DA85

Owner's Manual *12/12*

Safety Instructions

READ THIS!

WARNING!

This motor can cause severe harm to you, and/or others, if misused or if these safety precautions and instructions are not observed. Desert Aircraft is not responsible for any loss, injury or damage resulting from the miss-use of its products.

You alone are responsible for the safe operation of your motor.

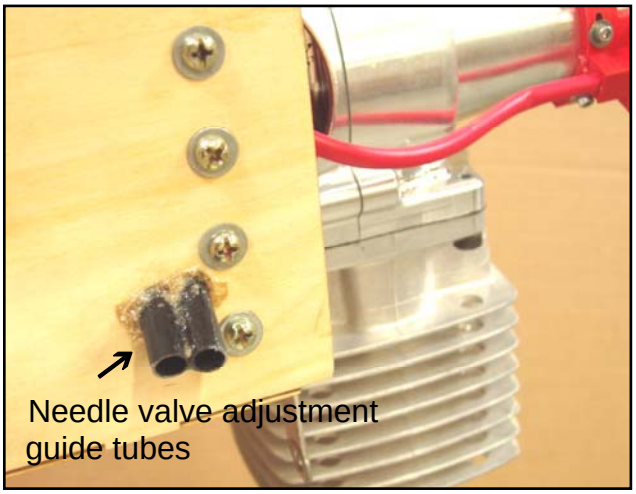
This motor can stop at any time, for a variety of reasons. Do not fly your plane in such a way that damage or harm will result if the motor stops running. If you cannot fly your plane safely if the motor stops running for any reason, do not fly the plane.

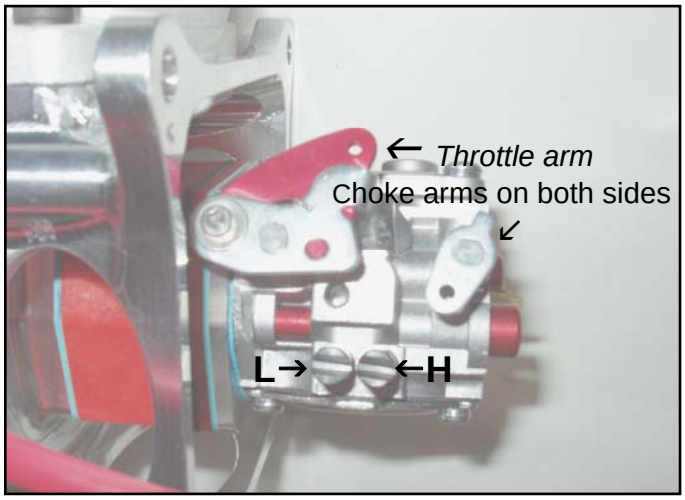
- Do not operate the motor if you do not want to be completely responsible for any damage or injury incurred or caused during its operation.
- Read all instructions before operating your motor.
- If you have any questions about any aspect of operating this motor, do not attempt to start or operate it.
- Never operate the motor, or fly, alone.
- When operating the motor, never stand, or allow anyone else to stand, in front of, or to the side of the propeller. Always stand behind the propeller.
- Keep away from the prop while operating the motor. Do not wear loose clothing near the motor or prop. Do not run the motor near loose material such as dirt, gravel, power cords, ropes, sand, etc. Loose material can be drawn into the turning prop causing injury or damage.
- Always operate the motor in an open area. Do not operate indoors.
- This motor can develop tremendous thrust. Make sure the aircraft is properly secured when starting or operating the motor.
- Inspect motor mount bolts and firewall integrity before operating the motor.
- Anyone in the immediate area of the motor should use eye protection during operation of the motor.
- Keep spectators at least 30 feet away when operating the motor.
- Turn off the motor before making any adjustments.
- Always use the proper size propeller. Never use a damaged, modified, or repaired propeller.
- Always use the correct length propeller bolts. Do not use spacers behind the propeller.
- Spinner cones must not touch the propeller.
- Thinner props may require using shorter prop bolts, especially if not using a spinner back plate. Make sure your prop bolts do not bottom out in the propeller hub.
- Check that the propeller bolts are tight before every flight.
- Always install an ignition kill switch to stop the motor.
- Adjust the carburetor linkage so that the motor will stop when the carburetor is completely closed.
- Gasoline is extremely flammable. Be careful of any sparks from electrical contacts such as fuel pumps, battery chargers, etc. Do not allow smoking in the area of your fuel supply or motor. Store fuel in approved containers and in well ventilated areas.
- Allow the motor to cool before touching or fueling.
- Always turn the prop a few revolutions after running the motor to discharge the ignition system.
- The ignition system develops extremely high voltage. Do not touch it during operation.
- Never use a damaged or repaired prop, or a prop that has struck the ground or any other object. Damage that can be hard to see, could turn into disaster when the prop is turning at thousands of RPM.

Mounting the Engine

The DA85 features a rear induction carburetor that is intended to protrude or breathe through the fire wall. While mounting and initial setup of the engine and with the carb through the firewall can take some extra work, this carburetor location provides a stable air environment for consistent high performance, while greatly reducing carburetor noise.

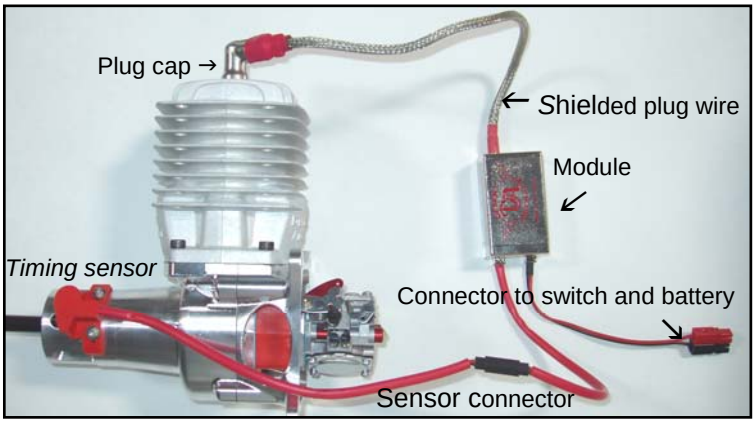
- If the firewall/motor box is too far back, it can be extended by adding a layer, or layers, of aircraft plywood, or extending the motor box with aircraft plywood.
- We do not recommend using standoffs or spacers to mount the DA85. Vibration and stress to the engine case increase when standoffs are used. Damage from using standoffs or spacers will not be covered under warranty.
- If you still elect to use shims or spacers between the rear of the engine and the firewall, make sure that the mounting faces of all the spacers or shims are flush with the rear of the engine. If the face of all spacers are not in the same plane or perfectly flush with the rear mounting face of the motor, the crankcase may be damaged. Again, this will not be covered under warranty.
- Make sure the carburetor has adequate clearance near the inlet to allow an unobstructed airflow into the carburetor. If the carburetor is located in front of a former or firewall, be sure there is at least 1" (25mm) of clearance from the carburetor inlet. If there is less than 1" clearance, make a hole larger than the carburetor inlet diameter in the former or firewall.
- The throttle arm is tapped for a 2-56 SAE ball link. If you wish, the throttle return spring can be released or cut on one end, but not removed. Without the spring, vibration will wear and damage the shaft and carb plate. This wear/damage will allow air and fuel to enter the engine when in the closed position, resulting in an unreliable idle and erratic throttle control.
- The choke lever can be actuated by hand with a small light weight pushrod or by a small servo behind the firewall. There are two arms on the choke shaft. One is removable and can be repositioned to give proper geometry for linkage access from the bottom or rear. Do not remove the detent ball and spring on the choke shaft.
- We do not recommend soft mounting the engine as it can cause problems with exhaust systems and carburetor linkages.
- If the carburetor is enclosed, guide tubes pointed directly at each needle can be installed to allow easy needle adjustments with a narrow screw driver. (See photo)
- Make sure firewall and/or motor box are secure.
- Check the mounting bolts regularly to insure they are tight.

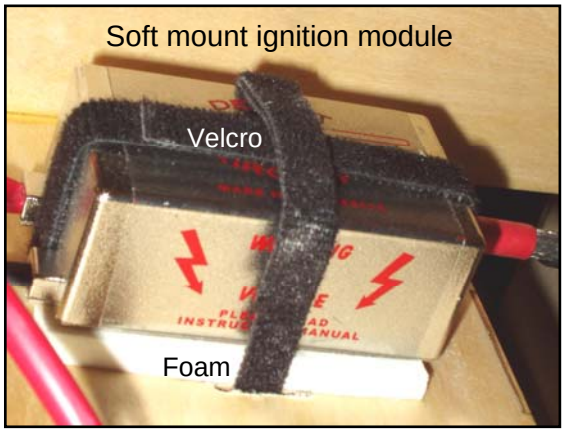




Ignition System

- When making electrical connections to the ignition system, use the same gauge wire (or larger) as used on the red and black power leads on the ignition module, all the way to the battery pack. Keep wire length to a minimum. Heavy-duty plugs, as supplied on the ignition, or as used on electric cars and planes, are recommended.
- Use a high quality switch such as JR's heavy-duty switch. Standard size R/C receiver switches are not recommended.
- Make sure the charge current does not reach the ignition module. In other words don't "charge" the ignition module.
- Keep ignition components and wiring separated, as much as possible, from your receiver, receiver battery, servos, wiring and switches.
- Don't use metal-to-metal linkages to operate the throttle.
- Always perform a radio range check before flying. If there are "glitches", DON'T FLY! Check for holes in the braided shielding, loose connections, etc.
- The ignition can be powered directly by 4 or 5 cell 4.8 or 6 volt NiCd/NiMH batteries, or 6.6 volt A123/LiFe batteries. If using batteries rated at more than 6.6 volts, a 5.5 or 6 volt regulator must be used. Higher voltage will damage the ignition system and will void the warranty.
- We recommend an 1800 mAh or larger capacity pack. With this size pack, the ignition should last longer than your receiver pack will. If meter test shows 5.0 volts or less at the ignition module, don't fly, re-charge.
- **When connecting the red pick-up sensor to the ignition module, make sure that the polarity of the wires entering the connectors is correct (Brown to brown, orange to orange)**
- Unlike some ignitions, the Desert Aircraft ignition is designed to spark only when the prop is flipped at a high speed. If the prop is not turned over at "starting" speed, the ignition will not produce a spark. This helps to prevent the motor from firing accidentally. The ignition coils can store energy for a short period of time after shut off. A few firm flips of the prop with the ignition off will expend any energy held in the coils by firing for one revolution.
- When removing the spark plug caps, PULL STRAIGHT out on the caps. **Do not pull on the shielded ignition wire!** If the cap seems loose and is not making a solid metal to metal contact with the spark plug base, use a small hose clamp around the base of the cap to keep them firmly attached to the base of the plug. To prevent radio interference, the spark plug cap must have the split retainer ring around the base to insure a tight fit. – DON'T FLY WITHOUT IT!
- **<u>Protect</u> the shielded plug wire from rubbing against fiberglass or sharp edges of wood or metal.** Rubber grommets and plastic "spiral wrap" insulation from automotive or electronic supply stores work well. Holes in the braided shielding can emit R/F noise or loose connections (spark plug caps, connectors and switches).
- Timing is set at the factory and should not need adjustment. Contact Desert Aircraft if you have any questions regarding timing.
- Only use NGK CM-6 spark plugs. Other plugs may not fit the plug caps firmly.
- Plug gap is .018" to .020" (.38 to .50 mm)
- Never operate the ignition without a spark plug in the plug cap! This can permanently damage the ignition coil.





Fuel and Oil Mix

- For the DA120, use Premium pump gas, such as 91 to 93 octane.
- We recommend purchasing your fuel from "name brand" gas stations. We have seen problems with cheaper gas from some discount type outlets.
- We recommend filtering your fuel between your fuel container and your plane's fuel tank. A high flow filter, or clunk/filter, between the tank and motor is also a good idea.
- Make sure the plane's tank is well vented and the fuel clunk moves freely.
- **Use of any other fuel or additives such as nitro formulas, aviation gas, white gas, etc., can harm the motor and void the warranty.**
- Do not use silicone sealers on the fuel system. Gas can break it down and carry it into the carb.
- We recommend a high quality synthetic oil. As for the brand of oil, there are many good ones on the market. Some oils, and their mix ratios, that Desert Aircraft recommends are: Red-line Two Stroke Racing Oil (40 to 1), Motul 800 (50 to 1), and Stihl HP Ultra (50 to 1). These oils can be found at most motorcycle or chainsaw shops.

Recommended Props

- Always tighten prop bolts and inspect your prop and spinner before each flight!
- Avoid large/heavy load props during the break-in period. Regardless of size or brand, it is important to not overload the engine during break-in. Check the rpm on the first run and make sure it is around 6,200 rpm or higher. Be more concerned about overloading the engine than over revving it. The optimum prop for your aircraft will depend on exhaust type, airframe weight, airframe size/drag, altitude, and your flying style. After break-in, we have found the optimum static RPM range for good performance is 6,000 to 6,700 depending on prop and exhaust selection.
- Some recommended break-in props are:
  Menz 26x10, Mejzlik 26x10, Mejzlik 27x10TH, 24x10 Mejzlik 3 blade
- Some recommended props after break-in are all of the above as well as:
  26x12 Mejzlik, 26x12 Menz, 26x10 Xoar, 25x12 AirModels 3 blade.
- If a tuned pipe system is used, all props listed above can be used along with:
  27x10 Mejzlik, 27x10 Menz, 27x10 Xoar, 28x10 Mejzlik, 24x12 Mejzlik 3 blade, 24x12W Mejzlik 3 blade.
- Lower rpm normally equals less prop and engine noise, but less power. A 3 blade prop just over 6,000 RPM can be very quiet. Smaller diameter props (less tip speed) and more pitch (more load/less rpm) will reduce noise. 3 blade props normally have less diameter and more load from the pitch and extra blade. This normally makes them the quietest props.
- Always use a drill guide to drill your props. We normally drill from the back side, then again from the front to insure the screws don't bind in the holes.
- Always check the balance of your prop.
- For safety, we recommend painting the tips of you props (front and back) with a bright color, especially black props.
- Never use a damaged or repaired prop, or a prop that has struck the ground or any other object. Damage that can be hard to see could turn into disaster when turning at thousands of RPM.

Starting

- Avoid running the engine without the wings installed on the fuselage. Without the mass of the wings, vibration will be very pronounced.
- Check that prop bolts are tight and spinner is secure.
- Make sure the starting area is free of dirt, sand, gavel, or other loose debris
- Always wear a heavy leather glove when starting the engine.
- Turn on the radio system and check the throttle operation and position.
- Have someone (with eye protection) firmly hold the plane.

1. Close the choke completely.
2. Open the throttle to approximately 1/8 position.
3. **Turn on the ignition.** ALWAYS BE PREPARED FOR THE ENGINE TO START ON ANY FLIP OF THE PROP, whether the ignition switch is on or off! Flipping the prop with the ignition off may flood the engine.
4. Give the prop a quick, firm, flip counter clockwise. Follow through quickly as you flip the prop so your hand swings out of the props path. Repeat until the engine fires or "pops". Flip the prop <u>one</u> more time.
5. Open the choke.
6. Set throttle to idle position. (carburetor butterfly plate just slightly open)
7. Flip the prop again until the engine fires and runs.
8. Let the engine warm up for 15 to 20 seconds before advancing the throttle.

- The engine may not need to be choked if the engine is re-started shortly after the previous run.
- If the engine becomes flooded, removing or "pinching" the fuel line while flipping the prop quickly will help to dry things out. The spark plug can also be removed to speed the process.

Needle Adjustments

- The needle farthest to the rear of the engine is the "High End" needle. The needle closest to the engine is the "Low End" needle. Turning the needles clockwise "leans" the fuel mixture. Turning the needles counter-clockwise "richens" the fuel mixture.
- Settings will vary with altitude, temperature, humidity, prop load, fuel, carburetor variances, etc. A general starting point is: 1-1/2 open on the Low needle, 1-1/2 open on the High needle.
- Adjust the High needle to peak rpm. A tachometer is a great help, but remember that the peak RPM usually drops a little bit after every start due to heat build up. Don't lean the mixture any more than necessary. If the rpm steadily drops at full throttle or fades on long vertical maneuvers, the engine is too lean and is over heating.
- Adjust the Low needle until you achieve a smooth idle and a reliable transition to high throttle. Generally if the engine "stutters" or "coughs" in the mid range or when the throttle is advanced, the Low end is too rich and possibly even the High needle. If the engine dies quickly or sags during transition, the Low end is probably lean. Note: The low needle flows a small amount of fuel through the entire RPM range. Adjusting the low needle can have a slight effect on the higher RPM range. An overly rich Low needle can cause excessive vibration.
- While it is possible for the DA85 to idle below 1,000 RPM, an idle setting around 1,500 RPM insures a more reliable idle and throttle transition. Prop size has a big effect on the idle characteristics.
- Set the High needle only slightly rich during break-in. Operating the engine overly rich not only reduces power, it creates other problems such as poor transition, pre-mature carbon build-up, fouled plugs, excessive exhaust residue, sticking rings, and overall rough running.

Trouble Shooting

- **Motor won't start**:

- Possibly flooded: The DA85 normally only needs to be choked for the first start of the day. Over choking can cause flooding.
- Check battery voltage (should be at least 5.0+ volts) and all ignition connections, wiring, and switches. Check for breaks near all connectors, crimp joints or solder joints.
- Voltage regulators can fail intermittently or totally. If using a voltage regulator, try testing with a 4 or 5 cell pack without the regulator.
- Check tank venting, clunk position, and fuel flow.
- Check all fuel lines for kinks, pin holes, or damage.
- Does fuel move toward the carburetor when the prop is flipped?
- If fuel isn't moving towards the carburetor, is the choke plate completely closing? Is the carburetor or carburetor mount loose causing an air leak? Look for fuel seepage around the carburetor mounting area.
- Is the throttle set at idle or slightly higher after engine "pops" and choke is opened?
- Make sure prop is flipped over with authority. The ignition won't fire at low speed.
- If a lot of fuel drips from the carburetor, the engine may be flooded. If so, remove and dry spark plug, or replace it. Try starting again without using the choke.

- **Motor runs poorly or stops:**

- Rough running can be an indication that the engine might be too rich. Make sure both needles are adjusted to peak performance. Due to changes in air pressure and air flow in the cowl when the plane is flying, the needles may need to be adjusted to deal with in flight performance, not just the way the engine runs on the ground. This may take several ground adjustments and flight tests.
- Make sure carburetor has not come loose causing an air leak in the carburetor mounting area. Look for fuel seepage.
- If your radio has a Battery Failsafe option, the throttle can stop working momentarily when the receiver battery voltage drops.
- Check that the fuel clunk is intact and can move freely to the correct tank position.
- Check all ignition connections and switches carefully. Faulty switches and contacts can cause momentary loss of ignition power due to vibration and harness movement during flight.
- Check Ignition battery voltage.
- If the engine runs poorly and the RPM tops out at 3,000 to 4,000 RPM, make sure that the polarity of the wires entering the connectors is correct (Brown to brown, orange to orange). The connectors can be forced together the wrong way.
- Make sure your fuel is fresh. Changes in atmospheric conditions can cause water condensation in gas cans and tanks. Look for water in your fuel can and plane's fuel tank.
- Needle settings may need adjustment when the engine is moved from one plane to another or cowl configurations are changed. This is because even slight changes in air flow can change the tuning of the carburetor.
- Make sure the choke stays open during flight. Vibration and a heavy unsecured choke linkage can cause the choke to close under high G-loads.

Maintenance

- Being a high performance 2 stroke engine, certain parts can wear quickly. Under normal operation, pistons, piston rings, needle bearings, spark plugs, etc. may need occasional non-warranty replacement to insure peak performance.

- Screws can come loose! After a few flights check that all screws are secure. Periodically check that all screws are tightened to the correct torque rating. Muffler bolts should be checked frequently.

	Size	Torque specifications
Spark plug:	CM-6, 10mm	90 in. lbs.
Steel prop bolts:	M5x 50mm	65 in. lbs. / wood props, 80 in. lbs. /carbon props.
Steel crankcase bolts:	M5x16mm	100 in. lbs.
Steel cylinder base bolts:	M5x16mm	95 in. lbs.
Steel carb mount bolts:	M5x75mm	30 in. lbs.*

***Caution:** Care must be taken to not over tighten the carb mounting bolts. Over tightening can distort and damage the injected molded reed valve parts and rubber gaskets.

- Use a 4m hex wrench for all M5 screws.

- For spinner mounting, the crankshaft extension is threaded for M5 screws. In this application (steel to steel) the 10-32 SAE screws supplied with most spinners will work fine in the M5 threaded hole. **Do not substitute 10-32 screws for any other screws on the engine!**

- Inspect the engine periodically for any signs of fuel seepage. This can indicate an air leak which can create a lean fuel/air ratio, which in turn can cause erratic running and engine damage. If tightening the appropriate screws does not cure the problem, contact Desert Aircraft.

- After prolonged use, carbon deposits can build up on top of the piston and on the combustion dome of the cylinder. Great care must be taken when trying to remove these carbon deposits to avoid damaging the parts. Once an attempt to remove carbon has been made, the task must be completed, as any remaining carbon may be loosened and can dislodge while the engine is running. This can damage the engine and/or bridge the spark plu

Manuals may be updated with additional tips and trouble shooting info from time to time. Please check our web site for downloadable manuals and updates.

IF ANY PROBLEM PERSISTS, PLEASE CONTACT
DESERT AIRCRAFT FIRST!

We designed and manufactured your engine and have built, serviced, and analyzed thousands more. We cover your engine's warranty, not someone at the field or a stranger on the Internet. Please give us the opportunity to help first!

Remember! This motor can stop at any time, for a variety of reasons. Do not fly your plane in a way that damage or harm will result if the motor stops running. If you cannot safely fly your plane if the engine stops for any reason, do not fly the plane. Desert Aircraft will not be responsible for damage caused in engine–out situations.

DA85 WARRANTY

Your DA85 motor and ignition system are covered with 3 year warranty by Desert Aircraft, starting from the date of purchase.

- This warranty covers defects in workmanship and materials only.
- Do not disassemble the motor or ignition system. Disassembly of the motor or ignition system can void the warranty on that item.
- Any modifications to the motor, or the ignition system, other than those authorized by Desert Aircraft, will void this warranty.

This warranty does not cover the following:

- Shipping expenses to and from Desert Aircraft for warranty service.
- Damage caused by improper handling, operation, or maintenance.
- Damage caused by a crash.
- Damage caused by using improper fuel or additives.
- Damage incurred during transit to Desert Aircraft. **WRAP AND PACK ENGINE CAREFULLY!!**

NOTE: ***DESERT AIRCRAFT WILL NOT SHIP ANY WARRANTY REPLACEMENT ITEMS UNTIL POSSIBLY DEFECTIVE ITEMS IN QUESTION ARE RECEIVED BY DESERT AIRCRAFT.***

Please be sure to pack any items sent to us carefully to prevent any shipping damage. Enclose the item(s) in a plastic bag(s) and then wrap with protective bubble wrap. Bagged parts, ignitions, etc, can be taped to larger items so they don't get "lost" in the packing material. Use a box with ample room. Be sure to include your contact information as well as a description of the problem.

Desert Aircraft

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Office hours are 9 am to 5 pm Arizona time.

Repair/Return Form (Please make copy)

Please fill out and enclose this form when shipping items for service

Customer Name_____ **Date**_____
Address_____
City_____ **State**_____ **Zip**_____ **Country**_____
Phone #_____ **Cell #**_____
Email _____

Items in Box:

DA50 Serial #_____ **DA60 Serial #**_____ **DA85 Serial #**_____
DA100 Serial #_____ **DA120 Serial #**_____ **DA150 Serial #**_____
DA170 Serial #_____ **DA200 serial #**_____ **Other**_____

Single Ignition Serial # _____ **Twin Ignition Serial # _____**

Prop Bolts? _____
Prop washer? _____
Muffler(s)? _____ **Muffler screws?**_____
Standoffs? _____
Other Items? _____

REASON FOR RETURN? Crash: Yes___ No____
Other:_____
_____
_____
_____
_____
_____
_____
_____

Oil used? _____
Gas type? _____
Exhaust system type? _____
Has the engine been sent in for service before? _____**Why?**_____
_____
_____

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