



DA35

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.
- Do not make adjustments to the motor while it is running.
- 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 correct length propeller bolts. Do not use spacers behind the propeller.
- Spinner cones must not touch the propeller.
- Thinner props may require the use 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 and use 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.
- 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. Undetected damage could turn into disaster when the prop is turning at thousands of RPM.

Motor Installation

- The DA35 can be mounted with or without the included stand-off spacer mounts. The ends of the spacers with “flats” are mounted to the motor mount tabs with steel M5x16 metric screws (supplied). The engine is mounted to the firewall with M5x25 mounting bolts and washers (supplied) that pass through the firewall and thread into the round end of the standoff mount.
- We recommend blue Loctite on all engine mounting screws. Check the mounting bolts regularly to insure they are tight.
- Thrust adjustments must be made by angling the firewall. Do not use shims, washers, or spacers behind the supplied stand-off mounts. Un-even shim heights will cause stress, and possible damage, to the engine case. The rear face of each stand-off must be mounted on the same surface plane.
- Do not use soft mounts with the supplied standoffs. The excess engine movement and vibration will cause problems with exhaust systems, carburetor components, and linkages, as well as damage to the engine.
- Make sure the aircraft’s firewall and/or motor box are strong and secure. If flex or movement is detected, in the mounting area, re-enforce the structure.
- Cooling is critical to motor performance and longevity. Allow as much cooling air as possible in through the front inlets of the cowl. Allow an outlet opening approximately 2 1/2 times larger than the intake at the bottom rear of the cowl for the hot air to escape. Air must flow through the cylinder fins, not just inside the cowl, to properly cool the motor. Don't let the air take the easy way out! Make it go through the fins. Round cowls with large frontal openings need ducting or shrouds to direct the air through the cylinder fins. Any air not directed to the engine is wasted.
- Keep components like the ignition system, fuel tank, fuel lines, receivers, etc, away from, or shielded from, heat generated by canister and tuned pipe exhaust systems. Hot fuel tanks and fuel lines can cause frustrating tuning issues, and overheated electronic components can have intermittent problems or total failures.
- 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 the firewall, be sure there is at least 3/8” (10mm) of clearance from the carburetor inlet. If there is less than this, make a hole larger than the carburetor inlet diameter in the firewall to insure the carburetor’s intake is un-restricted.
- The throttle arm is tapped for a 4-40 SAE ball link. The return spring tension on the DA35 carburetor is fairly light and we recommend leaving it in place. The spring reduces butterfly plate and shaft wear as well as insuring the throttle closes if the servo linkage fails.
- The choke arm has tapped holes for a 4-40 SAE ball link. It can be rotated 360 degrees to allow access from the rear, side, or front of the engine. A servo can be used or it can be operated manually. For maximum security, once the arm’s position has been determined, a small flat spot can be filed or ground on the choke shaft where the arm’s set screw seats. We also recommend thread locking compound like Loctite.
- To prohibit vibration damage to the choke assembly, do not remove the detent ball and spring on the choke shaft.
- Since the carburetor needles must often be adjusted differently with the cowl on as compared to off, we recommend small access holes be made in the cowl for adjusting the needle valves with a long, narrow, screwdriver.
- A 12 oz. fuel tank will typically be good for approx 12 minutes of flying time or more, depending on throttle settings. Use a larger tank if you require more flying time. The tank must be vented. The carb has a strong pump, so the tank can be mounted almost anywhere. The fuel line and tank stopper must be gas compatible. Do not use any silicone sealers on the fuel system. Gas can break it down and carry it into the carb.
- The inner diameter of the fuel tubing should be the same or larger than the carburetor's fuel inlet fitting's inner diameter. 1/8” I.D. is recommended. Make sure all fuel line connections are secure. For extra security, small nylon zip ties work well to keep the fuel line on the metal fittings. Make sure the fuel line is secure and not near the exhaust or cylinder fins. While an inline fuel filter can be used, we recommend filtering the gas entering the fuel tank from your field container.

Ignition System

Introduction

The **V2 Desert Aircraft Ignition** module is a microprocessor controlled auto advance/retard system.

The unique timing curve has been developed by Desert Aircraft to provide optimum performance and reliability for your DA35. This unique curve will provide easy starting, smooth running throughout the rev range and rapid response to acceleration and deceleration.

With the combination of multiple magnets on the engine hub and a bipolar hall sensor, the microprocessor can measure the shaft speed and position accurately. The V2 ignition provides consistent safe starting because the module won't spark unless the propeller is deliberately "flipped" at starting speed. The module will also not allow the engine to start or run backwards.

Warning! This programmed ignition system may not be compatible with other Desert Aircraft engines.

Mounting

The module is supplied with mounting grommets and eyelets to be used in a similar way they are used to mount servos. Alternatively the module can be mounted with Velcro straps on a foam/rubber bed. Cable ties (Zip ties) should be avoided as the hard plastic can damage the ignition module case over time.

Choose a location where the module can sit flat away from heat sources and well away from any receivers or connected servos. The module will produce a small amount of heat so do not completely enclose it in foam. (The top surface with the embossed logo is where most of the heat will be radiated from.)

Choose a location that will allow you to route the cables in such a way they will not be damaged.

The sensor cable is provided in a rubber braided sleeve that is resistant to high temperatures and abrasion. There is no need to provide any additional protection (e.g. spiral wrap) as that will just add mass to the sensor lead putting more strain on the connections.

The HT cable has an outer silicon jacket to give protection from both high temperatures and mechanical abrasion. Please take care that the cable is protected from sharp edges (e.g. fiberglass cowl edges) as this will cut through the protective sleeve and can result in unreliable engine performance. Route and support the cable so that it minimizes the amount of movement of the cable.

Connection

Three simple connections are all that is required.

1. Push the spark plug cap onto the CM6 spark plug until the hex of the spark plug is covered by the cap outer shell. The cap is secured by both the outer housing around the plug hex as well as the internal silicon moulding fitting over the plug top.
2. Plug the sensor lead into the module in the slot marked "SENSOR." A Futaba style lead is used so that it will only plug in one way. **YOU MUST USE A DA TYPE HALL SENSOR FOR CORRECT OPERATION.**
3. Connect the battery via your preferred switch (either mechanical or Tx controlled kill switch) to the slot marked "POWER." Check the alignment so that the polarity is correct. **IT IS IMPORTANT NOT TO CONNECT POWER TO A MODULE WITHOUT A SPARK PLUG FITTED TO THE CAP.**

Note about mechanical switches. We have found that toggle switches are un-reliable when subjected to the vibration typical of a model aircraft. Heavy duty slide style switches typically supplied by the radio manufacturers are better suited.

Battery Considerations

The V2 ignition module is nominally rated for 4.8 to 8.4V dc supply. This means you can use either a 4 or 5 cell nickel cadmium (NiCad), nickel metal hydride (NiMH) battery, or a 2 cell lithium ion (Li-ion), Lithium polymer (LiPo) or Lithium ion phosphate (LiFePO4) battery. The module features a constant power convertor to charge the high voltage capacitor. This will mean the higher the supply voltage used, the lower the current draw from the battery. On the V2 single ignition module, a 4cell NiCad 1100mAh battery will give a couple of hours of typical flying with plenty of reserve. A 2 cell Lion 600mAh will give approx the same running time.

Soft pack LiPo batteries while electrically compatible are not ideal for use in gas aircraft because of their mechanical construction. Over a period of time, the tab connection to the LiPo cells will not tolerate the vibration experienced by a typical gas aircraft. We have seen these connections become intermittent resulting in unreliable engine performance.

A reverse connected battery will not damage the module but it won't run and the LED will not turn on. On the other hand if you allow the battery positive (or an internal cell connection) to come into contact with the engine or the ignition module enclosure, **it will damage the module.** We have seen this happen with poor mounting of the battery pack which has worn through the insulation of the cell letting it touch the engine or module case.

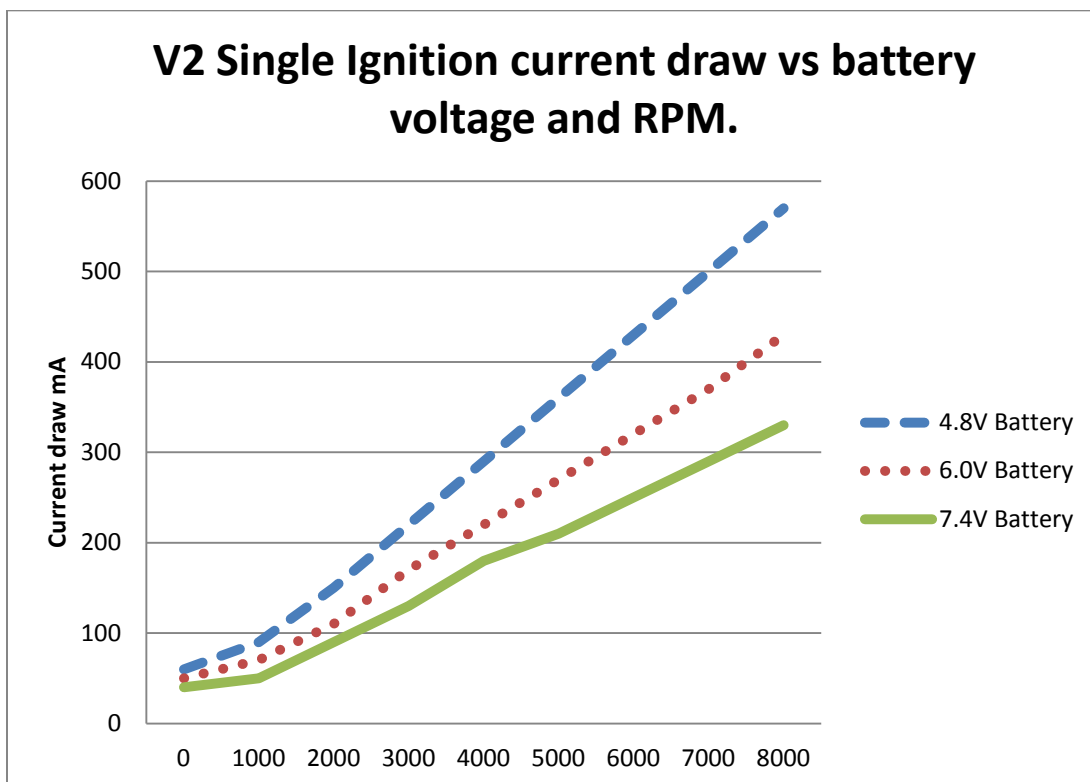
Ignition (continued)

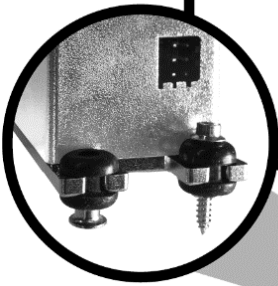
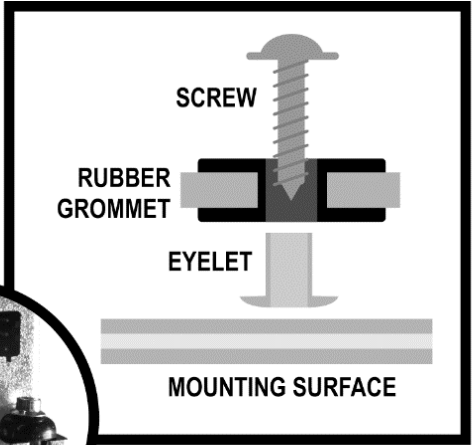
- Always perform a radio range check before flying. Range should be at least 200 Ft. with the plane on the ground and the motor running. If there are "glitches", DON'T FLY! Check for damage, loose connections, faulty radio/servo components, etc.
- When removing the spark plug caps, PULL STRAIGHT out on the caps. **Do not pull on the ignition wires!** If caps seem loose and are 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 caps must have the split retainer ring around the base to insure a tight fit. – DON'T FLY WITHOUT THEM!
- 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 caps! This can permanently damage the ignition coil.

Desert Aircraft V2 Ignition Specifications

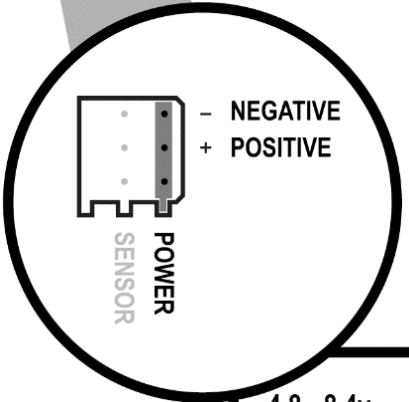
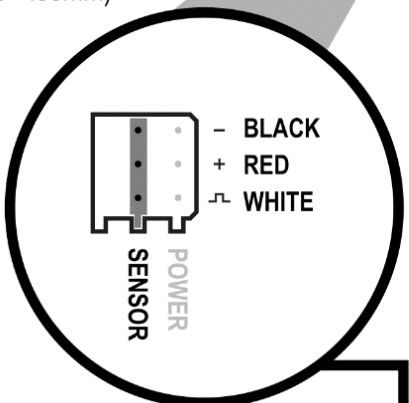
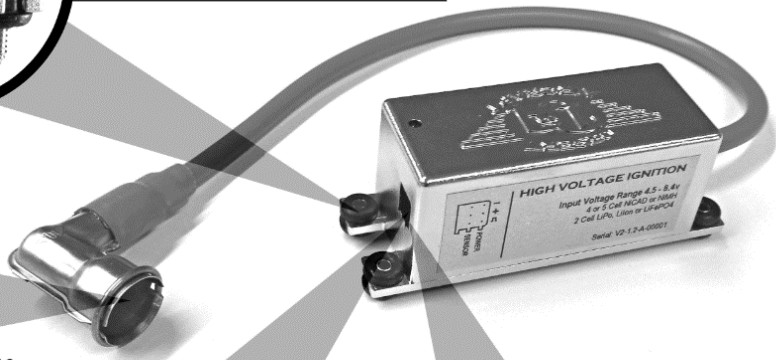
Note: Specifications subject to change.

Parameter	Minimum	Typical	Maximum
Operating voltage	4.5Vdc	4.8 to 7.4Vdc	8.5Vdc
Current draw. (See graph)	40mA (zero RPM)	90 to 500mA	600mA
Output voltage	20Kv	21kv	25kv
RPM range	250RPM	900 to 9,500RPM	15,000 RPM
North pole magnet		40 degrees BTDC	
South pole magnets		110 and 5 degrees BTDC	
Operating temp (module)	15°F (-10°C)	75°F (25°C)	122°F (50°C)
Operating temp (Sensor)	-40°F (-40°C)	75°F (25°C)	302°F (150°C)





CM6 SPARK PLUG
 .018 - .020" Gap
 (.45 - .50mm)



Ignition will only function correctly with
 DA HALL EFFECT SENSOR.

4.8 - 8.4v
 4 or 5 Cell NiCAD or NiMH
 2 Cell LiPo, Li-Ion, LiFE.
NO REGULATOR NEEDED

READ DETAILED INSTRUCTIONS BEFORE USE

Fuel and Oil Mix

- For the DA35, 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.
- 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) and Motul 800 (50 to 1). These oils can be found at most motorcycle shops.

Break-in

- We do not recommend breaking the engine in on a test stand. A stationary load and lack of air ducting can lead to engine overheating. After a few short runs and any required needle adjustments, we recommend flying the engine. The engine should run well from the beginning and improve as flight hours accumulate.
- Special break in props are not required. Just don't start with something beyond the recommended sizes. Over loading the engine creates excessive heat. We recommend that peak rpm should not exceed 8,400 rpm. The normal peak rpm range for break-in and normal flying is 7,500 to 8,200 rpm.
- Adjust the needles as needed and give the engine a few easy flights. The needles may need adjustment as the engine settles in and when other things change such as different props, exhaust, weather, and altitude.

Recommended Props

- Always check and tighten prop bolts before each flight! Loose prop bolts allow prop movement, which will shear the bolts.
- Always use the correct length prop bolts! If a spinner back plate is not used, the prop bolts may be too long and can bottom out in the hub before they fully tighten against the prop washer.
- The exhaust system, weight of the airplane, field elevation, etc., will have an effect on what prop load will work best for your application. Prop loads can vary from one prop to another, even when both are marked as the same size. Carbon fiber props usually have thinner airfoils and often produce higher rpm than the same diameter and pitch wood prop.
- Some recommended props are:
 - 2 Blade 20x8, 20x9, 20x10, 21x8
 - 3 Blade 18x10, 19x11N
- The DA35 has a wide power band. Again, the normal peak rpm range for break-in and normal flying is 7,500 to 8,200 rpm
- Smaller diameter props with more pitch, especially 3 blades, can reduce tip speed and noise.
- Always use a drill guide to drill your props.
- Always check the balance of your prop.
- For safety, we recommend painting the tips of your props (front and back) with a bright color, especially on black props.

Starting

1. Check that prop bolts are tight and spinner is secure.
2. Make sure the starting area is free of dirt, sand, gravel, or other loose debris
3. Turn on the radio system and check the throttle operation and position.
4. Have someone (with eye protection) firmly hold the plane.
5. Close the choke completely.
6. Open the throttle to approximately 1/4 position.
7. Turn on the ignition. BE SAFE! ALWAYS BE PREPARED FOR THE MOTOR TO START ON ANY FLIP OF THE PROP, whether the ignition switch is on or off!
8. Always wear a heavy leather glove when starting the motor.
9. Give the prop a quick, firm, flip counter clockwise. Follow through quickly as you flip the prop so your hand is out of the propeller's path. Repeat until the motor fires or “pops”.

Starting (Continued)

10. Open the choke.
11. Set throttle to idle position. (carb butterfly plate slightly open)
12. Flip the prop again until the motor runs.
13. Let the motor warm up for 15 or 20 seconds before advancing the throttle.

Needle Adjustments

- The needle farthest from the motor is the “High RPM” needle. The needle closest to motor is the “Low RPM” 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, fuel, carb variances, etc. A general starting point is: 1 3/8 open on the Low needle, 1 7/8 open on the High needle.
- Adjusting either needle (primarily the Low) can have a slight effect on the other. Example: leaning the Low needle can “slightly” lean the high range.
- Adjust the Low RPM needle until you achieve a smooth idle and a reliable transition to high throttle. Generally if the motor “stutters” or “coughs” in the mid range or when the throttle is advanced, the low end needle is too rich and possibly even the high end needle. If the motor dies quickly, the low end is probably lean.
- Adjust the High RPM needle to peak rpm. A tachometer is a great help, but remember that the RPM may drop a little bit after every start due to residual heat buildup. Don’t lean the mixture any more than necessary. If the rpm steadily drops at full throttle or fades on long vertical maneuvers, the motor is too lean and is overheating. Don’t set the needles overly rich to protect the engine. Operating the motor overly rich not only reduces power, it creates other problems such as poor transition, vibration, pre-mature carbon build up, fouled plugs, excessive exhaust residue, sticking rings, and overall rough running.

Trouble Shooting

Motor won't start

- Check battery voltage (should be 5.0+ volts when checked under load) and all ignition connections, wiring, and switches (both standard and optical). Wires can break from vibration near connectors. Check and/or swap out regulators, isolators, or optical switches if using one
- Check tank venting, clunk position, and fuel flow.
- Fuel doesn’t move in the line when the prop is flipped or carb doesn’t “prime”? Is the choke plate closed completely? Make sure tank is vented. Make sure there are no air/fuel links on the engine case or carb mount area. Is the carb or carb mount loose causing an air leak? Again, look for fuel seepage.
- Is throttle set at idle or slightly higher after motor “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 carb, the motor might be flooded. If so, remove and dry, or replace, the spark plugs. Try starting again without using the choke, then use the choke if required.

Other issues

- Fuel drips continually from carb: Make sure there is no debris in the needle seat. Remove needles and blow air into the holes. 5
- Broken prop bolts: In order for bolts to shear, some type of side loading (shear) movement is usually required. If the bolts are tightened correctly, nothing moves and prop bolts will rarely break. It’s a good idea to replace prop bolts routinely. Check prop bolts before each flight!
- Excessive vibration: Check that low rpm needle setting is not too rich. Check prop and spinner balance. Make sure ignition sensor hasn’t moved. Check that motor mount bolts are secure. Make sure firewall and motor box are rigid. Some poor designs need added re-enforcement to the firewall/motor box area to eliminate flex.
- Pink or purple colored cylinders: These colors indicate engine temperature has been too high. Check that needle settings are not too lean, air flow for cooling is sufficient, oil/gas mixture is correct.

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!

Maintenance

- Being a high performance 2 stroke engine, certain parts of your DA35 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. It's recommended to replace, rather than re-use the red aluminum screws.

	<u>Size</u>	<u>Torque specifications</u>
Spark plug:	CM-6, 10mm	90 in. lbs.
Steel prop bolts:	M4x 40mm	65 in. lbs.
Aluminum crankcase bolts:	M5x20mm	70 in. lbs. (Don't re-use. Replace with new)
Aluminum cylinder base bolts:	M5x13mm	70 in. lbs. (Don't re-use. Replace with new)
Aluminum carb mount bolts:	M5x55mm	50 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 4mm hex wrench for all M5 cap screws.
- Use a 3mm hex wrench for all M\$ cap screws
- For spinner mounting, the crankshaft extension is threaded for M5 screws. In this application 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 plug.

Manuals may be updated with additional tips and trouble-shooting info from time to time. Please check our web site, www.desertaircraft.com, or contact us for current manuals and updates.

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.

DA35 WARRANTY

Your DA35 engine and ignition system are covered with a 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, or the use of aftermarket parts, 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 OR REPLACE ANY WARRANTY REPLACEMENT ITEMS UNTIL ITEMS IN QUESTION ARE RECEIVED BY DESERT AIRCRAFT AND DEEMED DEFECTIVE.

DESERT AIRCRAFT

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Repair/Return Form

(Please make copy)

Please fill out and enclose this form when shipping items for service. Pack items carefully!

Customer Name _____ Date _____
Address _____
City _____ State _____ Zip _____ Country _____
Phone # _____ Cell # _____
Email _____

Items in Box:

DA35 Serial # _____ DA50 Serial # _____ DA60 Serial # _____
DA70 Serial # _____ DA85 Serial # _____ DA100 Serial # _____ DA100i Serial
_____ DA120 Serial # _____ DA150 Serial # _____ DA170 Serial # _____
DA200 serial # _____ Other _____

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

(Below items normally not required to repair or test the engine)

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

REASON FOR ENGINE AND/OR IGNITION RETURN?

Crash: Yes _____ No _____ Other _____

Prop used? _____ Oil used? _____
Gas type? _____ Exhaust system type? _____

Has the engine been sent in for service before? _____ Why? _____

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