

Field Follies

By Frank Granelli



Last month, we left our fuel tank filled and in the right place to insure trouble free operation. The tank setup is good, we already know how to set the high and low-speed needle valves and the proper glow plug is in place. Now we just need to get the engine started to have a really great flying day. The first of many.

Modern glow engines are so user-friendly that we only need to make the glow plug glow and then find some way to rotate the engine to get it started. With modern industry and modelers' imaginations being what they are, there are now about five million tools to perform each operation. Of course, we need some place to house these millions of tools.



Photo 1 – The Hangar 9 field box on the left arrives fully assembled with a power panel cutout. The Great Planes Master Caddy needs more work but has a detachable starting box to permit remote starting at contests, fun-flys and wherever club rules require starting outside the pit area. (Photo courtesy of Hobby Hut, Pompton Plains, NJ)

From 1970 to 1974, I housed all the field equipment I owned, a 2 oz. turkey baster with a fuel line attached, a 1.5V battery with alligator clips, a “chicken stick” and some tools, in a brown paper bag. But the baster took five minutes to fuel a sixteen ounce tank, the battery was always dead, the alligator leads were constantly shorting out against the engine’s head fins and the chicken stick kept breaking the wooden propellers. If everything was actually working, then the bag would rip open, spilling everything onto the ground.

I do not recommend such limited equipment to anyone but, in truth, this is all you actually *need* to get flying. But there are better ways today, so lets look at some of them. It is a good idea to find a

home more permanent than a paper bag for your field equipment and many manufacturers offer these “field boxes” such as the ones shown in photo 1.

Expect a field box to be able to hold all the tools you will need plus a gallon of fuel, full pump, glow starter, power panel, 12-volt battery and electric engine starter. Some field boxes, such as the Master Caddy, are equipped to hold the aircraft during field assembly or repairs, but not for engine starts or runs. Although each field accessory, such as the Thunder Tiger fuel pump in last month’s article, can be powered from its own battery, most model pilots find it more convenient to use one 12-volt battery to run everything through a power panel.



Photo 2 – Gel cell field box batteries come in various sizes and voltages. The larger battery has a 7 Ah capacity while the smaller one rates at 4 Ah. A charger is also required. Power panels range from advanced on the left to basic and inexpensive on the right.

Photo 2 shows a few of the many such batteries and power panels available. Most field box batteries are 12-volt “gel cells.” Gel cells do use common lead-acid technology but in a different form that does not spill or require venting. Motorcycle batteries are also often used, but must be firmly fastened in an upright position and completely vented to the outside.

The most popular 12-volt gel cell battery has a capacity of 7 Ah (amp hours). This is more power than required on most flying days. But sometimes a balky engine, yours or a friend’s, can make excessive power demands on a field box battery that you forgot to charge last night. For these occasions, you may find that a 9 Ah battery is ideal.

If you always connect your starter directly to the battery *without* a power panel, consider a system that I use for Pattern competition starts where only three minutes, from start to airborne, are allowed (photo 3). Use a heavy-duty starter (discussed later) and a 4 Ah, 12-volt battery wired in series with a 4 Ah, 6-volt gel cell. This setup could probably turnover a big block V8. But always make sure your engine is not flooded as this much starting power could damage an engine hydraulically locked in place with liquid fuel.

Most electric fuel pumps use 12 volts, as do most electric starters. But the average glow plug burns out above 2 volts. If only one battery is used to power the field box, then some sort of voltage control system must be used. The most common is the power panel like those pictured in photo 2.

Power panels range in sophistication and cost from basic to expensive. The Hobbico Accu-Glo power panel in photo 2 automatically adjusts glow plug power based on the plug’s power requirements. This helps a slightly flooded engine (not one hydraulically locked) to start. The panel also indicates the field box battery’s power levels, whether the glow plug is good and has a charging jack for the popular rechargeable single-cell glow igniters. The basic Hobbico panel has the glow igniter’s charging jack, but the pilot must manually adjust the glow plug’s power levels and know that a zero meter reading means the plug connection is bad.

The power panel supplies the battery's full voltage, usually 12 volts, to the starter and fuel pump connections. Power panels are usually supplied with the "banana plug" connectors for the starter. Some pilots prefer to wire the fuel pump directly into the rear of the power panel. While that works fine, I suggest that you use additional banana plugs to connect the fuel pump. Pulling the plugs at the end of the day prevents accidental pump operation during packing up or transit.



Photo 3 – A competition flight line starter case. The two small batteries provide 18 volts for a positive start every time. The orange Radio South Glow Igniter automatically adjusts the current flow to light the plug under all conditions. Backup glow igniters are also available including one that uses an alkaline "D" cell for power.

The close-up photo shows a typical fuel pump, fuel container installation. If you look carefully, you will note that the Sullivan Streamer's power leads are stapled in a position away from the fuel container. Although electrical shorts usually only pose a problem when a metal fuel container is used, it never hurts to be extra careful. Being extra careful, we used two layers of shrink tubing protecting the pump's wires in the stapled area. An extra precaution would be to use an insulated staple.

The pump is positioned on the outside of the field box to prevent it's being knocked around as tools are taken out and replaced from the box's inner storage areas. While lowering the pump's workload by reducing the fuel draw distance to a minimum, this position also protects the fuel lines from cuts and nicks that could result in leaks. Electrical shorts from the pump itself cannot penetrate the pump's plastic housing.

Besides, the pump and fuel lines always contain internal fuel so if the pump does somehow short internally, its position near the fuel bottle is a mute point as the ignition will just travel along the lines until it reaches the bottle. Fortunately, glow fuel does not behave like gasoline. If you plan to use gasoline, or a metal glow fuel container, then position the fuel pump on the other side of the box, on the internal wall opposite the power panel. I do not recommend either with an electric pump anyway.



Photo 4 – A typical position for the electric fuel pump. Having the pump close to the plastic, not metal, fuel container reduces the pumps workload. This Sullivan Streamer pump has its own switch, but will also work using the power panel’s switching. Some pumps do not have internal switches and require a panel to operate.

There are many types and sizes of electric starters. The photo shows representative samples of the major types from several manufacturers. Most model pilots will require a 12-volt standard-duty starter or a heavy-duty, 12/24 volt one. Either works great on all trainer and “second model” engines. The standard model costs around \$30 while the heavy-duty starter is priced about \$70.



Photo 5 – A starter for every model engine. 12-volt red/black Hobbico standard-duty is best on engines up to .90 cu. in. The 12/24-volt, gold/white Sullivan Super Hi-Tork heavy-duty is designed for all engines up to 2.35 cu. in. The Black, 24-volt Model 4 Sullivan starter is for up to 24 cu. in. gasoline motors. There is even a starter for 0.49 size engines, the green Sullivan Hornet. (Photo courtesy of Hobby Hut, Pompton Plains, NJ)

One school of thought on starter choice is that most model pilots, especially in today’s world of larger ARF models, will someday be flying a 1.20 cu. in. size model, or even larger. It might make sense then to buy a heavy-duty starter now, as it will be required later. Having a 12/24-volt starter also provides the pilot with power choices or 12, 18 or 24 volts.

For both heavy-duty and standard starters, there are several rubber insert cone shapes available. The photo shows three different shapes plus the reverse side of one that is used to start an engine not equipped with either a spinner or AMA safety nut (not a good practice). The cones are inexpensive, interchangeable among most brands and should be replaced about every three to four years. Both of the white inserts are nearing the end of their service life, notice the cracks, and will be replaced before next season.



Photo 6 -- The pink starter insert is designed for engines equipped with AMA safety nuts. The white insert fits most common spinners up to three inches. The dark gray insert fits sharp, deep cone spinners and larger spinners. When reversed, all inserts will fit small AMA safety nuts or engines without spinners or safety nuts.



Photo 7 – The two small Harry Higley AMA safety Nuts meet AMA insurance requirements and look nice on aircraft like Piper Cubs, P-47 Thunderbolts and B-17s. The brass nut weighs 2 oz. and is used to add nose weight. Sharp spinners like the yellow or metal work best with the pink insert. Standard spinners use the white insert. (Photo courtesy of Hobby Hut, Pompton Plains, NJ)



Photo 8 – A starter has damaged this spinner. Always hold the starter cone tight against the spinner before turning it on. If the starter must rotate before contacting the spinner, either the field

box battery is weak or the starter is too small for the engine. Clean the insert with denatured alcohol every few months to remove dirt buildup that also causes slippage.

As the photo illustrates, there are many different spinner shapes and sizes. There is a starter insert available to fit all of them. In answer to a few spinner questions we have received, an all-plastic spinner, such as the yellow one pictured here, should not be used in applications exceeding 12,000 rpm. The red, plastic cone/metal backplate spinner can be used in all reasonable applications, up to 15,000 rpm, but can be damaged by a mis-applied starter. The all-metal spinner not only resists starter damage and may be used in all applications, it is balanced to reduce engine wear and increase rpm.

A “chicken stick” is actually just a manual device to rotate the propeller without using your fingers. It should be called the “wise person” stick as today’s powerful engines with more advanced timing do considerably more hand damage on a “kickback” than did the ones of old when the stick first got its name. This device uses a padded rod to protect the propeller. Just like the refueling squeeze bulb discussed last month, every field box should have a chicken stick in case the electric starter system fails. Every nick on the yellow Sonic Tronics Cheeter Stick in the photo would have been in my hand without it.



Photo 9 – *The two most common chicken sticks. J’Tec’s all-metal Power Stroke looks sharp and works well, but costs \$11. The \$5, well-used, wooden SonicTronics Cheeter Stick works just as well but is not very fancy. Either one will prevent those hospital “stitch up” visits that tend to spoil many flying sessions.*

No matter what device is used to rotate the propeller or how fast it rotates, it will be a long, sad flying day if the glow plug isn’t “lit.” Lighting the glow plug requires at least 1.2 volts constantly applied until the engine runs. There are many different types of equipment used to “light it up.” If there is a power panel, most pilots chose the simple wire and connector system as shown in the photo. This system just plugs into the power panel, provides 1.5 volts and features adjustable current flow depending upon the glow plug’s condition.

Independent systems use either a rechargeable, 1.2-volt Ni-Cad battery (fixed or replaceable) or a replaceable 1.5-volt alkaline battery. Rechargeable systems require a charger that plugs into the glow plug end. Many independent glow plug igniters feature a meter to measure the current being supplied to the glow plug. Having a meter prevents one major headache. The meter’s reading itself is not all that important as the current is not adjustable and it is hard to read anyway. What *is* important is that you can tell if the glow plug has completely failed; the meter will read zero current.

Another good feature to look for in an independent glow igniter is a medium length stem. Short stem igniters are good, but can't reach a glow plug inside a cowling. Very long stems, about six inches long, tend to vibrate and come loose too often to trust on un-cowled engines (the plug access hole in the cowling helps stabilize very long reach igniters). Sometime in your model piloting career, you will fly an airplane with cowling. Might as well get the medium-length igniter now, as you will surely use it before your career is done. The same holds true for your choice of glow plug wrenches.



Photo 10 – The Du-Bro glow plug igniter on the left features a rechargeable and replaceable Ni-Cad. The orange McDaniel Ni-Starter has a meter to let you know if the plug is bad. The cord and plug igniter are typical of those used with a power panel. A good glow –plug wrench is invaluable.

As shown in the photo, there is a wealth of field and accessory equipment available. Enough items so that your friends and family should have no difficulty determining your holiday and birthday presents for the next decade. We only covered in detail the basic items that are “must haves” to get started.

But digital voltmeters that test a radio system's batteries are nice to have for sport aircraft and are a necessity when a model's cost starts to cause altitude sickness in normal people. Rather than just measure a battery's voltage, these instruments measure voltage while applying a simulated flight load on the receiver battery. A safe practice is to cease flying, and start recharging, when the battery's voltage drops to 0.1 to 0.2 volts below its nominal capacity. When the common 4.8-volt receiver battery reaches 4.6 volts, it is time to recharge. The same applies to a 6-volt receiver battery when it reaches 5.8 volts or when the 9.8-volt transmitter battery drops below 9.6 volts. These are conservative ratings but they will never cost you a model airplane due to a dead battery.

Field chargers can extend your flying day while insuring there is always “enough” radio system battery capacity for safety. A digital tachometer extends engine life by preventing lean runs. A tachometer also prevents airframe damage that can result from off-runway landings because the low speed mixture adjustments were incorrect and the engine died during your first spin attempt.

There are also so many required tools like ball driver sets (English and Metric) all sizes and types of screwdrivers, wrenches, extra spinner parts, propellers and spare glow plug caddies, emergency adhesives and extra parts required that discussing them would take several more articles. Luckily, you can find out about all these extra tools by just checking what the other pilots at your field have squirreled away in their flight boxes.

If you think you would like to see what many of these extra items are and also see how the Great Planes Master Caddy is built, you can find this information in the “Baggage Compartment” of Model Aviation's Sport Aviation online magazine; www.masportaviator.com



Photo 11 - A modeler's wish list of field equipment is photo form. Most model pilots do not need everything here, but we sure want them all.

In this part of Model Aviation's From The Ground Up Series, we have covered just about everything most newer model pilots will need to know for successful engine management. Other parts of this series covered in detail how to pick the right radio system for your needs and how best to install it in your model, how to construct a light electric model and what every new modeler needs to know about electric flight.

But even the best radio system and engine still need *something* to hold it all together and then get the entire thing into the air. And that something, the airframe itself, is the subject of the next part of the From The Ground Up Series. We will cover how to assemble a Ready-To-Fly (RTF) trainer first and then how to assemble it so it lasts even longer and flies better. Almost-Ready-to Fly (ARF) trainer models are next followed by the many improvements that can be made to an ARF to prolong the airframe's life and make it fly even better. See you then.

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