

Integral

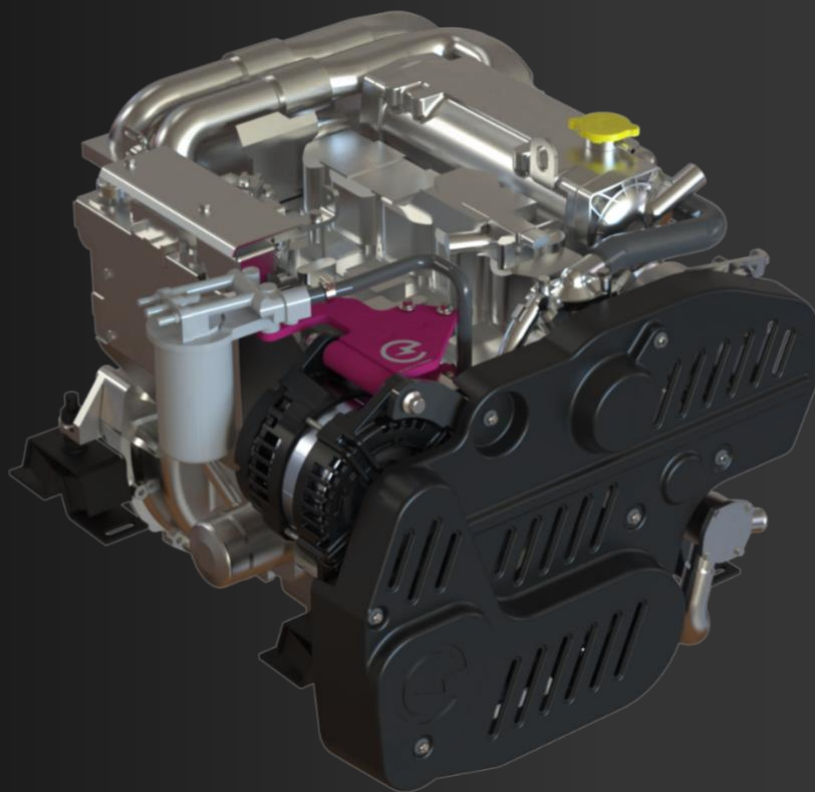
E-POWER

ISP004 – BRACKET

INSTALLATION GUIDE

Version 1.5 | April 2024

Yanmar JH CR Series



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1. INTRODUCTION

This document describes the mechanical installation procedure to mount the Integral On-Engine Generator (OEG) and optional belt cover to the Yanmar JH CR series of marine diesel engines.

These installation instructions suit the Yanmar JH-CR range of engines including:

- 3JH 40
- 4JH 45
- 4JH 57
- 4JH 80
- 4JH 110

This manual applies to bracket assembly **ISP0004**.

1.1 Target Audience Assumptions

It is assumed the reader of this installation guide is a trained mechanical installer with an adequate knowledge of marine engineering terms, concepts, language, and abbreviations.

1.2 Disclaimer

Integral Solutions has taken great care in preparing the information contained in this manual and the information is believed to be accurate, comprehensive, and reliable at the time of publication. However, it is up to the operator of the equipment and parts detailed in this manual to ensure that they are appropriately skilled to use such equipment and parts.

It is also the responsibility of the operator of the equipment and parts detailed in this manual to ensure the equipment and parts are used in the manner directed, are correctly installed and are suitable for the customers' requirements.

Integral Solutions does not provide any representations or warranties, expressed or implied, as to the accuracy or completeness of the information contained in this manual.

To the extent permitted by law, Integral Solutions does not assume any responsibility or liability for any injury, loss or damage incurred as a result of any use or reliance upon the information contained within this manual other than for such injury, loss or damage which it would be unlawful for Integral Solutions to attempt to exclude.

1.3 Support

For additional support or if you have any questions, please contact our support team on the following details:

E-MAIL support@integralsolutions.com

PHONE +44 (0) 1736 755466

2. HEALTH AND SAFETY

2.1 Important safety instructions

Electromechanical equipment, including the On Engine Generator (OEG), mounting brackets, and accessories, can cause bodily harm and pose life-threatening danger when improperly installed, operated, or maintained. To prevent accidents, be aware of potential dangers and act safely. Read and follow all safety precautions and instructions. SAVE THESE INSTRUCTIONS.

2.2 Accidental starting and moving parts

Fitting the Integral system involves the use of engines and other moving components such as hatches, covers and other associated parts used on leisure and sailing craft.

Lock off any engine start buttons to ensure against accidental starting.

Utmost care must be taken when opening hatches and lockers. Make sure you remove or securely support hatches and lockers in a safe manner.

2.3 Working with engines

Fitting the Integral system involves running engines for long periods of time ensure the vessel is suitably set up to reduce emissions being inhaled during running of the system.

2.4 Engine noise

Hazardous noise can cause hearing loss. Marine diesel engines can produce noise levels greater than 105 dBA. Prolonged exposure to noise levels greater than 85 dBA can cause permanent hearing loss. Wear hearing protection when near an operating marine diesel engine.

2.5 Heavy lifting / manual handling

Some of the equipment involved with the installation may be heavy, ensure wherever practicable to use lifting equipment such as strops and lifting hoists and any other available equipment. Some of the equipment including batteries may need to be lifted into tight and awkward locations please ensure you plan out properly how to move things into place in a safe and sensible manor to prevent damage to people and the equipment.

2.6 Assembly Torque

The assembly torque values stated in this manual are for guidance only, they are recommended values for the thread sizes and bolt materials provided. However, the condition of the mounting hole within the engine must be considered.

Threaded holes must be cleaned and degreased prior to installation. Torque values must be decreased if the threads are damaged or show any signs of failure.

During assembly and torquing of the fasteners, stop immediately if the thread feels damaged.

2.7 Tools Required

The following tools are required to complete the installation.

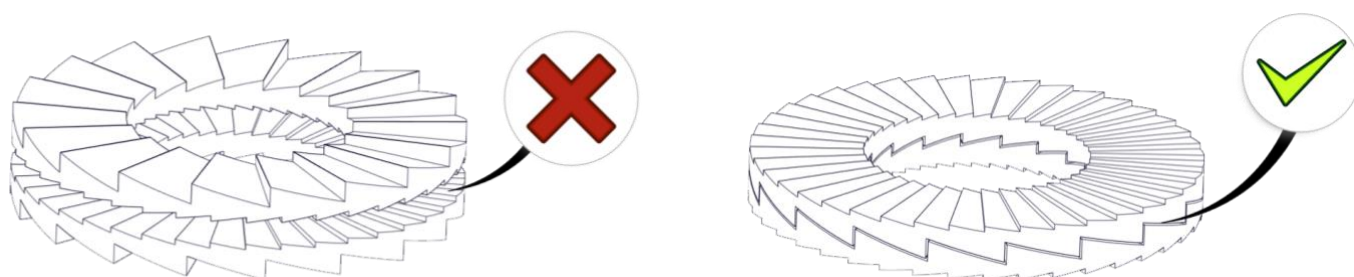
- Torque wrench, suitable for 20-100 Nm
- Universal joint swivel to suit the above
- Sockets adaptors (A/F) – 8 mm, 10 mm, 13 mm, 15 mm & 17 mm
- Hex drive bits (A/F) – 6 mm & 8 mm
- Wrench with 3/8" square drive
- 19mm open ended spanner (wrench)
- 16 mm open ended spanner (wrench)
- 14mm open ended spanner (wrench)
- Loctite 243 (thread lock, blue, medium strength) or equivalent
- Flat head screwdriver
- Multi V-Belt pulley alignment tool (400 mm minimum span)
- Paint pen
- Knife for paint removal

2.8 Assembly Instruction Notes

All threaded fasteners shall be torqued to the values specified with a tolerance of +/- 10%.

Loctite / thread lock shall be used only on the specified joints. When using Loctite, ensure that all threads are clean and degreased. Apply Loctite sparingly to the male thread.

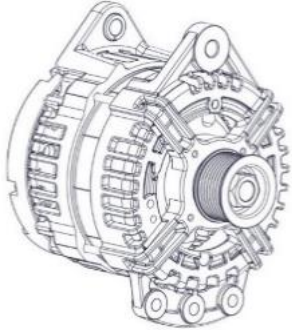
Wedge locking washers are provided as a glued pair. The two (2) halves should not be separated. If a pair becomes separated, they can still be used but must be installed in the correct orientation, with the large mating wedges face-to-face, as shown in the following image.



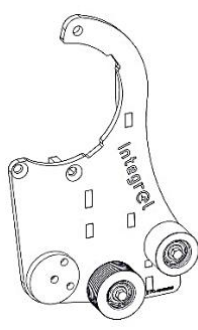
3. PART IDENTIFICATION

3.1 Bracket Components

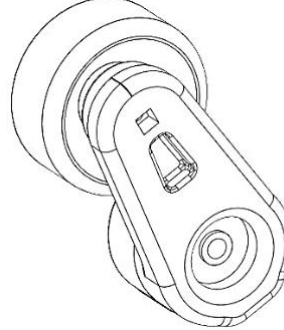
One each of the following components is supplied with the bracket kit. Ensure all parts are in the kit before starting installation.



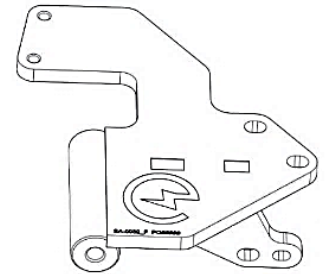
On Engine Generator
(OEG)



Lower Bracket
SA-0010
Assembled



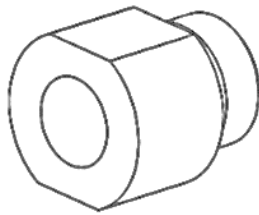
Tensioner
PQG500250



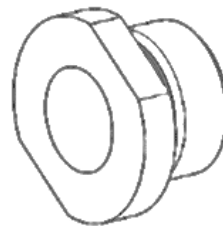
Upper Bracket
SA-0032



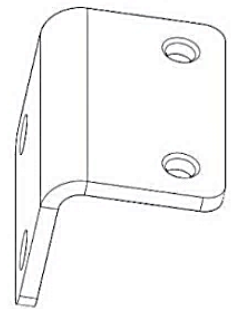
10PK Pulley
MC-0755



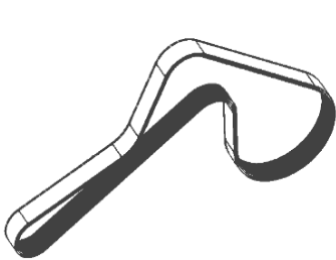
4JH Spacer
MC-0011



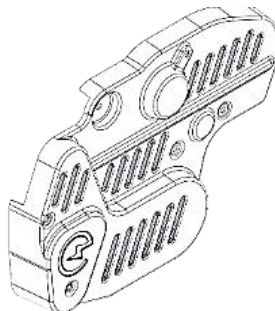
3JH Spacer
MC-0012



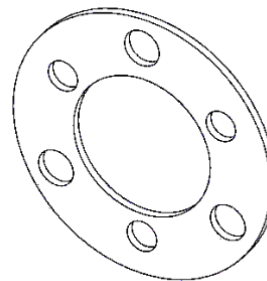
Filter bracket
SA-0409



8PK 1323 Belt
MC-0036



OEG Belt Cover
MC-0332



Shim Pack
MC-0408



Pulley alignment
tool
MC-0589

3.2 Bracket Fixings and Hoses

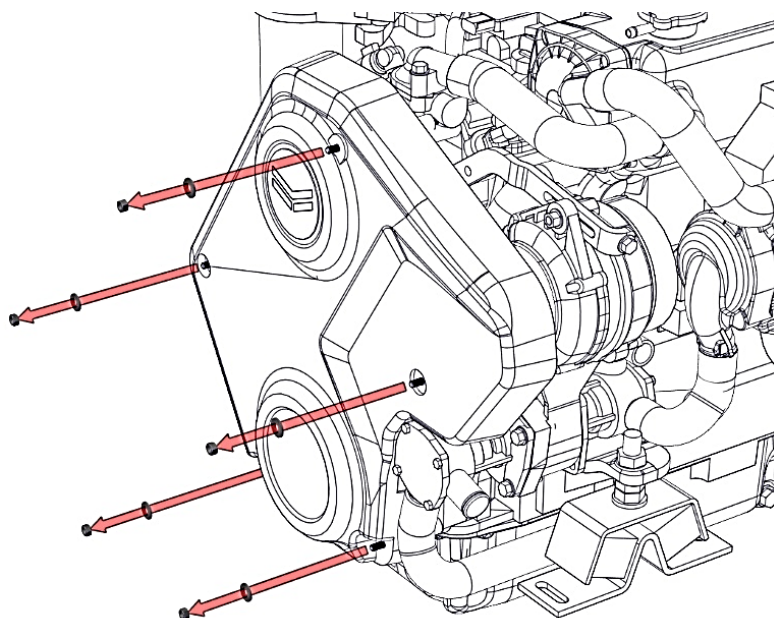
Item	Quantity	Size	Description
1	1	M6sp	WEDGE-LOCKING WASHERS
2	6	M8sp	WEDGE-LOCKING WASHERS
3	6	M10sp	WEDGE-LOCKING WASHERS
4	3	M12sp	WEDGE-LOCKING WASHERS
5	1	M12	WEDGE-LOCKING WASHERS
6	2	M8x16	HEXAGON SOCKET THIN HEAD CAP SCREW (DIN 7984)
7	1	M12x25	HEXAGON SOCKET THIN HEAD CAP SCREW (DIN 7984)
8	4	M6x20	FLANGE BOLT (DIN 6921)
9	6	M8x25	HEX HEAD FLANGE BOLT (DIN 6921)
10	1	M10x35	HEX HEAD FLANGE BOLT (DIN 6921)
11	2	M10x45	HEX HEAD FLANGE BOLT (DIN 6921)
12	1	M10x70	HEX HEAD FLANGE BOLT (DIN 6921)
13	1	M12x35	HEX HEAD FLANGE BOLT (DIN 6921)
14	1	M12x40	HEX HEAD FLANGE BOLT (DIN 6921)
15	1	M12x50	HEX HEAD FLANGE BOLT (DIN 6921)
16	4	M6	HEX NUT, LOCKING, ALL METAL (ISO 7042)
17	7	M6	RUBBER GROMMET AND SHOULDER WASHER
18	2	13-20	HOSE CLIP
19	3	M10	HEX FLANGE NUT (DIN 6923)
20	3	M10x50	STUD (ISO 4029)
21	1	M8x85	HEX HEAD FLANGE BOLT (DIN 6921)
22	1	10	FUEL HOSE

4. ENGINE PREPARATION

Prepare the engine for mounting the bracket as described in the following steps.

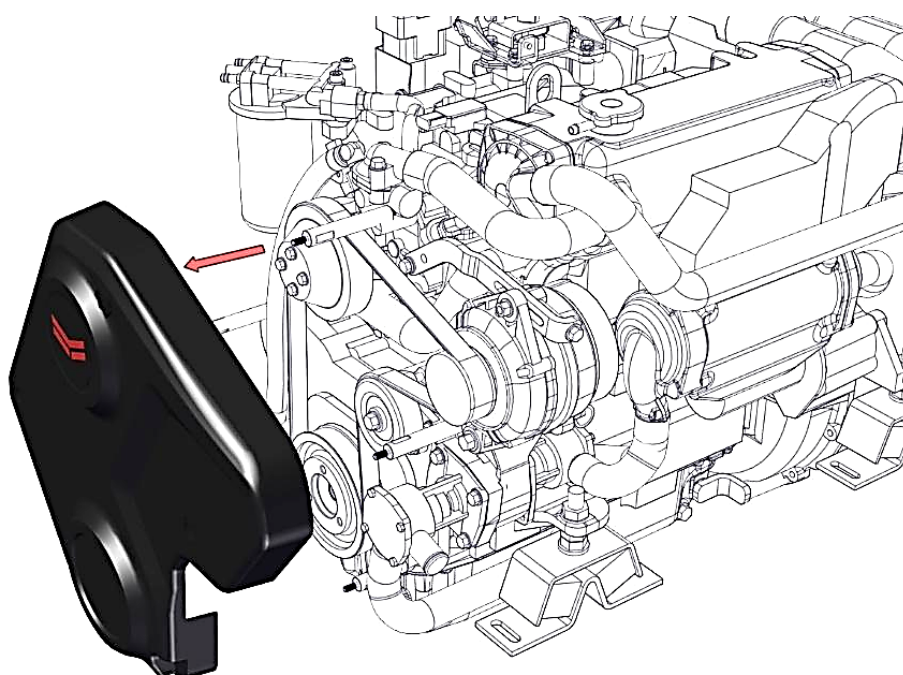
STEP 4.1. Remove belt cover fasteners

Remove the five (5) **M6 nuts and washers** from the belt cover



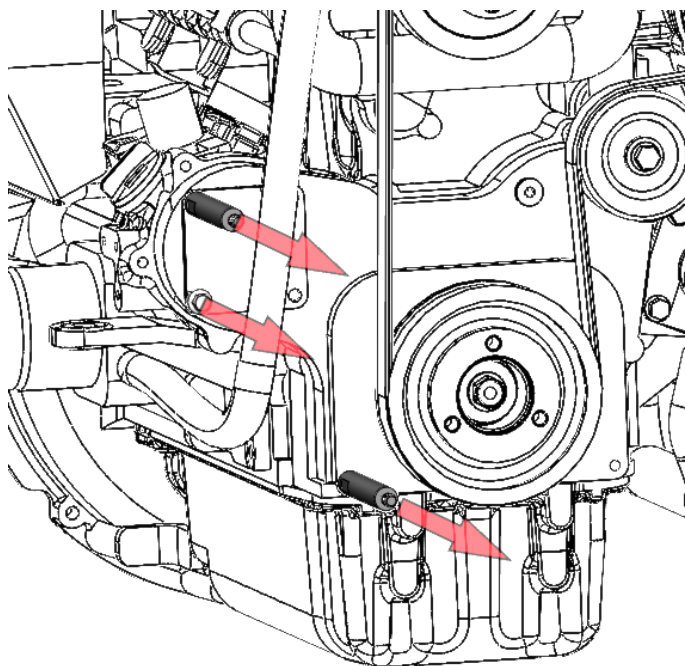
STEP 4.2. Remove the belt cover

Remove the **belt cover** from the engine.



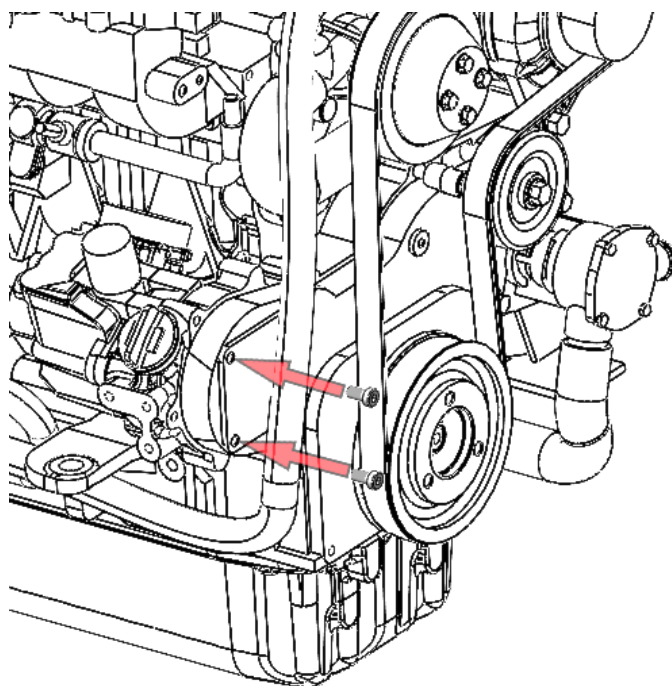
STEP 4.3. Remove belt cover supports

Remove each of the two (2) belt cover supports from the left-hand side of the engine crank shaft. Use a **14 mm** open ended spanner. Remove bottom left **M8x16** flange bolt on injector pump cover.



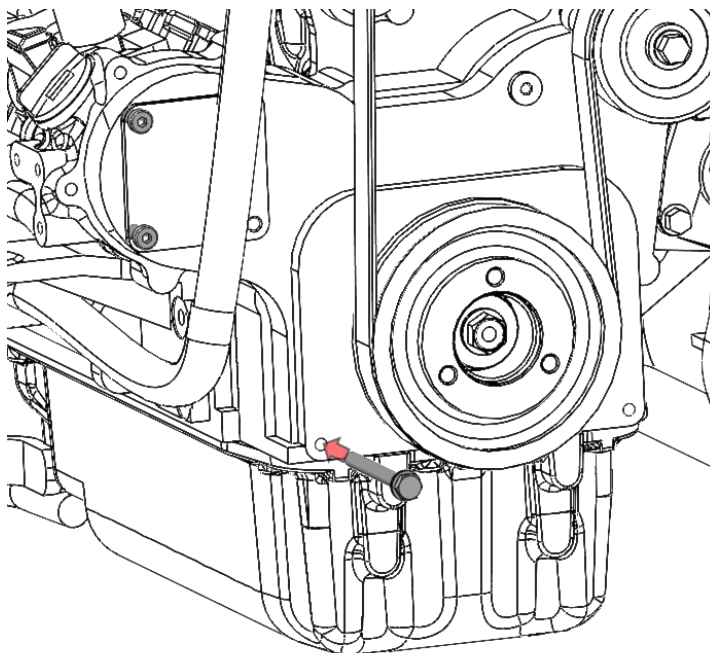
STEP 4.4. Replace belt cover support

Replace the upper left support with two (2) **M8x16** socket thin head bolts. Torque bolts to **20.0 Nm (14.7 lb. ft)**.



STEP 4.5. Replace belt cover support

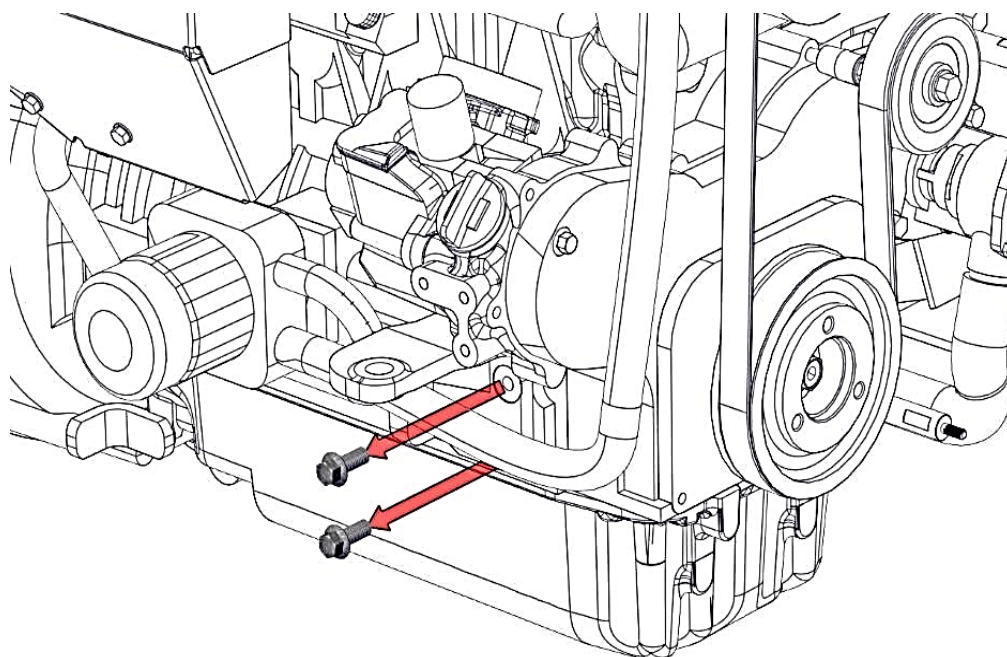
Replace the bottom left support (next to the crank shaft pulley) with **M8x85** hex head bolt and **M8** wedge lock washer. Torque the bolt to **20.0 Nm (14.7 lb. ft)**.



STEP 4.6. Remove mounting foot fasteners

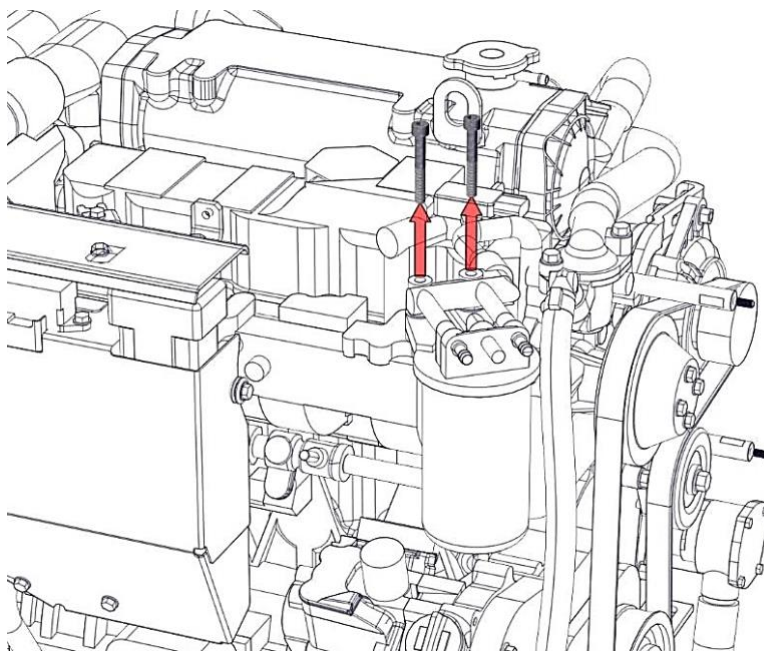
Remove the two (2) bolts securing the mounting foot as shown in the image below. Only remove the two (2) bolts closest to the crank shaft pulley-end of the engine. The mounting foot should not be removed.

Note! The mounting foot is NOT shown in the following drawing to avoid cluttering the diagram.

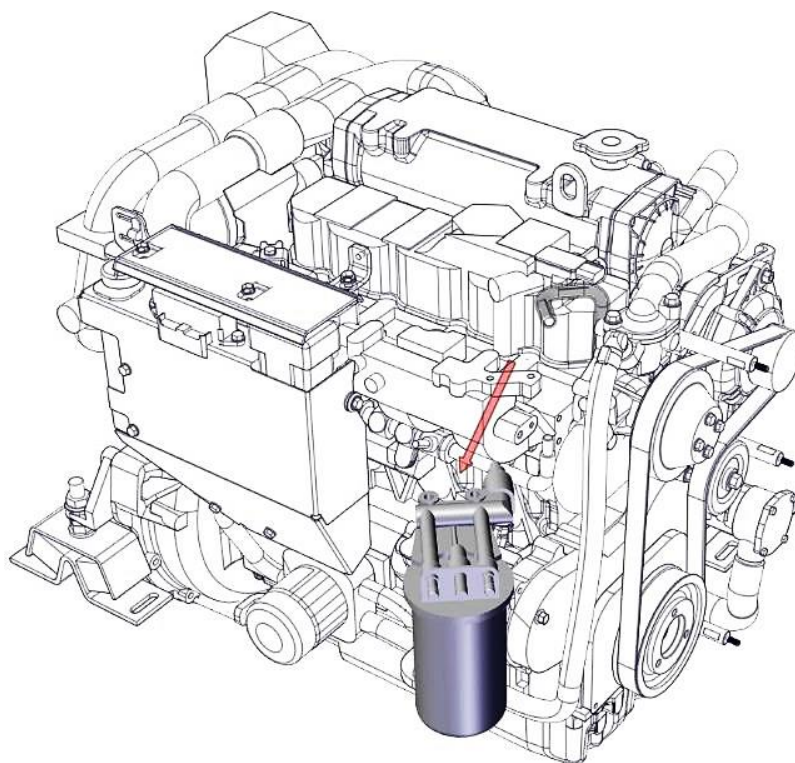


STEP 4.7. Remove fuel filter bolts

Remove the mounting hardware securing the fuel filter. If required, the top cover of the engine can be removed to ease access. Retain this for future use.

**STEP 4.8. Remove the fuel filter**

Disconnect the hose and remove the fuel filter.



STEP 4.9. Belt cover supports

OPTION A - IF **NOT** USING SUPPLIED BELT COVER

Remove the three (3) belt cover supports to the engine.

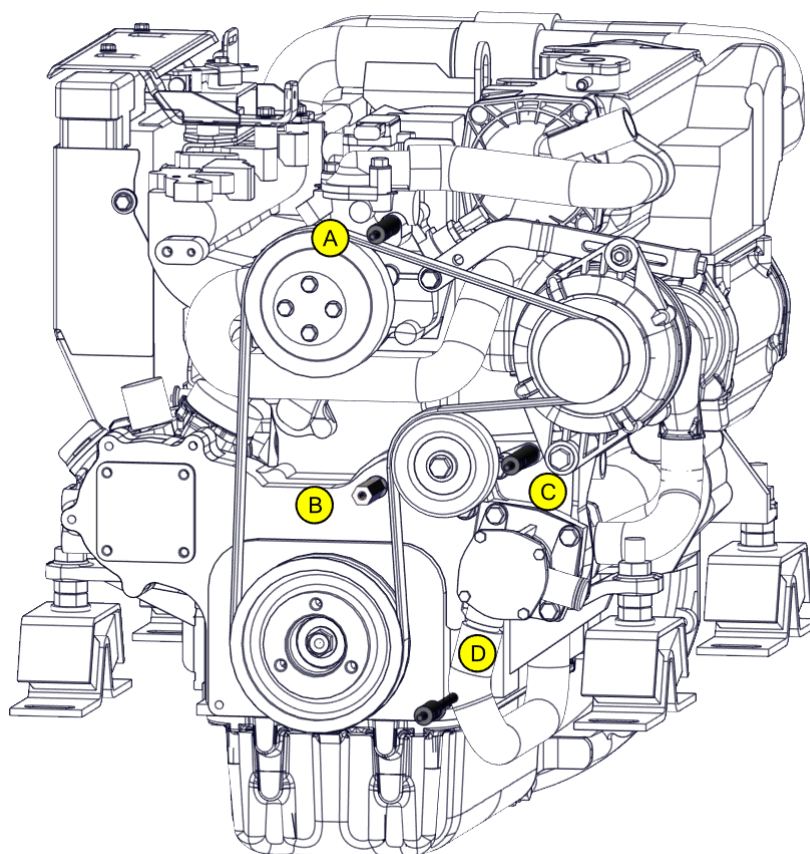
- A** - YANMAR STANDOFF – 60mm (129677-09481)
- B** - N/A
- C** - YANMAR STANDOFF – 75mm (129677-09431)
- D** - YANMAR STANDOFF – 38mm (129677-09411)

OPTION B - IF USING SUPPLIED BELT COVER

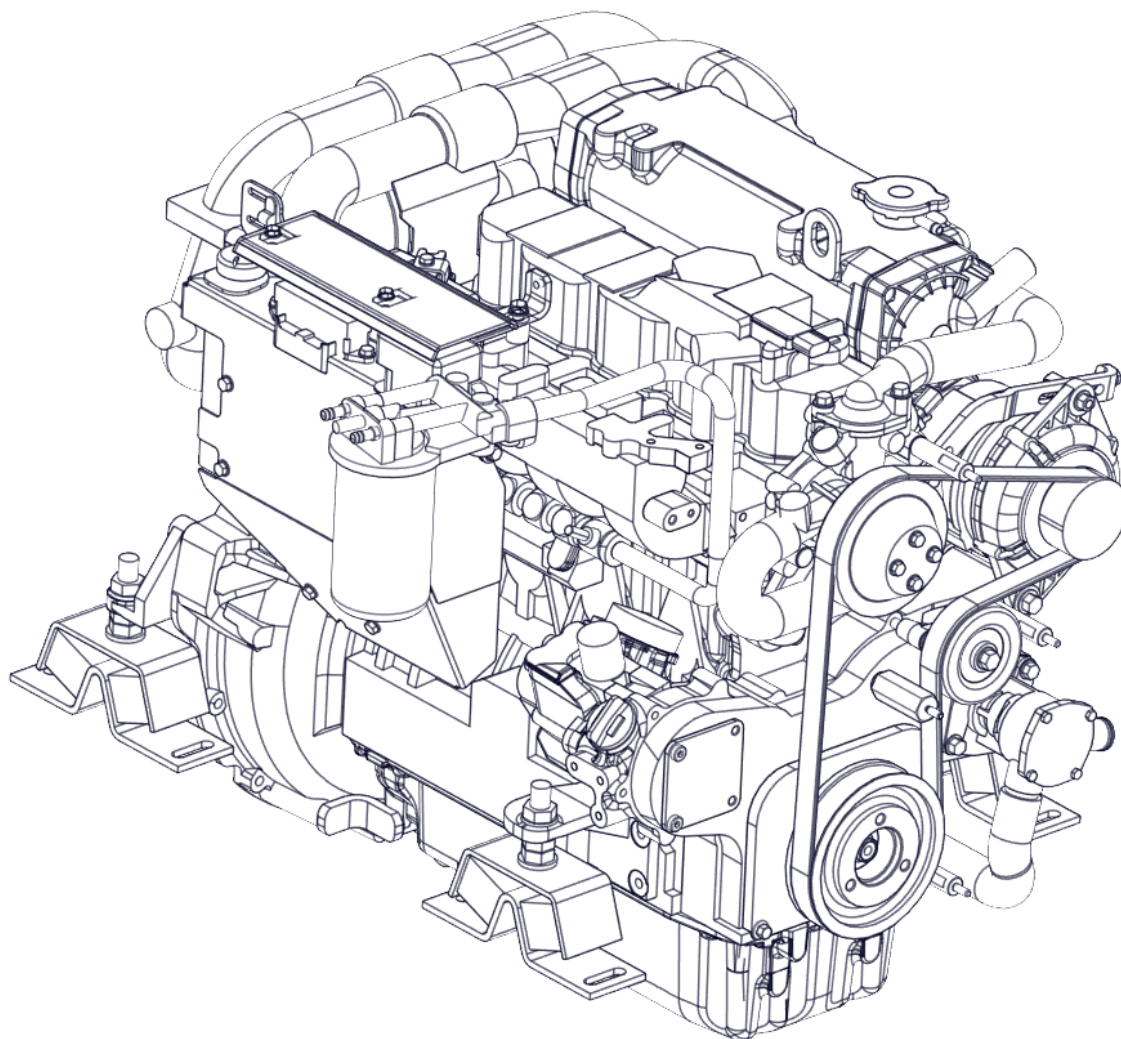
Retain Yanmar supports and fit the new belt cover support to the engine.

- A** - Retain YANMAR STANDOFF – 60mm (129677-09481)
- B** - Fit new M6 X 55mm STANDOFF (MC-0336)
- C** - Retain YANMAR STANDOFF – 75mm (129677-09431)
- D** - Retain YANMAR STANDOFF – 38mm (129677-09411)

Use a **14 mm** open ended spanner. Torque bolts to **20.0 Nm (14.7 lb. ft)**.



The engine is now ready for the OEG bracket to be mounted.



5. MOUNTING THE BRACKET

STEP 5.1. Prepare the lower bracket

Prepare the lower mounting bracket by fitting either part **MC-0011** or part **MC-0012** to part **SA-0010** as shown.

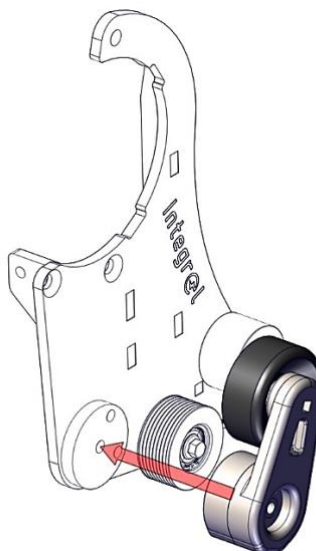
- **3JH Engines**
 - Use **MC-0012** (short spacer).
- **4JH Engines**
 - Use **MC-0011** (long spacer).

Use a **19 mm** open ended spanner.



STEP 5.2. Fit tensioner to lower bracket

Mount the automatic tensioner (**PQG500250**) ensuring the locating pins are inserted into the locator plate correctly



STEP 5.3. Fit tensioner bolts

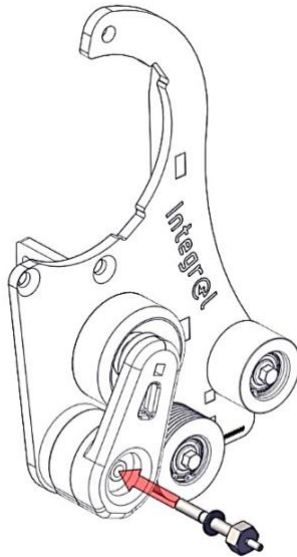
OPTION A - IF **NOT** USING SUPPLIED BELT COVER:

Fit the **M10x70** flange head bolt and **M10** wedge locking washer.

OPTION B - IF USING SUPPLIED BELT COVER:

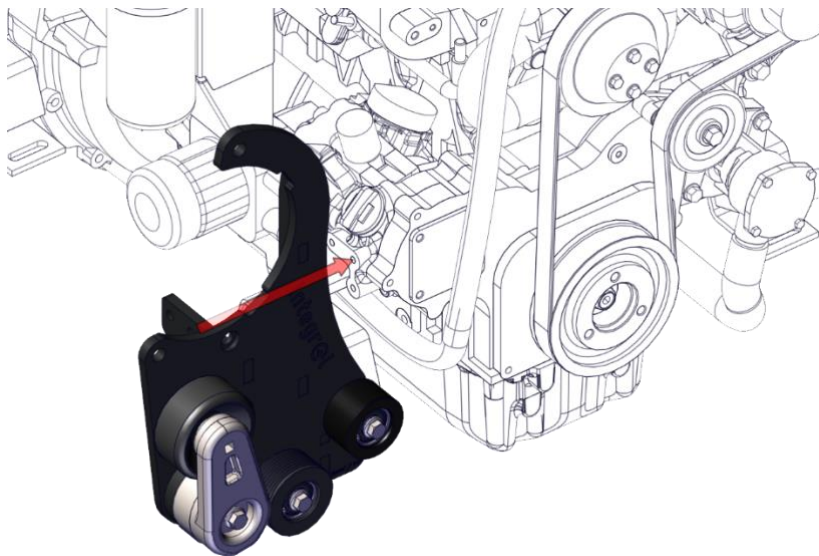
Fit the **M10 x M6** tensioner standoff (MC-0353).

To allow for final adjustment, do NOT torque yet; use a **15 mm** socket.



STEP 5.4. Align the lower bracket

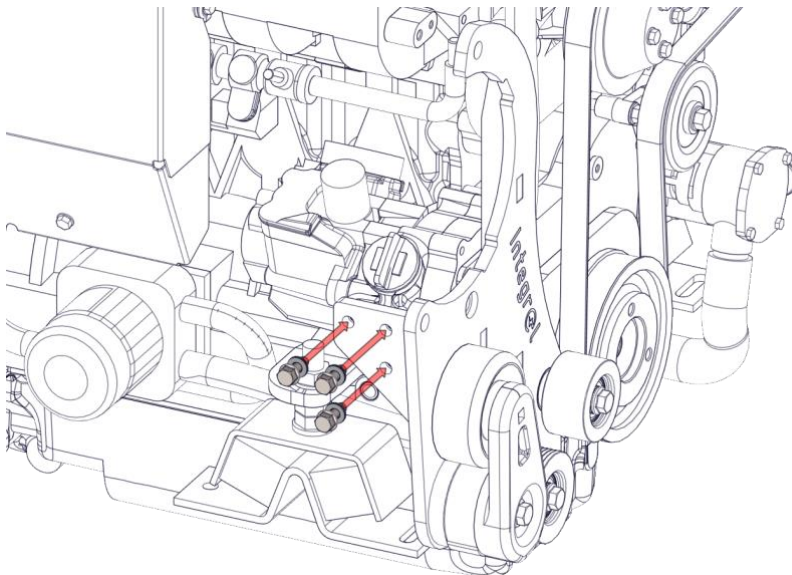
Mount the lower bracket assembly to the engine. Ensure that the holes within the bracket align with the foot mounting holes.



STEP 5.5. Fit the lower bracket upper bolts

Fit three (3) **M8x25** flange head bolts paired with **M8** wedge lock washers.

Do not torque yet to allow for final adjustment; use a **13 mm** socket.



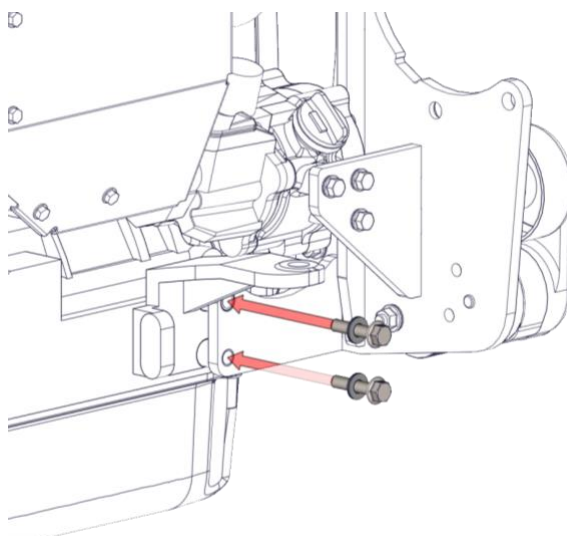
STEP 5.6. Fit the lower bracket lower bolts

Fit the lower mounting hardware to the foot mounting holes as follows.

- **3JH Engines**
 - Upper hole = **M10x35** flange head bolt and **M10** wedge locking washer.
 - Lower hole = **M10x45** flange head bolt and **M10** wedge locking washer.
- **4JH Engines**
 - Both holes = **M10x45** flange head bolt and **M10** wedge locking washer.

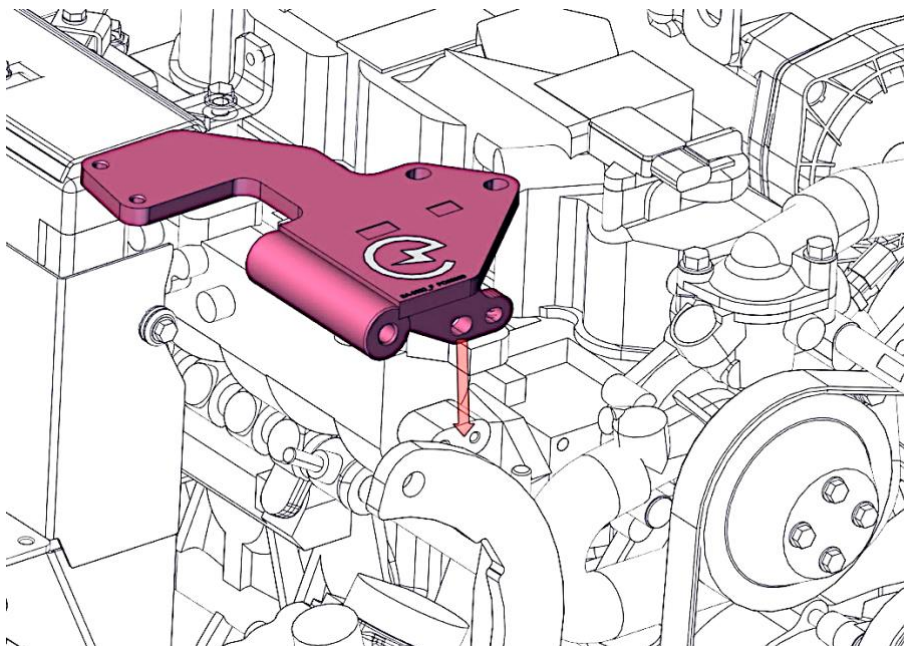
To allow for final adjustment, do NOT torque yet; use a **15 mm** socket.

Use the universal joint swivel adaptor for easier access.



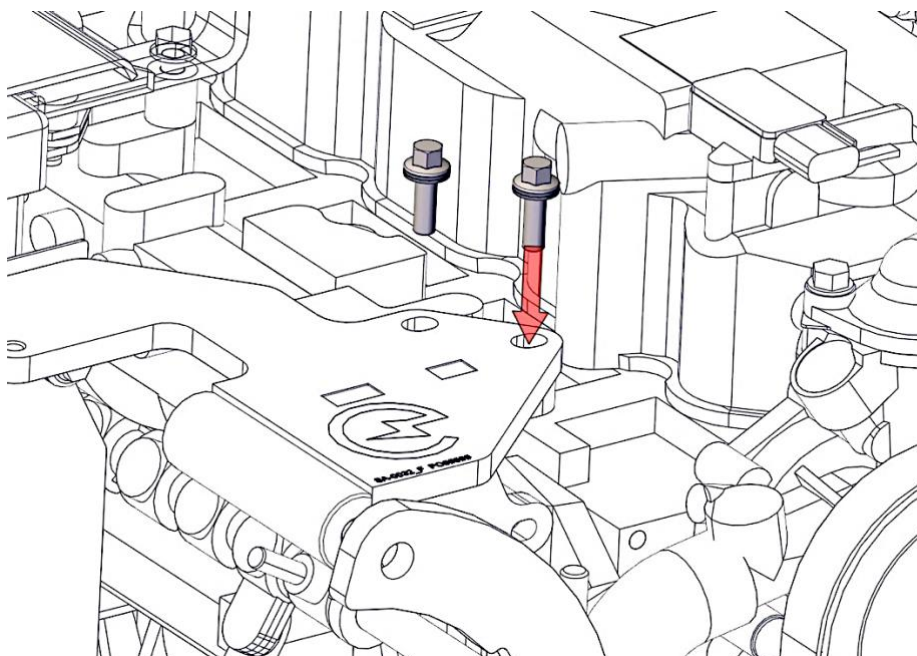
STEP 5.7. Align the upper bracket

Align the upper bracket assembly to the engine. Ensure the holes within the bracket align with the fuel filter mounting holes.



STEP 5.8. Fit the vertical bolts of the upper bracket

Fit the remaining two (2) **M8x25** flange head bolts paired with **M8** wedge lock washers. To allow for final adjustments, do NOT torque yet; use a **13 mm** socket.



STEP 5.9. Fit the horizontal bolts of the upper bracket**OPTION A - IF *NOT* USING SUPPLIED BELT COVER:**

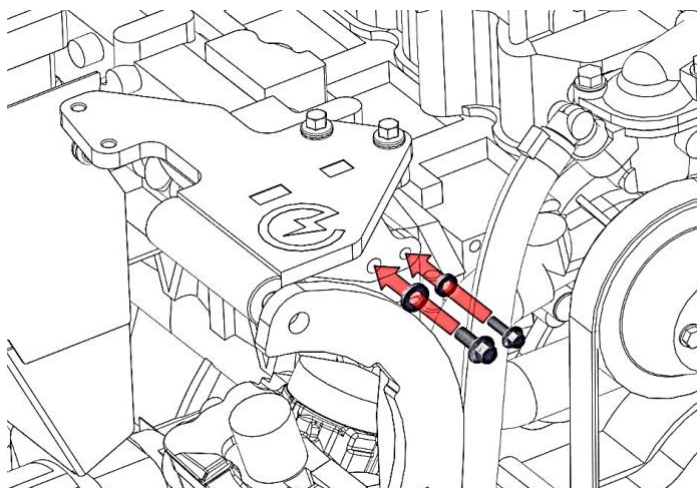
Fit the **M6x20** flange head bolt paired with an **M6** wedge lock washer.

To allow for final adjustment, do NOT torque yet; use a **10 mm** socket

On some engine models, a hose clip is secured to the **M6** hole. This can be reinstalled between the bracket and the locking washer.

Fit the **M8x25** flange head bolt paired with a **M8** wedge lock washer.

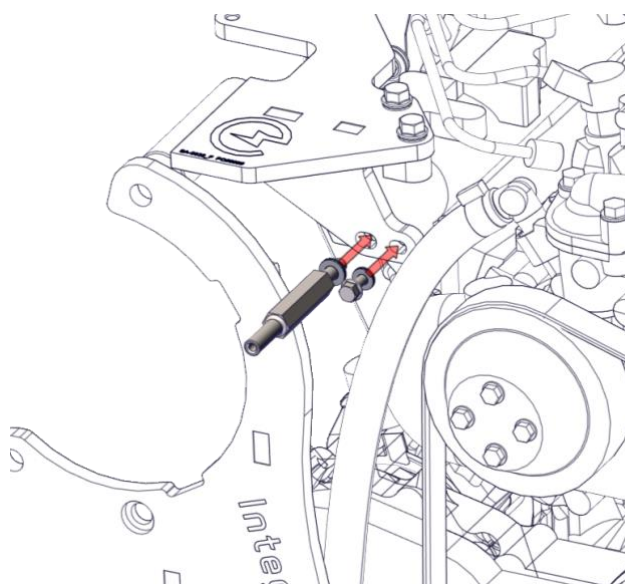
To allow for final adjustment, do NOT torque yet; use a **13 mm** socket.

**OPTION B - IF USING SUPPLIED BELT COVER:**

Fit the **M6x20** flange head bolt paired with an **M6** wedge locking washer (as above).

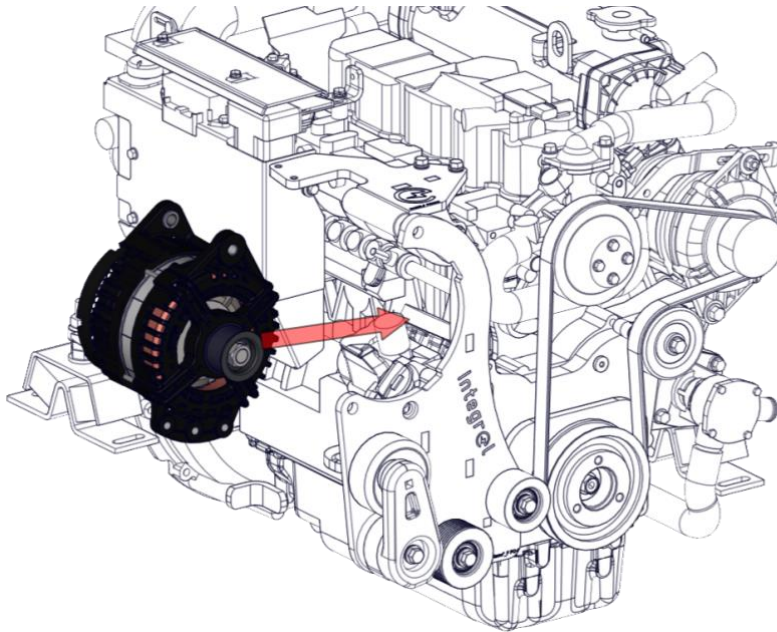
Fit the **M8 x M6 85mm** standoff (MC-0334) paired with an **M8** wedge locking washer.

To allow for final adjustment, do NOT torque yet; use a **13 mm** spanner.



STEP 5.10. Fitting the OEG

The order in which the OEG is fitted and secured depends on user preference and engine access. The following two (2) steps can be swapped if desired to aid with fitting the OEG.



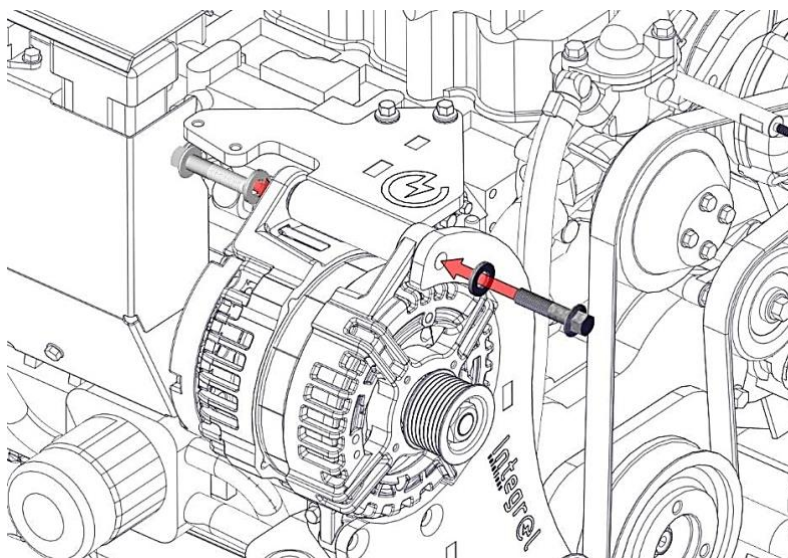
STEP 5.11. Fit the OEG top mounting bolt

Fit the **M12x50** flange head bolt paired with an **M12** wedge locking washer through the lower bracket as shown in image below.

Ensure the bolt closest to the belt pulley is installed first, as the rear mount of the OEG is automatically adjusted.

Fit the **M12x40** flange head bolt paired with an **M12** wedge locking washer through the rear OEG mounting point and into the top bracket.

To allow for final adjustment, do NOT torque yet. Use a **16 mm** socket.

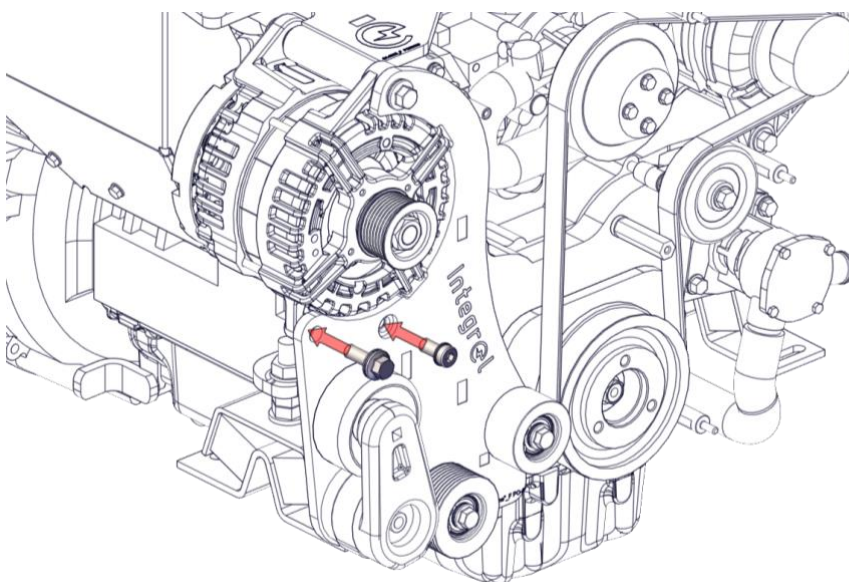


STEP 5.12. Fit the OEG bottom mounting bolts**OPTION A - IF *NOT* USING SUPPLIED BELT COVER:**

Fit **M12x35** hex head flange bolt paired with an **M12SP** wedge lock washer.

Fit **M12x35** hex socket thin head cap screw paired with an **M12** wedge lock washer into counterbore hole.

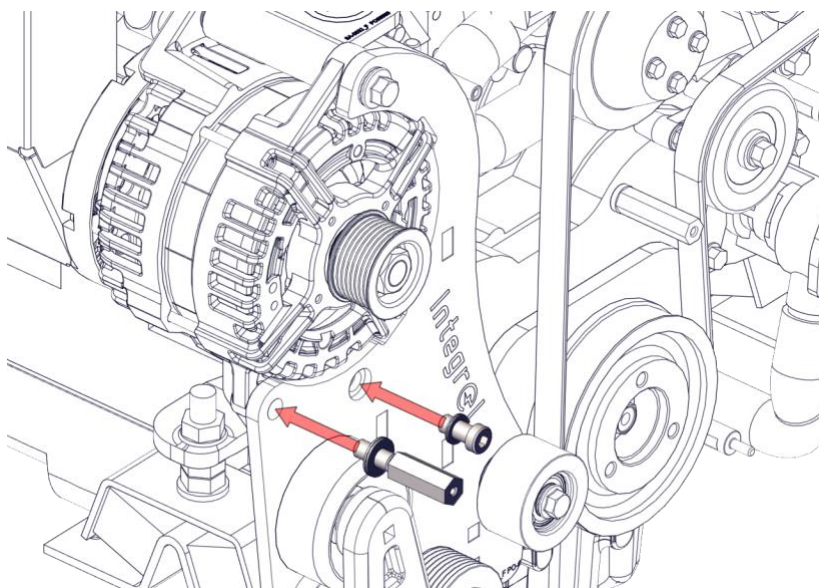
To allow for final adjustment, do NOT torque yet.

**OPTION B - IF USING SUPPLIED BELT COVER:**

Fit **M12x35** hex socket thin head cap screw with **M12** wedge locking washers into counterbore hole.

Fit the **M12 x M6** standoff (MC-0333).

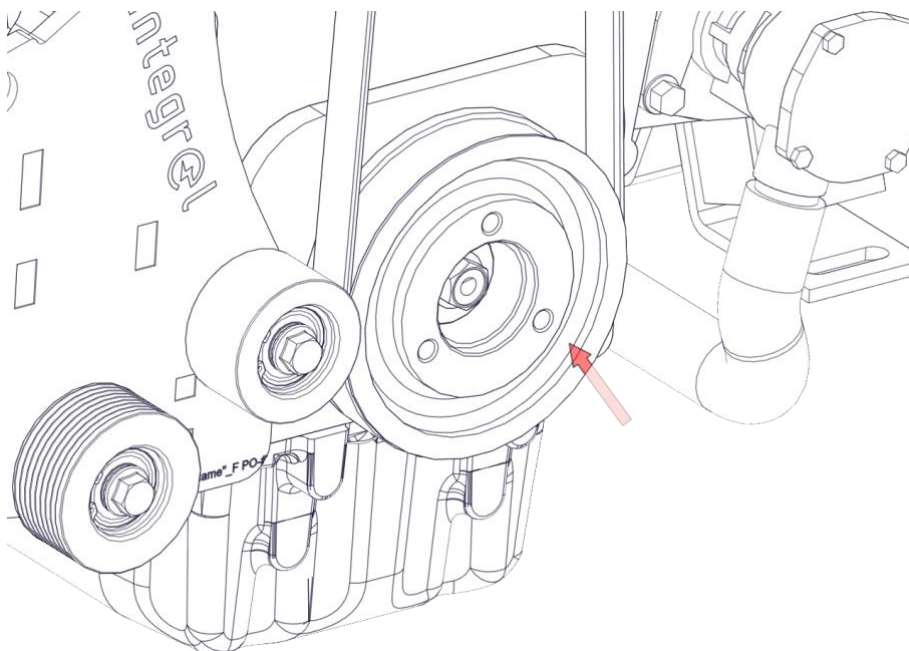
To allow for final adjustment, do NOT torque yet. Use a **17 mm** socket.



STEP 5.13. Prepare the engine pulley

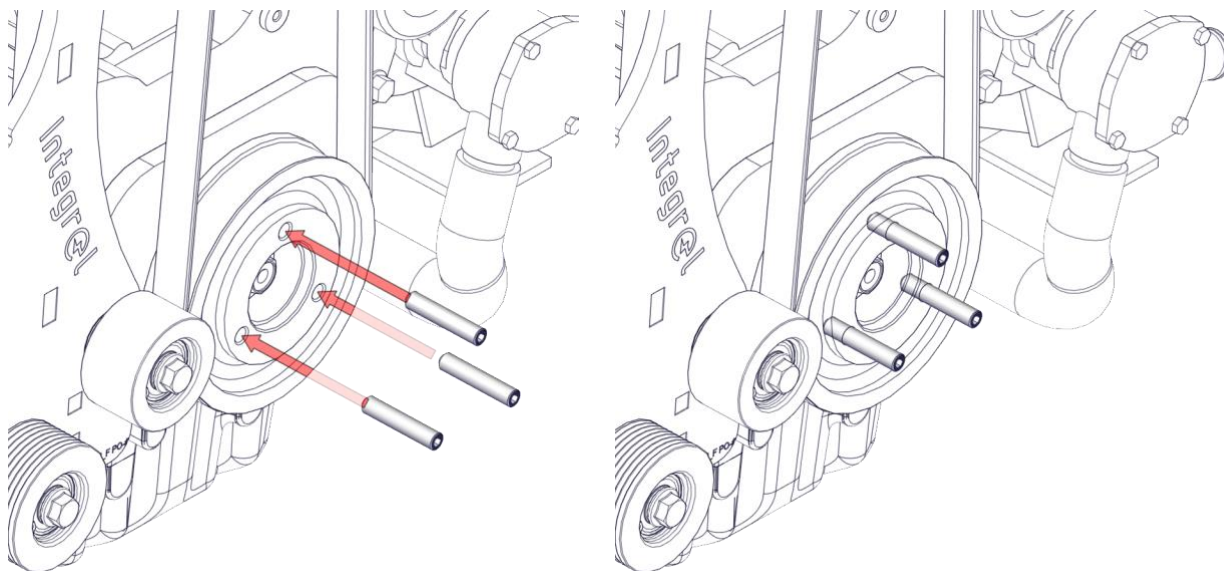
Test fit the crank pulley to ensure adequate clearance.

It is common for paint overspray to be present on the inside diameter of the pulley. If the Integrel crank pulley cannot be mounted use a knife to remove excess paint from the Yanmar crank pulley.



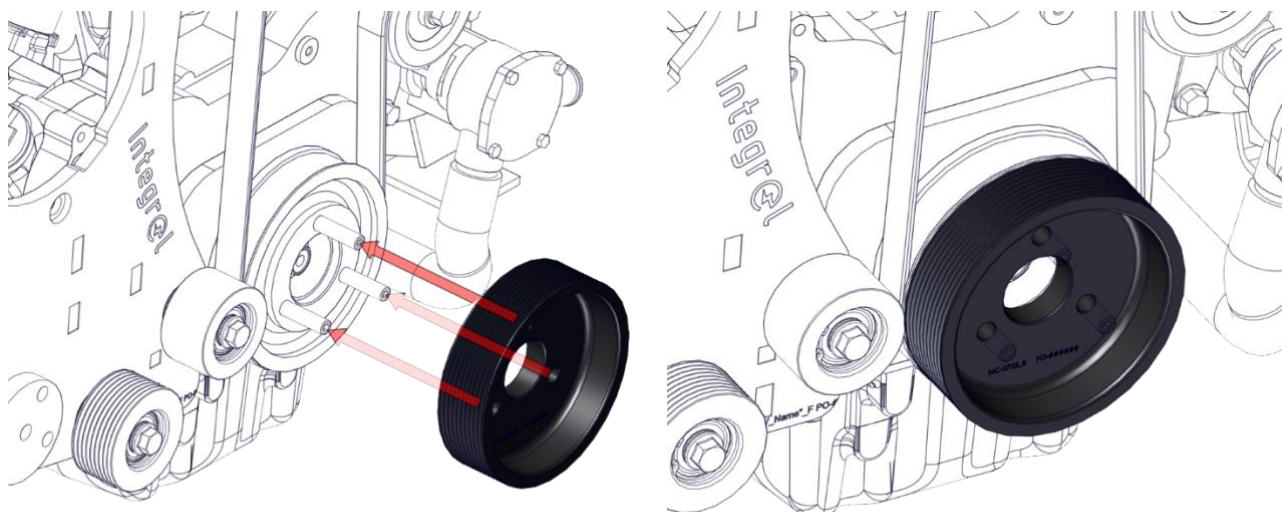
STEP 5.14. Fit the pulley studs to engine pulley

Fit the three (3) **M10x50** studs to the existing engine pulley ensuring that They are properly tightened to **48.0 Nm (35 ft/lb)**, refer to Section [2.6. Assembly Torque](#).



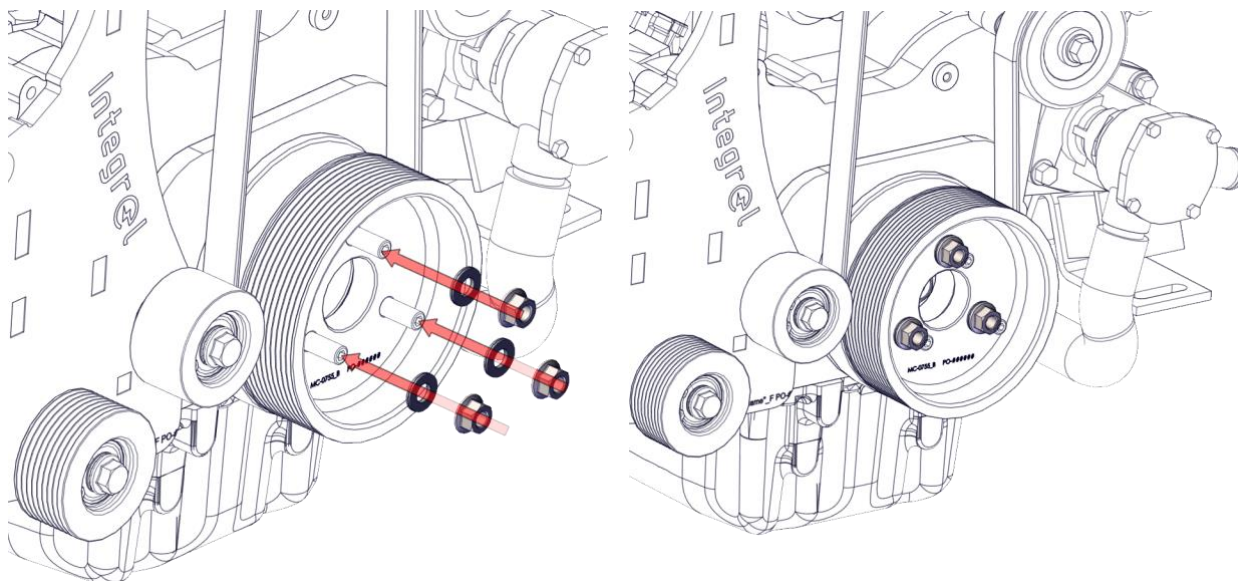
STEP 5.15. Fit the OEG pulley

Fit the crank pulley to the existing Yanmar pulley ensuring that it fits snugly against the engine pulley.



STEP 5.16. Secure the OEG pulley

Fit three (3) **M10** flange head nuts paired with **M10** wedge lock washers.

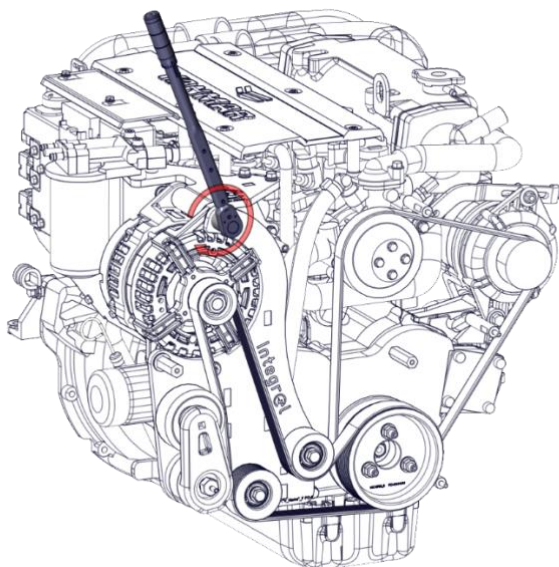


6. FINALISING THE INSTALLATION

STEP 6.1. Lightly tighten all bolts

Lightly tighten all bolts such that there is no movement of the OEG, brackets or pulley.

Do NOT fully tighten the bolts yet.



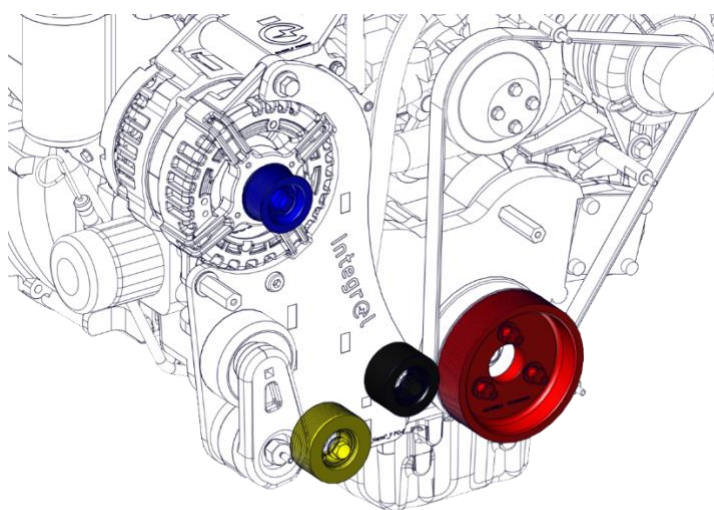
STEP 6.2. Check pulley alignment

Check pulley alignment using the belt pulley alignment tool (MC-0589) supplied with the kit.

Alignment is critical! Poor alignment dramatically degrades system performance and belt life by increasing vibration, noise, and temperature levels.

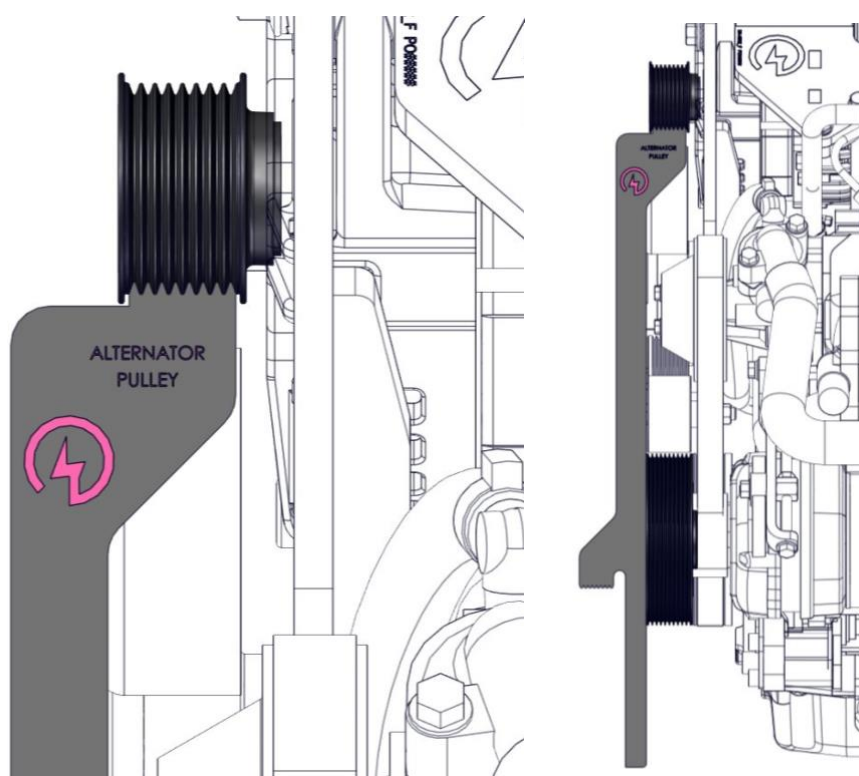
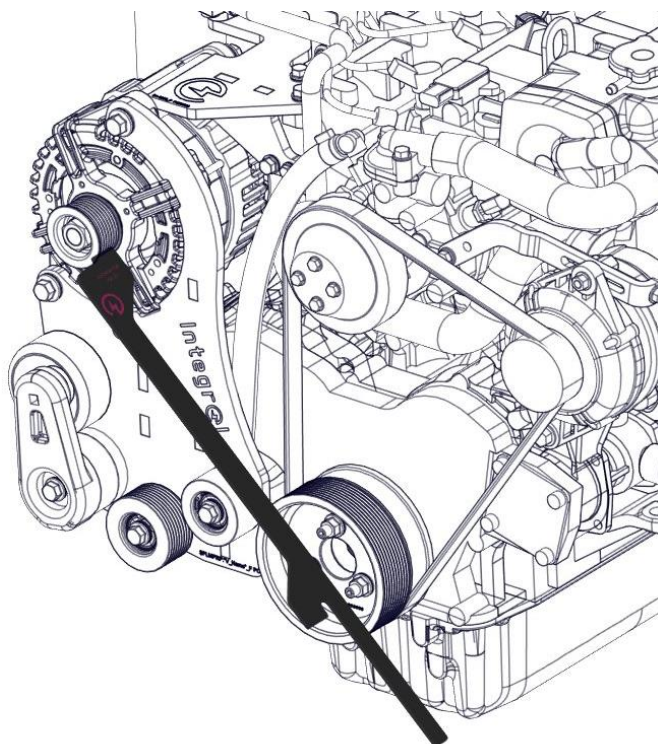
Alignment of the engine pulley (red) and the OEG pulley (blue) is the priority.

Pulley positions can be adjusted by fitting spacers behind the crank pulley if required.



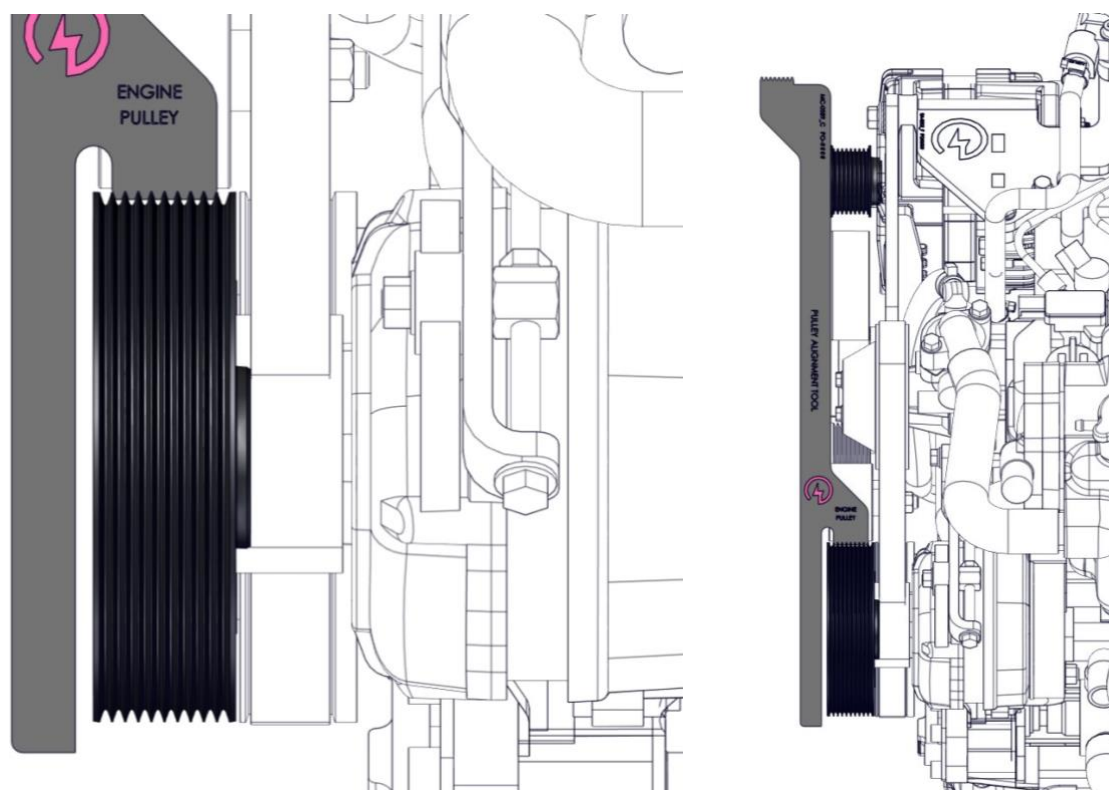
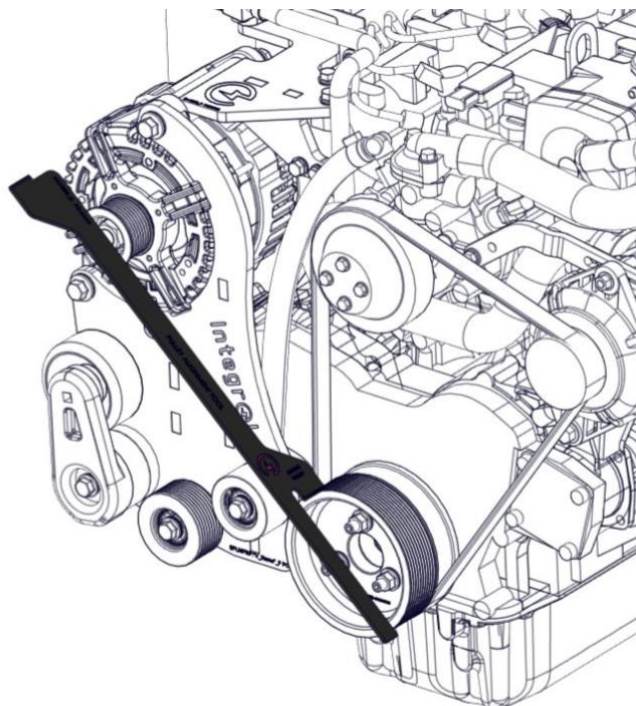
STEP 6.2.1. Pulley (engine) offset alignment

With the alignment tool positioned with the flat section resting onto the outer face of the engine pulley, the teeth labelled 'Alternator Pulley' should align with the OEG pulley as shown.



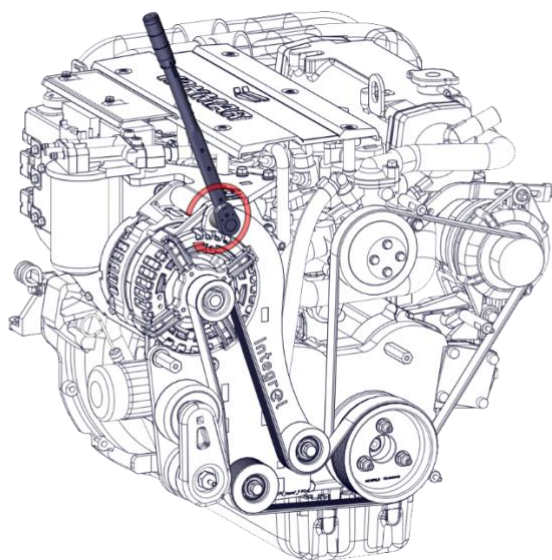
STEP 6.2.2. Pulley (OEG/Alternator) angle alignment

With the alignment tool positioned with the flat section resting onto the outer face of the OEG/Alternator, the teeth labelled 'Engine Pulley' should align with the engine pulley as shown.



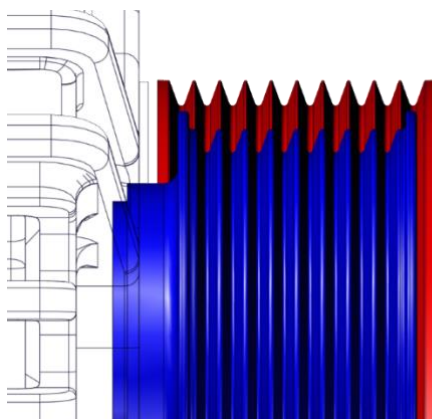
STEP 6.3. Tighten and torque all bolts

- **M6** bolts. Torque to **10 Nm (7.4 lb. ft)**. Use a **10 mm** socket.
- **M8** bolts. Torque to **24 Nm (17.7 lb. ft)**. Use a **13 mm** socket.
- **M10** bolts. Torque to **48 Nm (35.4 lb. ft)**. Use a **15 mm** socket.
- **M12** bolts. Torque to **85 Nm (62.7 lb. ft)**. Use a **17 mm** socket.
- **M12** thin head cap screws. Torque to **75 Nm (55 lb. ft)**. Use an **8 mm** hex drive.
- **M10** crank pulley nuts. Torque to **48Nm (35 lb. ft)**.



STEP 6.4. Double check pulley alignment

Re-check pulley alignment with supplied Belt pulley alignment tool. Adjust if required.

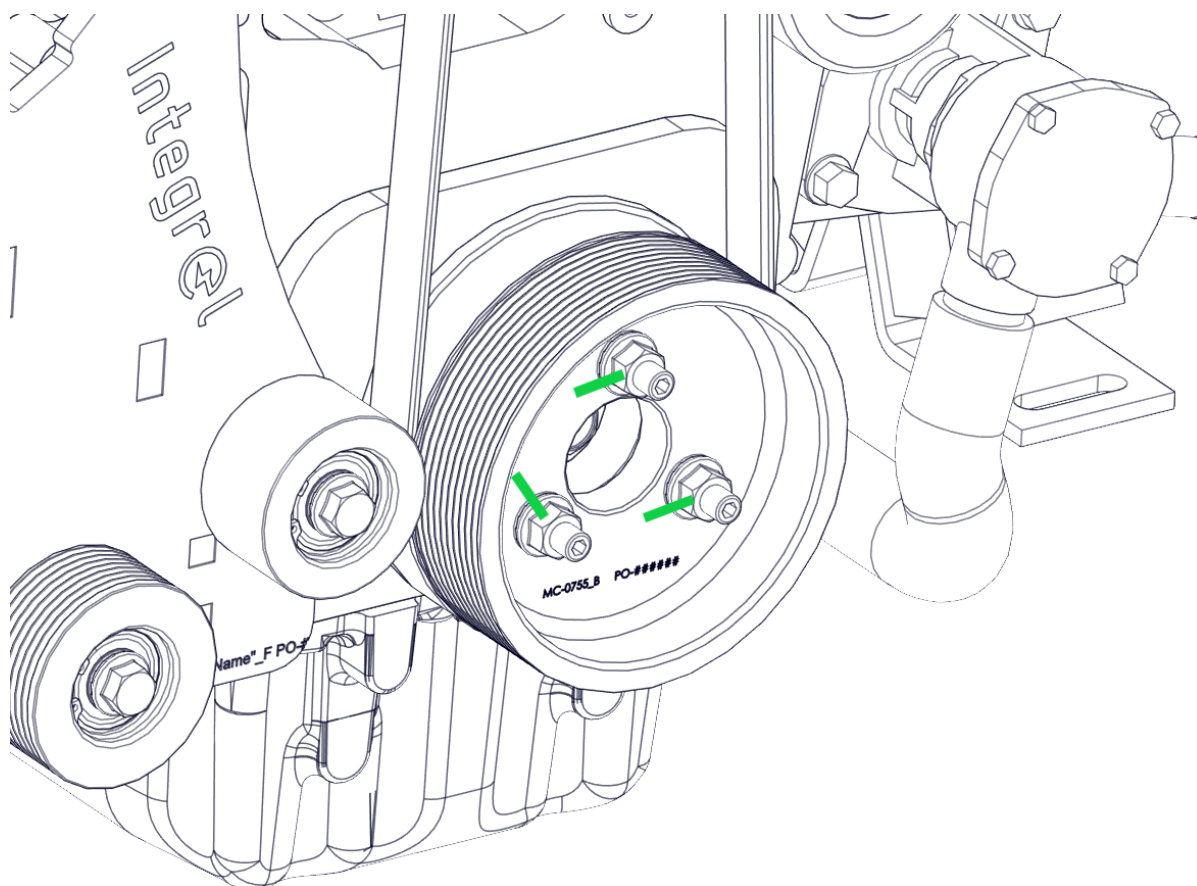
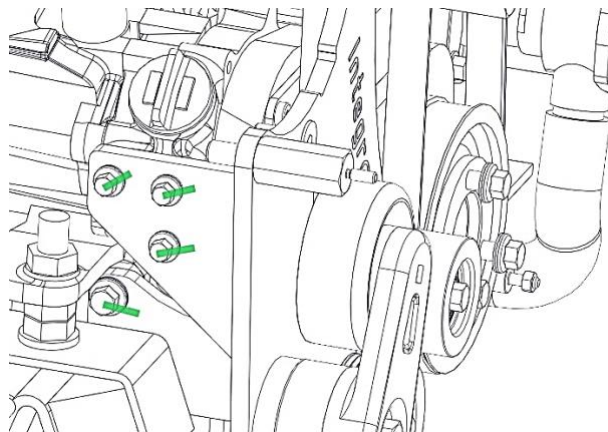
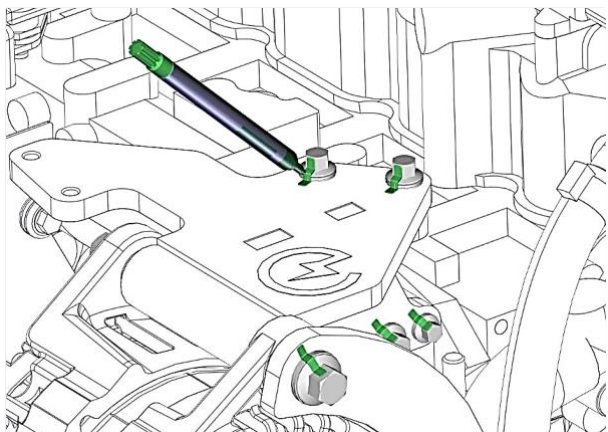


STEP 6.5. Mark all bolts

Mark each bolt with a paint pen to indicate the bolt has been correctly tightened.

As a minimum, the mark should touch the head of the fastener and the surface of the mounting plate such that any movement of the fastener can be observed with a visual inspection.

Fasteners vary dependent on optional belt cover use, ensure all fasteners are marked.



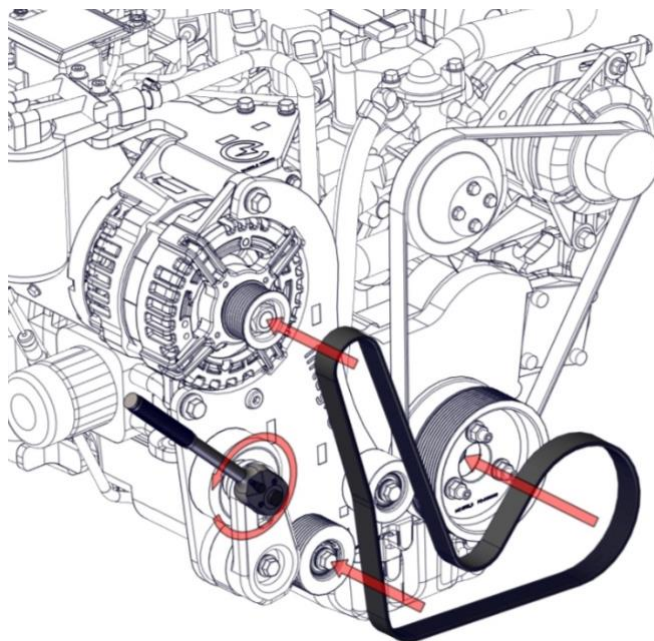
STEP 6.6. Fit the belt

The tensioner must be fully retracted to aid fitting.

A wrench with a **3/8"** square drive can be inserted into the square port near the top of the tensioner arm. The wrench provides a mechanical advantage to allow the tensioner to be retracted. It is beneficial to mechanically restrain the tensioner. Failure to restrain the tensioner may result in trapped fingers and/or the risk of pinching between parts.

The belt can be gradually fitted to the pulleys. The simplest method of installation is to fit the belt to the entire system except for the main crank pulley. Once in place, the belt can be pushed onto the main crank pulley. It is best to do this gradually one groove at a time, rotating the main crank pulley clockwise helps to pull the belt onto the pulley.

Once the belt is correctly fitted, release the tensioner to apply tension to the belt.

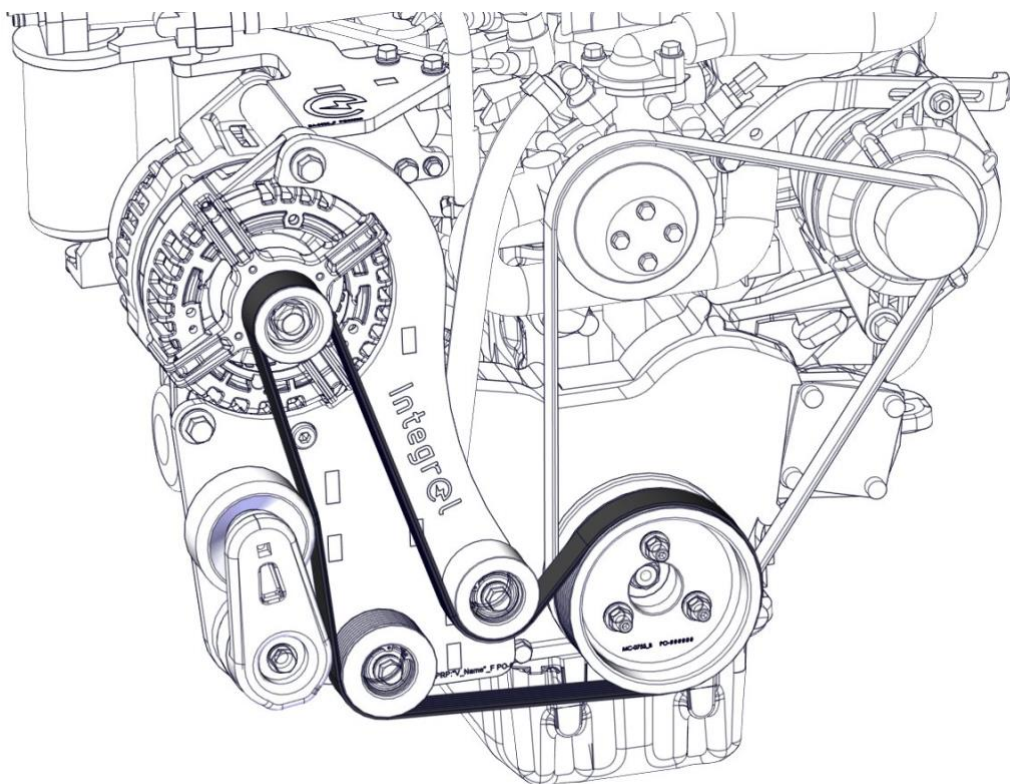


Use your mobile phone to scan the QR code for belt installation video:



STEP 6.7. Inspect the belt

Once fully fitted, the belt must be inspected. Visually inspect the entire length of the belt ensuring there are no kinks or twists in the belt, and that the belt is correctly positioned in the three (3) grooved pulleys. Carefully check the first groove of the belt is in the first groove of each of the pulleys.



STEP 6.8. Reinstall the fuel filter

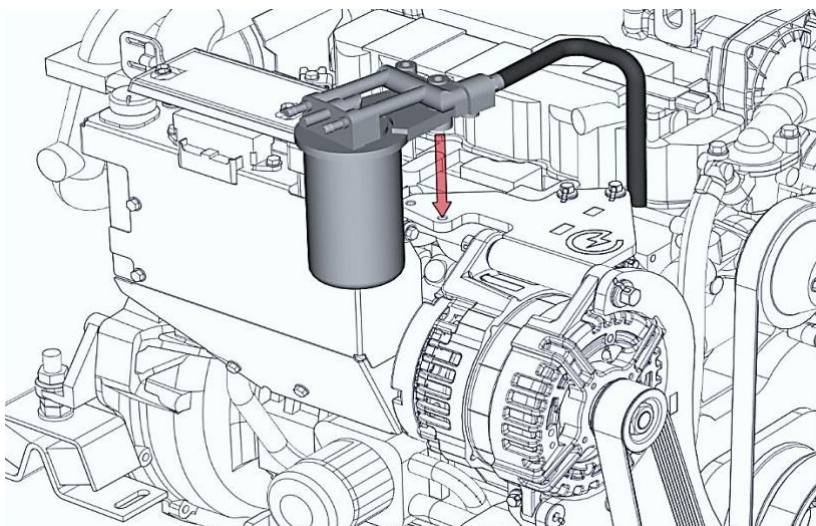
The fuel filter may be installed on the top bracket, or alternately using a separate filter bracket.

Installing the fuel filter using the top bracket

In some cases, the original hose connection is on the underside of the fuel filter, with the rear port blanked off. In this case, we recommend the blanking plug and hose connector are swapped such that the hose exits from the rear of the fuel filter.

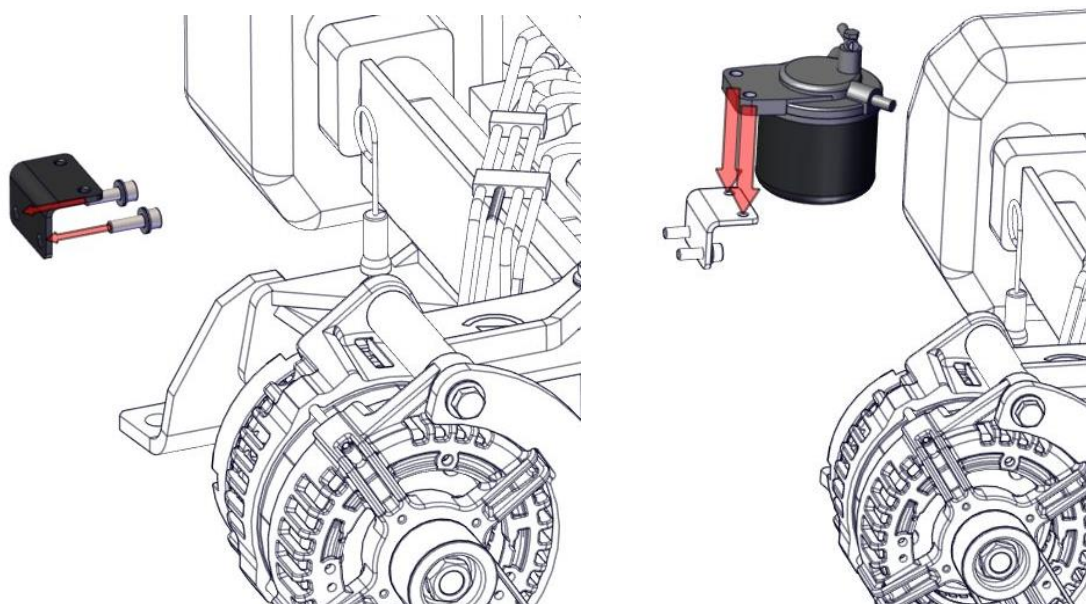
The short hose to the fuel filter should be replaced with a longer length of hose (model **HFH505**), and retained with the jubilee hose clip, model **00SS**.

The fuel filter is mounted behind the OEC and is attached to the upper bracket (see **STEP 6.9**).



Installing the fuel filter using a filter bracket

The filter bracket can be secured on any wall close to the engine using screws. The filter should be fixed onto a bracket. A long hose is required for this fixing. The hose is retained with a jubilee host clip, model **00SS**.

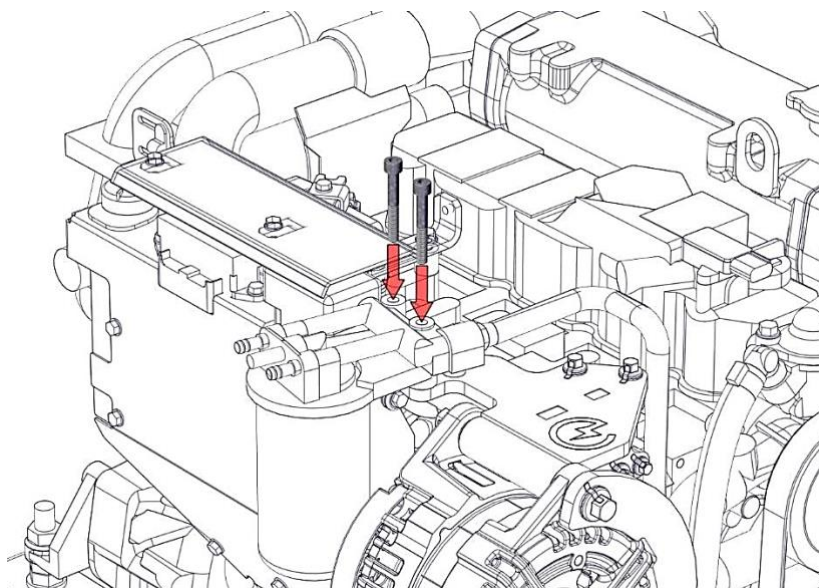


STEP 6.9. Fit fuel filter bolts

Retain the fuel filter using the original mounting hardware.

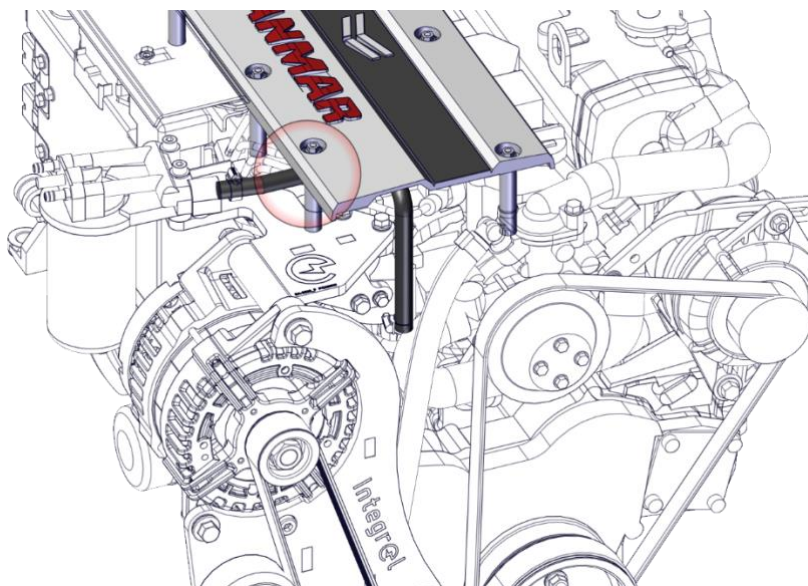
Torque the **M8** fasteners to **24.5 Nm**

Note! It is recommended the OEG electrical connections are made prior to final installation of the fuel filter to avoid the possibility of fuel igniting due to sparking when electrical connections are finalised.



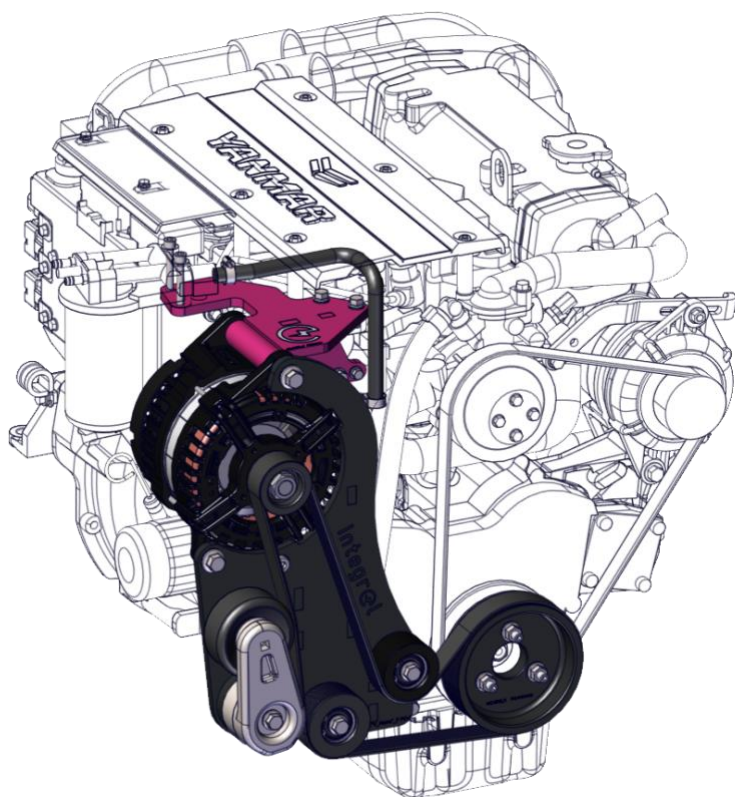
STEP 6.10. Filter hose check

During visual inspection of the engine top cover, check the filter hose is not touching the cover to prevent wear.



STEP 6.11. Perform visual inspection

The installation is now complete. A full visual inspection of the installation must be completed before starting the engine. Ensure that any fluids that may have spilled are cleaned up, and that all tools and other loose materials are moved away from the engine.

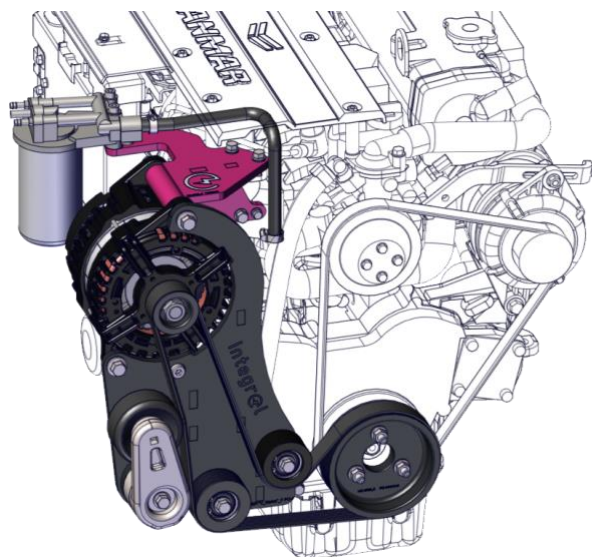


7. TEST THE INSTALLATION

STEP 7.1. Test run the engine

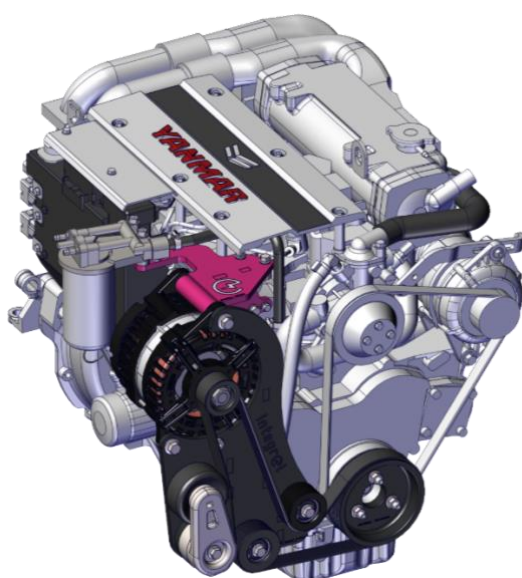
Integrel strongly recommends the engine is run at various speeds (RPM) to ensure the system runs smoothly without any adverse vibration.

Note! At low speeds, the tensioner and belt may move rapidly to compensate for low belt loads and friction within the system.



STEP 7.2. Perform a final visual inspection

A full and final visual inspection of the installation must be completed with particular attention to the belt and painted marks on all fasteners. Any signs of premature belt wear or fastener movement must be addressed, and the system adjusted accordingly.

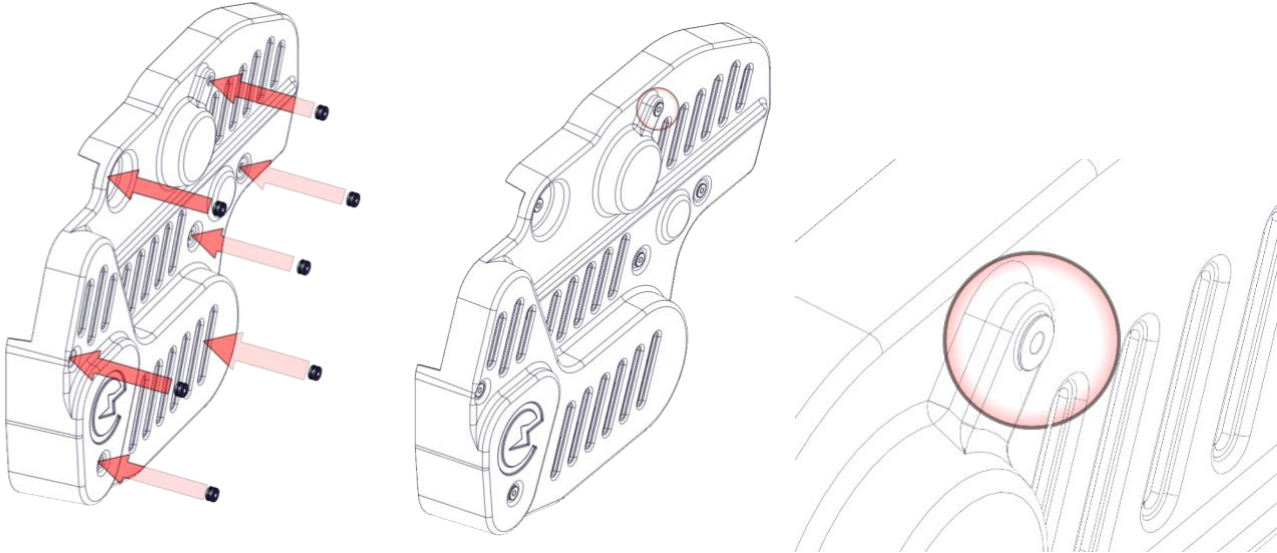


8. BELT COVER FITMENT (OPTIONAL)

STEP 8.1. Fit rubber grommets

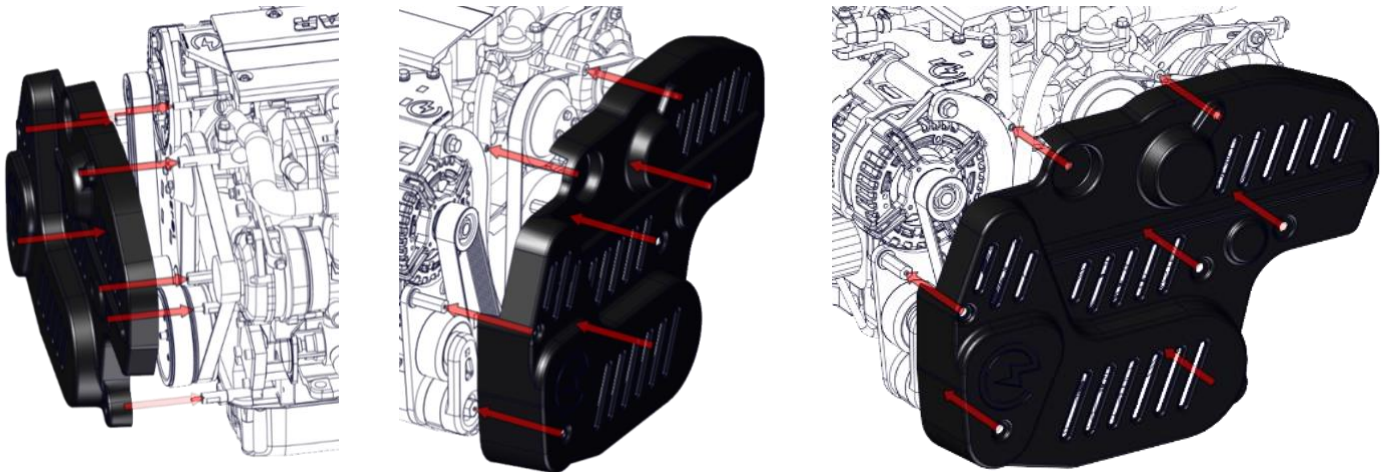
Fit the supplied seven (7) **M6 rubber grommets** into the belt cover.

Note! Inserting the grommets into hot water for a short time will allow the rubber to soften for easier installation.



STEP 8.2. Position Belt Cover

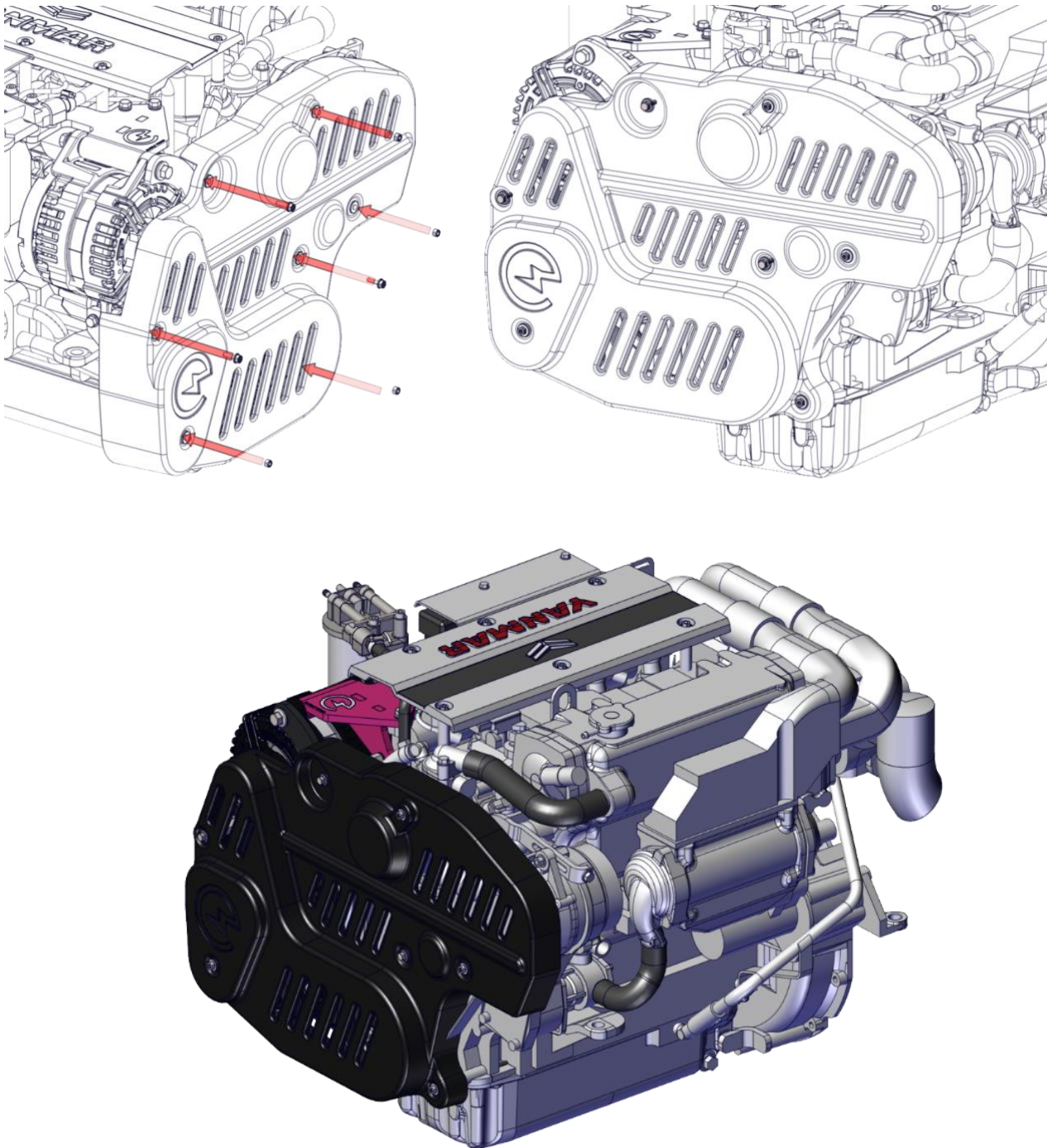
Fit the supplied belt cover to the engine as shown.



STEP 8.3. Fasten belt cover

Fasten the cover using four (4) **M6 lock nuts** and three (3) **M6x20 flange bolts** as shown.

- o Torque to **10 Nm (7.4 lb. ft)**. Use a **10 mm** socket.

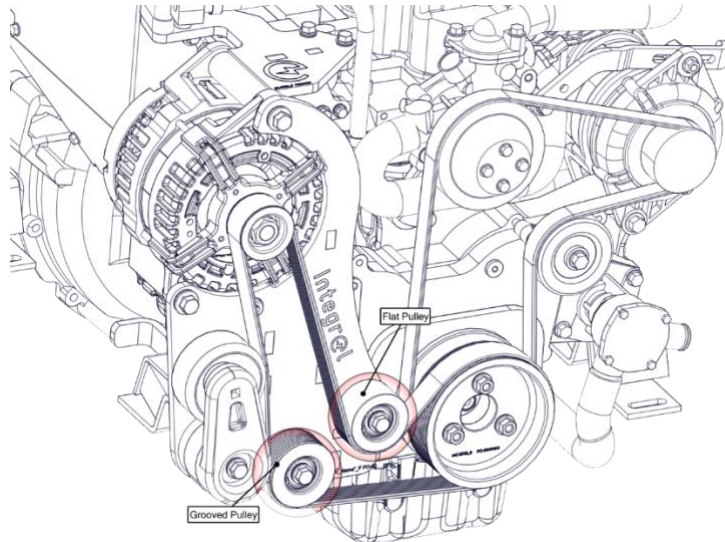


9. IDLER PULLEY REPLACEMENT (SERVICE)

9.1 Identificaton of pulleys

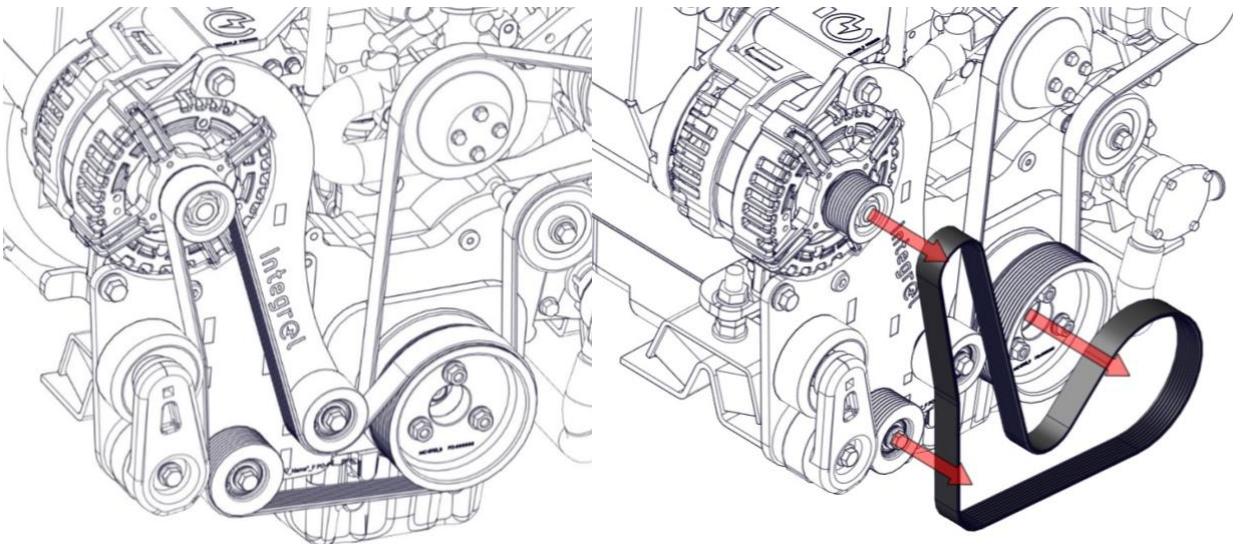
The Integrel Yanmar system is designed for JH-CR series and it includes 2 pulleys with serviceable options. The same service procedure applies to both pulleys.

- **Grooved Pulley**
- **Flat pulley**



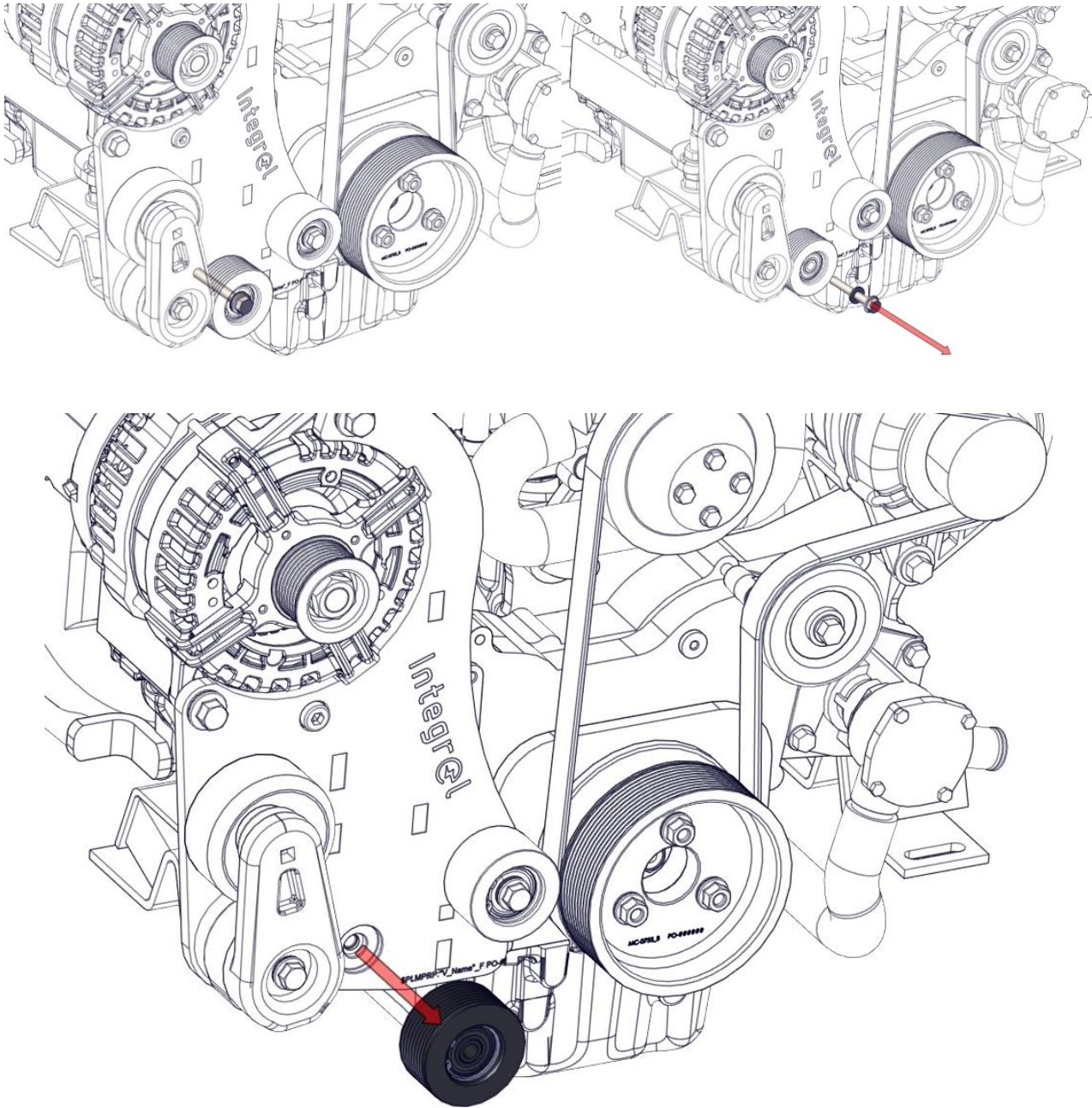
9.2 Belt removal

Relieve tension on the belt. Tension on the belt is applied by the tensioner. See [STEP 6.6. Fit the belt.](#)



9.3 Pulley removal

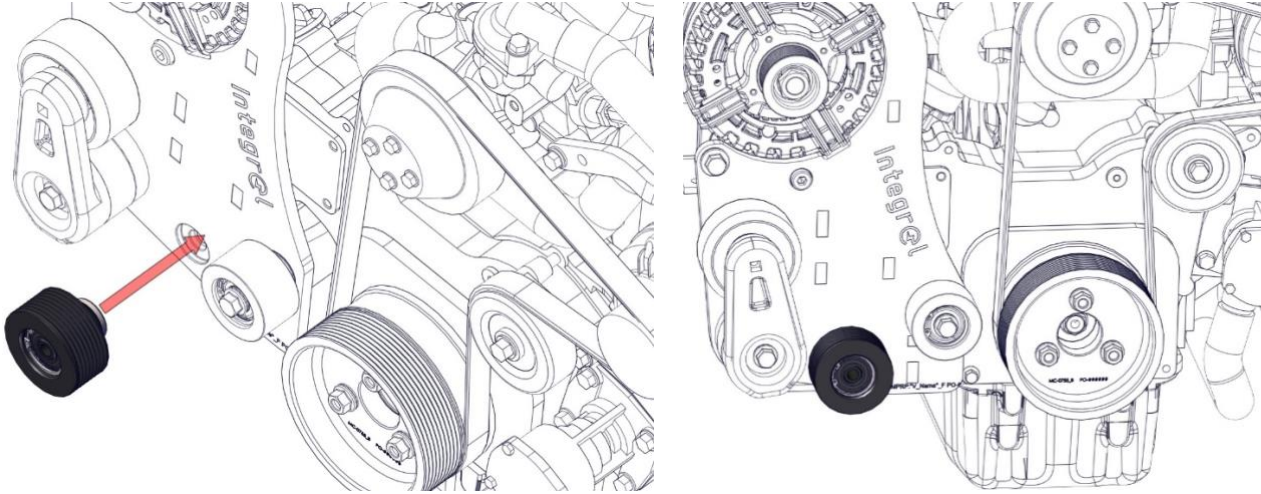
The pulley is press fitted onto spigots and secured by an **M10** hex head bolt, **M10** wedge locking washer (*Front of bracket*) & **M10** nut (*Back of the bracket*). After removal of bolt & nut, the pulley will come loose (A gentle knock with rubber hammer can help with removal).



9.4 New pulley fitment

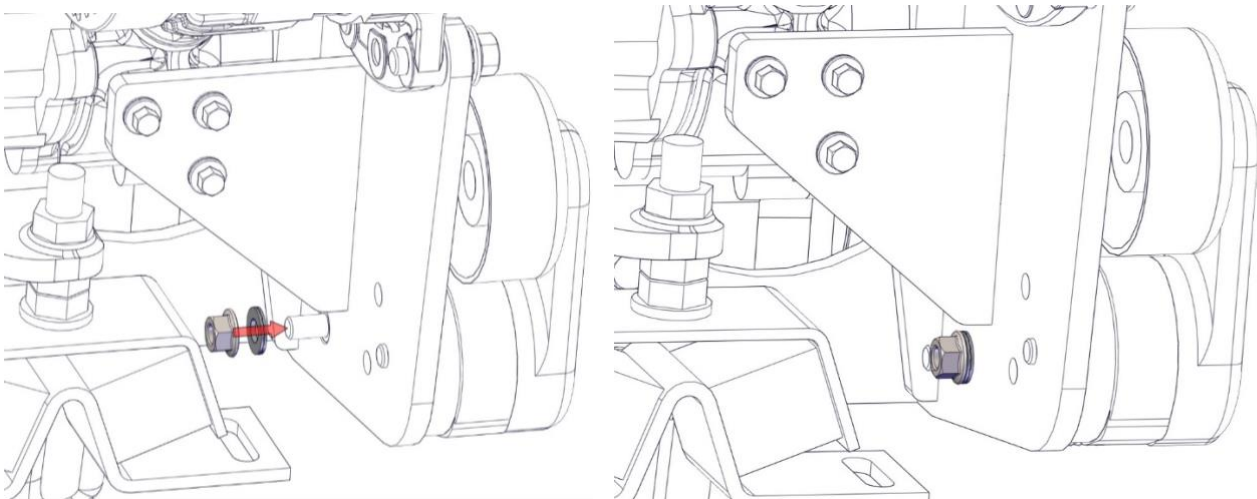
Place the pulley spigot in the bracket recess as shown in the following image. **Ensure the flat or grooved face of the pulley is perpendicular to the bracket face!**

PULLEY ALIGNMENT IS CRITICAL



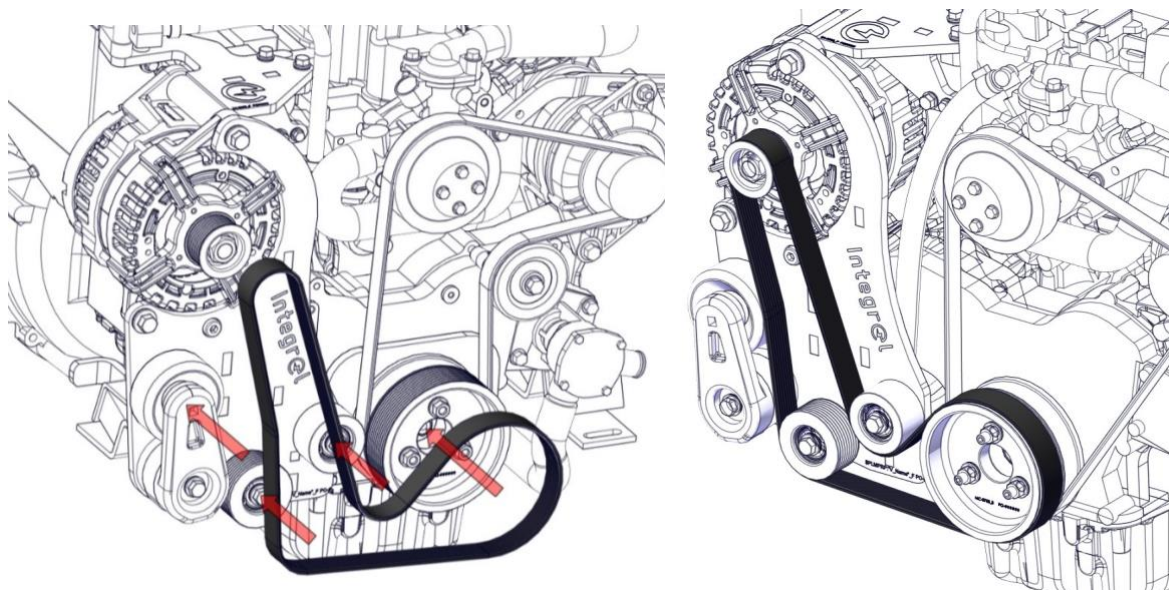
9.5 Securing a new pulley

The pulley must be secured by an **M10x70** hex head bolt paired with an **M10** wedge lock washer (*Front of bracket*) & **M10** nut with **M10** wedge lock washer (*Back of the bracket*). The bolt and nut connection should be tightened to **65 Nm** using a torque wrench.



9.6 Belt fitment

1. Follow the procedure described in STEP 6. Fit the belt.
2. To test the installation, see the description in Section 7 -Test the Installation.



Use your mobile phone to scan the QR code for belt installation video:





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