

FEMA universal on-board starting system in connection with glow plug heater GlowControl 1-2 OAS by rainbowtronic.

Dieter Groß describes his experiences with the assembly.

When I constructed the Fournier RF 4 from an Aeronaut model making kit I wondered if I wanted to allow myself the luxury of an on-board starter. An accurate replica of the original motor glider should also be capable to stop the engine in midair and start again, if required. Of course this means a more demanding technical effort which can only be achieved with a precisely prefabricated and flawlessly working system.

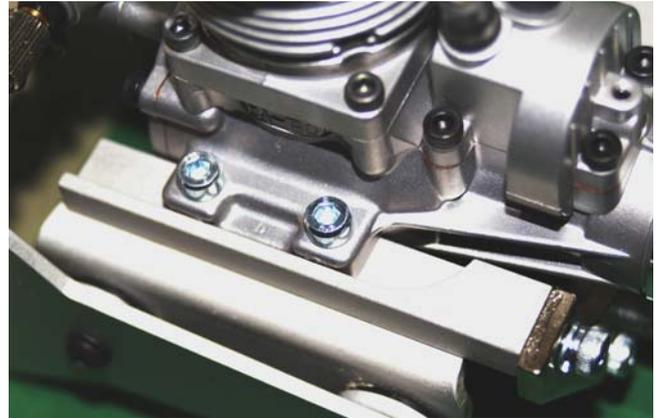
A model maker has only limited possibilities for the assembly as there is actually only one manufacturer who has such a system in his product range for years. I made a very informative phone call with Mr. Böhler, owner of FEMA Modelltechnik, and subsequently ordered a universal on-board starting system with necessary adaptation kit for use in the Saito FA 80. Obligatory for the proper function of the system with a glow-plug engine is a fine running glow-plug heater so that the engine does not suffer any damage.

Only a couple of days later I received the shipment and immediately started to inspect it thoroughly.

All assembly groups are neatly shrink-wrapped and sorted in such a way that the required accessories of a group can easily be assigned and used. A novelty in this range is the microprocessor controlled glow plug heating GlowControl 1-2 OAS which was specially developed for glow plug engines with on-board starting systems.

Except for the adjustment of the mounting plate on the used engine support the entire system is completely prefabricated and ready for use, so that basically only assembly work is necessary for the installation of the system for operation.

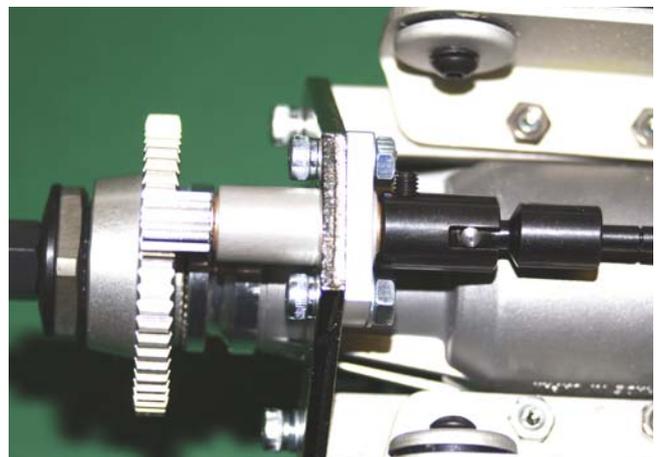
First of all, assemble the adaptation kit on the crank shaft of the engine. For that purpose remove the propeller saver and replace it with the parts of the adaptation kit. The procedure is explained in the provided mounting instructions. Sectional drawings leave no doubt about



the approach. The gearwheel with integrated freewheel is then shifted onto the clamping ring of the adaptation kit. That's it with the modifications of the engine.



Now starts the actual assembly of the starting device and the connection with the engine. Screw the bearing of the bevel onto the front plate which is then temporarily connected with the supports of the engine mount. For the ideal attachment of the engine on the supports the mounting holes of the front plate are provided as slotted holes. Thus the supports can be adjusted perfectly to the width of the engine. The engine has to be positioned in such a way that the bevel is aligned force-fit with the freewheeling gear. Here you have to proceed carefully for the correct starting of the engine. When the engine is aligned on the supports the mounting holes of the engine can be marked out and drilled on the supports. Now align the engine



with the support plates on the actual engine support and fasten it. Make sure the propeller saver of the engine has the required distance to the front cowling opening. But these were the greatest difficulties that have to be overcome when installing the mechanics. Then you just have to drill a hole into the engine frame in the correct place to insert the cardan shaft of the attached starter engine into the freewheel. On basis of the given conditions the assembly of the cardan shaft should be as linearly as possible. In the case of my Fournier this wasn't possible. But despite an angled assembly I never encountered any problems during a couple of take-offs.

The starter engine is a top quality version of a 480 engine including ball bearings und exchangeable carbon brushes. It is attached to a separate aluminium mounting plate which also carries the gearbox. The mounting plate can be tightened to a frame of the fuselage. This may be an ordinary bulkhead or, in the case of the Fournier, a separate frame which can be required due to the assembly conditions. Despite miscellaneous single components the entire system can be disassembled for maintenance within a few minutes if it was assembled correctly. In my opinion this is a big advantage of the complete construction.



How does the electric power supply of the starter engine works?

The operator has again different options. He can use high-amperage NC, NiMH and Lipo cells with a capacitance of at least 1.0 Ah. The cells should have at least 9.6–12 Volt. I used 10 cells GP 1250 that suffice a complete afternoon of flying and a couple of starts without problems. Now I would probably use Lipos with a capacitance of about 2000 mAh that also have an advantage concerning their weight. The GlowControl can also be used with the storage batteries mentioned above. This glow plug heating is new in the FEMA product range. Therefore I want to go into the details of its functionality.

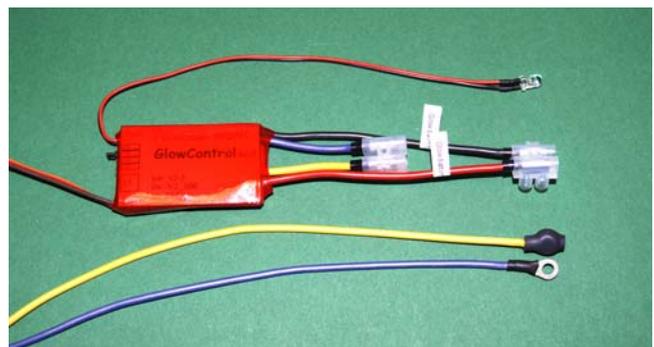


The figure shows the IC servo and the micro switch which is used to start and stop the starter engine.

It is a great advantage that you do not need a second storage battery. The GlowControl can be connected with the same starter battery parallel to the on-board starter as it



can be operated with an input voltage of 8.4 – 12.0 Volt. For the receiver battery you can also choose between a 4 or 5 cells version. The monitoring of the receiver battery with storage of the error condition which is displayed by the status of the very bright special LED is a remarkable contribution to the security of the model. It can be attached to a clearly visible position on the model to show the respective functional status in an optimal way.



The operation of the GlowControl is absolutely easy and causes no trouble at all. The provided manual is really helpful and explains everything explicitly.

First of all configure the GlowControl for the power supply and the number of glow plugs. Set or remove two jumpers.

After you set the servo way for the correct running direction you connect the GlowControl via the vacant receiver channel parallel to the gas servo assembly or with the help of a Y-cable on the same channel. The trimming should be in neutral position. Now you can switch on the power supply of the receiver. There are two quick blinks of the status LED and then a blink every 1.5 seconds to show the readiness for operation.

The programming of the glow path and of the other settings is carried out with the help of another jumper which has to be removed before starting the programming. In this way the GlowControl is set into standby mode. The status LED does not blink. The programming is then conducted in two stages.

1. The throttle control is set into half-gas position in which the heating should start. The trimming is in the position '0'. For operation hit the switch which is integrated in the GlowControl. The position is now saved and confirmed by a single blink of the status LED.

2. Put the throttle control in neutral position. Hit the switch again. For confirmation the status LED blinks twice.

The programming is completed. Attach the jumper again and switch off the receiver power supply for at least 5 seconds to transfer the values into the storage. They are available after switching on the receiver unit. Then connect the actual glow and starter storage battery. It is important to consider the correct polarity as a wrong connection would damage the GlowControl.

I want to point out some special features of the GlowControl. The required heating range can be programmed individually whereas the additional heating capacity can be set proportionally to the gas position. A special starting mode helps you with the starting of the engine on ground and particularly in the air. The full heating energy can be activated for about one minute even if the throttle control is not in neutral position. A so-called auto-boost function provides an excellent transient behaviour from neutral to full throttle position.

Another mentionable aspect is a contribution to security for use on a daily basis: after switching on the remote control unit, the GlowControl is not activated until the throttle control is operated. It does not work before that – regardless of the position of the throttle control.

I use several GlowControls with and without on-board starting systems on single or two cylinder engines and I am just thrilled by the simple and secure operation. It never happened that the engine stopped in midair or that my Fournier refused an air start. This improvement of the functional security is immensely reassuring. With the application of a GlowControl you can be sure that the engine works reliably even in extreme operating conditions. If an engine really stops in midair it is probably due to an empty tank.

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