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**DA100**

# **Owners Manual**

## **Introduction**

*The DA 100 was designed to provide the highest quality and performance in Giant Scale modeling. Unlike most other large gas engines on the market, the DA 100 is not a combination of various industrial motor parts. Desert Aircraft computer designed the DA100 from the ground up as a high performance aircraft engine. We did not cut any corners. Existing cylinders, pistons and crankshafts were plentiful and cheap, but did not offer the performance and other features that we needed. The DA 100 pistons, cylinders and crankshaft were designed by, and manufactured exclusively for, Desert Aircraft.*

*Like the TOC Champion DA150, the DA100 features long connecting rods and high piston pin location for better rod angularity and piston tracking. Three large crankshaft bearings are used to offer maximum stability and longevity. The pistons, rods, and crankshaft are very well balanced, providing the smoothest vibration levels for your airframe and radio system in its class.*

*Rather than use a shaft extension to gain clearance between the prop and the cylinders and carburetor, the front section of the case is long, with a bearing right behind the prop hub. Not only does this provide a very stable crankshaft, it also makes fitting the engine and mufflers in the cowl, much easier.*

*The crankcases are CNC milled from 7075 T6 aluminum alloy. Along with excellent fit and finish, precise bearing alignment is insured, which is critical to engine performance.*

*The reliable Desert Aircraft auto advance, electronic ignition system insures easy starting and high performance. This ignition provides a powerful spark, yet is fully shielded to insure protection from R/F noise.*

*Congratulations and thank you from all of us at Desert Aircraft for choosing to own the best in Giant Scale engines!*

## **Safety Instructions**

**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.
- 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.
- 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.
- 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 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.
- 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.

## **Motor Installation**

- Mount the motor using high grade 1/4" or 6mm dia. bolts with washers and locking nuts on the rear of the firewall. Make sure your firewall is structurally sound. The crankshaft centerline is in the exact center of the rear mounting plate bolt pattern.
- The throttle arm is pre-tapped for a 2-56 ball link. Make sure the carburetor's idle set screw is removed or set so that the carb can be fully closed by the servo at low trim. Use a high quality servo for the throttle. A poor quality servo or linkage will not provide accurate and repeatable throttle settings. Don't use metal to metal linkages.
- Un-hook, but **don't remove**, the throttle return spring if the motor is not going to be bench run.
- Do not try to rotate the carburetor 180 deg. on the mounting block or remove the butterfly shaft assembly. Do not remove the composite carburetor mounting block from the reed valve assembly. It is sealed with a special sealant and may not re-seal correctly if removed.
- When not using case pressure for a smoke pump, make sure the hole for crankcase pressure (back of the case, near the carb mount) is sealed.
- The carburetor needs at least 1 1/2" (38mm) of clearance between the intake and the bottom of the cowl. If there is less than 1 1/2", make an opening in the cowl below the carb at least as large as the carb intake diameter.
- Since the carburetor 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, screw driver. Sometimes the needles can be reached through the cowl's openings for the exhaust system.
- A 32 oz. (or larger) fuel tank is recommended. 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. The inner diameter of the fuel tubing should be the same or larger than the carburetor's fuel inlet fitting's inner diameter. Make sure all fuel line connections are secure. Small nylon zip ties work well to keep the fuel line on the metal fittings. Make sure the fuel line is secure and not touching the exhaust or cylinder fins. An inline fuel filter is recommended.
- Cooling is critical to motor performance and longevity. Allow as much cooling air as possible in from the front of the cowl. Allow an opening at least 2 1/2 times larger at the rear or bottom 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. Air ducts can be made from thin plywood, balsa, fiberglass, or aluminum sheet to guide and force air from the front inlets to and through the cylinder fins.

- Depending on the location of the exhaust system, and cowl airflow, the carburetor may need some air cooling also. A hot carb can be erratic in flight or make the motor hard to restart. Sometimes placing heat shielding material between the exhaust and carburetor can help.

## **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. Keeps 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.
- Isolate the charge circuit from the ignition while charging the batteries. In other words don't "charge" the ignition module.
- Use 4.8 or 6 volt rated batteries only. Higher voltage will damage the ignition system and will void the warranty. We recommend a 1400 mAh or larger capacity pack. With this size, the ignition should last longer than your receiver pack will. If the meter shows 5.0 volts or less, don't fly, re-charge. (A 4.8 volt pack will read 5.2 + when fully charged.)
- 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 fire. This helps to prevent the motor from firing accidentally. Unless you are having problems starting the motor, don't bother "testing" the ignition with the plug removed from the cylinder.
- When removing the spark plug caps, PULL STRAIGHT out on the caps, not the shielded ignition wires! If the cap seems loose, and is not making a solid metal to metal contact with the spark plug base, contact Desert Aircraft for a replacement. To prevent radio interference, the spark plug caps must have the split retainer ring around the base to insure a tight fit to the spark plugs – DON'T FLY WITHOUT THEM!
- **Protect the shielded plug wires 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 (i.e: RADIO INTERFERENCE!)
- 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. Range with one section of the antenna extended should be at least 80 to 100 ft. with the plane on the ground and the motor running. If there are "glitches", DON'T FLY! Check for holes in the braided shielding or loose connections (spark plug caps, connectors and switches). If that

doesn't solve the problem, re-locate your ignition and receiver components farther apart. If the problem persists, return the ignition to Desert Aircraft for inspection.

- 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 .015" to .020" (.38 to .50 mm)

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## **Fuel and Oil Mix**

- Mid to High octane gas is recommended.
- We recommend filtering your fuel, between your fuel container and your plane's fuel tank. Also, a high flow inline filter, or clunk/ filter between the tank and motor is a good idea.
- For break-in, we recommend a petroleum based oil such as Lawn Boy Ashless or Pennzoil Air Cooled 2 stroke oil at 32 to 1. Run at least 4 to 5 gallons of petroleum oil/gas mix for break-in. Peak rpm should be over 6,000 during the break-in process.
- After the break-in process, we recommend a high quality synthetic oil. As for brands of oil, there are many good ones on the market. Some oils, and their mix ratios, that Desert Aircraft recommends are: Amsoil "100 to 1" Premix (100 to 1) and Bel-Ray H1-R (50 to 1). These oils can be found at most motorcycle shops.
- Make sure the plane's tank is well vented and the fuel clunk moves freely.
- Use of any other fuel or additives such as methanol, nitro formulas, etc., can harm the motor and will void the warranty.
- Do not use any silicon sealers on the fuel system. Gas can break it down and carry it into the carb.

## **Recommended Props**

- Always inspect your prop and spinner and **tighten prop bolts** before each flight! Lose prop bolts allow prop movement which will shear the bolts.
- While special break-in props are not generally required, they can help speed up the break-in process and reduce the risk of over loading the motor.
- The following props are recommended:  
For break-in:      Menz 26x10, 26x12, 27x10   Mejzlik 26x12, 28x10   Bolly 26x12  
For normal use:   Mejzlik 27x10, 28x10, 28x12, (25x12, 26x12 3 blades)  
                          Menz 26x10, 27x10, 28x8, 28x10  
                          Bolly 28x10  
                          Airmodels 28x10, (25x12, 26x12 3 blades)
- The DA100 has a very wide power band. The "normal" peak operating rpm for break-in is 6,000 to 6,500 rpm, and 5,700 to 6,800 rpm for normal aerobatics after break-in. With fine tuning and a large prop, the idle can be as low as 800 rpm.
- Smaller diameter props with more pitch, especially 3 blades, will reduce noise.
- Remember, lower rpm normally equals less 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 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 the prop is turning at thousands of RPM.

## **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. 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".
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 End" needle. The needle closest to motor 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, fuel, carb variances, etc. A general starting point is: 1 3/8 open on the Low needle, 1 1/2 open on the High needle.
- Adjusting either needle can have a slight effect on the other. Example: leaning the low needle can "slightly" lean the high range.
- Adjust the High End 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 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 motor is too lean and is over heating.
- Adjust the Low End 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.

- Set the High needle slightly rich during break-in. Operating the motor 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**

- Check battery voltage (should be at least 5.0+ volts) and all ignition connections, wiring and switches.
- Check tank venting, clunk position, and fuel flow.
- Is the case pressure tap sealed? ( 1/4" 28 threaded hole in the rear case, near carb)
- Does fuel move towards the carb when the prop is flipped?
- If carb isn't priming, is choke plate closing completely? Is the carb or carb mount loose causing an air leak? 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, plugs. Try starting again without using the choke.

### **Motor runs poorly in flight, especially during aerobatics**

- The motor might be too rich. Make sure both needles are adjusted to peak performance.
- Make sure carb has not become loose causing an air leak. Look for fuel seepage. Check that the fuel clunk is not stuck in the wrong 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.
- A common cause of poor running during aerobatics with gas aircraft motors is the variation of airflow and air pressure around the carb inlet and the carb pump vent hole (located on the front carb diaphragm cover). The carb has a hard time adjusting to positive and negative pressures in and around the cowl. If the vent hole senses the prop blast or some other pressure variance, it will usually cause the carb to pump more fuel, which in turn makes the motor run rich. One symptom is that the motor becomes rich on take off. Shielding the carb from the "hostile" airflow usually cures this problem. Cooling shrouds, between the cylinders and the bottom edge of the air inlets on the front of the cowl, not only lower the motors operating temperature, but also help to prevent air from rushing down the inside of the cowl and effecting the carb air flow. Cowled-in carbs have less problems than those exposed to the outside airflow. A small air dam behind the carb inlet can help give a good positive air flow to exposed carb inlets.



If any problem persists, please contact **DESERT AIRCRAFT**

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## **DA100 WARRANTY**

Your DA100 motor and ignition system are covered by a 2 year warranty, 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 will 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, modifications, or maintenance.
- Damage caused by a crash.
- Damage caused by using improper fuel or additives.
- Damage incurred during transit to Desert Aircraft. **PACK ENGINE CAREFULLY!!**

**Note! Replacement items will not be shipped until suspect items are received by, and deemed defective by, Desert Aircraft.**

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