



YANMAR®

6LPA series SERVICE MANUAL

**6LPA-STP2
6LPA-STZP2**

P/N: 0B6LP-U00101

**MARINE
ENGINES**

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1207

California
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

California
Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.
Wash hands after handling.

Section 1

INTRODUCTION

This manual gives specific instructions for the proper repair of Yanmar 6LPA-STP2/STZP2 series marine engines.

Please follow the procedures carefully to ensure quality service.

Yanmar recommends that you read this *Service Manual* completely before starting with repairs.

Along with standard tools, Yanmar recommends the use of special tools, necessary to perform repairs correctly.

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This manual is a living document. Periodic manual revisions are published to document product improvements and changes. This practice ensures the manual has the most current information.

At times, the revision involves inserting additional pages in one or more sections. Replace the Revision Control Table and insert the new pages.

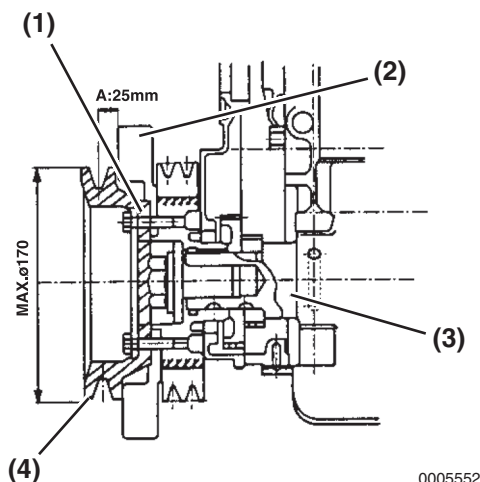
This method of revision control represents the most cost-effective solution to providing current, updated information as needed.

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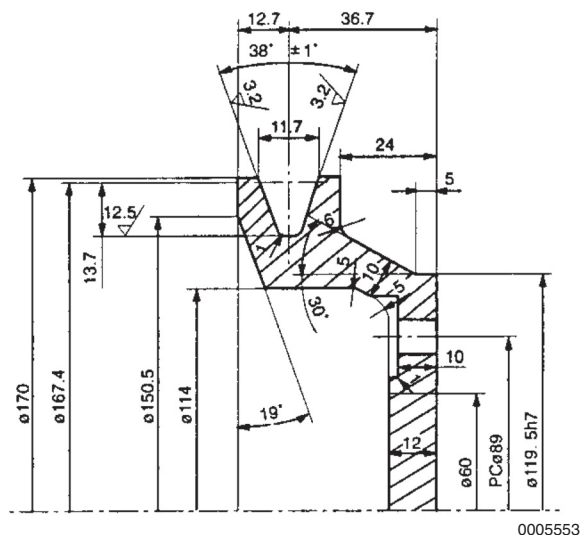
Method for Front PTO

1. Use type "A" (Belt drive with no outside bearing). NEVER use other types of PTO.
2. NEVER engage the UP-pull drive. Use the side pull belt drive.
3. Use a single V-drive, type "A."
4. The PTO pulley should be aluminum. The outside diameter should be maximum 170 mm (6.69 in.) and the overhang within 25 mm (0.98 in.).
5. Install the pulley to the exterior of the viscous damper and tighten the pulley and damper with the damper fixing bolts (M8 x (6 Qty.)) and the washers. (Torque: 3.8 ± 0.2 kg·m, 37.27 ± 1.96 N·m (27.4 ± 1.4 lb-ft))

Note: The crankshaft may break if the front PTO output exceeds the allowable output.

V-Pulley Overhang**Figure 3-14**

- 1 – Pulley Thickness Should be 10 mm (0.393 in.)
- 2 – Viscous Damper
- 3 – Crankshaft
- 4 – PTO Pulley (Aluminum)

V-Pulley Drawing**Figure 3-15**

- "A"-Type V Belt Style: A Material: Aluminum equivalent inertia weight $0.065 \text{ kg} \cdot \text{cm} \cdot \text{sec}^2$ ($0.63 \text{ N} \cdot \text{cm} \cdot \text{sec}^2$)

LOCATION OF NAMEPLATE

The nameplate of the Yanmar 6LPA series engines is shown in **Figure 3-16**. The nameplate is located on the engine rocker arm cover.

Engine Nameplate (Typical)

6LPA-STP2/STZP2 Engines

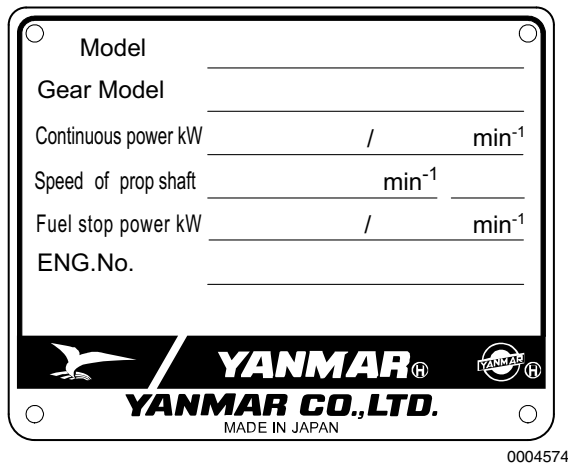


Figure 3-16

DIESEL FUEL

Diesel Fuel Specifications

CAUTION! *Only use diesel fuels recommended by Yanmar for the best engine performance, to prevent engine damage and to comply with EPA warranty requirements. Only use clean diesel fuel.*

Diesel fuel should comply with the following specifications. The table lists several worldwide specifications for diesel fuels.

DIESEL FUEL SPECIFICATION	LOCATION
No. 2-D, No. 1-D, ASTM D975-94	USA
EN590:96	European Union
ISO 8217 DMX	International
BS 2869-A1 or A2	United Kingdom
JIS K2204 Grade No. 2	Japan

Additional Technical Fuel Requirements

- The fuel cetane number should be equal to 45 or higher.
- The sulfur content must not exceed 0.5% by volume. Less than 0.05% is preferred.
- Water and sediment in the fuel should not exceed 0.05% by volume.
- Ash content not to exceed 0.01% by volume.
- Carbon residue content not to exceed 0.35% by volume. Less than 0.1% is preferred.
- Total aromatics content should not exceed 35% by volume. Less than 30% is preferred.
- PAH (polycyclic aromatic hydrocarbons) content should be below 10% by volume.
- NEVER mix kerosene, used engine oil, or residual fuels with the diesel fuel.
- NEVER use Biocide or mix winter and summer fuels.

ABBREVIATIONS AND SYMBOLS

Abbreviations

A	ampere
AC	alternating current
ACEA	Association des Constructeurs
Ah	ampere-hour
API	American Petroleum Institute
ARB	Air Resources Board
ATDC	after top dead center
BDC	bottom dead center
BTDC	before top dead center
°C	degree Celsius
CARB	California Air Resources Board
CCA	cold cranking amp
cfm	cubic feet per minute
cm	centimeter
cm³	cubic centimeter
cm³/min	cubic centimeter per minute
cu in.	cubic inch
D	diameter
DC	direct current
DI	direct injection
DVA	direct volt adapter
EPA	Environmental Protection
ESG	electronic speed governor
°F	degree Fahrenheit
fl oz	fluid ounce (U.S.)
fl oz/min	fluid ounce (U.S.) per minute
ft	foot
ft-lb	foot pound*
ft-lbf/min	foot pound force per minute
g	gram
gal	gallon (U.S.)
gal/hr	gallon (U.S.) per hour
gal/min	gallon (U.S.) per minute
GL	gear lubricant
hp	horsepower (metric)
hr	hour
I.D.	inside diameter
ID	identification
IDI	indirect injection
in.	inch
in.Aq	inches Aqueous (water)
in.Hg	inches Mercury
in-lb	inch pound**
J	joule
JASO	Japanese Automobile
K	kelvin

kg	kilogram
kgf/cm²	kilogram force per square
kgf/m	kilogram force per meter
km	kilometers
kPa	kilopascal
kW	kilowatt
L	liter
L/hr	liter per hour
lb	pound
lbf	pound force
lb-ft	pound foot (Tightening Torque)
lb-in	pound inch (Tightening Torque)
m	meter
mL	milliliter
mm	millimeter
mmAq	millimeter Aqueous (water)
MPa	megapascal
mV	millivolt
N	newton
N·m	newton meter
No.	number
O.D.	outside diameter
oz	ounce
Pa	pascal
PS	horsepower (metric)
psi	pound per square inch
qt	quart (U.S.)
R	radius
rpm	revolutions per minute
SAE	Society of Automotive
sec.	second
t	short ton 2000 lb
TBN	total base number
TDC	top dead center
V	volt
VAC	volt alternating current
VDC	volt direct current
W	watt

Symbols

°	degree
+	plus
-	minus
±	plus or minus
Ω	ohm
μ	micro
%	percent

* Work torque such as engine torque

** Work torque such as starter motor torque

UNIT CONVERSIONS

Unit Prefixes

Prefix	Symbol	Power
mega	M	x 1,000,000
kilo	k	x 1,000
centi	c	x 0.01
milli	m	x 0.001
micro	μ	x 0.000001

Units of Length

mile	x	1.6090	= km
ft	x	0.3050	= m
in.	x	2.5400	= cm
in.	x	25.4000	= mm
km	x	0.6210	= mile
m	x	3.2810	= ft
cm	x	0.3940	= in.
mm	x	0.0394	= in.

Units of Volume

gal (U.S.)	x	3.78540	= L
qt (U.S.)	x	0.94635	= L
cu in.	x	0.01639	= L
cu in.	x	16.38700	= mL
fl oz (U.S.)	x	0.02957	= L
fl oz (U.S.)	x	29.57000	= mL
cm ³	x	1.00000	= mL
cm ³	x	0.03382	= fl oz (U.S.)

Units of Mass

lb	x	0.45360	= kg
oz	x	28.35000	= g
kg	x	2.20500	= lb
g	x	0.03527	= oz

Units of Force

lbf	x	4.4480	= N
lbf	x	0.4536	= kgf
N	x	0.2248	= lbf
N	x	0.1020	= kgf
kgf	x	2.2050	= lbf
kgf	x	9.8070	= N

Units of Torque

ft-lb	x	0.1383	= kgf/m
in.-lb	x	0.0115	= kgf/m
lb-ft	x	1.3558	= N·m
lb-ft	x	0.1383	= kgf/m
lb-in.	x	0.1130	= N·m
lb-in.	x	0.0115	= kgf/m
kgf/m	x	7.2330	= ft-lb
kgf/m	x	86.8000	= in.-lb
kgf/m	x	9.8070	= N·m
N·m	x	0.7376	= ft-lb
N·m	x	8.8510	= in.-lb
N·m	x	0.1020	= kgf/m

Units of Pressure

psi	x	0.0689	= bar
psi	x	6.8950	= kPa
psi	x	0.0703	= kgf/cm ²
bar	x	14.5030	= psi
bar	x	100.0000	= kPa
bar	x	29.5300	= inHg (60°F)
kPa	x	0.1450	= psi
kPa	x	0.0100	= bar
kPa	x	0.0102	= kgf/cm ²
kgf/cm ²	x	98.0700	= psi
kgf/cm ²	x	0.9807	= bar
kgf/cm ²	x	14.2200	= kPa
in.Hg (60°)	x	0.0333	= bar
in.Hg (60°)	x	3.3770	= kPa
in.Hg (60°)	x	0.0344	= kgf/cm ²
mmAq	x	0.0394	= in.Aq

Units of Power

hp (metric or PS)	x	0.9863201	= hp SAE
hp (metric or PS)	x	0.7354988	= kW
hp SAE	x	1.0138697	= hp (metric or PS)
hp SAE	x	0.7456999	= kW
kW	x	1.3596216	= hp (metric or PS)
kW	x	1.3410221	= hp SAE

Units of Temperature

$$^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$$

$$^{\circ}\text{C} = 0.556 \times (^{\circ}\text{F} - 32)$$

Conditions to Ensure Compliance with EPA Emission Standards

The following are the conditions that must be met in order to ensure that the emissions during operation meet the EPA standards:

- Ambient temperature: -20 to 40°C (-4 to 104°F)
- Relative humidity: 80% or lower

The diesel fuel should be:

- ASTM D975 No. 1-D or No. 2-D, or equivalent (minimum of cetane No. 45)

The lubricating oil should be:

- Type API, Class CD or higher

Perform inspections as outlined in *Periodic Maintenance Procedures on page 4-9* and keep a record of the results.

Pay particular attention to these important points:

- Replacing the engine oil
- Replacing the oil filter
- Replacing the fuel filter
- Cleaning the air cleaner

Note: Inspections are divided into two sections in accordance with who is responsible for performing the inspection: the user or the manufacturer.

Inspection and Maintenance

See *Inspection and Maintenance of EPA Emission-Related Parts on page 4-8*. Inspection and maintenance procedures not shown in the *Inspection and Maintenance of EPA Emission-Related Parts* section are covered in *Periodic Maintenance Schedule on page 4-6*.

This maintenance must be performed to keep the emission values of your engine in the standard values during the warranty period. The warranty period is determined by the age of the engine or the number of hours of operation.

PERIODIC MAINTENANCE SCHEDULE

Daily and periodic maintenance is important to keep the engine in good operating condition. The following is a summary of maintenance items by periodic maintenance intervals. Periodic maintenance intervals vary depending on engine application, loads, diesel fuel and engine oil used and are hard to establish definitively. The following should be treated only as a general guideline. **CAUTION! Establish a periodic maintenance plan according to the engine application and make sure to perform the required periodic maintenance at intervals indicated. Failure to follow these guidelines will impair the engines safety and performance characteristics, shorten the engines life and may affect the warranty coverage of the engine.**

Note: The following procedures are considered normal maintenance and are performed at the owner's expense.

* For EPA requirements, see *Inspection and Maintenance of EPA Emission-Related Parts* on page 4-8.

○: Check or Clean ◇: Replace								
System	Item	Periodic Maintenance Interval						
		Daily	Every 50 hours or one month whichever comes first	Every 125 hours or 6 months whichever comes first	Every 250 hours or one year whichever comes first	Every 500 hours or 2 years whichever comes first	Every 500 hours or 2 years whichever comes first	Every 1250 hours or 5 years whichever comes first
Whole	Visual inspection of engine exterior	○						
Fuel System	Check the fuel level and refill if necessary	○						
	Drain water and sediment from the fuel tank		○					
	Drain the fuel / water separator		○					
	Replace the fuel filter element		◇ Initial 50		◇			
	Check the fuel injection timing						○	
	Check the fuel injector pressure and nozzle spray pattern*				○		◇	
Lubricating System	Check the engine oil level	○						
	Change the engine oil		◇ Initial 50	◇				
	Replace the engine oil filter element		◇ Initial 50	◇				
	Wash the engine oil cooler							○