YANMAR

A0A5054

SERVICE MANUAL

SD20, 30, 31

YANMAR

SERVICE MANUAL



SAIL DRIVE

FOREWORD

This Service Manual covers the Model SD20, 30 & 31 sail drive unit only. For service information on the GMC series & 3HMC marine diesel engine which drives it, please refer to the respective GM/HM Series Manuals.
Since the lower gear case is located below the waterline, the hull must be raised and the sail-drive unit removed for inspection and adjustment. To cut down on this inconvenience, the unit must be kept in tip-top running condition. So, when a mechanical or other problem does arise, and you have gone to the trouble of lifting the hull out of the water, do not limit your maintenance to adjusting and/or repairing the defective part. Give the unit a thorough inspection to catch problems before they occur.
Before re-attaching the unit to the hull, always conduct a Bench Test.
Please refer to the Installation and Operation Manual for instructions on removing the unit from the hull.

FM23056 JMI-0099
Certified by **ISO 9001**
International Organization for Standardization
Standards for Quality Assurance System

This product has been developed, designed and produced in accordance with the Standards for Quality System of ISO 9001 (International Organization for Standardization) under the following authorized institutions: JMI (Japan Machinery and Metals Inspection Institute), BSI (British Standards Institution) and EQNET (The European Network for Quality System Assessment and Certification).

Certified under the following standards:
ISO 9001 - 1987 / BS 5750 : Part 1 : 1987 / EN 29001 - 1987 / JIS Z9901 - 1991

Printed in Japan
A0A5054-JC03

SAIL DRIVE UNIT

Model SD20, SD30 & SD31

CHAPTER 1 GENERAL

1. Specification 1-1
2. Sectional View & Names of Parts 1-2
3. Criteria for Replacing Parts 1-5
4. Disassembly and Reassembly Tool 1-6
5. Notes on Disassembly, Inspection and Reassembly 1-19

CHAPTER 2 DISASSEMBLY

1. Disassembling the Upper Gear Case 2-1
2. Disassembling the Lower Gear Case 2-8

CHAPTER 3 REASSEMBLY

1. Reassembling the Propeller Shaft Assembly 3-1
2. Reassembling the Pinion Shaft Assembly (Input Shaft) 3-5
3. Reassembling the Upper and Lower Gear Cases 3-11
4. Lubrication 3-13
5. Attaching the Folding Propeller 3-14

CHAPTER 4 SHIM ADJUSTMENT (Gear Backlash Adjustment)

1. Location of Adjustment Shims 4-1
2. Replacements Requiring Shim Adjustments 4-2
3. Adjusting the Upper Pinion Gap (T_1) 4-3
4. Adjusting the Upper Gear Backlash (T_2, T_3 & T_4) 4-4
5. Adjusting the Lower Gear Backlash (T_5, T_6 & T_7) 4-7

CHAPTER 5 BEARING & OIL SEAL REPLACEMENT

1. Replacing the Upper Gear (A) & (B) Bearing 5-1
2. Replacing the Clutch Shaft, Dog Clutch & Needle Bearings 5-3
3. Replacing the Driving Shaft Bearing 5-4
4. Replacing the Propeller Shaft Bearing 5-6
5. Replacing the Propeller Shaft Oil Seal 5-8
6. Replacing the Lower Gear Case Needle Bearings 5-9

CHAPTER 6 TIGHTENING TORQUES FOR NUTS AND BOLTS

1. Tightening Torques for Nuts and Bolts 6-1

CHAPTER 7 ELECTRICAL WIRING

1. Electrical Wiring 7-1
2. Checking Rubber Seal Switch Operation 7-2
3. Electrical Wiring Diagram (A-Type Instrument Panel) 7-3
4. Electrical Wiring Diagram (B-Type Instrument Panel) 7-4

CHAPTER 8 MODIFYING, THE LONG-REACH UNIT (Optional Parts)

1. General 8-1
2. Modification Method 8-2

Printed in Japan
A0A5054-JC03

CHAPTER 1

GENERAL

1. Specifications 1-1
2. Sectional View & Names of Parts 1-2
   2-1 Sectional View & Names of Parts 1-2
   2-2 Route of Cooling Water & Lubricating Oil 1-3
   2-3 Sectional View with Engine 1-4
3. Criteria for Replacing Parts 1-5
4. Disassembly and Reassembly Tools 1-6
   4-1 General Handtools 1-6
   4-2 Special Tools 1-9
   4-3 Measuring Instruments 1-15
   4-4 Others 1-18
5. Notes on Disassembly, Inspection and Reassembly 1-19

Printed in Japan
A0A5054-JC03

1. Specifications

Model			SD20			SD30	SD31
Reduction gear system			Constant mesh gear with dog clutch				
Direction of rotation	Input shaft		Counter-clockwise viewed from stern				
	Propeller shaft		Counter-clockwise viewed from stern				
Reduction ratio	Ahead		2.64				2.31
	Astern		2.64				2.31
Propeller speed rpm (at DIN 6270A rating)			1289			1212	1472
Lubrication system			Splash lubrication				
Lub.oil capacity (liter)			2.2 (Standard unit) 2.5 (Long-reach unit)				
Dry weight kg (lbs)			30 (66)			32 (70)	33 (73)
Remote-control device	Control head		Single control lever, Travel 70mm (2 3/4")				
	Cable		"MORSE" 33C (equivalent)				
Applicable eng.	Model		1GMC	2GMC	3GMC	3HMC	**
	Output kw (HP) /rpm	DIN6270B	6.7 (9.1)/3600	13.4 (18.2)/3600	20.1 (27.3)/3600	25.4 (34.0)/3400	
		DIN6270A	5.9 (8.02)/3400	11.8 (16.0)/3400	17.7 (24.1)/3400	22.4 (30.0)/3200	
Flexible mount	Engine side		2	2	2	2	
	Sail-drive side		1	1	1	1	
Total dry weight kg(lbs)			95 (205)	123 (271)	153 (337)	176 (387)	

Applicable engine (New-GM/HM-series)	Model		*1GM10C	*2GM20C	*3GM30C	*3HM35C
	Output kw (HP) /rpm	DIN6270B	6.7 (9.1)/3600	13.4 (18.2)/3600	20.1 (27.3)/3600	25.4 (34.0)/3400
		DIN6270A	5.9 (8.02)/3400	11.8 (16.0)/3400	17.7 (24.1)/3400	22.4 (30.0)/3200
Flexible mount	Engine side		2	2	2	2
	Sail-drive side		1	1	1	1
Total dry weight kg (lbs)			104 (229)	134 (295)	153 (337)	180 (397)

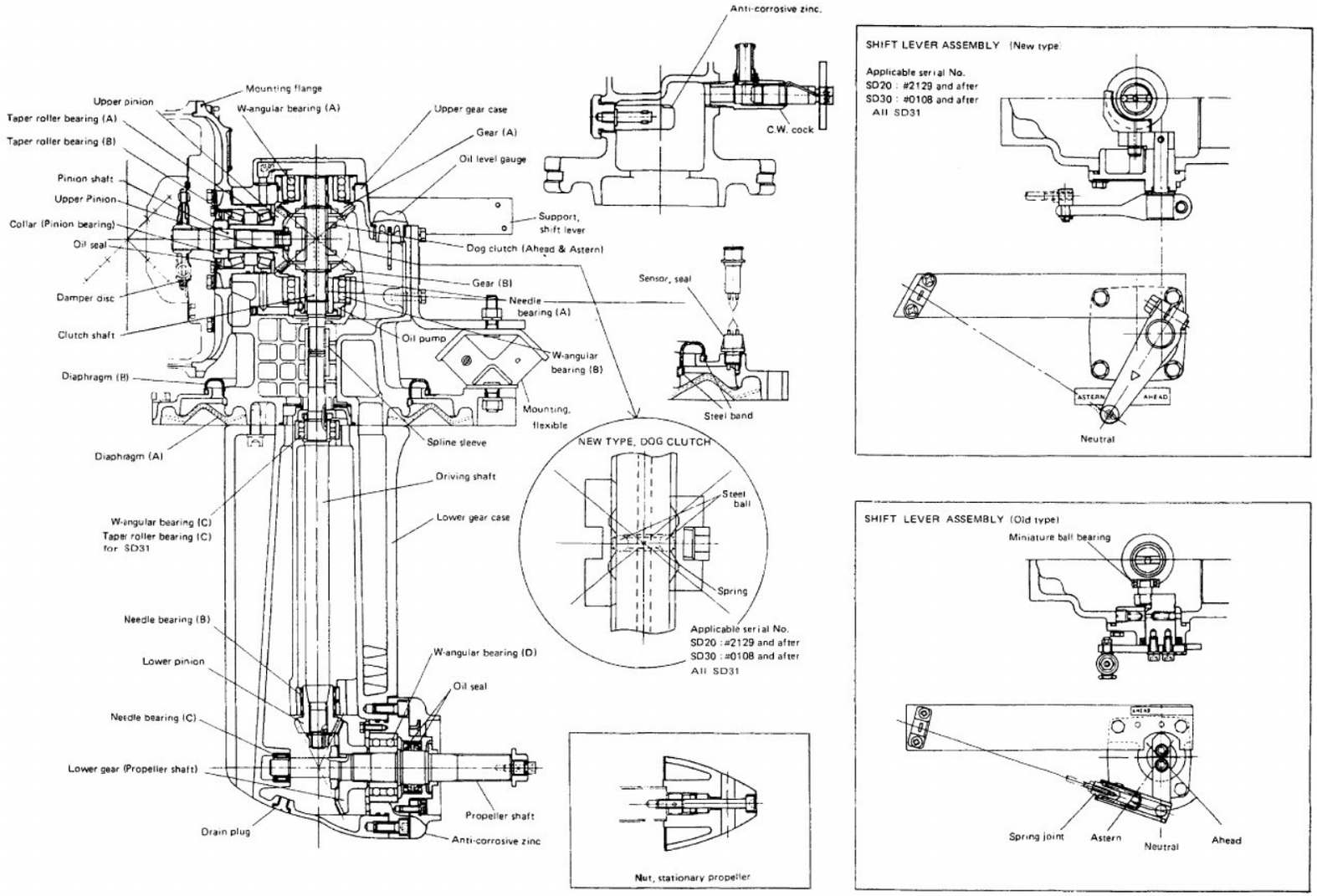
**Applicable engine model for SD31	Model		3JH2CE	3JH2-TCE	4JH2CE
	Output kw (HP) /rpm	DIN6270B	28.5 (38.7)/3600	35.0 (47.6)/3600	37.5 (51.0)/3600
		DIN6270A	25.7 (34.9)/3400	31.6 (43.0)/3400	33.8 (46.0)/3400
Number of flexible mount	Engine side		2	2	2
	Sail-drive side		1	1	1
Total dry weight kg (lbs)			202 (445)	207 (456)	233 (514)

Printed in Japan
A0A5054-JC03

APERÇU — Engine Manual — fichier complet disponible après achat

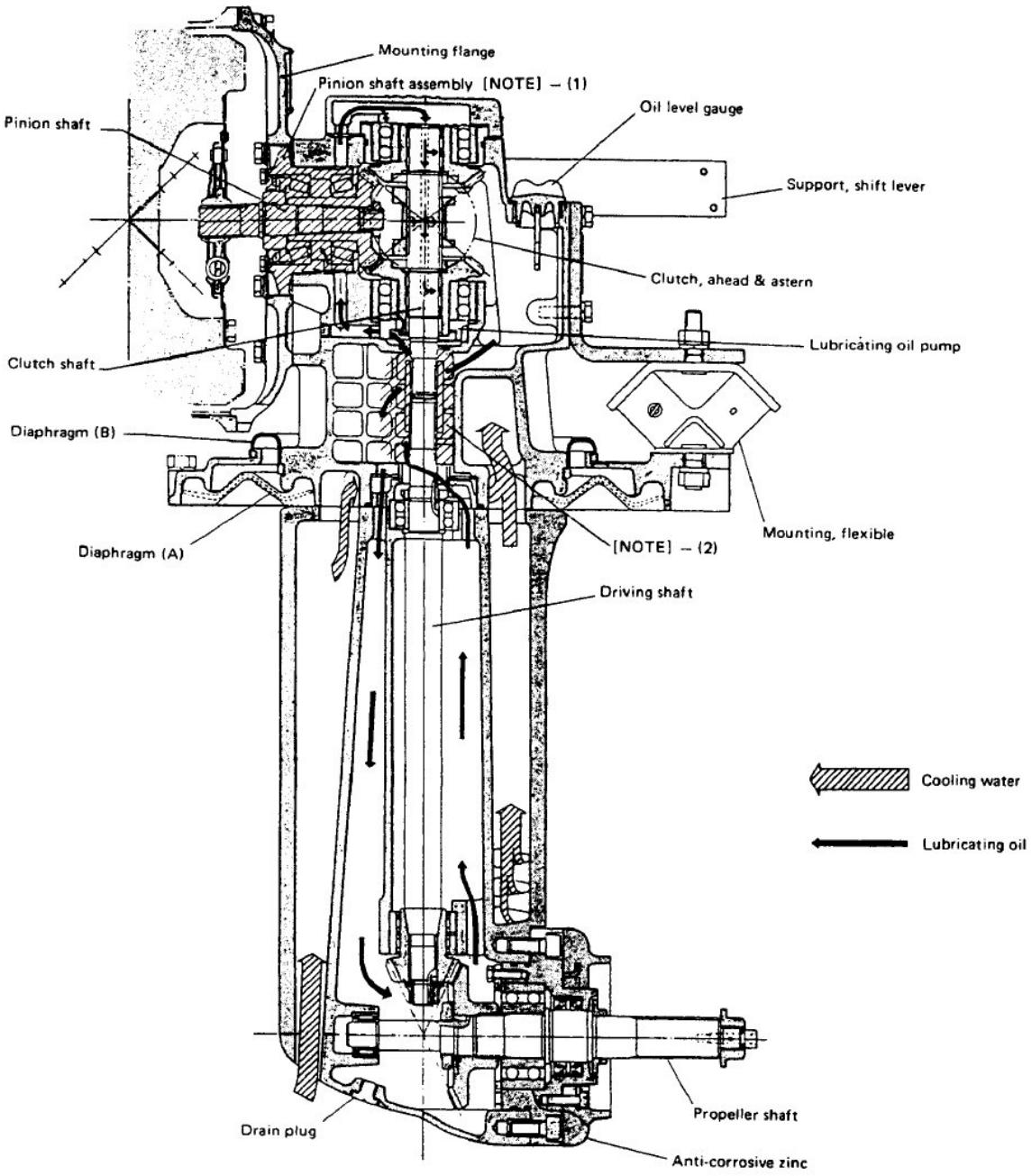
2. Sectional View & Names of Parts

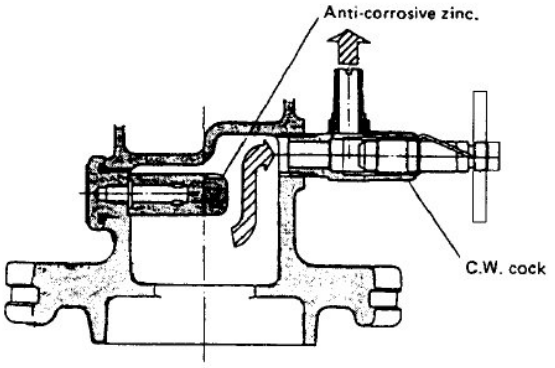
2-1 Sectional View & Names of Parts



APERÇU — Engine Manual — fichier complet disponible après achat
7/10

2-2 Route of Cooling Water & Lubricating Oil





[NOTE]

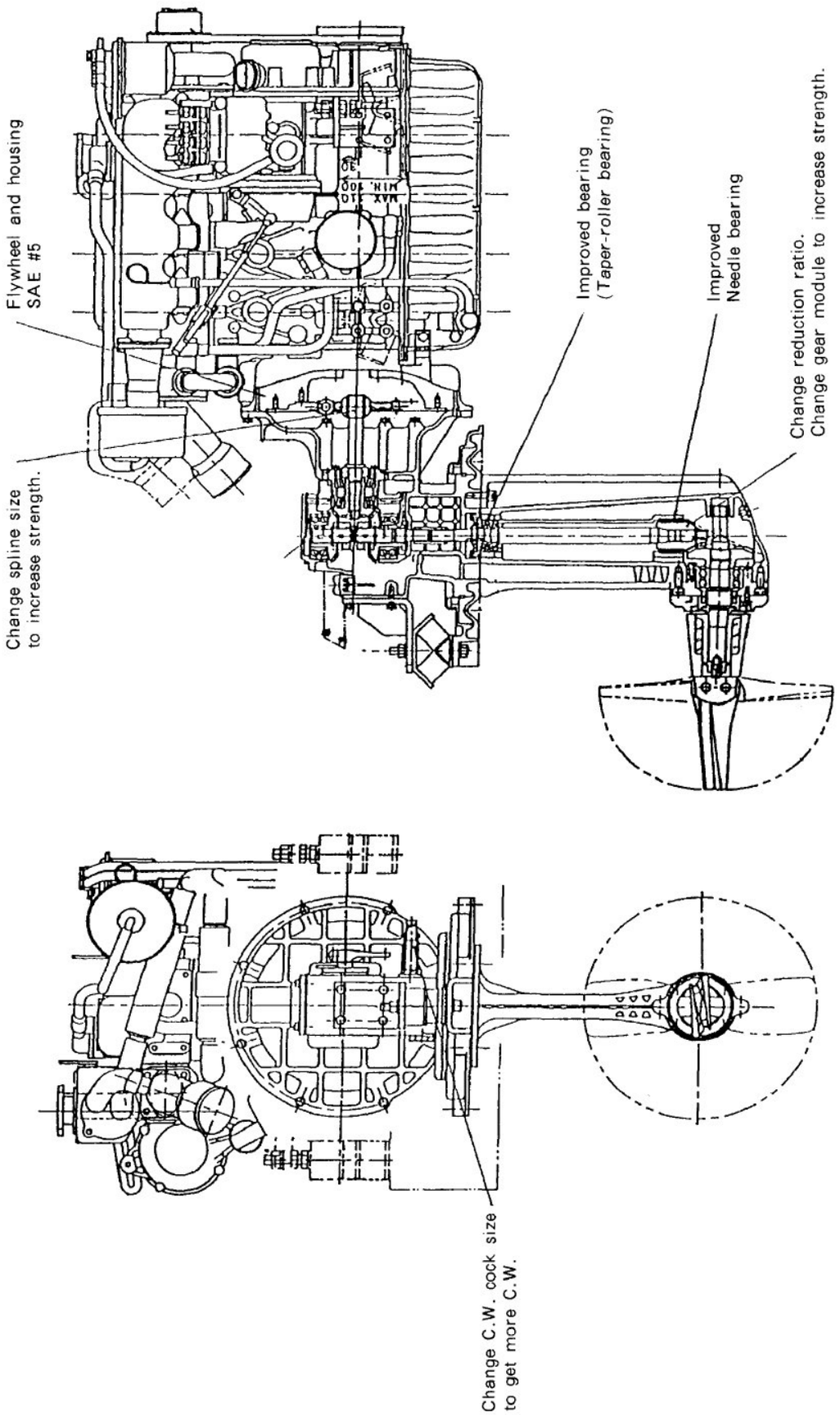
The following changes have been incorporated in products prior to D/#0454:

(1) The pinion shaft assembly is provided with a lubricating oil pouring port in the upperward-facing direction. Refer to page 3-8.

(2) The spline sleeve in the upper gear case is fitted with an oil guide.

APERÇU — Engine Manual — fichier complet disponible après achat 8/10

2-3 Sectional View with Engine



Printed in Japan
A0A5054-JC03

9/10
APERÇU — Engine Manual — fichier complet disponible après achat

3. Criteria for Replacing Parts

Criteria for replacement		Criteria for replacement	
		Standard value	Standard service life
Bearings	Needle bearing (A) (B/# K20×24×13)	Evidence of needle flaking or loss	1,500 hrs.
	Needle bearing (B) (B/# RNA69/28) (RNA49/32RD2)		
	Needle bearing (C) (B/# NA5903)	1) Evidence of needle flaking or loss 2) Replacement of propeller shaft	
	Miniature ball bearing (B/# 609)	Axial internal clearance ≧ 0.1 mm	Total of 100,000 engagements and disengagements
Oil pump		Outer radius : ≦ 59.3 mm	2,000 hrs.
Anti-corrosive zinc parts	Anti-corrosive zinc parts (Upper gear case)	Weight : ≦ 140 g (with plug)	One year
	Anti-corrosive zinc parts (Lower gear case)	Weight : ≦ 400 g	A half year
Oil seals		1) Lip hardening or hair cracks 2) Disassembly	1,000 hrs. or 2 years
Diaphragms (A) & (B)		Hair cracks	2 years
Washers		Disassembly	
Steel band		Disassembly	
Clutch	Dog clutch	Dog corner — Standard : 0.2 C Replacement standard : ≧ 3.0 R	
	Upper gear (A)	Dog corner — Standard : 0.7 R Replacement standard : ≧ 3.0 R	
	Upper gear (B)		

Printed in Japan
A0A5054-JC03

APERÇU — Engine Manual — fichier complet disponible après achat