suspension Too Hard	Tire Pressure Too High	Set Correctly
	Bent Fork Tubes	Replace
	Wrong Weight Fork Oil	Replace
	Too Much Fork Oil	Set Correctly
	Plugged Oil Passages	Rebuild Front Forks
	Damaged Sliders	Replace
	Forks Binding, Incorrect Assembly Front Fender and/or Front Wheel	Correct
Wheel Turns Hard	Damaged Wheel Bearings	Replace
	Front Axle Bent	Replace
	Brake Dragging (Hydraulic or Mechanical Problem)	Repair as Necessary
	Brake Dragging (Bent Disc)	Replace
	Improper Assembly After Repairs	Correct as Necessary



NOTES

This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook paper. There are no margins, text, or other markings on the page.

CHAPTER 13

REAR WHEEL & SUSPENSION

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GENERAL INFORMATION

WARNINGS AND PRECAUTIONS

WARNING

This motorcycle was produced with the designated tires as original equipment. The testing to ensure stability and superior handling was done using the OEM tires. Using non-OEM tires could result in poor motorcycle stability and handling, which can lead to a crash resulting in serious injury or death. Use only recommended tires inflated to the recommended tire pressures.

Operating the motorcycle with damaged rims creates a safety hazard including air pressure loss, steering imbalance and/or reduced steering control. Do not attempt to repair or straighten damaged rims.

Always use genuine Victory parts so that quality is not compromised. The use of tire valves and valve cores other than original equipment replacement Victory parts could cause tire deflation which may lead to loss of control, resulting in injury or death. Be sure tire valve caps are securely installed.

CAUTION

Work performed to the rear end of the motorcycle usually involves supporting the machine with the rear end elevated. Take precautions so that the motorcycle is securely supported when the rear tire is off the ground. This reduces the possibility of personal injury or damage to the motorcycle.

- The shock absorber is not serviceable.
- Refer to CH 2 for maintenance and adjustment of rear wheel & suspension components.
- Refer to CH 15 for brake system service.
- Refer to CH 14 for tire removal, repair, & balancing.

SPECIAL TOOLS

WHEEL SERVICE TOOLS

Bushing & Bearing Installation Set:	PV-43515
Wheel Bearing Service Set:	PV-49462
Platform Jack or Hoist	Commercially available

TIRE PRESSURE

Refer to Chapter 2 for tire pressure and specification information.

NOTE: Also refer to the Manufacturing Information decal located on the left frame down tube on the motorcycle, and Tire Information decal under the left side cover.



SPECIFICATIONS

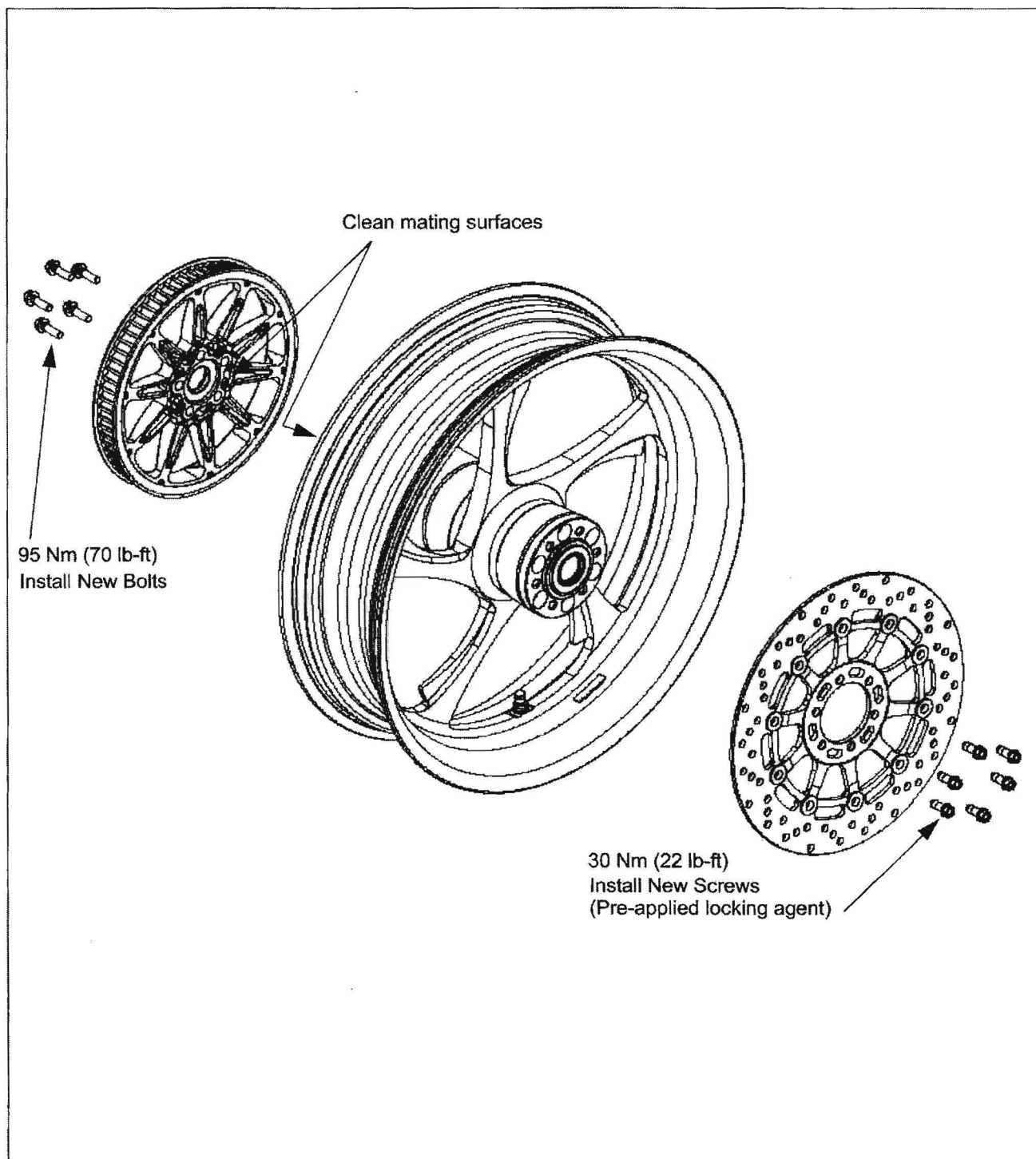
SPECIFICATIONS - REAR WHEEL AND SUSPENSION

SPECIFICATIONS			
Item		Standard	Service Limit
Axle Runout		-	.20 mm (.008")
Rear Shock Absorber		Single-Shock - Pre-Load Adjustable - Gas - Sealed Unit (Not Serviceable)	Inspect shock as outlined on page 13.24
Rear Wheel Runout (Cast & Billet Type)	Axial	.80 mm (.030 inch)	2.0 mm (.080")
	Radial	.80 mm (.030 inch)	2.0 mm (.080")
Rear Wheel Size / Type	Vegas / Kingpin	5.50 x 18" Cast or 5.00 x 18" Billet	--
	Hammer / Jackpot	8.50 x 18" Cast or Billet	
	High-Ball	3.5 x 16" Laced (Spoked Type)	
Rear Wheel Travel	2009-2012 Kingpin 2009-2012 Hammer	3.9 in (10 cm)	--
	2012 High-Ball 2009-2012 Jackpot 2012 Vegas 2012 Vegas 8-Ball 2012 Hammer 8-Ball	3.0 in. (7.5 cm)	--
Shock Spring Free Length	Models with 3.9 in (10 cm) travel	272 mm (10.70 inch)	--
	Models with 3.0 in. (7.5 cm) travel	254 mm (10.00 inch)	--
Shock Spring Installed Length (Standard)		Perform Ride Height Adjustment (page 2.36)	--
Suspension Ride Height	Vegas	See page 2.36	--
	Kingpin		--
	Hammer		--
	Jackpot		--
Spring Rate	Models with 3.9 in (10 cm) travel	90 N/mm (515 lb. in.)	--
	Models with 3.0 in. (7.5 cm) travel	110 N/mm (618 lb. in.)	--
Swing Arm Pivot Shaft Runout		Not Applicable	.20 mm (.008")
Swing Arm Pivot Shaft O.D.		16.20 - 16.25 mm (.638 - .640")	16.08 mm (.633")
Swing Arm Bushing Sleeve O.D.		29.95 mm - 30.00 mm	29.83 mm (1.1744")
Swing Arm Bushing Sleeve I.D.		16.25 mm - 16.50 mm	16.62 mm (0.6543")
Swing Arm Bushing I.D.		30.035 mm - 30.099 mm	30.22 mm (1.1897")
Swing Arm Bushing O.D.		38.035 mm - 38.060 mm	37.195 mm (1.4927")
Wheel bearing O.D. (approx)		51 mm	--
Wheel bearing I.D. (approx)		20 mm	--

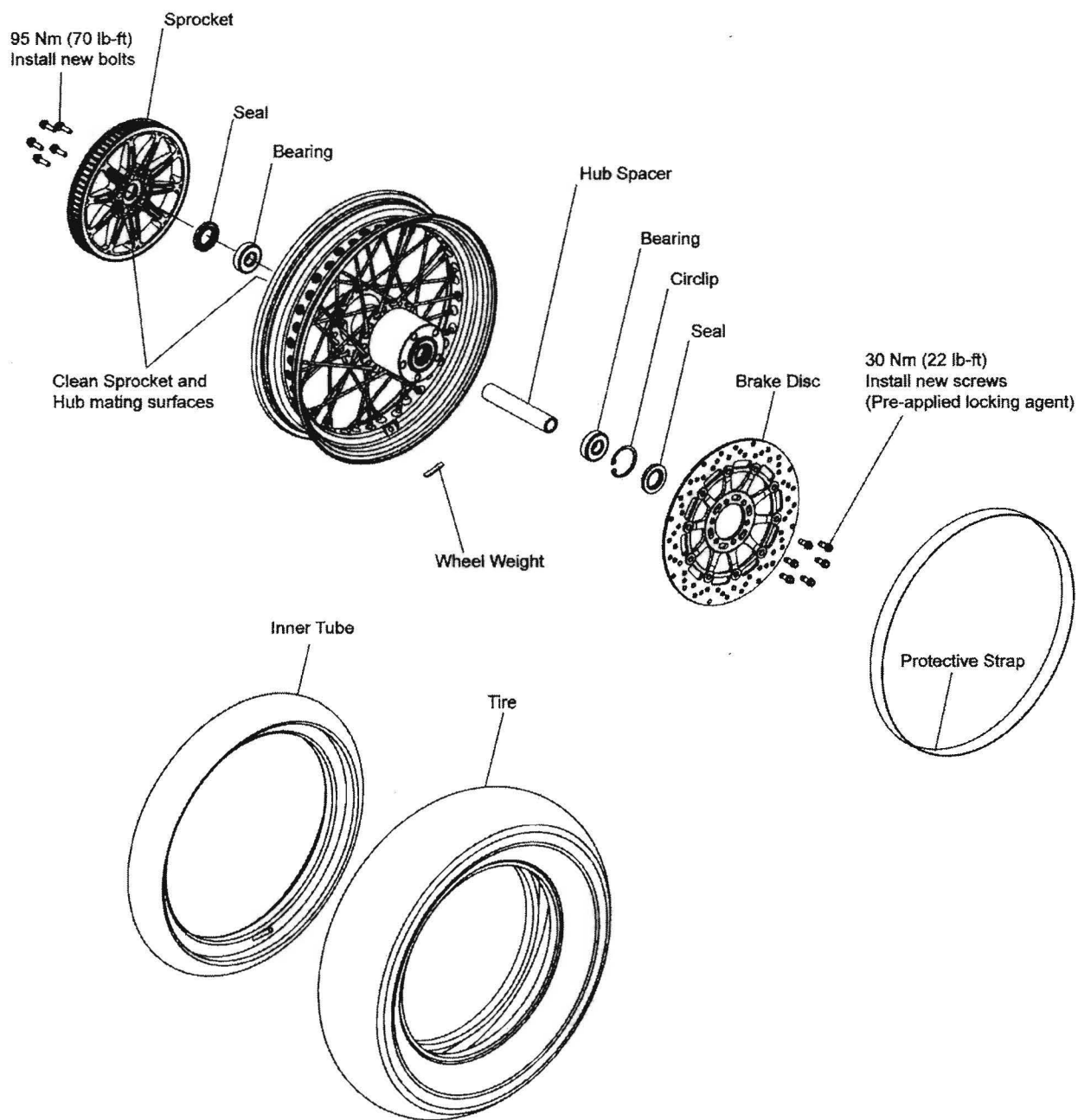


ASSEMBLY VIEWS & TORQUE

ASSEMBLY VIEW - REAR WHEEL - VEGAS / KINGPIN

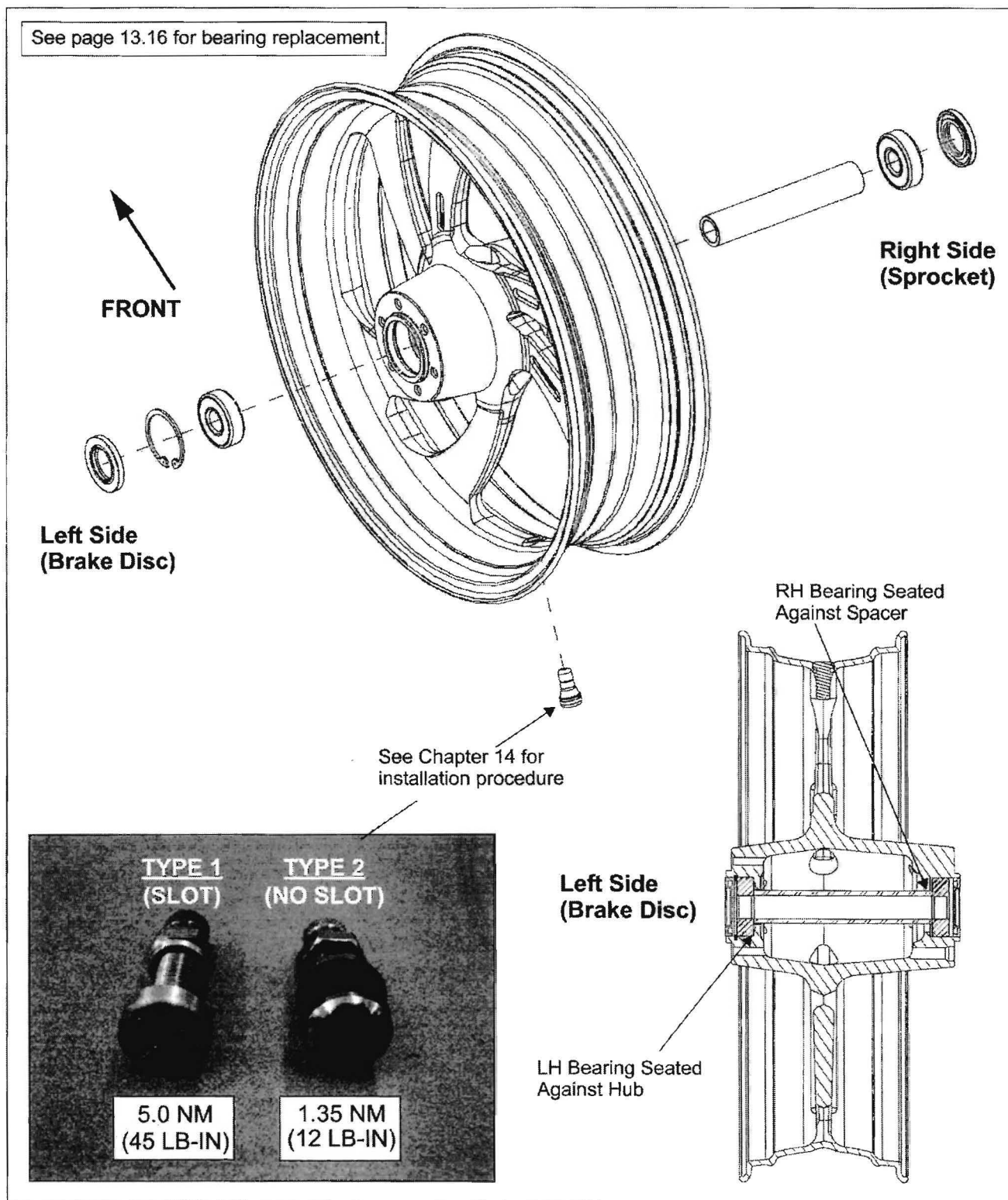


ASSEMBLY VIEW - REAR WHEEL (LACED) - HIGH-BALL



REAR WHEEL & SUSPENSION

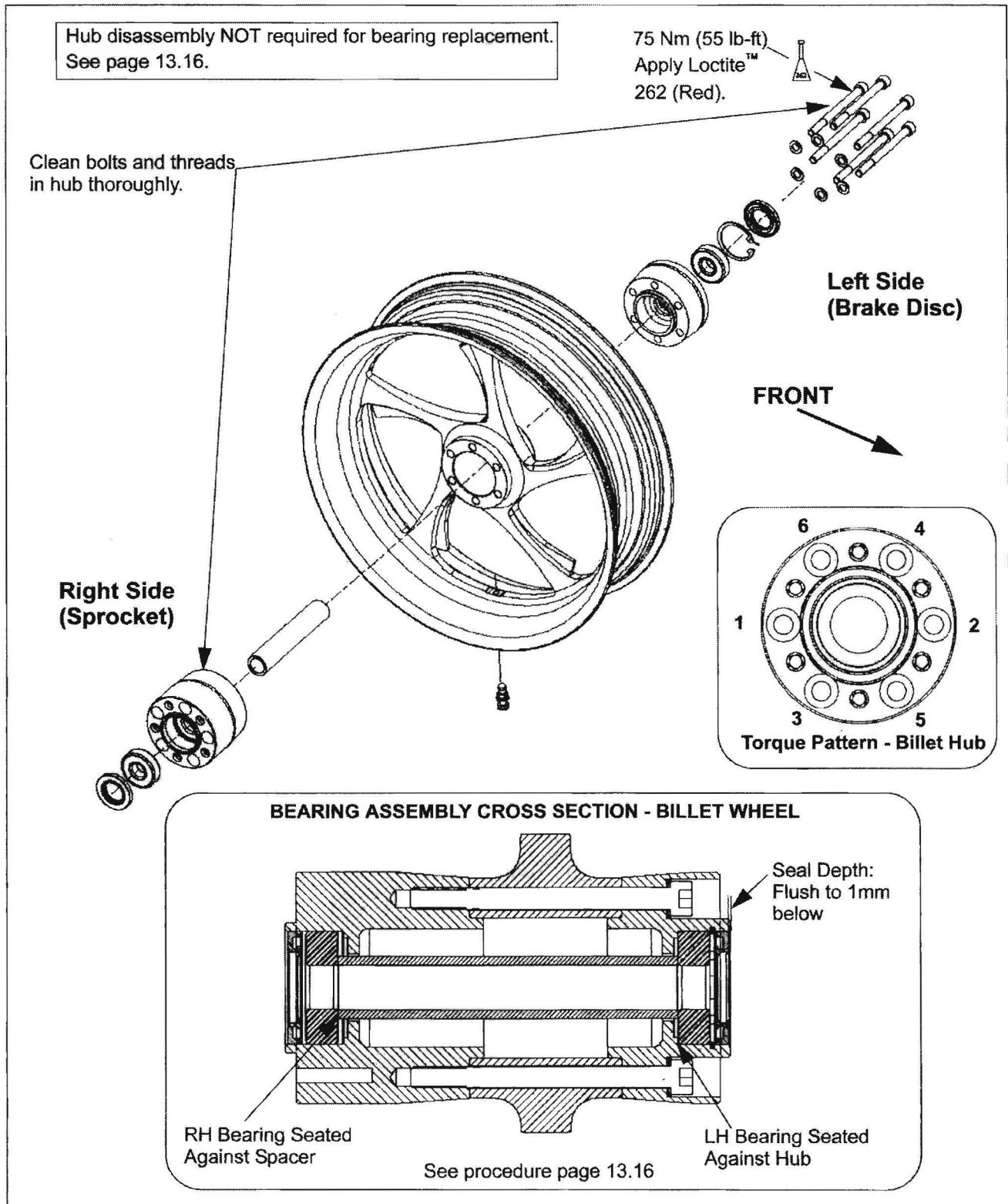
ASSEMBLY VIEW - REAR HUB (CAST) - VEGAS / KINGPIN



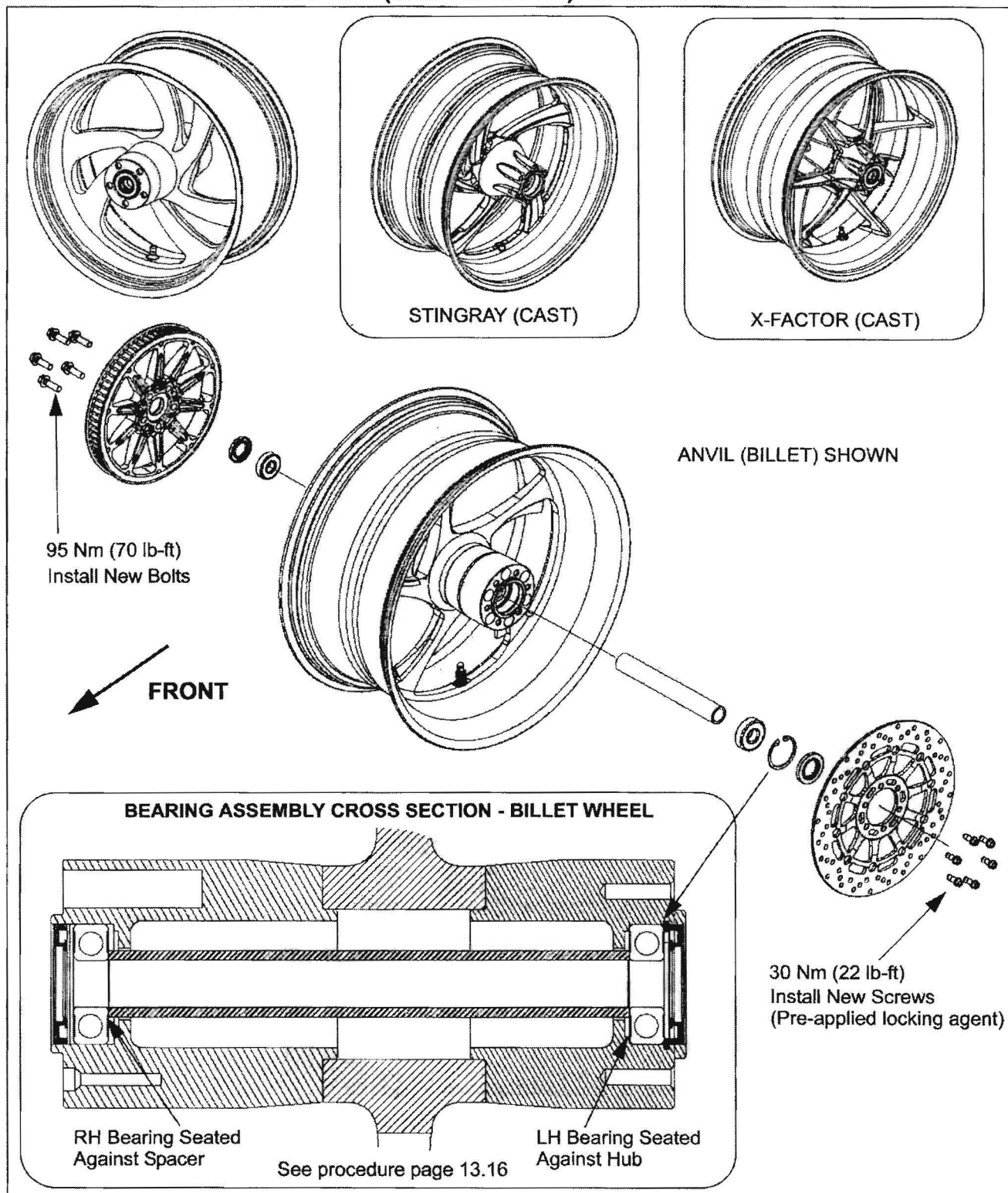
13.6



ASSEMBLY VIEW - REAR HUB (BILLET) - VEGAS / KINGPIN



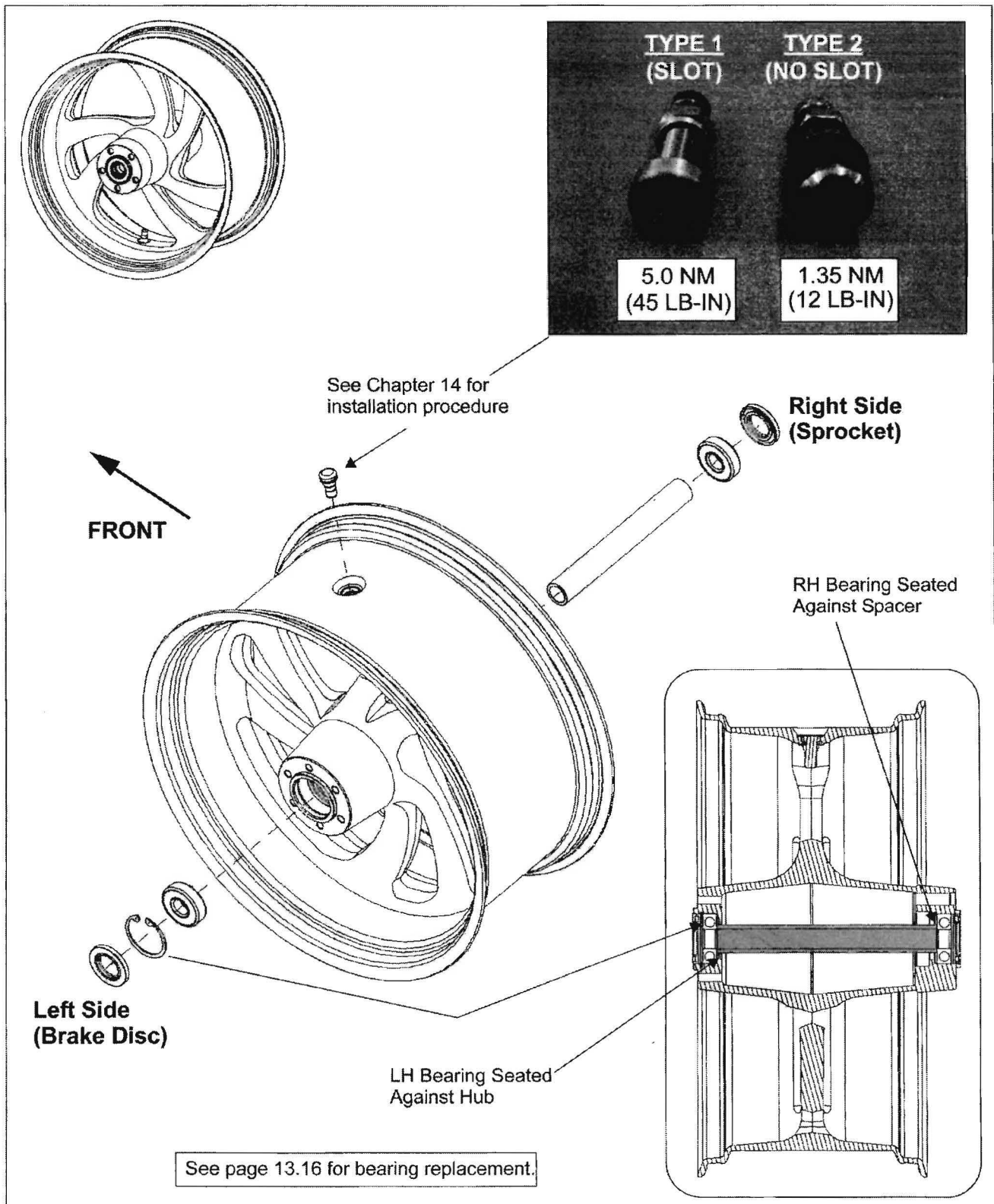
ASSEMBLY VIEW - REAR WHEEL (CAST & BILLET) HAMMER / JACKPOT



ASSEMBLY VIEW - REAR HUB (CAST) - HAMMER / JACKPOT

13.8





REAR WHEEL & SUSPENSION

ASSEMBLY VIEW - REAR HUB (BILLET) - HAMMER / JACKPOT

Hub disassembly NOT required for bearing replacement.
See page 13.16.

Ness Billet: 88 Nm (65 lb-ft)
Billet: 75 Nm (55 lb-ft)

Apply Loctite™
262 (Red).

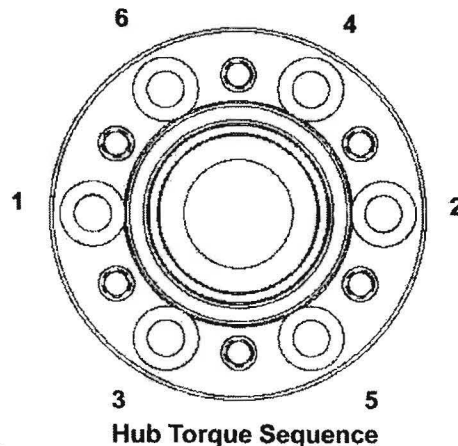
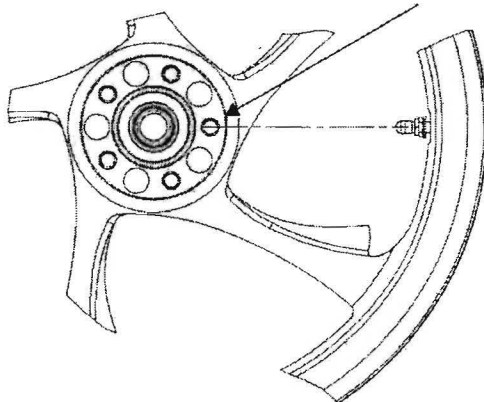
Clean bolts and threads
in hub thoroughly.

Left Side
(Brake Disc)

Right Side
(Sprocket)

No locking agent on
hub contact surfaces

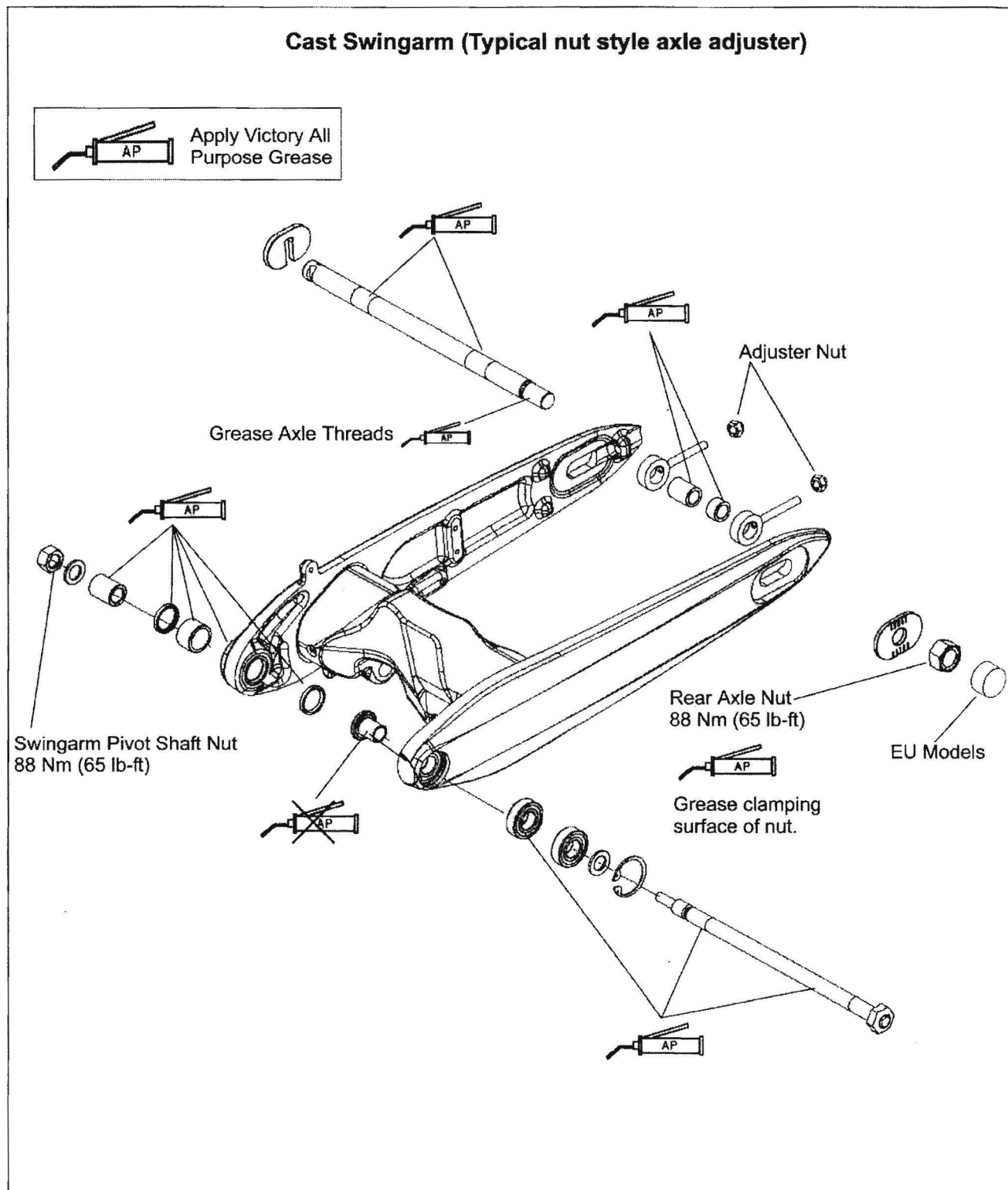
Assemble RH hub as shown with
threaded M12 hole in-line with valve stem.



13.10

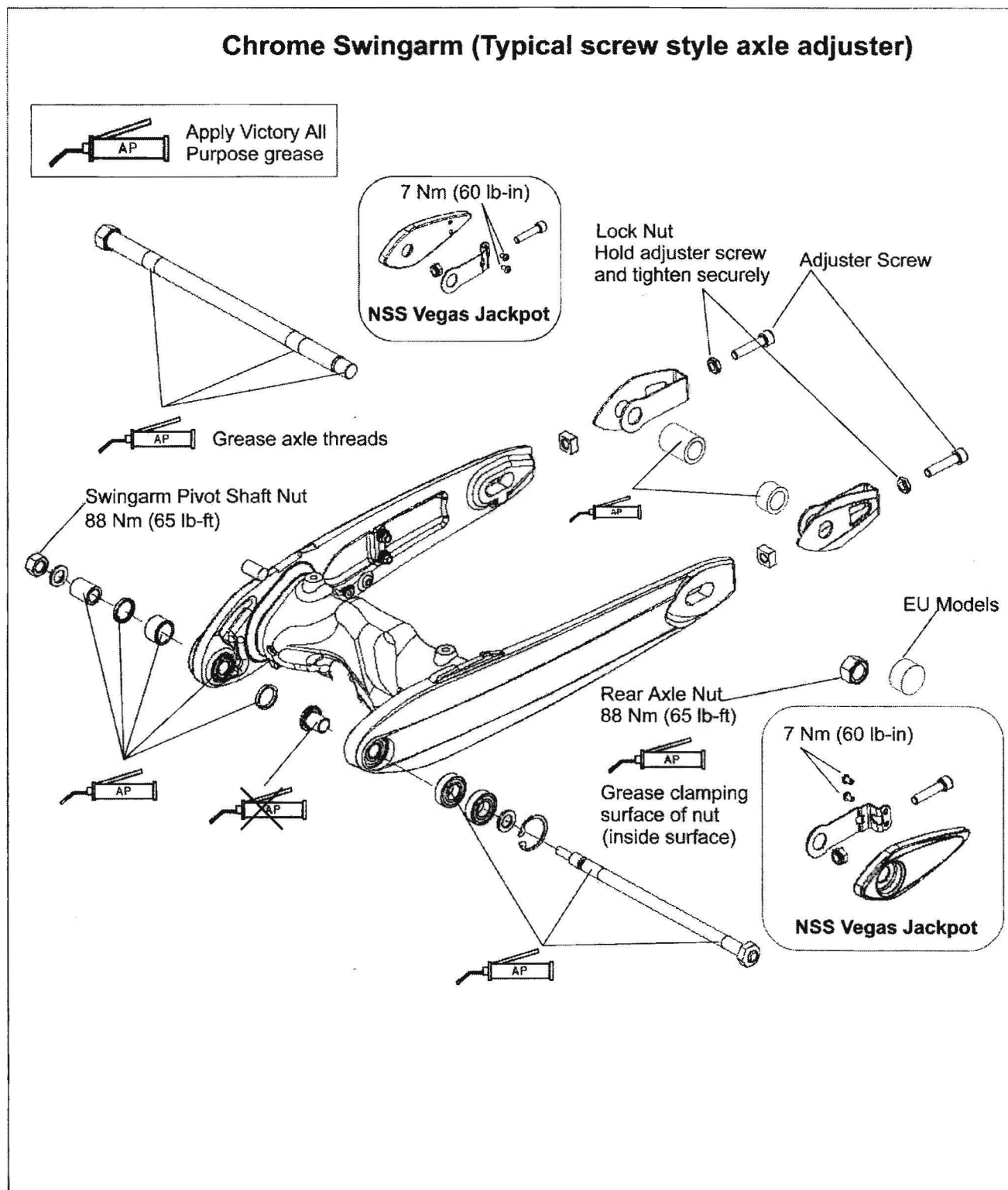


ASSEMBLY VIEW - SWINGARM (CAST) / REAR WHEEL / AXLE



REAR WHEEL & SUSPENSION

ASSEMBLY VIEW - SWINGARM (CHROME) / REAR WHEEL / AXLE



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REAR SHOCK SERVICE DATA

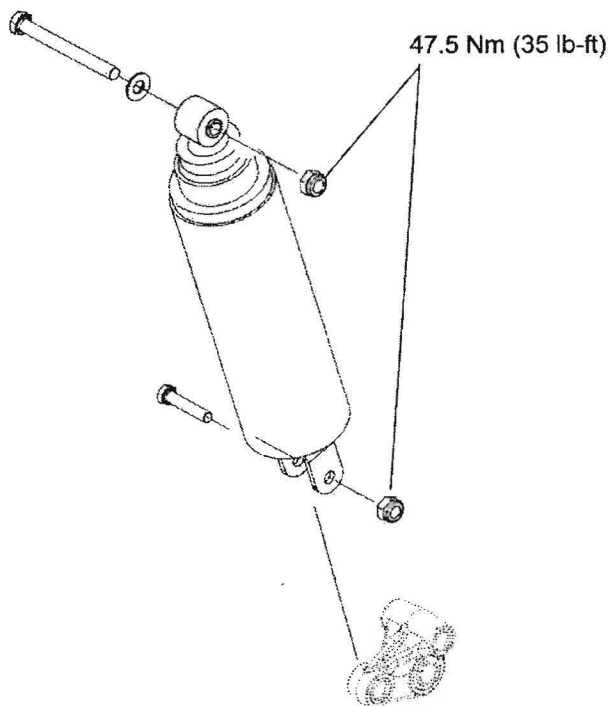
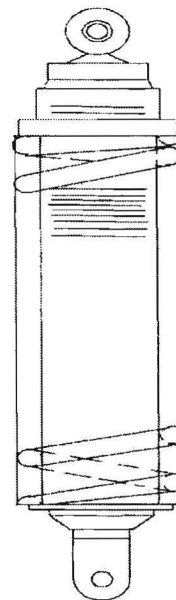
REAR SHOCK ABSORBER

THE REAR SHOCK IS NOT SERVICEABLE.

Do not attempt to de-pressurize or re-pressurize the shock.

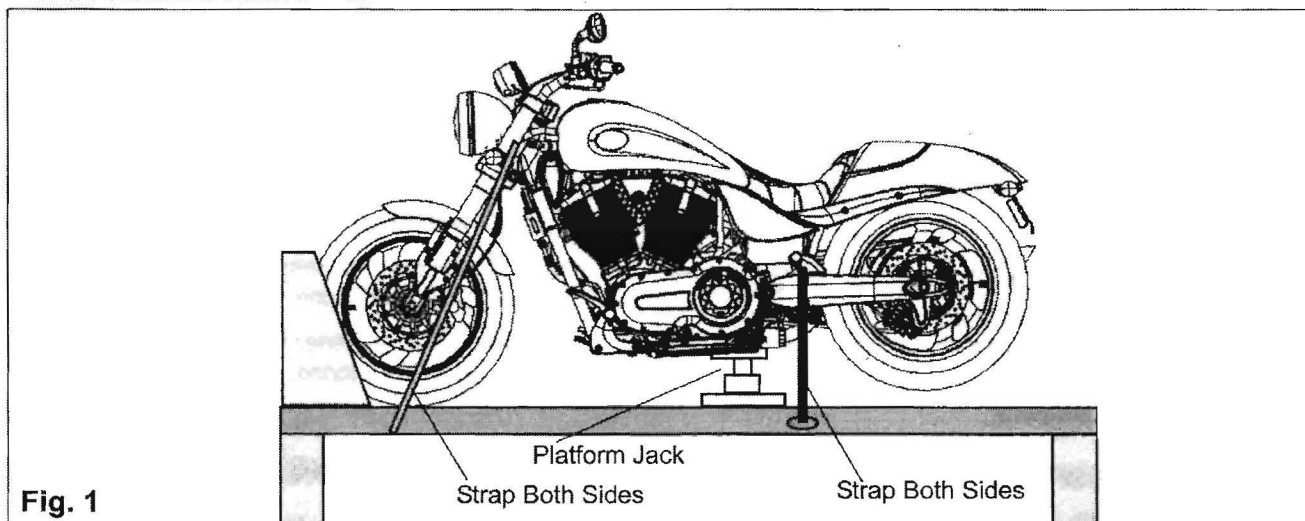
⚠ WARNING : The rear shock absorber contains nitrogen gas under high pressure. To prevent injury, do not disassemble, rebuild, puncture, or apply heat to the shock absorber.

Spring Installed Length: Perform Ride Height Adjustment (Chapter 2)



SERVICE PROCEDURES

REAR WHEEL REMOVAL



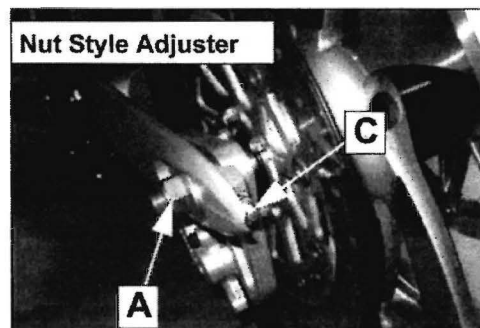
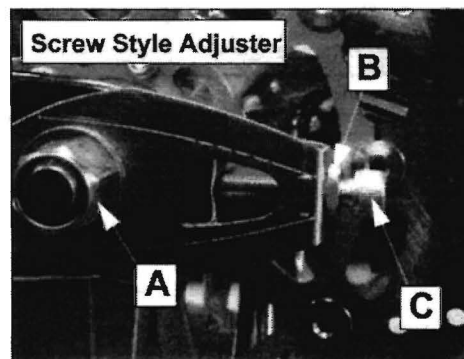
WARNING

Rear wheel removal involves supporting the machine with the rear end elevated. Take precautions so that the motorcycle is securely supported when the rear tire is off the ground. Severe personal injury or death can occur if the motorcycle tips or falls.

1. Secure motorcycle with rear wheel elevated (Fig. 1)
2. Remove belt guard.
3. Remove mufflers (Chapter 3).

NOTE: Muffler removal not required if axle has a removable plate on right side. These axles can be removed out the left side.

4. Euro Models Only: Remove axle nut cover.
5. **Screw Style Adjuster:** Remove axle nut (A). Loosen adjuster jam nut (B) on each adjuster.
Nut Style Adjuster: Loosen axle nut (A) about 5 turns. Tap axle to the right until plate is clear of swingarm. Remove plate.
6. Turn adjuster screws or nuts (C) OUT (counterclockwise) equally and push axle forward until belt is slack.



REAR WHEEL & SUSPENSION

7. Safely lift and support the rear of the motorcycle so tire is off the floor.
8. Tap axle out from left to right or draw axle out the left side on models with removable axle plate.
9. Lower rear wheel, disengage drive belt from rear sprocket and remove wheel from swing arm.
10. Secure brake caliper to swing arm with tie strap.

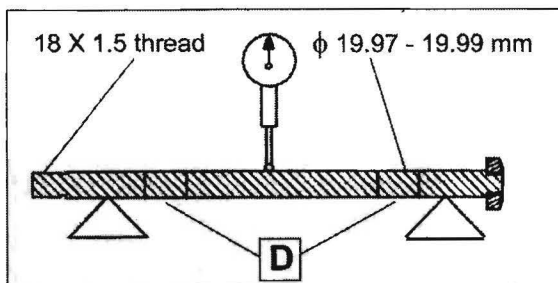
CAUTION

Do not hang rear brake caliper brake line or twist the brake line or damage may result.

NOTE: Do not apply rear brake pedal after the brake caliper has been removed.

REAR AXLE INSPECTION

1. Install rear axle in V-blocks and measure runout. Compare to service limit on page 13.3. Axle diameter should be measured on bearing surfaces at (D).



REAR WHEEL INSPECTION

NOTE: Wheel bearings must be in good condition.

1. Set up a dial indicator to measure axial and radial runout of the wheel. Refer to page 14.7 for procedure. Compare measurements to service limit on page 13.3.
2. Visually inspect wheel for cracks or other damage.
3. Replace wheel if it fails visual or measured inspection.
4. Inspect brake disc fastener torque (30 Nm / 22 lb-ft). Replace fasteners if loose.
5. Inspect sprocket fastener torque (95 Nm / 70 lb-ft). Replace fasteners if loose.

REAR WHEEL BEARING INSPECTION

NOTE: If possible, also inspect wheel bearings before removing the wheel from the vehicle. Do not remove bearings from wheel to inspect. Bearings cannot be repacked. Replace both bearings if one or both fail inspection, or if either bearing was removed.

1. Visually inspect integral bearing seal for damage.
2. Inspect bearing fit in wheel hub. The outer race of the bearing must fit tightly into the bore. You should not be able to move outer race by hand.
3. Slide axle into wheel and check for smooth rotation and tight fit.

NOTE: Due to extremely close tolerances, the bearings must be inspected visually, and by feel. Look for signs of discoloration, scoring, galling, or contamination from moisture or dirt. Replace bearings if any of the above are present. Turn the inner race of the bearings. The bearings should turn smoothly and quietly. The inner race should be firm with minimal side to side movement and no detectable up and down movement.



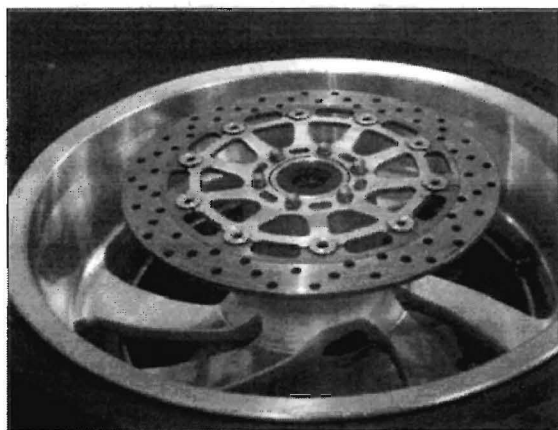
WHEEL BEARING REMOVAL (TYPICAL)

CAUTION

Do not reuse bearings that have been removed.

NOTE: Refer to instructions included with blind bearing removal tool. The procedure below is typical wheel bearing replacement procedure using Wheel Bearing Service Set PV-49462. Hammer and Jackpot models require the use of the long threaded shaft from Bushing and Bearing Service Set PV- 43515.

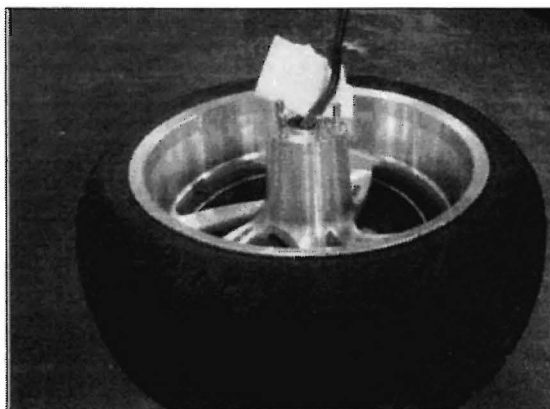
1. Remove brake disc (page 13.21).



2. Remove sprocket.



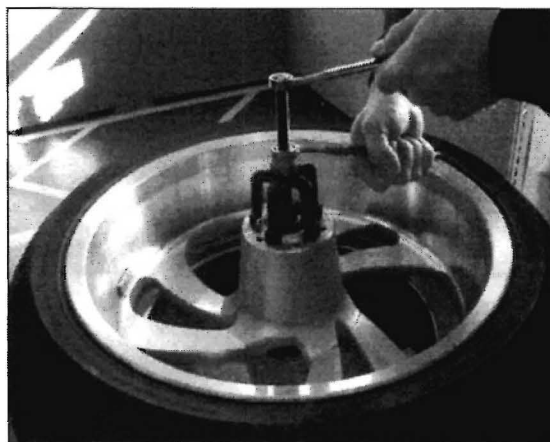
3. Protect hub. Pry seals out of hub on both sides.



4. Install bearing remover element into bearing. Tighten bearing remover until firm. Do not over-tighten or tool may be damaged.



5. Remove bearing.

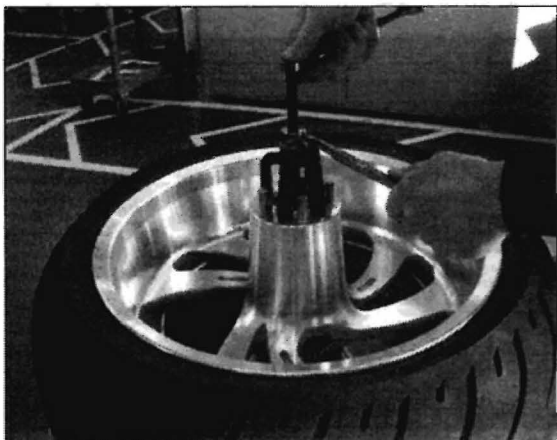


REAR WHEEL & SUSPENSION

6. Remove spacer.



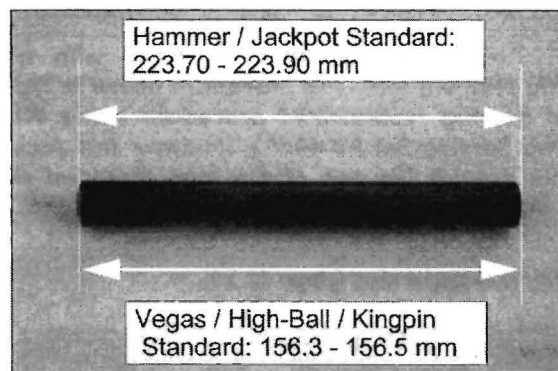
7. Remove retaining ring from disc side of hub.



8. Extract or drive bearing from sprocket side.

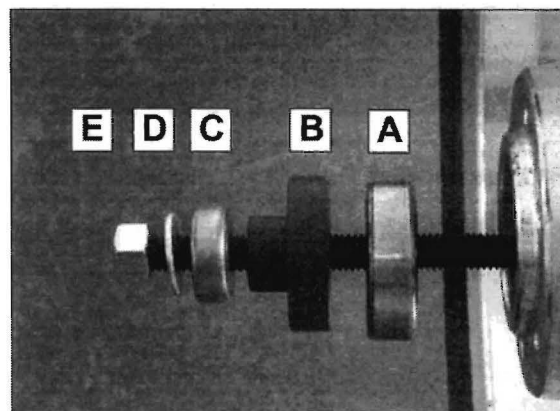
WHEEL BEARING INSTALLATION

1. Clean inside of wheel hub and bearing spacer. Replace spacer if worn beyond the service limit.



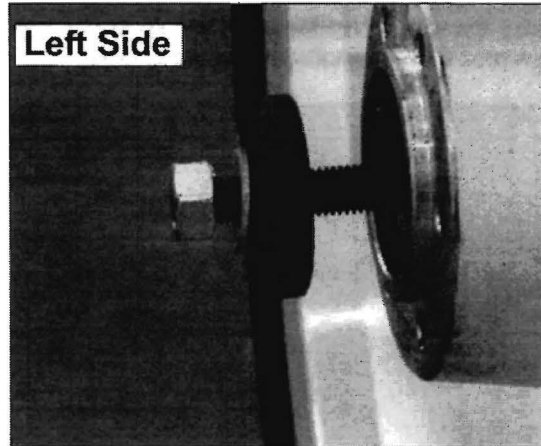
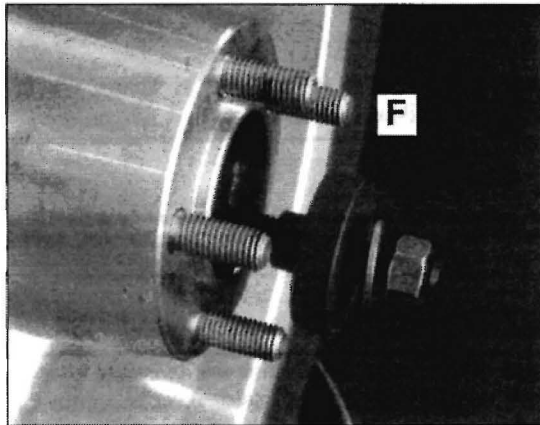
NOTE: Hammer & Jackpot models require the use of the long threaded shaft from Bushing and Bearing Service set PV-43515.

2. Place new bearing (A) into left (disc) side of wheel with markings facing out (toward outside of hub).

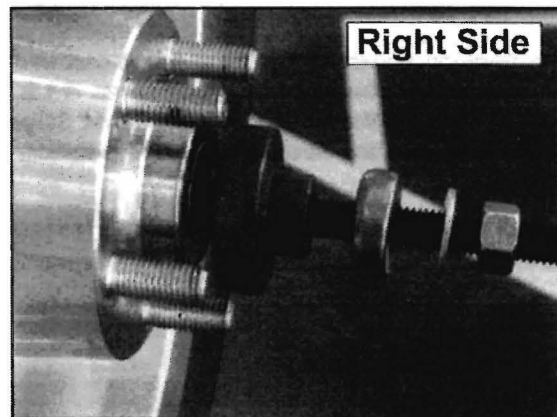


REAR WHEEL & SUSPENSION

3. Assemble tool with flat side of 50-51mm wheel bearing collar (B) against bearing. This tool must be slightly smaller than O.D. of bearing and must be flat to support both inner and outer race equally. DO NOT pull or press on inner race of ball bearings or bearing will be permanently damaged!
4. Install bearing (C), washer (D), and nut (E) on threaded shaft.
5. Install the other 50-51mm bearing tool (F) in bearing bore on right side of hub with flat washer and nut. Pull left bearing into hub by tightening nut on left side of tool until left bearing is fully seated in hub
7. Assemble tool through left side with backing disc (or bearing tool) flat against left bearing. Be sure the tool supports both inner and outer race.

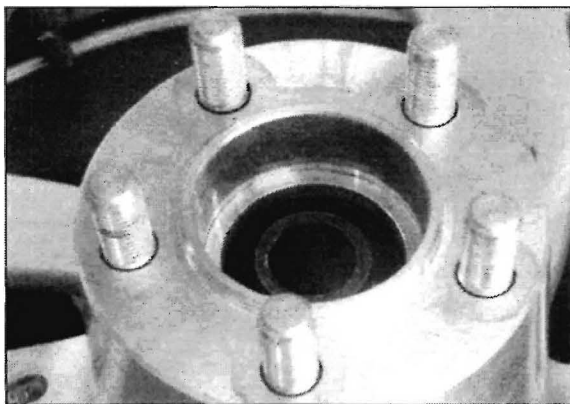


8. Place new wheel bearing on threaded shaft (markings out) and start it squarely in the hub.



NOTE: DO NOT install retaining ring at this time.

6. Turn wheel over and install bearing spacer. Be sure spacer is centered on bearing.



REAR WHEEL & SUSPENSION

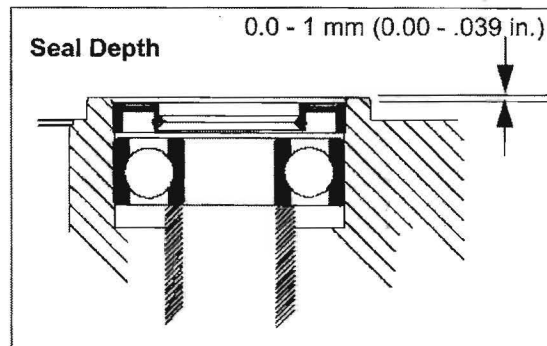
9. Install 50-51 mm wheel bearing installation tool with flat side against bearing, followed by tool bearing, flat washer, and nut.
10. Keep the wheel positioned as shown to keep spacer centered during installation of right bearing.



11. Pull bearing in to right side of wheel until seated against spacer.
12. Remove tool and check that the spacer is centered and firmly trapped between bearing inner races. **If it is not, center it using the front axle and repeat Steps 9 - 11 to fully seat the bearing against the spacer.**
13. Install retaining ring. Be sure retainer is fully seated in groove.



14. Install new seals using a 52 mm seal driver.



15. Rotate inner races of bearings to check for free, smooth rotation.
16. Install brake disc (page 13.21). Clean discs with Victory Disc Brake Cleaner.

CAUTION

Do not allow brake cleaner to contact painted surface.

WARNING

Grease or oil on the brake disc will increase stopping distance which may lead to loss of vehicle control or an accident.

17. Install rear sprocket (page 11.8).

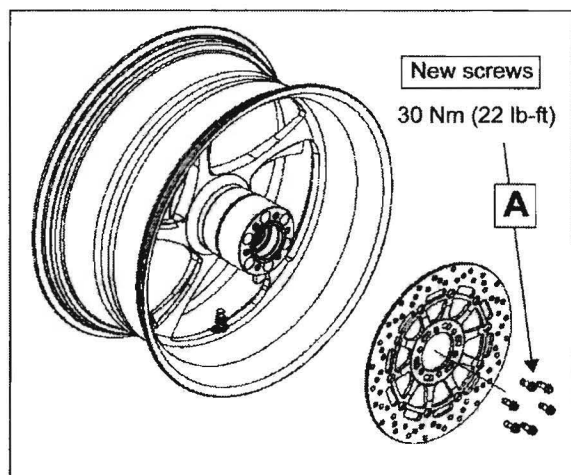


BRAKE DISC REMOVAL

1. Remove the rear wheel, referring to page 13.14.
2. Position wheel with brake disc facing up. Support wheel so as not to damage the belt sprocket.
3. Remove and discard brake disc screws (A).
4. Remove brake disc from wheel.

BRAKE DISC INSTALLATION

1. Clean bolt hole threads with Loctite Primer N.
2. Clean mating surfaces of disc and hub.
3. Install brake disc with part number to outside.
4. Install new brake disc screws and tighten in a star pattern to specified torque. Do not reuse brake disc screws. New screws have a pre-applied locking agent.



5. Install rear wheel. Refer to page 13.22.

REAR SPROCKET REMOVAL

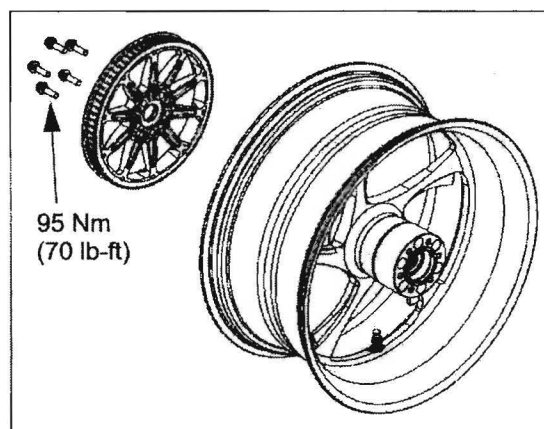
CAUTION

While working on the rear sprocket or wheel repair, take necessary steps to protect brake disc surface. Replace brake disc if damaged.

1. Securely support rear of motorcycle off floor.
2. Remove rear wheel. Refer to page 13.15.
3. Remove sprocket bolts and sprocket.
4. Remove rear sprocket from wheel.
5. Inspect rear sprocket and hub (page 11.8).

REAR SPROCKET INSTALLATION

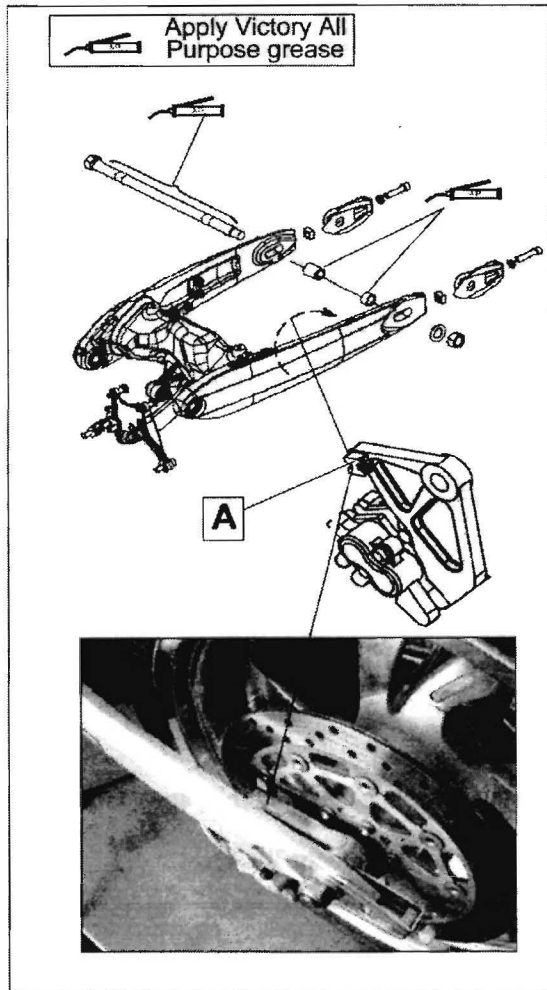
1. Clean sprocket bolt threads in hub to remove all grease or oil residue.
2. Clean mating surfaces of wheel and sprocket.
3. Install sprocket with new bolts. Do not reuse sprocket bolts.
4. Torque bolts in a star pattern to specified torque.
5. Install rear wheel (page 13.22).



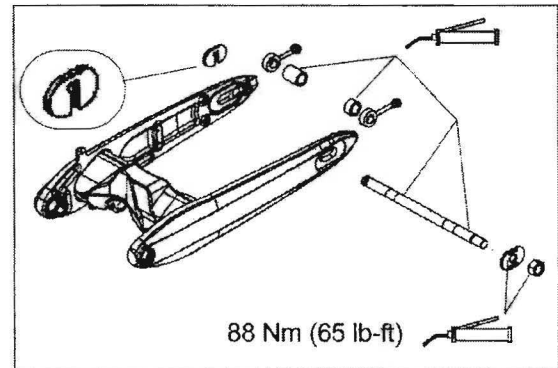
REAR WHEEL & SUSPENSION

REAR WHEEL INSTALLATION

1. Loosen axle adjuster screws or nuts equally to provide maximum belt slack.



2. Apply a thin film of grease to axle surface and threads.
3. Apply grease to seals in rear wheel.
4. Insert long spacer on sprocket side and short spacer on disc side of wheel.
5. Place caliper bracket tab (A) in slot on left side of swingarm.
6. Insert wheel assembly between swingarm, guiding brake disc between brake pads.
7. Install belt around rear sprocket.
8. **SCREW STYLE ADJUSTERS:** Start axle through right side swingarm and axle adjuster, through RH spacer and into wheel. Push axle in through entire wheel assembly, LH spacer, caliper bracket, and left side axle adjuster. Be sure the tab of caliper bracket is still engaged in slot on left side of swingarm.
9. **NUT STYLE ADJUSTERS:** Start axle through left side swingarm and axle adjuster, through caliper bracket, left spacer, and into wheel. Push axle in through entire wheel assembly, right wheel spacer and right axle adjuster and right side of swingarm until plate can be installed in slot of axle (with wheel alignment marks on plate facing OUT). Tap or pull axle back toward left side until plate is engaged in swingarm.
10. Grease axle nut and contact surface of axle plate.
11. Install washer and axle nut (if removed).
12. Be sure the tab of caliper bracket is still engaged in slot on left side of swingarm.
13. Tighten axle nut until seated and back off one full turn.
14. Adjust belt tension and wheel alignment (Chapter 2).
15. Torque rear axle nut to 88 Nm (65 lb-ft). On Euro models install axle nut cover and tighten set screw to 2.0 Nm (18 lb-in).
16. Apply rear brake pedal 2-3 times to position brake pads. If brake bleeding is necessary, refer to Ch 15.
17. Release brake pedal and turn rear wheel by hand. Inspect for smooth, free rotation without binding or brake drag. If drag is evident, inspect assembly and repair.
18. Install mufflers (Chapter 3).
19. Lower the motorcycle and test drive to ensure proper operation.



SHOCK ABSORBER REMOVAL

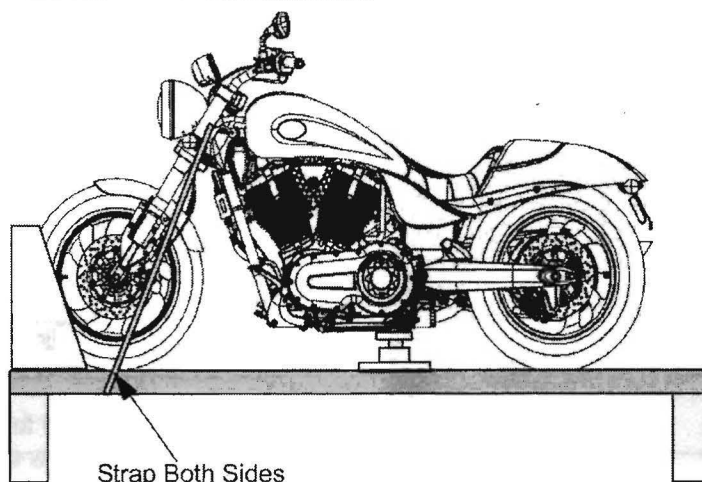
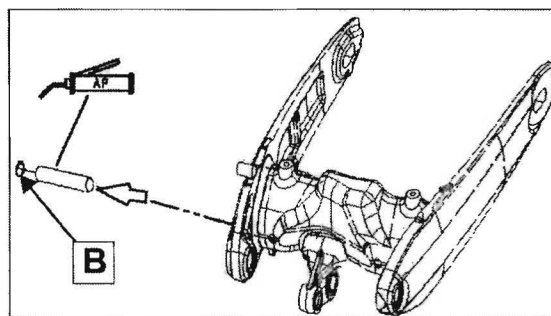
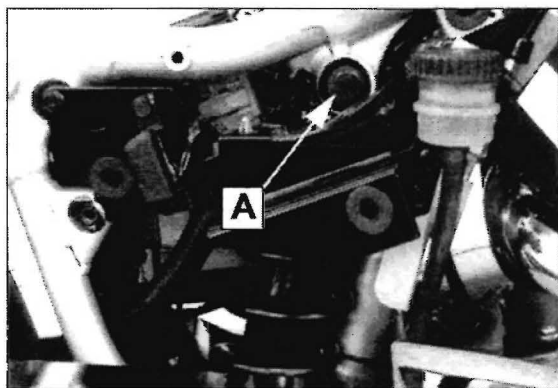


Fig. 1

WARNING

Shock absorber removal involves supporting the machine with the rear end elevated. Take precautions so that the motorcycle is securely supported when the rear tire is off the ground. Severe personal injury or death can occur if the motorcycle tips or falls.

1. Place motorcycle on lift table and secure front tire in the wheel vise. Stabilize the motorcycle with straps on both left and right sides. (Fig.1)
2. Remove seat & side covers.
3. Remove fuse box from mounting bracket to expose upper shock bolt (A).
5. Place a wide-based platform jack under rear of engine. Elevate the jack slightly until weight is removed from shock mounting bolts.
6. Remove snap ring (B) from pivot pin bore on right side of swingarm with a 45° internal snap ring pliers.

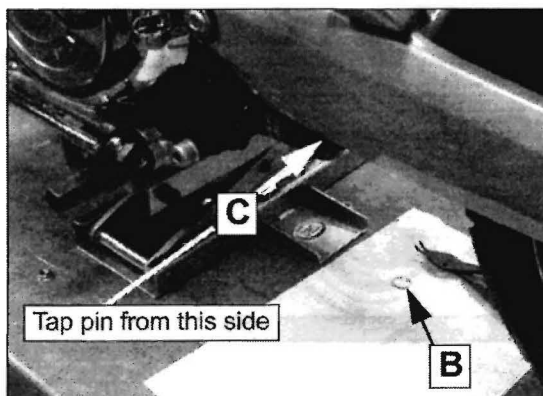


4. Loosen upper and lower shock mounting bolts and remove the nuts.
7. Remove bottom shock mounting bolt.



REAR WHEEL & SUSPENSION

8. Drive pivot pin out of swingarm / suspension link from the left side (C) as shown in photo below. Allow suspension link to drop out.



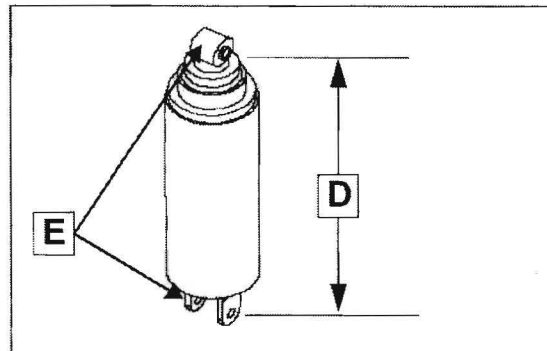
9. Remove top shock bolt.
10. Lift rear end of motorcycle slightly with jack until shock can be removed out the bottom.

SHOCK ABSORBER INSPECTION

WARNING

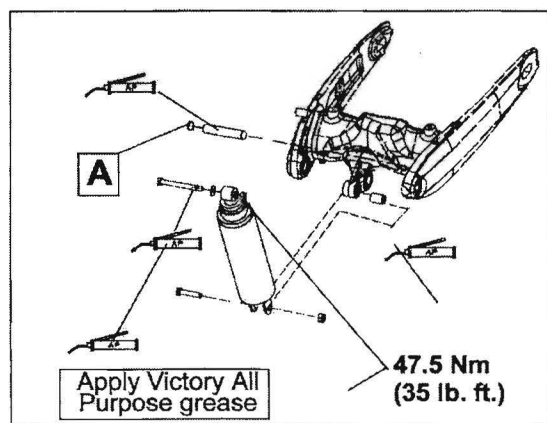
The rear shock absorber is gas pressurized and not rebuildable. DO NOT attempt to de-pressurize, disassemble, or service the shock.

1. Measure spring installed height (D) and record so ride height adjustment can be returned to rider's preference.
2. Lubricate spring collars and loosen completely.
3. Remove and thoroughly clean the shock spring.
4. Inspect shock for signs of oil seepage around the shaft seal. If leakage is suspected replace the shock absorber assembly.
5. Inspect eyelets (E) for cracks or damage. Replace shock if either eyelet is cracked.
6. Inspect damper rod for corrosion, pitting, or damage. Replace shock if any of the above is evident.
7. With shock upright, move damper rod through entire travel range. Damper rod should move smoothly with consistent damping through the entire travel range, and return to the fully extended position when released. Replace shock if damping is inconsistent, or if gas leakage has occurred and the damper rod does not fully extend when released.
8. Inspect shock spring for cracks or distortion. Measure free length and compare to specification on page 13.3.
9. Install spring, adjuster nut, and adjuster jam nut.
10. Adjust spring to the distance recorded in Step 1.
11. Install shock (page 13.25).
12. Be sure ride height measurement is within specified range after installing the shock (page 2.35).



SHOCK ABSORBER INSTALLATION

1. Grease all pivot points indicated below.
2. Lift shock into position and install top shock bolt with washer from right to left, and install nut.
3. Lubricate and install pivot pin through right side of swingarm.
4. Lift suspension link and align with swingarm and pivot pin bore in swingarm.
5. Tap pivot pin from right side of swingarm through suspension link and into left side of swingarm until fully seated.
6. Install a new snap ring (A) in swingarm with machined (flattest) edge facing out (toward right side). Be sure snap ring is seated properly in the groove.
7. Raise or lower motorcycle slowly as needed to align lower shock mount with suspension link.
8. Install lower shock bolt from right to left and install nut.
9. Torque shock bolts (nut side) to specification.

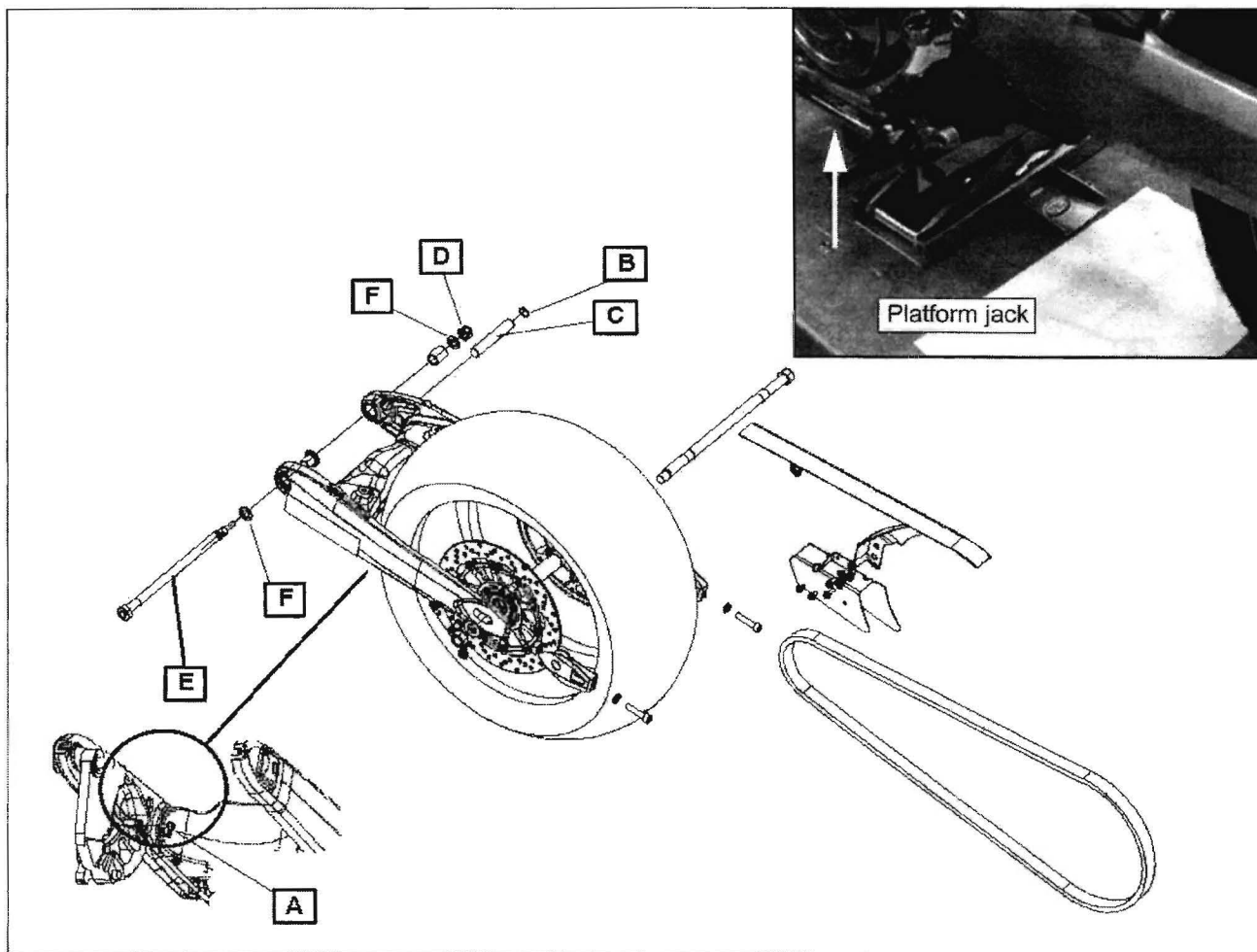


REAR WHEEL & SUSPENSION

SWINGARM

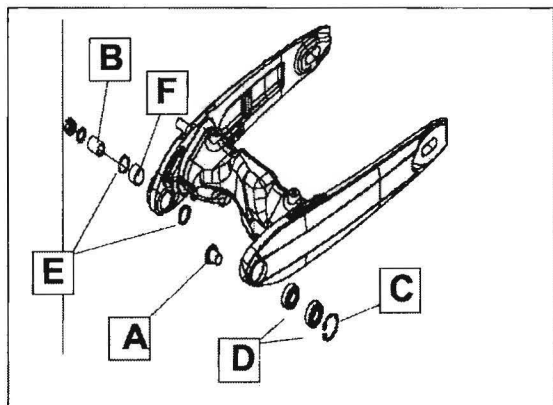
SWING ARM REMOVAL

1. Remove exhaust system (page 3.10).
2. Place a wide-based platform jack under rear of engine. Elevate the jack slightly until weight is removed from suspension / swingarm linkage.
3. Remove rear wheel assembly (page 13.15).
4. Remove belt guards (page 11.4).
5. Remove brake line guide from left-hand side of swingarm (A).
6. Remove internal snap ring (B) from swingarm on right side using a 45° snap ring pliers.
7. Drive pin (C) out from left to right through access hole in lower left side of swingarm using a pin punch.
8. Remove swingarm pivot shaft nut (D) and shaft (E). Collect the two washers (F).



SWING ARM BUSHINGS / BEARING REPLACEMENT

1. Remove bushing (A) from left side of swingarm.

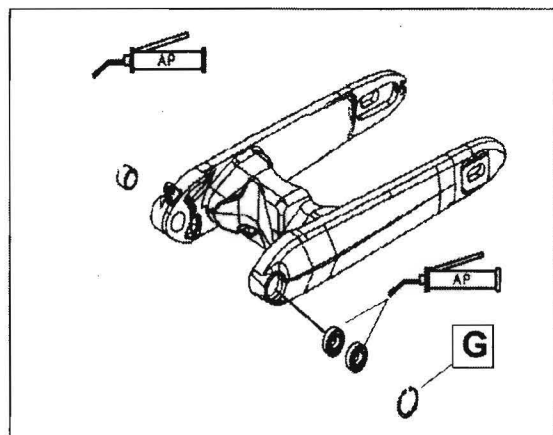


2. Remove sleeve (B) from right side of swingarm.
3. Remove snap ring (C) and drive bearings (D) out from inside to outside.

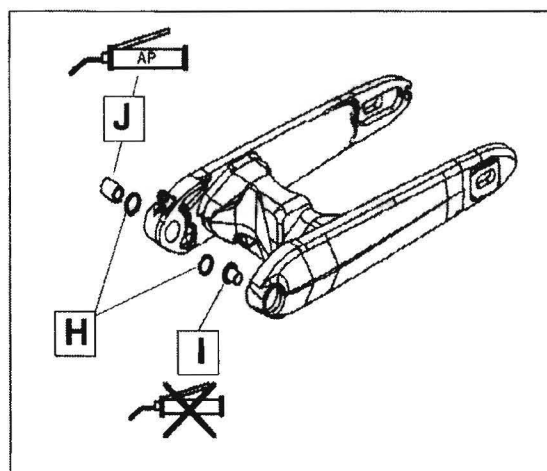
CAUTION

Do not reuse bearings that have been removed.

4. Remove seals (E) and bearing (F) from right side of swingarm.
5. Support the inside left edge of the swingarm.



6. Grease outside surface of new bearings and press into bore until seated, using a 41.5mm drive adapter or a suitable arbor. Press on the OUTER RACE only.
7. Install snap ring (G) and be sure it is seated properly in groove.
8. Support inside right edge of swingarm.
9. Grease surface of a new bearing and press into bore until centered. Use a 31.5mm drive adapter or a suitable arbor.
10. Apply grease to inner lip of seals (H) and install seals flush with outside of swingarm.



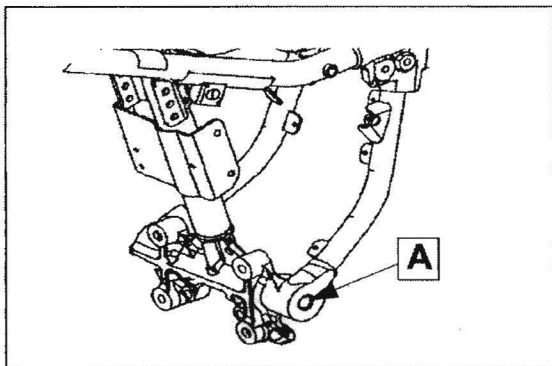
11. Install bushing (I) into left side of swingarm. Left side bearings are pre-lubricated. Do not apply grease to this bushing.
12. Grease right side bearing sleeve (J) and install with a twisting motion until centered in the seals and bearing.

13

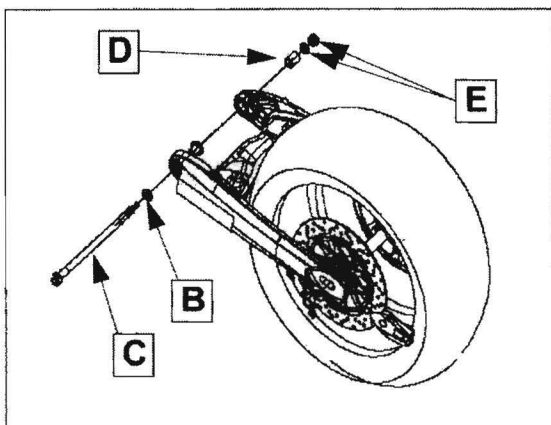


SWING ARM INSTALLATION

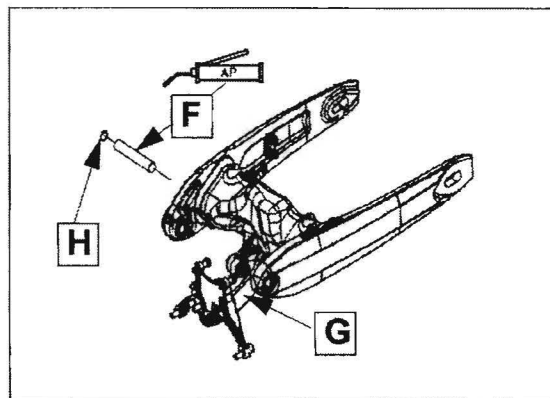
1. Clean inside of swingarm shaft bore in frame (A).



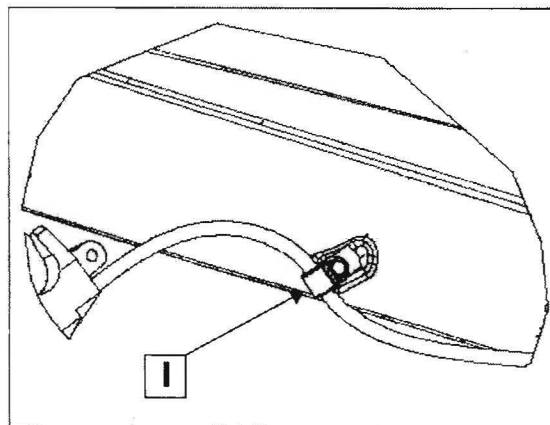
2. Grease swingarm pivot shaft.
3. Install left side washer (B) onto pivot shaft (C).
4. Place swingarm assembly (bearings and seals installed) in position on frame.
5. Install pivot shaft (C) from left to right through swingarm bushings and frame. Be sure right-hand sleeve (D) is in place and does not get pushed out of swingarm when shaft is installed.
6. Install right side washer and nut (E). Torque nut to 65 ft. lbs. (88 Nm).



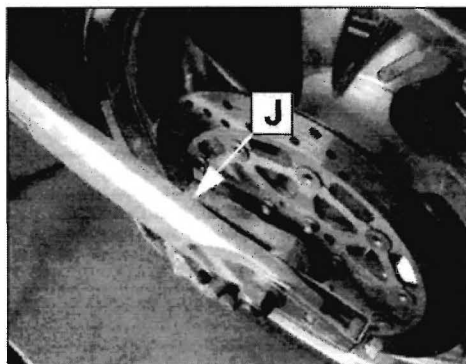
7. Move swingarm through travel range to be sure it pivots smoothly and freely.
8. Lubricate and install pin (F) through rearmost swingarm pivot and suspension rocker (G). Move swingarm and rocker as required to align.
9. Install a new retaining ring (H) with machined edge (flattest) facing out (toward right side). Be sure snap ring is fully seated in the groove.



10. Install rear brake line clamp (I) and torque screw to 8 ft. lbs. (10.8 Nm).



11. Locate caliper bracket in slot on the swingarm (J).



12. Install rear wheel assembly (page 13.22).
13. Install belt guards, exhaust bracket and mufflers.
14. Raise rear of motorcycle again and check to make sure that the following applies:
 - The rear wheel turns freely, without any interference between the belt guard, the tire, and the swingarm.
 - Brake line is properly routed and secured.
 - The left and right axle adjusters are aligned properly (wheel is in alignment).
 - The rear brake functions properly. It is critical that the peg on the caliper mount rides inside the channel in the swingarm. If brake pedal does not feel firm refer to Chapter 15 for brake inspection and bleeding procedure.
 - All fasteners have been tightened correctly.
 - There is adequate clearance between swingarm and exhaust mufflers and mounting.
 - The swingarm is not loose, it doesn't wobble from side to side, and it doesn't move up and down more than 1/32 of an inch when pushed and pulled firmly.
15. Test ride motorcycle to be sure rear suspension operates smoothly without binding or abnormal noises.
16. Adjust ride height (page 2.36).



TROUBLESHOOTING

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REPAIR RECOMMENDED
Rear Wheel Feels "Loose" or Wobbles	Loose fasteners	Torque to specifications
	Distorted (bent) rear wheel	Replace wheel
	Worn or damaged wheel bearings	Replace wheel bearings
	Worn or damaged swing arm bushings.	Replace swing arm bushings
	Damaged or incorrect rear tire	Replace rear tire
	Unbalanced rear wheel assembly	Balance tire/wheel
	Low tire pressure	Inflate to specification
	Loose swing arm, axle or suspension fasteners.	Torque to specifications
PROBLEM	POSSIBLE CAUSE	REPAIR RECOMMENDED
Rear Suspension Too Hard	Incorrect preload adjustment	Adjust to rider & load
	Bent shock damper rod	Replace shock
	Damaged or corroded suspension mount bushing	Correct as necessary
	Damaged or corroded swingarm bushings	Replace
	High tire pressure	Deflate to specification
	Drive belt adjustment too tight	Adjust drive belt tension
Rear Suspension Too Soft	Incorrect preload adjustment	Adjust to rider & load
	Leaking	Rebuild or replace shock
	Weak shock spring	Replace shock spring
	Excessive load placed on motorcycle	Educate consumer
	Low tire pressure	Inflate to specification
Rear Suspension Noisy	Loose fasteners	Torque to specifications
	Worn wheel bearings	Replace
	Worn swing arm bushings	Replace
	Damaged shock absorber	Replace as necessary
Wheel Drags (Turns Hard)	Incorrect drive belt adjustment	Adjust drive belt tension
	Brake problem	Refer to chapter 15
	Loose fasteners	Torque to specifications
	Bent rear axle	Replace
	Damaged wheel bearings	Replace
	Tire contact with object or chassis	Determine point of contact and correct



CHAPTER 14

TIRE INFORMATION

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TIRE INFORMATION

GENERAL / SAFETY

WARNINGS / PRECAUTIONS

WARNING

If a consumer wishes to replace the Original Equipment Manufacturer (OEM) tires with another brand of tire, Victory recommends contacting the tech-line department of the tire manufacturer being considered to ensure compatibility. Victory makes no other recommendation other than the OEM tires. Tires other than OEM may or may not adversely affect the handling characteristics of the motorcycle or may not have adequate clearance between tire and various parts of the motorcycle.

WARNING

Victory motorcycles are produced using the designated tires listed as original equipment. This includes field testing to ensure stability and superior handling. The use of tires other than original equipment may cause instability which can lead to a crash resulting in serious injury or death. Use only the recommended tires inflated to the recommended tire pressures.

Operating the motorcycle with damaged rims creates a safety hazard including air pressure loss, steering imbalance and/or reduced steering control. Do not attempt to repair or straighten damaged rims.

The use of tire valves and valve cores other than original equipment replacement Victory parts could cause tire deflation during driving. Always use genuine Victory parts or their equivalent. Be certain to install the valve stem caps securely. Do not allow the motorcycle to be ridden without properly installed valve stem caps.

WARNING

Do not attempt to repair tires that have:

- Punctures with a diameter of greater than 6mm (0.240").
- Cuts with a length of greater than 6mm (0.240").
- Any punctures or cuts on the sidewall of the tire.
- Tread depth of less than 1.6mm (.063") for the front tire.
- Tread depth of less than 1.6mm (.063") for the rear tire.
- Ply separation
- Tread separation
- Severe tread cupping.
- Cuts, gouges or scratches on the sealing surface of the bead.
- Flat spots on the tread.
- Bubbles, separation or any unusual damage to the inner liner of the tire.
- Chemical sealants or balance additives added to the tire.

WARNING

All repairs must be made from inside the tire. Victory recommends the use of "head-type" plugs such as: Tech *Tire Repair*TM Uni-Seals. Complete Tech *Tire Repair*TM kits are commonly available at most automotive parts outlets.

WARNING

No form of temporary repair should ever be attempted. Secondary damage caused by a penetrating object may not be detected and tire or tube deflation may occur at a later date.



⚠ WARNING

It is dangerous to ride with a worn tire. When a tire reaches the minimum tread depth listed below, replace the tire immediately.

FRONT TIRE MINIMUM TREAD DEPTH	REAR TIRE MINIMUM TREAD DEPTH
1.6 mm (.063") (1/16 inch)	1.6 mm (.063") (1/16 inch)

⚠ CAUTION

Two of the biggest factors contributing to premature tire wear are overloading and under-inflation. Do not deviate from the specifications for loading or inflation.

TIRE DATA**Tire Pressure / Loading Information**

Refer to the Tire Information label on the motorcycle for tire pressure or page 1.17.

The Manufacturer Information Label (page 1.17) also provides tire type and load range information.

WHEEL DATA**Wheel Specifications**

Refer to Chapter 12 (Front Wheel and Suspension) or Chapter 13 (Rear Wheel and Suspension) for wheel specifications.

SPECIAL TOOLS**SPECIAL TOOLS**

Tire changing machine (commercially available - follow manufacturer's instructions).

For manual tire changing described in this chapter:

Rim Protectors: PV-43536

Tire Irons (commercially available)



TIRE INFORMATION

TIRE INSPECTION

TIRE WEAR PATTERNS & GENERAL CAUSES

WEAR PATTERNS AND GENERAL CAUSES	
SYMPTOM	CAUSE
Wear on Left Side	Riding on Crowned Roads
Edges Worn	Underinflation or Excessive Loads
Excess Wear in the Middle of Tire	Over-inflation or Tire Abuse
Cracks in Tread Grooves	Underinflation, Excessive Loads, Suspension Bottoming
Tread Block Cupping (Usually Front Tire -See Below)	Normal Braking Wear

OZONE CRACKING

Ozone cracking usually shows up on the sidewalls of tires and is caused by sunlight, electric motor emissions, smog, or other environmental factors. Ozone cracking does not pose a problem unless the cracks reach the cords. If this occurs, moisture may penetrate the carcass of the tire causing cord separation. Tires showing signs of severe ozone cracking (cords visible at the bottom of the cracks) must be replaced.

FRONT TIRE CUPPING

Front of tread block worn more than rear of tread block:

- The cupping of front tires is somewhat normal.
- Rear tires are subjected to forces in both directions. The forces of braking and acceleration result in even tire wear.
- Front tires are subjected only to the forces of braking. When the brakes are applied, tire deflection is increased and wear occurs in only one direction.
- Incorrect tire pressure is the number one cause of excessive tire cupping. Too little tire pressure causes the tire to over-deflect which increases the amount of scrubbing and causes more tire cupping.
- Binding or improperly assembled front forks can also contribute to excessive tire cupping. If the front forks do not react as they should the tire acts as the sole suspension component and tread deflection increases.



TIRE CHANGING

GENERAL

There are three generally acceptable methods to dismount and mount a tubeless motorcycle tire from its rim. For each of the three methods, there are countless variations.

The three general methods are:

- Pneumatic or electrically operated tire machine
- Manually operated tire machine
- Manual manipulation of tire irons

The seal between the tire and rim is one of the most critical factors that contribute to the safe operation of the wheel/tire assembly. Victory permits and recommends all three of the general methods, but realizes that careless or improper work habits can damage both the tire and rim no matter which method is used. With any of the methods, care must still be taken to avoid damaging the rim, tire, inner tube, brake disk, or sprocket.

The pneumatic or electrically operated tire machine is preferred because it is the most efficient method to dismount and mount tires.

The manually operated tire machine is the next preferred method. It can be just as efficient as a power assisted tire machine but with some of the machines it may be necessary to remove the belt driven sprocket in order to gain sufficient clearance for tire removal.

Manual manipulation is the least preferred method since it will generally not deliver the same efficiency as the other methods and greater care needs to be taken when performed. Care must be taken when using tire irons to not damage or stress the tire bead. Also, the opposite bead needs to be in drop center of wheel during mounting and dismounting of the tire.

Be very careful not to damage the rim, tire, inner tube, brake disk or sprocket regardless of which method is used.

The following method describes the procedure using manually manipulated tire irons. Other than the actual operation of various tools, the general concept is the same regardless of which method is used.

The following procedure shows the front tire being removed from its rim. Other than the possibility of interference of the sprocket, the procedure is the same for the rear tire.

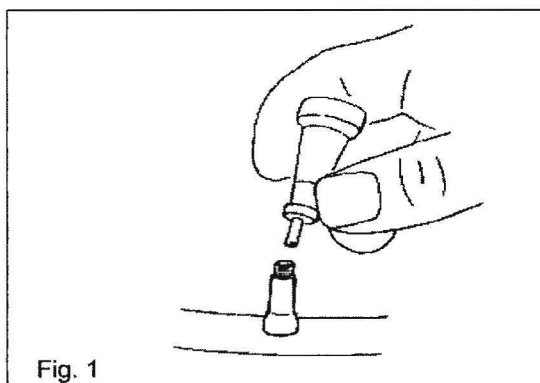
NOTE: Brake rotor bolts have a pre-applied locking agent and bolts should be replaced upon assembly. Refer to Chapter 11 for rear sprocket removal and installation. Refer to Chapter 13 for rear brake rotor removal and installation. Brake rotor bolts should not be reused.



TIRE REMOVAL

TIRE REMOVAL (TYPICAL)

1. Remove wheel / tire assembly from motorcycle (front refer to Chapter 12, rear refer to Chapter 13).

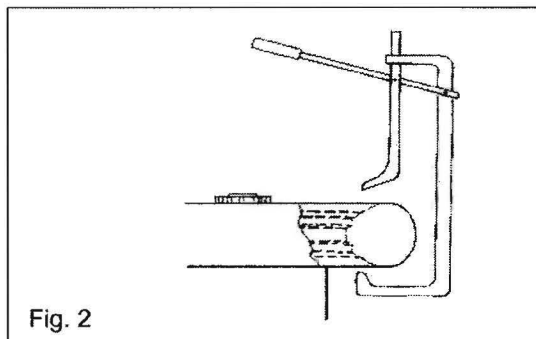


2. Remove valve core from valve stem and let all air escape. (Fig. 1)

CAUTION

If the tires have a directional arrow it must be observed and the tire installed correctly.

3. Mount the wheel assembly into a tire bead breaker and break the bead. (Fig. 2)

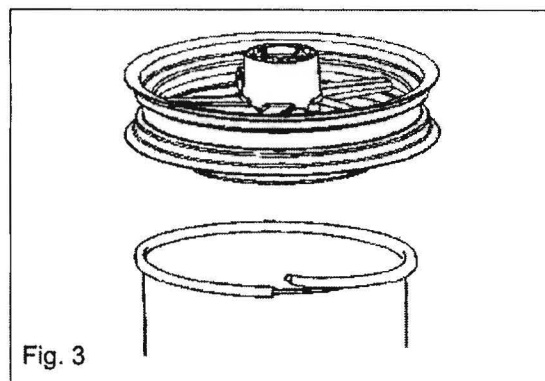


4. Flip the wheel assembly over and break the bead on the other side.

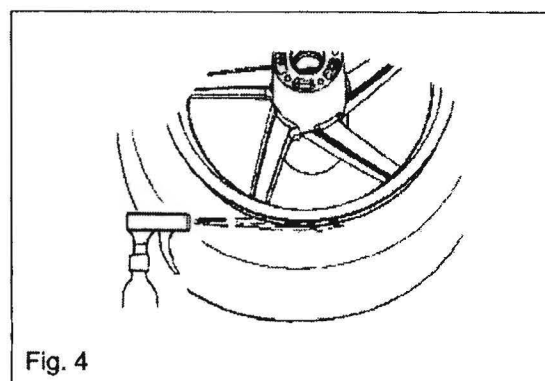
CAUTION

IMPORTANT: Take great care not to bend or otherwise damage the brake disc and/or belt driven sprocket. If the bead breaker being used interferes with either the brake disc and/or belt driven sprocket, remove the disc or sprocket as required.

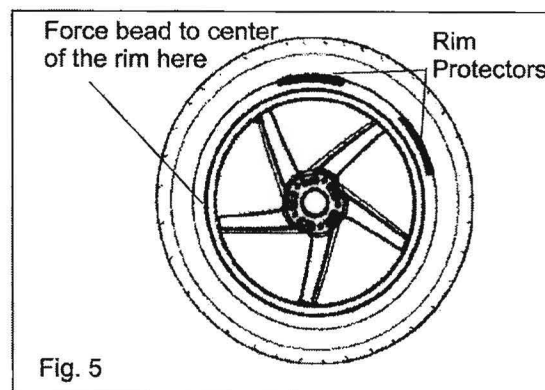
NOTE: This procedure can be performed on an empty 30 gallon drum with the top cut out. The top lip of the drum should be covered with a split rubber hose to protect the rim. (Fig. 3)



5. Position the wheel assembly so that the brake disc will not be damaged and the rim will not be scratched.
6. Push tire down and lubricate tire sealing edge (bead) with tire lubricant on both sides of tire. (Fig. 4)



7. Install rim protectors PV-43536. (Fig. 5)



8. Stand opposite of rim protectors and use your knee to push the tire DOWN into rim's drop center while pulling bottom bead UP into the drop center. For purposes of this procedure, the rim protector directly opposite you is now labeled the "12 o'clock" rim protector. (Fig. 6)

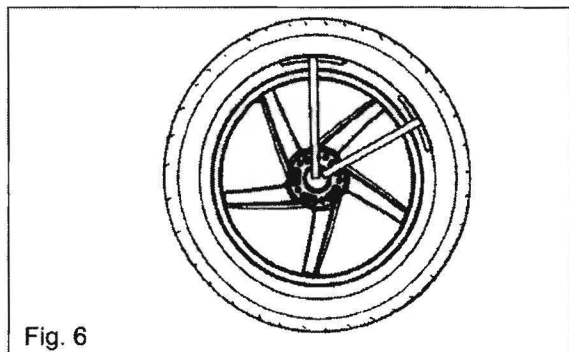


Fig. 6

9. While keeping both beads in the drop center, slide tire iron between tire bead and the 12 o'clock rim protector.
10. Slide another tire iron between tire bead and 2 o'clock rim protector.
11. Lever the 12 o'clock tire iron up and over (about 160°) and keep it positioned there.
12. Lever the 2 o'clock tire iron up and over.
13. Leave the 12 o'clock tire iron in place and levered over. Remove the 2 o'clock tire iron and slide it between the tire and rim protector at the 4 o'clock position.
14. Continue going around the tire until one side of tire is off the rim.
15. Turn tire and wheel assembly over on the drum, so the removed bead is facing down.

TUBE TYPE TIRES:

Remove valve stem nut, push stem through rim.
Remove tube and inspect tube carefully for signs of abrasion or other damage.
Replace tube and rim band whenever a tire is removed.

16. Push the tire away from you so the remaining bead is in the drop center of the rim.
17. Lubricate the bead and start it over the rim with a tire iron.
18. In most cases the tire can be forced off of the rim by hand. Continue to work around the tire until the tire is completely dismounted.

WHEEL INSPECTION

VISUAL INSPECTION & RUNOUT

1. Clean the rim of all rubber particles and corrosion.

WARNING

If any of the following problems are discovered, replace the wheel.

2. Inspect wheel for cracks and/or distortion.
3. Inspect bead seating area for scratches, distortion, or damage that could prevent proper sealing.
4. Measure wheel for radial runout (Fig. 7 A).
5. Inspect the wheel for axial runout, measured on inside edge of the wheel as shown. (Fig. 7 B).

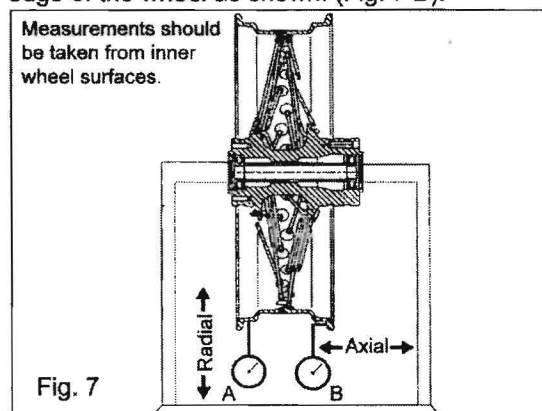


Fig. 7

NOTE: Measure runout on tire bead sealing surface of wheel. Be sure surface is clean.

6. Compare measurements of axial and radial runout to specifications listed in Service Manual. Replace wheel if any measurement exceeds Service Limit.
7. Clean the sealing surfaces of the rim thoroughly. Use a soft brush (nylon) soap and water if necessary.

WARNING

Do not scratch or damage sealing surfaces of rim. Loss of air pressure can cause a loss of control and an accident, resulting in serious injury or death.



TIRE INFORMATION

TIRE REPAIR PRECAUTIONS

WARNING

Only permanent plug-patch repairs of small tread area punctures from **inside** the unmounted tire are recommended. Never perform an exterior repair and never use an inner tube as a substitute for a proper repair. Speed should not exceed 50 MPH for the first 24 hours after repair and the repaired tire should never be used over 80 MPH. Inspect inflation pressure after tire cools for at least three hours following initial operation.

VALVE STEM

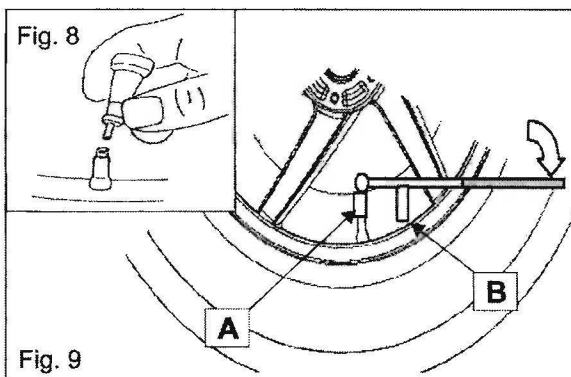
TIRE VALVE AND STEM INSPECTION

1. Remove and inspect valve core (Fig. 8). Replace if seal is worn, deformed or otherwise damaged. Inspect tire valve for cracks or visible damage and replace if necessary.

NOTE: Valve stem replacement is recommended when tire is being replaced.

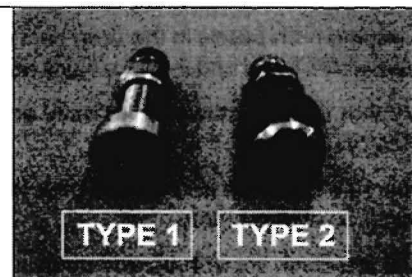
VALVE STEM INSTALLATION - RUBBER

1. Remove tire from wheel and cut valve stem with a diagonal cutter to remove.
2. Clean tire valve hole and sealing area thoroughly.
3. Lubricate tire valve and hole with P-80 rubber lubricant or equivalent.
4. Place tire valve into hole and screw a tire valve installation tool (commercially available) onto valve.
5. Place a small wood block against the rim to improve leverage point and keep the pulling angle as straight as possible. (Fig. 9)
6. Pull the valve until fully seated and remove tool.

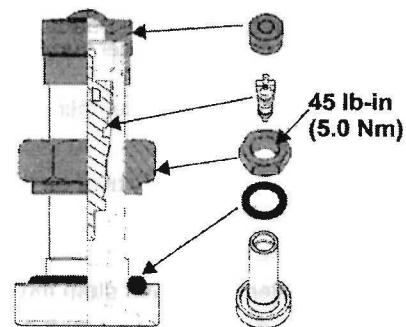


VALVE STEM INSTALLATION - METAL

1. Remove tire from wheel and remove old stem.
2. Clean gasket or O-ring seal surface of wheel.
3. Place tire valve (with seal washer or O-ring installed) through hole in rim and secure it hand tight with nut.
4. Refer to Fig. 10. On Type 2 valve stems (with no holding slot) tighten upper nut (A) to stem cap (B).
5. Hold nut (A) to prevent valve stem rotation, and torque lower stem nut (C) to 1.35 Nm (12 lb-in) using an open end torque wrench.
6. Release upper nut from cap and screw it down against stem nut.
7. Hold stem nut and tighten lock nut to 12 lb-in).



TYPE 1 (HOLDING SLOT)



TYPE 2 (NO HOLDING SLOT)

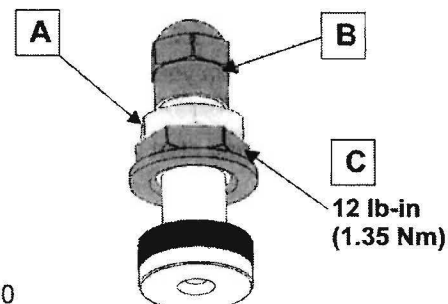


Fig. 10

TIRE INSTALLATION

TIRE MOUNTING

1. Lubricate both tire beads with rubber lubricant. (Fig. 11).

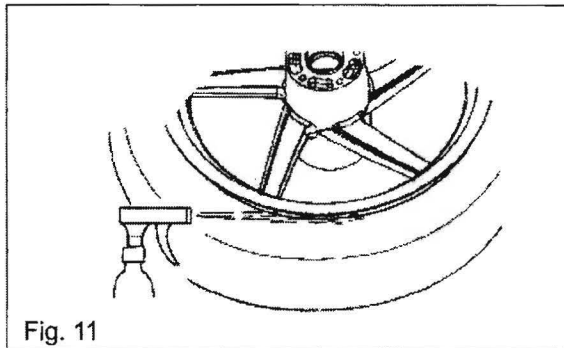


Fig. 11

WARNING

Never apply grease, oil, gasoline, spray type lubricants or anything other than rubber lubricant or a neutral soap and water solution to the tire bead. Doing so can damage the tire.

Balance Dots

Dunlop tires have a yellow dot on the sidewall which corresponds to the lightest part of the tire. This dot is meant to line-up with the tire valve which often is the heaviest part of the rim (although this is not always the case).

WARNING

Victory does not recommend the use of liquid balancer/sealers. These are a form of temporary repair which may adversely affect ply material and mask secondary damage caused by the penetrating object. Reliance upon sealants can result in sudden tire failure and accident.

Directional Arrows

If tires have directional arrows, they must be observed and tires installed correctly. When tires are manufactured, tread rubber is laid down as a strip and its ends connect as overlapping joints. When the tire is mounted correctly the scrubbing forces of acceleration (rear) or braking (front) press the lap joints together rather than try to separate the joint.

The wheel assemblies must be free of foreign debris that would affect balancing.

Carefully inspect the wheel bearings, seals and axle for damage or corrosion.

Ensure that bead is correctly seated.

TUBE TYPE TIRES:

Install new rim band (rim flap) on rim with hole oriented over valve stem hole in rim.

1. Place tire on drum.

CAUTION

Support tire assembly in such a way that brake disk or belt drive sprocket will not be damaged.

2. Lubricate the bead.
3. Orient tire correctly as to the balance dot and directional arrow.
4. Push tire on to rim until one bead is installed. It shouldn't be necessary to use tire irons to put one side of the tire onto the rim. Remember to keep bead(s) in the drop center of the wheel whenever possible.
5. Turn the tire / wheel over on the drum so the un-installed portion of tire is facing up.

NOTE: Confirm tire is positioned correctly by observing directional arrows. (Fig. 12)

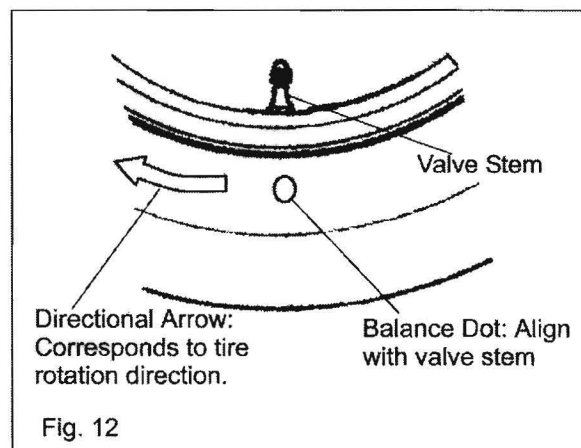


Fig. 12



6. For tube type tires, also observe the following:

Tube Type Tires:

Thread valve stem base nut completely on to valve stem.

Apply baby powder to new (deflated) tube and install by inserting valve stem through the rim band and rim.

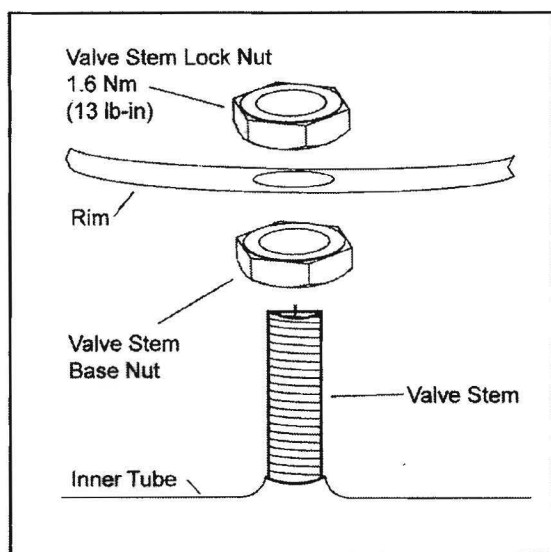
Install and turn the valve stem lock nut a few threads, but do not tighten at this time.

Install the tube in the tire starting at the valve stem and working around until the entire tube is laying inside the tire in a natural position.

Arrange the tube, if necessary, to remove kinks or bends, making sure that the valve stem projects straight out and forms a 90 degree angle with the rim.

Finish threading valve stem lock nut until it fully draws the valve stem through the rim.

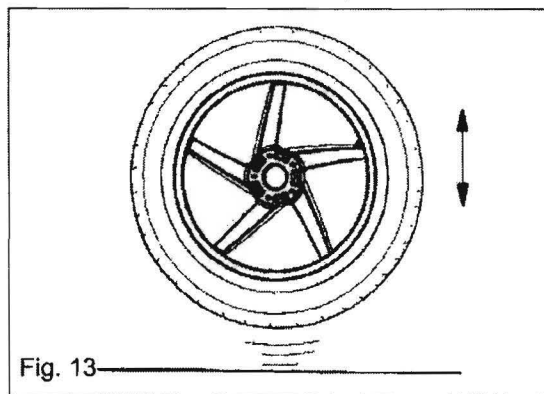
Torque the valve stem lock nut (Fig. 12b) to 1.6Nm (13 lb-in).



CAUTION

Make sure your tire irons are smooth and free of scratches or any sharp edges. Polish them if necessary. Do not slide the tire iron in any more than is necessary. When installing tube type tires, avoid lifting the tire iron past vertical to minimize the chance of pinching the tube.

7. Lubricate the tire bead.
 8. With your hands, push as much of the remaining tire bead as possible into the rim, pinching both upper and lower beads into the drop center.
 9. When no more of tire can be installed by hand, press down on portion of tire in front of you with your knee to keep the top bead in the drop center.
 10. Carefully slide a tire iron between the rim and tire at the other side of the un-installed portion of the tire.
- NOTE: Be sure both beads are forced as far as possible into the drop center of the rim.**
11. Lever the tire iron over and install that portion of tire. Continue to move tire iron in small increments until tire is completely installed.
 12. Install valve core if it was removed.
 13. Line up balance dot.
 14. Confirm that the directional arrows are pointing in the correct direction.
 15. Bounce tire on the floor several times while rotating tire. This will expand tire bead outward slightly which will make tire inflation easier. (Fig. 13)

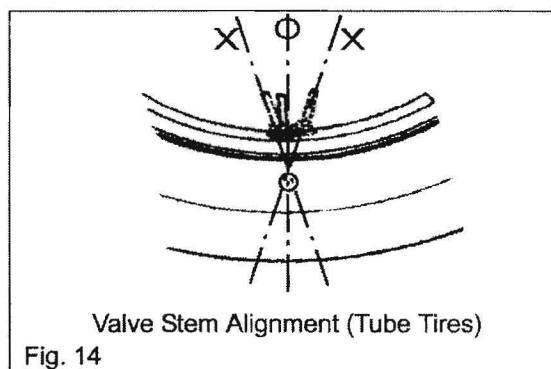


16. Inflate tire observing the precautions listed below.

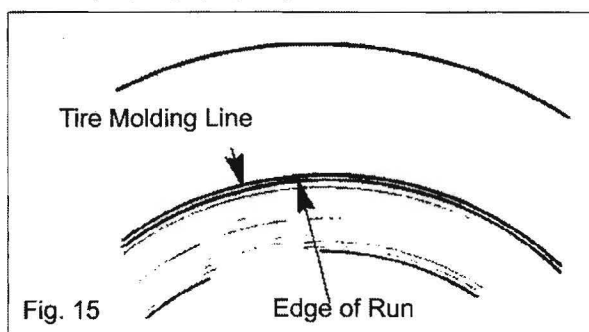
TIRE INFLATION & PRECAUTIONS

- Wear approved eye protection
- Lubricate the tire beads with a tire mounting lubricant before inflation.

- Before inflating a tube type tire, check to be sure valve stem is still straight. If not, rotate tire slightly on rim (in the direction the stem is pointing) to align (Fig. 14).



- Lock assembly on mounting machine or place in safety cage before inflating to seat beads
 - Use extension gauge and hose with slip-on air chuck.
 - Stand back with no part of your body within the perimeter of the assembled tire and rim.
 - Inflate with core in valve stem
 - Never inflate above 42 psi to seat beads
 - If beads do not seat by 42 psi. Deflate and repeat procedures. Never use a volatile substance or rubber "donut" to aid bead seating.
1. Inspect the line molded onto the tire side walls. It must be the same distance from the rim all the way around the tire. If the distance varies it indicates that tire is not seated properly. (Fig. 15)



2. If tire is not seated correctly, deflate and unseat the tire, relubricate the tire beads and repeat inflation procedure.
3. Install wheel assembly onto balance stand and spin. Observe the wheel assembly while it is spinning to make sure the tire is seated properly.

4. Adjust tire pressures to specifications.
5. Balance tire / wheel assembly.

! WARNING

FOR REPAIRED TIRES: Speed should not exceed 50 MPH for the first 24 hours after repair and repaired tire should never be used over 80 MPH. Inspect inflation pressure after tire cools for at least three hours following run-in.

FOR NEW TIRES: Replacement of OEM tires or replacement with differently constructed tires will not immediately produce improved reactions the same as the original tires when new. When new tires are installed, they should not be subjected to maximum power or hard cornering until a reasonable "scrub" period of approximately 100 miles has been covered. This will permit the rider to become accustomed to "feel" of new tires or tire combination, and achieve optimum road grip.

Inspect and adjust tire inflation pressure after tire cools down for at least three hours following "run-in".

TIRE BALANCING

TIRE BALANCING

! WARNING

It is essential that the wheel assembly be balanced before use and rebalanced each time the tire is removed.

Wheel balance affects stability, handling and overall safety of the motorcycle.

All Dunlop street tires should be installed with the yellow balance dot at the tire valve.

The use of liquid balancer/sealer is not recommended.

This procedure will outline balancing wheel assembly in a gravity balance stand. If a pendulum or spin type balancer is being used, reference the manufacturer's instructions that came with the equipment.

1. Mount wheel assembly in a balance stand.



Typical Balance Stand (Commercially available) (Fig. 16)

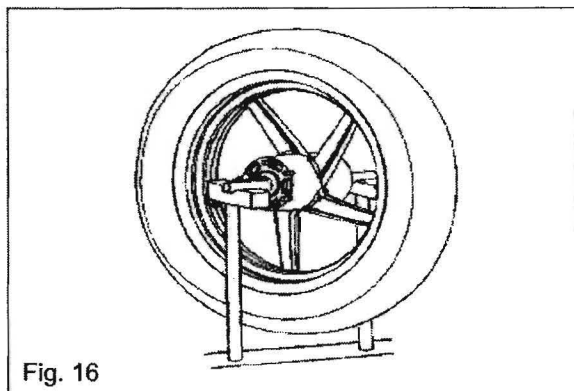


Fig. 16

2. Remove all balance weights. Clean tire and rim thoroughly.

NOTE: While it is possible to balance a wheel assembly with axle and grease-free wheel bearings as the pivot point, it is not recommended. Use an inspection stand that has knife edge bearings and its own axle.

3. Spin the wheel assembly. Allow it to stop on its own and mark the highest (lightest) part of the wheel.
4. Repeat the spinning process to verify the heaviest part of the wheel. (Fig. 17)

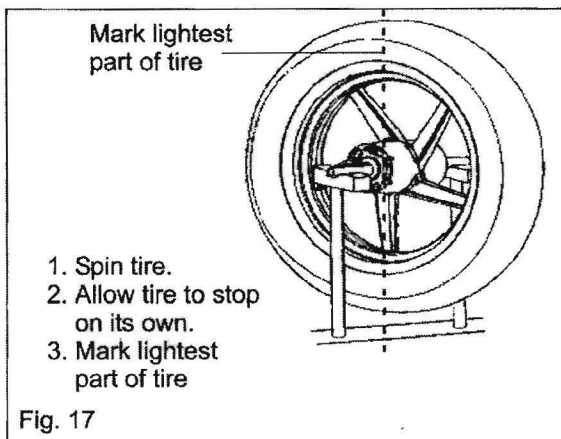


Fig. 17

NOTE: If the bearings are totally free to rotate and the wheel does not stop in the same place each time, the wheel is in balance.

5. Place balance weights at the lightest portion of wheel in small increments. (Fig. 18)

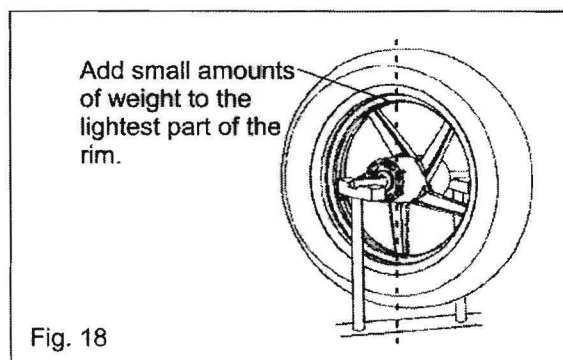


Fig. 18

6. After each addition of weight, spin the wheel assembly and allow it to stop by itself.
7. When correct amount of weight has been added to wheel, it will no longer stop in the same location and the wheel assembly is balanced.
8. Install wheel / tire assembly on motorcycle.

Front wheel installation: Chapter 12

Rear wheel installation: Chapter 13

CAUTION

Do not add more than 85 grams (3.0 oz.) of weight to the front or rear wheel.

If more than the recommended weight is necessary to balance the wheel, dismount the tire and rotate it 90° without regard to the yellow balance dot, and re-balance the wheel / tire.

Adhesive Weight P/N 1520253



SPOKED WHEEL OFFSET MEASUREMENT AND ADJUSTMENT

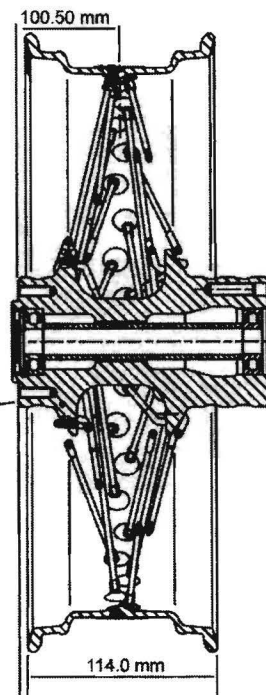
Front Wheel

Wheel Offset Calculation:

TOTAL WIDTH OF RIM = 114 MM
 1/2 WIDTH OF RIM ($114 / 2$) = 57 MM
 OFFSET (CENTER OF HUB) = 100.5 MM
 WHEEL OFFSET ($100.5 - 57$) = 43.5 MM

Brake Disc Mating Surface
 (measure offset from here)

Calculated Wheel Offset



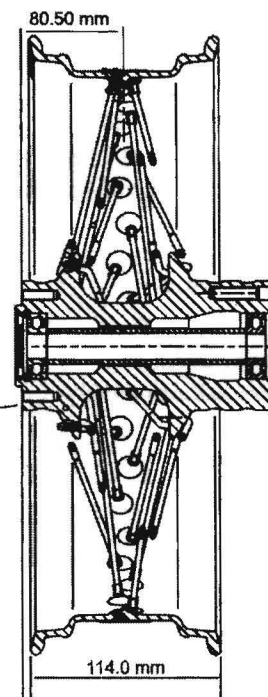
Rear Wheel

Wheel Offset Calculation:

TOTAL WIDTH OF RIM = 114 MM
 1/2 WIDTH OF RIM ($114 / 2$) = 57 MM
 OFFSET (CENTER OF HUB) = 80.5
 WHEEL OFFSET ($80.5 - 57$) = 23.5 MM

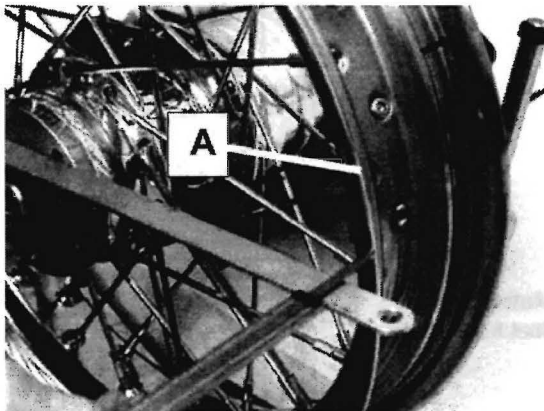
Brake Disc Mating Surface
 (measure offset from here)

Calculated Wheel Offset



Spoked Wheel Offset Adjustment

1. Lay a straight edge on the brake disc mounting surface and measure the offset distance to outermost edge of rim (A).



2. If the offset measurement is too large, loosen spokes on the opposite side of the rim and tighten spokes on the measurement side to decrease the wheel offset. Reverse this process to increase wheel offset.
3. Initially tighten spokes in 3 steps to the specified torque while maintaining distance A. This is a starting torque only. Final torque is listed on page 4.14

**Initial Spoke Torque - 8 Nm
(69 lb-in)**

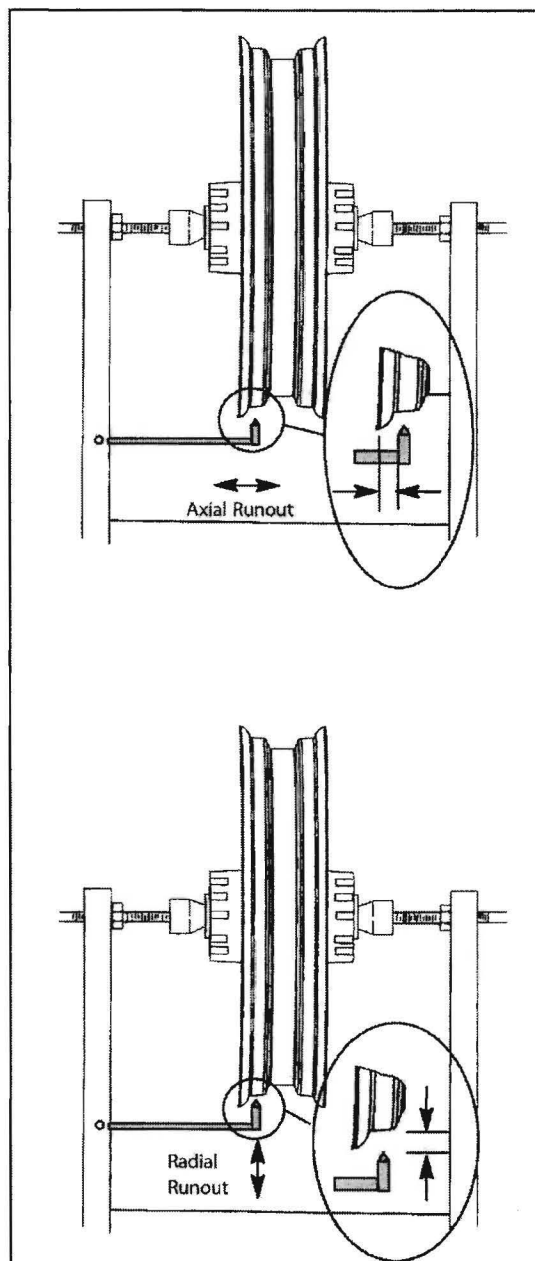
4. Place straight edge on disc mounting surface and measure to edge of rim. Verify that wheel offset is correct after tightening spokes.

NOTE: All spokes must be loosened or tightened the same amount to maintain minimum axial and radial runout.

Wheel Truing

1. Inspect wheel offset as outlined on page 4.12 before truing the wheel
2. Measure axial and radial runout.

NOTE: Axial runout is side to side movement (wobble) of the rim. Radial runout is the up and down movement (hop) of the rim.



3. First, adjust radial runout by loosening spokes around any high spots, rotate wheel 1/2 turn and tighten spokes directly opposite the high spot.

4. Adjust axial runout.

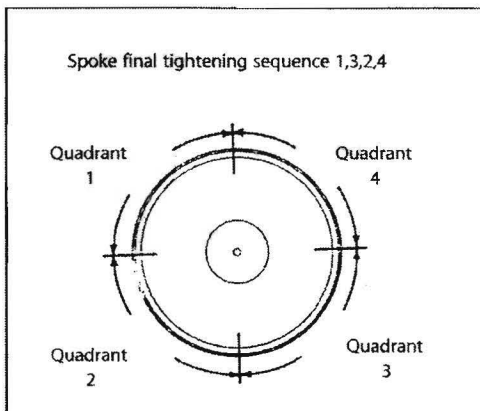
NOTE: It's important to work slowly and make adjustments in small increments. Alternate between radial and axial adjustments until runout is within specification.

Final Tightening

1. Using tape, divide wheel into four quadrants to perform final spoke torque sequence. Tighten each spoke equally. **(Tightening Sequence 1,3,2,4)**

**Final Spoke Torque - 8 Nm
(69 lb-in)**

2. Maintain proper runout adjustment during final tightening of spokes.



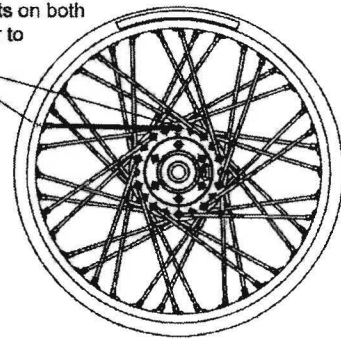
WHEEL LACING

WHEEL LACING

NOTE: If an assembled wheel is available it can be referenced for proper spoke pattern.

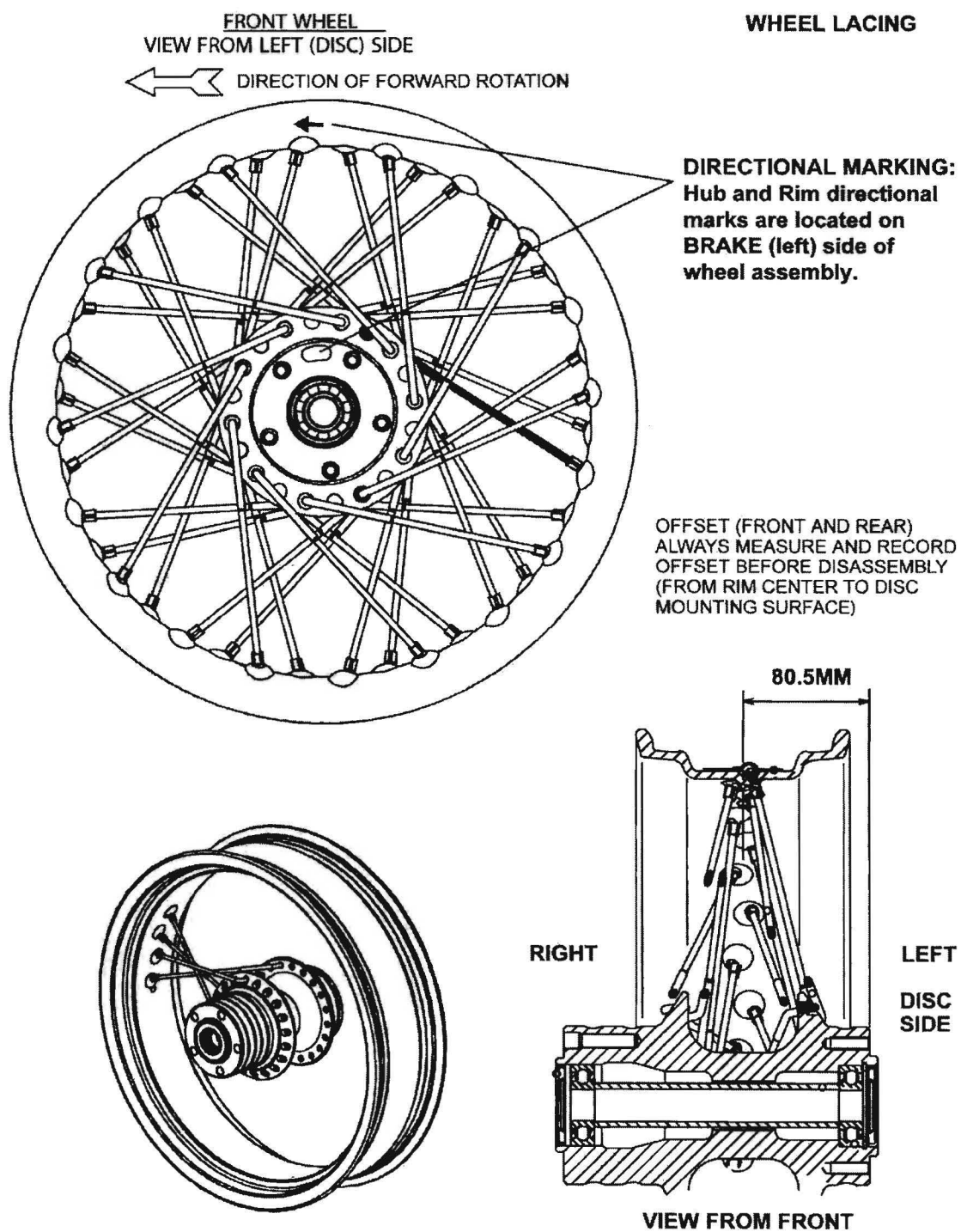
1. Before disassembly, select a "starting spoke" and make index marks at its anchor points on the hub and rim. This will help ensure the spokes are installed and grouped correctly upon assembly.

Select a "starting spoke" and mark its anchor points on both the hub and rim prior to disassembly.

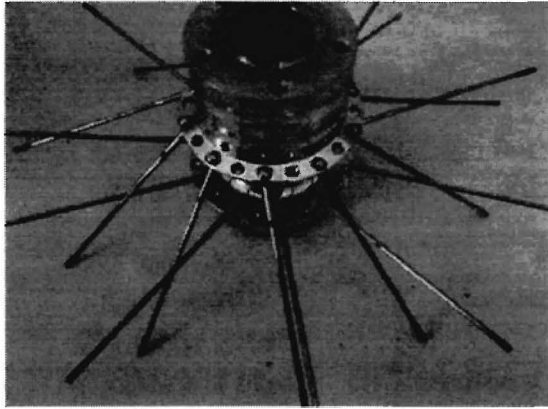


2. Organize 20 inside spokes and nipples on a clean work surface. Lubricate spoke threads and rim nipple-holes with a light oil.



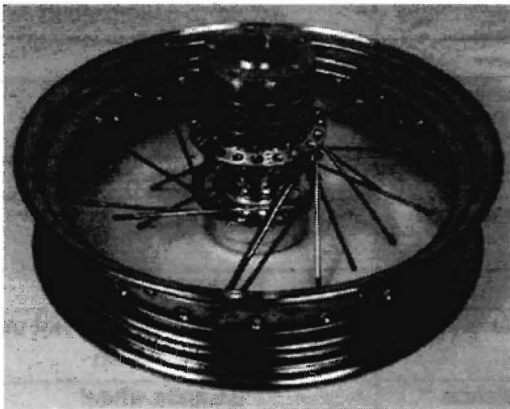


3. Using the index marks from step one, insert all inside spokes skipping one hole between each.



NOTE: Inside spokes are not installed directly across from each other on the different hub flanges. Install inside spokes on the opposite flange one hole to the right or left.

4. Lay rim in position around the hub assembly making sure the valve stem hole and spoke index marks are correctly located.



5. Thread the "starting spoke" into the corresponding nipple and continue to thread inside spokes until they are all finger tight.
6. Install outside spokes and screw on nipples. Work your way around the wheel, installing spokes on alternate sides of wheel. Continue until all spokes and nipples are installed. Tighten nipples equally by hand.
7. With all nipples installed, evenly snug all nipples using a spoke wrench. Tighten until one thread shows above each nipple. Work your way around the wheel tightening spokes equally.
8. Place wheel assembly onto a truing stand for rim offset adjustment, final spoke tightening and wheel truing of wheel.

SPOKE MAINTENANCE

⚠ WARNING

Spokes that have been improperly installed or adjusted could distort the wheel and result in a loss of vehicle control.

MAINTENANCE - Check Wheel Spokes

If your motorcycle is equipped with spoked wheels, inspect both wheels for loose, bent, broken or missing spokes. To identify loose spokes, grasp each spoke and try to move it side to side or up and down. All spokes should be equally tight and have the same amount of flex. Tighten loose spokes or replace bent, broken or missing spokes.

Inspect spokes after first 500 miles, then again every 5,000 miles.



TROUBLESHOOTING**TROUBLESHOOTING**

PROBLEM	POSSIBLE CAUSE	REPAIR RECOMMENDED
Rear Wheel (Wobbles)	Bent rim	Replace
	Worn or damaged wheel bearings	Replace as a set
	Worn or damaged swing arm bushings.	Replace as a set
	Damaged or incorrect tire	Replace rear tire
	Wheel assembly out-of-balance	Balance wheel
	Low tire pressure	Inflate to specification
	Loose swing arm, axle or suspension fasteners.	Torque to specification
Handlebars Oscillate (Wobble)	Bent front axle	Replace
	Worn or damaged wheel bearings	Replace as a set
	Tire mounted incorrectly	Inspect and re-mount tire
	Damaged tire	Replace
	Loose steering stem nut	Adjust to specification
	Incorrect tire	Replace
	Incorrect tire pressure	Inflate to specification
Front Wheel Oscillates (Wobbles)	Bent rim	Replace
	Worn or damaged wheel bearings	Replace as a set
	Damaged or incorrect tire	Replace
	Loose axle or axle pinch bolts	Torque to specification
	Right and left fork not installed at same height	Repair
	Fork oil level incorrect	Fill to specification
	Fork spring free length different between right & left	Replace spring that does not meet specification
	Wheel assembly out-of-balance	Balance wheel



CHAPTER 15

BRAKES

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BRAKE SYSTEM SAFETY

GENERAL

Use only genuine VICTORY replacement parts when servicing the brake system. Clean all system components prior to disassembly, including the fluid reservoir cover(s) to reduce the chance of debris entering the system during repair or maintenance work. Start with a clean work area away from dust, water or other contamination. Cleanliness is very important for proper brake system maintenance and repair. Follow procedure outlined in this manual carefully, including fastener torques and the application of special lubricant in required areas. Special lubricants are included with service kits.

WARNING

Contaminated brake discs or pads greatly reduce the amount of stopping force available & increase stopping distance. Brake discs can be cleaned using a commercially available brake disc cleaner. Follow the manufacturer instructions printed on the container. NEVER attempt to clean contaminated brake pads. Always replace pads as a set.

WARNING

The brake system uses ethylene-glycol based fluid (DOT 4). Do not use or mix with different types of fluid such as silicone-based (DOT 5) or any petroleum-based fluid.

Do not let water or moisture enter the master cylinder when refilling. Water significantly lowers the boiling point of the fluid and can result in poor braking.

Do not use brake fluid taken from old, used or unsealed containers. Never reuse brake fluid.

Keep brake fluid containers completely sealed and out of reach of children.

Brake fluid should be completely replaced every 24 months or 12,500 miles.

Brake hoses should be replaced whenever the exterior shows signs of deterioration or damage. Brake hoses should be replaced every four (4) years regardless of their exterior condition.

Bleed the brake system any time it is disassembled or when the brake action is spongy.

Always inspect the operation of the brakes before riding the motorcycle.

Replace sealing washers whenever brake lines are removed.

Always remove the master cylinder fluid reservoir cover and inspect the fluid level when brake pads are replaced.

NOTICE: Brake fluid and some types of brake cleaners will damage paint, plastics and some rubber compounds. Cover or remove plastic and painted parts before working on the brake system. If brake fluid is spilled on cosmetic surfaces, immediately rinse the area with a mild solution of soap and water until all traces of brake fluid are removed. Make sure the master cylinder reservoir being worked on is level and clean before removing the cap.



SPECIFICATIONS

GENERAL SPECIFICATIONS

BRAKE SYSTEM		
Item	Standard	Service Limit
Specified Brake Fluid	DOT 4	Replace every 24 months or 12,500 miles
Brake Disc Thickness, Front	5 mm	4.5 mm (.177") (Min)
Brake Disc Thickness, Rear	5 mm	4.5 mm (.177") (Min)
Brake Disc Runout	-	.30 mm (.012") (Max)
Brake Pad Wear Limit (Front & Rear)	-	When wear limit groove is no longer visible
Brake Pedal Free Play (Pedal Clearance)	Footpegs: 2 - 5 mm (.080 - .200") Floorboards: 1 - 2 mm (.040 - .080")	-
Brake Lever Freeplay (Front)	No Adjustment	-

TORQUE SPECIFICATIONS

BRAKE SYSTEM TORQUE SPECIFICATIONS

Refer to the exploded views in this chapter for components not listed here.

Description	Torque N-m	Torque lb-ft (lb-in)	NOTES
Bleed Screw, Caliper (Front and Rear Caliper)	5.4 N-m	(48 lb-in)	
Brake Pad Retaining Pin (Front and Rear Caliper)	17.0 N-m	12.5 lb-ft	
Footrest Support to Frame	47.5 N-m	35 lb-ft	
Front Brake Caliper to Fork Leg	42 N-m	31 lb-ft	
Front Brake Caliper Body Screws	27 N-m	20 lb-ft	Loctite™ 242 (Blue) E12 Reverse TORX
Front Brake Disc to Wheel Hub	30 N-m	22 lb-ft	See Chapter 12
Front Brake Lever Pivot Screw	1.0 N-m	(9.0 lb-in)	
Front Brake Lever Pivot Screw Nut	6.0 Nm	(52 lb-in)	
Front Brake Light Switch Screw	1.2 N-m	(11.0 lb-in)	
Front Brake Line Banjo Bolt (All)	24.5 N-m	18 lb-ft	
Front Brake Master Cylinder to Handlebar	10.8 N-m	(96 lb-in)	Tighten rear screw first
Front Brake Master Cylinder Reservoir Cover	1.5 N-m	(14 lb-in)	
Rear Brake Disc to Wheel Hub	30 N-m	22 lb-ft	See Chapter 13
Rear Brake Line Banjo Bolt (All)	24.5 N-m	18 lb-ft	
Rear Brake Master Cylinder Mounting Screws	10 N-m	(84 lb-in)	
Rear Brake Pressure Switch to Manifold	13.5 N-m	10 lb-ft	
Rear Brake Pressure Switch Manifold to Frame	11 N-m	(96 lb-in)	
Rear Brake Reservoir Mounting Screw	11 N-m	(96 lb-in)	

SPECIAL TOOLS

BRAKE SERVICE SPECIAL TOOLS

Front Master Cylinder Snap Ring Pliers (commercially available)

Caliper Piston Pliers (commercially available)

Front Brake Lever Reserve Inspection Adapter PV-50104

Tension Scale (to measure Front Brake Lever Reserve pull force) (commercially available)

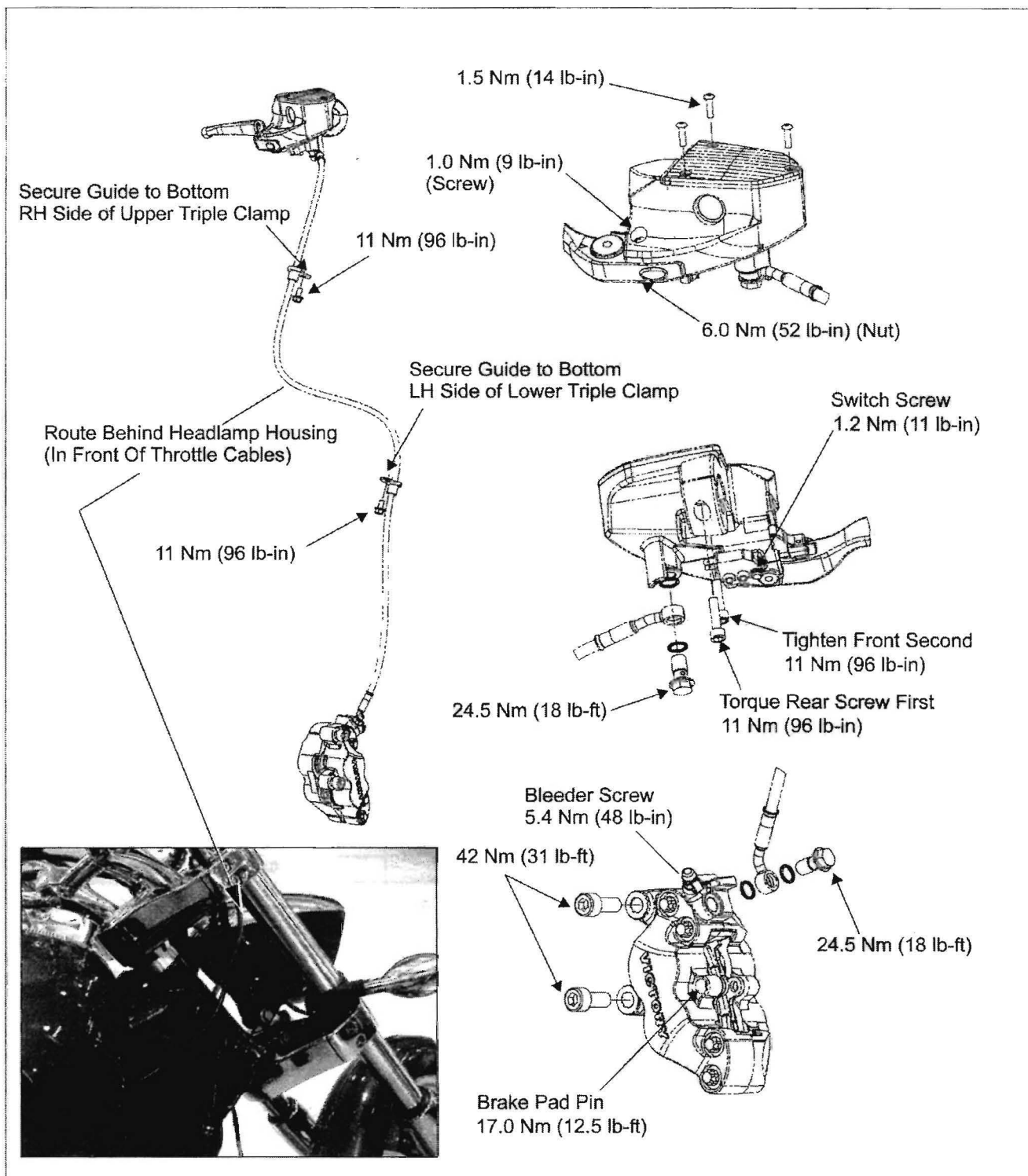
Vacuum Brake Bleeder (commercially available)

Pressure / Vacuum Pump (alternative to Vacuum Brake Bleeder above) PV-43545

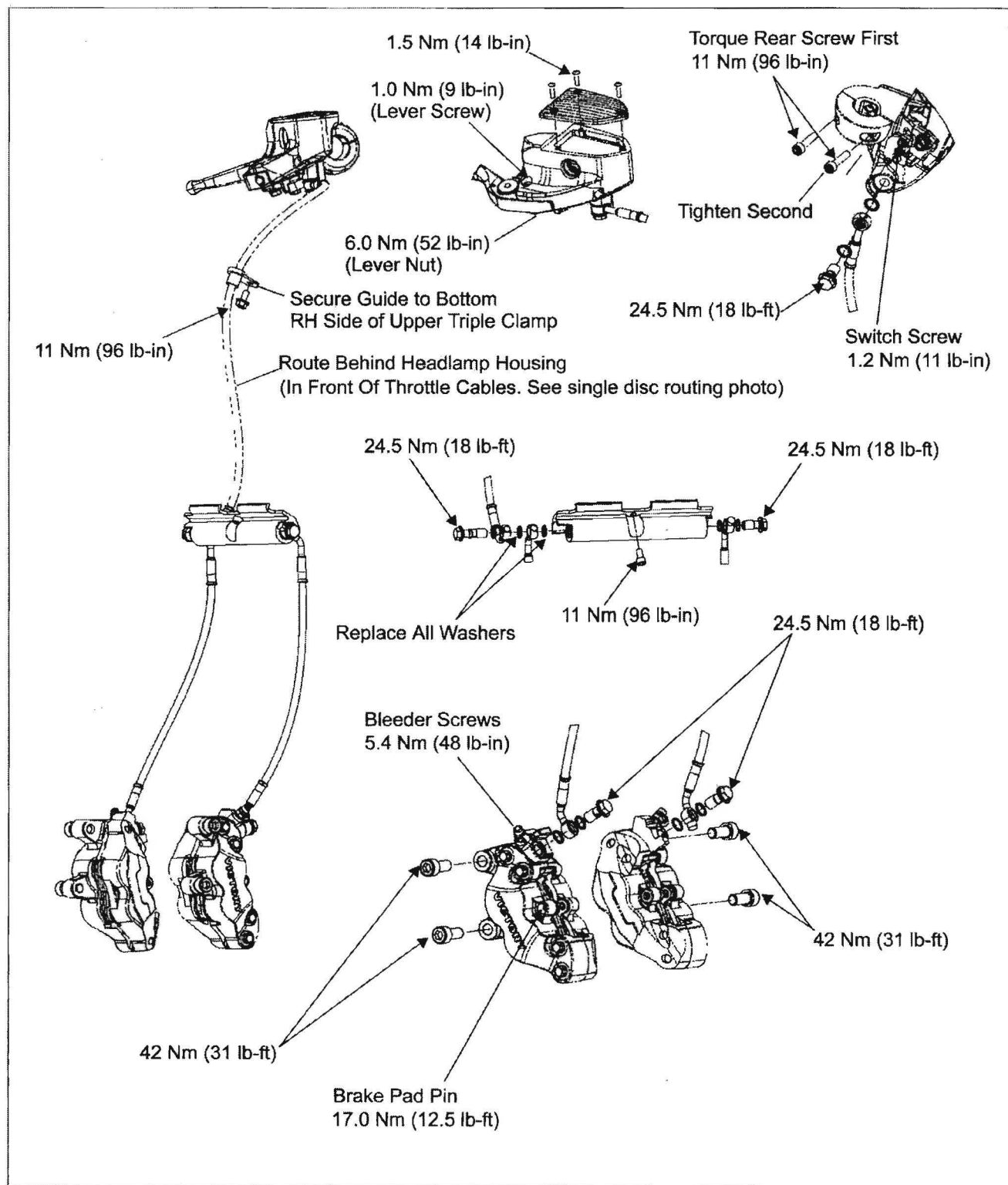


ASSEMBLY VIEWS & ROUTING

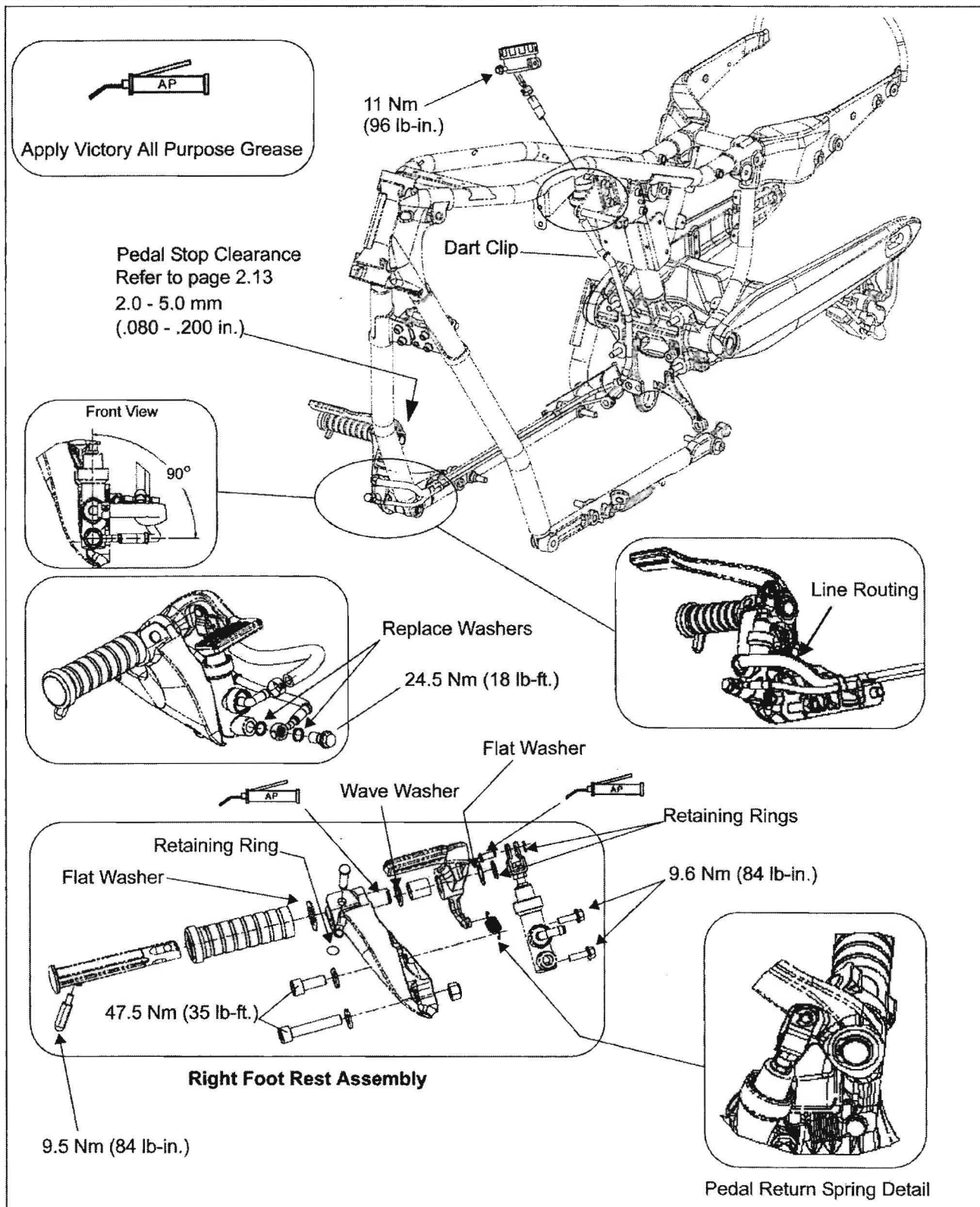
FRONT BRAKE - SINGLE DISC



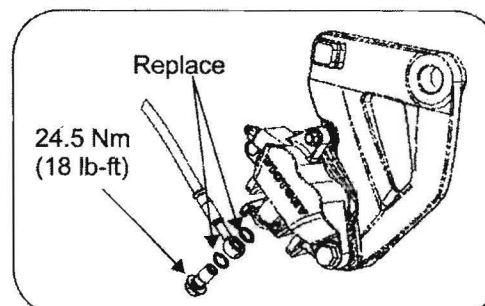
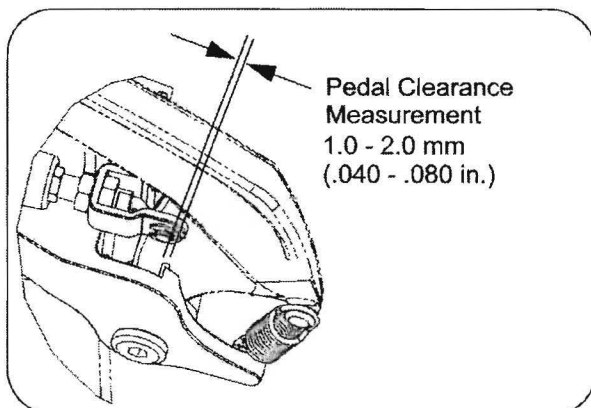
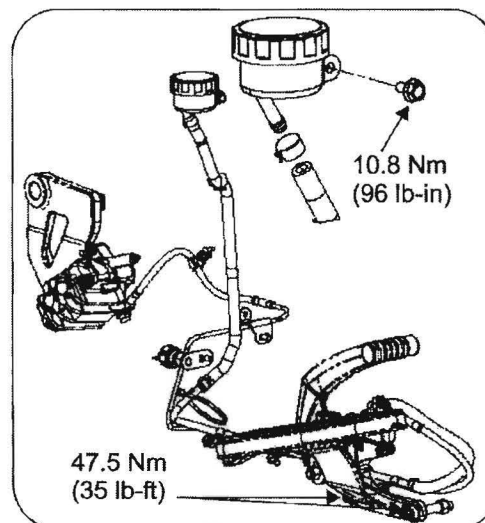
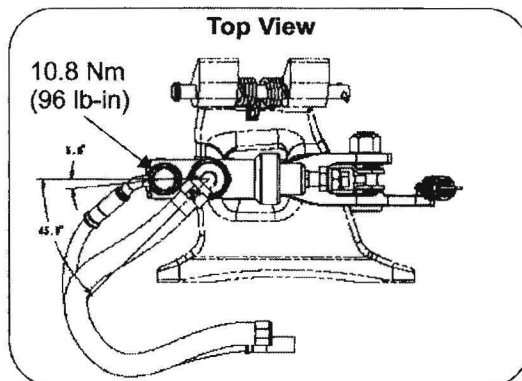
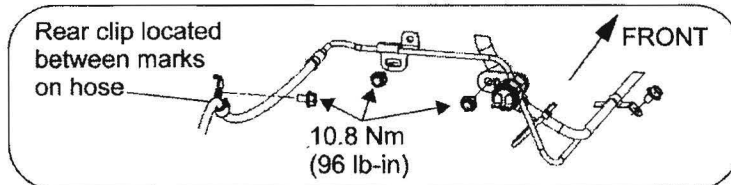
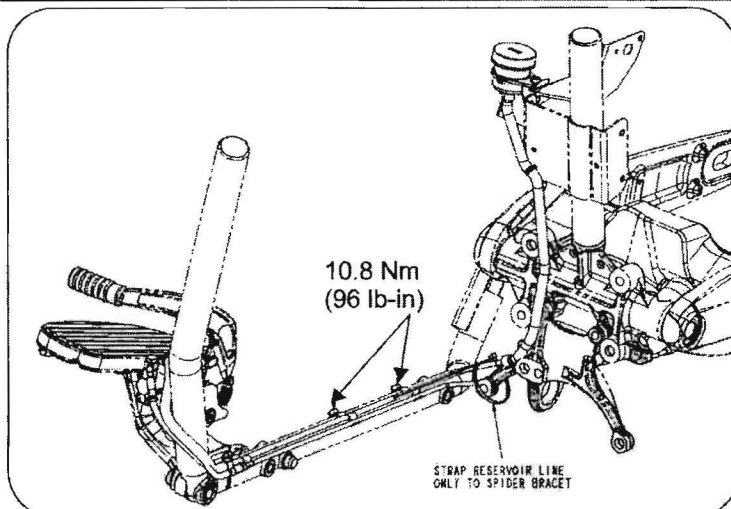
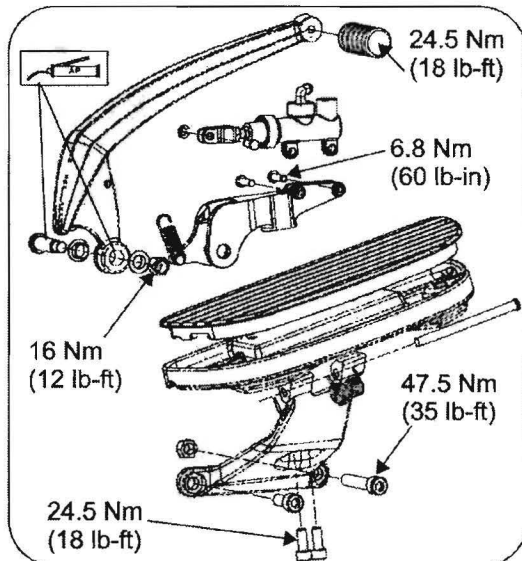
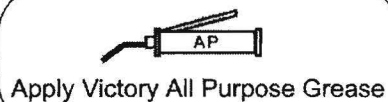
FRONT BRAKE - DUAL DISC



REAR BRAKE LINE ROUTING - FRAME AREA - FOOTPEGS



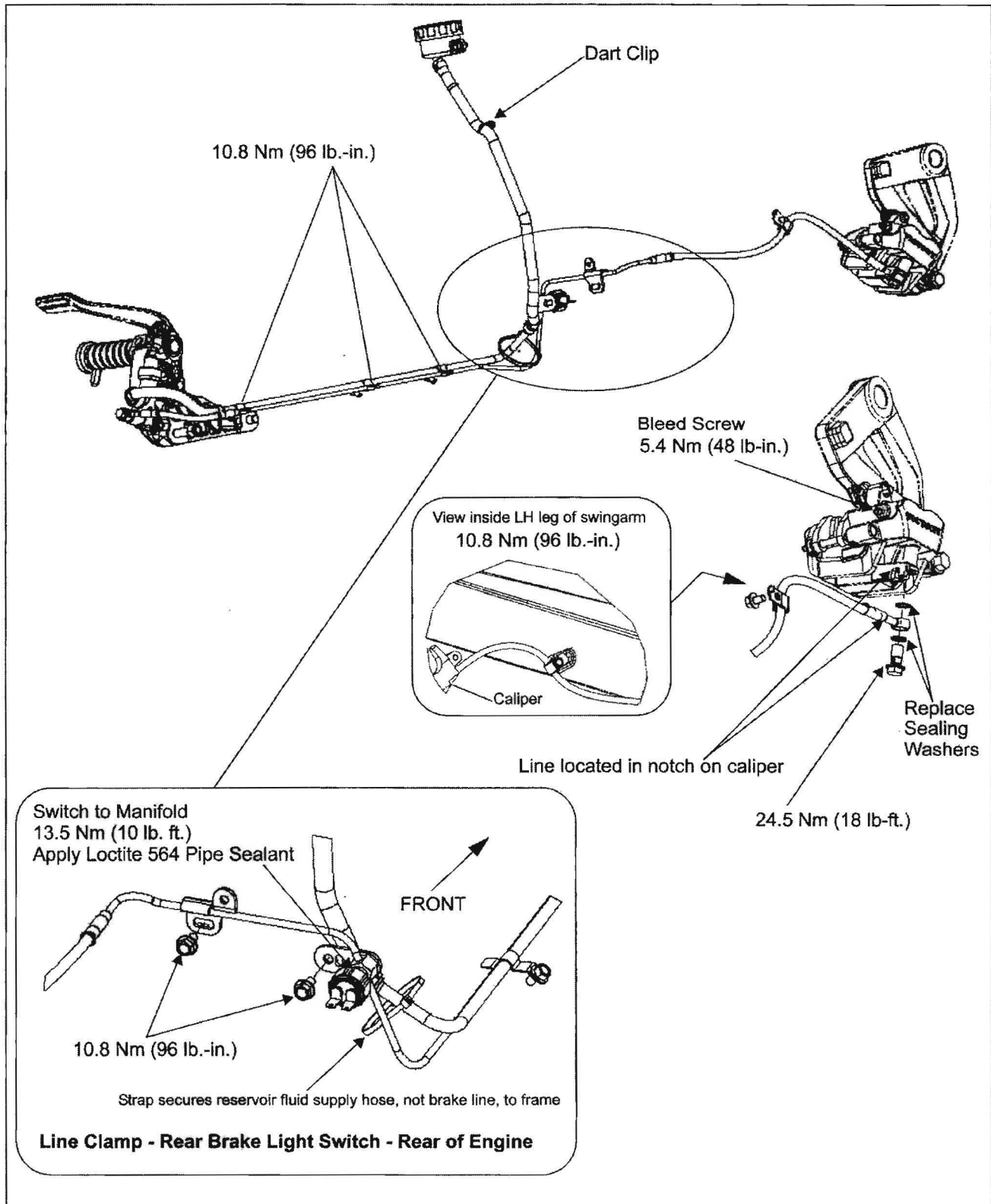
REAR BRAKE LINE ROUTING - FLOORBOARDS



15



REAR BRAKE LINE ROUTING - SWINGARM / REAR ENGINE FRAME CRADLE



MASTER CYLINDERS

FRONT BRAKE MASTER CYLINDER



This symbol indicates special lubricant from service kit must be applied to this part.



CCI OIL (009-Z00-313)

Application: **Internal:** Master cylinder bore, piston, and piston seal cups.



SPECIAL GREASE (009-Z00-115)

Application: **External:** Lever pivot screw and contact surface of lever to master cylinder piston.

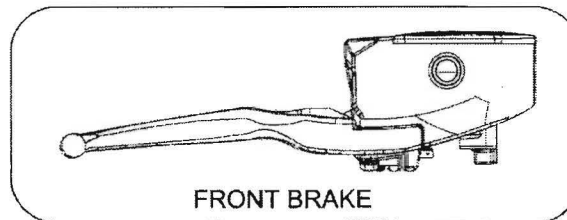
Refer to assembly views and rebuild procedure for detailed application of special lubricants.

NOTICE:

SINGLE AND DUAL FRONT BRAKE MASTER CYLINDERS ARE DIFFERENT. ORDER PARTS FOR THE APPROPRIATE MODEL.

VEGAS MASTER CYLINDER BORE DIAMETER (SINGLE FRONT DISC) = 12.7MM (1/2 IN.)

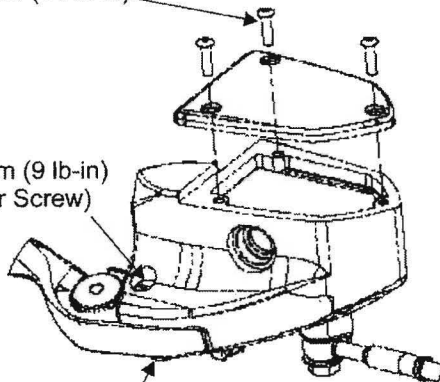
HAMMER MASTER CYLINDER BORE DIAMETER (DUAL FRONT DISC) = 15.87MM (5/8 IN.)



1.5 Nm (14 lb-in)

1.0 Nm (9 lb-in)
(Lever Screw)

6.0 Nm (52 lb-in)
(Lever Nut)

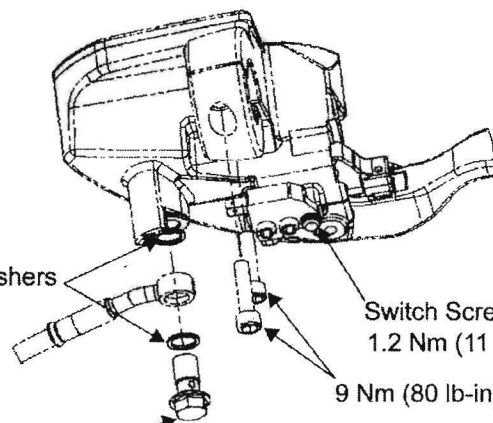


Replace Washers

Switch Screw
1.2 Nm (11 lb-in)

9 Nm (80 lb-in)

24.5 Nm (18 lb-ft.)



REAR BRAKE MASTER CYLINDER



This symbol indicates special lubricant from service kit must be applied to this part.



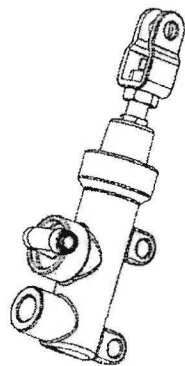
CCI OIL (009-Z00-313)

Application: **Internal:** Master cylinder bore, piston, and piston seal cups.

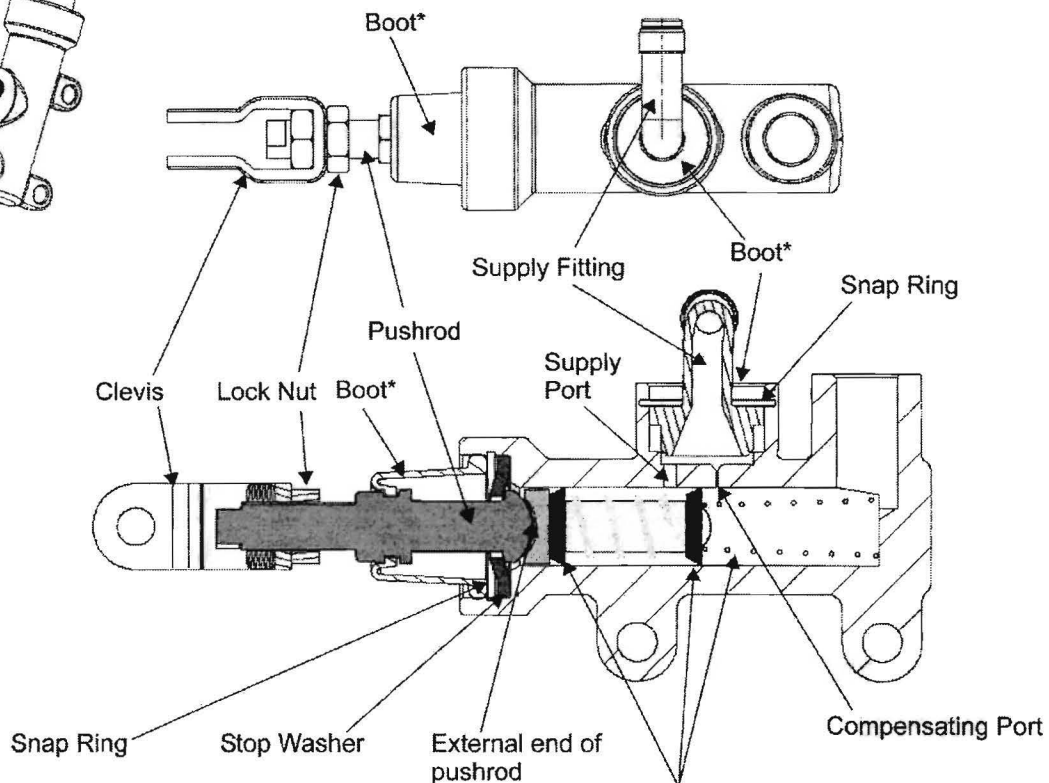


SPECIAL GREASE (009-Z00-115)

Application: **External:** Contact surface of pushrod to master cylinder piston.



Refer to assembly views and rebuild procedure for detailed application of special lubricants.



Brake
(009-Z00-115)



* No grease on sealing surface of boot

15.10



CALIPERS

FRONT BRAKE CALIPER



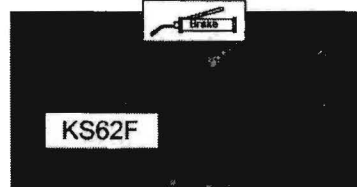
This symbol indicates special lubricant from service kit must be applied to this part.

Refer to assembly views and rebuild procedure for detailed application of special lubricants.



CCI OIL (009-Z00-313)

Application: **Internal:** Caliper pistons.



SILICONE GREASE (009-Z00-111) KS62F

Application: **Internal:** Caliper piston seals, piston dust seals.

External: O-ring at tip of pad retaining pin.

LH CALIPER SHOWN

FRONT



Piston
Apply special assembly OIL
(009-Z00-313)
(included with parts kit)



(009-Z00-111)
Piston Seal



(009-Z00-111)
Dust Seal

O-Ring

Pad Spring

Bleeder Screw
5.4 Nm (48 lb-in)



(009-Z00-111)

Clean all grooves

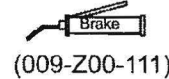
Inner Pad

Outer Pad

Piston
Apply special assembly OIL
(009-Z00-313)
(included with parts kit)

Piston Seal

Dust Seal



(009-Z00-111)



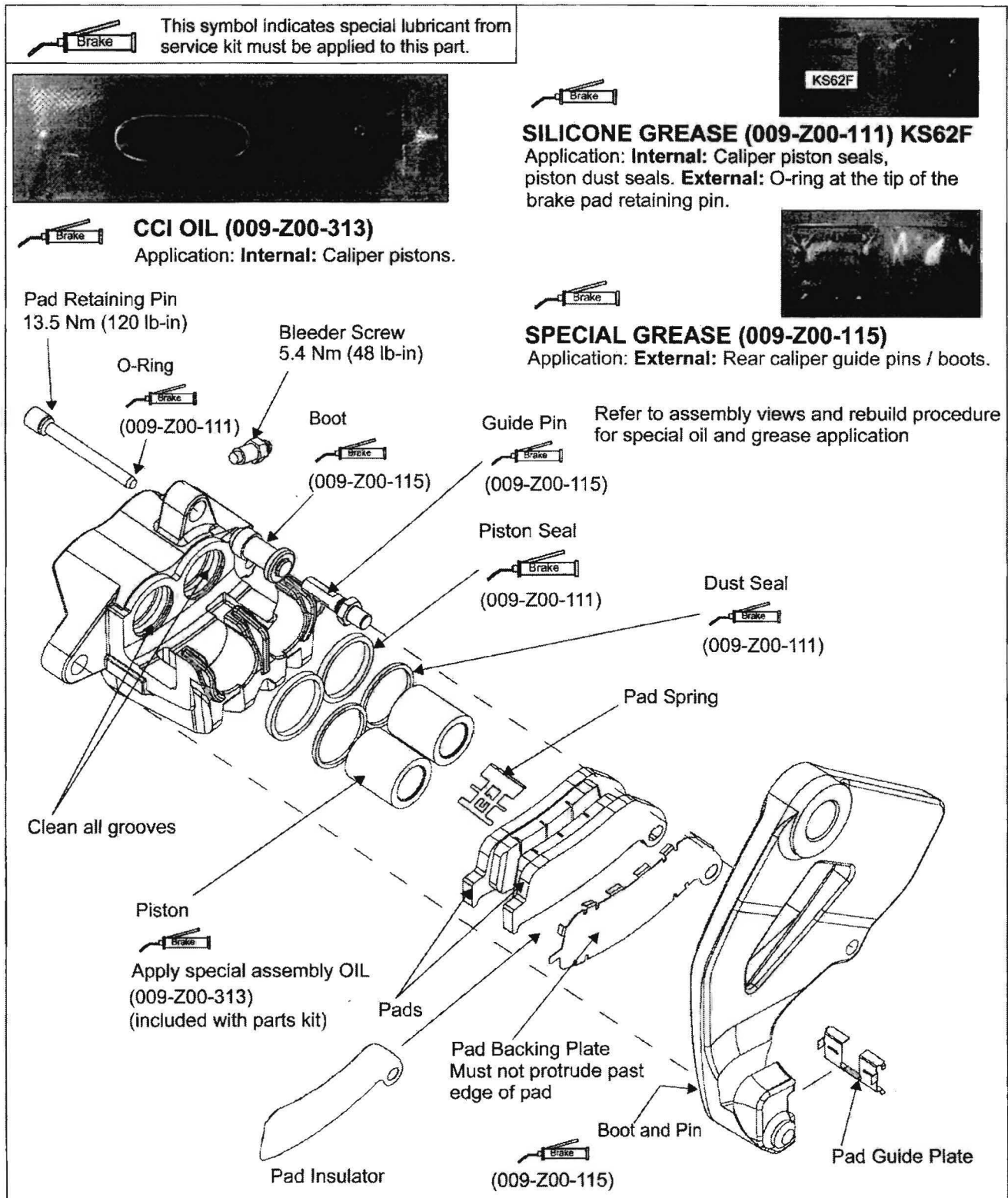
(009-Z00-111)

Pad Retaining Pin
13.5 Nm (120 lb-in)

Caliper Body Bolt
27 Nm (20 lb-ft)
Loctite 242 (Blue)
E12 Reverse TORX



REAR BRAKE CALIPER



BRAKE SYSTEM SERVICE

BRAKE FLUID REPLACEMENT & BLEEDING PRECAUTIONS

WARNING

Contaminated brake discs or brake pads greatly reduce braking performance and increase stopping distance. Do not attempt to clean contaminated pads. Replace them. Clean the brake disc with brake cleaner.

WARNING

This brake system requires ethylene-glycol based fluid (DOT 4). Do not use or mix different types of fluid such as silicone-based or petroleum-based.

WARNING

Do not use brake fluid taken from old, used or unsealed containers. Never reuse brake fluid. Brake fluid can accumulate moisture, reducing its performance.

WARNING

Brake fluid is poisonous. Keep brake fluid tightly sealed and out of reach of children.

WARNING

A soft, spongy feeling in the brake lever and/or brake pedal could indicate a hazardous condition in the brake system. Do not operate the motorcycle until the failure in the brake system is corrected.

WARNING

An unsafe condition exists when air is trapped in the hydraulic brake system. Air in the brake hydraulic system acts like a soft spring and absorbs a large percentage of the pressure developed by the master cylinder. Without this pressure, the braking system cannot develop full braking force to allow for safe, controlled stops. It is extremely important to bleed the brakes properly after any brake system work has been performed or when inspection reveals spongy brakes.

Keep these points in mind when bleeding hydraulic brakes:

- The master cylinder reservoirs have limited capacities. It is easy to empty them during the bleeding procedure. This introduces air into the system which you are trying to purge. Watch the reservoir closely and add fluid when necessary to keep the level above the LOW mark and prevent air from re-entering the system.
- Apply only light to moderate pressure to the lever or pedal when bleeding the brake system. Extreme pressure or rapid movement will cause a surge of fluid through the small orifices of the brake system when the bleeder screw is opened and could introduce air into the system by means of cavitation.
- Small amounts of air can become trapped in the banjo bolt fittings at the master cylinder(s) and junction points of brake lines. These fittings can be purged of air by following a standard bleeding procedure at these fittings (instead of the bleed screw on caliper) if necessary to speed the bleeding process. This is usually only needed if system was completely drained of fluid. Bleed each line connection, starting with the fitting closest to the master cylinder, working toward the caliper, and ending with the bleed screw.
- Always torque banjo bolts and other brake system fasteners and components to specified torque.
- Always install NEW genuine Victory replacement parts and rubber parts upon assembly. Apply special lubricant where indicated (included in service kits).



BRAKE BLEEDING / FLUID CHANGE

NOTE: Procedure is basically the same for both front and rear brakes.

NOTE: Throughout the following procedure, monitor fluid level in master cylinder reservoir constantly. Do not allow fluid level to fall below minimum level. (Fig. 1 and 2)

1. Remove cover and fill reservoir with DOT 4 brake fluid from a sealed container.

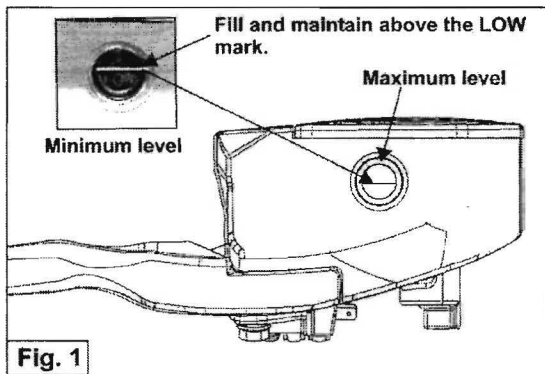


Fig. 1

Use Only Victory DOT 4 Brake Fluid 2872189

2. Between fills, set reservoir cover on reservoir to prevent entry of contaminants.

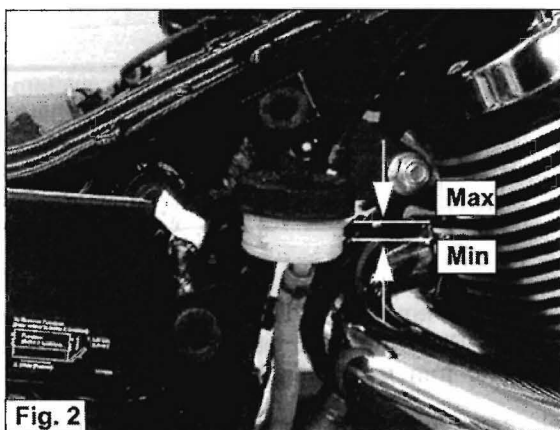
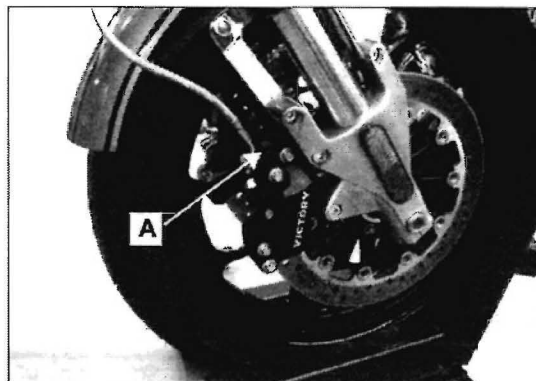


Fig. 2

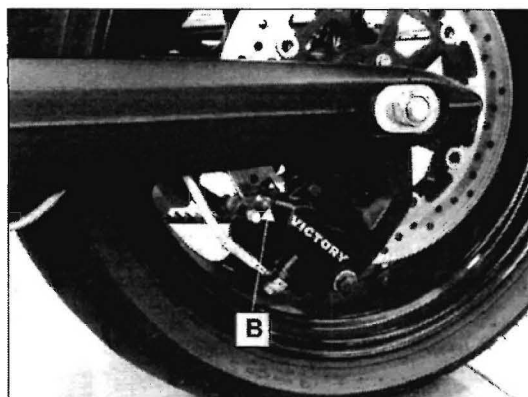
NOTE: If system is dry or very low on fluid due to parts replacement or disassembly, pump the lever or pedal *slowly* until air bubbles no longer rise through the fluid in the reservoir. For normal bleeding or system flush, continue with Step 3.

NOTE: Brake systems should be flushed every 2 years or more often if the fluid is discolored. To flush the system, follow the normal brake bleeding process, and continue bleeding and filling the reservoir until fluid moving through the bleeder hose is clear.

3. Remove rubber cap and install an 8mm box end wrench over the bleeder screw. Connect a tight-fitting clear hose to bleed screw of front (A) or rear (B) caliper.



NOTE: When bleeding dual front disc brake systems, bleed left side lines / caliper first (farthest from master cylinder) then bleed right side (closest to master cylinder). Repeat left caliper bleeding once.



4. Place a small quantity of fresh brake fluid into a small, clear jar.
5. Place the other end of bleeder hose into the jar. (Fig. 3).

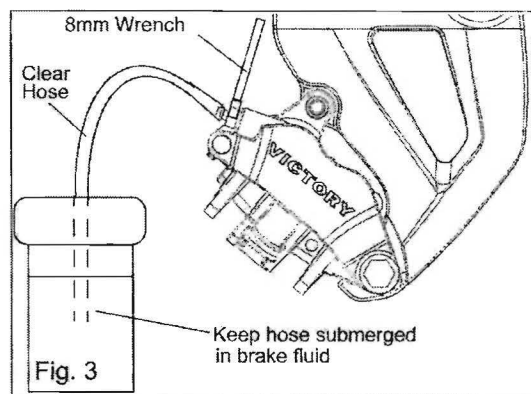
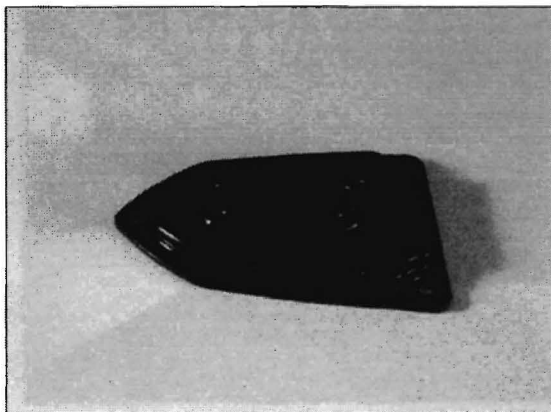


Fig. 3

6. *Slowly* pump brake lever or pedal until pressure builds and then hold.
7. Quickly open and close the bleed screw while holding pressure on lever or pedal.
8. Release lever or pedal pressure.
9. Check level of fluid in reservoir and add if necessary.
10. Repeat Steps 6, 7, 8, and 9 until lever or pedal is firm and no air can be seen moving through the clear hose.
11. **Torque bleed screw to 5.4 Nm (48 lb-in).** For dual front disc brake models repeat process for the right caliper, then bleed left caliper again.
12. After completing the bleeding procedure, inspect brake fluid level (page 2.17). clean the reservoir cover, diaphragm, and reservoir sealing surface. If diaphragm is extended, return it to normal (flat) position. Install diaphragm and cover.

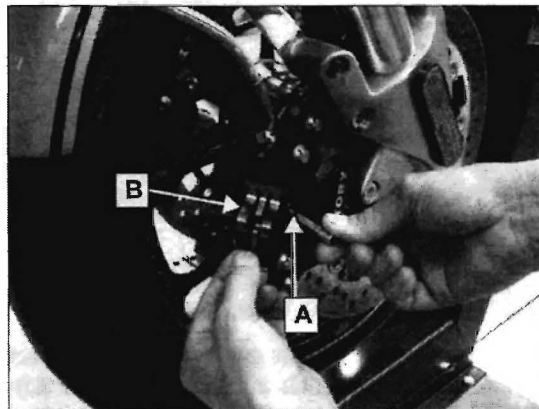


13. Inspect the feel when pressure is applied to the lever or pedal. The lever or pedal should feel firm, not spongy. If lever or pedal is not firm, repeat bleeding procedure and inspect brake system. See Troubleshooting at the end of this chapter.

FRONT BRAKE PAD REPLACEMENT

NOTE: Always replace brake pads as a set. Pads can be changed with caliper installed on the motorcycle. Refer to page 2.18 for front pad inspection.

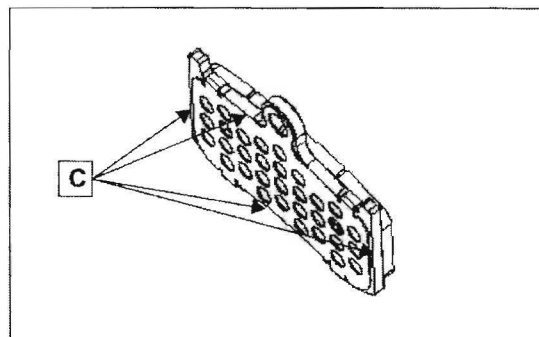
1. Remove brake pad pin (A).



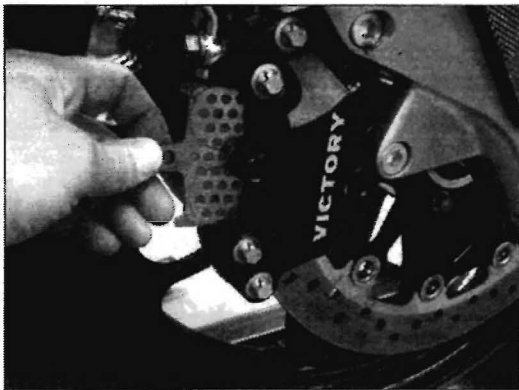
2. Remove spring plate (B); note direction of plate (wide legs at top) for assembly.
3. Push each pad back by hand to gain clearance for new pads.

NOTE: Brake fluid will be forced back into the reservoir when pads are pushed back. Remove reservoir cover and monitor fluid level, or attach a hose to the brake bleeder screw (as described in Brake Bleeding on page 15.14) and open the bleed screw while pushing the pads and pistons back.

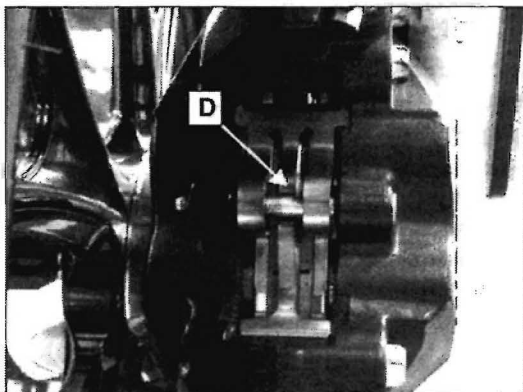
4. Remove each pad.
5. Wipe brake disc clean with a shop towel sprayed with Victory Brake Cleaner.
6. Inspect caliper piston seals for any sign of fluid leakage.
7. Install isolator on new brake pads. Be sure isolator plate (C) does not protrude from the brake backing plate.



8. Install new brake pads with friction material toward disc. Apply Silicone Grease (009-Z00-111) to O-ring on pad retaining pin.



9. Insert pin through caliper and through outer pad. Lay spring in place over pads and press on center (D) while sliding pin through spring and then through inner pad.



10. Torque pin to 17 Nm (12.5 lb-ft).
11. Inspect brake fluid in reservoir and set to proper level (page 15.14).
12. Slowly pump lever to set brake pads against disc. Lever should be firm, not spongy. If lever is spongy, inspect pad installation, bleed brake lines (page 15.14) and inspect brake disc (see page 15.18).
13. Install reservoir cover. Torque screws to 1.5 Nm (13 lb-in). Operate brake lever several times until lever is firm and pressure can be felt.

WARNING

After pad installation or any brake system repair, safely elevate wheel, apply and release brake pedal or lever 2-3 times and release. Verify wheel turns freely without drag. If brake drag is evident, do not operate the motorcycle. Inspect vehicle to determine cause and then repair as necessary.

REAR BRAKE PAD REPLACEMENT

Always replace brake pads as a set. The rear pads can be changed with the caliper installed on the motorcycle.

Refer to page 2.18 for rear brake pad inspection.

Do not attempt to remove the caliper from the bracket with bracket installed.

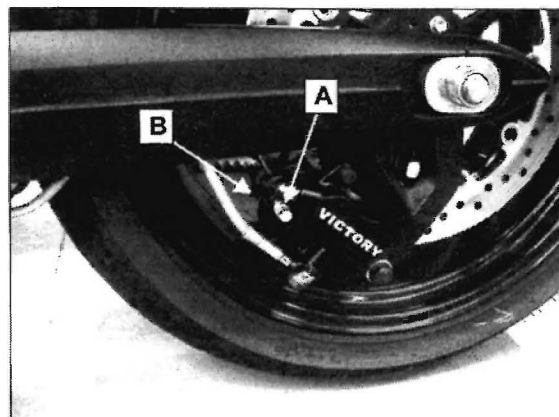
NOTE: Brake fluid will be forced back into the reservoir when pads are pushed back. Remove reservoir cover and monitor fluid level, or attach a hose to the brake bleeder screw (as described in Brake Bleeding on page 15.14) and open the bleed screw while pushing the pads and pistons back.

1. Push caliper toward wheel to push pad and pistons back and provide clearance for new pad installation.



NOTE: The caliper should move freely on the guide pins.

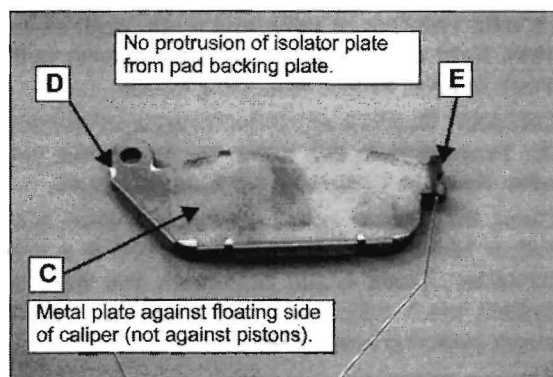
2. Slide retaining pin (A) out until inner pad can be removed. Note orientation of spring plate (B).



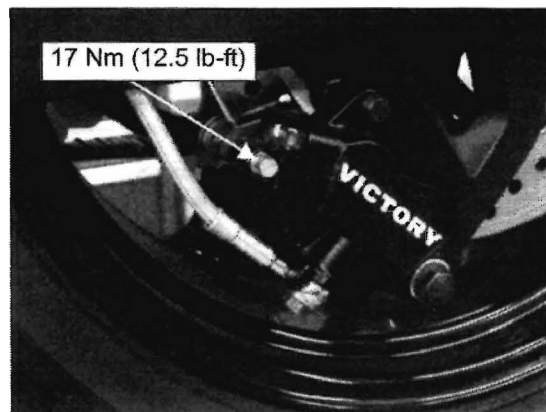
15.16



- Slide inner pad out front edge of rear caliper. Install new pad. Be sure backing plate (C) is properly installed on new pad with insulator (D) between brake pad and plate. Slide pad into place and engage tab (E) in the back of the caliper.
- Apply Silicone Grease (009-Z00-111) to O-ring on pad retaining pin. Install pin. **Torque to 17 Nm (12.5 lb-ft).**



- Install new outer brake pad. Be sure tab is engaged with caliper as for inner pad (see Step 3).



- Inspect fluid level in the reservoir and adjust as necessary (page 15.13).
- Pump brake pedal slowly several times to set new pads against disc, until lever is firm and pressure can be felt.
- Bleed brake system if necessary (page 15.14).

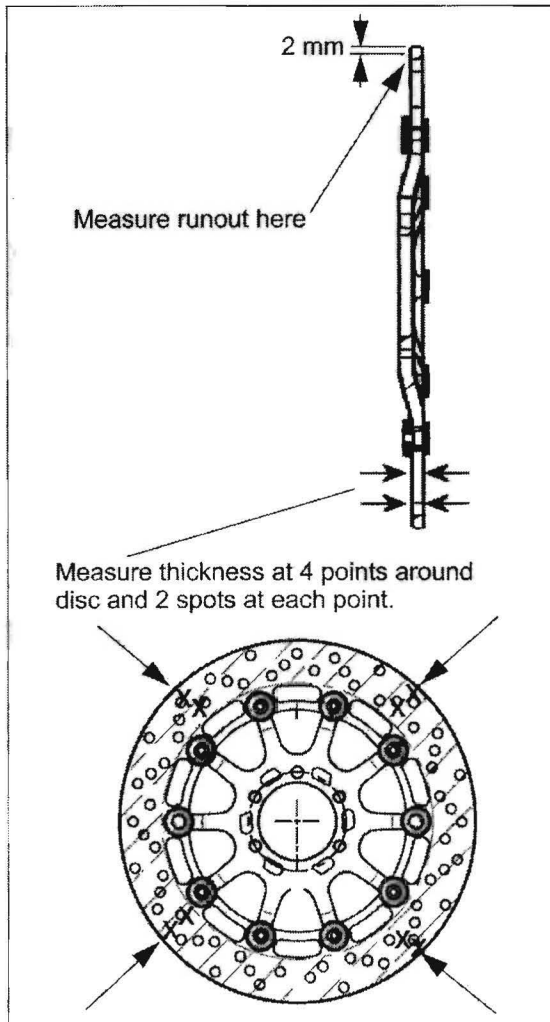
⚠ WARNING

After pad installation or any brake system repair, safely elevate wheel, apply and release brake pedal or lever 2-3 times and release. Verify wheel turns freely without drag. If rear brake drag is evident, inspect pedal clearance. Do not operate the motorcycle if drag is still evident after clearance adjustment. Inspect vehicle to determine cause and repair as necessary.



BRAKE DISC INSPECTION (Front & Rear)

1. Visually inspect disc for cracks or damage.
2. Measure brake disc thickness in several locations around disc with a micrometer, and along *wear surface* and compare to specifications found on page 15.3.



NOTE: Replace the brake disc if any measurement is worn beyond the service limit.

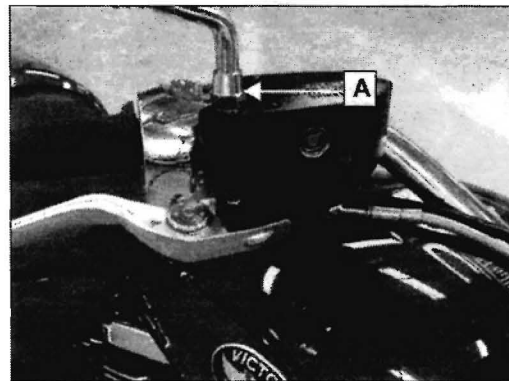
3. With disc mounted to wheel, inspect for brake disc runout / warpage with and compare to specifications found on page 15.3. Runout should be measured 2-4mm in from outside edge of disc.
4. If runout is excessive, refer to Troubleshooting at the end of this Chapter. Replace brake disc if dial indicator reading displays excessive brake disc runout and other possible causes have been eliminated.
5. Refer to Chapter 12 for front brake disc removal and installation. Refer to Chapter 13 for rear brake disc removal & installation.

FRONT MASTER CYLINDER SERVICE

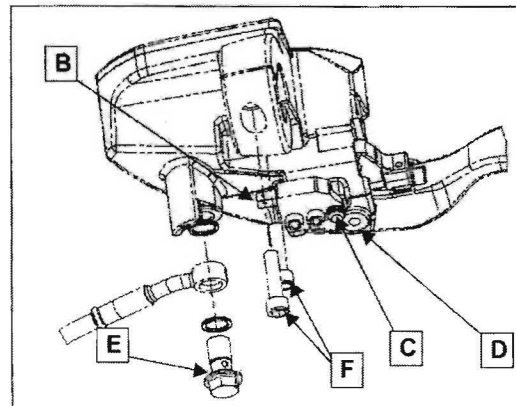
NOTICE: Brake fluid and brake cleaners could damage paint, plastics and some rubber compounds. Cover or remove plastic and painted parts before working on the brake system. If brake fluid is spilled on cosmetic surfaces, immediately rinse the area with a mild solution of soap and water until all traces of brake fluid are removed. Be sure master cylinder reservoir is level before removing cover.

IMPORTANT: Replace all rubber parts upon assembly.
NOTE: Procedure is the same for the clutch master cylinder. Refer to Chapter 9 for specifications.

1. Clean the master cylinder. Attach a drain hose to caliper bleed screw and place the end in a suitable container. Drain brake fluid from the front brake system (each caliper on dual front disc models) by slowly pumping brake lever.
2. Remove mirror (A).



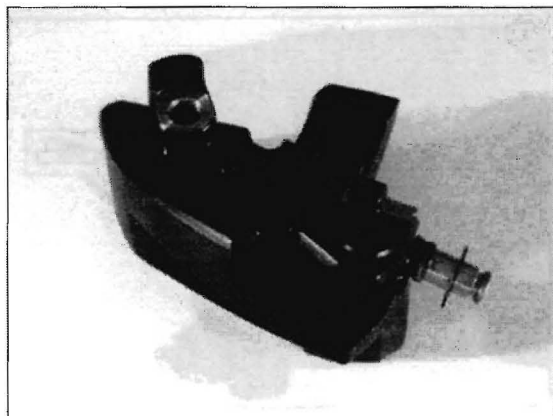
3. Disconnect front brake light switch wires at switch (B).
4. Remove switch (C) and brake lever nut (D), brake lever pivot screw, lever and bushing.
5. Remove brake line from master cylinder (E).
6. Remove screws (F), clamp, and master cylinder.



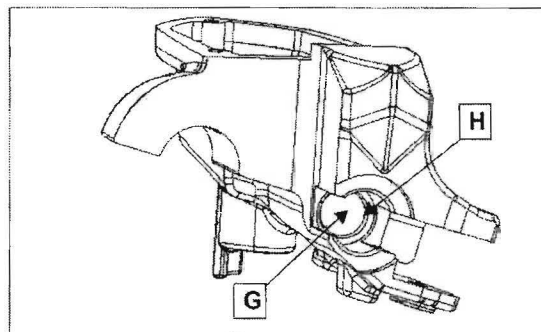
7. Remove reservoir cover and diaphragm.
8. Pull dust boot off piston and out of cylinder bore.
9. Remove snap ring.



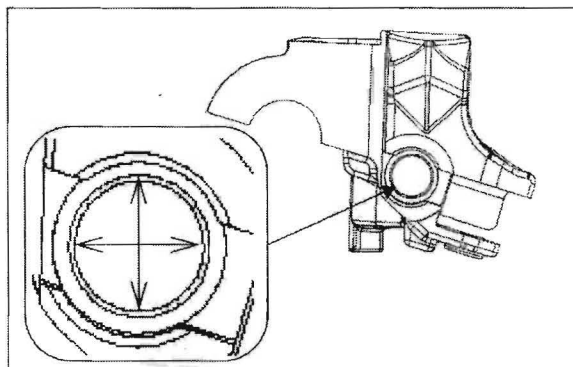
10. Slide piston out with spring. Note spring orientation for assembly of new spring (new parts).



11. Clean master cylinder with isopropyl alcohol and dry with compressed air. DO NOT soak in alcohol for more than 30 seconds. DO NOT aim pressurized air directly at the level sight glass.
12. Inspect bore (G) and chamfer of bore (H) for corrosion, scratches, scoring, or pitting. Replace master cylinder if any of these conditions are evident.



13. Measure the diameter of the bore. Replace master cylinder if worn beyond the service limit.



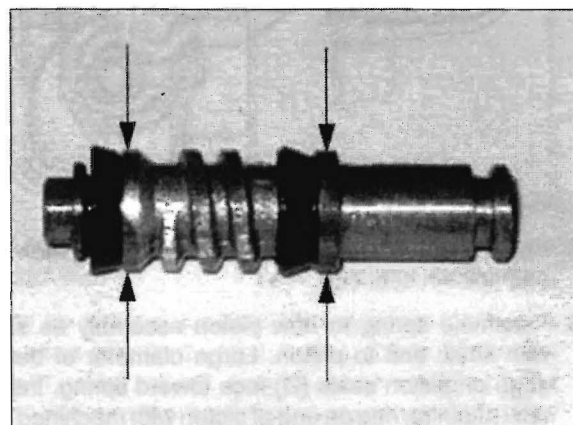
Master Cylinder Bore Diameter

Service Limit:

Dual Caliper: 15.913mm (.6265 in.)

Single Caliper: 12.743mm (.5017 in.)

14. Measure the diameter of the master cylinder piston in two places as shown below. Replace piston if worn beyond the Service Limit.



Master Cylinder Piston Diameter

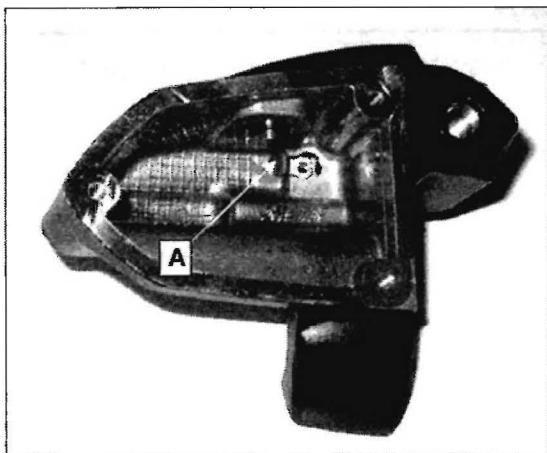
Service Limit:

Dual Caliper: 15.72mm (.6189 in.)

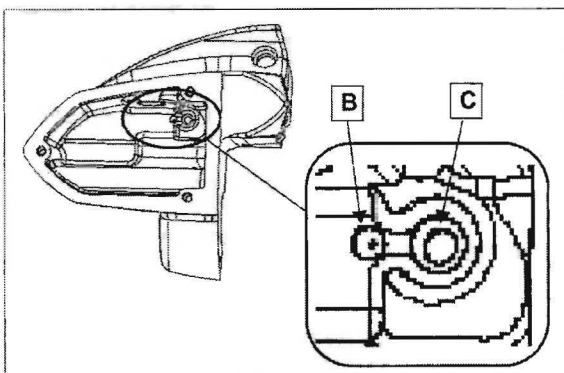
Single Caliper: 12.55mm (.4941 in.)



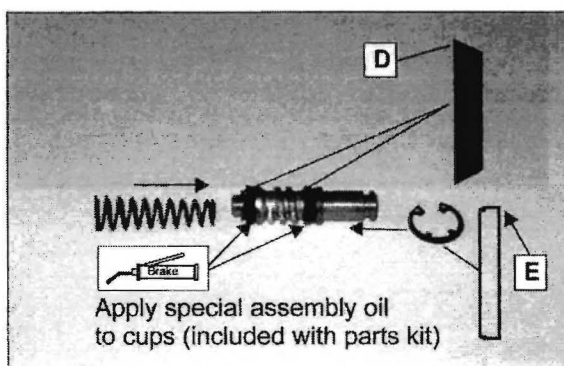
15. Remove deflector (A) from reservoir.



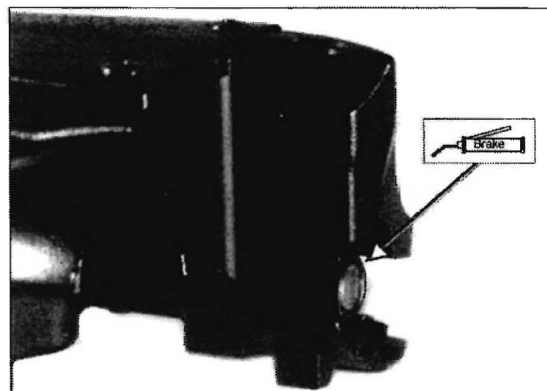
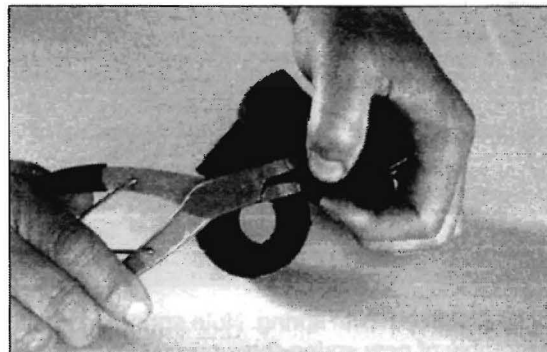
16. Clean the compensating port (B) and supply port (C) with compressed air to be sure they are clean and unobstructed. Re-install the deflector.



17. Apply a light film of special lubricant from piston kit to each piston seal cup.
18. Assemble spring to new piston assembly as shown with small end to piston. Large diameter of beveled edge on piston seals (D) face toward spring. Install a new retaining ring on end of piston with machined edge (sharpest of the two edges) facing out (E).



19. Carefully install spring / piston assembly into master cylinder bore. Work the front piston seal carefully past the chamfer and into bore. Use care not to damage or fold the seal when working it past the chamfer.
20. Continue to install the piston until the rear seal is past the chamfer. Push and hold the piston in far enough to allow the retaining ring to be installed.

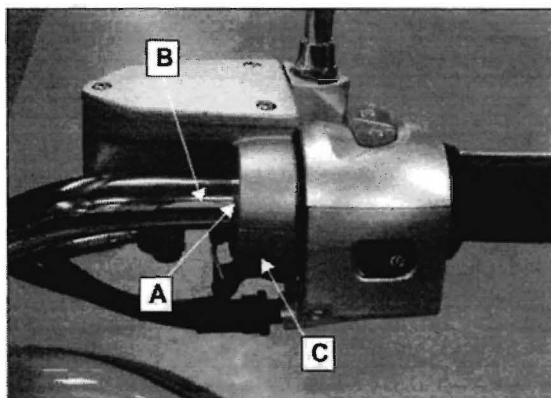


21. Be sure retaining ring is fully seated in the groove.
22. Clean the bore from the retaining ring outward, so the outer edge of the new dust boot adheres properly and will not dislodge from the bore.
23. Install new boot, seating the outer edge fully in the bore and engage outer lip of boot in piston groove.
24. Apply special lubricant from kit to brake lever contact surface.
25. Install master cylinder on handlebar. See page 15.21.

15.20

FRONT MASTER CYLINDER INSTALLATION

1. Clean the mounting surface on the handlebar.
2. Loosely install master cylinder, clamp, and screws. Rotate clamp on handlebar until parting line (A) of clamp is aligned with dot (B) on handlebar or position the master cylinder so top of reservoir is level with bars in the straight ahead position.



3. Torque rear clamp screw (C) first then torque front bolt to 11 Nm (96 lb-in).
4. Connect brake hose to master cylinder with banjo bolt and new sealing washers. Torque banjo bolt to 24.5 Nm (18 lb-ft).
5. Install brake light switch. Torque screws to 1.2 Nm (11 lb-in). Connect switch wires.
6. Lubricate brake lever bushing with special lubricant from kit and install lever. Torque pivot screw to 1.0 Nm (9 lb-in). Hold screw and torque nut to 6 Nm (52 lb-in).
7. Install mirror, adjust to proper angle, hold in position and tighten nut securely.
8. Turn handlebars until top of reservoir is level. Fill reservoir with Victory DOT 4 Brake Fluid and bleed the front hydraulic brake system (see page 15.14).

WARNING

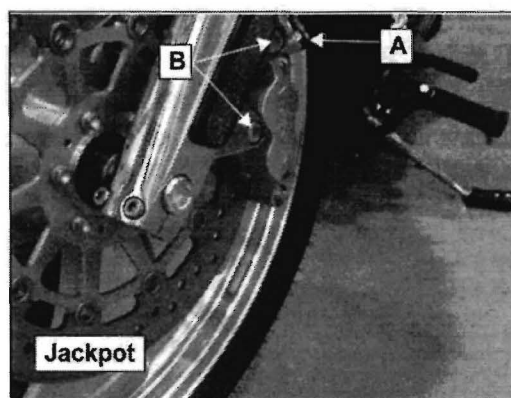
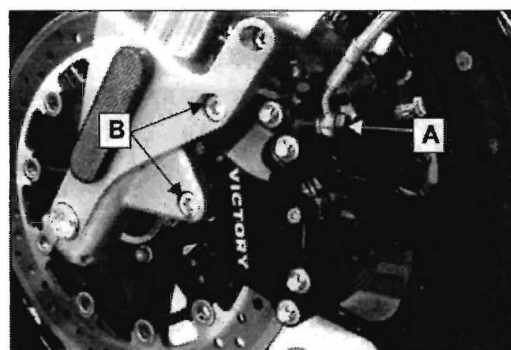
After pad installation or any brake system repair, safely elevate the wheel, apply and release the brake pedal or lever 2-3 times and release. Verify the wheel turns freely without drag. If brake drag is evident, do not operate the motorcycle. Inspect the vehicle to determine the cause and then repair as necessary.

FRONT CALIPER SERVICE

NOTICE: Brake fluid and brake cleaners will damage paint, plastics and some rubber compounds. Cover or remove plastic and painted parts before working on the brake system. If brake fluid is spilled on cosmetic surfaces, immediately rinse the area with a mild solution of soap and water until all traces of brake fluid are removed. Make sure the master cylinder reservoir being worked on is level before removing the cap. Replace all rubber parts upon assembly.

IMPORTANT: Replace all rubber parts upon assembly. Keep parts in order for assembly. *The top and bottom pistons in the caliper are not the same size.*

1. Remove banjo bolt (A), sealing washers, and brake hose from caliper assembly and allow it to drain into a container.
2. Remove front caliper mounting bolts (B) and remove the caliper.

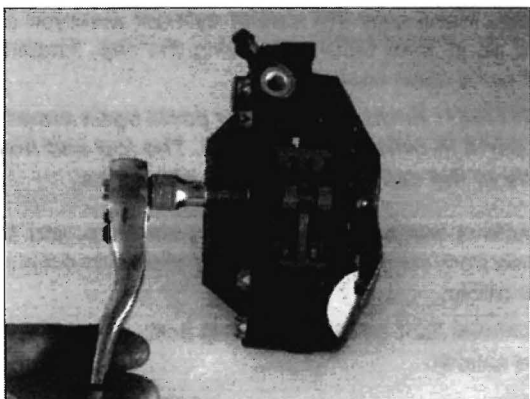


3. Cover the end of brake line(s) to prevent debris from entering.

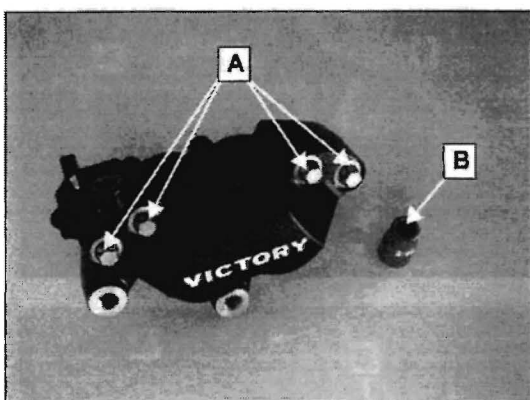


FRONT CALIPER SERVICE (CONT)

4. Cover the brake hose connection on the caliper and clean the outer surfaces of caliper assembly with Victory brake cleaner or isopropyl alcohol. Dry with compressed air.
5. Remove brake pads. **Pads contaminated with oil or grease must be replaced as a set.**



6. Remove the 4 caliper body bolts (A) using an E12 reverse Torx socket (B).



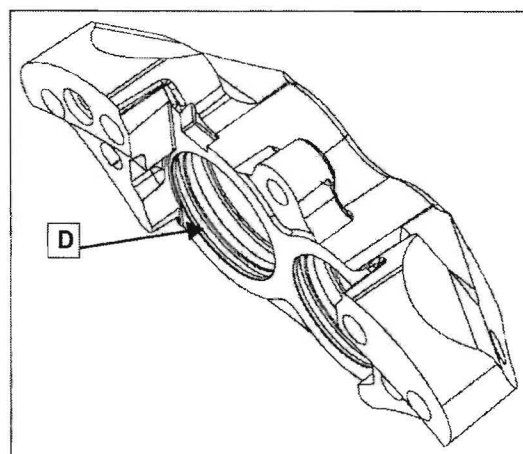
7. Separate the halves. Note the O-ring (C) used to seal the fluid passage. This O-ring must be replaced along with all rubber parts during assembly.



8. Keep parts in order for assembly in the same bore. *Top and bottom pistons (in each caliper half) have different diameters.*
9. Remove each piston with a caliper piston pliers. If a caliper piston pliers is not available, wrap the caliper in a shop towel and apply short bursts of compressed air through the brake line hole and through the transfer passage to force the pistons out of the bore.

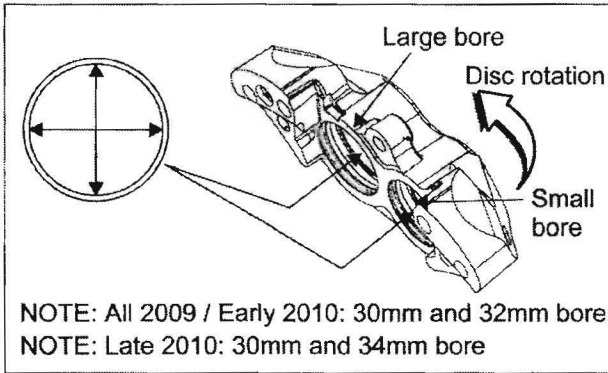


10. Remove dust seals and piston seals. Use care not to damage the seal bores.
11. Clean all parts thoroughly with isopropyl alcohol. Be sure the seal bores are clean, removing all traces of dirt or dried brake fluid.
12. Clean piston seal and dust seal bores (D) to remove residue that could cause the pistons to stick, resulting in brake drag.



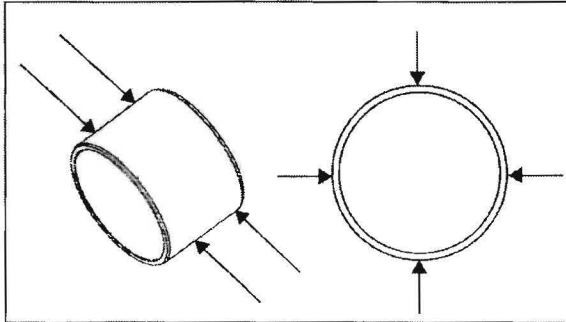
13. Inspect each piston bore for corrosion, scratches, scoring, or pitting. Replace caliper if any of these conditions are evident.

14. Measure the diameter of each caliper bore. Replace any caliper that is worn beyond the service limit.



**Front Caliper Bore Diameter
SERVICE LIMITS (By bore diameter)**
Std Bore 30.23mm: Limit = 30.31mm (1.1933 in)
Std Bore 32.03mm: Limit = 32.11mm (1.2641 in)
Std Bore 33.96mm: Limit = 34.04mm (1.3401 in)

15. Measure the outside diameter of each piston in two spots 90° apart, 5mm from outer edge. Repeat measurement 5mm from inner edge. Replace piston if worn beyond service limit at any measuring point.

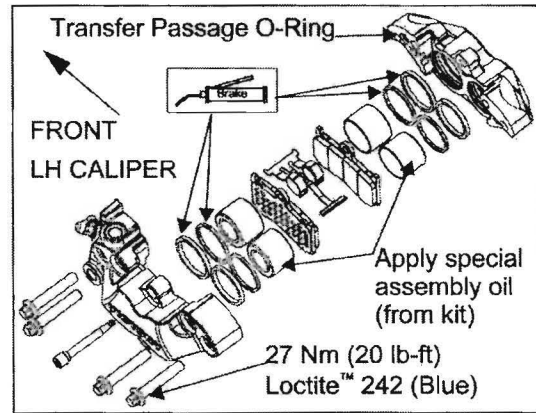


**Front Caliper Piston Outside Diameter
SERVICE LIMITS (By piston size)**
Std Size 30.15mm: Limit = 30.05mm (1.1846 in)
Std Size 32.00mm: Limit = 31.94mm (1.2575 in)
Std Size 33.91mm: Limit = 33.85mm (1.3327 in)

IMPORTANT: Install all new rubber parts during assembly. Do not reuse old seals or boots.

16. Apply special lubricant from service kit to new piston seals and dust seals.
17. Apply special assembly oil (included in kit) to outer surface of all pistons.
18. Install piston seals and dust seals in caliper body.

19. Install pistons in their respective bores.



20. Clean threads of each caliper body bolt making sure the threads are free from any oil, grease, or brake fluid. Apply a few drops of Loctite 242 (Blue) non permanent locking agent to the threads of each bolt.
21. Install a new O-ring on fluid transfer passage, assemble halves of caliper and start (4) bolts while holding pressure on halves to keep O-ring in place.
22. Evenly tighten bolts by hand until halves are secured.
23. **Torque bolts to 27 Nm (20 lb-ft).**
24. Install brake pads. Torque pin to 17 Nm (12.5 lb-ft).

FRONT CALIPER INSTALLATION

1. Clean mounting surfaces of caliper and fork leg.
2. Apply Victory brake cleaner or isopropyl alcohol to a clean shop towel and wipe brake disc(s) clean.
3. Separate brake pads and install caliper assembly over brake disc.
4. Install caliper mounting bolts. **Torque to 42 Nm (31 lb-ft).**
5. Connect brake hose to caliper with banjo bolt and new sealing washers.
6. Fill and bleed the front brake hydraulic system (page 15.14).

WARNING

After pad installation or any brake system repair, safely elevate the wheel, apply and release the brake pedal or lever 2-3 times and release. Verify the wheel turns freely without drag. If brake drag is evident, do not operate the motorcycle. Inspect the vehicle to determine the cause and then repair as necessary.

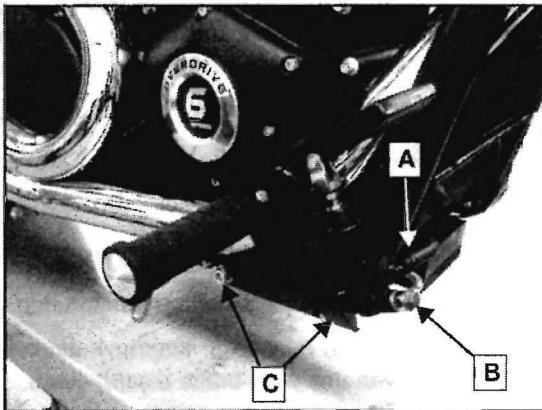


REAR MASTER CYLINDER SERVICE

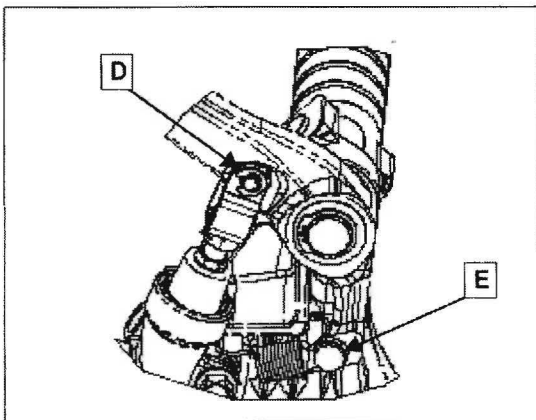
NOTICE: Brake fluid and brake cleaners will damage paint, plastics and some rubber compounds. Cover or remove plastic and painted parts before working on the brake system. If brake fluid is spilled on cosmetic surfaces, immediately rinse the area with a mild solution of soap and water until all traces of brake fluid are removed. Make sure the master cylinder reservoir being worked on is level before removing the cap. Replace all rubber parts upon assembly.

IMPORTANT: Replace all rubber parts upon assembly.

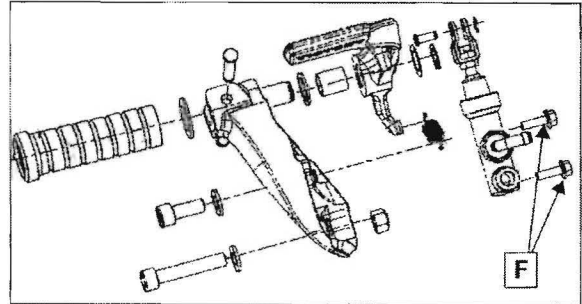
1. Remove clamp for reservoir hose at master cylinder (A) and disconnect fluid supply hose. Allow fluid to drain into a container.
2. Remove brake line banjo bolt (B), sealing washers and brake line.
3. Remove footpeg support bolts (C).



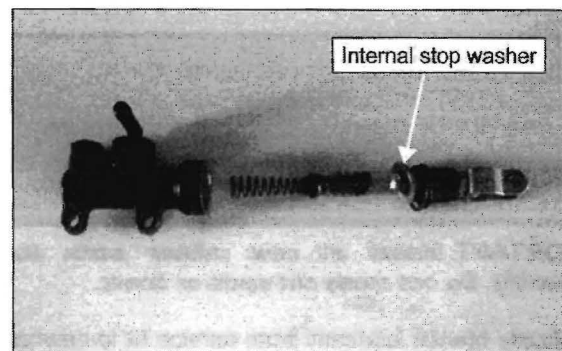
4. Remove retaining clip (D) from pushrod pin and remove pin from clevis. Note orientation of return spring (E) for assembly.



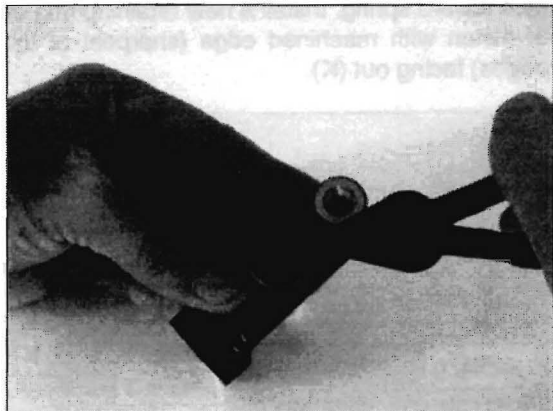
5. Remove master cylinder from footpeg support by removing the two mounting screws (F).



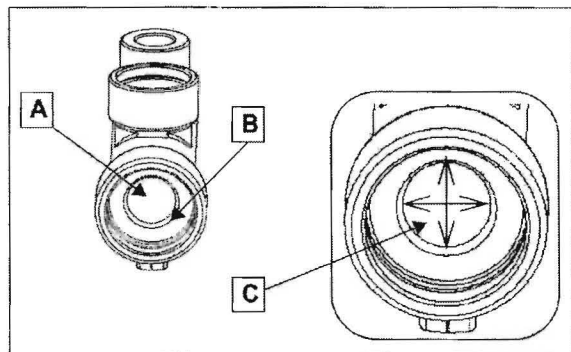
6. Compress pushrod and remove retaining ring. Slide the assembly out of master cylinder.



- Pull boot back from fluid supply fitting and remove retaining ring.



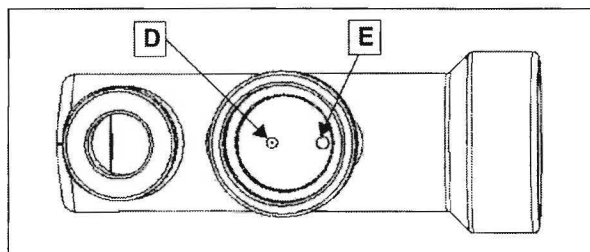
- Pull fitting from master cylinder with a twisting motion.
- Inspect cylinder bore (A) and chamfer (B) on the front of the bore for corrosion, scratches, scoring, or pitting. Replace master cylinder if any of these conditions are evident.



- Measure the bore diameter (C, above). Replace if worn beyond the service limit.

Master Cylinder Bore Diameter
Service Limit: 12.743 (.5017 in)

- Clean compensating port (D) and supply port (E) with compressed air to be sure they are clean and unobstructed.



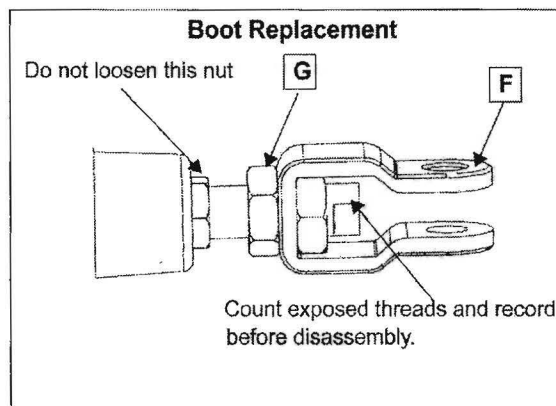
- Clean all parts with clean Victory DOT 4 brake fluid or isopropyl alcohol.

- Replace ALL RUBBER PARTS with new.

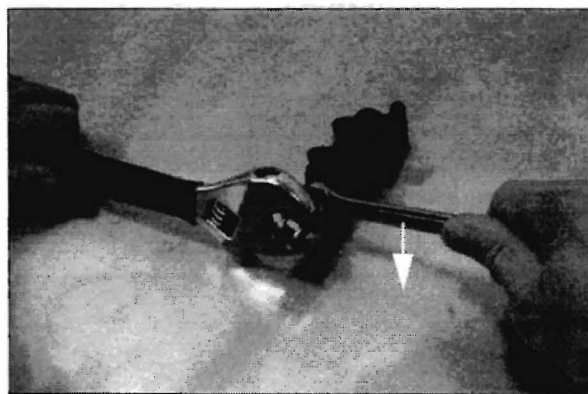
DUST BOOT REPLACEMENT

Measure the length of the pushrod assembly as shown below or count exposed threads above the nut inside the clevis prior to disassembly so pushrod length can be returned to an approximate adjustment after installing the dust boot.

NOTE: Pedal free play (clearance) must be inspected and adjusted before operating the vehicle.



- Hold clevis (F) and loosen lock nut (G) with a 12mm wrench (turn lock nut *clockwise* as viewed from the clevis end).

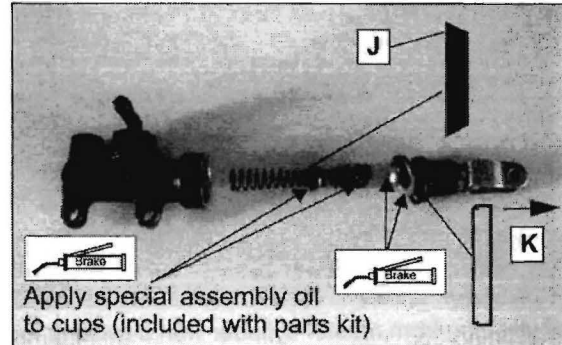
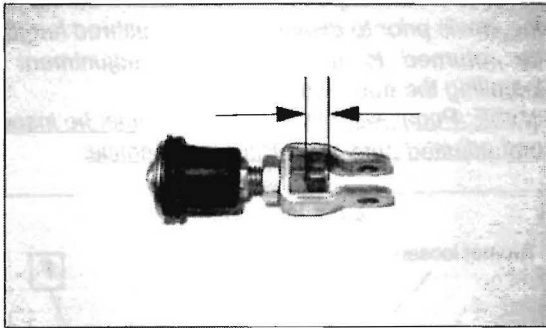


- Rotate clevis counterclockwise to remove it from the pushrod with the adjuster nut inside.

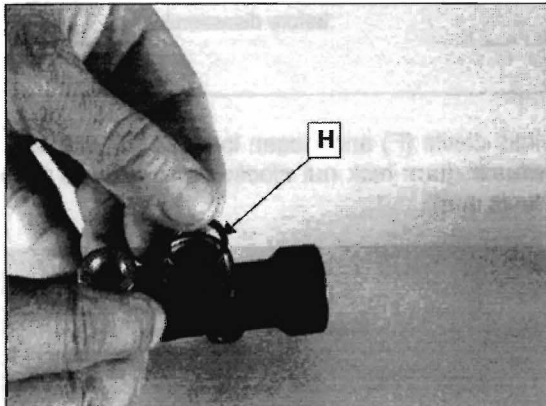


BRAKES

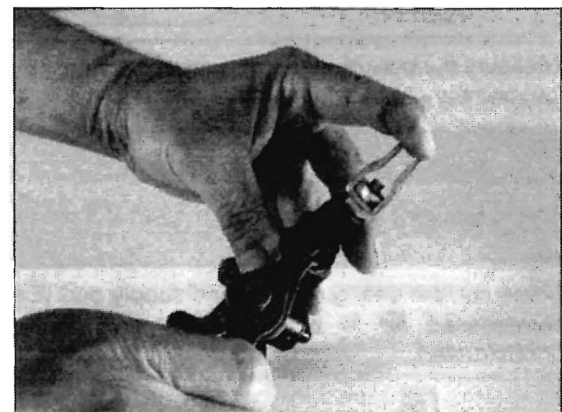
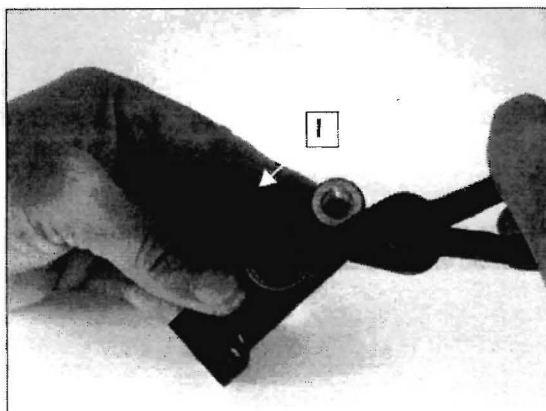
17. Remove lock nut from pushrod and remove old boot.
18. Install new boot and new piston retaining ring, and assemble the clevis.
19. Set the rod length back to the length recorded before disassembly.
24. Assemble spring to new piston with small end to piston. Large diameter of beveled edge on piston seals (J) face toward spring. Install a new retaining ring on end of piston with machined edge (sharpest of the two edges) facing out (K).



20. Hold clevis and tighten lock nut against it. **Torque to 17 Nm (12.5 lb-ft.).**
21. Apply Victory DOT 4 brake fluid to the O-ring (H) for the supply fitting and install it in the master cylinder.
25. Apply special lubricants from service kit to the seal cups, pushrod and backing washer.
26. Carefully install spring / piston assembly into master cylinder bore. Work the front piston seal carefully past the chamfer and into bore. Use care not to damage or fold the seal when working it past the chamfer.
27. Continue to install the piston until the rear seal is past the chamfer. Push and hold the piston in far enough to allow the pushrod assembly and retaining ring to be installed.
28. Align the pushrod and install the retaining ring. Be sure it is fully seated in the groove.



22. Install supply fitting and retaining ring.
23. Press seal (I) into place until seated.



29. Press outer edge of boot into the bore. The outer edge of boot and the bore should be dry so boot does not dislodge.
30. Pull the inner edge of the boot into place on the boot retainer nut on the pushrod.

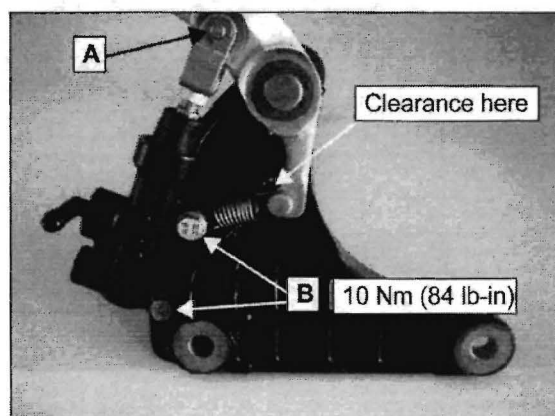
15.26



REAR MASTER CYLINDER INSTALLATION

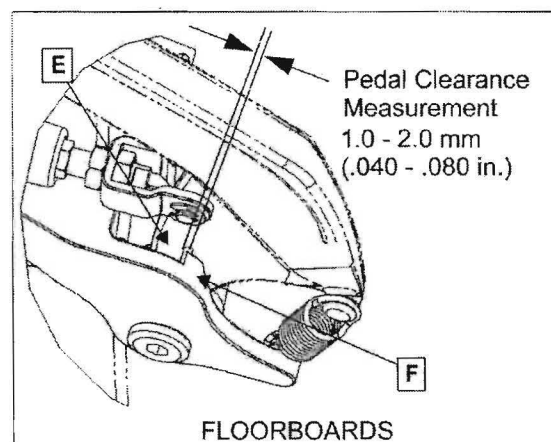
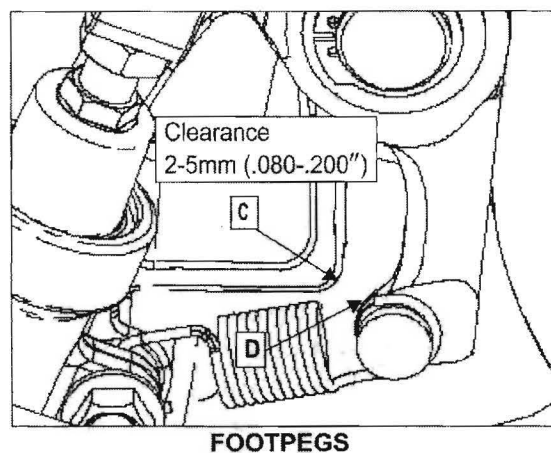
Also refer to the appropriate Assembly View at the beginning of this chapter.

1. Install master cylinder on footpeg support, engaging clevis with brake pedal.
2. Apply a light film of grease to clevis pin and install from outside to inside. Install a new retaining ring (A) on pin.
3. Position pedal return spring behind upper mounting post and install cylinder mounting screws (B). **Torque mounting screws to 10 Nm (84 lb-in).**



4. Verify the pushrod length adjustment.
FOOTPEG MODELS: There must be 2 - 5 mm (.080 - .200") clearance between the corner of the casting (C) and the pedal (D) when pedal is in fully released position and master cylinder piston is against its internal stop.
FLOORBOARD MODELS: There must be 1-2 mm (.040 - .080") clearance between pedal (E) and pedal stop (F) when pedal is in fully released position and master cylinder piston is against its internal stop.

5. Re-adjust pushrod length to provide specified clearance if necessary.



6. Assemble the footrest support to the vehicle. Torque bolts to 47.5 Nm (35 lb-ft.)
7. Attach fluid supply hose to master cylinder supply fitting using a new clamp.
8. Install the brake line with new sealing washers and torque banjo bolt to 24.5 Nm (18 lb-ft).
9. Fill the reservoir with Victory DOT 4 brake fluid and bleed the system as outlined on page 15.13.

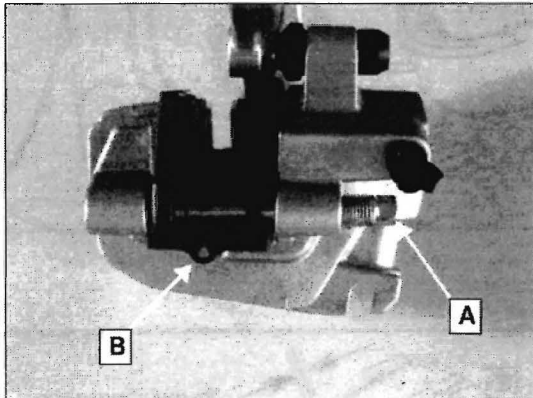
WARNING

After pad installation or any brake system repair, safely elevate the wheel, apply and release the brake pedal or lever 2-3 times and release. Verify the wheel turns freely without drag. If brake drag is evident, do not operate the motorcycle. Inspect the vehicle to determine the cause and then repair as necessary.



REAR CALIPER SERVICE

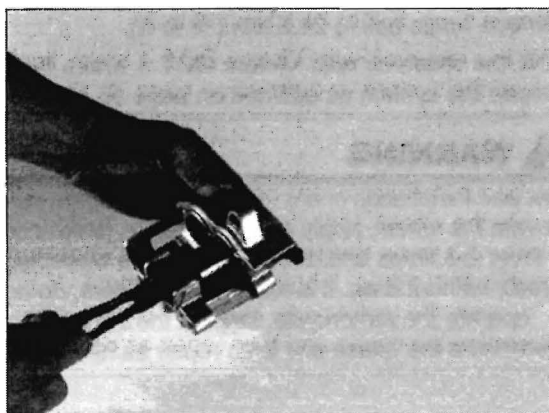
1. Remove banjo bolt and sealing washers from rear caliper and allow fluid to drain into a container.
2. Remove rear wheel (Chapter 13). Caliper and bracket must be removed as an assembly.
3. Remove pin (A) and brake pads. Note orientation of spring plate (B) for assembly.



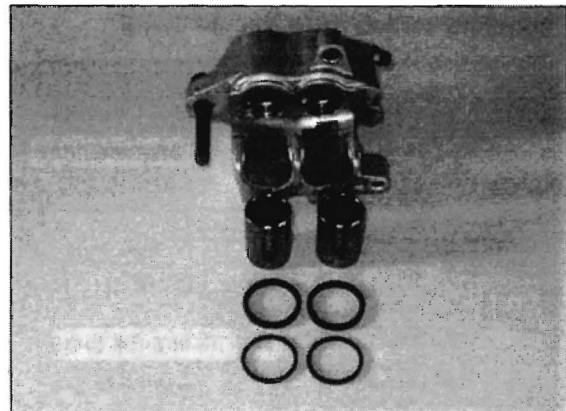
4. Slide caliper bracket off pins and remove spring plate.



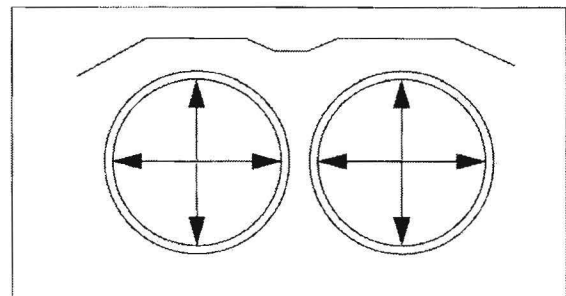
5. Remove caliper pistons. Keep pistons in order for installation in their respective bores.



6. Remove dust seals and piston seals. Use care not to damage the seal bores.
7. Clean caliper thoroughly with isopropyl alcohol. Dry with compressed air. Clean seal grooves thoroughly. Any residue left behind in the grooves could cause caliper pistons to stick and result in brake drag.
8. Inspect each bore and surface of each piston for corrosion, scratches, scoring, or pitting. Replace caliper assembly if any of these conditions are evident.



9. Measure diameter of each bore and piston. Replace caliper assembly or parts if worn beyond service limit.

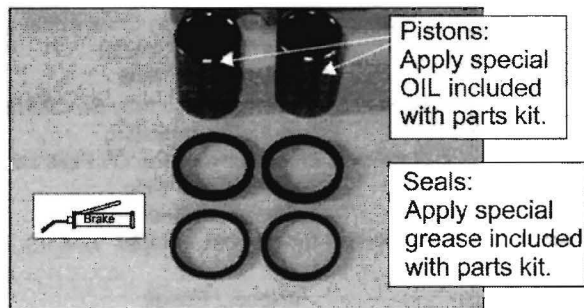


Caliper Piston Bore Diameter
Service Limit: 27.05mm (1.0649 in)

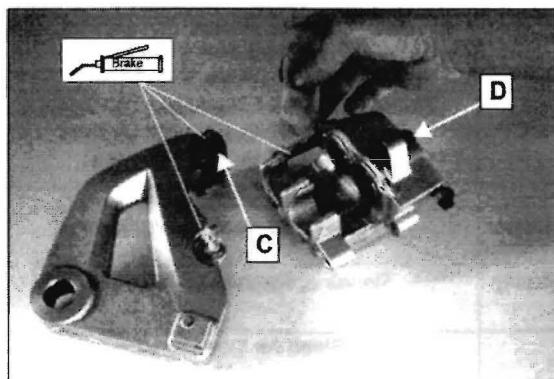
Caliper Piston Diameter
Service Limit: 26.935mm (1.0604 in)



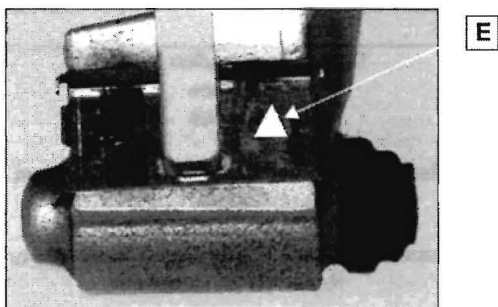
10. Install all new rubber parts during assembly. Do not reuse old seals or boots. Apply special lubricant from service kit to new piston seals and dust seals.
11. Apply special assembly oil to outer surface of all pistons.



12. Install piston seals and dust seals in caliper body.
13. Install pistons in their respective bore.
14. Replace caliper pin boot (C) on bracket and (D) on caliper. Apply special lubricant from service kit to boots and both pins.

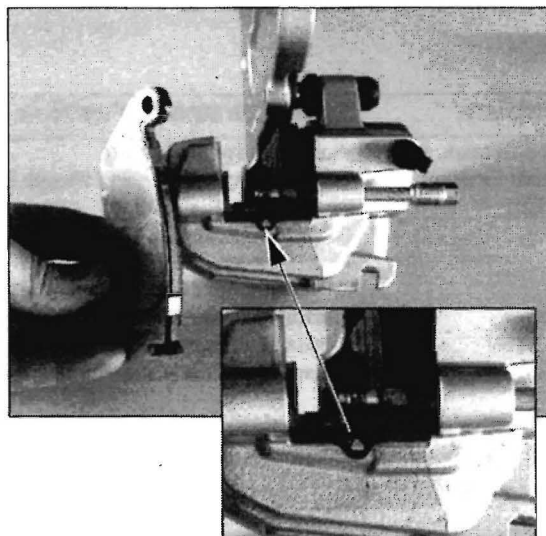


15. Be sure brake pad guide plate is in place on bracket with arrow (E) pointed up.

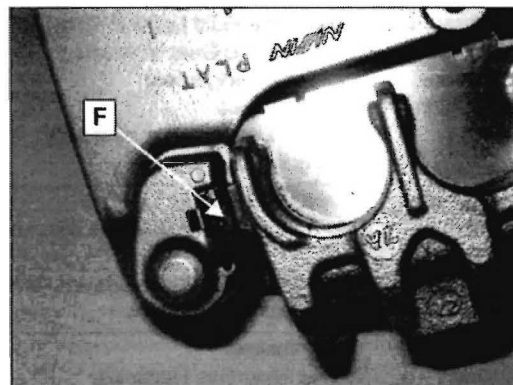


16. Assemble bracket to caliper. Remove excess lubricant.
17. Install spring plate and outer brake pad. Start pad pin through outer pad.

18. Install inner pad with insulator and backing plate.



19. Torque brake pad pin to 17 Nm (12.5 lb-ft).
20. Be end tabs of pads are both fully engaged in the heel plate (F) on bracket.



REAR CALIPER INSTALLATION

1. Install caliper and bracket. "REAR WHEEL INSTALLATION" on page 13.22
2. Install brake hose, and banjo bolt with new sealing washers.
3. **Torque banjo bolt to 24.5 Nm (18 lb-ft.)**
4. Fill and bleed the rear hydraulic brake system. Refer to page 15.13.

WARNING

After pad installation or any brake system repair, safely elevate the wheel, apply and release the brake pedal or lever 2-3 times and release. Verify the wheel turns freely without drag. If brake drag is evident, do not operate the motorcycle. Inspect the vehicle to determine the cause and then repair as necessary.



TROUBLESHOOTING

Problem	Symptom and/or Possible Cause	Possible Repair
Weak Brakes or Erratic Braking Action	Fluid Leakage (External) Fluid Leakage (Internal of Master Cylinder) Worn Pads Oil Contamination of Brake Pads and/or Brake Disc Air In System Low Brake Fluid Level In Reservoir Excessive Brake Disc Runout Worn or Damaged Wheel Bearings. Loose Front Axle Nut or Clamps or Loose Rear Axle Caliper Mount Surface Uneven Or Misaligned; Missing or Damaged Fasteners Clogged or Restricted Hydraulic Line Caliper Bracket Misaligned, Bent or Distorted Loose Brake Disc Brake Pads Glazed	Repair or Replace Leaking Component Replace Master Cylinder Replace Brake Pads Pads Must Be Replaced. Disc May Be Cleaned. Bleed Air From System Fill Reservoir, Bleed Brakes, Top Off Fluid Level. Replace Brake Disc. Replace Wheel Bearings. Torque Correctly, See Chapter 12 & 13 Inspect / Repair Replace Line(s) Replace Bracket Install New Screws. Torque to Specification Replace Pads. Avoid Needless Heavy Braking for 100-200 miles (Burnish New Brake Pads).
Poor Brakes or No Brakes When First Applied. Brake Lever Pressure Present If Lever Is "Pumped".	Air In System Low Brake Fluid Level In Reservoir Brake Disc is Bent or Warped Caliper Misalignment External Leak Internal Leak (master cylinder) Faulty Brake Hose	Bleed Air From System Fill Reservoir, Bleed Brakes, Top Off Fluid Level. Replace Brake Disc Determine Cause and Correct Repair or Replace Damaged Component Repair or Replace Master Cylinder Inspect for Bulges / Replace
Brake Pedal or Brake Lever Pulsates	Brake Disc Bent or Warped Mounting Surface of Brake Disc Uneven / Disc Loose Caliper Mount Surface Uneven Or Misaligned; Missing or Damaged Fasteners	Replace Brake Disc Repair or Replace as Necessary Repair or Replace as Necessary
Excessive Lever or Pedal Travel / Spongy Brake Feel.	Air in System Loose Mounting Hardware Low Brake Fluid Level In Reservoir Incorrect Brake Fluid Used See "Weak / Erratic Brakes" and Poor Brakes" possible causes above.	Bleed Air From System Repair as Necessary Fill Reservoir, Bleed Brakes, Top Off Fluid Level. Flush System and Replace With Correct Fluid
Fluid Leakage	Loose Banjo Fittings Damaged Banjo Fitting Sealing Washers Cracked / Damaged Hose Worn Master Cylinder Piston, Caliper Piston(s) or Seals Diaphragm (master Cylinder reservoir) Leaking Fluid level too high (new brake pads installed without removing added fluid)	Tighten to Specified Torque Replace Replace Repair / Replace Master Cylinder or Wheel Caliper. Inspect / Replace Cover, Cap, Diaphragm or Reservoir as Required Correct fluid level



Problem	Symptom and/or Possible Cause	Possible Repair
Brakes Drag Excessively or Self-Apply (Brakes Overheat)	Reservoir Over Filled	Adjust Level As Necessary
	Brake Pedal Or Lever Not Returning Completely To Rest Position	Inspect Linkage, Pivots and Mechanism For Cause Of Binding Or Restricted Movement;
	Inadequate Freeplay	Measure Pedal Clearance / Adjust
	Compensating Port Plugged	Repair or Replace Master Cylinder
	Internal Corrosion of Components (Master Cylinder / Caliper)	Replace Damaged Component
	Rear Caliper: Corrosion of Sliding Parts, Bent or Damaged Parts	Repair or Replace As Necessary
	Contaminated Brake Fluid	Flush System, Install Correct Fluid
	Caliper Pistons Sticking	Repair / Replace Caliper (Corrosion / Buildup of Residue In Caliper Piston Seal Grooves)
Brake Squeal/Squeak	Rider Error (Operator Riding Brakes)	Educate Operator
	If noise is minor and inconsistent, some brake squeak / squeal is characteristic of disc brakes and usually caused by dust / dirt on pads and / or brake disc.	Apply non oil-based solvent (such as Victory Brake Cleaner or isopropyl alcohol) to a clean shop towel and wipe dust / dirt from brake disc.
	Pad Not Secure in Caliper	Repair as Necessary. Inspect Pad Installation
	Aftermarket (not genuine Victory) Parts	Install Genuine Victory Parts
	Worn or Damaged Wheel Bearing(s)	Replace
	Worn Pads / Disc	Replace



BRAKES

NOTES

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CHAPTER 16

CHARGING SYSTEM & BATTERY

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CHARGING SYSTEM & BATTERY

IMPORTANT INFORMATION

GENERAL

All electrical system and component service can be performed with the engine in the frame.

CAUTIONS TO OBSERVE DURING ELECTRICAL SYSTEM SERVICE

CONNECTORS

Always turn off ignition switch before disconnecting any electrical component.

Always verify that bullet-type connectors are free of corrosion, contamination or breaks when troubleshooting electrical problems.

Verify that bullet-type connectors are firmly seated. Listen and/or feel for a click when connecting them.

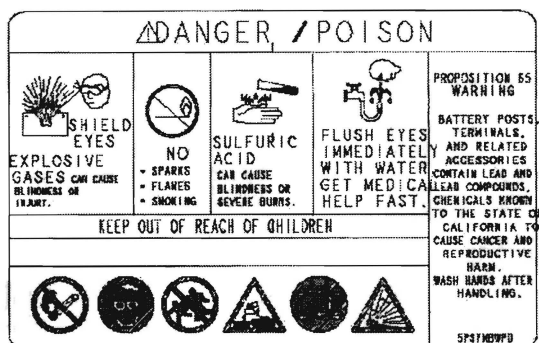
Ensure to release the lock on lock-type couplers before disconnecting them to avoid damaging the connector.

Pulling on the wires when disconnecting couplers can introduce problems. Hold the connectors themselves when disconnecting them, not their associated wires.

Inspect each male and female terminal of multi-pin connectors for corrosion, contamination, loose or bent pins.

BATTERY SAFETY

BATTERY LABEL



WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Antidote:

External: Flush with water.

Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

Eyes: Flush with water for 15 minutes. Call physician immediately.

Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in an enclosed space. Always shield eyes when working near batteries.

KEEP BATTERIES AND BATTERY ACID OUT OF REACH OF CHILDREN.

CAUTION

The charging system used on the motorcycle is calibrated for the maintenance free battery that is installed as original equipment. Do not replace with a conventional lead-acid battery.

Before troubleshooting the charging system, inspect the battery thoroughly. A discharged, poorly charged or faulty battery will make the readings obtained during charging system troubleshooting erroneous or difficult to interpret.

CAUTION

Even with a good battery, battery voltage can recover after charging, but under excessive loads the battery voltage will drop quickly and eventually "die". Often the charging system is suspect when it is not the cause of the problem. Always inspect for excessive loads if the battery continues to lose its charge. Items such as incorrect wattage bulbs, sticking brake light switch(s), continuous low rpm operation or leaving the lights on without the engine running for long periods of time can drain a battery even if the charging system is operating correctly.



A battery will self-discharge when the motorcycle is not in use. Make sure to properly store the battery as outlined later in this section.

Maximum voltage and service life is only achieved when the battery is properly serviced initially. Make sure to follow instructions outlined later in this section.

Overcharging can be caused by a faulty battery (shorted cell). Test system with a known good battery when diagnosing an overcharge condition.

New batteries must be properly maintained as outlined in this section to ensure proper service life.

CAUTION

CONNECTING AND DISCONNECTING THE BATTERY

Be sure to disconnect the **negative** battery cable **first** when **removing** the battery.

Be sure to connect the **positive** battery cable **first** when **connecting** the battery.

If corrosion is found on terminals, remove battery and clean terminals with a solution of baking soda and water. Finish the process by cleaning terminals (both battery and battery cables) with a wire brush.

Once connections are secured, apply a thin film of Nyogel™ grease to the terminals.

Make sure that the positive terminal has its protective boot in place.

CAUTION

FUSES

Fuses are in place to protect circuit wiring and components. Always determine the cause of an open fuse before installing a new fuse.

Do not increase the value of the fuse to correct the problem.

Do not use wire, tin foil or other substitutes for fuses.

CAUTION

ELECTRONIC COMPONENTS

Semiconductor parts used in electronic components will not withstand careless handling.

Do not drop or strike parts that contain semiconductors such as the ECM or rectifier/regulator. Dropping electronic components can cause damage to the component.

Follow instructions supplied in this chapter, including chapter 5 (Fuel Injection) and chapter 17 (Ignition System), very carefully when working on electronic components. Failure to follow instructions may cause irreparable damage to the part being inspected.

CAUTION

WIRE ROUTING

Make sure that all wires are routed correctly away from moving parts, hot exhaust, or sharp edges.



CHARGING SYSTEM & BATTERY

SPECIFICATIONS

GENERAL

Item	Specifications	
Electrical (General)	Ignition System	Distributor-less Transistorized Dual Coil Type Ignition
	Starting System	Electric
	Charging System	Permanent Magnet / 3 Phase / Full Wave Rectification
	Regulator/Rectifier	Solid State Three Phase Voltage Regulator/Rectifier
	Lighting System	12 V DC

CHARGING SYSTEM & ALTERNATOR

Item	Specifications	
Alternator No Load AC Output @ 900 RPM (Engine cool)	17.5-21 V AC @ Idle	
Alternator No Load AC Output @ 2000 RPM (Engine cool)	44 VAC at 2000 RPM	
Stator Coil Resistance (@ 21°C / 70°F) (Black to each other black) (Disconnect regulator - see test page 16.14).	less than 1 Ohm	
Stator Coil Resistance To Ground (Each black wire)	Infinity (no continuity)	
Regulator/Rectifier Regulated Voltage	14.3 - 14.7 V DC	
Alternator Output (Amps / Watts)	48 A, 13VDC @ 3500 RPM	
Battery (P/N 4011374)	Type	Yuasa: YTX20HL-BS
	Voltage	12 Volts DC
	Nominal Capacity @ 10 Hr Rate	18 AH
	Recommended Battery Charging Current	STD: 1.85 A for 5 to 10 hrs
	Cold Cranking Amp Rating	310

FASTENER TORQUE

Charging System		
Description	Torque Nm	Torque lb-ft (in-lb)
Flywheel Bolt	102 Nm	75 lb-ft
Primary Cover Screws	9.6 Nm	(85 in-lbs)
Regulator/Rectifier to Bracket	9.6 Nm	(85 in-lb)
Regulator/Rectifier Bracket to Crankcase	9.6 Nm	(85 in-lb)
Stator Mounting Screws to Primary Cover	11 Nm	(100 in-lbs) Loctite™ 242

SPECIAL TOOLS

Engine Stop Tool: PV-43502

Flywheel Puller: PV-43533

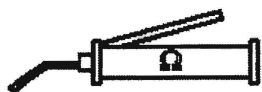
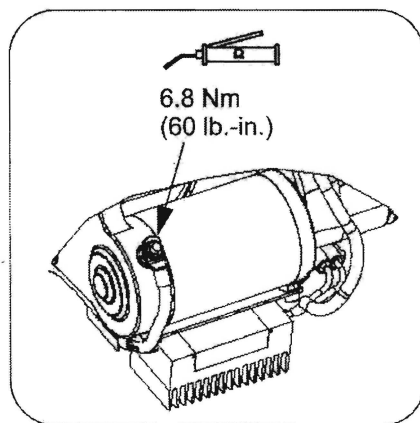
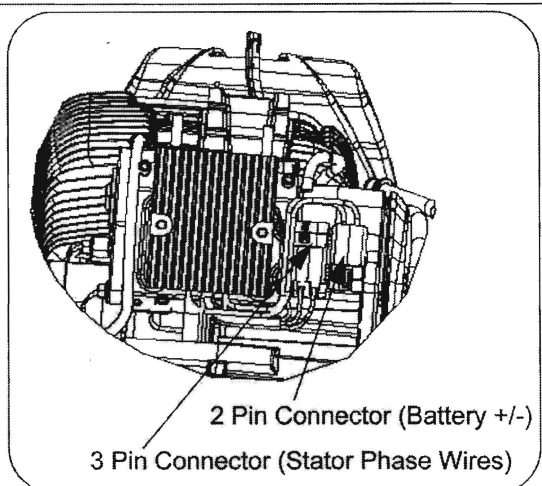
Digital Multi-Meter: PV-43546

Connector Test Kit: PV-43526 or Fluke Probe Adaptors

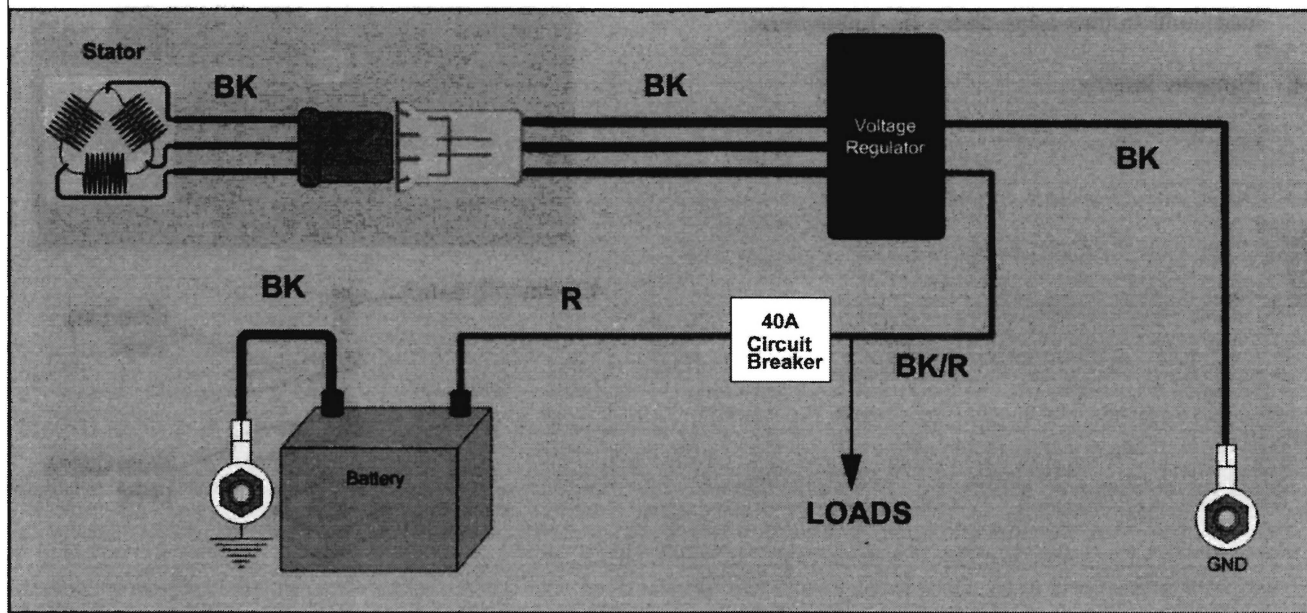
Battery / Conductance Tester: MDX - 610P / PU-50296

16.4





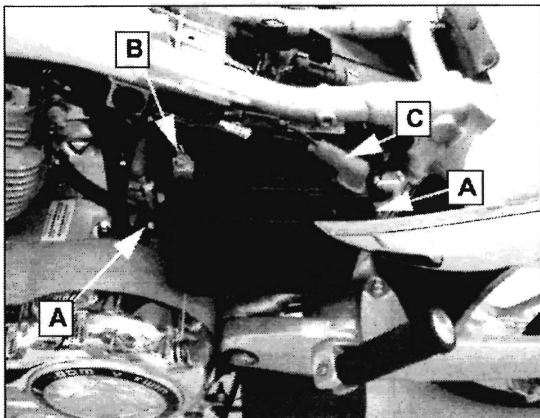
Apply Di-electric grease
P/N 2871329



BATTERY

BATTERY REMOVAL

1. Remove both side covers. (Chapter 3).
2. Remove operator's seat. (Chapter 3).
3. Jackpot: Remove rail covers.
4. Remove battery cover nuts (A) and cover.



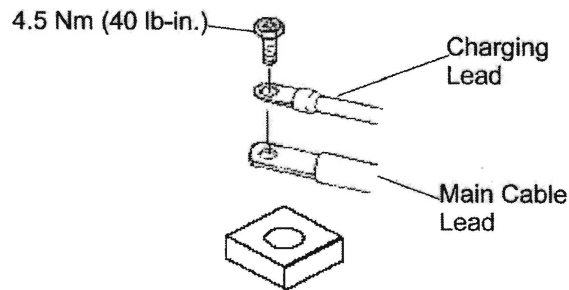
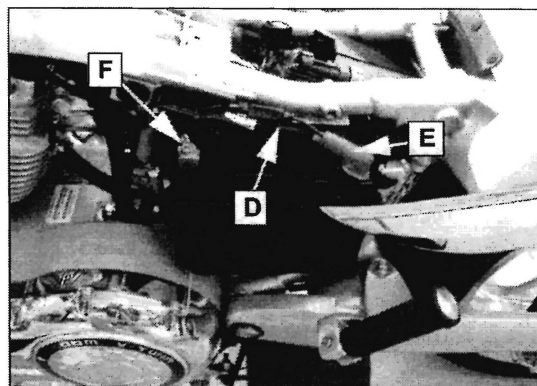
5. Remove negative (-) battery terminal bolt and cable first (B).
6. Remove positive (+) battery terminal bolt and cable last (C).
7. Lift battery up and tip the top edge inward (toward the bike) until bottom edge clears the battery box.
8. Remove battery.

BATTERY INSTALLATION

NOTE: Be sure cable ends and battery terminals are clean. Apply a light film of di-electric grease to terminal bolt threads.

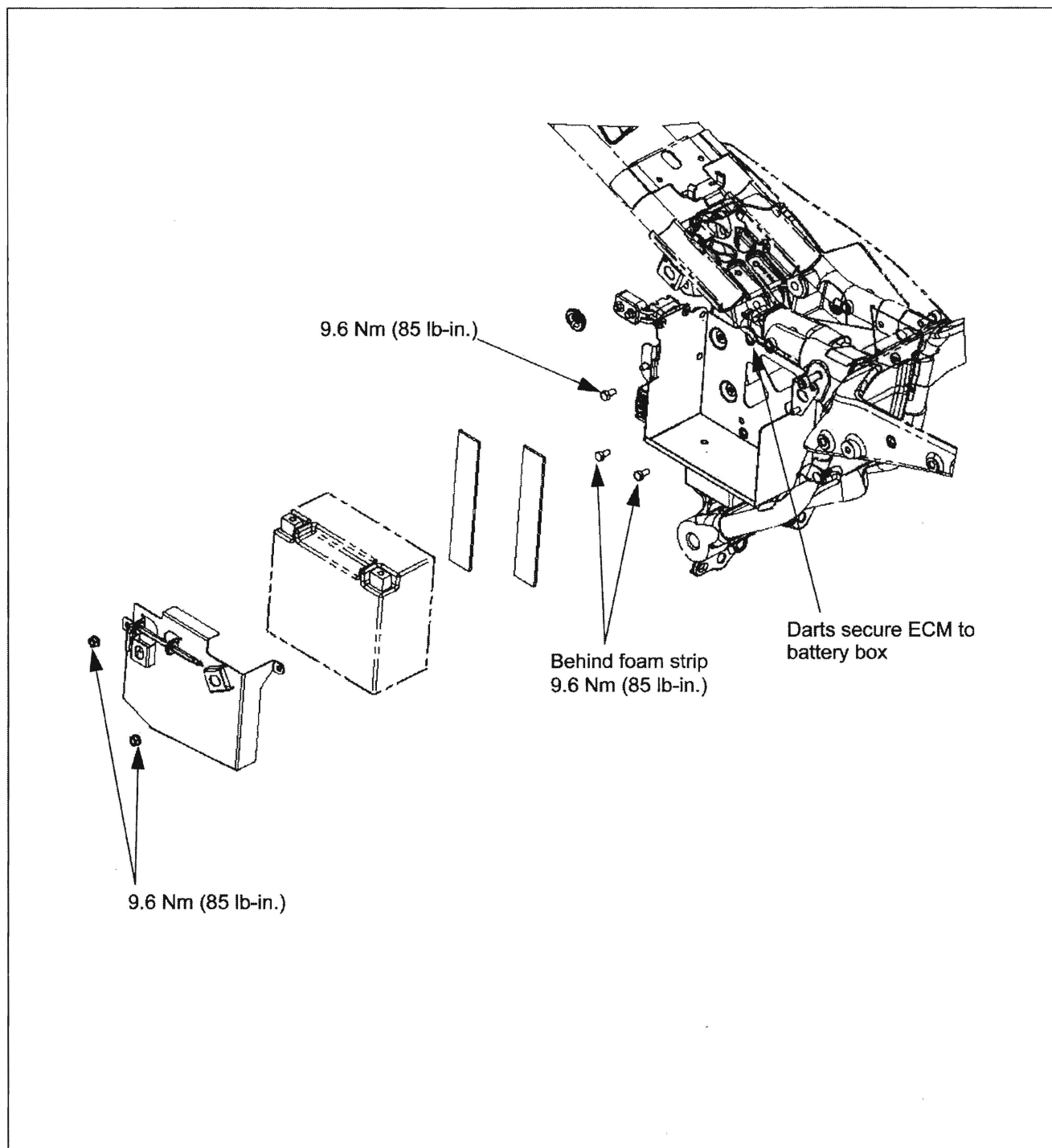
1. Carefully install battery with negative (-) terminal toward front of vehicle.
2. Connect positive cable (D) and charging lead ring terminal (with red marking).
3. Apply dielectric grease over terminal area for corrosion protection.
4. Slide red protective boot (E) over the terminal.
5. Connect ground (negative) cable (F) and charging lead ring terminal.
6. Apply dielectric grease over terminal area for corrosion protection.
7. Install battery cover. Assemble two nuts to studs and torque to 4.5 Nm (40 lb.-in.).

NOTE: Install side covers, seat, and rail covers (Jackpot).



BATTERY BOX

1. Remove battery (page 16.6).
2. Remove (3) battery box bolts.
3. Remove battery box.



CHARGING SYSTEM & BATTERY

BATTERY CHARGING - NEW BATTERY

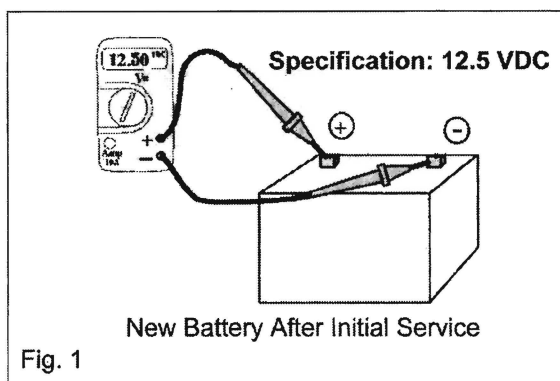
1. Charge the battery at 1.8 amps for 5 to 10 hours. use a straight rate charger (not load sensing or battery tender type) for the initial charge of a new battery.

CAUTION

Do not attempt to quick charge the battery at any time.

2. Remove battery from charger and let it sit for 30 minutes or longer.

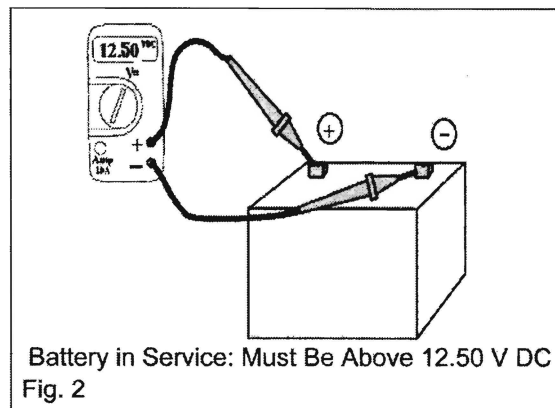
Measure voltage with a digital multimeter (Fig. 1). If lower than 12.5VDC, battery must be recharged again in accordance with step 1 and 2 above.



Specification: 12.5 V DC

3. After charging battery and letting it sit for 30 minutes or more, check battery voltage again. If battery voltage is still below 12.5 V DC, replace the battery.

BATTERY CHARGING (IN SERVICE)



1. Measure battery voltage with a digital multimeter. The reading should be above 12.50 V DC. If battery voltage is lower than 12.50 V DC battery must be charged according to the instructions given below. (Fig. 2)

CAUTION

Do not remove caps on battery while recharging. Do not attempt to inspect or add fluid to a maintenance free battery.

2. Charge battery at 1.8 amps for 5 to 10 hours.

Specification: 1.8 A for 5-10 hours

3. Remove battery from charger and let it sit for 30 minutes or longer.
4. Measure battery voltage with a digital multimeter. If battery voltage is lower than 12.50 V DC battery must be recharged again in accordance with step 1 and 2 above.
5. After charging battery and letting it sit for 30 minutes or more, check the battery voltage again. If battery voltage is still below 12.50 V DC, replace battery.

NOTE: When motorcycle is not used for one (1) month or more, remove battery and store it in a cool, dry area. Inspect voltage monthly and charge according to above instructions if necessary.



BATTERY INSPECTION

1. Remove battery.
2. Inspect battery tray and hold-down cover for damage and tight fasteners. Be sure all foam strips are in place on battery box (page 16.7).
3. Inspect for cracked or broken battery case.

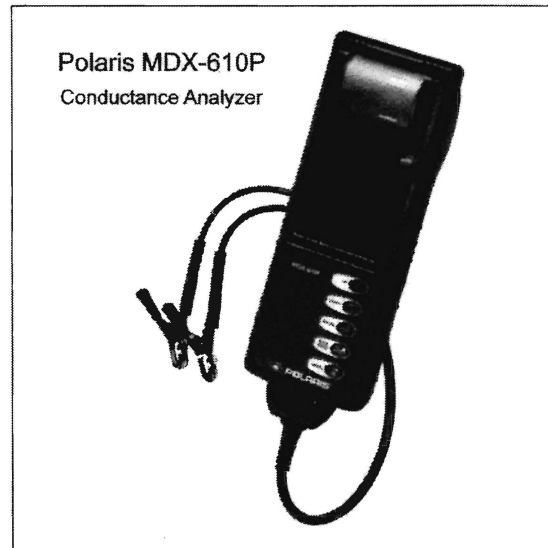
CAUTION

Do not remove the battery cap assembly in an attempt to inspect fluid level, specific gravity or attempt to add fluid to battery. After initial servicing, battery should remain sealed.

4. Inspect terminals for corrosion. If corrosion is found, remove battery and clean terminals with a solution of baking soda and water. Finish process by cleaning terminals (both battery and battery cables) with a wire brush.
5. Install battery (page 16.6).
6. Once connections are secured, apply a thin film of dielectric grease to terminals.
7. Install left side frame cover and seat.

Battery Testing

The recommended battery tester for all Victory batteries is special tool: MDX - 610P / PU-50296.

**Battery Conductance Analyzer**

Conductance describes the ability of a battery to conduct current. A conductance tester functions by sending a low frequency AC signal through the battery and a portion of the current response is captured, from this output a conductance measurement is calculated. Conductance testing is more accurate than voltage, specific gravity, or load testing.

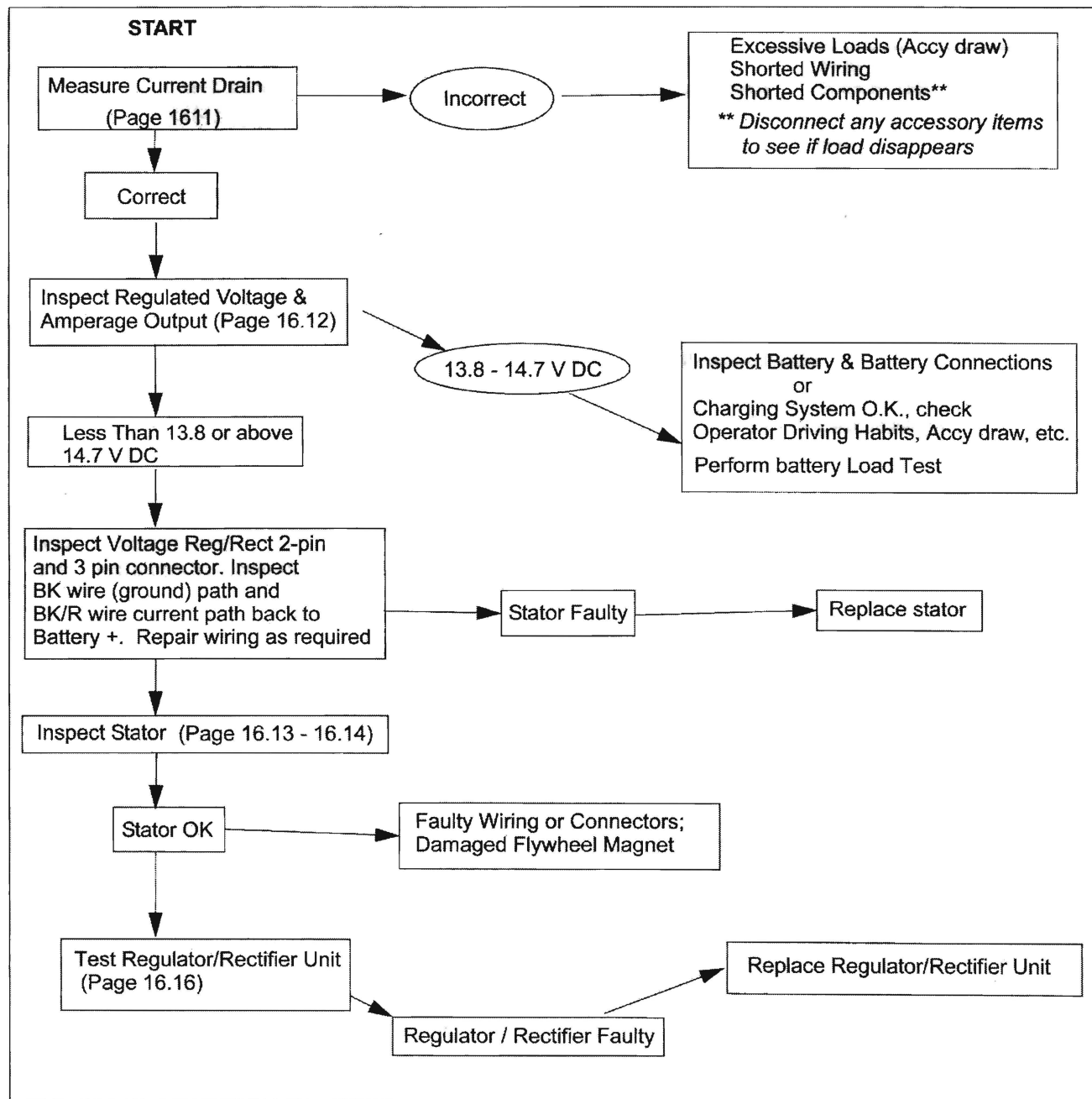
Authorized Polaris dealers/distributors are required to use the conductance analyzer when testing 12V Polaris batteries.



DIAGNOSTICS

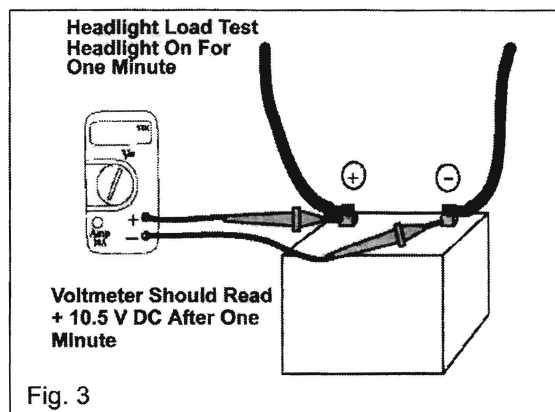
TROUBLESHOOTING

NOTICE: The battery must be fully charged and in good condition to obtain accurate readings. Battery charging current is automatically reduced by the regulator / rectifier if the regulator / rectifier unit reaches a critical temperature (overheated). The system should be cool when testing DC charging output or when testing the regulator / rectifier to ensure accurate readings. Refer to test procedure for individual charging system components for more information.



BATTERY LOAD TEST

1. Perform a battery load test using a battery load tester. Follow the load tester manufacturer instructions carefully.



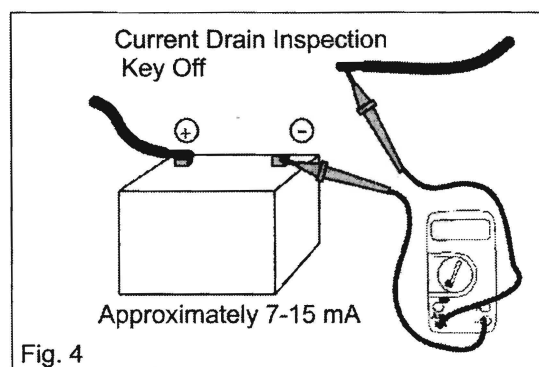
NOTE: Although not as conclusive, the following test can be used to direct troubleshooting efforts if a battery load tester is not available.

2. Charge battery as outlined in this section.
3. Install fully charged battery.
4. Connect red lead of a DC voltmeter to "+" battery terminal and the black lead to "-" terminal. (Fig. 3)
5. Turn ignition key on.
6. Switch head light to high beam position and leave it on for 1 minute (without the engine running).
7. At end of one minute, the digital multimeter should show a reading of above 10.5 V DC.
8. If battery voltage drops below 10.5 VDC, battery should be charged again and the test repeated. Battery condition is suspect if voltage falls below 10.5 VDC.

CURRENT DRAIN INSPECTION

Current drain is suspect if battery discharges when motorcycle is not in operation (short periods of storage).

1. Remove seat and left side cover.



2. Disconnect ground cable (-) from battery.
3. Install leads of multimeter to measure milliamps. Connect red (+) probe to ground cable and connect black (-) probe to battery negative (-) terminal. (Fig. 4)

Fluke™ 73 Multimeter PV-43546 or equivalent.

NOTE: Do not operate electric starter or meter fuse will be damaged.

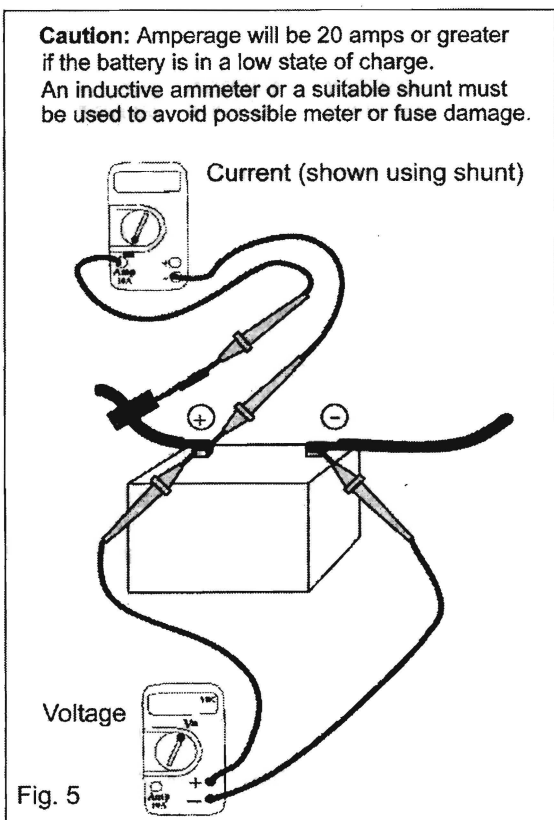
4. With ignition switch off, read current drain.
5. If current drain exceeds specifications inspect wiring and components for short to ground.

Specification: Less than 2 mA

6. Locate the faulty component or wiring by disconnecting accessories, wiring connections, and fuses one-at-a-time while observing current drain. When current drain falls within specifications, focus efforts on the last circuit or component that was disconnected.

REGULATED VOLTAGE / AMPERAGE OUTPUT INSPECTION

1. Remove side covers and operator's seat.



2. Remove battery cable and connect a 12V shunt as outlined in the instructions provided with shunt or use an inductive amperage clamp.
3. Set digital multimeter (DMM) to V DC scale.
4. Connect DC voltmeter red (+) lead to battery red (+) lead and black (-) voltmeter lead to battery black (-) lead. (Fig. 5)
5. Start engine and warm to operating temperature.
6. At 1000 RPM or slightly above; the ammeter should reach the "break-even" point (no amperage leaving the battery) and the voltmeter should be rising toward 14 VDC.

Specification: Break-even point for charging System:
1500 RPM

7. Increase engine RPM to 2500. The ammeter should rise a slight amount, then stabilize. Volt meter should read above 14 V DC.

8. Use results obtained from preceding tests and the following descriptions to determine if charging system is functioning properly.

CHARGING SYSTEM OPERATING CORRECTLY:

Ammeter goes up a small amount, then stabilizes slightly above +0 amps. Volt meter rises toward $14.8 \pm V$ DC, drops off a little and starts to stabilize.

LOW BATTERY: Amperage continues to rise, voltage levels off as battery is absorbing voltage. Charging system may be O.K. Need to charge battery fully or use a good battery and repeat test. Meters will indicate similar reading to the overcharging chart.

CHARGING SYSTEM UNDERCHARGING: Ammeter drops to 0 or remains below 0 (negative reading) at all rpm, volt meter remains the same or goes down. Go to voltage drop inspection.

CHARGING SYSTEM OVERCHARGING: Ammeter rises well above 0 and remains there or continues to rise. Volt meter goes well above 14.8 V DC and may continue to rise. Go to stator & voltage regulator/rectifier inspection.

EXCESSIVE LOAD: Current levels off or starts to drop, voltage continues to rise. Load may be excessive (accessories or shorted components). Determine if excessive loads are present. Disconnect accessories and re-test.

9. Turn ignition key off.
10. Remove ammeter shunt or inductive clamp.
11. Re-connect negative battery cables to battery.
12. Install seat and right and left side covers.



STATOR AC VOLTAGE OUTPUT INSPECTION

NOTE: DMM set to VAC (if meter has Vrms selection use Vrms). Engine cold. Regulator Rectifier disconnected (2-pin and 3-pin connector). Engine must be running. Be sure to heed the following Warnings and Cautions.

WARNING

HOT COMPONENTS

The engine and exhaust system become very hot during operation and remain hot for a period of time after the engine is shut off. Wear insulated protection for hands and arms or wait until the engine and exhaust system have cooled sufficiently before working on the machine.

WARNING

CARBON MONOXIDE

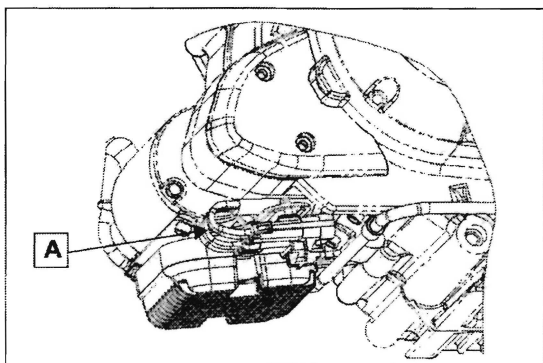
Never run an engine in an enclosed area. Exhaust contains poisonous carbon monoxide gas that can cause loss of consciousness and may lead to death. If you must run the engine to do some repairs, do so in an open area or with an exhaust evacuation system operating.

CAUTION

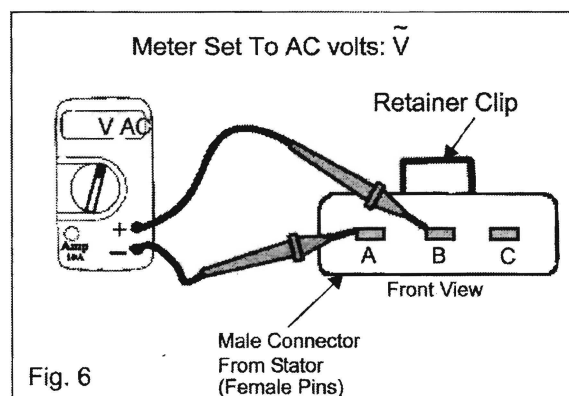
VOLTAGE / ARCING

Use caution not to touch any of the connections or allow the exposed terminals to come close to any other part of the vehicle or other objects, as an arc may occur.

1. Locate three wires coming from stator and follow the wires to the 3-pin connector.
2. Disconnect both 2-pin and 3-pin connector (A).



3. Set Digital Multimeter (DMM) to AC Volts scale.
4. Connect one lead of DMM to pin A (Fig. 6) on the wire connector that comes FROM the stator.



5. Connect other lead to pin B (Fig. 12).

CAUTION

VOLTAGE / ARCING

Use caution not to touch any of the connections or allow the exposed terminals to come close to any other part of the vehicle or other objects, as an arc may occur.

6. Start the engine and let it run at idle. Observe the DMM reading.
7. The DMM should indicate a minimum reading of 17.5-21 V AC at idle.
8. If using a meter other than the Fluke 73, be sure your meter reads rms volts.
9. Repeat test for pins A & C.
10. Repeat test for pins B & C.

Specification:

No load AC Volts @ 900 - 1000 RPM:

48A Alternator - Approx 19 VAC @ 900 RPM

NOTE: The test results in Steps 7, 8 and 9 can read more than 22 VAC, but it is important that the reading for each pair of wires is approximately equal.

11. Increase RPM to 2000. Repeat Steps 4-9.

12. At 2000 RPM the reading should be at least 48VAC.

NOTE: The test results obtained in step 10 can read more than 48 VAC, but it is important that they are all approximately equal.

Specification:

No load AC Volts @ 2000 RPM:

48A Alternator - Approx 44VAC @ 2000 RPM

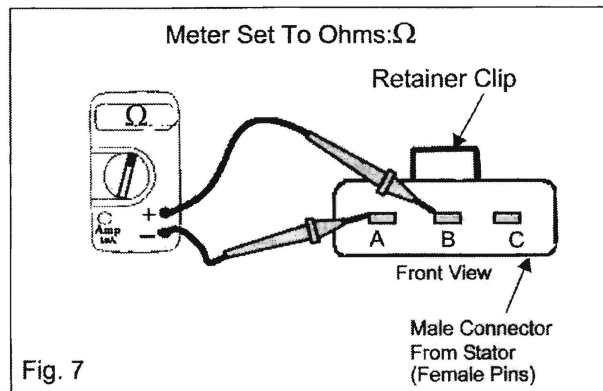


STATOR RESISTANCE INSPECTION

CAUTION

The **engine must not be running** while performing the following resistance test.

NOTE: DMM set to resistance. Engine OFF and cold. Regulator Rectifier disconnected (2-pin and 3-pin connector).



1. Disconnect the 3 pin connector from stator.
2. Set DMM to OHMs scale.

NOTE: Make sure DMM leads are plugged into correct jacks.

3. Connect one lead of DMM to any one of pins in multi-connector leading from stator. (Fig. 7)
4. Connect other lead of DMM to any one of the other two pins in the multi-connector and observe circuit resistance reading.

Specification:

Stator Resistance:

0.1-0.5 Ω (plus meter resistance, see below)

CAUTION

Do not allow your hands or fingers to touch meter leads or one meter lead and any grounded portion of the motorcycle or reading obtained will be inaccurate.

NOTE: 0.3 Ω to 0.5 Ω ohms may be less than the internal resistance of your meter leads or meter. Before measuring stator resistance, connect the meter leads together and read the display and record this measurement. Subtract this reading from stator resistance readings.

EXAMPLE: Connect meter leads together, meter reads 0.3 ohms. Measure stator resistance, meter reads .7 ohms. Subtract 0.3 ohms (meter/lead resistance) from .7 ohms.

True reading is:

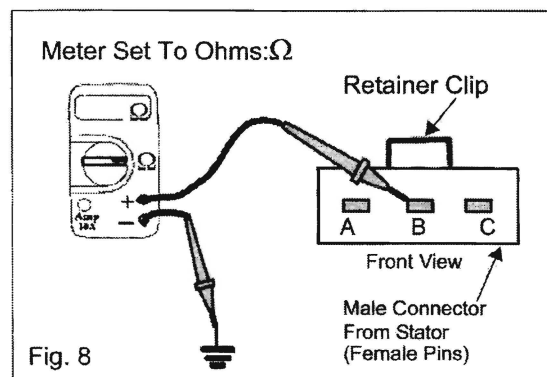
$$\begin{aligned} &0.7 \text{ ohms (observed reading when checking stator)} \\ &- 0.3 \text{ ohms (meter/lead resistance)} \\ &= 0.4 \text{ ohms (true stator winding resistance)} \end{aligned}$$

5. Remove one of the DMM leads and connect it to the other pin in the multi-connector. The reading should be the same as the first test reading.
6. Remove the lead that was connected to the same multi-connector pin for the first two tests and connect it to the other multi-connector pin. This reading should also be the same as the first two readings.

STATOR WINDINGS TO GROUND INSPECTION

NOTE: DMM set to resistance. Engine OFF and cold. Regulator / Rectifier disconnected (3-pin connector).

1. Connect one DMM lead to one of the multi-connector pins and place the other lead of the DMM in contact with a good engine ground, observe resistance to ground reading. (Fig. 8)



Specification: Stator Windings to Ground:
Open Circuit (OL)

2. Repeat test for other two stator leads to ground.
3. There should be no connection from stator windings to ground.

VOLTAGE DROP: RECTIFIER / REGULATOR TO BATTERY(+)

NOTE: Leave regulator / rectifier connected for this test.

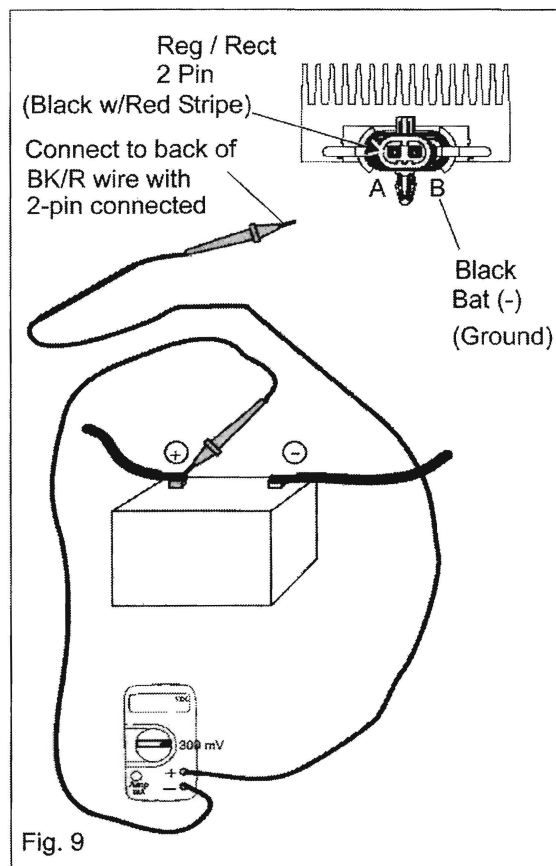


Fig. 9

1. Set Digital Multi-Meter (DMM) to DC Volts scale.
2. Connect red lead (+) of DMM to Black/Red wire coming out of regulator / rectifier. (Fig. 9)
3. Connect black lead (-) of DMM to positive (+) lead of battery.
4. DMM must read below 0.1 volts DC (100 mV). If it does read 0.1 V DC or less the circuit is O.K.

Specification: 0.1 V DC

5. If DMM reads above 0.1 volts DC there is excessive resistance in the circuit that must be corrected.
6. Likely problem areas will be the battery terminal connection and/or regulator/rectifier connector although the problem can be located at any point within the circuit. Visual inspections or continued voltage drop inspections are necessary to determine the cause.

STATOR REMOVAL

1. Remove primary cover (page 9.8).
2. Place primary cover on bench with padded material between primary cover and bench top.

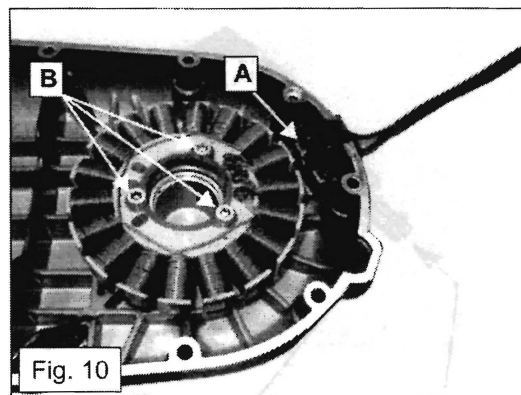
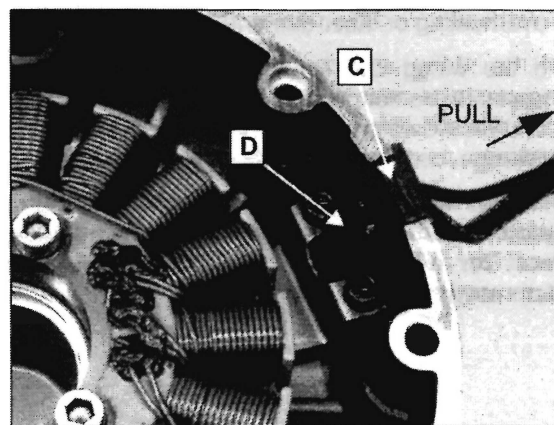


Fig. 10

3. Remove wiring retainer plate (A) (Fig. 10)
4. Remove three (3) socket head screws (B).
5. Remove stator from primary cover.

STATOR INSTALLATION

1. Clean stator mounting surface and screw holes in primary cover.
2. Place stator in primary cover taking care to route wires correctly in the channel.
3. Install screws and torque 12 Nm (100 lb-in).
4. Install grommet (C) into groove in cover and then install retainer plate. Torque screws to 5.7 Nm (50 lb-in).
5. Pull wires to remove any slack or loop at point (D). Wires must not protrude into flywheel rotor area.



6. Install primary cover (page 9.11).

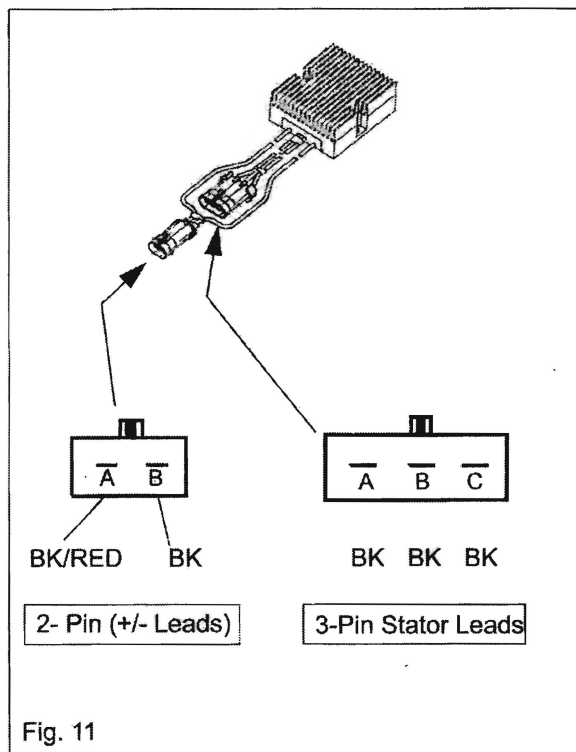
FLYWHEEL REMOVAL

Refer to page 9.24.



RECTIFIER / REGULATOR CONNECTOR INSPECTION

1. Disconnect 2 and 3 pin connectors. (Fig. 11)

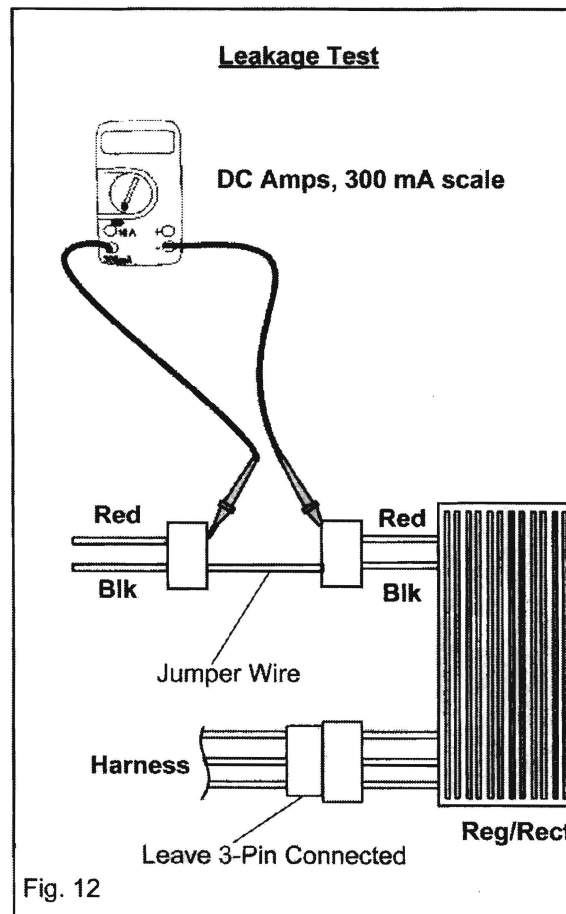


2. Inspect male and female pins in the 3-pin connector and the 2-pin connector carefully. Check for corrosion, loose pins, poor connections, or evidence of overheating or other damage.
3. If the wiring and connectors are undamaged and appear to be clean and tight, inspect the battery, stator, and related wiring. Test the regulator / rectifier for diode leakage, as described in the following tests.

NOTE: Do not touch the meter leads when testing the regulator rectifier. Readings in the following chart are correct for a Fluke™ 73 multimeter. Use of other meters may invalidate the test.

DIODE LEAKAGE TEST

NOTE: Engine must be OFF. Perform this test at the regulator / rectifier 2-Pin connector. Testing at any other point (between battery and battery cable for example) could include leakage not attributable to the Regulator / Rectifier unit.



1. Disconnect the 2-pin connector at voltage regulator / rectifier unit.
2. Install a jumper wire as shown to provide a complete ground path (Fig. 12).
3. Connect meter as shown, with red (+) meter lead to the red wire on harness side, and the black meter lead to the red wire on the regulator / rectifier side.
4. Compare leakage to specification below.

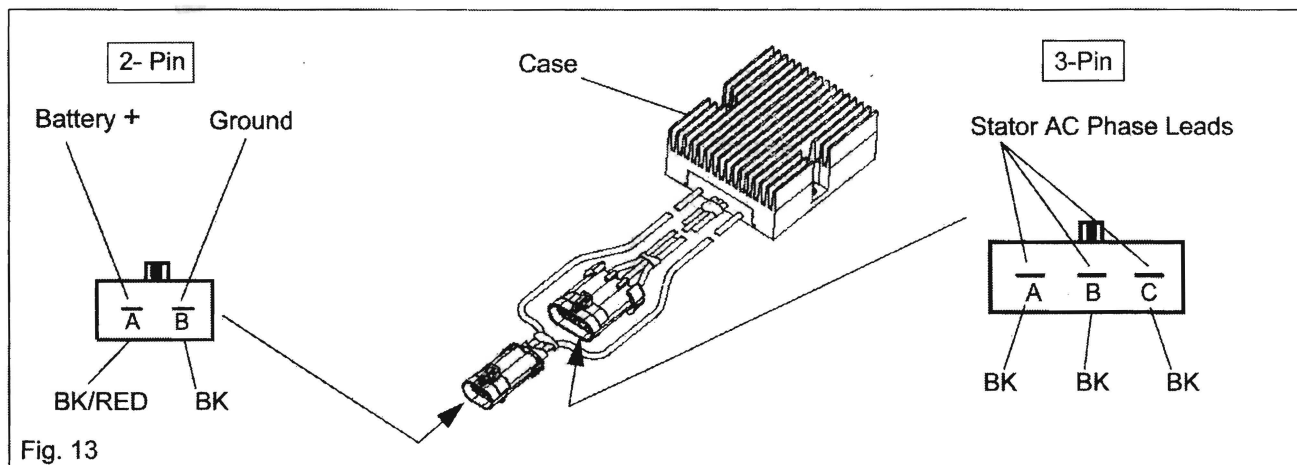
Specification:

Leakage: Less than 1.0 mA

REGULATOR / RECTIFIER TEST

- Remove the regulator / rectifier. Unit must be cool for accurate testing.

- Disconnect 2-Pin and 3-Pin connectors (Fig. 13)
- Use **DIODE CHECK** function on the Fluke 73 DMM
- Perform all tests described in test table below. Test results describe a properly functioning part.



Regulator / Rectifier Test Table - Set DMM to *DIODE CHECK* Function

DMM RED LEAD	DMM BLACK LEAD	RESULT
AC Phase 1 (Pin A of 3-pin)	AC Phase 2 (Pin B of 3-pin)	Open Circuit
AC Phase 2 (Pin B of 3-pin)	AC Phase 3 (Pin C of 3-pin)	Open Circuit
AC Phase 1 (Pin A of 3-pin)	AC Phase 3 (Pin C of 3-pin)	Open Circuit
AC Phase 2 (Pin B of 3-pin)	AC Phase 1 (Pin A of 3-pin)	Open Circuit
AC Phase 3 (Pin C of 3-pin)	AC Phase 1 (Pin A of 3-pin)	Open Circuit
AC Phase 3 (Pin C of 3-pin)	AC Phase 2 (Pin B of 3-pin)	Open Circuit
Battery + Lead (Pin A of 2-pin)	Ground Lead (Pin B of 2-pin connector)	Open Circuit
Ground Lead (Pin B of 2-pin)	Battery + Lead (Pin A of 2-pin connector)	Open Circuit
Ground Lead (Pin B of 2-pin)	Case	Closed Circuit (continuity)
Ground Lead (Pin B of 2-pin)	Any Phase	Open Circuit
Any Phase	Ground Lead (Pin B of 2-pin connector)	Open Circuit
Battery + Lead (Pin A of 2-pin)	Any Phase	Open Circuit
AC Phase 1 (Pin A of 3-pin)	Battery + Lead (Pin A of 2-pin connector)	365mV to 515mV*
AC Phase 2 (Pin B of 3-pin)	Battery + Lead (Pin A of 2-pin connector)	365mV to 515mV*
AC Phase 3 (Pin C of 3-pin)	Battery + Lead (Pin A of 2-pin connector)	365mV to 515mV*

* Look for readings that are approximately equal (+/- 5%) rather than a specific voltage.



RECTIFIER / REGULATOR REPLACEMENT

1. Remove the (2) mounting screws (A, Fig. 14).
2. Lift the locking tab and separate the 3-pin connector.
3. Lift the locking tab and separate the 2-Pin connector.
4. Remove darts (B).
5. Installation steps are done in reverse order of removal. Be sure mounting bracket is clean and that all connections are clean and tight. Secure wires and connectors (Fig. 15).

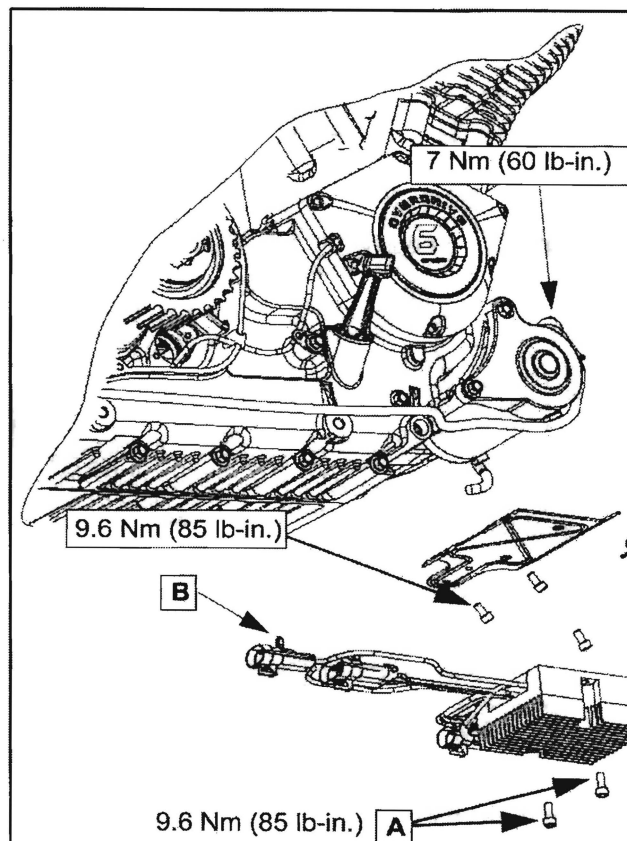


Fig. 14

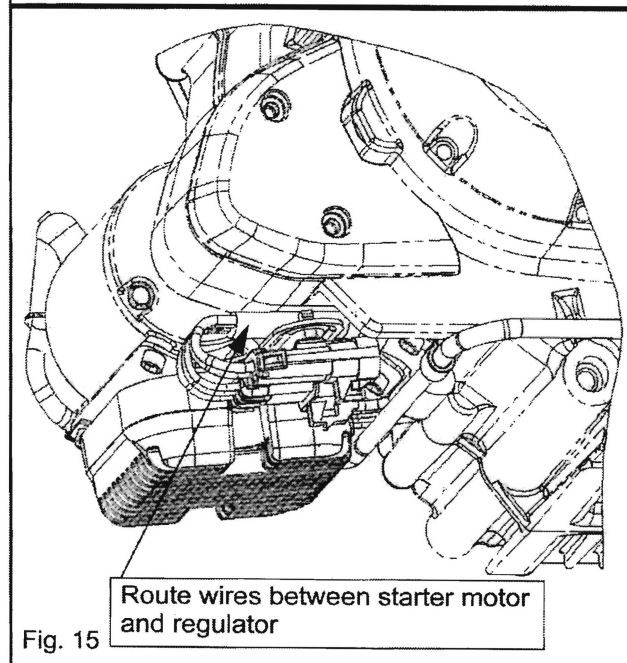


Fig. 15

CHAPTER 17

IGNITION

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GENERAL SAFETY INFORMATION

There are many hazards present when working on or around the ignition system. Read and pay close attention to the following warnings and cautions when working on any component in this section.

⚠ WARNING

Never run an engine in an enclosed area. Exhaust contains poisonous carbon monoxide gas that can cause loss of consciousness and may lead to death. If you must run the engine to do some repairs, do so in an open area or with an exhaust evacuation system operating.

⚠ CAUTION

Some procedures call for the engine to be run in order to warm the engine to operating temperature. If this is done the exhaust pipes can "blue" if a cooling air stream is not provided by means of a shop fan directed at the exhaust system (particularly the head pipes).

⚠ CAUTION

Follow the instructions closely when troubleshooting items in this section. Some electrical components can be damaged if they are connected or disconnected while the ignition switch is ON and current is present.

⚠ WARNING

The engine and exhaust system become very hot during operation and remain hot for a period of time after the engine is shut off. Wear insulated protection for hands and arms or wait until the engine and exhaust system have cooled before working on the machine.

⚠ CAUTION

Parts containing semi-conductors can be easily damaged if handled carelessly. Do not drop or subject the electronic components to shock loads.

⚠ CAUTION

Using incorrect heat range spark plugs can damage the engine. Always follow the manufacturer's recommendations for spark plug heat range.

GENERAL PRECAUTIONS

- This ignition system is controlled electronically and no provisions are available to inspect or change ignition timing. A timing light is still valuable as a diagnostic tool.
- Poor connections are the most common cause of ignition problems. Inspect all connections and replace the spark plugs before doing extensive ignition system troubleshooting.
- Make sure the battery is fully charged and that the charging system is operating correctly.
- A signal from the Crankshaft Position Sensor must be present at the ECM for spark to occur.

SPECIFICATIONS IGNITION SYSTEM

GENERAL SPECIFICATIONS			
Item		Specifications	
Spark Plug		NGK DCPR6E	
Spark Plug Gap		0.8-.9 mm (.032-.036 in.)	
Ignition Coil Resistance	Primary	0.3 - 0.6 Ohms \pm 20%	
	Secondary	See coil test page 17.8	
	Plug Wire (with cap*)	Front: 4360-5780 Ohms** / Rear 4080-5050 Ohms**	
Crank Position Sensor Resistance		280 Ohms \pm 10% (No short to ground)	
* Spark plug end caps are not removable ** See page 17.7 for test procedure			

17.2



TORQUE VALUES

IGNITION SYSTEM

Fastener Torque Specifications - Ignition System			
Description	Torque Nm	Torque lb-ft (in-lb)	Notes
Spark Plug	14.5-19.5 Nm	10.8-14.5 lb-ft	Apply Anti-Seize
Ignition Coil to Frame	11 Nm	(100 lb-in)	
Timing wheel Bolt	28 Nm	17 lb-ft	
Flywheel Bolt	102 Nm	75 lb-ft	

SPECIAL TOOLS

IGNITION SYSTEM

SPECIAL TOOL	PART NUMBER
Connector Test Lead Adapter Kit	PV-43526 (Or FLUKE test probe adaptors)
Fluke 73™ Digital Multimeter	PV-43546
Inductive Timing Light	PV-43537

TROUBLESHOOTING

BASICS

Before troubleshooting the ignition system, ensure that the engine stop switch is in the run position, the battery is fully charged, and system related fuses are not open (blown). Check visually for corroded, loose, or broken connections in critical areas such as the sensor connector itself, or at the engine-to-chassis harness 14 pin connector. Check for loose wire pins in the individual sensor connectors and at the ECM (under the seat).

Don't forget the spark plugs! The Ignition System Troubleshooting flow chart (and the accompanying text) is designed to help you troubleshoot ignition system problems. It will not lead you to faulty or fouled spark plugs. Always inspect spark plug condition **first** (and replace if necessary) when troubleshooting ignition system problems.

Be sure that the spark plugs are the correct heat range and are the specified resistor spark plugs. Non-resistor spark plugs can introduce electrical problems due to increased Radio Frequency Interference (RFI).

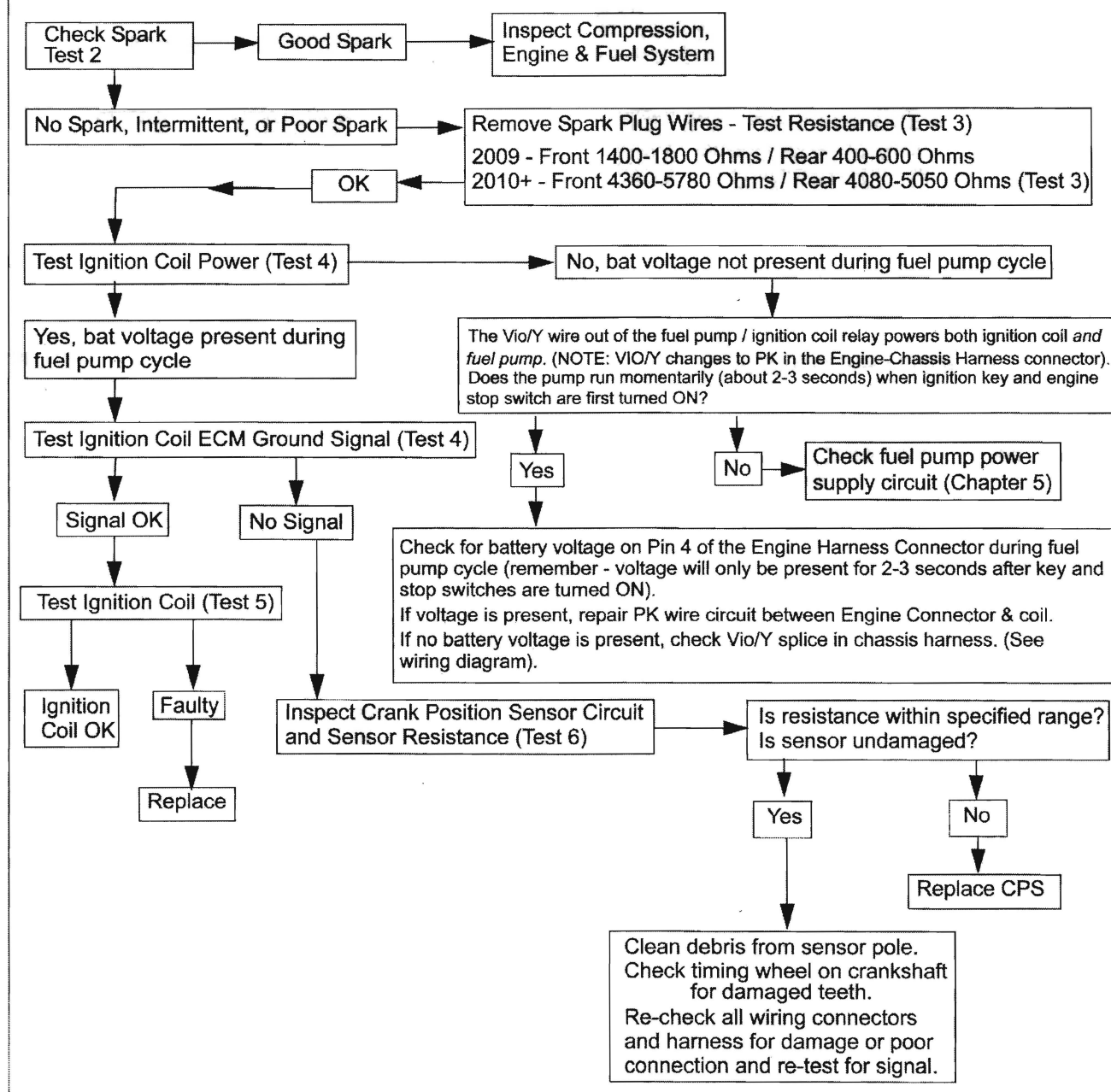
WARNING

Extremely high voltage is present in the ignition system. Do not touch the ignition coil, wires or spark plugs during test procedures.



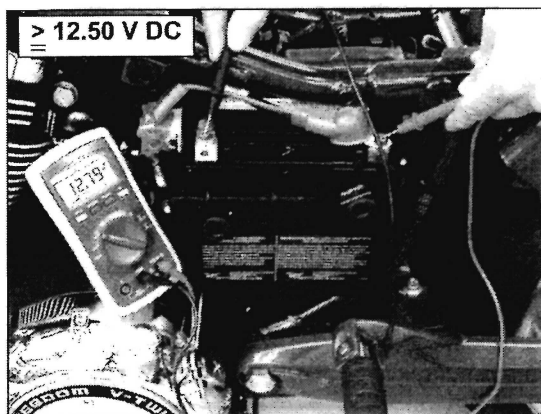
IGNITION SYSTEM TEST FLOWCHART

Before proceeding: 1) Verify battery voltage is at least 12.5 Vdc (Test 1). Replace spark plugs with new.
 2) Check fuel pump fuse (10A) and engine fuse (15A)
 3) Turn ignition key and Engine Stop Switch ON and listen for fuel pump. Pump should run for 2-3 seconds at initial power up. If fuel pump does not run, See chapter 5.



BATTERY VOLTAGE INSPECTION: Test 1

1. Remove seat LH side cover.
2. Set Digital Multimeter (DMM) to DC Volts.



3. Inspect battery voltage.
4. If the battery voltage is below 12.5 V DC charge or replace the battery with a fully charged battery. Refer to Chapter 16 for battery inspection, battery charging and charging system inspection.

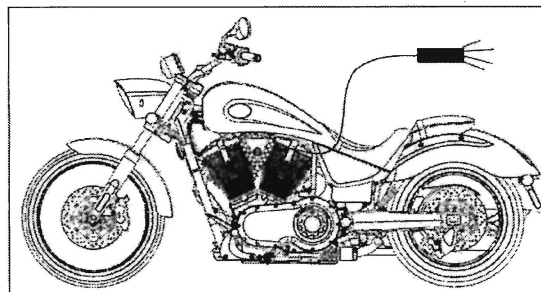
NOTE: When operating the starter with a low battery, the voltage available for the ignition coils can drop below the minimum required to produce spark.

SPARK INSPECTION: TEST 2

1. Connect an inductive timing light to one spark plug wire.

Inductive timing light PV-33277-A

2. Turn ignition switch and engine stop switch ON.
3. Shift transmission into neutral and pull in clutch lever.
4. Depress starter button and observe timing light.



5. Determine if timing light flashes without interruption for both cylinders.
6. Consistent flashes indicate some secondary voltage is present. The likelihood of an ignition related problem is reduced but not eliminated. Keep the following points in mind:
 - There is a threshold voltage and amperage requirement for timing lights below which they will not trigger and therefore, not flash.
 - Fouled spark plugs may drop secondary voltage so low that a timing light will not trigger and therefore, not flash.
 - With no current flowing (open secondary side of the ignition coil) the timing light will not flash.
 - A faulty high tension lead (plug wire) or poor connection is one example of an open secondary.

CAUTION

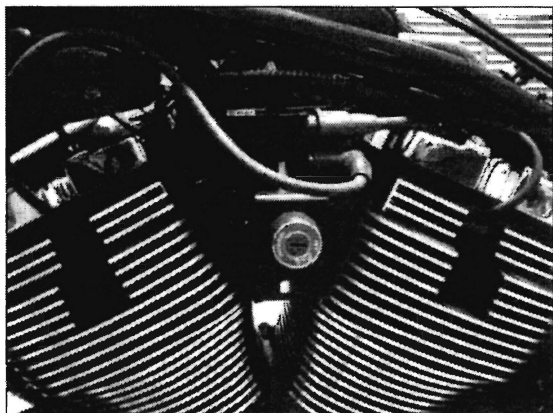
Do not attempt to remove the spark plug caps from the spark plug high tension leads. The spark plug caps are molded to the plug wires and are only available as an assembly. The specifications given include the resistance of the spark plug caps.

7. Replace spark plugs, connect plug wires and re-test.
8. If timing light does not flash consistently for one or both cylinders, test high tension leads (Test 3).



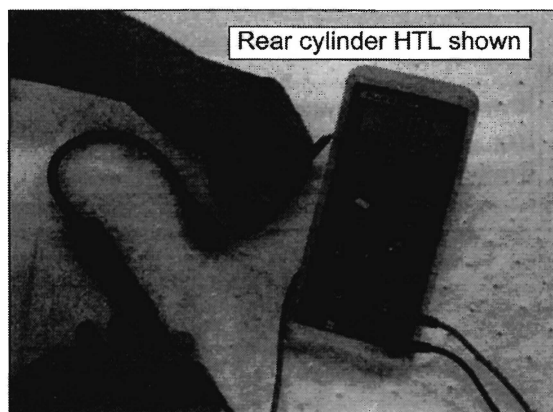
COIL HIGH TENSION LEADS: Test 3

1. Remove high tension leads by pulling firmly on the boots at the coil and spark plug. DO NOT pull on the wire or HTL may be permanently damaged.



NOTE: The plug caps or coil ends are **NOT** removable. Wire must be replaced as an assembly.

2. Test each high tension lead with an ohmmeter and compare to specification. Move wire to detect internal breaks or poor connections at terminal ends.



High Tension Lead Resistance

2009 - Front: 1400 - 1800 Ω
2009 - Rear: 400 - 600 Ω

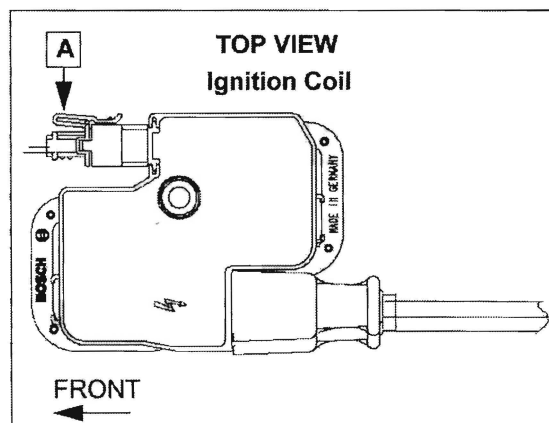
2010-2012 - Front: 4360 - 5780 Ω
2010-2012 - Rear: 4080 - 5050 Ω

IGNITION COIL POWER & GROUND SIGNAL Test 4

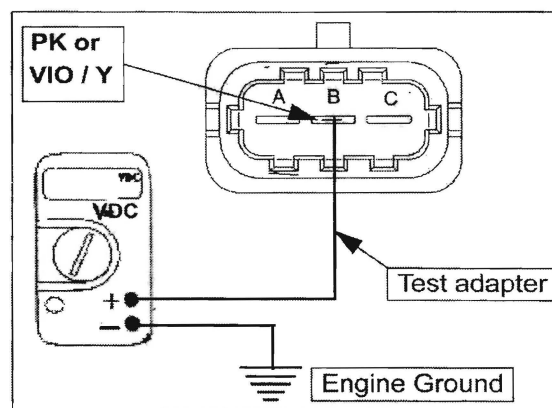
Power To Ignition Coil

Battery voltage must be present at the ignition coil (Pin B) during fuel pump initial cycle and during cranking. Note that power is not necessarily present when key is on.

1. Remove ignition switch cover (page 3.3).
2. Remove ignition coil harness connector from the back of the coil by *pressing* tab (A) and gently pulling the harness connector to remove.



3. Place the DMM selector dial on the **Volts DC** scale.
4. Connect the black lead to ground (on the engine).
5. Connect a small thin test adapter lead to the center terminal of the ignition coil primary connector and the + meter lead to the test adapter.



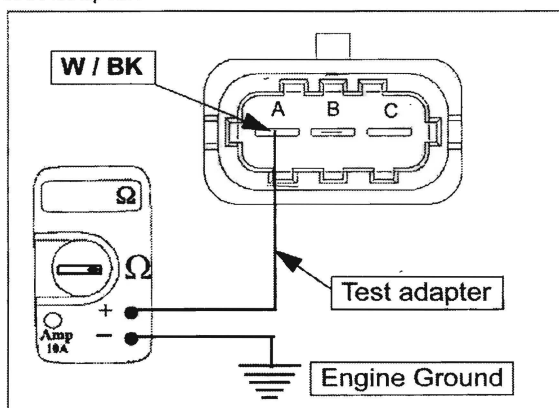
6. With engine stop switch OFF, turn the ignition key ON.
7. Turn the engine stop switch to RUN. Battery voltage should appear on the center terminal for 2-3 seconds until the pump completes its prime cycle.
8. With transmission in Neutral, crank the engine. Battery voltage should again be present on center wire.

Test 4 (Cont.)

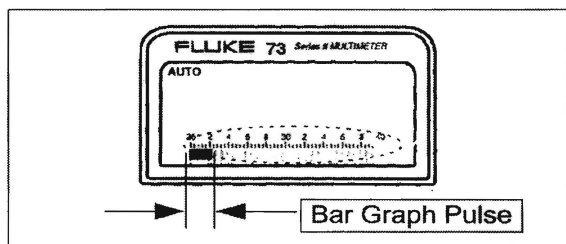
ECM (Ground) Signal To Ignition Coil

ECM ground signal must be present at each of the outer terminals of the ignition coil primary harness connector. The signal will appear as a pulse on the meter bar graph with DMM selector in the OHMs position.

1. Place the DMM selector dial on the **OHMS** scale.
2. Place a small thin test adapter into one of the outer terminals of the ignition coil primary connector (either the W/BK or W/GN) and connect one meter lead to the test adapter.



3. Ground the other lead to the engine.
4. Place transmission in Neutral.
5. Turn the ignition key and engine stop switch ON.
6. Crank the engine with the electric starter and watch the bar graph on the Fluke 73 DMM. The bar graph should pulse evenly while engine is cranking, indicating a ground signal is present.

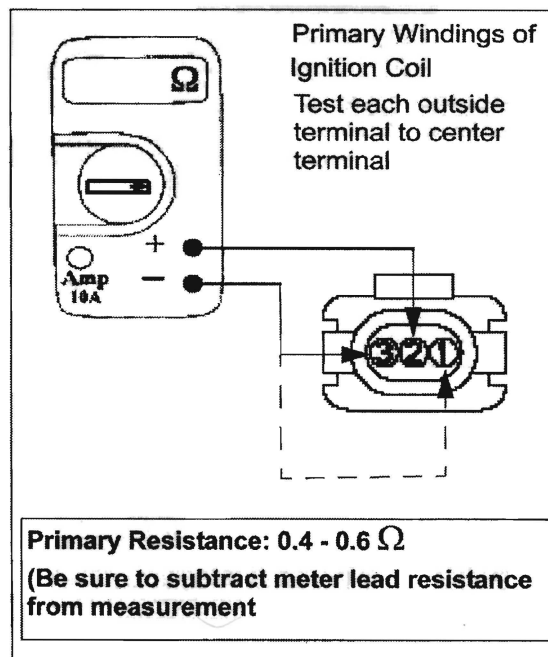


7. Repeat the test on the other outside wire in the connector.
 - If no pulse is present, test the Crankshaft Position Sensor (Test 6).
 - If the signal is present on one wire and not the other, test related wiring and connections.
 - If both signals are present and there was battery voltage on the VIO/Y wire (center terminal) but still no spark, test the ignition coil windings. (Test 5).

IGNITION COIL RESISTANCE - Test 5

Ignition Coil Primary Winding

1. Remove ignition coil (page 17.11).
2. Select OHMS function on the DMM.
3. Measure resistance between terminal 3 and terminal 2 on the coil. Compare to specification.
4. Measure resistance between terminal 1 and terminal 2 on the coil. Compare to specification.



Ignition Coil Secondary Windings

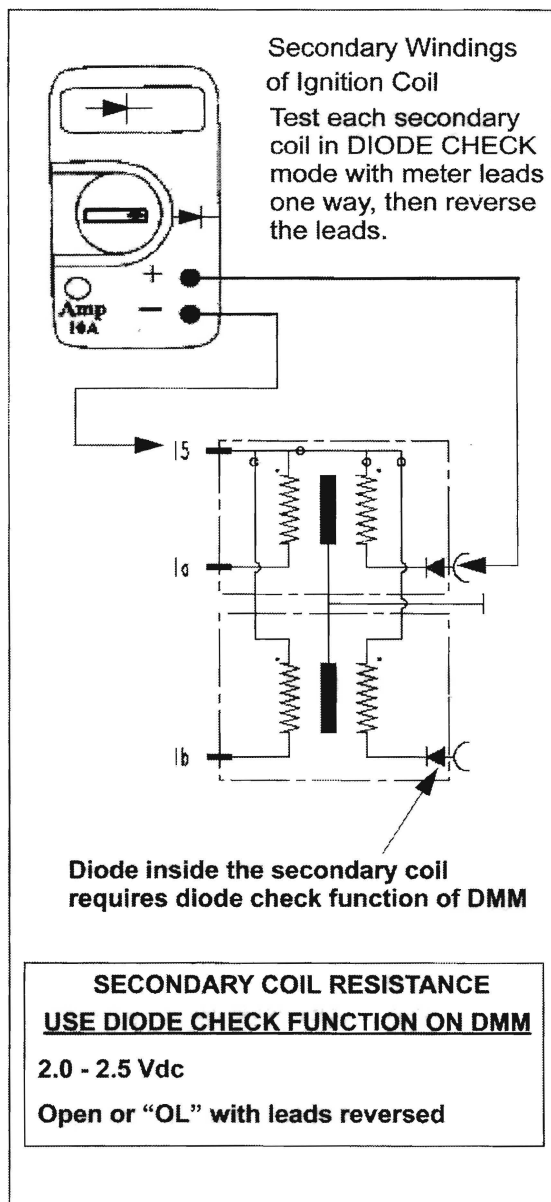
1. Remove ignition coil (page 17.11).
2. Select DIODE CHECK function on the DMM.
3. Place red DMM lead on center terminal (#2) of coil primary and black lead on secondary terminal and record.
4. Move black DMM lead to the other secondary terminal and record. (Reading should be the same for both secondary windings).

(Cont.)



Ignition Coil Secondary Windings (Cont.)

5. Repeat measurements on each secondary coil with meter leads reversed.
6. Compare readings to specification. Resistance should be low with leads one way and OL with leads reversed.

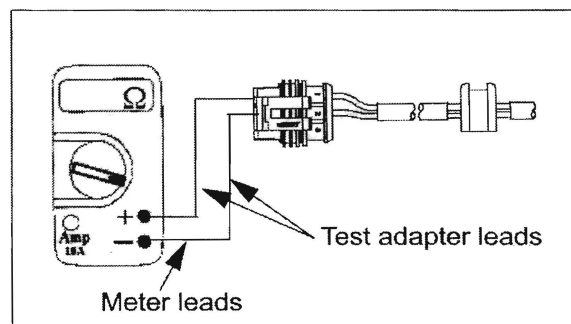


CRANKSHAFT POSITION SENSOR (CPS) RESISTANCE INSPECTION:

Test 6

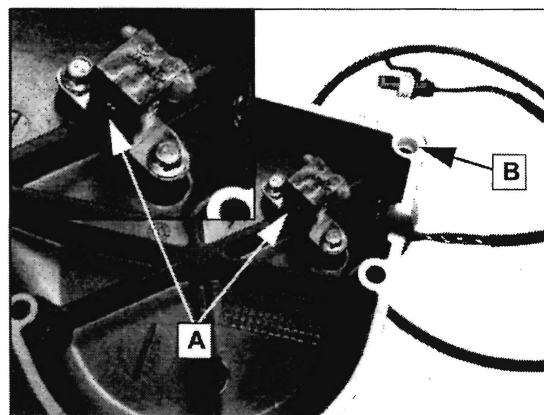
NOTE: This test can also be performed at the ECM connector, to test the entire circuit with the sensor. See test 6A (page 17.10).

1. Disconnect the CPS sensor (connector is located at rear of engine).
2. Visually inspect the sensor wire harness for damage, and loose or broken wires or connector pins.
3. Select OHMS function on the DMM.
4. Measure resistance through the CPS coil by connecting a test adapter lead to the sensor wires and to the meter leads.



Specification: 280Ω @ 20°C, 68°F (+/- 20%)

5. Remove the lower right engine cover.
6. Visually inspect center pole (A) of crankshaft position sensor for damage or metal particles clinging to the magnet. Be sure dowel pins (B) are in place on the cover (or crankcase) to ensure air gap is correct.

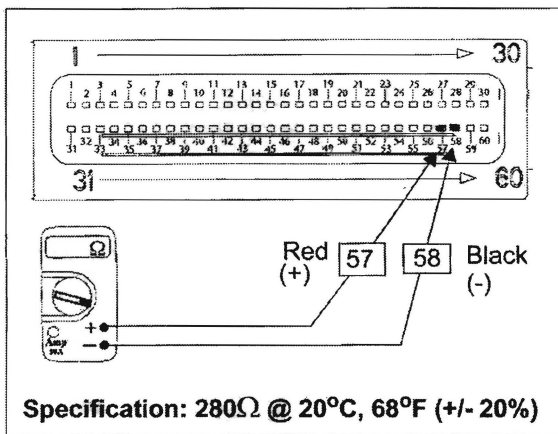


CRANK POSITION SENSOR CIRCUIT and SIGNAL Test 6A

NOTE: A test lead adapter kit is required to prevent connector pin, socket, or case damage.

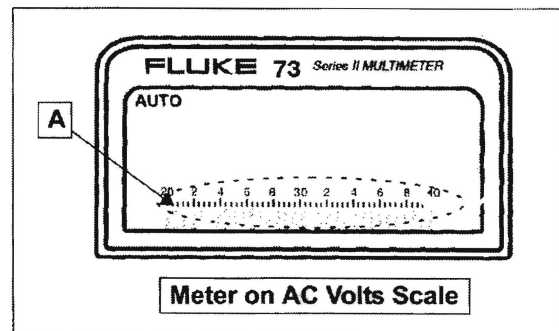
Connector Test Lead Adapter Kit PV-43526 or suitable Fluke test adapter leads

1. Turn ignition key OFF.
2. Remove ECM connector from ECM (page 5.34).
3. Select OHMS function on the DMM (Ω).
4. Connect test adapter leads to the DMM leads.
5. Place one test adapter lead in pin 57 and the other in pin 58 of the ECM connector (not the ECM). Compare resistance to specification.



CPS AC Signal Test

6. With leads connected as for the resistance test (pin 57 and 58 of the ECM connector), select Volts AC function on the DMM.
7. Turn engine over with electric starter and observe DMM display.
8. With spark plugs installed voltage reading will be erratic due to low rpm and pulsing nature of the signal. The numerical display will be erratic. Watch bar (A) at bottom of display to determine if a signal exists. Any fluctuating AC signal is correct for this test.



9. Remove spark plugs from engine. Install spark plugs into spark plug caps and ground the spark plug electrodes securely to the engine.
10. Measure AC voltage signal from crank position sensor while turning engine over using electric starter with spark plugs out and compare to specification.

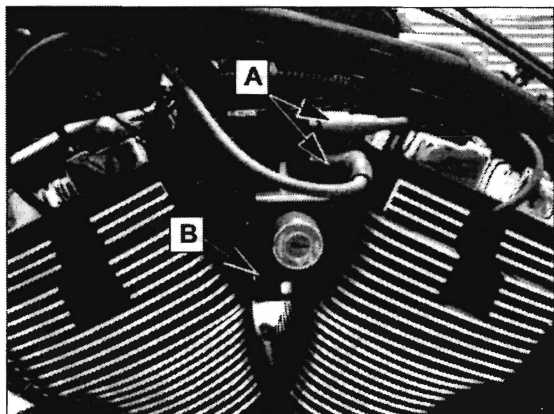
Specification: 2-5 V AC (Spark Plugs Removed)

GROUND CIRCUIT INSPECTION: Test 7

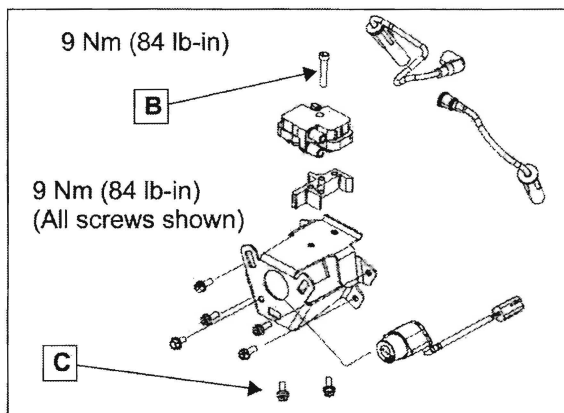
1. Set DMM to DC volts.
2. Connect red meter lead to positive (+) post of battery.
3. Connect black meter lead to several bare metal places on frame, engine and wiring harness ground connections while observing meter reading at each.
4. At each ground test point, meter should read battery voltage.
5. Low voltage indicates resistance. Corrosion, paint, loose or damaged connections, or broken wires can cause ground problems.
6. Clean battery terminals thoroughly and apply a thin coat of dielectric grease. The battery ground cable is attached to the frame at the left rear corner of crankcase (near clutch cable or hydraulic clutch slave cylinder).

IGNITION COIL REMOVAL

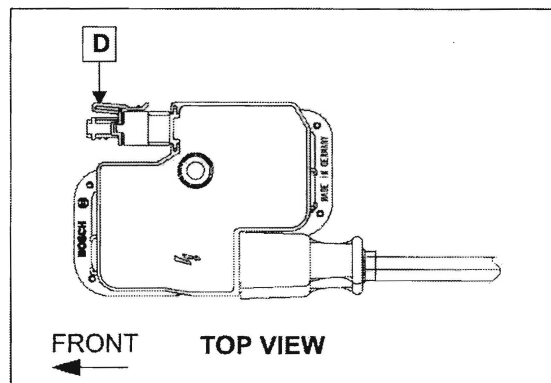
1. Turn ignition switch OFF and remove key.
2. Remove ignition switch cover (page 3.3).
3. Remove both high tension leads (A) from coil.



4. Remove screw (B) and ignition coil. To remove coil with bracket, remove 2 screws (C).



5. Press tab (D) to remove primary connector.



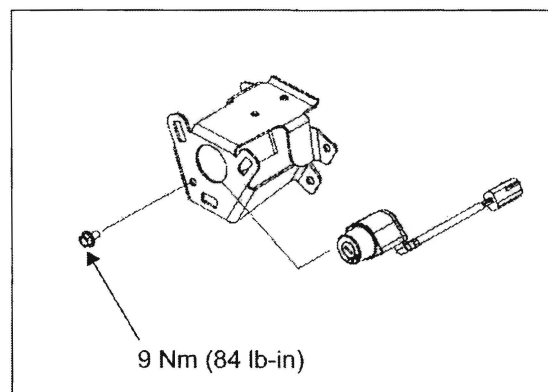
6. Remove ignition coil.

IGNITION COIL INSTALLATION

1. Installation procedure is the reverse of removal procedures.
2. Apply light film of dielectric grease inside the spark plug boot of high tension leads.
3. Torque coil mount screw (or screws if coil was removed with bracket attached) to 9 Nm (84 lb-in).

IGNITION SWITCH REMOVAL

1. Turn ignition switch OFF and remove key.
2. Remove ignition switch cover (page 3.3).
3. Remove mounting screw from face of switch bracket.
4. Open or cut any tie straps that secure the harness.
5. Separate ignition switch connector from main wire harness by pushing the tab to release.



NOTES

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CHAPTER 18

ELECTRIC STARTER

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ELECTRIC STARTER

GENERAL

SAFETY INFORMATION

WARNING

Always disconnect the battery (negative terminal first) before servicing the starter motor.

- Inspect the condition of the battery before troubleshooting the starter system. Also inspect main engine ground (on crankcase - upper left rear corner) and battery cable connections.

SPECIFICATIONS

STARTER SPECIFICATIONS

ELECTRIC STARTER & STARTER CLUTCH		
Item	Standard	Service Limit
Battery Voltage, No Load	Above 12.5 V DC	-
Resistance: Between Any Two Commutator Bars	Continuity (0 Ohms)	-
Resistance: Commutator to Armature Shaft	Infinity (OL on Fluke™ 73)	-
Resistance: Battery Input Terminal to Insulated Brush	Continuity (0 Ohms)	-
Resistance: Bat. Input Terminal to Starter Motor Case	Infinity (OL on Fluke™ 73)	-
Starter Motor Brush Length	13 mm ± 0.5 mm (0.512 ± 0.020")	6.5 mm (0.255")
Starter Motor Operating Amp Draw	90-120 Amps	Use inductive ammeter
Starter Motor No Load Amp Draw (Bench Test)	30-40 Amps after initial surge	-
Starter Torque Limit Clutch Break-Away Torque	40-50 lb-ft when new	32-46 lb-ft after break-in
Total Voltage Drop Allowed - Pos Side Of Starter	0.3 V DC (300 millivolts)	-
Total Voltage Drop Allowed - Neg Side Of Starter	0.3 V DC (300 millivolts)	-
Voltage Drop Allowed: Each Connection - Pos Circuit	0.2 V DC (200 millivolts)	-
Voltage Drop Allowed: Each Connection - Neg Circuit	0.2 V DC (200 millivolts)	-

FASTENER TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS - STARTER SYSTEM		
Description	Torque Nm	Torque lb-ft (in-lb) & Notes
Bearing Cover Screws	10 Nm	(85 in-lb)
Electrical Terminal (+) to Starter Motor	6.8 Nm	(60 in-lb)
Neutral / Overdrive Switch	11 Nm	(100 in-lb) Apply Pipe Sealant
Positive Cable (+) to Motor Terminal	7 Nm	(60 in-lb)
Primary Drive Gear Bolts (to Crankshaft)	41 Nm	30 lb-ft. Clean crankshaft threads thoroughly. Install new screws.
Regulator / Rectifier Screws	10 Nm	(85 in-lb)
Rotor Bolt (Flywheel)	102 Nm	75 lb-ft
Starter Motor to Crankcase Bolts	30 Nm	22 lb-ft
Starter Motor Case Bolts	10 Nm	(85 in-lb)

18.2



SPECIAL TOOLS**STARTER SYSTEM SPECIAL TOOLS**

SPECIAL TOOL	PART NUMBER
Digital Multi-Meter	PV-43546
Inductive Ammeter Clamp (Optional)	PV-39617
Rotor Puller (Flywheel)	PV-43533
Engine Stop Tool	PV-43502
Connector Test Adapter Kit	PV-43526

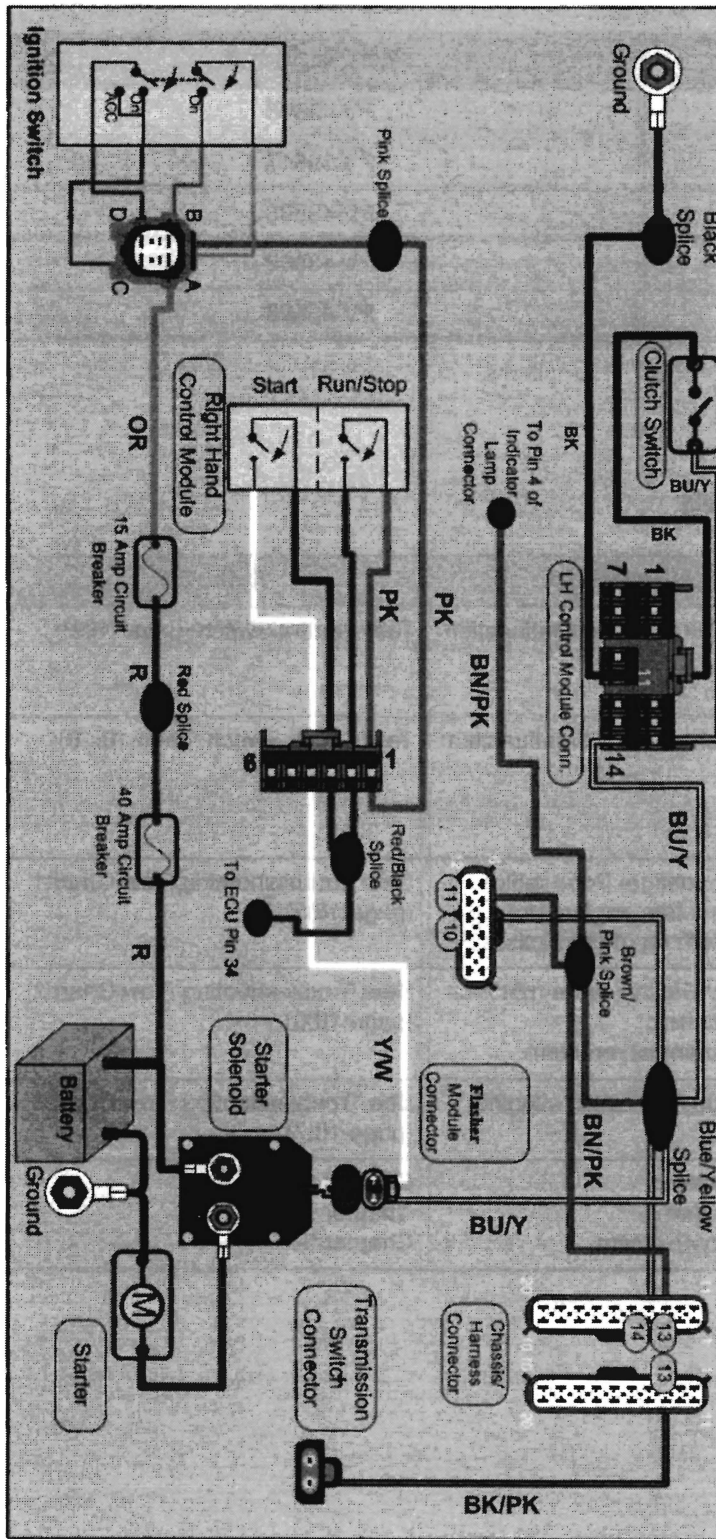
DIAGNOSTICS**TROUBLESHOOTING FLOW CHART MENU**

Symptom	Possible Cause	Refer To:
Starter motor does not turn with transmission in neutral. Turns with clutch pulled in.	Neutral Switch or Circuit Malfunction	Test Neutral Switch (page 18.9)
Starter motor does not turn with transmission in gear and clutch lever pulled in. Turns with transmission in neutral.	Clutch Switch or Circuit Malfunction	Test Clutch Switch (page 18.10)
Starter motor will not turn	Low battery voltage. Poor cable connections. Main engine ground loose (rear left top of crankcase).	See Troubleshooting Flow Chart 1 (page 18.5)
Starter motor turns slowly. Engine may or may not start.	Low battery. Faulty starter motor or drive mechanism. Engine mechanical problem.	See Troubleshooting Flow Chart 2 (page 18.6)
Starter motor turns, but engine does not turn.	Starter torque limit clutch slipping (Chapter 9).	See Troubleshooting Flow Chart 3 (page 18.7)
Starter motor turns at normal speed, but engine does not start.	Ignition Problem Engine Problem Fuel Delivery Problem	Chapter 17 Chapter 7-10 Chapter 5



ELECTRIC STARTER

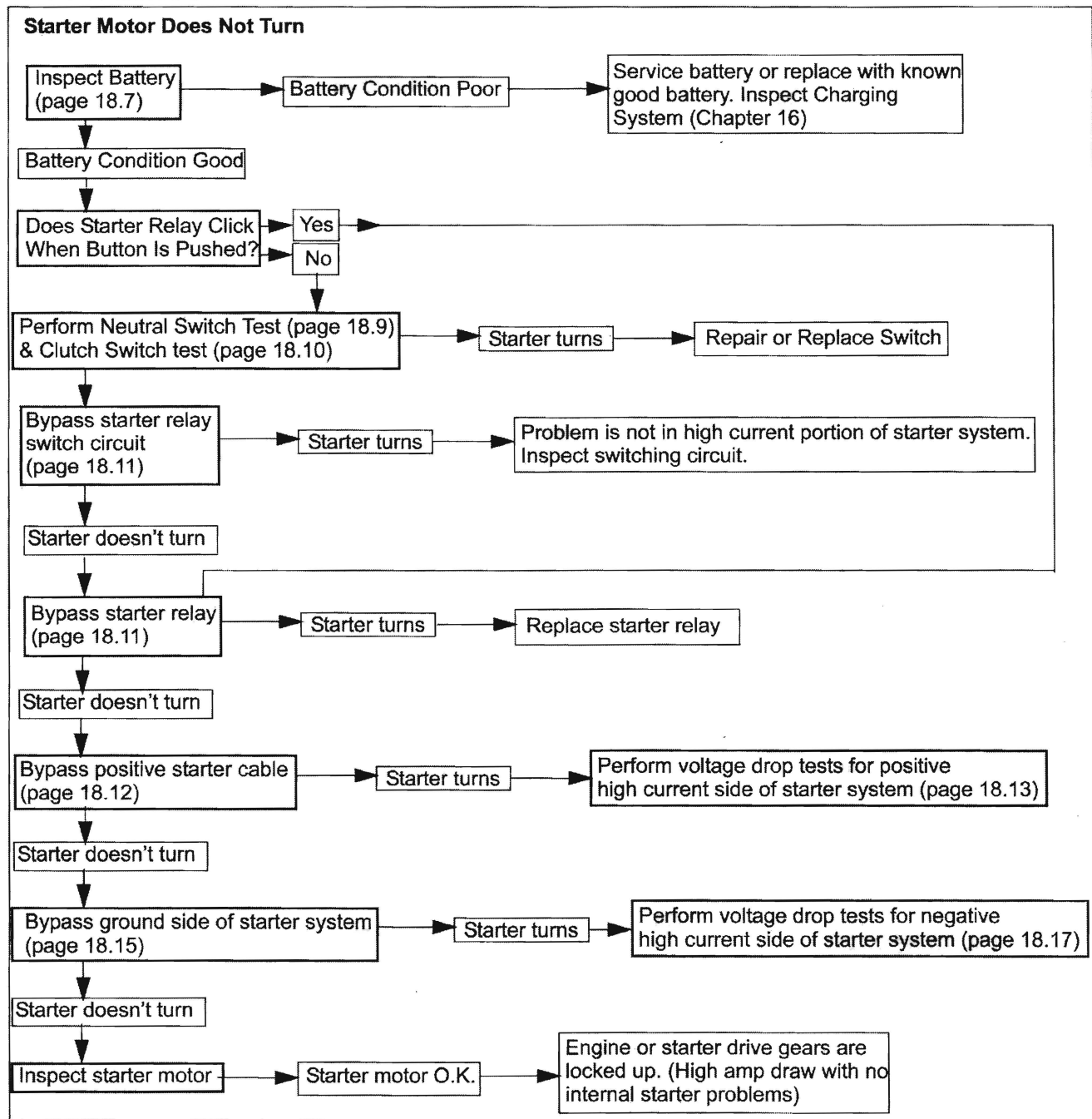
STARTER CIRCUIT DIAGRAM



18.4



TROUBLESHOOTING FLOW CHART 1



WARNING

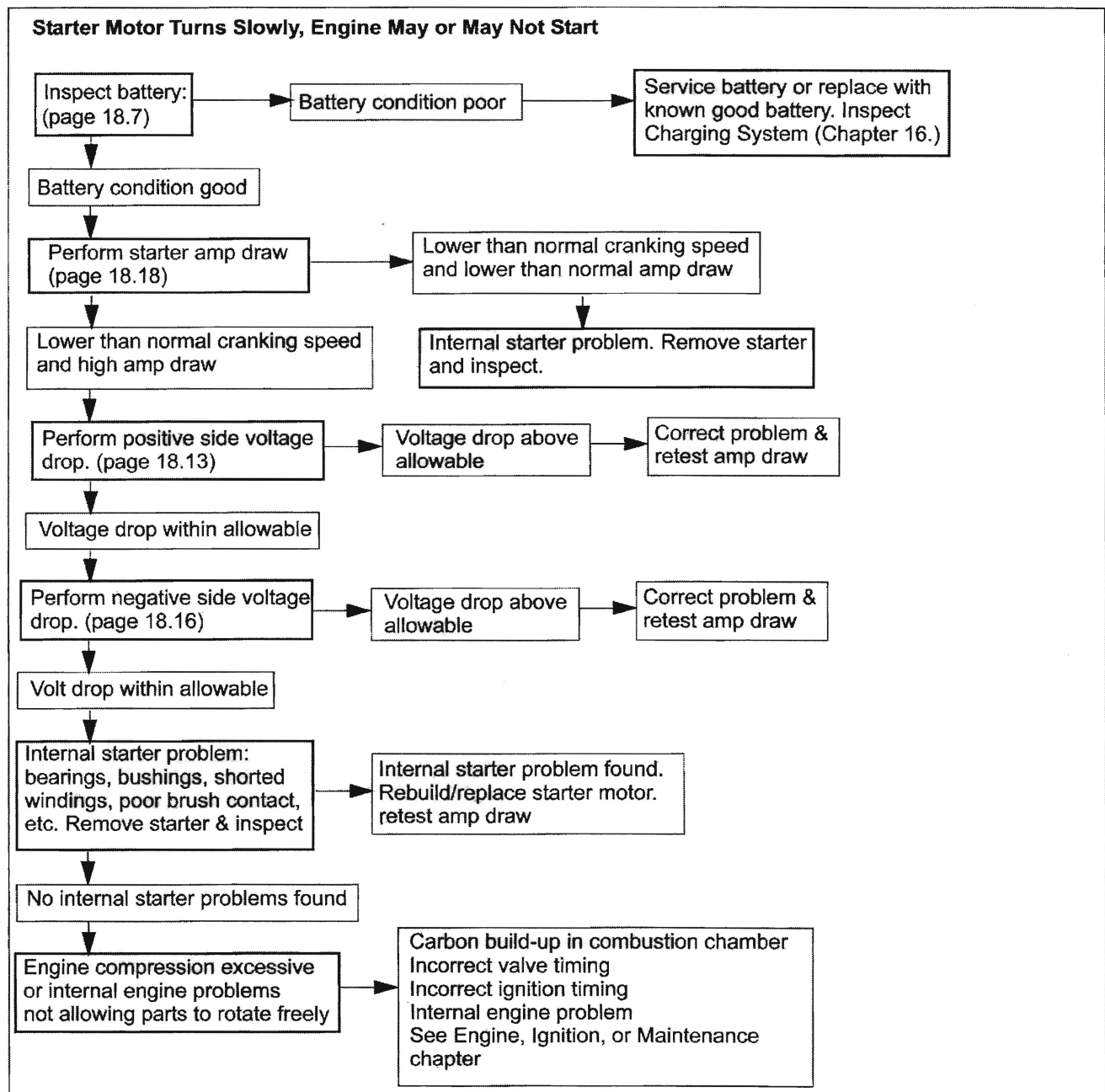
Ensure that motorcycle is secure and transmission is in neutral for all tests.

CAUTION

Inspect fuses and make sure battery is fully charged before inspecting starter system.



TROUBLESHOOTING FLOW CHART 2



NOTE: These procedures require a Digital Multi Meter and high a high current shunt, or an inductive ammeter clamp and a DMM.

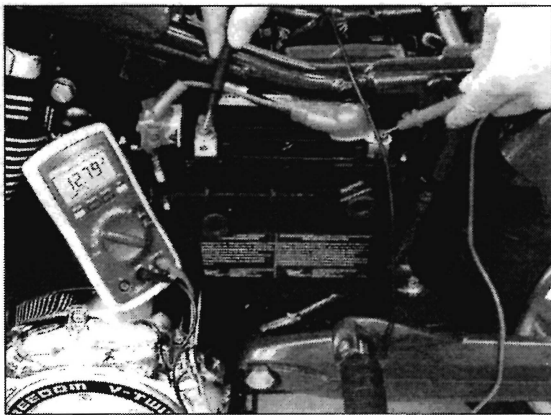


TROUBLESHOOTING FLOW CHART 3

Symptom	Possible Cause	Possible Reason and/or Inspection Needed
Starter motor turns, but engine does not turn. The starter motor can be heard spinning.	Starter clutch malfunction.	Refer To Procedure Chapter 9.
	Starter torque limit clutch slipping.	Refer To Procedure Chapter 9.
	Starter gears damage.	Refer To Procedure Chapter 9.

BATTERY INSPECTION & CHARGING PROCEDURES

1. Remove left side cover (Chapter 3).



2. Measure battery voltage. Voltage reading should be above 12.5 V DC. If the battery voltage is lower than 12.5 V DC charge battery according to the instructions given below.

The battery is a maintenance free type. Do not attempt to inspect or add fluid to a maintenance free battery.

3. Charge battery at 1.8 amps for 5 to 10 hours.

Specification: 1.8 A for 5-10 hours

4. Remove battery from charger and let it sit for 30 minutes or longer.
5. Measure battery voltage. If lower than 12.5 V DC battery must be recharged again in accordance with step 1 and 2.
6. After charging battery and waiting 30 minutes or more, check battery voltage again. If voltage is still below 12.5 V DC, replace the battery.

NOTE: If battery measures below specifications inspect the charging system. (Chapter 16).



ELECTRIC STARTER

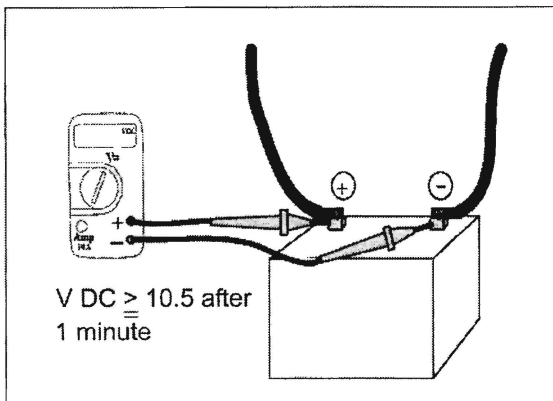
CIRCUIT & SWITCH TESTING

BATTERY LOAD TEST

1. Load test battery using a commercially available battery load tester. Follow the battery load tester manufacturer instructions.

NOTE: Although not as conclusive, the following test can be used to direct troubleshooting efforts if a battery load tester is not readily available.

2. Charge battery until open circuit voltage is above 12.5 Volts (page 18.7).
3. Install battery and connect battery cables.
4. Connect digital multimeter to battery and keep it connected for duration of test.
5. Turn ignition key on and move head light high beam switch to High Beam for 1 minute (without the engine running).

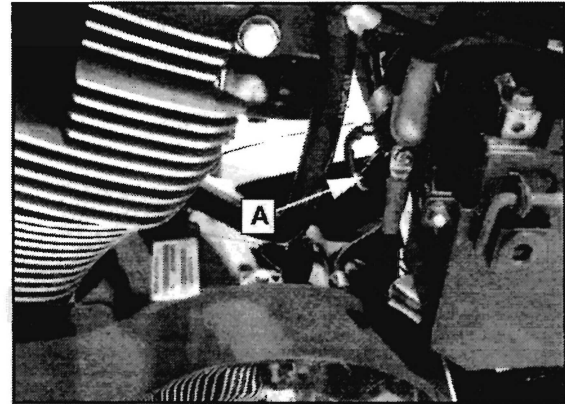


6. Turn ignition off. Measure battery voltage.
7. If battery voltage drops below 10.5 V DC, re-charge and re-test battery or replace it.

STARTER RELAY GROUND CIRCUIT TEST

WARNING

Ensure that motorcycle is secure and that transmission is in neutral for the following inspection.



NOTE: Shifting transmission to neutral or pulling in the clutch lever provides a ground path for the low current side of the starter relay. This test will temporarily bypass these components. Refer to Starter Circuit Diagram on page 18.4.

1. Shift transmission to Neutral.
2. Tap into the Blue / Yellow wire (A) and connect it to ground.
3. Turn ignition switch ON and place engine stop switch in RUN position.
4. Press starter button. If starter motor turns, inspect clutch switch (page 18.10) and neutral indicator switch (page 18.9).

NEUTRAL SWITCH INSPECTION

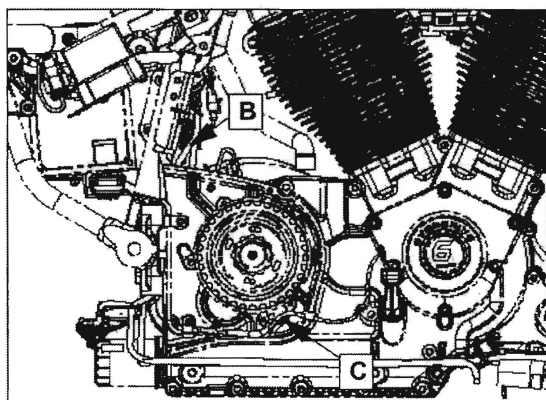
Symptoms of a faulty Neutral Indicator Switch may include:

- Starter motor does not operate when transmission is in neutral,

but...

- Starter motor does operate when clutch is pulled in.

1. Turn ignition switch on and place engine stop switch in the RUN position.
2. Shift transmission into Neutral.
3. Observe neutral indicator light.
4. If indicator is not lit with transmission in neutral:



- Disconnect neutral / overdrive switch at (B).
- Connect Brown/Pink on main harness side of connector to ground on engine (not the switch side of connector) with a jumper lead. This provides a path to ground for the neutral light.

5. If the neutral lamp comes on, neutral indicator switch is at fault. Continue with Step 6 to test the neutral indicator switch (C).
6. Set meter to measure resistance.
7. Place one meter lead on Black / Pink wire on switch side of connector.
8. Place the other lead on the battery negative terminal.
9. Compare reading to Table 1 below.
10. Replace neutral switch or repair wiring as necessary.
11. If neutral indicator switch is working correctly and neutral indicator did not light with the transmission in neutral; inspect neutral lamp and circuit wiring for a open/short circuit.

If switch is faulty, refer to Neutral Switch Removal / Installation in Chapter 19.

TABLE 1 - TESTING NEUTRAL SIDE OF GEAR POSITION SWITCH

Gear Position	Meter lead connections to switch		Ohmmeter Reading*
Neutral	Black / Pink (on switch side of connector)	Crankcase	$\leq .5 \Omega$
Any gear (except Neutral)	Black / Pink (on switch side of connector)	Crankcase	∞ (OL)
* Be sure to subtract meter lead resistance from resistance reading			



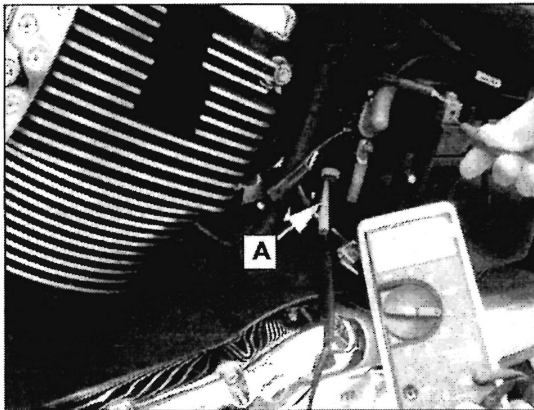
CLUTCH SWITCH / CIRCUIT TEST

Refer to Starter Circuit Diagram on page 18.4.

The symptom of a faulty clutch switch circuit is:

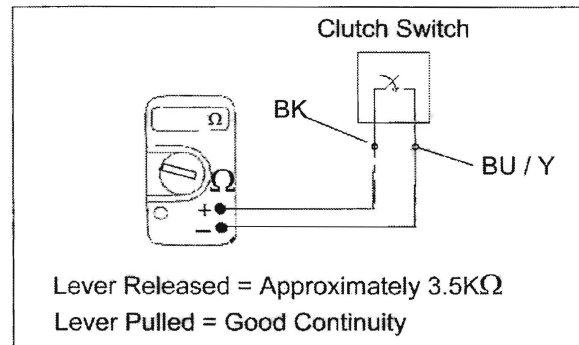
- Starter motor will not operate with transmission in gear and clutch lever pulled in. Starter operates with transmission in neutral. Use an ohmmeter to determine if continuity is present when the switch is closed (lever pulled in).

1. Transmission can be in neutral or in any gear.
2. Remove left side cover.
3. Separate the 2 pin connector from starter relay.



4. Set meter to measure resistance (Ω).
5. Connect red (+) lead of DMM to Blue/Yellow wire in connector on main harness side using a test probe (A) from Victory Connector Test Kit PV-43526.
6. Connect black meter lead to battery negative post.
7. Operate clutch lever while observing meter display.
8. Pull clutch lever to the handlebar. Meter should display continuity or very low resistance (less than 1 ohm) when the clutch switch closes.
9. Release clutch lever, meter should display OL (open line).
10. If clutch switch does not test as described inspect clutch switch, clutch switch wiring or mounting of switch to clutch lever for fault.

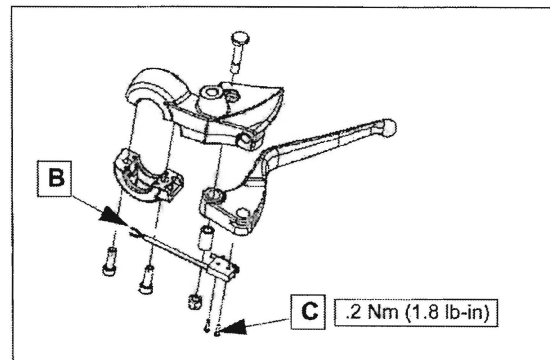
11. Disconnect switch wiring connector at handlebar.



12. Connect ohmmeter across terminals of clutch switch. Test for continuity when clutch lever is pulled to handlebar. Test for high resistance with lever released.
13. If switch tests correctly at connector, check circuit between clutch lever switch and starter relay, including LH bar switch connector inside head lamp.
14. If switch fails test, inspect mounting of switch.
15. If switch is mounted correctly and physically operates but does not open and close electrically, replace switch.

CLUTCH SWITCH REMOVAL

1. Disconnect wire harness at (B).
2. Remove retaining screws (C). Pull clutch lever and secure it to the handlebar. Slide switch and rotate it slightly to remove.



CLUTCH SWITCH INSTALLATION

1. Pull clutch lever and secure to handlebar.
2. Install switch and retaining screws.
3. Connect wire harness.
4. Release clutch handle.
5. Verify proper operation.



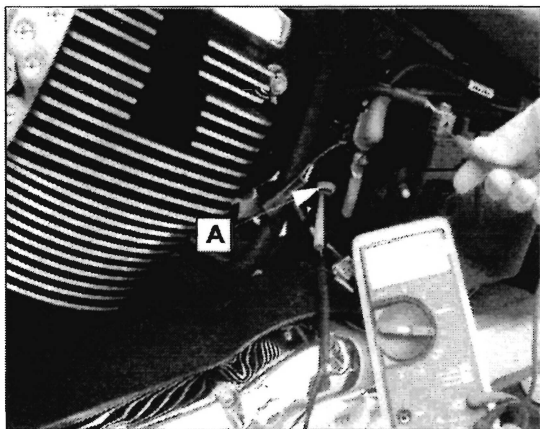
STARTER RELAY POSITIVE CIRCUIT TEST

! WARNING

Secure motorcycle and place transmission in neutral for the following test.

Refer to Starter Circuit Diagram on page 18.4.

1. Place the transmission in neutral.
2. Remove left side cover.
3. Separate connector at starter relay.
4. Set DMM to DC Volts.
5. Check battery voltage by testing across battery terminals. Note the voltage reading (should be above 12 DC volts.)
6. Connect red (+) lead of DMM to the yellow/white wire in starter relay wiring harness connector (A) using a test probe from Victory Connector Test Kit PV 43526.



7. Connect DMM black lead to battery negative post.
8. Turn ignition key ON and Kill Switch to RUN position.
9. Press starter button. The meter should display battery voltage. If voltage is more than .2 volts below battery voltage, inspect the power supply circuit.

STARTER RELAY BYPASS TEST

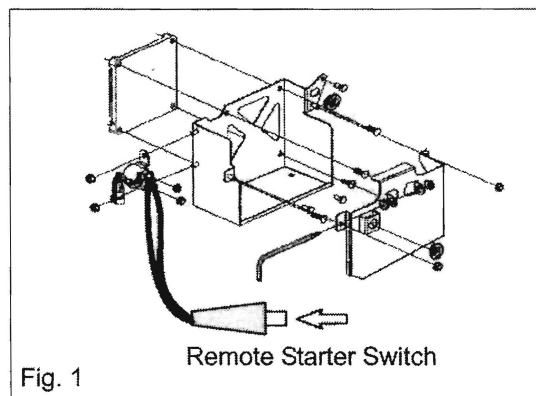
! WARNING

Secure motorcycle and place transmission in neutral for the following test. Be sure the transmission is in neutral!

! WARNING

The following test involves high current, heat and possible sparks. Wear a face shield and approved safety glasses while doing the following test. Only use the tool recommended to prevent excessive heat and possible burns.

1. Place the transmission in neutral.



2. Remove left frame side cover.
3. Connect one lead of a remote starter switch to one of the terminal posts on the relay and the other lead to the other terminal post on the relay.

! CAUTION

Do not allow the metal clips of the remote starter relay switch to touch each other and short out.

4. Depress button on remote starter switch. (Fig. 1)
5. If starter motor operates, and Positive Circuit Test, Clutch Switch Test, and Neutral switch tests have passed inspection, replace the relay.
6. If the starter motor does not operate, perform test on following page.



ELECTRIC STARTER

STARTER RELAY TO STARTER MOTOR POSITIVE CABLE BYPASS TEST

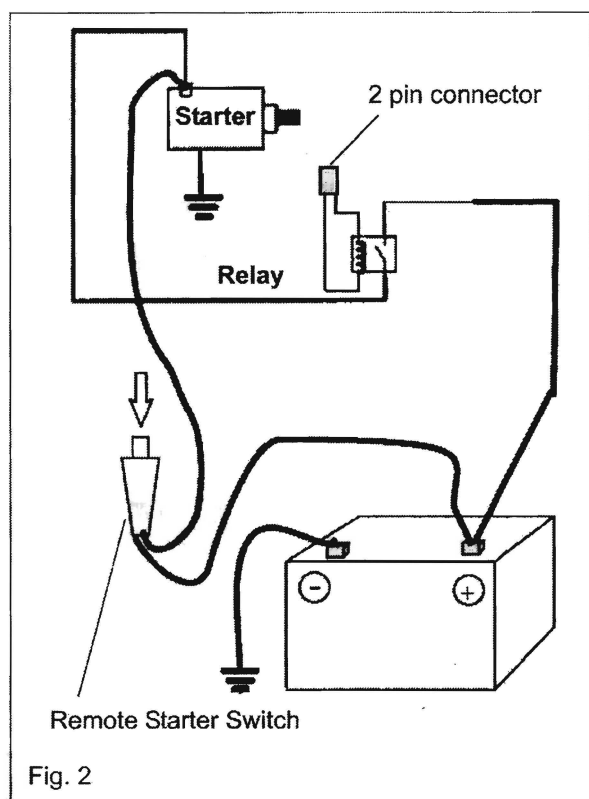
WARNING

Secure motorcycle and place transmission in neutral for the following test.

WARNING

The following test involves high current, heat and possible sparks. Wear a face shield and approved safety glasses while doing the following test.

1. Place the transmission in neutral.
2. Remove left side cover.



3. Connect one clamp of a heavy-duty, automotive remote starter switch to positive terminal lug at starter motor. (Fig. 2)

4. Connect other clamp of remote starter switch to positive terminal of battery.

WARNING

Do not allow any part of the jumper cable clamp to touch the chassis or any other ground. Be sure transmission is in neutral.

5. Make sure transmission is in neutral, key switch off and stop switch off.
6. Pull in clutch lever and depress the remote starter switch momentarily.
7. If starter turns, there is excessive resistance in the positive, high current side of the starter system. Go to Positive Side Voltage Drop Test.
8. If starter does not turn, go to Negative Cable Bypass Test.



POSITIVE SIDE VOLTAGE DROP TEST

Symptoms: Starter motor does not turn or turns slowly when starter relay is bypassed. Starter motor works correctly when performing Starter Relay Positive Cable Bypass Test.

1. Remove spark plug caps.
2. Install test spark plugs or plugs with the gap CLOSED into plug caps.
3. Ground spark plug center electrode to engine.

NOTE: *The total voltage drop equal to the voltage drop between the battery (+) to starter (+). The total voltage drop must not exceed 0.3 Volts DC.

CAUTION

The ignition system must be disabled when doing voltage drop tests, if engine starts it will be difficult to measure voltage drop. To disable ignition system quickly and safely, observe the following steps.

POSITIVE SIDE VOLTAGE DROP TESTS

Location	Steps	Allowable Voltage Drop
Battery (+) To Starter (+)	1 through 8	0.3 Volts DC (300 mV DC)
Battery (+) to Battery Side of Relay	9 through 17	0.2 Volts DC (200 mV DC)*
Across Relay	18 through 22	0.2 Volts DC (200 mV DC)*
Starter (+) to Starter Side of Relay	23 through 31	0.2 Volts DC (200 mV DC)*

CAUTION

Only operate starter long enough to stabilize the reading on the DMM (less than 10 seconds). Let starter motor cool down between each voltage drop test to prevent damage to starter motor.

4. Place transmission in neutral.

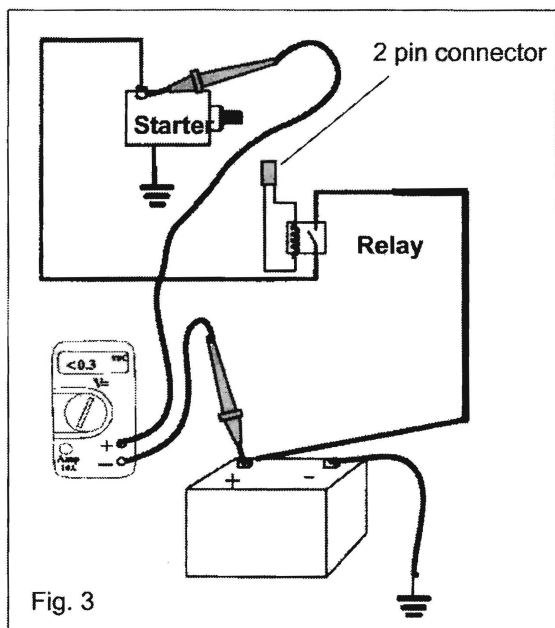


Fig. 3

8. Place the other lead of the DMM to starter motor positive terminal screw. (Fig. 3)
9. Turn ignition switch on, turn engine stop switch to run position. Pull in clutch lever.
10. Operate the starter normally (no jumper cables in place) and observe meter display.
11. If DMM reads more than 0.3 Volts DC when the starter motor is engaged, it indicates that there is excessive resistance in the starter's battery positive path. Continue with the following tests to isolate each section of the positive path and observe the voltage drop with DMM leads placed as indicated.

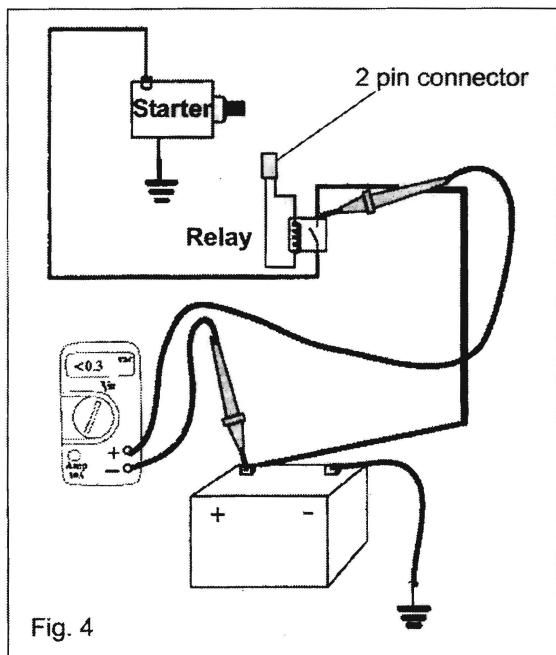
(Cont.)

5. Remove left side cover.
6. Set DMM to DC Volts.
7. Place one lead of DMM to positive battery post. (Fig.3)



ELECTRIC STARTER

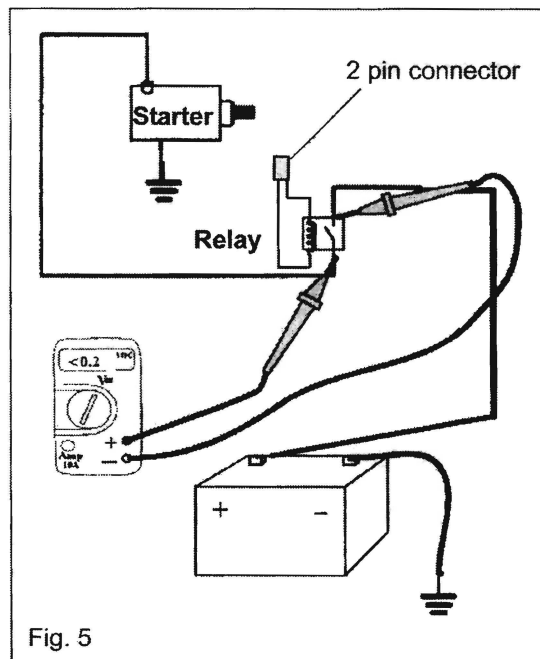
12. Place one lead of DMM to positive battery post. Ensure DMM is set to read DC Volts. (Fig. 4)



13. Place other lead of DMM to relay terminal leading to battery. (Fig. 3)
14. Engage starter and observe meter display, it should read less than 0.2 Volts DC (200 mV DC).
15. If voltage drop is observed, the cable, connection at the battery or connection at the relay is causing resistance and must be corrected.
16. Inspect cable ends for corrosion where cable is connected to terminal lugs.
17. Remove cable. Set the DMM to read Ohms.
18. Place DMM leads at both ends of the cable and measure the cable's resistance. The resistance should be 0 ohms. Replace cable if necessary.
19. Inspect battery post, battery cable lug and relay lug for corrosion or looseness.

NOTE: Corrosion has resistance that limits or stops the flow of current to the starter motor.

20. If corrosion is found, wash all connections with a solution of baking soda and water, wire brush all contact areas, apply a light film of dielectric grease to the hardware and tighten connections. Retest to verify problem has been corrected.



21. Place one lead of DMM to battery side of relay. Reset DMM to read DC Volts if necessary. (Fig. 5)
22. Place other lead to starter motor side of relay. (Fig. 5)
23. Engage starter and observe meter display; it should read less than 0.2 Volts DC (200 mV DC).
24. If voltage drop is observed, remove cables and clean cable terminals and relay terminals. Reattach cables. Retest voltage drop.
25. If voltage drop is still observed through the relay, replace relay.

(Cont.)



26. Place one lead of DMM to starter motor side of relay. Ensure DMM is set to read Volts DC. (Fig. 6)

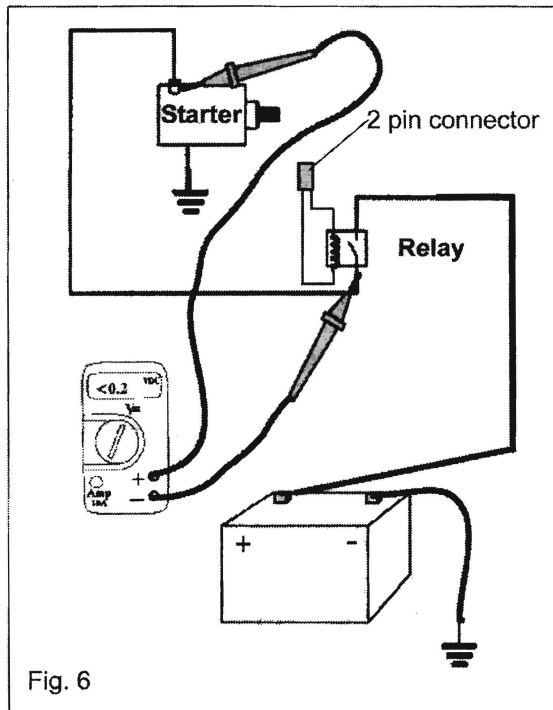


Fig. 6

27. Place other lead of DMM to starter motor positive terminal. (Fig. 6)
28. Engage starter and observe meter display.
29. If voltage drop is observed, cable connection at relay or connection at starter motor is causing resistance and must be corrected.
30. Inspect cable ends for corrosion where cable is connected to terminal lugs.
31. Remove cable. Set DMM to read Ohms.
32. Place DMM leads at both ends of cable and measure cable resistance. The resistance should be 0 ohms. Replace cable if necessary. Remember to subtract test lead resistance.
33. Inspect starter cable lug and relay lug for corrosion or looseness.
34. If corrosion is found, wash all connections with a solution of baking soda and water, wire brush all contact areas, apply a light film of dielectric grease to hardware and tighten connections. Retest to verify problem has been corrected.

NEGATIVE CABLE BYPASS TEST

1. Place transmission in neutral.

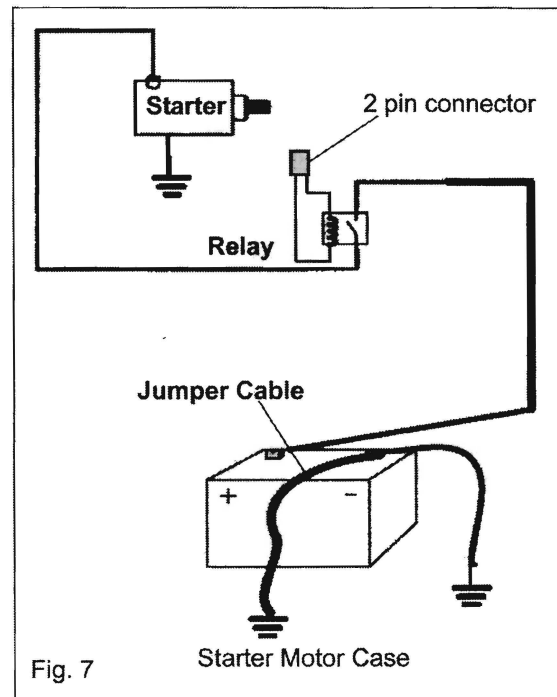


Fig. 7

2. Remove left side cover.
3. Connect one clamp of an automotive type jumper cable (heavy gauge jumper cable) to battery negative post. (Fig. 7)
4. Connect other end of jumper cable to a good ground location on starter motor body.
5. Make sure transmission is in neutral. Turn ignition key and stop switch on. Pull clutch lever in and attempt to start motorcycle.
6. If starter motor turns, there is excessive resistance in the negative, high current side of the starter system. Perform Negative Side Voltage Drop Test.
7. If starter does not turn and all troubleshooting steps have led to this test, replace starter motor.



ELECTRIC STARTER

NEGATIVE SIDE VOLTAGE DROP TEST

NEGATIVE SIDE VOLTAGE DROP TESTS		
Location	Steps	Allowable Voltage Drop
Battery (-) To Starter Body (-)	1 through 8	0.3 Volts DC (300 mV DC)
Battery (-) to Battery Cable Ground Connection At Engine	9 through 17	0.2 Volts DC (200 mV DC)*
Battery Cable Ground Connection To Starter Body (-)	18 through 24	0.2 Volts DC (200 mV DC)*

NOTE: *The total voltage drop of these two items will equal to the voltage drop between the battery (-) to starter body (-). The total voltage drop must not exceed 0.3 Volts DC.

CAUTION

Only operate the starter long enough to stabilize the reading on the DMM (less than 10 seconds running time). Let starter motor cool down between each voltage drop tests to prevent damage to starter motor.

Disable the ignition system so engine will not start during this test.

- Remove spark plug caps.
- Install test spark plugs or plugs with the gap closed into plug caps.
- Ground center electrode of spark plugs to engine.

1. Place transmission in neutral.

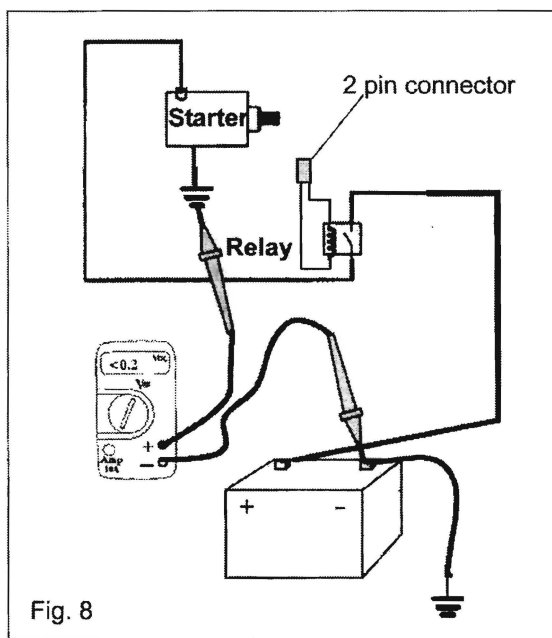


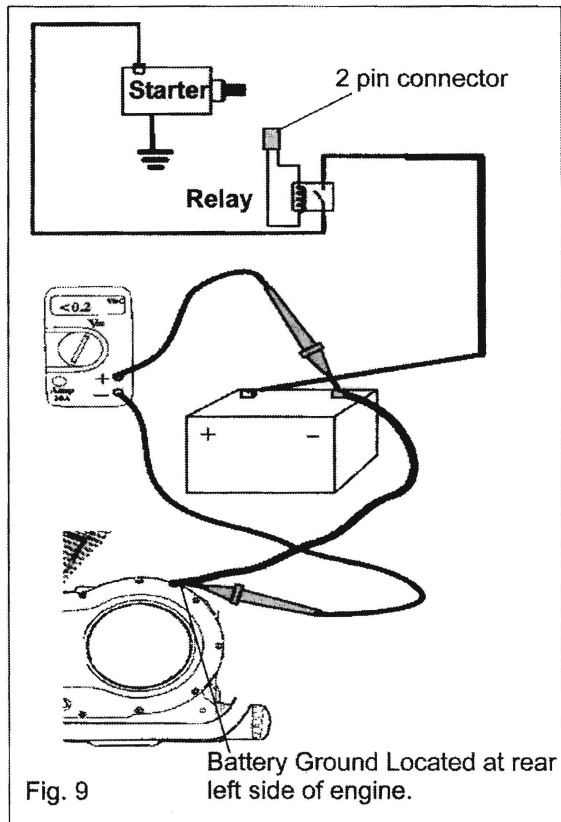
Fig. 8

2. Remove left side cover.
3. Set DMM to DC Volts.
4. Place one lead of DMM to negative battery post.
5. Place other lead of DMM to a clean ground on starter motor body. (Fig. 8)
6. Turn ignition switch ON and engine stop switch to RUN position. Pull clutch lever in.
7. Operate starter normally (no jumper cables in place) and observe meter display.
8. If DMM reads more than 0.3 Volts DC when starter motor is engaged, it indicates that there is excessive resistance in the starter's battery negative path. Continue with the following tests to isolate each section of the negative path and observe the voltage drop with DMM leads placed as indicated.
9. Place one lead of the DMM to the negative battery post. Ensure that the DMM is set to read DC Volts.
10. Place the other lead of the DMM to the battery cable engine ground connection.

(Cont.)



11. Engage starter and observe meter display; it should read less than 0.2 Volts DC (200 mV DC).

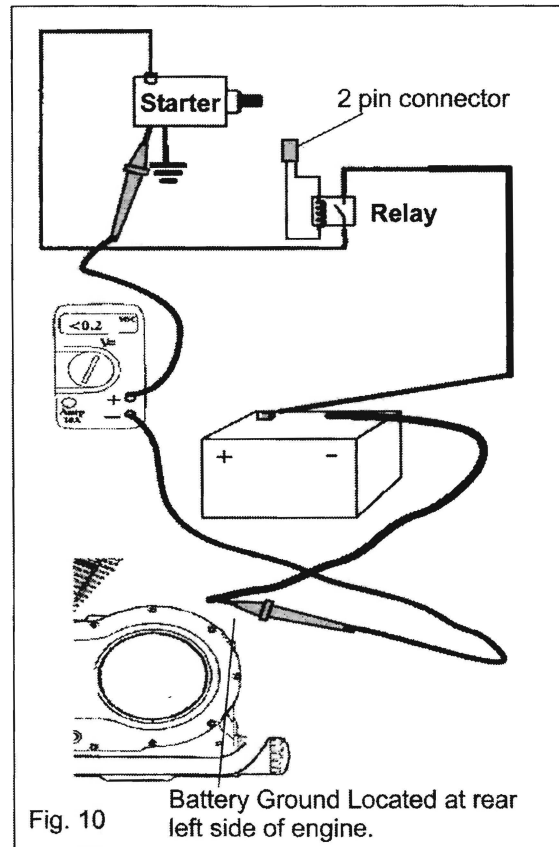


12. If voltage drop is observed, the cable, connection at the battery, connection at the engine or mounting surface of the starter motor body is causing resistance and must be corrected.
13. Inspect the cable ends for corrosion where cable is connected to battery or engine.
14. Remove the cable. Set the DMM to read Ohms.
15. Place the DMM leads at both ends of the cable and measure resistance. The resistance should be 0 ohms. Remember to subtract meter lead resistance. Replace the cable if necessary. (Fig. 9)
16. Inspect the battery post, battery cable lug and engine battery cable mount for corrosion or looseness.

NOTE: Corrosion has resistance that limits or stops the flow of current to the starter motor.

17. If corrosion is found, wash all connections with a solution of baking soda and water, wire brush all contact areas, apply a light film of dielectric grease to the hardware and tighten connections. Retest to verify problem has been corrected.

18. Place one lead of DMM to battery cable mount at engine. Reset the DMM to read DC Volts if necessary.
19. Place the other lead on starter motor body.
20. Engage the starter and observe the meter display, it should read less than 0.2 Volts DC (200 mV DC).
21. If voltage drop is observed, there is resistance between the battery cable connection at engine and the mounting surfaces of the starter motor. While this would be unusual, it is possible.



22. Remove and clean the connection between ground battery cable and engine. (Fig. 10)
23. Remove the starter and ensure that the starter is making firm contact with engine. Ensure that the starter mounting bolts are tight.
24. If corrosion is found, wash all connections with a solution of baking soda and water, wire brush all contact areas, apply a light film of dielectric grease to the hardware and tighten connections. Retest to verify problem has been corrected.

ELECTRIC STARTER

STARTER CURRENT DRAW TEST

WARNING

Do not allow any part of the jumper cable clamp to touch the chassis or any other ground.

CAUTION

Disable the ignition system so that the engine will not start during this test.

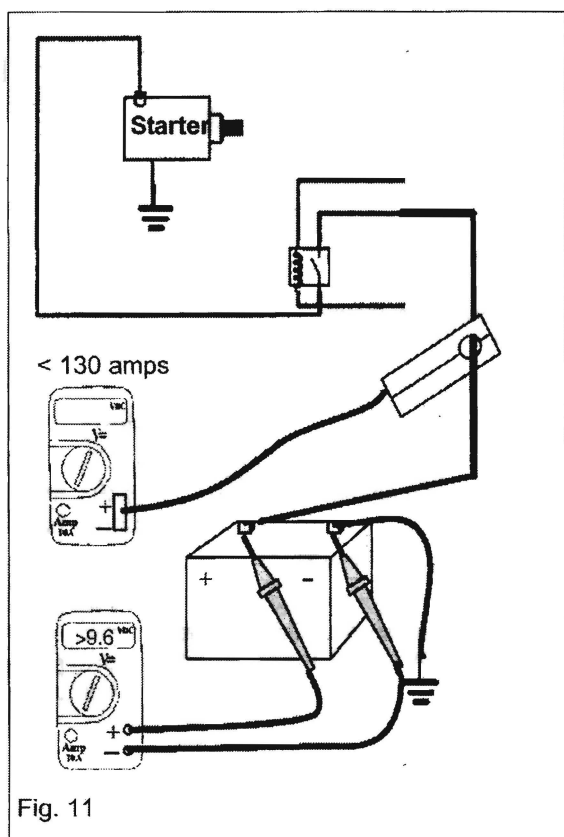
Remove spark plug caps.

Install test spark plugs into plug caps.

Ground spark plugs against engine.

1. Inspect the battery (see procedure). Charge or replace battery as necessary before proceeding.
2. Place transmission in neutral.
3. Position an inductive ammeter clamp on battery positive cable. (Fig. 11)

4. Set DMM to Volts DC scale and connect red lead of meter to positive post of battery. (Fig. 11)
5. Connect black lead of meter to negative post of battery. (Fig. 11)
6. Turn ignition switch on and observe ammeter. It should register negative amps. If it does not, turn the ammeter probe around.
7. Make sure ignition switch is on, engine stop switch is in the run position, transmission is in neutral, clutch lever pulled in and that the ignition system is disabled.
8. Press starter switch and crank starter for about 5 seconds and observe both meters and the tachometer.
9. The battery voltage should remain above 9.6 volts.
10. The amperage draw of the starter should not exceed 130 amps. See page 18.19 for Starter Current Draw chart.



18.18



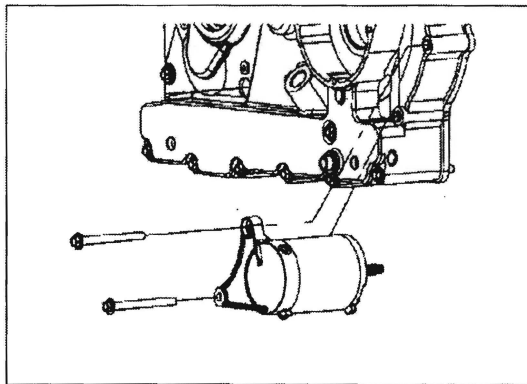
STARTER CURRENT DRAW RESULTS (Good Battery Condition Verified)			
Amperage Draw	Battery Voltage	Engine RPM	Possible Problem
90 to 120 amps	9.6 Volts DC or Greater	Greater Than 400 rpm	Normal
Less Than 90 amps	9.6 Volts DC or Greater	Less Than 400 rpm	Internal starter problems
Greater Than 130 amps	Less Than 9.6 Volts DC	Less Than 400 rpm	Inspect for voltage drops on positive or negative side of starter circuit.
Greater Than 130 amps	Less Than 9.6 Volts DC	Less Than 400 rpm	Voltage drops within acceptable limits. Remove starter & inspect.
Greater Than 130 amps	Less Than 9.6 Volts DC	Less Than 400 rpm	Voltage drops within acceptable limits. No internal starter problem. Engine compression is excessive or internal engine problems not allowing parts to rotate freely.

STARTER MOTOR REMOVAL

⚠ WARNING

Ensure that the ignition switch is turned off. Remove the negative cable at the battery before removing the starter motor.

1. Remove exhaust system. (Refer to Chapter 3)
2. Remove right lower frame rail. (Chapter 6)
3. Remove regulator/rectifier assembly.
4. Remove cable from starter terminal.



5. Place drain pan under starter.
6. Remove 2 starter motor mounting bolts and remove starter.

STARTER MOTOR INSTALLATION

⚠ WARNING

Make sure that the ignition switch is turned off and that the negative cable is disconnected from the battery before installing the starter.

1. Place starter into the engine case while aligning the starter mounting lugs as closely as possible during the installation process.
2. Rotate the starter to align starter mounting lugs with bolt holes in engine cases.
3. Install starter mounting bolts and tighten to specification.

30 Nm (22 lb-ft)

4. Connect starter motor cable and cable nut. Torque cable nut to specification.

6.8 Nm (60 in-lb)

5. Install regulator/rectifier assembly.

10 Nm (85 in-lb)

6. Install exhaust system. Refer to Chapter 3.
7. Connect negative battery cable.

STARTER CLUTCH REMOVAL

1. Refer to Chapter 9.



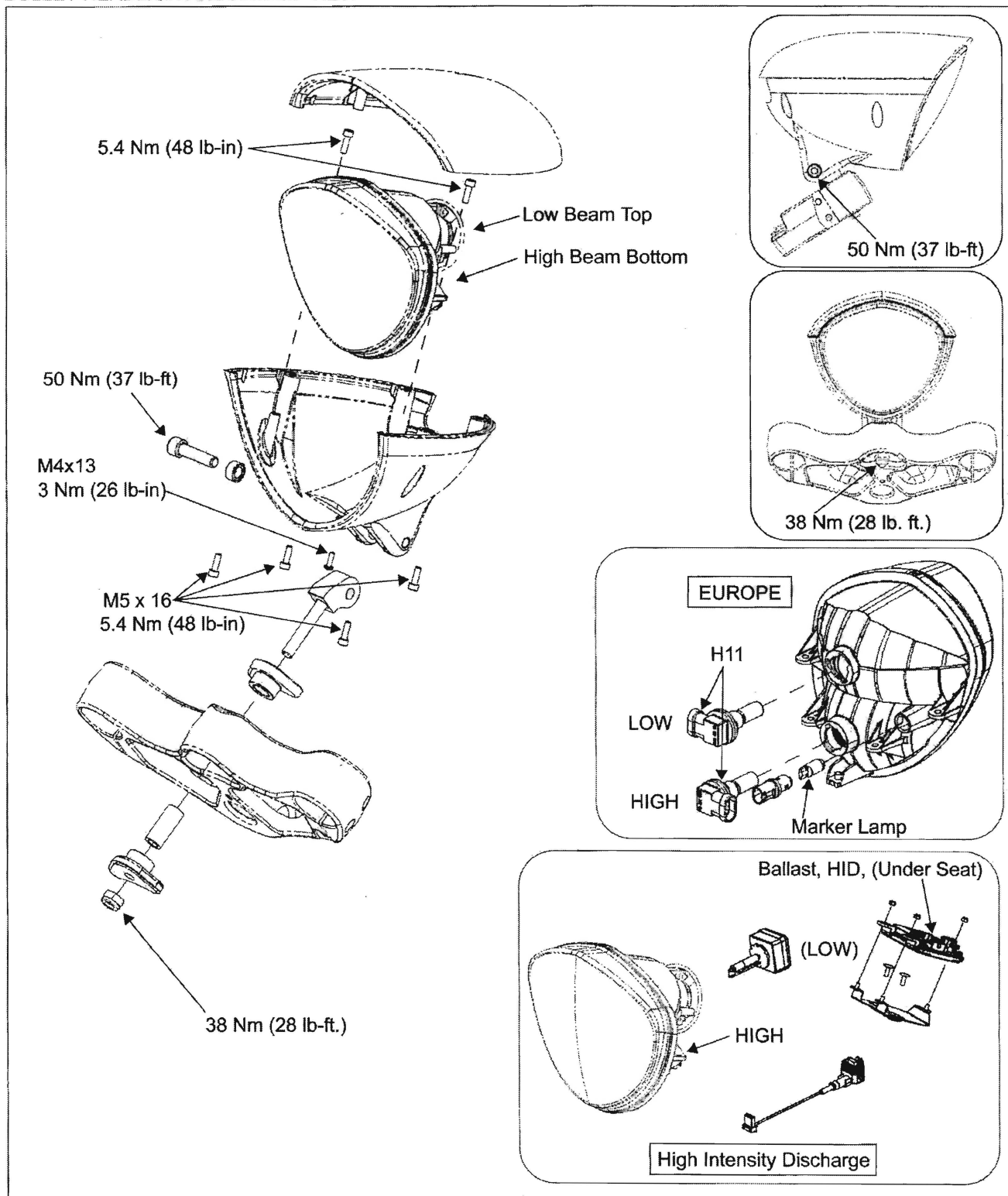
CHAPTER 19 **WIRING / LIGHTING SYSTEMS**

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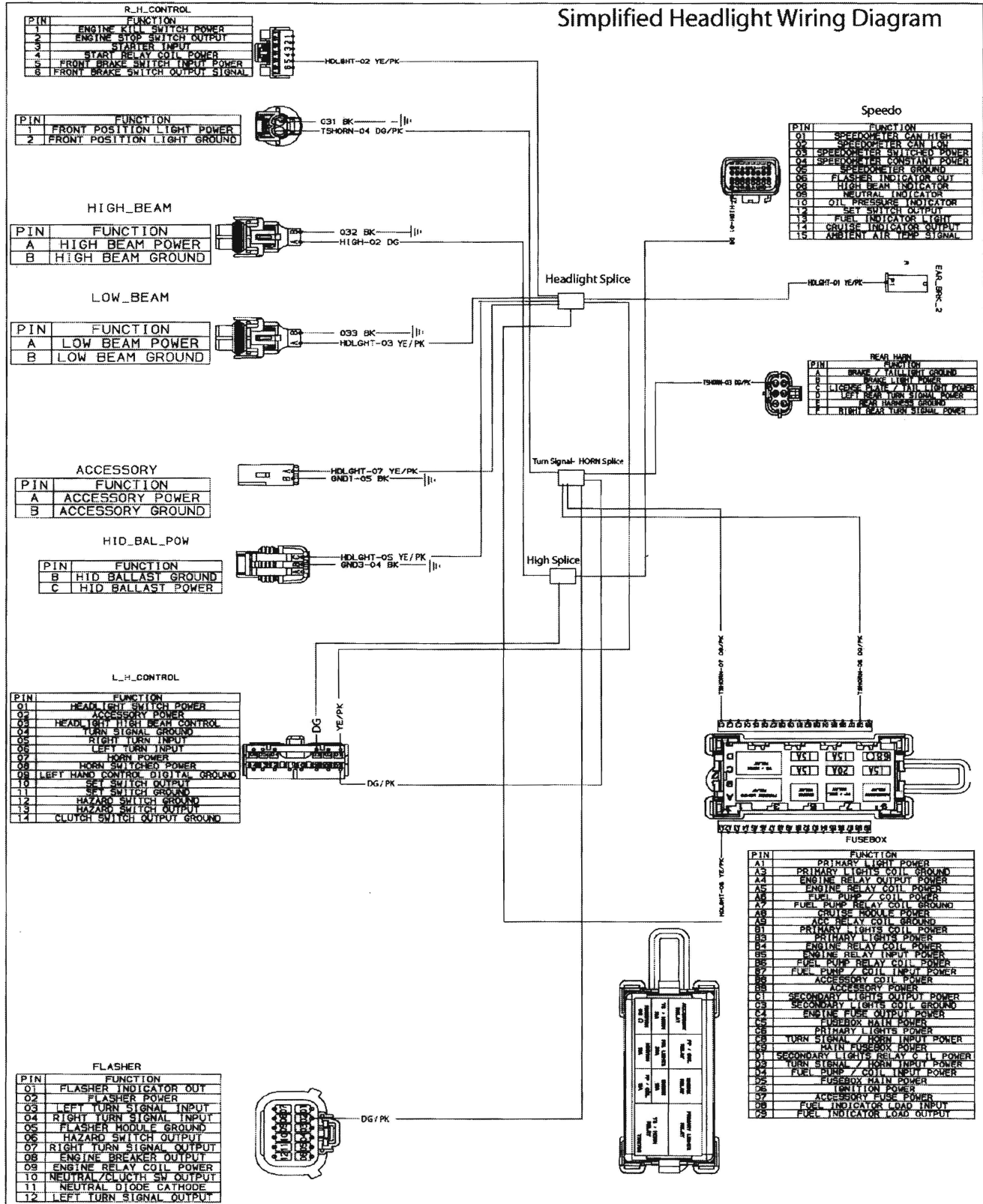
HEADLIGHT

BULLET HEADLIGHT ASSEMBLY VIEW



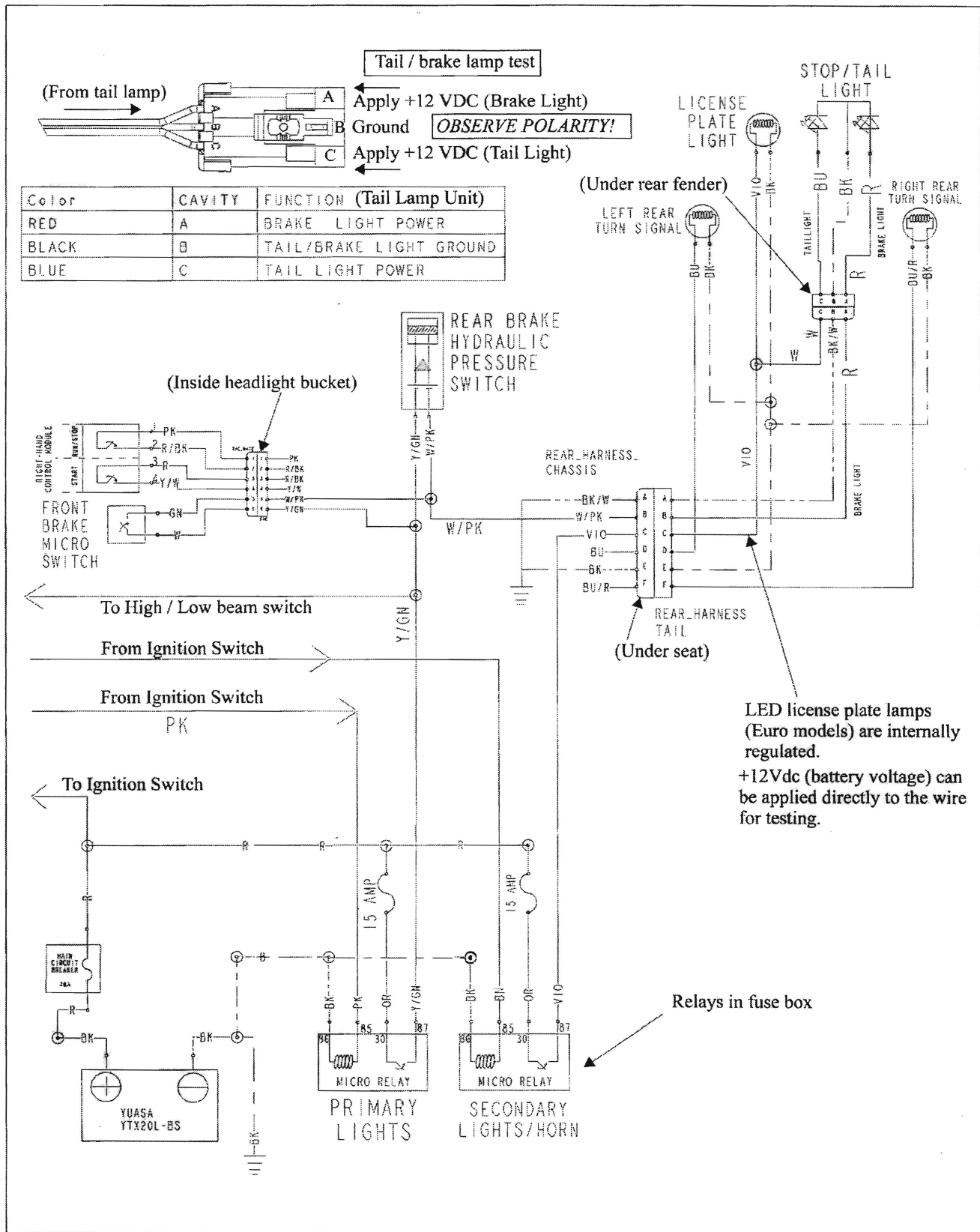
HEADLAMP SYSTEM WIRING

Simplified Headlight Wiring Diagram



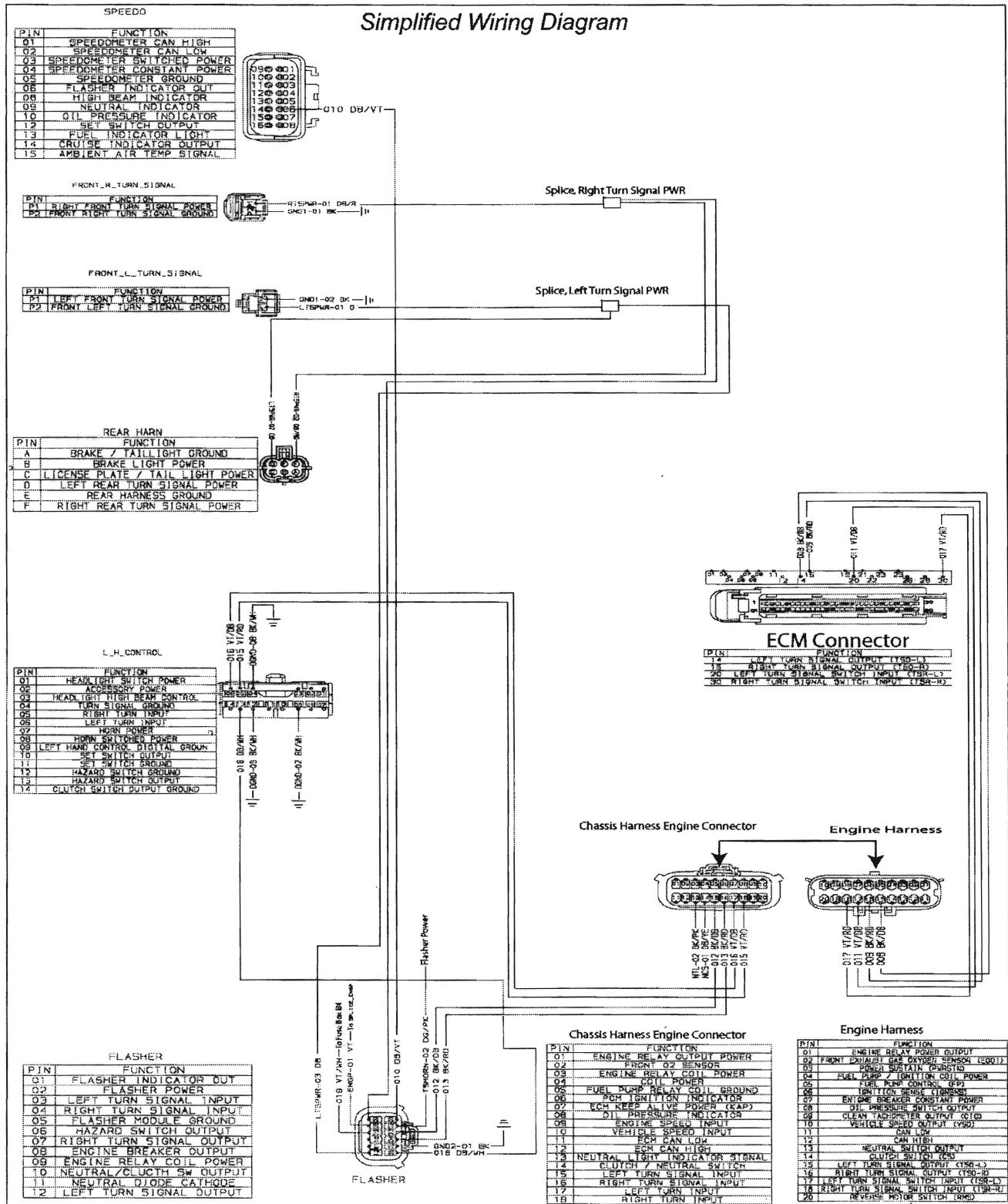
WIRING / LIGHTING SYSTEMS

TAIL LAMP / BRAKE LAMP SYSTEM WIRING DIAGRAM



TURN SIGNAL / HAZARD SYSTEM

TURN SIGNAL SYSTEM WIRING DIAGRAM



WIRING / LIGHTING SYSTEMS

TURN SIGNAL FLASHER MODULE - INPUT / OUTPUT

Module located under seat on right side of frame. Remove plastic dart from frame tube to access module and connector.
NOTE: Ignition key must be ON and Engine Stop switch set to RUN for turn signal system function.

FLASHER MODULE PIN FUNCTION			
Pin Number	Function / Name	Wire Color	Overview of Operation
1	Flasher Indicator out	DB / VT	Module sends power to the turn signal indicator lamp on this wire when a turn signal or hazard is selected
2	Switched Power Input (+12VDC)	DG / PK	+12VDC From secondary lights / horn relay. This wire supplies battery voltage to the module
3	Left Turn Input	BK / DB	This wire receives a left turn ground input from Pin 14 of ECM (auto cancel circuit). Ground signal must pass through Pin 15 of Chassis-to-Engine harness connector. When ECM auto-cancels a turn signal (or if manually cancelled by the operator at the turn signal switch) this ground is taken away from the flasher module by the ECM.
4	Right Turn Input	BK / RD	This wire receives a right turn ground input from Pin 15 of ECM (auto-cancel circuit). Ground signal must pass through Pin 16 of the Chassis-to-Engine harness connector. When ECM auto cancels a turn signal (or if manually cancelled by the operator at the turn signal switch) this ground is taken away from the flasher module by the ECM.
5	Ground	BK	Flasher module ground
6	Hazard Switch Input	DB / WH	This wire is grounded through the hazard switch when the switch is closed, and the module flashes all turn signals (module sends 12V to Pin 7 and Pin 12 of the module for distribution to both left and right side turn signals)
7	Right Turn Signal Output	DB / RD	Module sends power to right turn signals on this wire when it receives a RH turn signal input (ground) from ECM on Pin 4 (BK/R)
8	Engine Breaker Output / Engine Diode Anode	VT	Positive side of ECM Protection Diode. Prevents voltage spikes to ECM
9	Engine Relay Coil Power / Engine Diode Cathode	VY / WH	Negative side of ECM Protection Diode. Prevents voltage spikes to ECM
10	Neutral Light Diode Anode	DB / YE	Grounded when clutch lever switch is closed so engine can be started in gear when lever is pulled in. Diode prevents Neutral light from illuminating when clutch lever is pulled in with transmission in gear
11	Neutral Light Diode Cathode	BK / PK	Ground path through neutral light switch when transmission is in neutral
12	Left Turn Signal Output	DB	Module sends power to left turn signals on this wire when it receives a LH turn signal input (ground) from ECM on Pin 3 (BK/BU)



TURN SIGNAL SYSTEM OVERVIEW AND DIAGNOSTICS

Refer to system wiring diagram on page 19.5. For all testing / troubleshooting, remember to turn the ignition key ON and the engine stop switch to RUN.

OVERVIEW OF OPERATION:

The Auto-Cancel function of the turn signal system is controlled by the ECM (located under the seat). When the left or right turn signal switch is activated, the switch connects the BK/W ground wire at the switch to either ECM Pin 20 (for a LEFT signal) or ECM Pin 30 (for a RIGHT signal). *Note that this connection travels through either Pin 17 (for left turn) or Pin 18 (for right turn) of the Engine-to-Chassis Harness connector under the seat.*

When the ECM receives a ground signal from the switch on Pin 20 or 30, it then relays this ground signal to the Flasher Module Pin 3 (for left) or Pin 4 (for right) and maintains the ground connection until automatically or manually cancelled.

When the flasher module receives a ground input from the ECM, it sends an intermittent (flashing) 12VDC to the appropriate turn signal.

When time / distance criteria for signal cancellation is achieved, the ECM takes away the ground from the Flasher Module, and the turn signal is canceled. The signal can also be manually cancelled by pushing the turn signal button straight inward. This connects both turn signal wires to ground at the same time, and the ECM sees this as a "manual cancel" input.

Note that because the Hazard system requires no cancel function, *the ECM is not part of the Hazard circuit.* A HAZARD input (a ground) goes directly from the Hazard Switch to Pin 6 of the Flasher Module. The module sees the ground on Pin 6 and sends flashing 12VDC to BOTH left and right turn signals.

GENERAL TROUBLESHOOTING: Turn signal diagnostics can be accomplished by manually connecting the appropriate wires to ground at various points in the system (most easily performed at the Engine-to-Chassis harness connector under the seat) and by verifying wire and switch continuity with an Ohmmeter. As with any electrical malfunction, ALWAYS verify that all wire connections are clean and tight. **TIP:** If turn signal(s) function when Hazard switch is ON, turn signal wire connections, signal lamp units, and related wiring from Flasher Module are all in working order. Check ground inputs from switch to ECM and ground outputs from ECM to Flasher Module as described below.

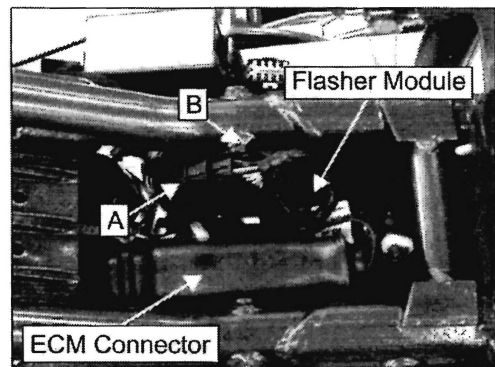
CONNECTOR AND COMPONENT LOCATION: The turn signal switch connector is located inside the headlight housing. The Engine-to-Chassis harness connector, Flasher Module, and ECM connector are located under the seat.

TURN SIGNAL SWITCH BYPASS TEST:

1. Locate Engine-to-Chassis harness connector (A) under seat and leave it connected.
2. On engine harness side of connector, jump VIO/BU wire (Pin 17) to test left turn or VIO/R (Pin 18) for right turn to ground at battery negative (-) post. **TIP:** Engine harness side of connector has a Violet wire in Pin 7 and the Chassis harness side has an Orange wire in Pin 7.

NOTE: If piercing probes are used, use care not to damage the wire. Seal probe marks on wire insulation when test is completed.

3. Turn ignition key ON and Stop switch to RUN. If turn signal works, inspect turn signal switch continuity and the path between switch and engine harness connector (to test Engine-to-Chassis harness connection perform Step 2 on the chassis side of connector).
4. The same basic test outlined above for the ground inputs from the switch can be performed on the ground output wires that supply the ground from the ECM to the flasher module (BK/BU Pin 15 and BK/R Pin 16). If turn signal function is restored when the output wire is grounded, the Flasher Module (and connection to the Flasher) is in working order. If signal does not flash with output wire grounded, inspect Flasher Module connection (by removing dart (B) in above photo) and continuity of BK/BU or BK/R wire to ECM.



ECM Connector Removal is on Page 5.34

TURN SIGNAL SWITCH CONTINUITY TEST:

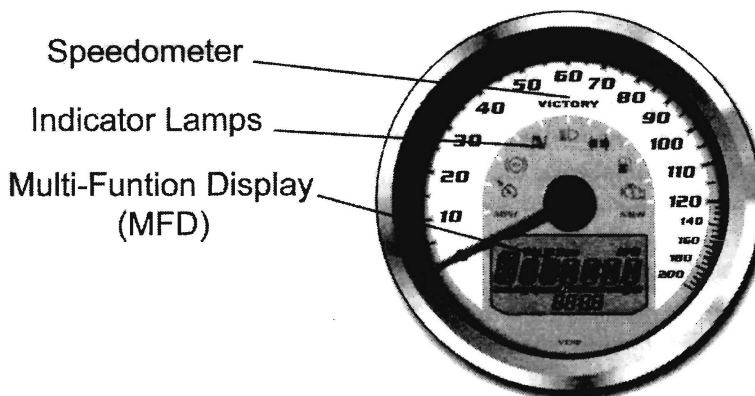
1. Remove headlight housing cover (or headlight on round headlamp models). Locate LH switch 14 Pin connector.
2. Separate connector. Connect ohmmeter to Pin 4 and Pin 5 (RH turn) or Pin 4 and Pin 6 (LH turn) on switch side of connector. Hold switch to left or right and verify good continuity in each position.



Speedometer Information

Instrument Cluster Speedometer

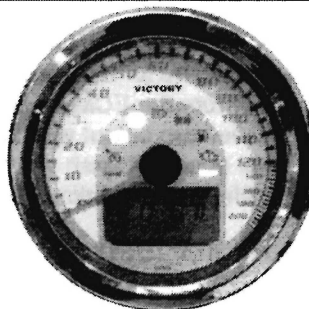
The speedometer displays vehicle speed in either miles per hour (MPH) or kilometers per hour (km/h).



Indicator Lamps

Lamp	Indicates	Condition
	Anti-Lock Brake (ABS) Test / Fault	N/A
	Neutral	This lamp illuminates when the transmission is in neutral and the ignition key is in the ON position.
	High Beam	This lamp illuminates when the headlamp switch is set to high beam.
	Turn Signal	The turn signal indicator flashes when the left, right, or both turn signals (hazard) are active. <i>If a bulb fails, or if there is a short circuit in the signal system, the lamp flashes at more than twice the normal rate.</i>
	Low Oil Pressure <i>Oil Pressure Warning located on MFD for MY12 SEE IMAGE BELOW</i>	This lamp illuminates when the ignition switch is in the ON position and the engine is off, indicating that the indicator circuit is functioning properly. This lamp also illuminates if engine oil pressure drops below safe operating pressure. If this lamp illuminates while the engine is running, turn the engine off as soon as safely possible and check the oil level. <i>If the oil level is correct and the lamp remains on after the engine is restarted, turn the engine off immediately.</i>
	Low Fuel	This lamp illuminates when approximately one gallon (3.8 liters) of fuel remains in the fuel tank.
	Check Engine	This lamp illuminates momentarily when the ignition switch is in the ON position and the engine is off. This indicates proper function. <i>If this lamp illuminates while the engine is running, contact an authorized VICTORY dealer promptly for diagnosis.</i> The light will remain on if the tilt sensor shuts down the engine. If abnormal sensor or engine operation is detected the light will remain on as long as the fault condition exists. Retrieve the error codes for diagnosis. This lamp is also known as a malfunction indicator lamp (MIL).
	Cruise Control Engaged (if equipped)	

NOTE: Oil Pressure Warning has moved to the Multi-Function Display (MFD) for MY12. When the ignition is turned on the LO OIL message will be displayed momentarily. THIS IS NORMAL. If the LO OIL message illuminates while the engine is running, turn the engine off as soon as safely possible and check the oil level. *If the oil level is correct and the lamp remains on after the engine is restarted, turn the engine off immediately.*

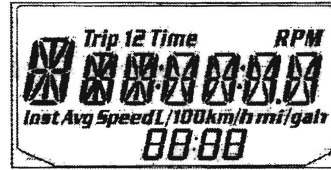


Instruments, Features and Controls

Instrument Cluster

Multi-Function Display

Use the mode button to toggle through the modes of the multi-function display. Press and hold the mode button to reset the trip odometers, average fuel economy, average speed and trip hour meter.



Modes Available	
Standard Modes	Accessory Modes
Odometer	Trip Odometer 2
Trip Odometer 1	Average Fuel Economy
Tachometer	Instantaneous Fuel Economy
Gear Indicator	Trip Hours
Clock	Average Speed
	DC Voltage
	Ambient Air Temperature

Display Units (Standard/Metric)

The display can be changed to display either standard or metric units of measurement.

Tip: To exit the set-up mode at any time, wait 10 seconds. The display automatically exits and returns to the odometer display.

	Standard Display	Metric Display
Distance	Miles	Kilometers
Fuel	U.S. Gallons	Liters, Imperial Gallons
Temperature	Fahrenheit	Celsius
Time	12-Hour Clock	24-Hour Clock

1. Turn the key to the OFF position.
2. Press and *hold* the mode button while turning the key to the ON position.
3. When the display flashes the distance setting, tap the mode button to advance to the desired setting.
4. Press and *hold* the mode button to save the setting and advance to the next display option.
5. Repeat the procedure to change remaining display settings.



Instruments, Features and Controls

Instrument Cluster

Multi-Function Display

Odometer

The odometer displays total distance traveled by the vehicle.

Trip Odometers

The ignition switch must be in the ON position to access the trip odometers. The trip odometers (Trip 1 and Trip 2) display total distance traveled since being reset. To reset a trip odometer, toggle to the trip odometer. Press and hold the mode button until the meter resets.

Engine Speed (Tachometer)

Engine speed displays in revolutions per minute (RPM).

Gear Position

A gear position displays only when the transmission is in gear and the motorcycle is moving.

Two dashes (--) display if the stop/run switch is in the RUN position and the motorcycle is not moving while in gear. The dashes also display if the stop/run switch is in the STOP position.

"N" displays when the stop/run switch is in the RUN position and the transmission is in neutral.

Oil Pressure

(MY12) The Oil Pressure warning indicator is part of the Multi-Function Display. When the ignition is switched ON, the MFD will display LO OIL briefly as part of the MFD display test. THIS IS NORMAL. If the LO OIL message is displayed while the engine is running, turn the engine OFF as soon as safely possible and check the engine oil level. If the oil level is correct, restart the engine. If the LO OIL message is displayed again, turn the engine OFF immediately.

Clock

Tip: The clock must be reset any time the battery has been disconnected or discharged.

1. Turn the key to the ON position. Use the mode button to toggle to the odometer display.
2. Press and *hold* the mode button until the hour segment flashes. Release the button.
3. With the segment flashing, tap the mode button to advance to the desired setting.
4. Press and *hold* the mode button until the next segment flashes. Release the button.
5. Repeat steps 3-4 twice to set the 10-minute and 1-minute segments. After completing the 1-minute segment, step 4 will save the new settings and exit the clock mode.
6. Turn the key to the OFF position.

Average Fuel Economy (Accessory)

This mode displays average fuel economy since being reset. To reset, toggle to this mode. Press and hold the mode button until the meter resets.

Instantaneous Fuel Economy (Accessory)

This mode displays the instantaneous fuel economy of the motorcycle.

Trip Hours Meter (Accessory)

The trip hours meter displays total hours of operation since being reset. To reset, toggle to this mode. Press and hold the mode button until the meter resets.



Instruments, Features and Controls

Instrument Cluster

Multi-Function Display

Average Speed (Accessory)

The average speed mode displays average vehicle speed since being reset. To reset, toggle to this mode. Press and hold the mode button until the meter resets.

DC Voltage (Accessory)

The volt meter displays battery voltage. If the engine is not running, approximate *battery* voltage displays. If the engine is running, approximate *charging* voltage displays.

Ambient Air Temperature (Accessory)

If the accessory sensor is installed, toggle to this mode to display the ambient air temperature. The key must be in the ON position.

Diagnostic Functionality

Certain conditions will cause an error message to display in the screen. If this occurs, please see your VICTORY dealer.

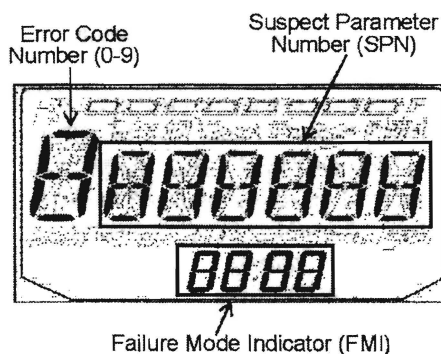
Message	Location	Indicates
LO	DC Voltage Screen	Voltage remains below 11.0 volts for more than 10 seconds
OV	DC Voltage Screen	Voltage remains above 15.0 volts for more than 10 seconds
ERROR	All	Checksum error (gauge malfunction)

Engine Error Codes

The error screen displays only when the CHECK ENGINE light is on or when it goes on and off during one ignition cycle. Error codes are not stored. When the key is turned OFF, the code and message is lost, but will reappear if the fault reoccurs after restarting the engine.

If the CHECK ENGINE indicator lamp illuminates, retrieve the error codes from the display.

1. If the error codes are not displayed, use the mode button to toggle until "Ck ENG" displays on the main line of the display.
2. Press and hold the mode button to enter the diagnostics code menu.
3. Record the three numbers displayed in the gear position, clock and odometer displays.
4. Press and release the mode button to advance to the next error code.
5. Press and hold the mode button to exit the diagnostics code menu.
6. See an authorized VICTORY dealer for code details and diagnosis.



WIRING / LIGHTING SYSTEMS

SPEEDOMETER

Speedometer Gear Position Indicator

The Gear Indicator will show two dashes (--) if the stop/run switch is in the RUN position and the motorcycle is not moving while in gear. The dashes also display if the stop/run switch is in the STOP position. The two dashes will also display if the clutch lever is pulled IN while the vehicle is moving and in gear (coasting).

The Gear indicator will show the gear number (1 through 6) when the vehicle is running AND the vehicle is moving AND the transmission is in gear 1 through 6 AND the clutch lever is out and the clutch is engaged. The letter "N" is displayed in Neutral.

SPEED SENSOR TEST

NOTE: The speed sensor can also be tested using Digital Wrench. Refer to Chapter 5 for an overview of the Digital Wrench diagnostic system.

To test the speed sensor with the signal tester, unplug speed sensor connector (top of crankcase behind rear cylinder). Install signal test adapter harness between sensor and tool harness. Rotate rear wheel slowly. If speed sensor is functioning, light on tool will alternate on and off corresponding to rear wheel rpm.

Speedometer Signal Tester (PV-43544)

Signal Test Adapter (PV-47303)

SPEEDOMETER CIRCUIT VOLTAGE TEST AND TROUBLE SHOOTING

1. Disconnect speed sensor connector (on top of crankcase behind rear cylinder).
2. Set digital multimeter to measure DC voltage. Turn ignition key ON and verify battery voltage is present on the VT/PK wire (Pin 3) at the speed sensor harness connector.
3. If battery voltage is not present on the VT/PK wire (pin 3), test related wiring (refer to wiring schematic).
4. Set multimeter to the ohms/continuity function. Check for continuity between the BN/DB wire (pin 1) and the negative - side of the battery. There should be continuity (0.5 ohms or less) between pin 1 and ground. If there is no continuity, check related wiring and connectors. See wiring schematic. Turn key off.
5. Locate ECM and disconnect the ECM connector. Check for continuity between the DG/BN (pin 2) of the speed sensor harness connector and pin 42 of the ECM connector. There should be continuity (0.5 ohms or less). If there is no continuity, check related wiring and connectors.

NOTE: The signal from the speed sensor is supplied to the ECM on Pin 42, and distributed or used by the ECM to operate the speedometer, the cruise control module (whether equipped with cruise or not, the connector is there). If any one of these components is functioning properly (for example, the speedometer works or the cruise control will accept a set speed) then the speed sensor itself is functional and supplying a signal to the ECM. Diagnostics should be focused on the non functional circuit, not on the speed sensor itself.

TAIL LIGHT

LED TAIL LIGHT - THEORY OF OPERATION

The multiple LED tail / brake lamp functions much like a conventional incandescent tail / brake lamp. LED lights require a regulated current supply to prevent damage, so a current regulation circuit is incorporated inside the tail lamp unit. Direct 12 volt battery power can be applied directly to the brake or tail lamp wire for testing purposes, but polarity **MUST** be observed or the LEDs will be permanently damaged.

Tail Light Input:

When the ignition key is turned to ON or PARK position, battery voltage is delivered to the TAIL LEDs on the VIOLET wire from the Secondary Lights / Horn relay. Current through each TAIL LED (WHITE wire) is limited (inside tail lamp unit) to approximately 250 mA.

Brake Light Input:

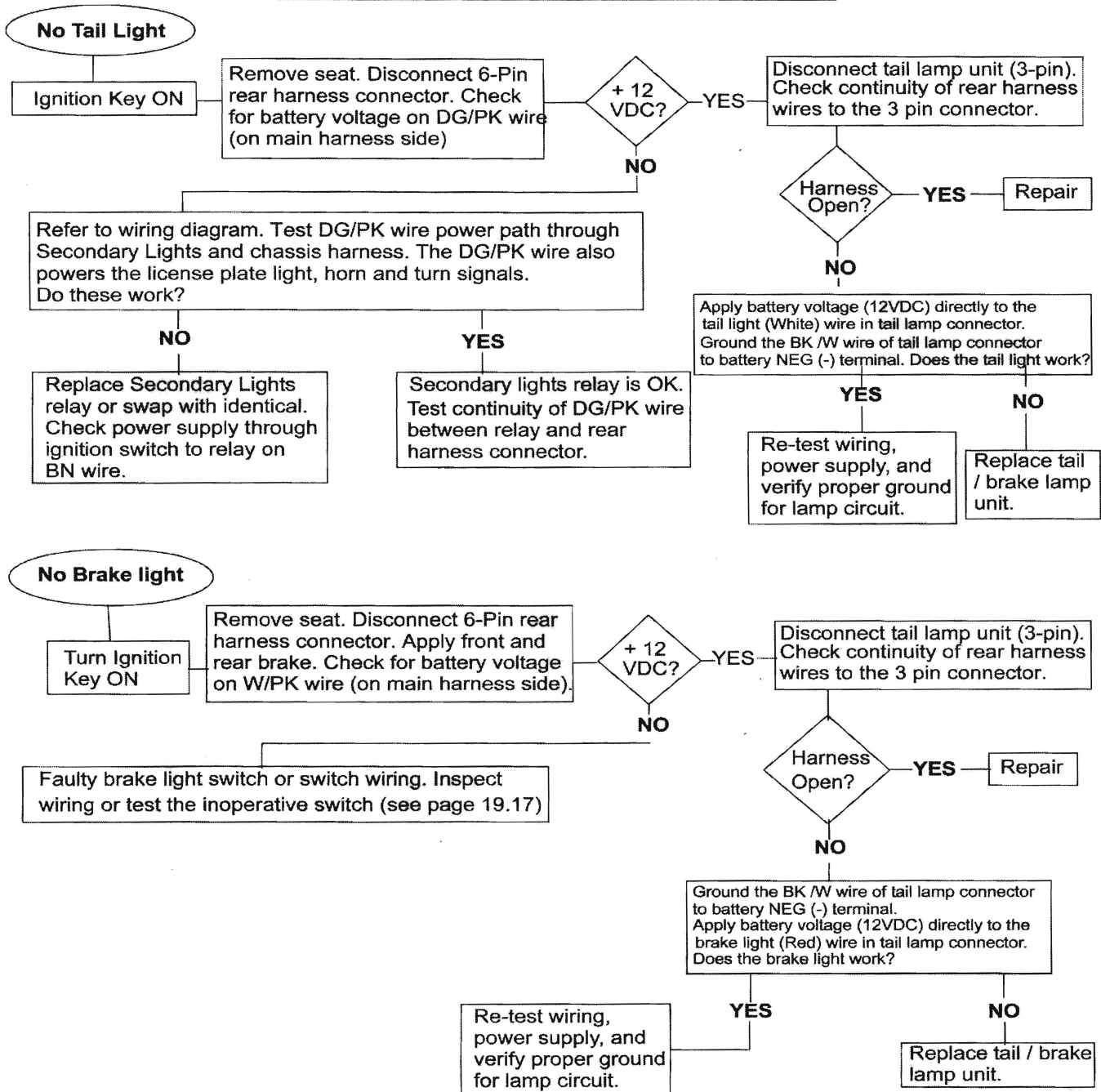
With ignition key ON, the primary lighting relay delivers battery voltage to the front and rear brake switches on the Y/GN wire. When front or rear brake is applied, power flows to the 6 Pin rear harness connector on the W/PK wire, and to the 3 Pin tail lamp connector on the RED wire. Current is limited (inside tail lamp unit) to approximately 500 mA.



LED TAIL LIGHT CIRCUIT DIAGNOSTICS

IMPORTANT!

ALWAYS carefully inspect wires, pins, and sockets in all connectors in a circuit for loose or corroded parts.

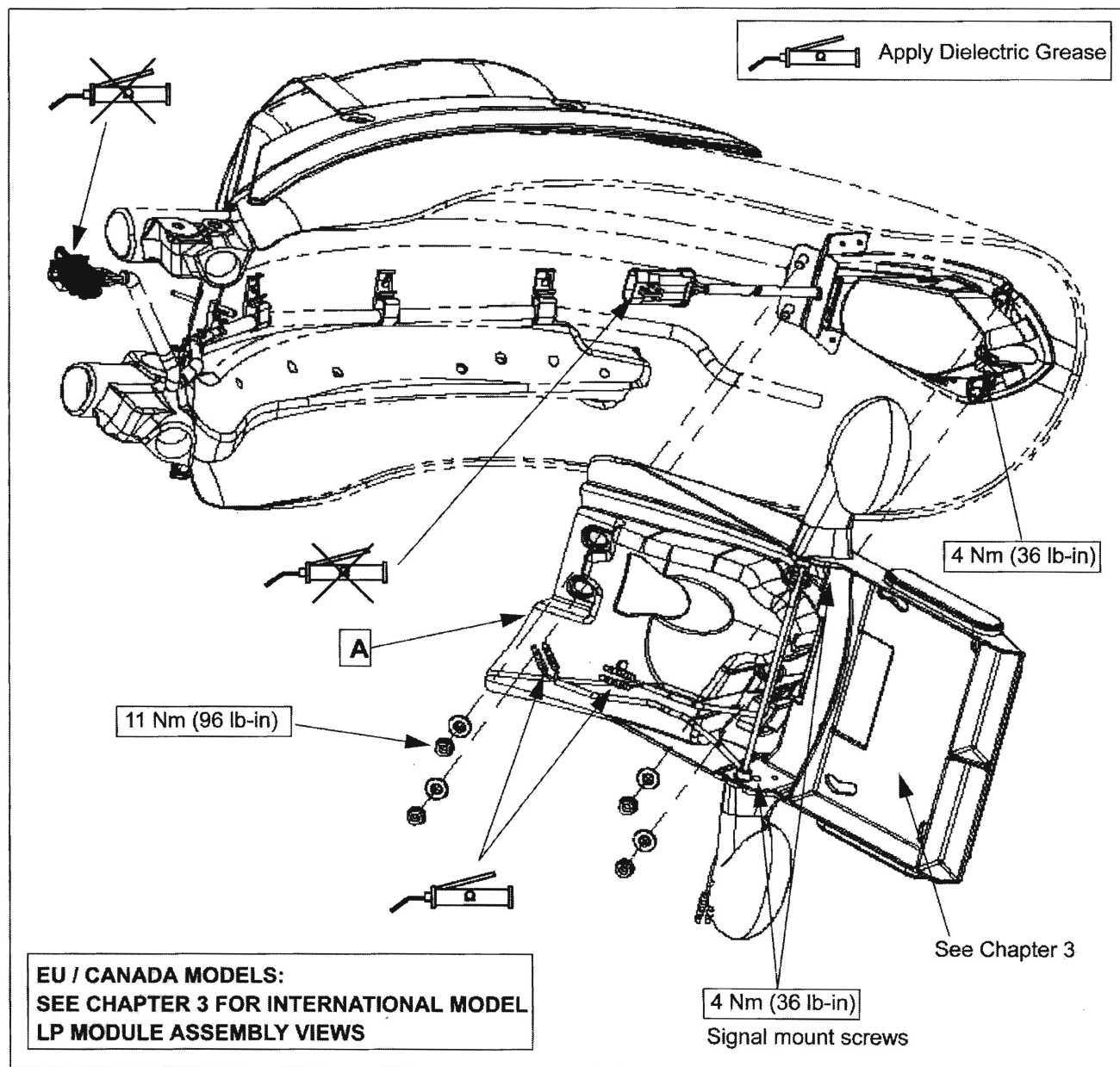


WIRING / LIGHTING SYSTEMS

TAIL LIGHT / REAR TURN SIGNAL - VEGAS

NOTE: Fender removal is recommended for wire harness or tail lamp replacement (Chapter 3). Turn signal assemblies can be installed by removing wiring cover (A) on Vegas and Vegas 8-Ball models. Vegas Low models require rear fender removal.

1. For wire access, remove cover (A) by removing the (4) nuts, top hat washers, and grommets.
2. Disconnect / remove wiring from harness guides as required to access to components.
3. **Be sure all wiring is routed and secured properly upon assembly.**

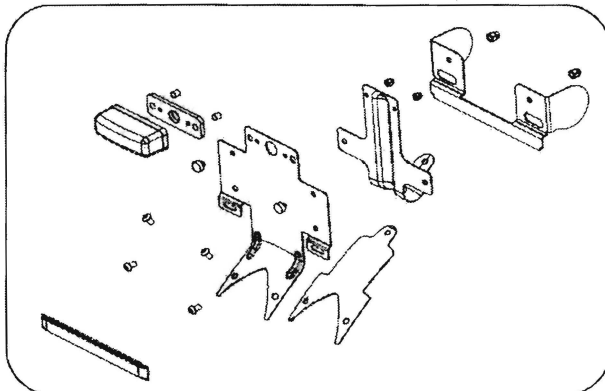
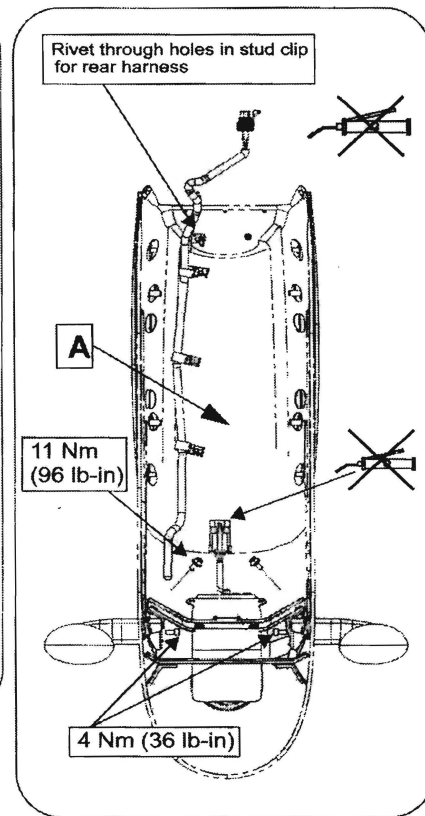
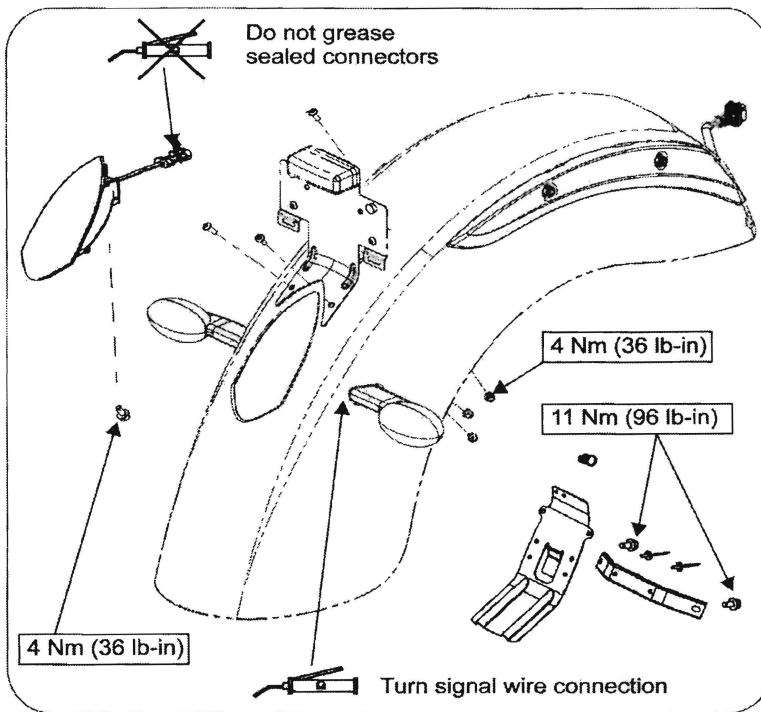


TAIL LIGHT / REAR TURN SIGNAL / LICENSE MODULE - KINGPIN

NOTE: Fender removal is required on Kingpin models for wire harness, tail lamp, or turn signal replacement (Chapter 3).

1. For wire access, remove cover (A) by removing (4) nuts, top hat washers, and grommets.
2. Disconnect / remove wiring from harness guides as required to access to components.
3. **Be sure all wiring is routed and secured properly upon assembly.**

III. 2 - KINGPIN



**EU / CANADA MODELS:
SEE CHAPTER 3 FOR INTERNATIONAL MODEL
LP MODULE ASSEMBLY VIEWS**

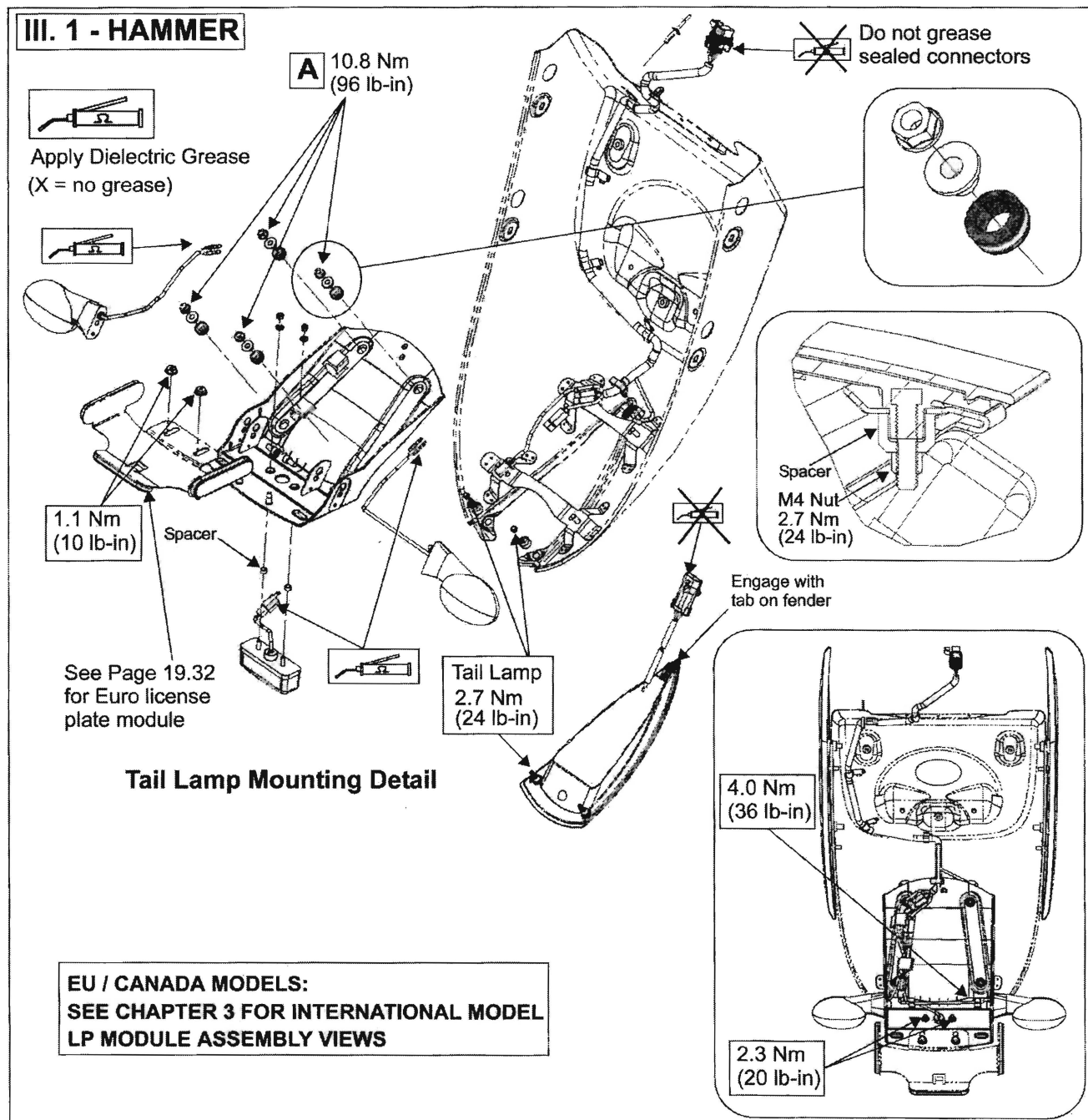


WIRING / LIGHTING SYSTEMS

TAIL LIGHT / REAR TURN SIGNAL - HAMMER

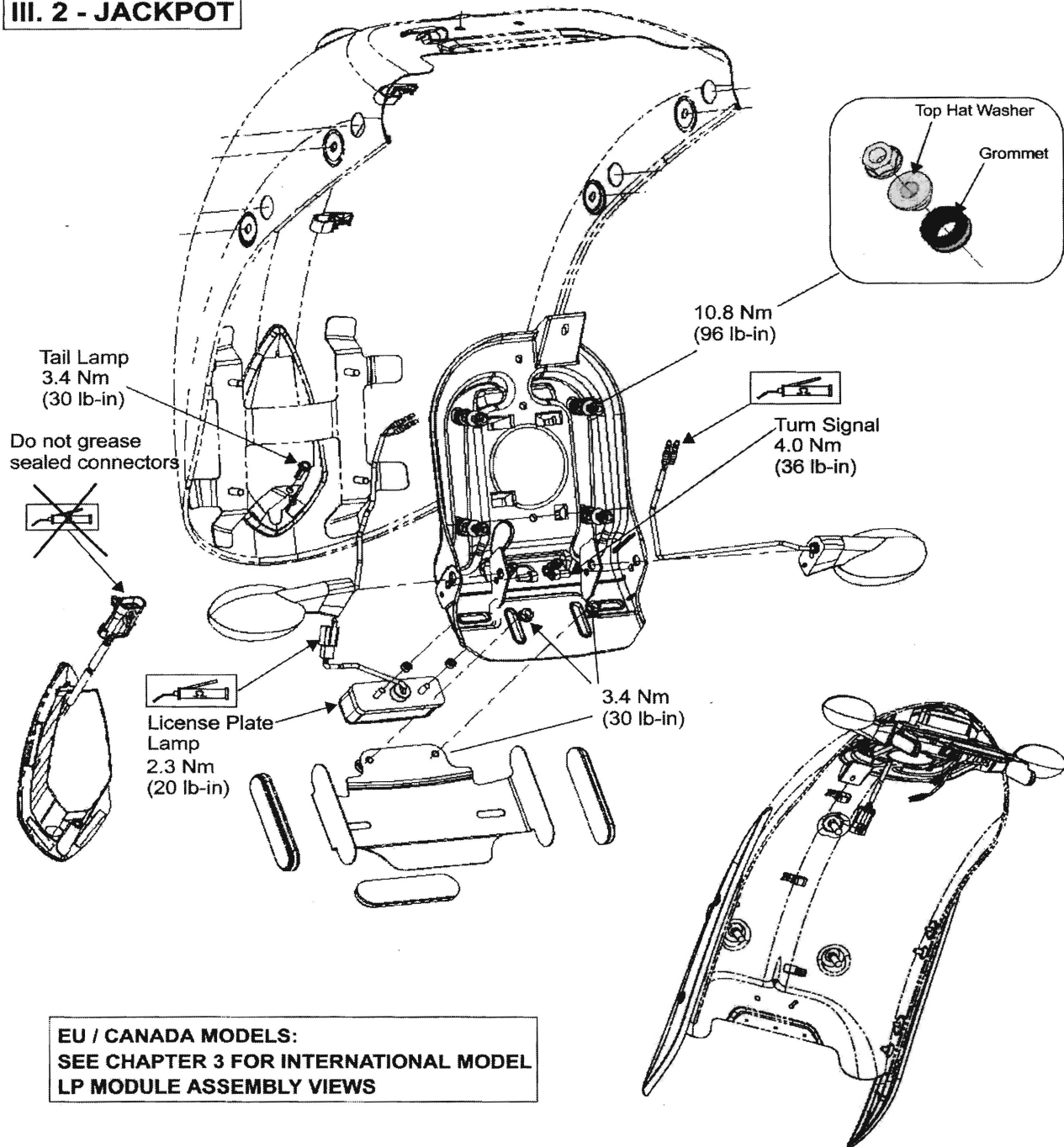
NOTE: Fender removal is recommended for wire harness replacement (page 3.17). Be sure all wiring is routed and secured properly upon assembly. Refer to III. 1 (Hammer) below and III. 2 (Jackpot) on page 19.17.

1. For wire access, remove rear lighting module (4) nuts, top hat washers, and grommets. (A)
2. Disconnect / remove wiring from harness guides as required to access to components.



TAIL LIGHT / REAR TURN SIGNAL / LICENSE MODULE - JACKPOT

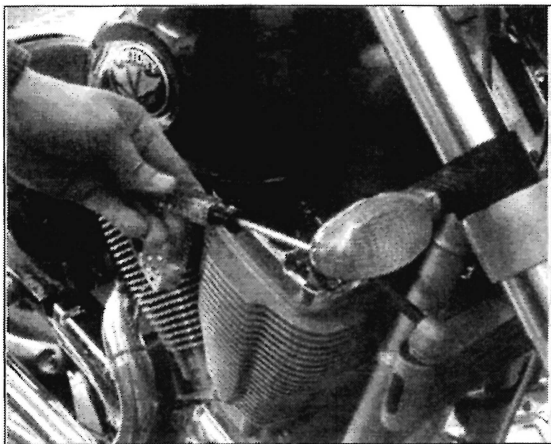
III. 2 - JACKPOT



TURN SIGNAL / BULB REPLACEMENT

Bulb Removal

1. Remove #1 Phillips screw from back of signal unit.
2. Swing lens out and carefully disengage tab on inside edge of unit.
3. Push bulb in and rotate 1/4 turn counterclockwise to remove.



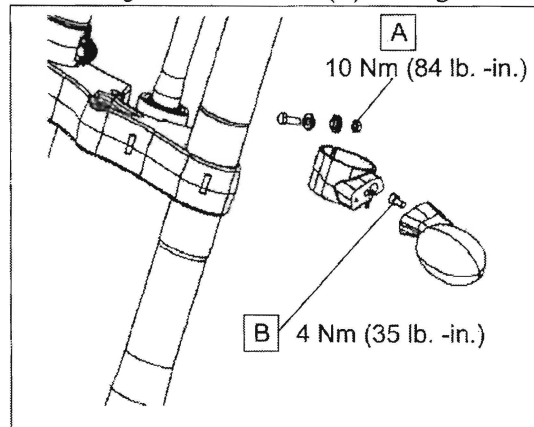
Bulb Installation

1. Apply a light film of dielectric grease to base of new bulb.
2. Align tabs. Push bulb inward and rotate 1/4 turn clockwise to install.
3. Engage tab of lens in edge of signal unit.
4. Swing lens cover onto unit and hold in position.
5. Install screw and tighten only until lens is secure. DO NOT over-tighten screw!



Signal Unit Removal - Front

1. Remove nut (A), screw, and bushings from mount.
2. Open mount and remove from fork tube.
3. Remove signal mount screw (B) and signal unit.

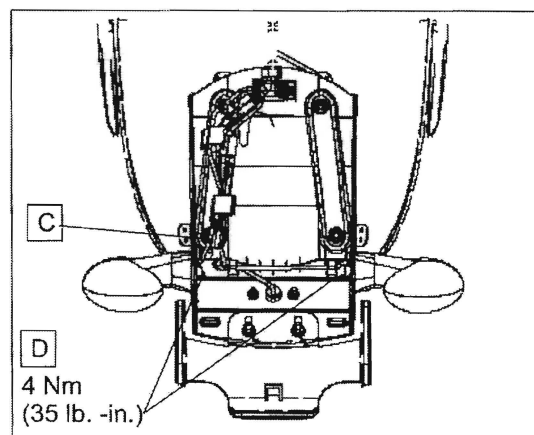


Signal Unit Installation - Front

1. Reverse steps for removal and torque screw.

Signal Unit Removal - Rear

1. Remove fender panel and disconnect wire(s) at (C).
2. Remove screw (D) and backing plate.



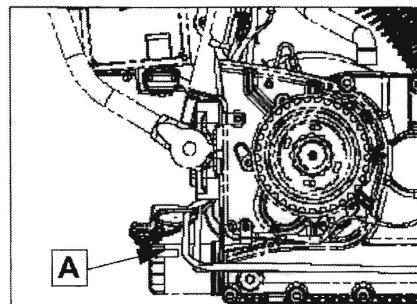
Signal Unit Installation - Rear

1. Feed wire through mount and backing plate and connect wire(s) at (C).
2. Apply dielectric grease (2871329) to wire connectors.
3. Route and secure wires.
4. Torque screw (D) to 4.0 Nm (35 lb-in).
5. Install panel and torque fasteners to 10.8 Nm (96 lb-in).

SWITCH TESTING

BRAKE LIGHT SWITCH TEST

1. Disconnect the rear brake light switch wires (A) for rear switch or the wires from the front brake switch.
2. Set multimeter to measure resistance.
3. Connect meter leads to each terminal of the switch or to each wire of the switch wire harness (from switch).
4. Apply the brake.

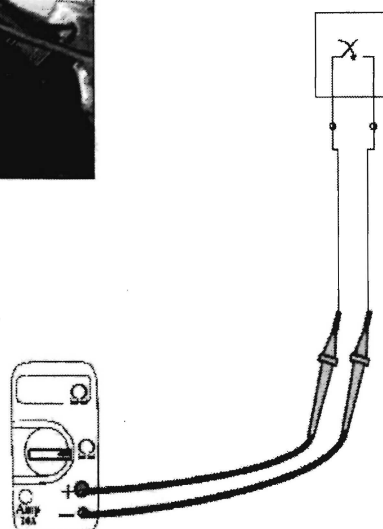


SPECIFICATION: Continuity When Brake Applied

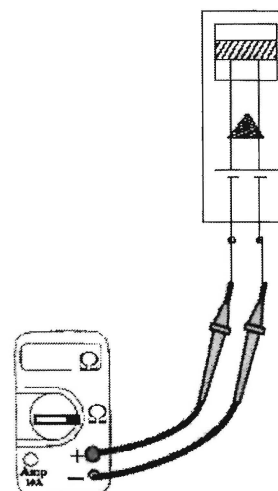


Disconnect switch wires
Remove switch screw(s)

Front brake
micro switch
located on front
brake lever perch



Rear brake
hydraulic
pressure
switch
located above oil filter



CLUTCH SWITCH TEST

1. Disconnect clutch switch 2 pin connector. Measure the resistance of the switch with lever pulled to handlebar (less than 1 Ohm resistance) and with lever released (OL).
2. See Chapter 18 for complete clutch switch circuit test.

THROTTLE SAFETY SWITCH TEST (ACCESSORY CRUISE CONTROL)

If the accessory Cruise Control will not set or will not remain set and a throttle safety switch problem is suspected, perform the following test. OVERVIEW: The throttle safety switch sends power to the cruise control module to cancel a cruise setting when the throttle is closed. Power should not be present on Pin D at the module connector unless the throttle is closed.

1. Disconnect both wires from switch on throttle closing cable.
2. Connect an ohmmeter to switch terminals. Switch should be open (OL).
3. Close throttle grip firmly. Switch should have good continuity (less than 1 Ohm resistance).
4. Turn key ON. Verify battery voltage is present on Lt BU / PK wire.
5. Re-connect switch wires securely to terminals.



WIRING / LIGHTING SYSTEMS

TIPOVER SENSOR (ANGLE SENSOR)

OVERVIEW OF OPERATION

The Tipover Sensor (TOS) is used to disable the fuel pump, fuel injector, and ignition circuits in the event of a crash or tipover condition.

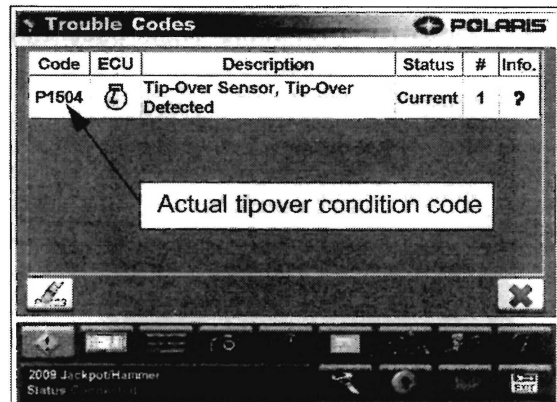
The ECM sends a 5VDC reference to the sensor and monitors the output voltage. From the output signal, the ECM can tell whether the TOS system is in normal operation, if the vehicle is tipped over, or if there is an open or short in the system wiring. Only a tipover voltage from the sensor will cause the ECM to disable the fuel pump and ignition circuits. If the TOS system wiring is disconnected (open / high) the ECM will set a fault code (and subsequent CHK ENG light) but will not disable the engine's operational circuits. The same is true for a TOS system short to ground (low).

Only in the event of an actual tipover condition is the voltage output within a range that will cause the ECM to disconnect the fuel and ignition circuits as well as the internal drivers that control them.

TIPOVER SENSOR RESET

After a Tipover Condition Has Occurred:

1. Return the motorcycle to the upright position and place it on the side stand.
2. Be sure the Engine Stop (kill) switch is in the RUN position.
3. Turn the ignition key OFF.
4. Turn the ignition key ON. The fuel pump should cycle and the system should return to normal operation.

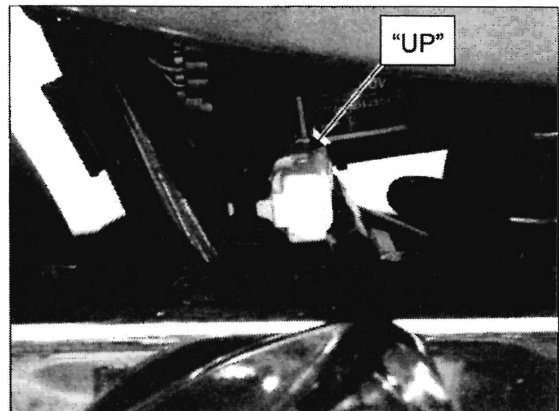


SENSOR LOCATION

The tipover sensor is mounted on the rear inner fender debris flap behind the rear shock absorber. The sensor and wire connector can be accessed by removing the right side cover.

DIAGNOSTICS

1. If the tipover sensor was activated (vehicle was actually tipped over) reset the system as outlined above. If the system fault is still present, continue.
2. Remove the right side cover.
3. Visually inspect the sensor. Be sure it is securely mounted to the debris flap and the debris flap is secure in the chassis. The word "UP" must be visible on the top of the sensor and the sensor should be level relative to the motorcycle.
4. Disconnect the sensor from the main wire harness and look at connector pins for signs of corrosion or misalignment that would cause a poor connection.
5. Connect Digital Wrench for further diagnosis of the tipover sensor circuit.



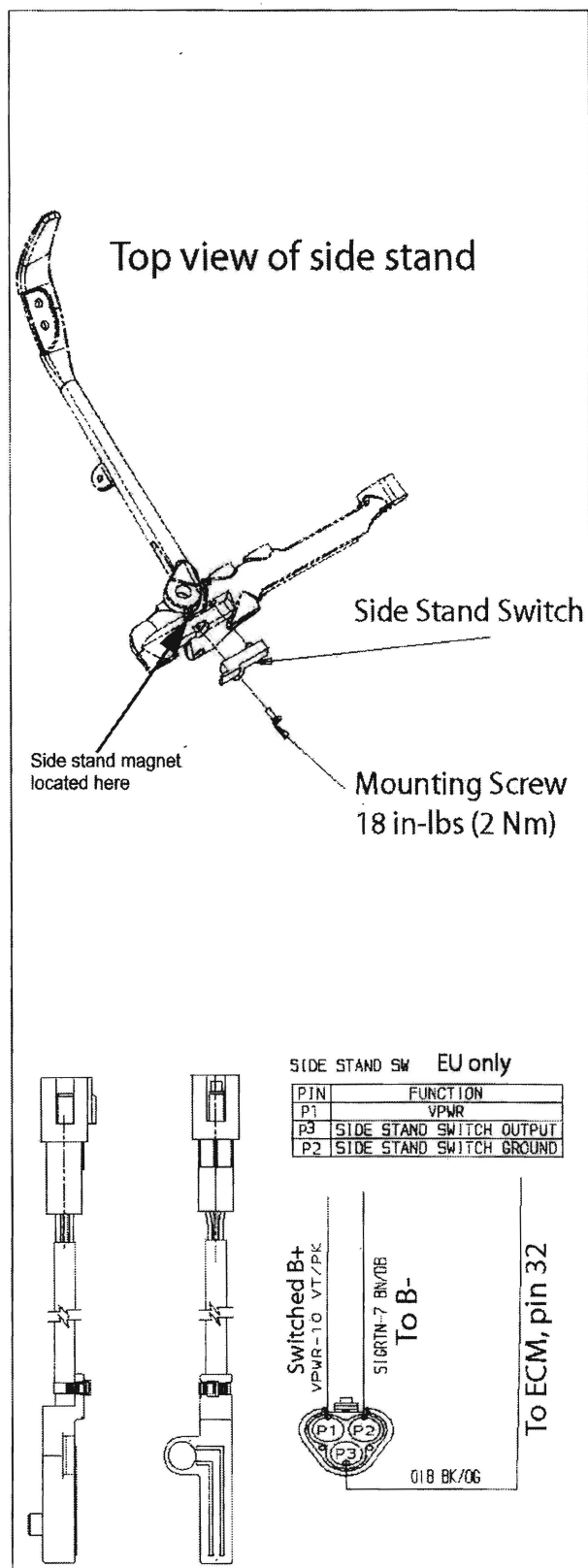
Side Stand Safety System Information (EU Models Only)

NOTE: The Side Stand Safety System is only used on EU model Victory Motorcycles.

- The Side Stand Safety System is in place on EU models to prevent driving or starting the motorcycle with the side stand in the lowered position while the transmission is in gear. This system will shut the engine off when transmission is in gear with the side stand down. This system will also prevent the engine from starting with the side stand in the lowered position and the transmission in gear with the clutch lever pulled in (the engine will crank, but not start).
- The Side Stand Safety System uses a magnetic switch mounted on the frame above the side stand pivot point. The EU side stand has a magnet mounted near the pivot point that activates the switch. The switch relays the side stand position to the ECM.
- Be sure to choose the correct calibration when reflashing the ECM on ALL Victory Motorcycles and verify the VIN information is correct in the ECM after the reflash. A no start condition could exist if the VIN information is not correct.

Side Stand Switch Testing

1. Inspect side stand. Be sure the side stand magnet is still attached to the side stand by the pivot point. Also clean any large debris off of the side stand magnet.
2. Disconnect the connector for the side stand switch. Turn key on. Place the red lead of a volt meter on pin 1 (VT/PK) of the engine harness connector and place the black lead of the volt meter on battery ground. Battery voltage should be present. If battery voltage is not present, check related wires and connections. Refer to the engine wire harness wire diagram. Turn key off.
3. With an ohm meter or continuity tester, check pin 2 (BN/DB) for good continuity to battery ground. There should be good continuity to ground (0.5 ohms or less).
4. Disconnect the ECM connector. With an ohm meter or continuity tester, check for continuity between pin 3 (BK/OG) of the side stand switch harness connector and pin 32 of the ECM connector. There should be good continuity (0.5 ohms or less). If there is high resistance or no continuity, check related wires and connectors.
5. Check pins 1-3 on the side stand switch connector for shorts/grounds. If found, replace switch.



NEUTRAL INDICATOR SWITCH INSPECTION

1. Disconnect Neutral Indicator switch 2 pin connector located at the rear of engine by the vertical frame down-tube.
2. Set DMM selector to Ohms.
3. Connect one meter lead to battery negative terminal.
4. Connect the other meter lead to the BK / PK (Neutral switch) wire in the switch side of the connector. Shift transmission into Neutral. There should be low resistance to ground.

Neutral Indicator Switch Test

5. Shift transmission into Neutral.
6. Compare resistance to Table 1.

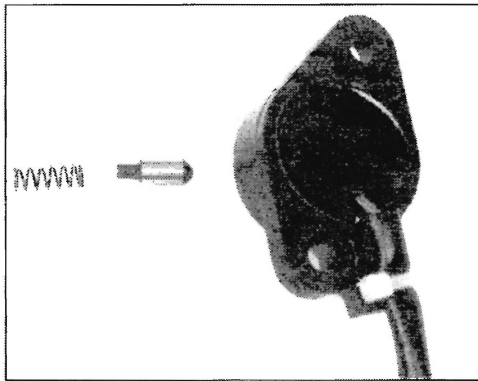
TABLE 1 - TESTING NEUTRAL SIDE OF GEAR POSITION SWITCH

Gear	Meter lead connections		Ohmmeter Reading*
Neutral	Black / Pink	Crankcase	$\leq 1.0 \Omega$
Any gear (except Neutral)			∞ (OL)

* Be sure to subtract meter lead resistance from resistance reading

NEUTRAL INDICATOR SWITCH REMOVAL

1. Remove exhaust system and drive sprocket cover.

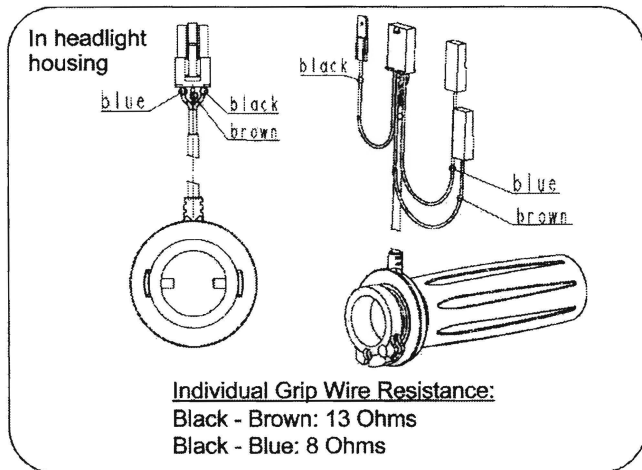
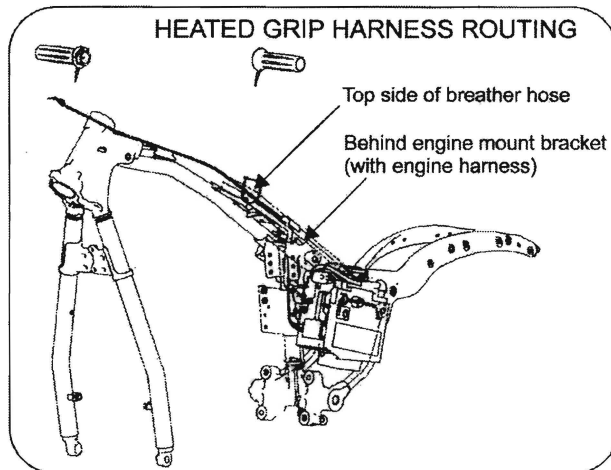


2. Remove 2 screws.
3. Disconnect 2-pin connector located near rear top of crankcase (follow wires from switch to connector).
4. Remove wire harness from P-clips on crankcase.
5. Remove switch.
6. Remove pin and spring from shift drum.
7. Remove sealing O-ring.
8. Assemble in reverse order with a new O-ring. Torque screws to 4.9 Nm (43 lb-in) and P-clamp screws to 9.8 Nm (87 lb-in).



HEATED GRIPS

HEATED GRIPS



TROUBLESHOOTING:

Measure Grip Resistance at Switch:

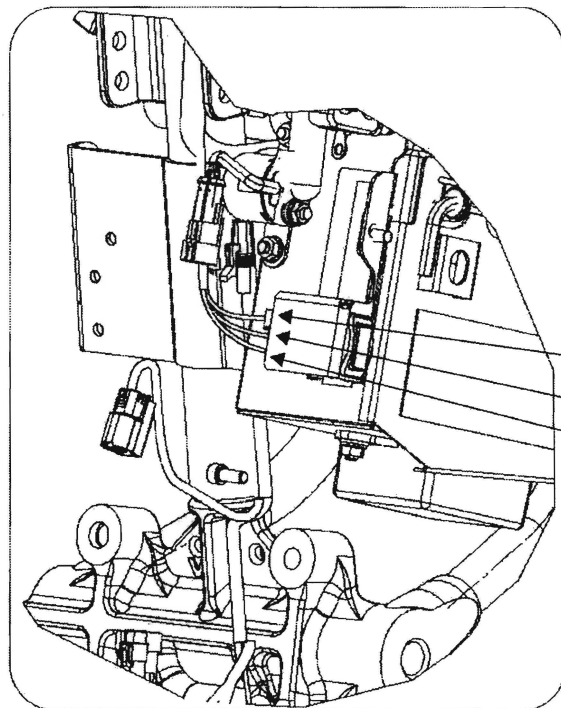
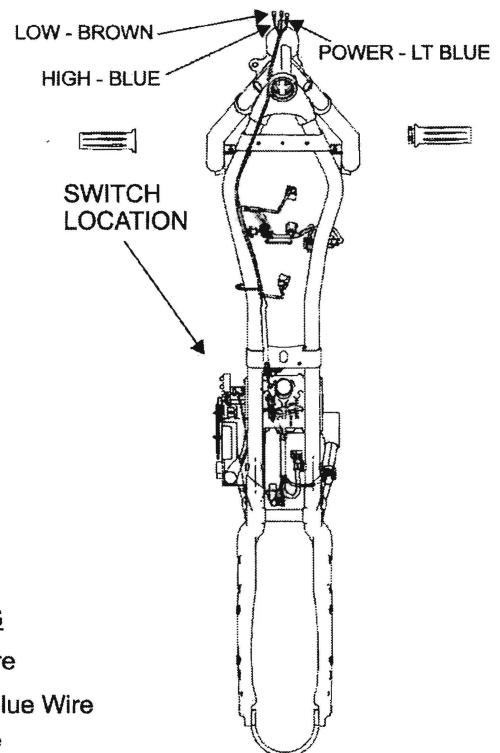
(This test measures the resistance of both grip heater grids in parallel).

Disconnect BU (High) and BN (Low) wires from switch.

Measure the resistance between BU wire and ground: Approx 4 Ohms

Measure the resistance between BN wire and ground: Approx 6.5 Ohms

If resistance is out of range, test each grip resistance individually.

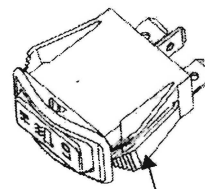
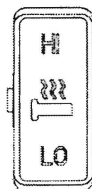


SWITCH WIRING

LOW - Brown Wire

POWER - Light Blue Wire

HIGH - Blue Wire



Compress both tabs to remove switch

SWITCH CONTACT			
Wire Color	BN	LTBU	BU
HIGH		●	●
OFF		●	
LOW	●		



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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