

SUZUKI OUTBOARD MOTOR

DF90

DF115 *FOUR STROKE*

For '02 model

SUPPLEMENTARY SERVICE MANUAL



DF90/115 "K2" (2002) MODEL

FOREWORD

This supplementary service manual describes the outline, technical data and servicing procedures for the "K2" (2002) models outboard motor.

Please read and thoroughly familiarize yourself with this information before using it for your service activities.

NOTE:

Use this supplement with the following service manual:
DF90/115 Service Manual (P/no, 99500-90J0 • -01E)

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***SPECIFICATIONS**

* These specifications are subject to change without notice.

Item	Unit	Data	
		DF90T	DF115T

PRE-FIX	09001F	11501F
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DIMENSIONS & WEIGHT

Overall length (front to back)	mm (in.)	779 (30.7)
Overall width (side to side)	mm (in.)	481 (18.9)
Overall height	L	mm (in.) 1556 (61.3)
	UL	mm (in.) 1683 (66.3)
Weight (without engine oil)	L	kg (lbs.) 189.0 (416)
	UL	kg (lbs.) 194.0 (427)
Transom height	L	mm (in. type) 539 (20)
	UL	mm (in. type) 666 (25)

PERFORMANCE

Maximum output	kW (PS)	66.2 (90)	84.6 (115)
Recommended operating range	r/min.	4500 – 5500	5000 – 6000
Idle speed	r/min.	625 ± 25 (in-gear : approx. 625)	

POWERHEAD

Engine type	4-stroke DOHC	
Number of cylinders	4	
Bore	mm (in.)	84.0 (3.31)
Stroke	mm (in.)	88.0 (3.46)
Total displacement	cm ³ (cu in.)	1950 (119.0)
Compression ratio	: 1	9.8
Spark plug	NGK	BKR6E
Ignition system	Full-transistorized ignition	
Fuel supply system	Multi-point sequential electronic fuel injection	
Exhaust system	Through prop exhaust	
Cooling system	Water cooled	
Lubrication system	Wet sump by trochoid pump	
Starting system	Electric	
Throttle control	Remote control	

Item	Unit	Data	
		DF90T	DF115T

FUEL & OIL

Fuel		Suzuki highly recommends that you use alcohol-free unleaded gasoline with a minimum pump octane rating of 87 ($\frac{R+M}{2}$ method) or 91 (Research method). However, blends of unleaded gasoline and alcohol with equivalent octane content may be used.
Engine oil		API classification SE, SF, SG, SH, SJ Viscosity rating 10W-40
Engine oil amounts	L (US/Imp. qt)	5.5 (5.8 / 4.8) : Oil change only 5.7 (6.0 / 5.0) : Oil filter change
Gear oil		SUZUKI Outboard Motor Gear Oil (SAE #90 hypoid gear oil)
Gearcase oil capacity	ml (US/Imp. oz)	1050 (35.5 / 37.0)

BRACKET

Trim angle		PTT system
Number of trim position		PTT system
Maximum tilt angle	degree	75

LOWER UNIT

Reversing system		Gear
Transmission		Forward-Neutral-Reverse
Reduction system		Bevel gear
Gear ratio		12 : 25 (2.08)
Drive line impact protection		Spline drive rubber hub
Propeller		Blade × Diam. (in.) × Pitch (in.)
		3 × 14 × 17
		3 × 14 × 19
		3 × 14 × 21
		3 × 14 × 23

REDUCTION SYSTEM

1st reduction gear ratio (Crankshaft drive gear: Driven gear)	29 : 36 (1.24)
2nd reduction gear ratio (Lower unit gear)	12 : 25 (2.08)
Total reduction gear ratio	2.59 $\left(\frac{36}{29} \times \frac{25}{12}\right)$

4 GENERAL INFORMATION

*SERVICE DATA

* These service data are subject to change without notice.

Item	Unit	Data	
		DF90T	DF115T

POWERHEAD

Recommended operating range	r/min	4500 – 5500	5000 – 6000
Idle speed	r/min	625 ± 25 (in-gear : approx. 625)	
**Cylinder compression	kPa (kg/cm ² , psi)	1300 – 1700 (13 – 17, 185 – 242)	
**Cylinder compression max. difference between any two cylinders	kPa (kg/cm ² , psi)	100 (1.0, 14)	
**Engine oil pressure	kPa (kg/cm ² , psi)	550 – 600 (5.5 – 6.0, 78 – 85) at 3000 r/min. (at normal operating temp.)	
Engine oil		API classification SE, SF, SG, SH, SJ Viscosity rating SAE 10W-40	
Engine oil amounts	L (US/Imp. qt)	5.5 (5.8 / 4.8) : Oil change only 5.7 (6.0 / 5.0) : Oil filter change	
Thermostat operating temperature	°C (°F)	58 – 62 (136 – 144)	

** Figures shown are guidelines only, not absolute service limits.

Item	Unit	Data	
		DF90T	DF115T

CYLINDER HEAD / CAMSHAFT

Cylinder head distortion	Limit	mm (in)	0.05 (0.002)		
Manifold seating faces distortion	Limit	mm (in)	0.10 (0.004)		
Cam height	IN	STD	mm (in)	37.320 – 37.480 (1.4693 – 1.4756)	39.220 – 39.380 (1.5441 – 1.5504)
		Limit	mm (in)	37.220 (1.4654)	39.120 (1.5402)
	EX	STD	mm (in)	37.030 – 37.190 (1.4579 – 1.4642)	39.040 – 39.200 (1.5370 – 1.5433)
		Limit	mm (in)	36.930 (1.4539)	38.940 (1.5330)
Camshaft journal oil clearance	Top, 2nd, 3rd, 4th	STD	mm (in)	0.020 – 0.062 (0.0008 – 0.0024)	
		Limit	mm (in)	0.120 (0.0047)	
	5th	STD	mm (in)	0.045 – 0.087 (0.0018 – 0.0034)	
		Limit	mm (in)	0.120 (0.0047)	
Camshaft journal (housing) inside diameter	Top, 2nd, 3rd, 4th	STD	mm (in)	23.000 – 23.021 (0.9055 – 0.9063)	
		Limit	mm (in)	23.171 (0.9122)	
	5th	STD	mm (in)	26.000 – 26.021 (1.0236 – 1.0244)	
		Limit	mm (in)	26.171 (1.0304)	
Camshaft journal outside diameter	Top, 2nd, 3rd, 4th	STD	mm (in)	22.959 – 22.980 (0.9039 – 0.9047)	
		Limit	mm (in)	22.869 (0.9004)	
	5th	STD	mm (in)	25.934 – 25.955 (1.0210 – 1.0219)	
		Limit	mm (in)	25.844 (1.0175)	
Camshaft runout	Limit	mm (in)	0.10 (0.004)		
Cylinder head bore to tappet clearance	STD	mm (in)	0.025 – 0.066 (0.0010 – 0.0026)		
	Limit	mm (in)	0.150 (0.0059)		
Tappet outer diameter	STD	mm (in)	30.959 – 30.975 (1.2189 – 1.2195)		
Cylinder head bore	STD	mm (in)	31.000 – 31.025 (1.2203 – 1.2215)		

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Item	Unit	Data	
		DF90T	DF115T

VALVE / VALVE GUIDE

Valve diameter	IN		mm (in)	33 (1.3)
	EX		mm (in)	28 (1.1)
Tappet clearance (Cold engine condition)	IN	STD	mm (in)	0.23 – 0.27 (0.009 – 0.011)
	EX	STD	mm (in)	0.23 – 0.27 (0.009 – 0.011)
Valve seat angle	IN		—	15°, 45°, 60°
	EX		—	15°, 45°
Valve guide to valve stem clearance	IN	STD	mm (in)	0.020 – 0.047 (0.0008 – 0.0019)
		Limit	mm (in)	0.070 (0.0028)
	EX	STD	mm (in)	0.045 – 0.072 (0.0018 – 0.0028)
		Limit	mm (in)	0.090 (0.0035)
Valve guide inside diameter	IN,EX	STD	mm (in)	6.000 – 6.012 (0.2362 – 0.2367)
Valve guide protrusion	IN,EX	STD	mm (in)	13.5 (0.53)
Valve stem outside diameter	IN	STD	mm (in)	5.965 – 5.980 (0.2348 – 0.2354)
	EX	STD	mm (in)	5.940 – 5.955 (0.2339 – 0.2344)
Valve stem end deflection	IN	Limit	mm (in)	0.14 (0.006)
	EX	Limit	mm (in)	0.18 (0.007)
Valve stem runout	IN,EX	Limit	mm (in)	0.05 (0.002)
Valve head radial runout	IN,EX	Limit	mm (in)	0.08 (0.003)
Valve head thickness	IN	STD	mm (in)	1.0 (0.04)
		Limit	mm (in)	0.7 (0.03)
	EX	STD	mm (in)	1.20 (0.05)
		Limit	mm (in)	0.7 (0.03)
Valve seat contact width	IN	STD	mm (in)	1.1 – 1.3 (0.04 – 0.05)
	EX	STD	mm (in)	1.1 – 1.3 (0.04 – 0.05)
Valve spring free length		STD	mm (in)	42.7 (1.68)
		Limit	mm (in)	41.0 (1.61)
Valve spring tension		STD	N (kg, lbs)	167 – 193 (16.7 – 19.3, 36.8 – 42.5) for 32.6 mm (1.28 in)
		Limit	N (kg, lbs)	151 (15.1, 33.3) for 32.6 mm (1.28 in)
Valve spring squareness		Limit	mm (in)	2.0 (0.08)

Item	Unit	Data	
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CYLINDER / PISTON / PISTON RING

Cylinder distortion	Limit	mm (in)	0.05 (0.002)
Piston to cylinder clearance	STD	mm (in)	0.020 – 0.040 (0.0008 – 0.0016)
	Limit	mm (in)	0.100 (0.0039)
Cylinder bore	STD	mm (in)	84.000 – 84.020 (3.3071 – 3.3079)
Cylinder measuring position		mm (in)	50 (2.0) from cylinder top surface
Piston skirt diameter	STD	mm (in)	83.970 – 83.990 (3.3059 – 3.3067)
Piston measuring position		mm (in)	26.5 (1.04) from piston skirt end.
Cylinder bore wear	Limit	mm (in)	0.10 (0.039)
Piston ring end gap	1st	STD	0.20 – 0.35 (0.008 – 0.014)
		Limit	0.70 (0.028)
	2nd	STD	0.35 – 0.50 (0.014 – 0.020)
		Limit	1.00 (0.039)
Piston ring free end gap	1st	STD	Approx. 11.3 (0.44)
		Limit	9.0 (0.354)
	2nd	STD	Approx. 11.0 (0.43)
		Limit	8.8 (0.347)
Piston ring to groove clearance	1st	STD	0.030 – 0.070 (0.0012 – 0.0028)
		Limit	0.12 (0.005)
	2nd	STD	0.020 – 0.060 (0.0008 – 0.0024)
		Limit	0.10 (0.004)
Piston ring groove width	1st	STD	1.22 – 1.24 (0.048 – 0.049)
	2nd	STD	1.51 – 1.53 (0.059 – 0.060)
	Oil	STD	2.51 – 2.53 (0.099 – 0.100)
Piston ring thickness	1st	STD	1.17 – 1.19 (0.046 – 0.047)
	2nd	STD	1.47 – 1.49 (0.058 – 0.059)
Pin clearance in piston pin hole	STD	mm (in)	0.006 – 0.017 (0.0002 – 0.0007)
	Limit	mm (in)	0.040 (0.0016)
Piston pin outside diameter	STD	mm (in)	20.997 – 21.000 (0.8267 – 0.8268)
	Limit	mm (in)	20.980 (0.8260)
Piston pin hole diameter	STD	mm (in)	21.006 – 21.014 (0.8270 – 0.8273)
	Limit	mm (in)	21.040 (0.8283)
Pin clearance in conrod small end	STD	mm (in)	0.003 – 0.014 (0.0001 – 0.0006)
	Limit	mm (in)	0.050 (0.0020)
Conrod small end bore	STD	mm (in)	21.003 – 21.011 (0.8269 – 0.8272)

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Item	Unit	Data	
		DF90T	DF115T

CRANKSHAFT / CONROD

Conrod small end inside diameter	STD	mm (in)	21.003 – 21.011 (0.8269 – 0.8272)
Conrod big end oil clearance	STD	mm (in)	0.020 – 0.040 (0.0008 – 0.0016)
	Limit	mm (in)	0.065 (0.0026)
Conrod big end inside diameter	STD	mm (in)	47.000 – 47.018 (1.8504 – 1.8511)
Crank pin outside diameter	STD	mm (in)	43.982 – 44.000 (1.7316 – 1.7323)
Crank pin outside diameter difference (out of round and aper)	Limit	mm (in)	0.010 (0.0004)
Conrod bearing thickness	STD	mm (in)	1.484 – 1.502 (0.0584 – 0.0591)
Conrod big end side clearance	STD	mm (in)	0.100 – 0.250 (0.0039 – 0.0098)
	Limit	mm (in)	0.350 (0.0138)
Conrod big end width	STD	mm (in)	21.950 – 22.000 (0.8642 – 0.8661)
Crank pin width	STD	mm (in)	22.100 – 22.200 (0.8700 – 0.8740)
Crankshaft center journal runout	Limit	mm (in)	0.04 (0.002)
Crankshaft journal oil clearance	STD	mm (in)	0.020 – 0.040 (0.0008 – 0.0016)
	Limit	mm (in)	0.065 (0.0026)
Crankcase bearing holder inside diameter	STD	mm (in)	62.000 – 62.018 (2.4409 – 2.4417)
Crankshaft journal outside diameter	STD	mm (in)	57.994 – 58.012 (2.2832 – 2.2839)
Crankshaft journal outside diameter difference (out of round and taper)	Limit	mm (in)	0.010 (0.0004)
Crankshaft bearing thickness	STD	mm (in)	1.990 – 2.006 (0.0783 – 0.0790)
Crankshaft thrust play	STD	mm (in)	0.11 – 0.31 (0.004 – 0.012)
	Limit	mm (in)	0.35 (0.014)
Crankshaft thrust bearing thickness	STD	mm (in)	2.425 – 2.475 (0.0955 – 0.0974)

Item	Unit	Data	
		DF90T	DF115T

ELECTRICAL

** New "K2" service data

Ignition timing	Degrees at r/min	BTDC 1° – BTDC 44°	BTDC 3° – BTDC 44°
Over revolution limiter	r/min	**6200	
CKP sensor resistance	Ω at 20°C	168 – 252	
CMP sensor resistance	Ω at 20°C	—	
Ignition coil resistance	Primary	Ω at 20°C	1.9 – 2.5
	Secondary	k Ω at 20°C	No.2–No.3 : 18–34 (including H.T.cord and spark plug cap) No.1–No.4 : 19–36 (including H.T.cord and spark plug cap)
High tension cord resistance	k Ω /m at 20°C	Approx.16	
Battery charge coil resistance	Ω at 20°C	0.16 – 0.24	
Battery charge coil output (12V)	Watt	480	
Standard spark plug	Type	NGK	BKR6E
	Gap	mm (in)	0.7 – 0.8 (0.028 – 0.031)
Fuse amp. rating	A	Main fuse : 60 Sub fuse : 30	
Recommended battery capacity (12V)	Ah (kC)	100 (360) or larger	
Fuel injector resistance	Ω at 20°C	11.0 – 16.5	
IAC valve resistance	Ω at 20°C	8 – 12	
IAT sensor / Cylinder temp. sensor / Ex- mani. temp. sensor (Thermistor characteristic)	k Ω at 25°C	1.8 – 2.3	
ECM main relay resistance	Ω at 20°C	80 – 120	
Starter relay coil resistance	Ω at 20°C	80 – 120	
PTT motor relay coil resistance	Ω at 20°C	3.0 – 4.5	

STARTER MOTOR












Max. continuous time of use	Sec	30	
Motor output	kW	1.4	
Brush length	STD	mm (in)	16.0 (0.63)
	Limit	mm (in)	12.0 (0.47)
Commutator undercut	STD	mm (in)	0.5 – 0.8 (0.02 – 0.03)
	Limit	mm (in)	0.2 (0.01)
Commutator outside diameter	STD	mm (in)	29.0 (1.14)
	Limit	mm (in)	28.0 (1.10)
Commutator outside diameter difference	STD	mm (in)	0.05 (0.002)
	Limit	mm (in)	0.40 (0.016)

PTT MOTOR

Brush length	STD	mm (in.)	9.8 (0.39)
	Limit	mm (in.)	5.5 (0.22)
Commutator outside diameter	STD	mm (in.)	22.0 (0.87)
	Limit	mm (in.)	21.0 (0.83)

SELF-DIAGNOSTIC SYSTEM INDICATION

When the abnormality occurs in a signal from sensor, switch, etc., the “CHECK ENGINE” lamp on the monitor-tachometer flashes (lights intermittently) according to the each code pattern with buzzer sounding.

PRIORITY *	FAILED ITEM	CODE	LAMP FLASHING PATTERN	FAIL-SAFE SYSTEM ACTIVATING
1	MAP sensor 1	3 – 4	on  off	YES
2	CKP sensor	4 – 2	on  off	YES
3	IAC valve / By-pass air screw adjustment	3 – 1	on  off	NO
4	CMP sensor	2 – 4	on  off	YES
5	CTP switch	2 – 2	on  off	NO
6	Cylinder temp. sensor	1 – 4	on  off	YES
7	IAT sensor	2 – 3	on  off	YES
8	MAP sensor 2 (Pressure detect passage)	3 – 2	on  off	NO
9	Rectifier & regulator (Over-charging)	1 – 1	on  off	NO
10	Exhaust manifold temp. sensor	1 – 5	on  off	YES
11	Fuel injector	4 – 3	on  off	NO

* If more than two items fail at once, the self-diagnostic indication appears according to priority order. The indication repeats three times.





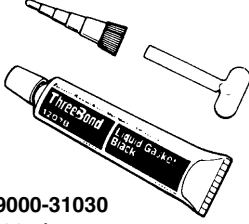
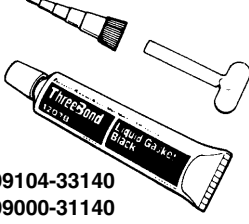


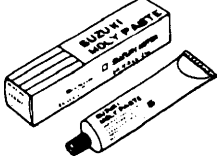

TIGHTENING TORQUE

* Tightening torques have been changed from the middle of 2002 year model.

Tightening Torque – Important Fasteners

ITEM		THREAD DIAMETER	TIGHTENING TORQUE		
			N · m	kg-m	lb.-ft
Cylinder head cover bolt		6 mm	11	1.1	8.0
Cylinder head bolt		8 mm	23	2.3	16.5
		10 mm	70	7.0	50.5
Crankcase bolt		8 mm	25	2.5	18.0
		10 mm	56	5.6	40.5
Conrod cap nut	DF90	8 mm	35	3.5	25.5
	DF115		*40	*4.0	*29.0
Camshaft housing bolt		6 mm	11	1.1	8.0
Camshaft timing sprocket bolt		10 mm	78	7.8	56.5
Timing chain guide bolt		6 mm	10	1.0	7.0
Intake manifold bolt / nut		8 mm	23	2.3	16.5
Oil pressure switch		—	13	1.3	9.5
Fuel delivery pipe bolt		8 mm	23	2.3	16.5
Fuel delivery pipe plug / union bolt		12 mm	35	3.5	25.5
Fuel return pipe bolt		8 mm	23	2.3	16.5
Low pressure fuel pump bolt		6 mm	10	1.0	7.0
Thermostat cover bolt		6 mm	10	1.0	7.0
Flywheel bolt		16 mm	245	24.5	177.0
Starter motor mounting bolt		8 mm	23	2.3	16.5
		10 mm	50	5.0	36.0
Engine oil filter		—	14	1.4	10.0
Engine oil drain plug		12 mm	13	1.3	9.5
Engine holder bolt		8 mm	*25	*2.5	*18.0
Power unit mounting bolt		8 mm	23	2.3	16.5
		10 mm	50	5.0	36.0
Driveshaft housing bolt		10 mm	50	5.0	36.0
Upper mount nut	Front	12 mm	85	8.5	61.5
	Rear	12 mm	80	8.0	58.0
Upper mount cover bolt		10 mm	50	5.0	36.0
Lower mount bolt / nut		12 mm	60	6.0	43.0
Clamp bracket shaft nut		22 mm	43	4.3	31.0
Water pump case bolt		8 mm	20	2.0	14.5
Gearcase bolt		10 mm	55	5.5	40.0
Propeller shaft bearing housing bolt		8 mm	20	2.0	14.5
Pinion nut		14 mm	100	10.0	72.5
Propeller nut		18 mm	55	5.5	40.0

MATERIALS REQUIRED

<p>SUZUKI OUTBOARD MOTOR GEAR OIL</p>  <p>99000-22540 (400 ml x 24 pcs.)</p>	<p>SUZUKI SUPER GREASE "A"</p>  <p>*99000-25030 99000-25010 (500 g)</p>	<p>WATER RESISTANT GREASE</p>  <p>99000-25160 (250 g)</p>	<p>SUZUKI SILICONE SEAL</p>  <p>99000-31120 (50 g)</p>
<p>SUZUKI BOND "1104"</p>  <p>99000-31030 (100 g)</p>	<p>SUZUKI BOND "1207B"</p>  <p>* 99104-33140 99000-31140 (100 g)</p>	<p>THREAD LOCK "1342"</p>  <p>99000-32050 (50 g)</p>	<p>THREAD LOCK SUPER "1333B"</p>  <p>99000-32020 (50 g)</p>
<p>4-Stroke Motor Oil</p> <p>API : SE, SF, SG, SH, SJ SAE : 10W-40</p>	<p>**SUZUKI MOLY PASTE</p>  <p>99000-25140 (50 g)</p>	<p>**THREAD LOCK SUPER "1303B"</p>  <p>99000-32030 (50 g)</p>	

NOTE:

* Marked part No. is in U.S. market only.

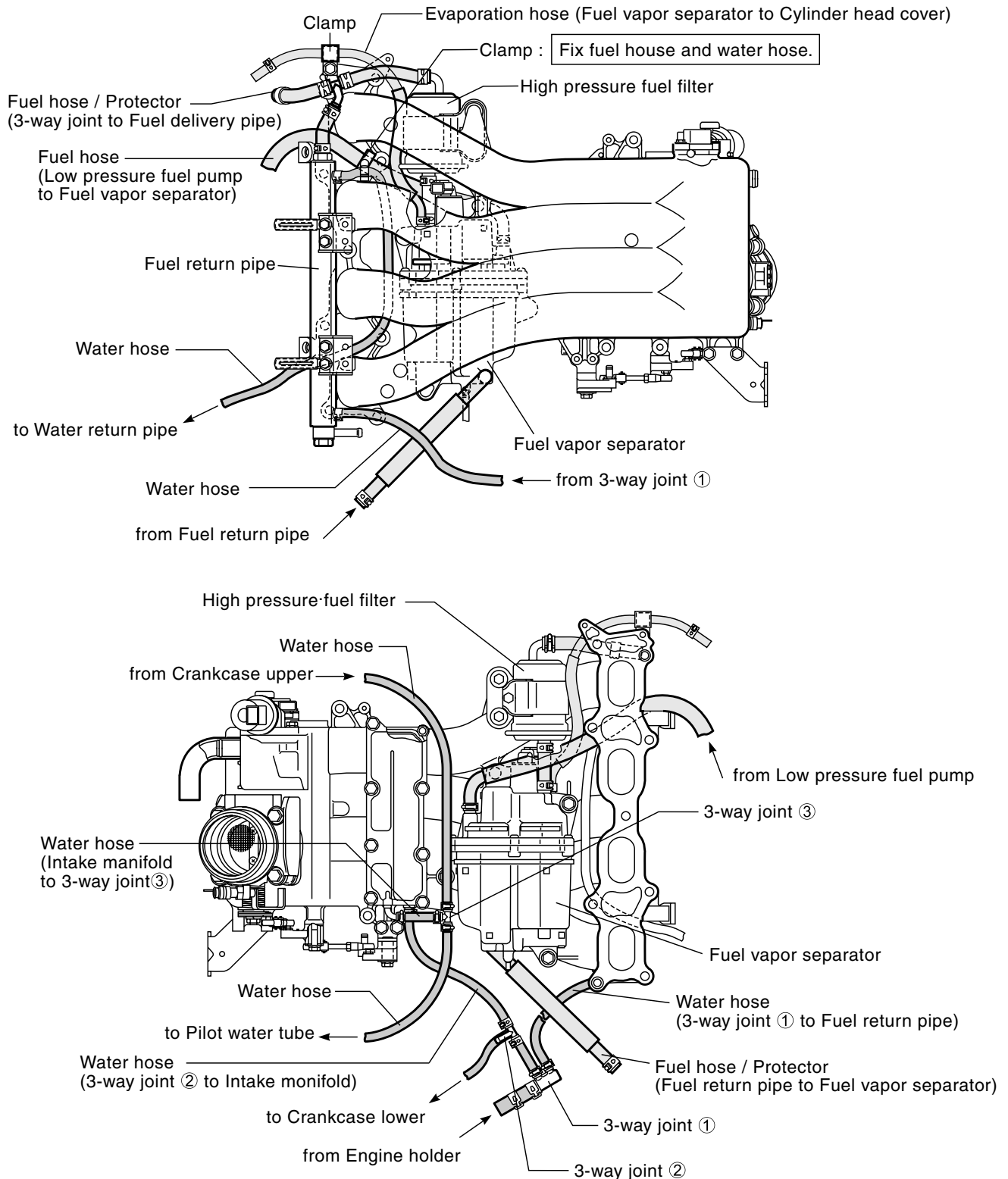
** Marked materials have been added from 2002 year model.

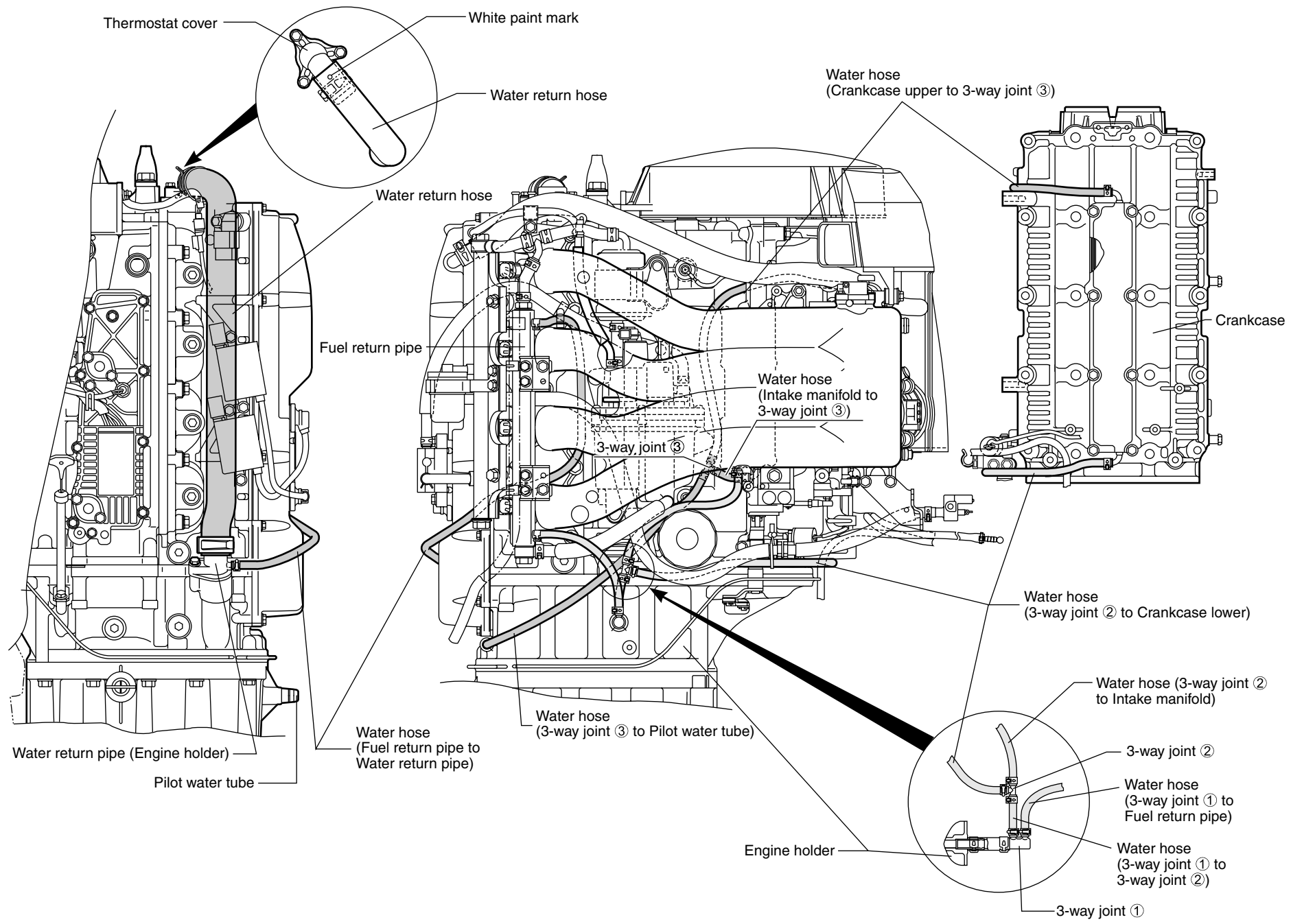
FUEL / WATER HOSE ROUTING

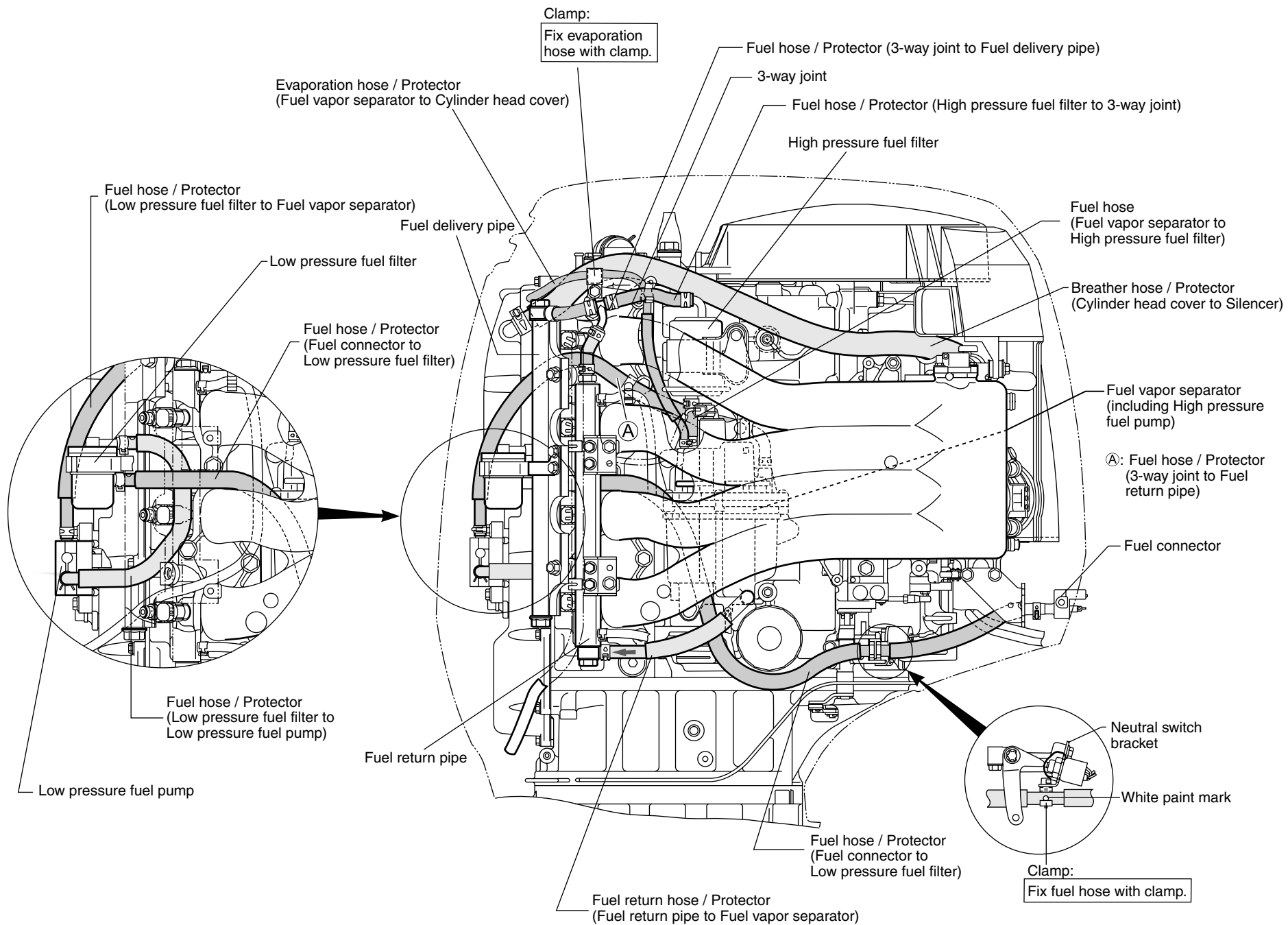
Fuel and water hose routing have been changed from the middle of 2002 year model.

CAUTION

- Do not over-bend (kink) or twist hoses when installing.
- When installing hose clips, position tabs to avoid contact with other parts.
- Check that hoses do not contact rods and levers during either engine operation or standstill.
- Extreme care should be taken not to cut, abrade or cause any other damage on hoses.
- Care should be taken not to cause hoses to be compressed excessively by any clamp when fitted.







OVER-REVOLUTION CAUTION SYSTEM

The over revolution limiter have been changed.

Over revolution limiter


6500 r/min → 6200 r/min

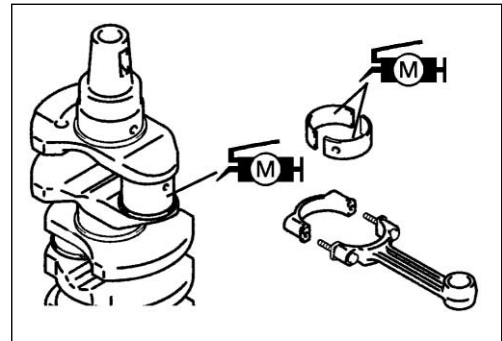
NOTE:

Although a function of the over revolution limiter is controlled by ECM, the part number of ECM has not been changed. If you install a 2002 year model ECM to the 2001 engine, the over revolution limiter will activate at about 6200r/min.

CRANK PIN AND CONROD BEARING

Before installing conrod cap, apply Suzuki Moly Paste to crank pin and connecting rod bearing.

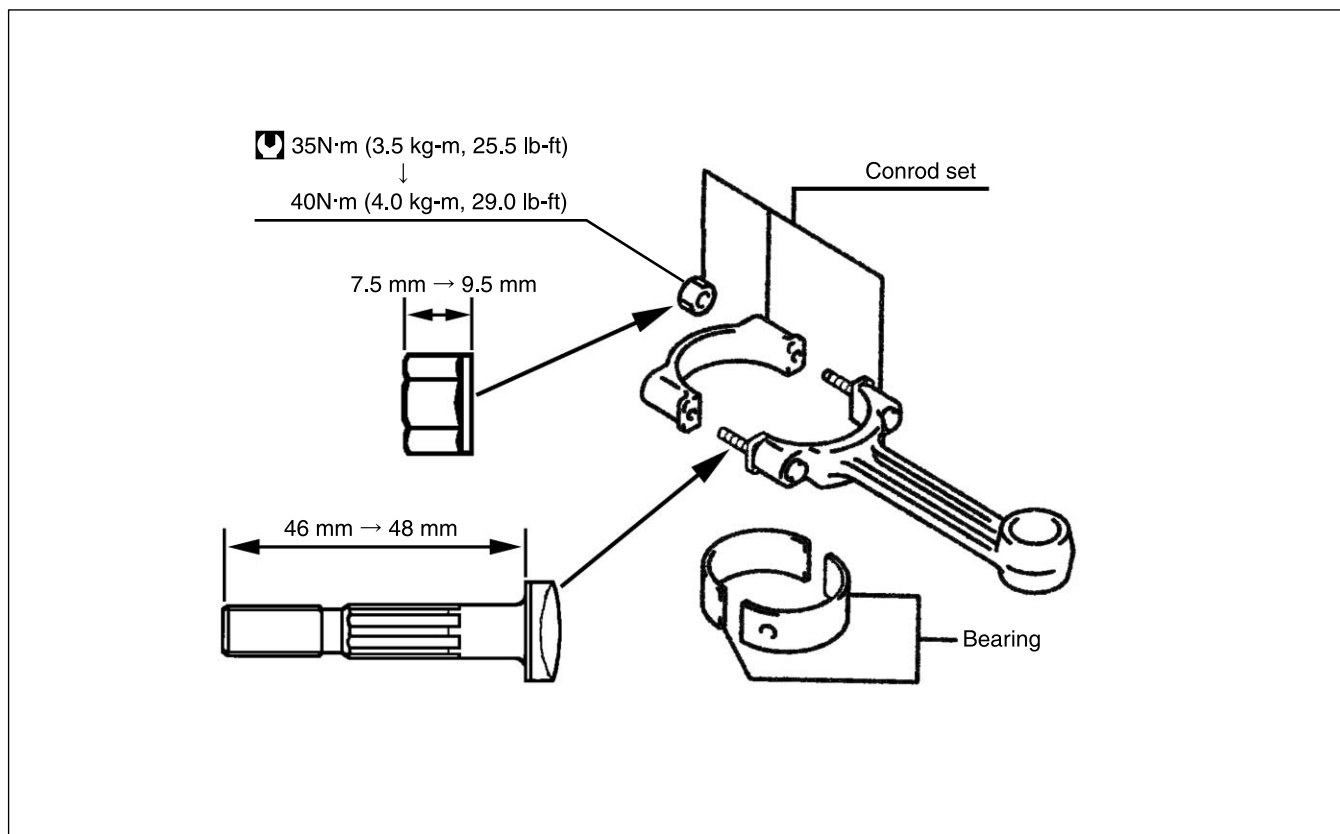
 99000-25140: Suzuki Moly Paste



CONROD ASSY AND BEARING

The conrod assy and bearing have been changed from the middle of 2002 year model DF115.

In addition, the tightening torque of conrod nuts also have been changed.

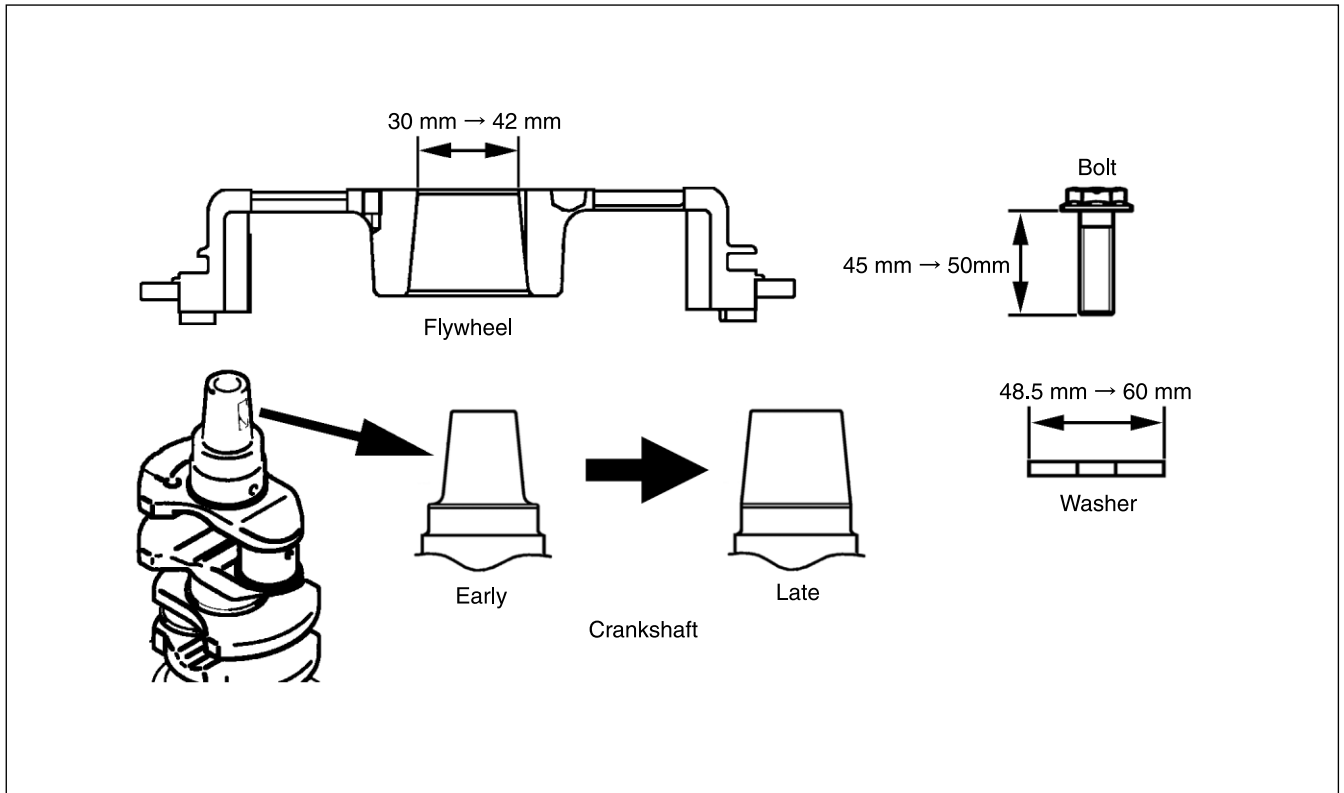


NOTE:

The bearing has been changed from plane type to micro-groove type.

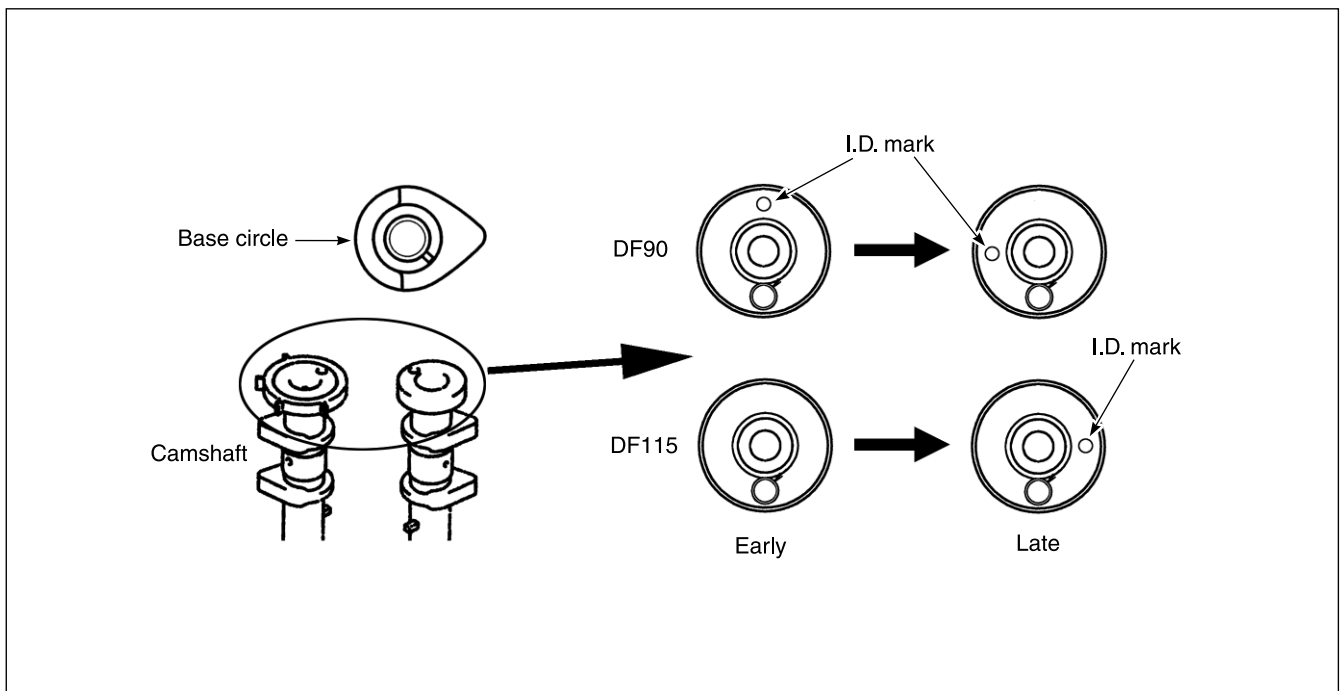
CRANKSHAFT AND FLYWHEEL

The shape of crankshaft have changed from the middle of 2002 year model DF115.
As the result of this change, flywheel, flywheel bolt and washer also have been changed.



CAMSHAFT AND TAPPET SHIM

The shape of base circle (opposite side of cam face) of camshafts have been changed from 2002 year model DF90 and late of 2001 year model DF115.
And each camshaft has own identification mark.

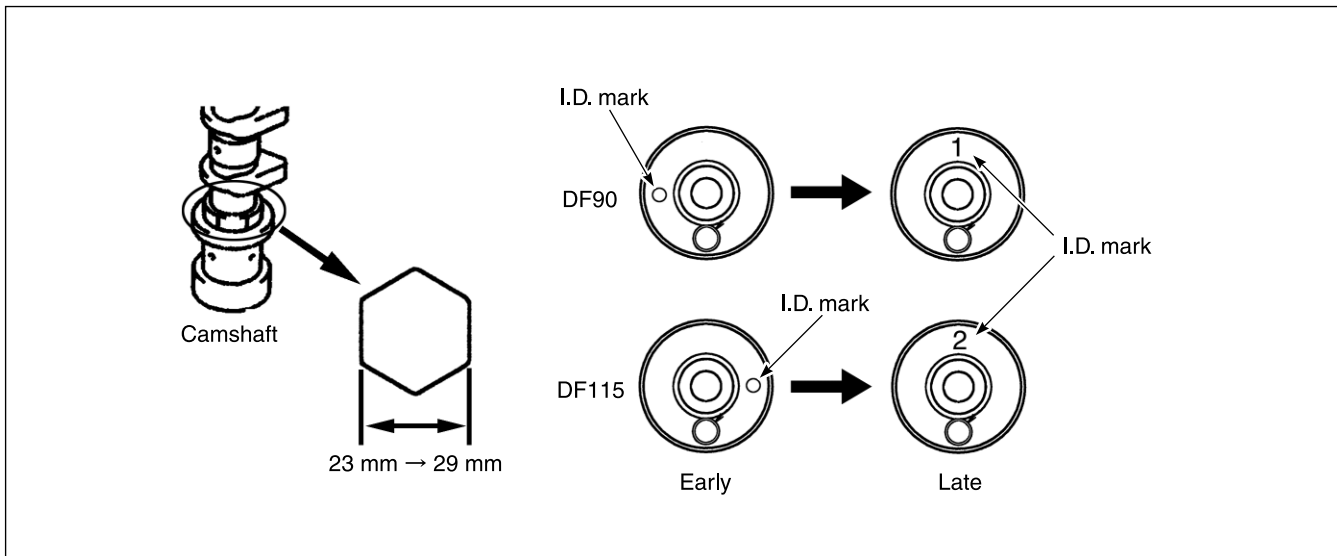


TAPPET SHIM

New size of tappet shims have been added.

I.D. number	Thickness (mm)
303	3.025
305	3.050
308	3.075
310	3.100
313	3.125

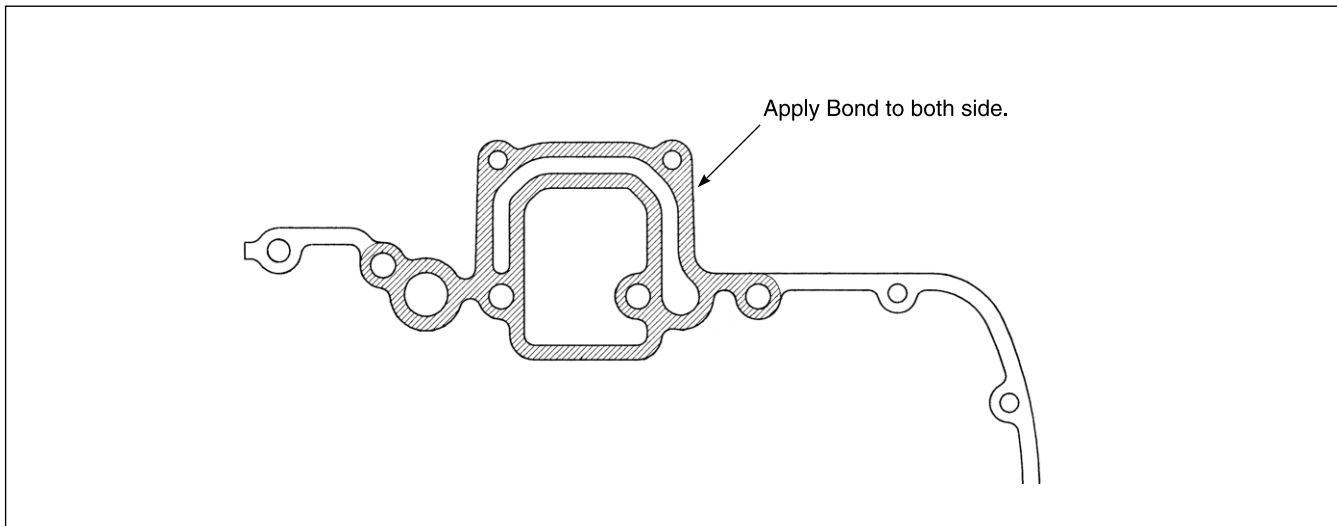
The sape of camshafts have been changed from the middle of 2002 year model.
And each camshaft has own identification mark.



ENGINE HOLDER GASKET

When installing the engine holder gasket, apply Suzuki Bond “1207B” as shown in figure.

 99000-31140 (Except for U.S. market) Suzuki Bond “1207B”
99104-33140 (Only for U.S. market)



ENGINE HOLDER BOLT

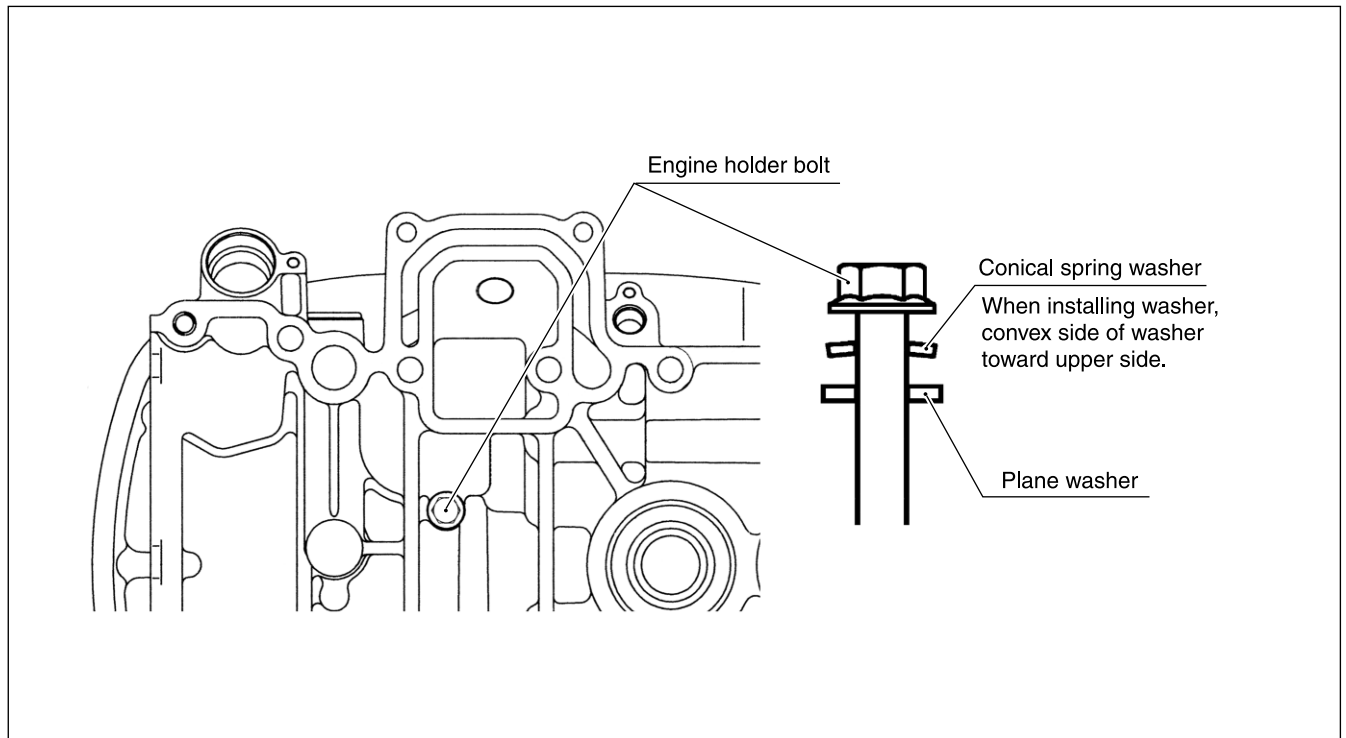
The engine holder bolt has been changed from the middle of 2002 year model.
A conical spring washer and plane washer have been added.
In addition, the tightening torque of engine holder bolt also has been changed.

Engine holder bolt

1st step 23 N·m (2.3 kg-m, 16.5 lb-ft)

Final step—Before installing power unit, retighten a bolt.

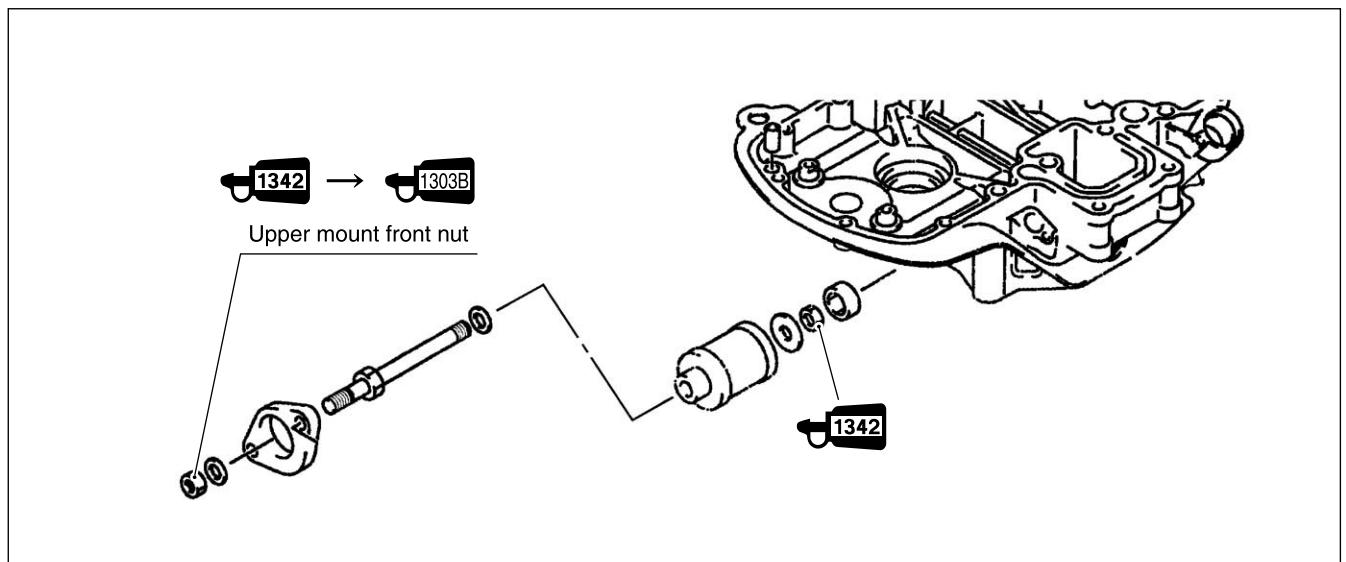
25 N·m (2.5 kg-m, 18 lb-ft)



UPPER MOUNT FRONT NUT

The thread lock has been changed.

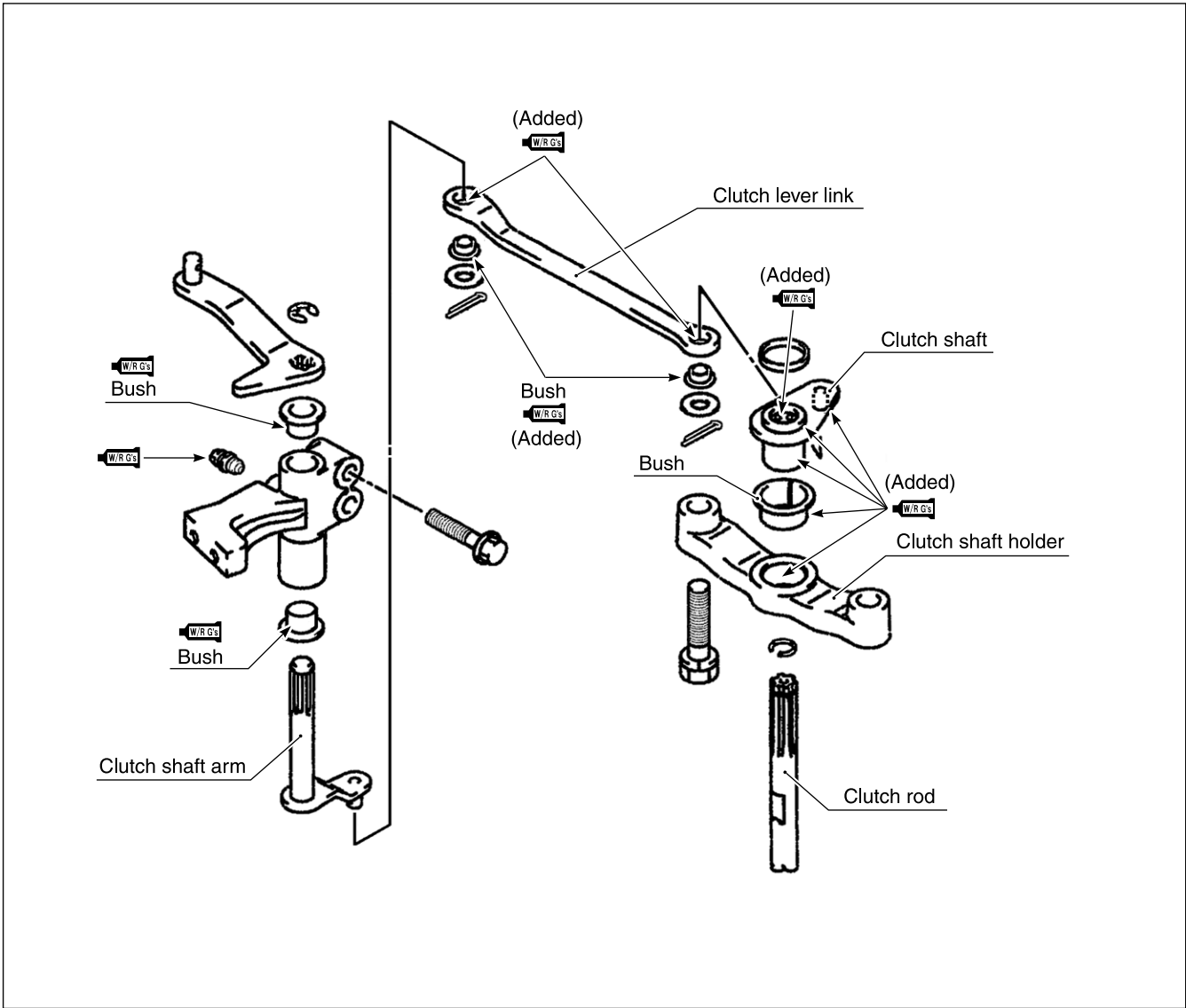
 99000-32030: Thread Lock Super "1303B"



CLUTCH LINKAGE

Apply Water Resistant Grease to the following points.

 99000-25160: Water Resistant Grease



Prepared by

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