

Important safety note:

Please note that a combustion engine with built-in electronic on-board starter is not a toy. The combustion engine might suddenly start due to an unintentional activation. Please read the safety notes in the assembly instructions and the appendix thoroughly.

Recommended starter battery:

Only high-amperage (16 A) NC, NiMh and LiPo batteries (as used for electronic flying models) are suitable as starter batteries.

Note to the operation of the on-board starter:

The maximum time of operation of the on-board starter is 10 secs. The maximum operating temperature of the on-board starter must not exceed 70°C.

Warranty

Our electric on-board starters are shipped as kits. The professional assembly and normal operation is beyond our influence. Therefore the warranty is limited to components included in the kit as well as their functioning. We assume no liability for damages resulting from improper assembly or operation.

Recommendation for the running-in of the on-board starter:

After the complete assembly of the on-board starter on the internal combustion engine we recommend to disassemble the glow plugs and to let the on-board starter run in for approx. 3 minutes. Then you can put the on-board starter into operation.

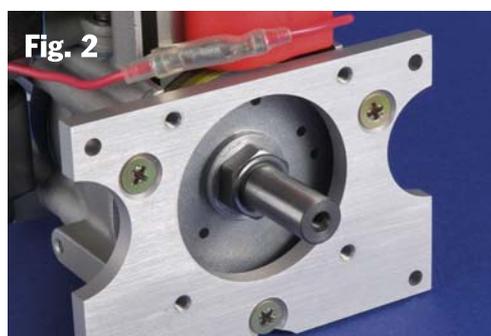
Assembly instructions for:

Stock number 9715A, suitable for Titan ZG 20, Zenoah G-20.

Stock number 9713A, suitable for Titan ZG 23/26, ZG 231/260 Heli. Zenoh G 230/260 PU, G231/260 PUH.

Stock number 9613A, suitable for Titan ZG 23/26 Marine, Zenoah G 230/260 PUM.

The on-board starters with stock number 9613A and 9713A can be attached directly to the standard aluminium engine support plate of the engine. The engine support plate contains all threads that are required for the assembly. For the Titan ZG 20 and Zenoah G 20, the engine mounting plate attached to the engine is turned by 180° so that the counter bores for the mounting bolts show towards the engine. The thrust washer with stock number 9530/32 has to be shifted over the thread of the motor shaft (fig. 1). Now you can start the assembly of the on-board starter. First of all, attach the tappet (9400/10) to the engine shaft (fig. 2 and 3).



Assembly note:

Apply some strong adhesive or Loctite Threadlock onto the flights of the tappet to secure it (do not install a securing ring to ensure concentricity).

The next steps of the assembly of the on-board starter are identical for both engine types.

Assembly of freewheeling gear:

First of all, apply sufficient grease on the inside and both front sides of the freewheel. Use the special grease that is included in the kit. Now shift the freewheeling gear onto the tappet by turning the gear against rotating direction. Then mount the thrust washer. The mounted freewheeling gear has to provide a slight axial clearance. It can easily be turned against rotating direction but immediately engages when turned into rotating direction (fig. 4 and 5).

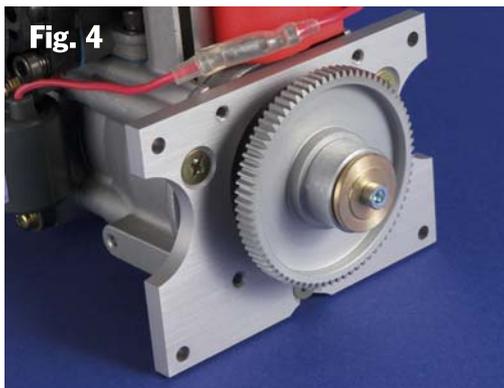


Fig. 4

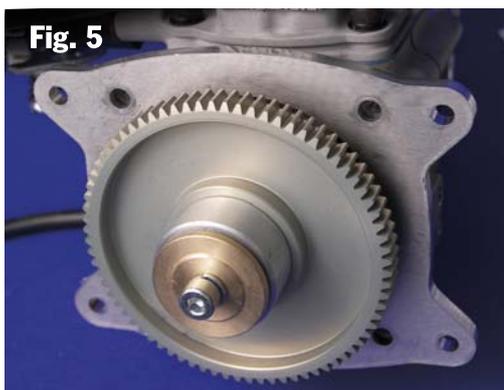


Fig. 5

Assembly of the starter engine:

Next, screw together the starter engine (stock number 9580/05) and the pre-assembled gear unit. Use the screws M 2.5x10 plus retaining ring and washer. When tightening the screws make sure to provide a slight tooth clearance. It must be possible to turn the gear smoothly (fig. 5).



Fig. 6

Assembly of gear unit with starter engine on the fan housing

Attach the distance bolts included in the kit to obtain the correct space between the gear unit and the freewheeling gear. When tightening the screws make sure to provide a slight tooth clearance. By manually turning the gearwheel in first gear against starting direction you can check if the complete starting unit can be turned smoothly. If the gearwheels jam or the tooth clearance is too large you have to slightly increase the boring of the mounting plate for the gear unit (fig. 7, 8 and 9).

Note:

The bevel (10 teeth) must not exert edgewise pressure on the freewheeling gear as this would destroy the freewheeling. Please adjust the tooth clearance carefully. The maximum operating temperature at the freewheeling must not exceed +70°C.

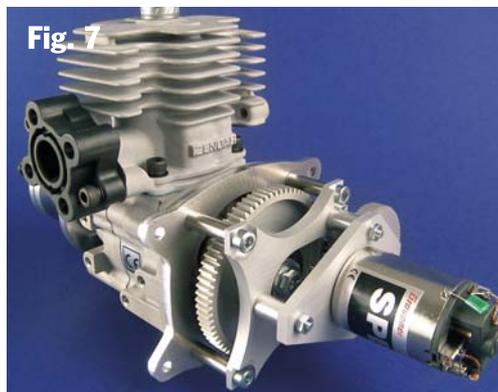


Fig. 7



Fig. 8

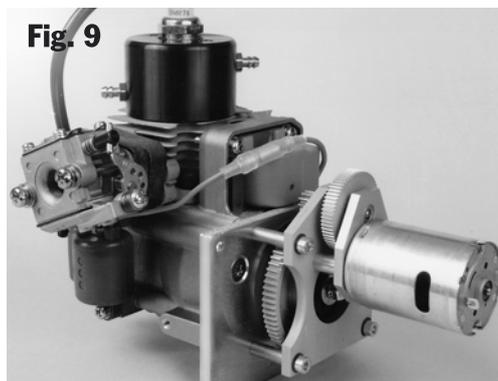


Fig. 9

For a marine engine, we recommend the use of a flywheel with a weight of ca. 250 g. The flywheel is attached to the output side of the combustion engine.

Recommended starter battery:

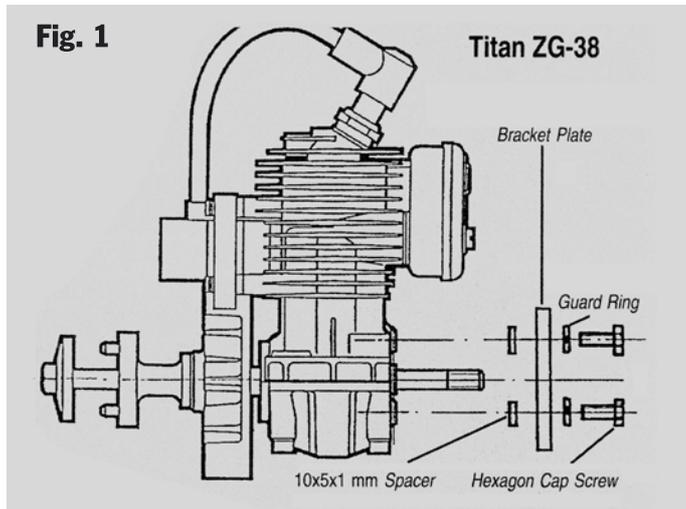
9.6-10.8 Volt, min. 1.0 Ah for:
Stock number 9713A and 9715A
10.8-15 Volt, min. 1.0 Ah for:
Stock number 9613A.

The mechanical assembly of the on-board starter is now completed. You find instructions for the control of the on-board starter on page 5.

Assembly instruction

Stock number 9714, suitable for Titan ZG-38, Zenoah G-38

These combustion engines are shipped without mounting plate. First of all, attach the mounting plate (stock number 9520-01) included in the kit (fig. 1).

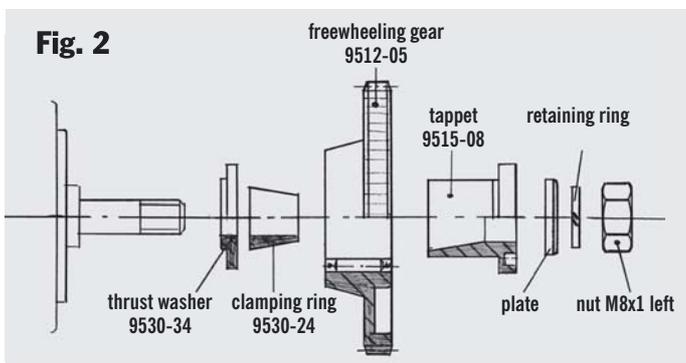


Note:

The supporting points for the mounting plate of the Titan ZG-38 are not processed. Plane the supporting points with a file. Make sure that all supporting points have the same height. You can easily check this by putting the mounting plate onto the supporting points. Repeat the planing with the file if necessary.

Assembly of the starter engine:

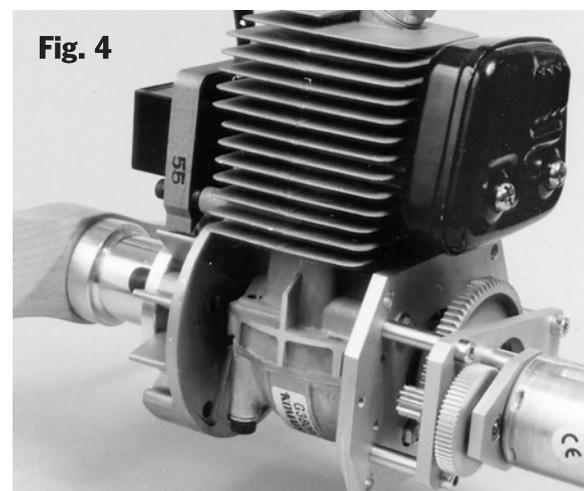
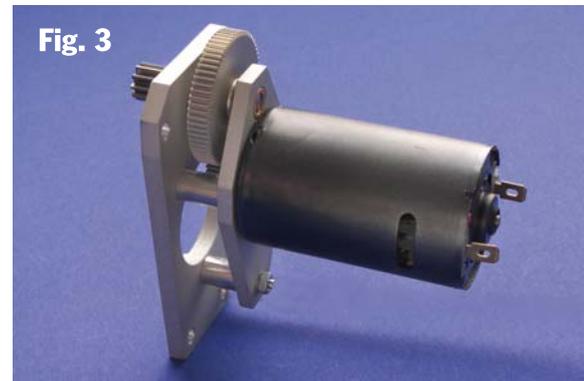
Next, screw together the starter engine (stock number 9540/05) and the pre-assembled gear unit. Use the screws M 3x25 plus retaining ring and washer. When tightening the screws make sure to provide a slight tooth clearance. It must be possible to turn the gear smoothly (fig. 3).



Assembly of gear unit with starter engine on the fan housing

Attach the distance bolts included in the kit to obtain the correct space between the gear unit and the freewheeling gear. When tightening the screws make sure to provide a slight tooth clearance. By manually turning the gearwheel in first gear against starting direction you can check if

the complete starting unit can be turned smoothly. If the gearwheels jam or the tooth clearance is too large you have to slightly increase the boring of the mounting plate for the gear unit (fig. 4).



Note:

The bevel (10 teeth) must not exert edgewise pressure on the freewheeling gear as this would destroy the freewheeling. Please adjust the tooth clearance carefully. The maximum operating temperature at the freewheeling must not exceed +70°C.

Recommended starter battery:

10.8-15 Volt, min. 1.0 Ah for:
Stock number 9714.

The mechanical assembly of the on-board starter is now completed. You find instructions for the control of the on-board starter on page 5.

Starter Akku Empfehlung:

10,8 - 15 Volt, min. 1,0 Ah für:
Best.Nr. 9714.

Hiermit ist die die mechanische Montage des Bordanlassers abgeschlossen. Die Steuerung des Bordanlassers entnehmen Sie bitte der Seite 5.

Control of the electronic on-board starter via radio control. We recommend the following functional sequence:

As shown in the circuit diagram three switches are required for the controlling of the on-board starter which are connected in series. We recommend to mount the airborne starter countersunk to avoid an unintentional operation.

The »on-off« position of the switch has to be marked distinctly (fig. I).

The safety switch additionally prevents starting while the throttle lever of the radio control is not in the position of idle speed. The safety switch is operated via the gas servo and is only closed in idle speed position. Keep the actuating cams on the cam plate as short as possible (fig. II). The micro switch for the starting and stopping of the starter

Attach the starter battery and the switches as near as possible to the combustion engine. Make sure that the cables between the starter battery, safety switch, on-off switch and starter engine are as short as possible. They should have a minimal distance of 100mm to receiver and antenna in order to avoid radio interferences. We recommend soldered junctions for wiring (plug connections cause an unnecessary transfer resistance).

Tin-plate the flexible wires prior to soldering them. After cooling check each soldering by shaking it. The starter battery is connected via high-quality plugs. The starter engine is already suppressed and thus no further interference suppression is required.

Initial operation:

Prior to the first operation you have to grease the gearwheels with a high-quality gear grease. The freewheeling is already greased and you only need to drip a few drops of sewing-machine oil onto the upper front side prior to every take-off.

After fully tightening and securing all screw connections you can now try the first take-off. If the starter engine has the wrong direction, then the electrical connections of the engine have to be swapped.

Prior to the first start fuel has to be taken in via the bellow until the fuel drips out of the carburettor.

Now you can start the electronic on-board starter without difficulty. If the Zenoah cannot be activated immediately put your finger momentarily onto the opening of the carburettor until the first ignitions occur. This procedure is required just once a flying day. The engine starts reliably as long as the carburettor contains fuel.

Note:

If the freewheeling does not couple after a longer operational stop then typically the grease has hardened. Clean it with petrol or spirit and lubricate it with the enclosed bearing grease. Make sure that the rollers do not drop out of the freewheel during cleaning. Dropped rollers can be re-inserted easily.

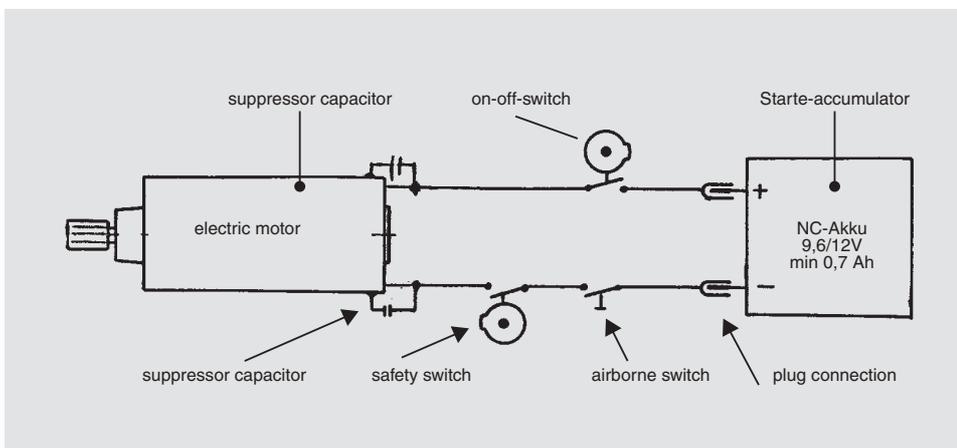
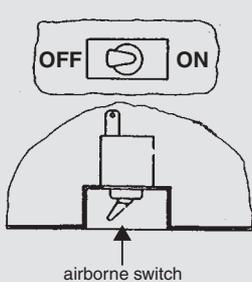


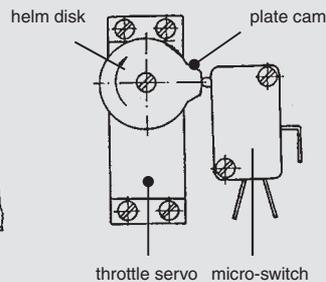
Fig. I airborne switch

Fig. II safety switch

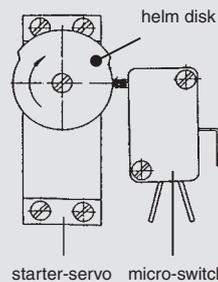
Fig. III on-off-switch



airborne switch



throttle servo micro-switch



starter-servo micro-switch

engine is operated via the starter servo (fig. III). For this function we recommend an IC servo with put-on polarity-reversal switch (f. ex. Graupner C508 with polarity-reversal switch stock number 3945).

We hope you have a lot of fun with our on-board starter system and wish you many successful starts – and as many happy landings.

Ersatzteile für	9400A	9420A	9421A	9613A	9713A	9714	9715A
Spare parts for		9420/08	9715/08*	9420/08*	9420/08*	9520/01	9715/08*
Engine support plate			9530/32			9530/33	9530/32
Thrust washer	9400/10	9400/10	9400/10	9400/10	9400/10	9500/07	9400/10
Tappet	9400/11	9400/11	9400/11	9400/11	9400/11		9400/11
Freewheeling gear, 76 teeth, m = 0.8mm	9400/12	9420/12	9420/12	9410/12	9410/12	9512/05	9410/12
Gearbox support with bevel, 10 teeth and aluminium gear	9400/16	9420/16	9420/16	9713/02	9713/02	9714/02	9715/02
Carrier for electric motor	9400/15	9420/15	9420/15	9713/04	9713/04	9714/04	9715/04
Starter engine with bevel	9400/04	9420/04	9420/04	9575/03	9580/05	9575/03	9580/05
Small parts kit	9400/07	9420/07	9421/07	9613/12	9713/12	9714/07	9515/07
Fan wheel with reconditioning	9400/08						
Nut M8x1 left						9520/02	
Clamping ring						9530/24	
Micro switch, 16A	9560/05 suitable for all on-board starters						
On-board switch, 16A	9560/07 suitable for all on-board starters						
2 core cable 1.6 mm	9560/08 suitable for all on-board starters						
Weight without starter storage battery in g.	375	375	375	450	375	450	375

*not included in the kit

