

Important safety information:

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

Recommended starter battery:

The starter battery is not included in the kit. Only high-amperage (20A) lip batteries (as used for electronic flying models) are suitable as starter batteries (11.1 Volt, min. 1.0 Ah).

Information on the operation of the on-board starter:

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

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 plug and to let the on-board starter run in for approx. 3 minutes. Then you can put the on-board starter into operation.

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.

Assembly instructions for: Saito FG-57T, stock number 9732

Fig. 1



Disassembly of the propeller adapter (fig. 2 and 3)

First remove the fixing screw as demonstrated in figure 2. Make sure to use a high-quality hexagon screw driver 1,5 mm. To remove the fixing screw, you have to heat the propeller adapter to approx. 100°C. It is recommended to use a heat gun. After you removed the fixing screw, disassemble the propeller adapter using a drawing-off device (see fig. 3). Therefore you also have to heat the propeller adapter to approx. 100°C.

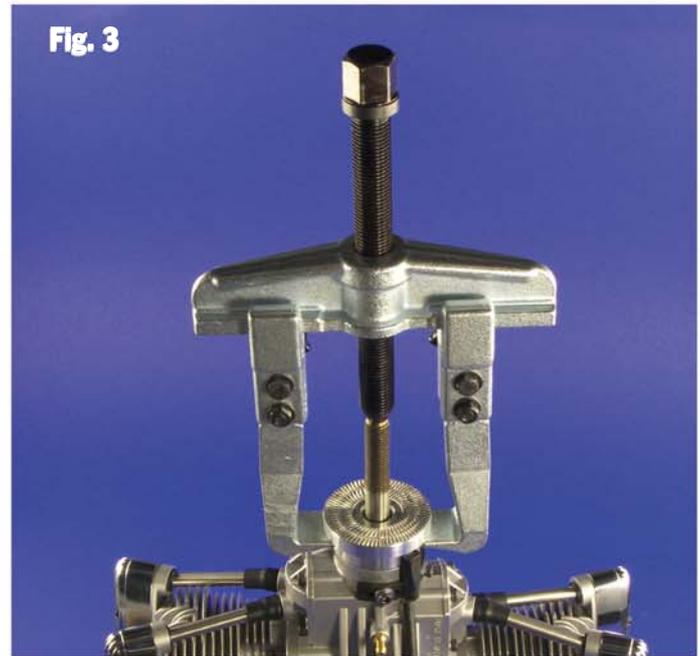
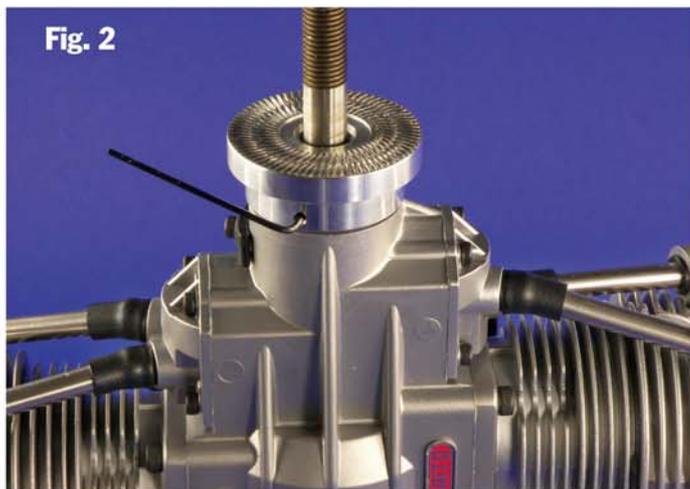
Note:

From a temperature of 120°C onwards the magnet loses its magnetic force. The propeller adapter is very firmly secured. A solid drawing-off device is necessary for the disassembly.

Assembly of the engine support plate and the support for the bevel gearing (fig. 1 and 4)

First screw the two supports to the engine support plate. Use the enclosed countersunk screws M5 x 16mm and secure the screws with adhesive.

Then mount the »Saito FG-57T« onto the engine support plate. Use the enclosed hexagon socket screw M4 x 20 as well as the nut M4 and the retaining rings.



Assembly of the signal transmitter with clamping ring on the crank shaft (fig. 5 and 6)

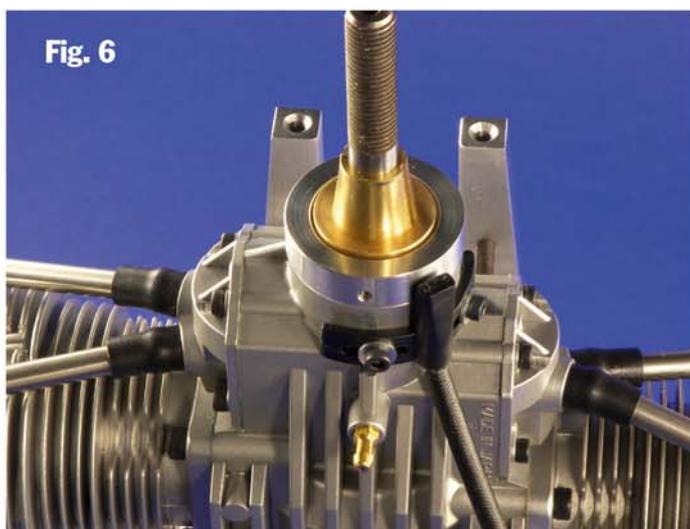
Adjust the signal transmitter with the fixing screw. Make sure that the fixing screw engages into the longitudinal slot of the engine shaft. When tightening the fixing screw make sure that the signal transmitter can be moved in longitudinal direction. Then mount the clamping ring and press it firmly onto the signal transmitter.



Assembly of the bevel support plate and the bevel bearing with gear (fig. 7, 9 and 12)

First screw the bevel bearing to the bevel support plate. Use the enclosed hexagon socket screws M4 x 12 mm and the retaining rings.

Now screw the bevel support plate to the supports. Use the hexagon socket screws M4 x 16 mm and the retaining rings. You can also mount the fixing screw M4 x 25 with the counter nut M4.



Assembly of starter motor and cardan shaft (fig. 8, 9 and 10)

During the assembly, stick exactly to figure 8. If required, the shaft can be shortened. The cardan shaft has a predetermined breaking point in the shape of a cut notch in order to protect the gear wheels. When shortening the cardan shaft make sure that the notch is preserved.

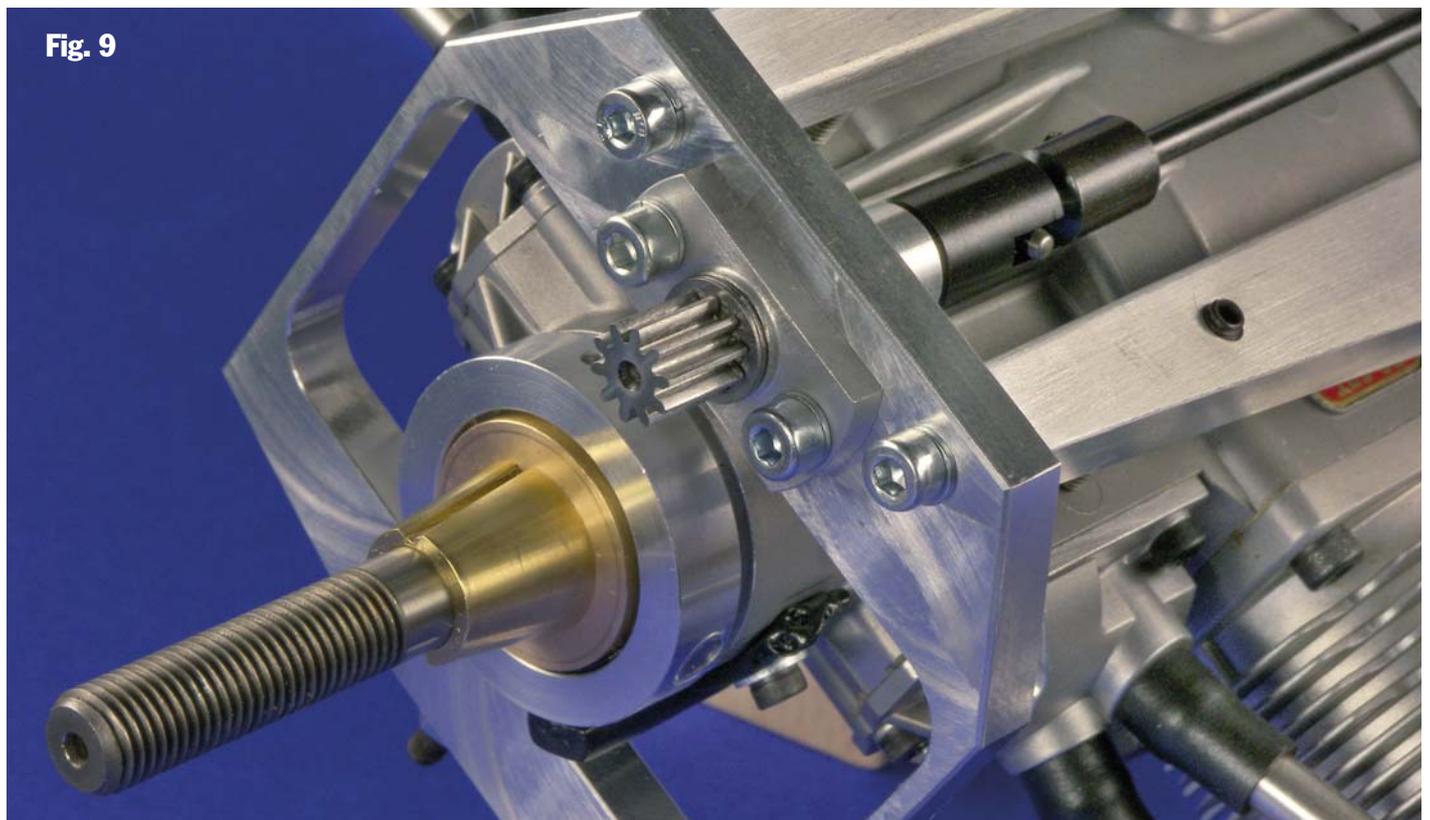
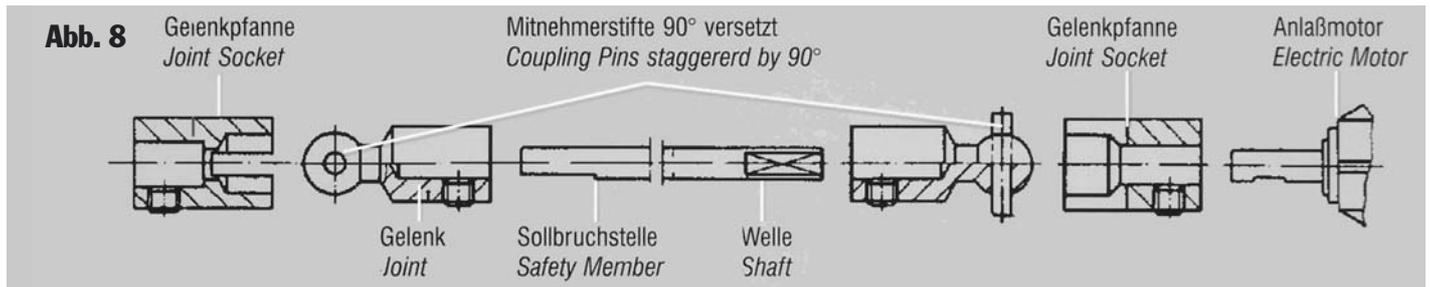
Important:

The adapter pins have to be twisted by 90°. This has to be considered when honing the surface of the adapter.

Now screw the starter engine to the gearbox. Use the enclosed screws M3 x 25 and the retaining rings.

Now you can mount the starter engine with gearbox and the cardan shaft. Use the enclosed hexagon sockets screws M4 x 12 mm and the retaining rings.

The mounted cardan shaft requires a longitudinal play of approx. 0.3 mm.

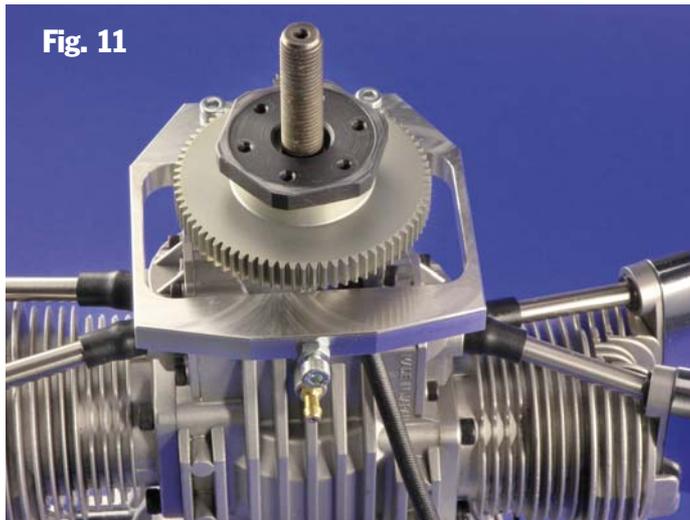


Assembly of the freewheeling gear and adjustment of the tooth clearance (fig. 1, 11 and 12)

Lubricate the inside and the front side of the freewheel generously with the enclosed high pressure grease. Make sure that the rollers don't fall out of the freewheel. The propeller adapter can be easily inserted into the freewheel by turning it clockwise. The mounted freewheeling gear has an axial play and can be easily cranked against the starting direction, but immediately engages in starting direction.

You can now assemble the propeller. Use the enclosed holder disc and the fastening nut. Screw the fastening nut firmly.

Fig. 11



Now you can adjust the backlash with the adjustment screws in the supports and the bevel support plate. Then secure the adjustment screws with the nuts of type M4.

Note:

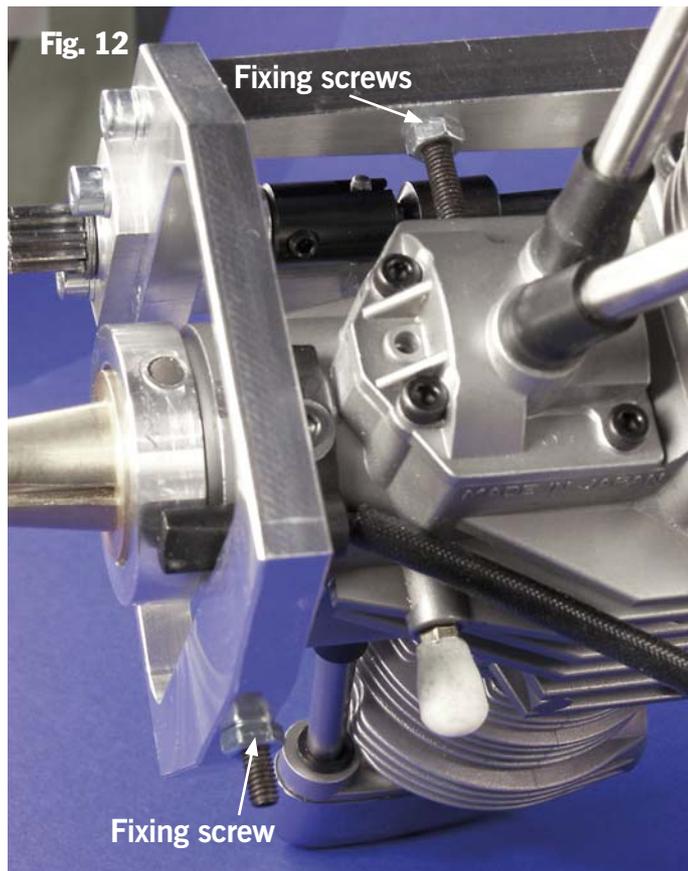
The gear (10 teeth) must not exert edgewise pressure on the freewheeling gear as this would destroy the free-wheel. Please adjust the backlash carefully. The maximum operating temperature at the freewheel must not exceed +70°C.

Note:

To secure the propeller, counter the fixing nut with the screw M5. Shorten the screws according to your requirements (fig. 1).

The mechanical assembly of the on-board starter is now completed.

Fig. 12



Note to the disassembly of the freewheeling gear for maintenance, fig. 14

Use the same drawing-off device as for the disassembly of the propeller adapter.

Make sure not to damage the teeth of the gearwheel.

It is not necessary to heat the gearwheel as the propeller adapter is not agglutinated.

Fig. 13



Fig. 14



Spare parts for	9710	9711	9732
Thrust washer/signal transmitter with magnet	9530/33	9530/33	9732/07
Clamping ring	9530/23	9530/23	9730/27
Plate for bevel bearing/bevel support plate	9518/03	9711/01	9732/02
Engine support plate	9710/01	9710/01	9732/01
Dowel pin / support, 2 units	9518/05		9732/03
Freewheeling gear, 76/92 teeth, m=0.8	9512/05	9512/05	9732/10
Adapter, SW 32 mm/SW 38 mm	9518/07	9518/07	9712/07
Bevel bearing	9500/03	9500/03	9500/03
Gear, 10 teeth, m=0.8	9500/06	9500/06	9500/06
Cardan shaft	9515/07	9515/07	9515/07
Starter engine with gearbox	9580/01*	9572/01*	9732/11
Starter engine with gear, 12 teeth, m = 0.5	9580/05	9575/03	9575/03
Aluminium gear with output shaft	9580/04	9570/04	9570/04
Fastening nut for propeller			9732/04
Holder disc for propeller			9732/05
Micro switch, single	9560/04	9560/04	9560/04
Board switch, 16A	9560/07	9560/07	9560/07
Small parts kit (not shown)	9710/12	9711/12	9732/12
Propeller-attachment-material			9732/04

*Dimensional drawings see page 14.

Dimensional drawings: 9710 / 9711 / 9732

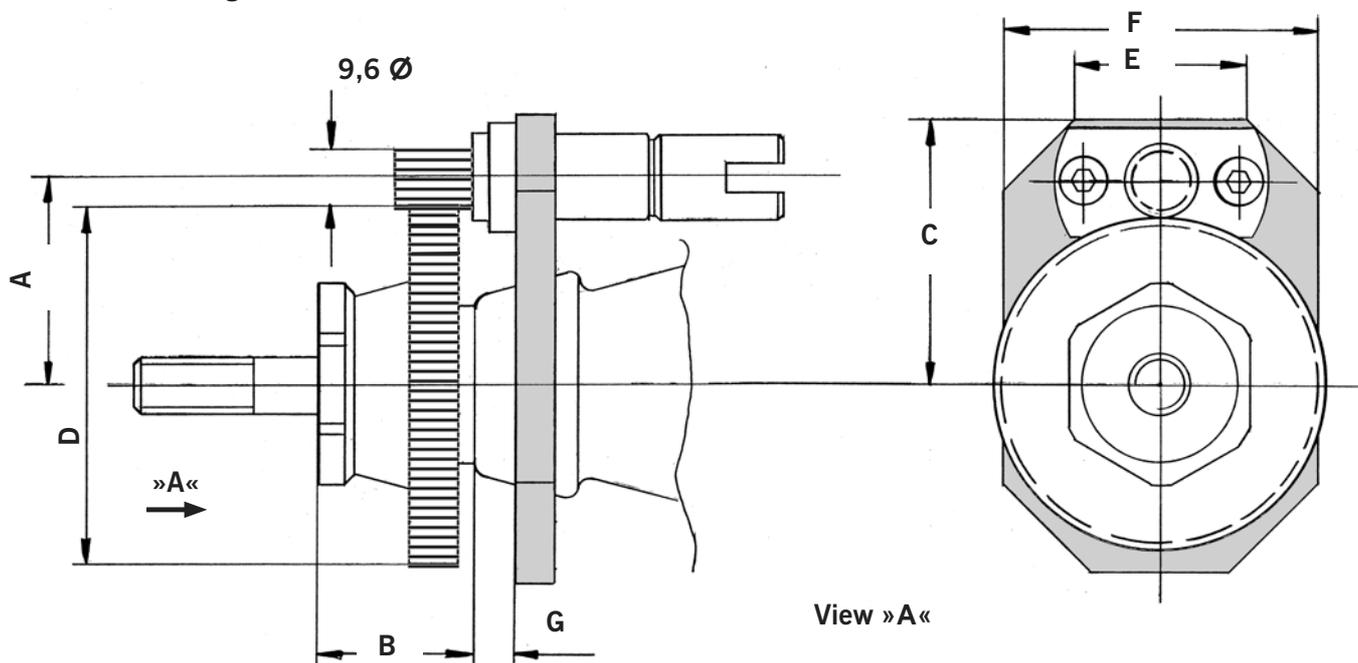


Table with dimensions (dimensions in mm) / weight (without starter storage battery)

Type	A	B	C	D	E	F	G	Weight
9710	35,0	24,0	44,0	60,8	28,0	60,0	8,0	400 gr.
9711	35,0	24,0	44,0	60,8	28,0	60,0	8,0	450 gr.
9732	42,0	26,0		73,6			8,0	600 gr.

Control of the electronic on-board starter

General information:

The electric on-board starter is controlled via micro-switches that are operated from an IC servo. For the secure starting of the internal combustion engine it is necessary that the starter engine starts at the activation of the engine immediately with full power in order to prevent the kick-back of the combustion engine. (Please do not use electric controllers)

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 the starting as long as 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 starting and stopping the starter 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 C 508 with polarity-reversal switch, stock number 3945).

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 100 mm 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.

Basically, the electronic on-board starting systems can run in two operation modes.

Circuit diagram

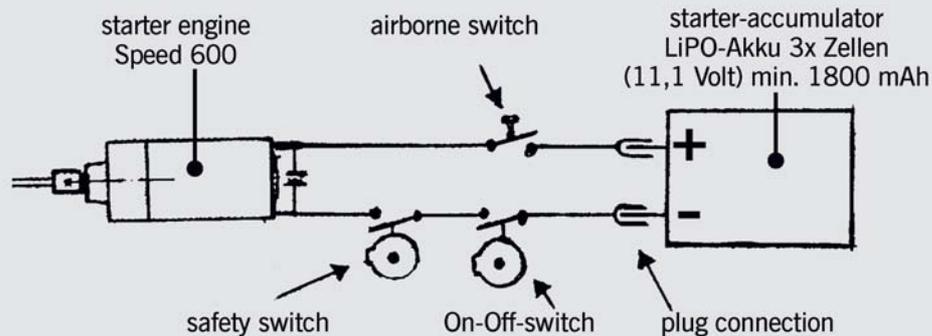


Fig. I airborne switch

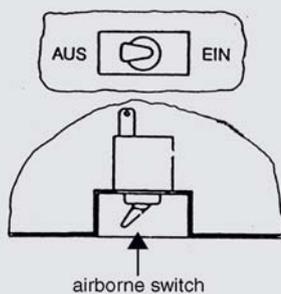


Fig. II safety switch

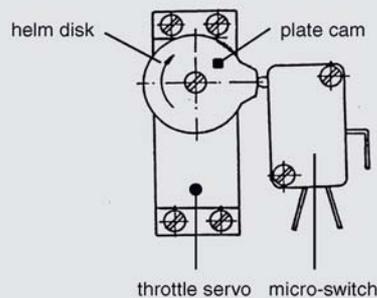
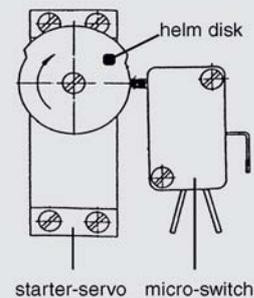


Fig. III on-off-switch



1. Starting of the internal combustion engine via the radio control on ground and in air

With this operation mode, the internal combustion engine can be started via the radio control on the ground as well as in the air. The starter battery is placed inside the model (see circuit diagram).

Operation sequence:

- On-board switch in position Ein (On).
- Use the radio control to switch on the starter engine first and then the ignition, until the combustion engine runs safely. Now switch off the starter engine.
- The combustion engine is switched-off by disconnecting the ignition via the radio control.

2. Safe starting of the combustion engine is only possible on ground.

You can also use the electronic on-board starter to just start the combustion engine accident-proof and without help from the ground. For this operation mode, we recommend to assemble just the starting device with the starter engine into the model and place the starter battery in a starter box and connect it with a board connector. The switch is operated manually. The cable between starter box and model should not exceed a length of 150 cm to avoid a high power loss. Wire cross section at least 1.5 mm².

Initial operation

It is purposeful to secure all screw connections (Loctite, alternatively an all-purpose adhesive). Generously lubricate the freewheel with the enclosed high pressure grease. Prior to the initial operation, lubricate the inside of the gear bearing, the joints of the cardan shaft as well as the gearwheel and the gear (only use high-quality ball-bearing grease).

After fully tightening and securing all screw connections, you can now try a take-off.

First, screw off the glow plug; it must be possible to turn the combustion engine easily into rotating direction, when turned against rotating directing, the freewheel engages and the starter engine is also turning.

Now switch on the starter engine. If the starter engine rotates into the wrong direction, you have to exchange the engine connections. When the glow plug is screwed in and connected you are ready to test the device. Prior to the first start, turn the combustion engine slowly twice by hand, with the carburettor kept shut until the fuel reaches the carburettor. This procedure is required just once a flying day.

The engine starts reliably as long as there is fuel in the carburettor. Switch on the starter engine first and then the glow plug. The position of the throttle stick is a slightly increased neutral gear. Switch off the starter engine when the combustion engine runs safely.

Important information:

If the freewheel does not engage after a longer period without operation, it is usually due to resinification. It has to be cleaned (petrol or spirit) and lubricated with the included high pressure grease. Make sure that the rollers don't fall out of the freewheel during the cleaning. If this is the case, just put them back.

If too much fuel is taken in, the combustion engines tend to kick back. These kick-backs may damage the on-board starter. Therefore, fuel should only be taken in until it reaches the carburettor. If too much fuel is taken in, firmly turn the combustion engine for a couple of times by hand until the excess fuel leaks out. Only then activate the starter engine and the glow plug.

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.