YANMAR

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SERVICE MANUAL

MARINE DIESEL ENGINE

6CX-GTYE

2000. 3. 10

FOREWORD

This service manual outlines procedures for servicing and maintaining Yanmar 6CX-GTYE engines to obtain maximum life and performance. It explains about the structure, performance, dis- and re-assembly procedures, important inspection points, servicing instructions and the wear limit of parts. For a full understanding of this manual, also refer to the Operation Manual and Parts Catalog. Besides reference use at your service shop, this manual can also be used as a text for your service engineers. You should understand the contents of this manual fully to offer accurate and efficient service to your customers.

For accurate and efficient work, the following preparations are necessary:

1. Check the service date of your customer
   ①When was the last service?
   ②How many months or hours has the engine been used since the lasteding service?
   ③What was the trouble and what parts were replaced in the last service?
   ④What parts must be replaced in the present service?

2. Preparation of Parts
   Check the inventory of parts that are necessary for servicing.

3. Preparation of Report Forms
   Inspection and service check sheets, parts measurement record form, operation test record form.

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1. Specification

1-1. Major Specification

ENGINE MODEL			UNIT	6CX-GTYE		
Type				Vertical, water-cooling, 4-cycle diesel engine		
Combustion system				Direct in jection		
Aspiration				Turbocharger with air cooler		
No. of cyl.- bore×Stroke			mm	6-110×130		
Displacement			ℓ	7.413		
Rated out put			kW(HP)/rpm	265(360)/2600		
Max out put			kW(HP)/rpm	294(400)/2700		
Non-load rotation speed(Max./Min)			rpm	2900±25/450 $^{+50}_{0}$		
Starting system				Electric starting, 24V-4kW		
Firing order				1-4-2-6-3-5-1		
Direction of rotation (viewed from stem)	Crankshaft			Counter-clockwise		
	Propeller shaft			Bi-rotation		
Lub. oil capacity	Max.		ℓ	33		
	Effect		ℓ	19		
Marine gear	Model			YX-71-1		
	Type			Hydraulic wet multi-disk type		
	Reduction ratio(forwerd)			2.07	2.58	2.91
	Propeller shaft speed(at cont. rating)		rpm	1255	1006	894
	Direction of rotation(propeller shaft)			Clockwise or counterclockwise viewed from stem		
	Dry weight		kg	210		
	Lubricating oil capacity	Max.	ℓ	6		
		Effective	ℓ	0.5		
	Hydraulic oil pressure		kgf/cm²	22±5		
Fuel system	Fuel injection pump			In-line type		
	Injection timing			b.T.D.C 13°±1		
	Type of in jection nozzle degree			Hole type 6-Φ0.28×155°		
	Injection pressure		MPa(kgf/cm²)	23.5±0.5(240±5)		
	Applicable fuel			Diesel oil or l ight oil(Cetane valve≧45)		
	Fuel filter			Paper element		
Engine lub. oil system	Lubrication			Forced lubrication by geared pump		
	Lub. oil discharge volume		ℓ /hr./rpm	≧6720/2600		
	Lub. oil pressure		kgf/cm²	5±0.5		
	Lub. oil			API Service grade CD		
	Lub. oil filter			(Suction side) Perforated steel plate	(Discharge side) Paper element	
Cooling water system	Sea water pump			Rubber impeller type, gear driving type		
	Freshwater pump			Center type, V-belt driving type		
	Cooling			Fresh water cooling		
	Pump discharge volume		ℓ /hr./rpm	Seawater: ≧9820/2600 Fresh water : ≧13000/2600		
	Fresh water capacity inside engine		ℓ	33		
	Fresh water capacity in sub-tank		ℓ	0.8		
Turbo charger	Type			HOLSET HX50		
	Cooling			Air cooling		
	Lubrication			Common with engine		
Air cooler	Type and capacity			Fin tube type 6.5m²		
	Cooling			Seawater cooling		
Engine dimension : Overall length×overall width×overall height			mm	1586×897×964		

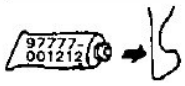
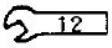
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2. Disassembly and Reassembly

2-1. Preparations before Disassembly and Reassembly

2-1-1 Visual Mark List for Disassembly and Reassembly

Visual Mark		Visual Mark	
	See		※1 Apply liquid packing
	Caution		Safety
	Measure		Clean
	Oil supply		※2 Use torque wrench

※1 THREE BOND 3B-388-055
※2 The figure shows the widths across flat of the hexagonal part.

2-1-2 Disassembly

(1)Prepare the disassembly tools, measuring devices and record forms.
(2)Prepare the cleaning machine and cleaning cans.
(3)Prepare a place for putting parts and parts containers.
(4)Extract cooling water and lube oil.
(5)Put the disassembled parts in order.
(6)Return bolts and nuts to their original positions temporarily to avoid confusion with different bolt and nut types.
(7)Locate the cause of trouble accurately before disassembly, and do not remove or disassemble unnecessary parts.

2-1-3 Reassembly

(1)Clean and inspect the disassembled parts completely.
(2)Apply clean engine oil to the sliding and rotational parts before installation.
(3)Replace all gaskets and O-rings.
(4)Apply liquid packing to the necessary parts to prevent water or oil leakage.
(5)Check and ensure the correct oil and thrust clearance during reassembly.
(6)Install the parts according to the alignment marks when they are provided. Take care of the combination of the parts with selective engagement.
(7)Do not mix up bolts, nuts and washers. Tighten the major bolts and nuts to the specified tightening torque. Take special care when tightening alluminum alloy parts.
(8)Apply engine oil to the threads and seat of the major bolts and tighten them to the specified tightening torque.

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2-2. Disassembly and Reassembly Tools

Standard tools

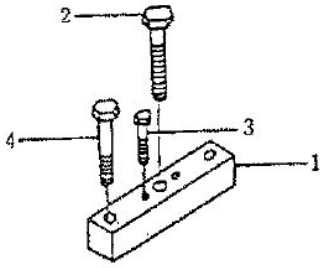
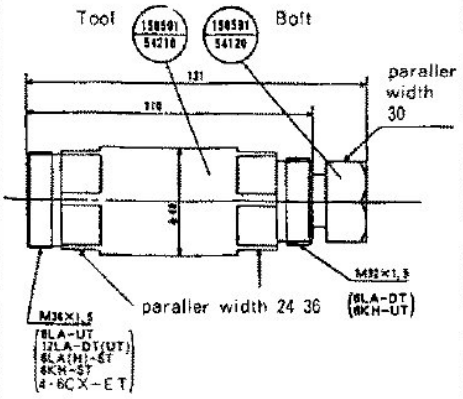
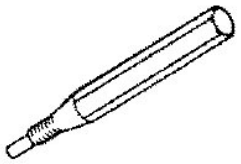
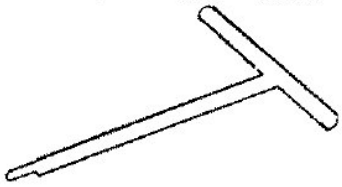
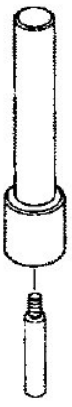
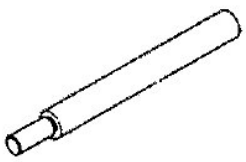
The following are the standard disassembly and reassembly tooLs:

Name of tool	Size	Shape
Double-head wrench	8 × 10, 12 × 14, 13 × 17 19 × 22, 24 × 27	(for removing fuel valve)
Wrench	7, 26	
Adjustable wrench	200	
Screw driver	⊕,⊖ changeeble	
Hexagon bar wrench	(for clutch emergency bolt)	
Double-head wrench	17 × 19	
Pliers		
Box wrench	19 × 12 (for cyl. head) 13 × 17 (for fuel oil pump)	
Extractor	(for fuel valve adiabatic packing) 127610–92910	
Extractor	(for removing fuel valve) 127616–92500	
Clearance gauge	(for adjusting intake/exhaust valve clearance	
Hammar		
Filter wrench	(for removing filters) 127610–92750	
Oiler		
Turning handle		(Filter wrench)

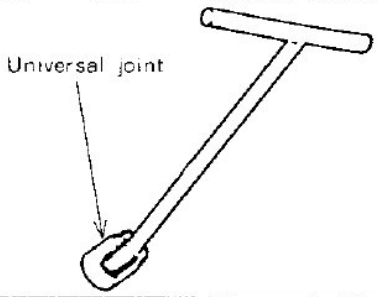
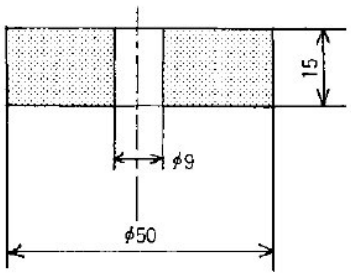
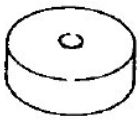
Tools (to be specially ordered)

Name of tool	Code No.	Shape
Socket (for rod bolt)	127610 – 92730	
Extractor for valve guide	127411 – 92160	
Extractor for fuel oil valve	127616 – 92500	
Piston insertion tool	122310 – 92140	
Piston rings fitting/removal tool	135410 – 92140	
Oil pan potitioning tool	1. Bolt (4pcs) 127610 – 92700 2. Spacers A 127610 – 92680 3. Spacers B 127610 – 92690	

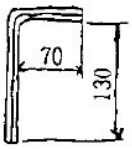
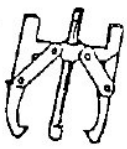
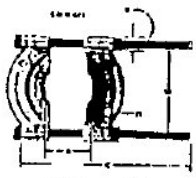
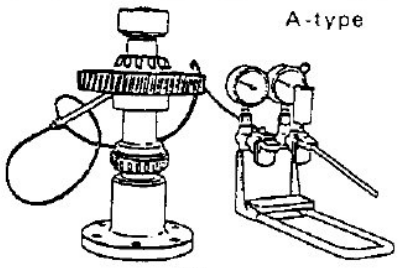
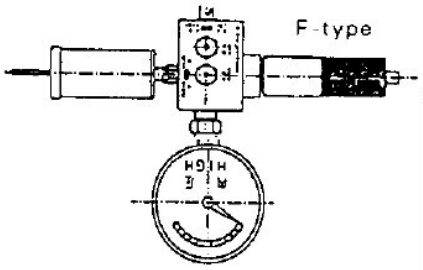
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Name of tool	Code No.	shape
Fresh water pump impeller (cam gear puller) (Press-fitting type)	1. Spacer 127610-92430 2. Bolt 124160-77511 3. Bolt (for impeller) ×2 26116-060302 4. Bolt (for cam gear) ×2 26116-080502	
Automatic timer tool (adiabatic material puller)	158591-54120 158591-54200	
Adiabatic material puller	127610-92910 (Standard)	
Protector puller	127695-92910	
Stem seal insertion tool		
Valve guide puller		

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Name of tool	Code No.	shape
Exhaust manifold puller		
Fuel valve puller tool 127616-92500		 

Special tools for clutch

No.	Name of tool	Note	shape
1	Emergency bolt span	For tightening the emergency bolt on clutch failure	
2	Gear puller		
3	Bearing separator	For removing bearing; used together with the gear puller	
4	Hydraulic fitting tool	For disassembly of output shaft joint Output shaft joint and large gear	A-type  F-type 

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Name	for using
Liquid packing (THREEBOND auxiliary packing):	The silver grey semi-dry type viscoelastic liquid packing based on extreme heat-resisting synthetic rubber and synthetic resin. Apply the packing to the seal surface and join the part after serveral minutes when the packing has become semi-dry. The white liquid packing based on nylon resin. Brush the packing on the seal surface and join the part after several minutes when the packing has become semi-dry. Be sure to stir well before use.
White paint	Coat the paint on the contact area with the cylinder body before inserting the cylinder liner to prevent rust and water leakage. (Use the oil type make-up paint.)

Name		quantity	Code No.	Note
Scale removing agent	UNICON	1 case (4kg × 4)	974100-01460	The strong scaling agent removes scale quickly (1~10 hrs.). Dissolve the agent in 10 parts of water or seawater (by weight ratio) and stir it well. Scale can be removed by just immersing the disassembled parts. To speed up the treatment, stir the solution. When the cleaning performance drops, neutralize the solution and throw it away.
	Counteragent (caustic soda)	1 case (2kg × 4)	974100-0200	
	PH test paper	1 set	974100-04200	
Anti-rust agent		—	—	Mix the agent in ten parts of fresh water and stir the solution by operating the engine for about 5 minutes. The anti-rust performance lasts for about 6 months.
Coolant		—	—	Can be used both as anti-freeze in winter and coolant in summer. The performance lasts for 2 years.

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