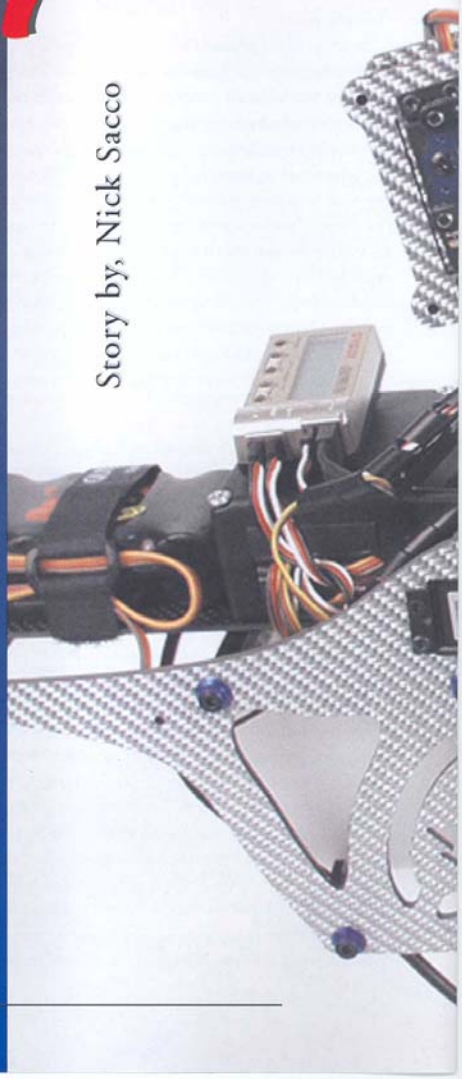
Quick Gas-Her

Story by, Nick Sacco



Model Helicopters just keep getting better and better! I don't design helicopters for a living, but quality is something that doesn't take an advanced degree to understand. When you have your hands on quality, it's pretty obvious.

When I set eyes on the Pro GasHer helicopter from Quick Worldwide for the first time, the word; "Wow" seemed perfectly appropriate. My eyes immediately went to the silver carbon fiber frames. From there my jaw started to drop as my eyes lingered over the vented, machined clutch bell and then the massive all-metal machined head. Just like the lady from the commercial we all know who said; "Where's the beef?" I was asking myself; "Where's the plastic?" But, there wasn't any. I eyed the swashplate and the washout base and tapped the metal parts just to be sure.

Slowly my eyes traveled the length of the anodized blue tailboom to the tail mechanics and yep, sure enough I found the plastic, the tail blades. This discovery was however, totally anti-climactic. This helicopter is not a pieced together helicopter. It's a new design and each portion of the helicopter (e.g., head, frame, mechanics) was designed to function together.

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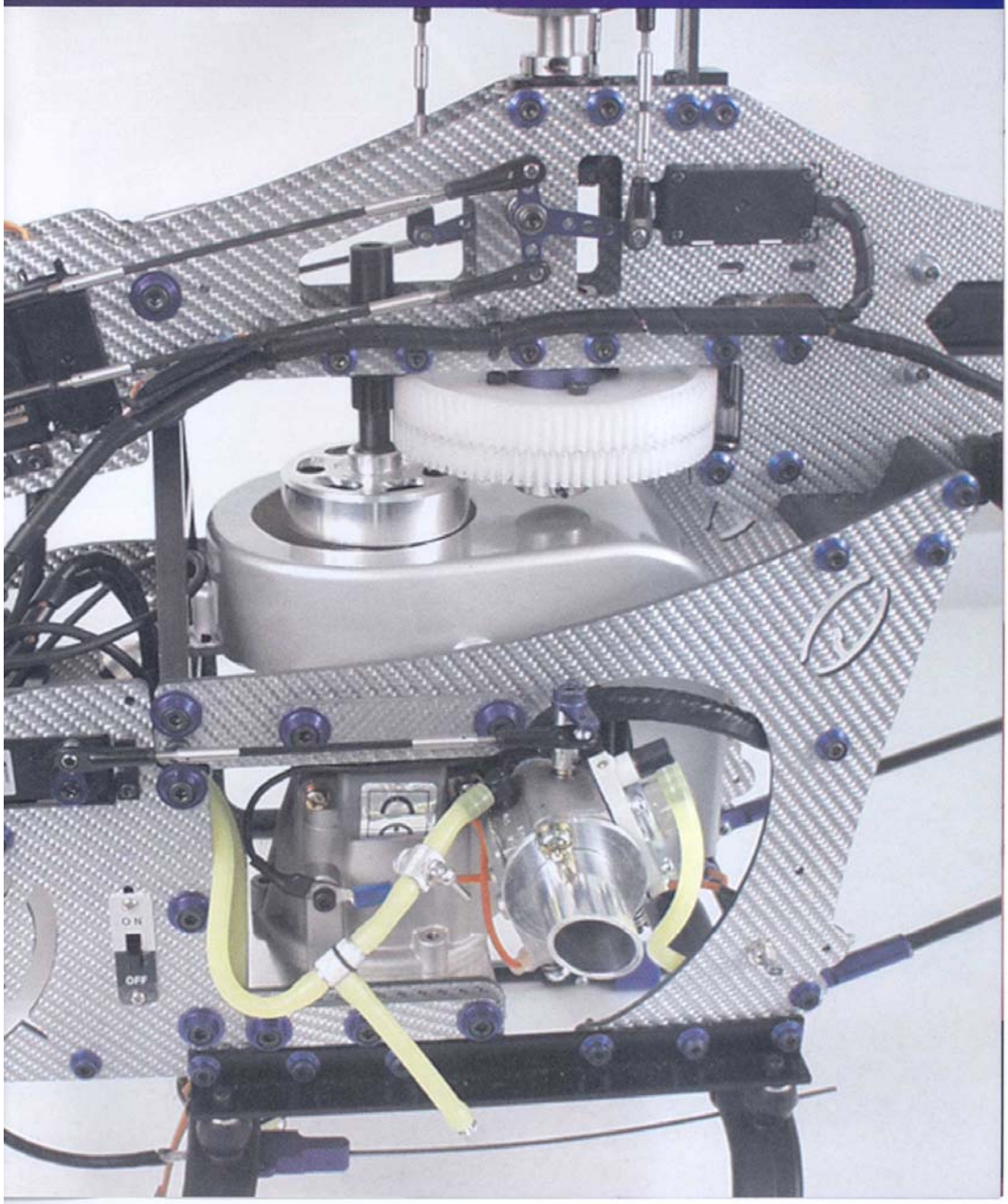


The GasHer main rotor head is all business. Blade grips and pitch arms are bulletproof. Head has a nice soft feel in hover yet, as you push the stick over, it comes to life.

I spoke with the creator of the helicopter and I learned that it is a new design. Actually, it is one of many new designs to be offered by Quick Worldwide in the coming months. The creator of the GasHer is Mr. Irwin Siner. Irwin has been around helicopters for many years. Longer than I have, that's for sure.

Does he know what works best in his helicopters? Yes. He flies all of them with the intention of making the last flight better than the first. His passion for helicopters is evident in his products and in talking with him about ideas for future designs.

So let's dive into this flagship from Quick Worldwide. Let me take you around the model and together we'll look it over, kick the tires...er...skids!

GasHer by Quick Worldwide

The helicopter is built around the well-known Zenoah G-26. This engine follows an impressive line of small displacement gasoline engines from Japan. First in a gas helicopter there was the G-23. Miniature Aircraft used this in the original Gasser model (1005) back in the early 1990's. I fly my MA Gasser all the time and I think that gasoline engines are a wonderful thing to behold!

The G-23 was later followed by the G-231, which was based on the G-23 but some additional power was obtained by Zenoah. Finally, the G-26 arrived with a bigger bore and still more power. See inset for comparisons.

The GasHer is available in two models; the Sport and the Pro. The main differences are as follows:

Sport: *G-10 frames - Single Spindle w typical through-the-head design seen on many fine helicopters - Mostly metal tail mechanics - Boom supports are Carbon -Tail Grips are composite - Main Grips are CNC.*

Pro: *Carbon fiber fames - Double Spindle (one for each blade holder) design. No, this is NOT a flapping head design - Full metal tail components - Tail Grips are Aluminum - Main Grips are Aluminum with replaceable stainless steel inserts for drag bolts.*

The standard model is available with a belt-driven tail system. A tube drive system is available later or may be substituted for the belt system at additional cost when purchased. Plastic tail blades are included. Carbon fiber blades may be purchased separately.

The GasHer is built like a tank. She is 13 pounds of beautiful muscle. The GasHer's looks are both gorgeous and

The tail rotor gearbox is conventional. However, the CNC slider, blade hub & blade grips provide a solid tail rotor system.

futuristic. She has 3mm thick frames, machined head and tail system, tall, stout plastic landing struts, innovative rubber dampened engine mounting system, and thick molded and fully supported tail boom mount.

When you select your style of GasHer, blades and muffler are not included. There are many kinds of blades available and generally pilots have their favorites. Speaking of mufflers, there are many from which to choose: Quick Worldwide has an amazing-looking twin pipe model consisting of one stainless steel manifold which splits at a "Y" juncture into 2 ends for the twin pipes. The Hatori 957 with its shiny aluminum body and one-piece design is quiet and attractive. A tuned pipe system is available as a stainless steel header with an aluminum expansion-type muffler. There are others available.

THE HEAD

The head on the Pro is a unique design. There are two machined halves of the head, each contains a spindle supported by 2 radial bearings and 1 thrust bearing. The spindle of course is what attaches to the machined main blade grips. Dampening is achieved by 5 "O" rings surrounding a dampening shaft that mounts perpendicularly to the yoke or center hub (the part that slips on to the mainshaft). A shaft called the "center shaft" is the pivot point for the machined halves and is supported by radial bearings, as is the dampening shaft. What does all of that mean? In short, it means strength, reliability, and longevity.

The head uses a 6-piece flybar control arm on the seesaw that offers tremendous stability and stiffness to the flybar control. The design of the control system is designed for precise and accurate control of all moving head parts.

The helicopter uses the familiar Collective, Cyclic, Pitch, Mixing (CCPM) arrangement of 120-degree sliding swashplate design. That is, the swashplate moves up and down the mainshaft depending upon the amount of collective required. That means three servos operate at the same time, not just one. That means that three times the current is being drawn out of the batteries, and that means good battery management is imperative, but...more about that later. Roll and pitch or cyclic control means that the transmitter interprets the control stick input for say, left and forward cyclic and mixes it in a predetermined proportion to the three servos. That means that your old 4-channel AM radio is really not going to work. You will be required to purchase a transmitter with CCPM programming.

Side view shows the modular construction. Note the dual gear drive train. Plenty of room for the radio gear.

The interesting difference is the linkage arrangement of the three servos that are mounted in the top section of the helicopter. It would take me too long to describe how it works, so please refer to the pictures in the article. Suffice it to say that the servos are not mounted directly under the swashplate. Although nothing in this world is perfect, using the same type servos on the swashplate will minimize control interaction on the swashplate. Pitch control is a "leading edge" design, meaning that the control arm to rotate the blades is mounted on the same side as the leading edge of the blade.

TRANSMISSION

The GasHer uses a double main gear system configuration stacked one on top of the other. The main gears have 88 teeth and the clutch pinion uses an 11 tooth pinion for a gear ratio of 8:1. The purpose of the stacked arrangement provides the helicopter with a driven tail system. What's a driven tail? Well, when the engine is stopped on helicopters without driven tails, the tail blades stop. The pilot has little or no tail control on the way down and as long as forward motion is continued, the helicopter's tail weathervanes behind the canopy and things are just fine.

A driven tail on the other hand, affords the pilot tail control by allowing the main rotor blades to power the tail system via the one-way clutch. If the blades are turning (engine running or not) the tail system is turning. Nice.

The double-stacked gears allow the helicopter to have separate gearing; one gear connects the engine pinion to the main shaft through the one-way bearing. Rotation for the tail blades is provided by an idler gear. This gear meshes with the lower main gear (connected to the mainshaft) and via a vertical axle to a tooth gear (on which rides the drive belt) the belt is spun and connects to the rear tooth gear/axle on which the tail blades are mounted. The belt makes a 90-degree turn down the tail boom. The arrangement is very simple and smooth.

An optional tube drive system is available from QWW and allows the pilot to use a longer tail boom and consequently longer main blades. The pilot is able to use 700 to 710mm blades with the standard tail boom and belt drive, and up to 800mm blades with the longer boom. My testing was done with the standard length boom and belt driven tail system.

THE TAIL

The GasHer uses a fairly standard arrangement of mechanics in the tail to provide tail blade pitch adjustment. But what impressed me were the parts used and the fit and machining of the parts. To give you an example; without any

lubrication, the tail pitch slider (and complete mechanics including blades) would move up and down the output axle as the boom was rotated on its own and without any lubrication!

The pitch slider is a threaded bronze slider barrel onto which goes the internally bearinged ball and link-arm support arms. This is held in place using a knurled nut that threads onto the end of the bronze barrel. There is a ball and socket arrangement in the pitch slider mechanism that is a jewel. The socket is a bronze socket that is pressed into a location in the aluminum arm. The resulting product is again smooth and free of slop.

Everything back here is metal except for the carbon fiber (or G-10 in Sport) frame sides, including the ball links on the blade grips. It's good quality work and provides a predictable and slop-free tail system.

A nice feature of the ball location in the grips is that placing the ball into the outermost hole (and combining with a neutral servo arm position and proper pitch rod length) provides the pilot with a 3-degree positive pitch automatically.

UNIQUE ITEMS

There are plenty of innovative or and/or refined mechanical items on the GasHer. Here are a few in this category:

❑ Dampened Engine Mount The engine mounts to the sideframes only. There is no "bottom" to the helicopter. To accomplish the mounting, the GasHer utilizes two aluminum-machined plates fastened to the top and bottom of the G-26 engine. These plates contain 10 locations where bolts are threaded through the sideframes and into the two plates. But, what makes this mounting system unique is that inside these 10 locations are soft dampeners which are designed to absorb much of the engine's vibrations.

❑ Gas Tank How exciting can this be right? Actually it has great features. The tank has a centerline around its horizontal, which makes finding "half-tank" easy. There are two vertical raised mold lines at either end of the tank that are used in the frame system to retain the tank, and keep it from siding fore and aft. The tank is fastened by two adjustable frame supports. The stopper system accommodates three lines. The inside and outside of the stopper are machined aluminum and allow the builder to securely tighten the center screw, which holds it all together. The tubes in the tank are very stiff thick-walled aluminum and are sized to the Medium Tygon tubing.

❑ Predrilled Holes In addition to the mounting holes, additional holes are drilled into the frame for tie-wraps, kill switch, and on-off switch. This is one of those details that speak quality to all pilots!

❑ Huge Radio Tray This is the only helicopter I have that actually has excess room for mounting radio, batteries and gyro. Honestly, I hated to locate the radio on the tray because it has the "QWW" cut into it and looks great.

❑ Solid Boom Support The plastic 2-piece compression "socket" for the tail boom is chunky and solid and best yet, the boom fits very tightly without any tape!

❑ Lower Frame Rails Another chunk of 3mm machined aluminum terminating the frames and connecting to the tall, hefty skids.

❑ Carbon Rod System Although building linkage rods are my least favorite of all things to do, I loved the finished product. They look sharp, they don't bend, and they are always straight.

❑ Metal Servo Mounting Plates There are four plates used (front and back) on each servo. These offer balanced mounting of the servo body and offer excellent support for the four 2-56 hex screws.

❑ Vented Clutch Bell This offers additional cooling for the bell, yes. But I liked being able to peer inside the unit and keep tabs on the lining and the clutch itself.

❑ Perfect Fitting One-Way Indicating Links. These links are marked on the outside by having an "O" around the ball hole. They are easy to snap on and off (ball-link pliers are recommended) and easy to know which direction is the best. There is no binding of any links against the balls on a new helicopter. This is great news for anyone who has built a new heli and had to resize every link.

❑ Sufficient Cooling All helicopters must have good cooling for maximum engine longevity. The GasHer is no exception. The 8-bladed plastic fan utilizes forward facing cupped blades providing sufficient airflow over the engine even at idle speeds. There is enough RPM room before engagement of the clutch for the fan to provide cooling air, preventing overheating on the ground.

❑ Replaceable Stainless Steel Inserts for Drag Link Bolts This feature adds longevity and strength to the blade grips. The drag link bolts that fasten the blades to the grips pass through very hard stainless steel inserts. Should these holes ever elongate, replacing the inserts is easy and saves time and money not having to rebuild the head.

❑ Dense, Hard Delrin Main Gears These gears are tough. They are very hard, and wear well.

❑ Tall Landing Skids I liked the height of the helicopter. A tall helicopter doesn't get its tail stuck in tall grass, and offers some additional flexing on landings.

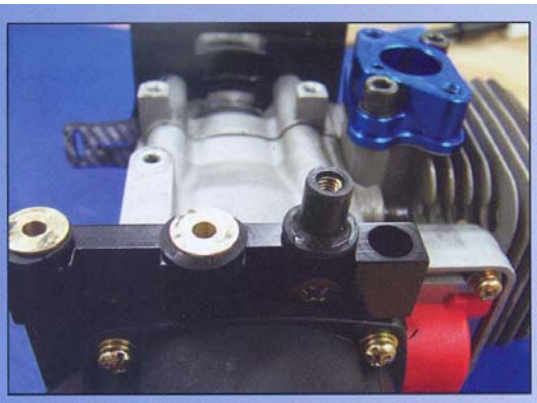
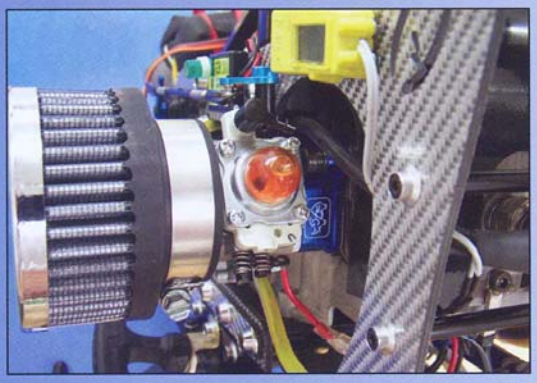


Image showing unique engine mount, see text for more details.



Note carburetor and Z-RC's machined aluminum spacer - see text.

Image shows the GasHer's clutch and pinion arrangement.

CONFIGURATION

I completed my GasHer using non-digital servos on the controls. I used a Futaba 401 gyro system with a Futaba Digital 9232 servo on the tail. The throttle uses a plain old JR 517. I used Tygon fuel tubing throughout and a three-way fuel filter on the helicopter.

Radio settings refer to JR. I'm not being a snob; I just have a JR radio.

120-degree CCPM Setup:

- o Front Left Servo - Channel 2
- o Rear Right Servo - Channel 3
- o Front Right Servo - Channel 6

Swashplate Travel Adjust for Elevator is same as the Aileron, but must be a Negative Number.

I used my VexaControl's ServoXciter (ROTORY January 2003) and my Electrodynamics ServoCiser to center my servos as I was setting up linkages. I used their handy sweep feature to exercise the servos and watch the controls. It was interesting too, to see the low current draw from the servos, thanks to the extremely smooth control linkages in the GasHer.

I used QWW's landing gear dampeners, skid stops, and metal servo arms. I needed two servo lead extensions (one for the tail servo and one for the rear right side CCPM servo. I used a Dean's base-loaded antenna as I did not want any antenna wire showing. I used Zenoah's on-off switch for the kill switch, but any good sturdy SPST switch will work. Zenoah's comes with the proper plug on one lead that fits the black wire from the G-26 and the other lead has a fork-type connector for mounting under an engine screw.

I used Futaba's 401-gyro system, with a 9253 digital servo. This gyro is made for digital or non-digital servos and allows the pilot to switch preferences. I liked the responsiveness with this combination and felt the tail was being managed perfectly.

I used Electrotek's GEM 2000 (ROTORY NOV 2003) for my battery monitor. This device has an extremely bright flashing LED that makes checking the battery voltage easy. As an added feature it can also help diagnose radio problems.

Since I like to monitor the engine's operating temperature, I used an MIP engine temperature monitor with the sensor mounted on the threaded hole in the top of the cylinder head. I also used the Eagletree System's Seagull Dashboard (ROTORY Jan 2006) so that I could monitor Rotor Speed, engine temperature and other things in flight and instantaneously.

I used a very nice K&N filter obtained from O'Neill Brothers Racing in California. These filters weigh about 125 grams, so if you're counting calories its weight may put you off. If you really don't care and desire excellent air filtration and good looks like I do - get one. Be sure to lubricate the filter too, K&N filters are designed to be lubricated with light oil for maximum efficiency and are soapy water washable.

I filter my fuel from the can to the helicopter. In my way of thinking, the helicopter filter is just redundant and gives me added assurance that the fuel is clean. There is another very fine filter within the G-26's Walbro carburetor, but I definitely don't want to regularly have to check that! For fuel, I used regular 87 octane gasoline and 6oz per gallon of Klotz synthetic Modelube as the oil. After an initial break-in hover routine of a gallon, I run 5oz of Klotz. Just because I don't get to fly as often as I'd like, I squirt a couple shots of Stabil into my gallon container. Stabil allows gasoline to sit for extended periods without going bad. A word: 6oz of Klotz is really not for flying around. It is too much oil in my opinion and the engine does not run that well. Additionally, the carburetor needles were too touchy.

I routed the helicopter's fuel lines (Medium Tygon) as follows:

❑ The tank's clunk line runs from the tank to the carburetor intake.

❑ The tank's vent line (straight in the tank) runs to the overflow nipple on the primer-bulb side of the carburetor. I have a 3-way filter in this line that allows me to fuel the helicopter without disconnecting lines.

❑ The tank's vent line (bent to nearly touch the inside top of the tank) runs to the bottom of the helicopter as simply an overflow. I have it fastened on the bottom of the helicopter so it doesn't flop around.

I would not recommend placing a filter in the line from tank to carburetor. I found in my testing that when a filter was used in the fuel line, bubbles formed in the filter and caused the engine to run lean. This of course, makes it very difficult to set the carburetor and very easy to overheat the engine. Miniature Aircraft's, Operator's Guide for the Spectra-G offers this advice.

Be aware that if you use a 3-way filter in the primer-overflow line, you will not be able to empty the tank, since the internal tube does not reach the bottom of the tank. There are many ways to solve this problem and I chose to extend the overflow tube from the primer to the bottom of the tank using a length of Tygon tubing. I am merely using the filter as a way to refuel and defuel without pulling tubing.

For electric power, I used some 3000mah NiCd batteries I had. If you decide to use all digital servos, I would definitely consider something along these lines too. I use high capacity batteries, just because I don't like worrying about charging all the time - that's where having an onboard voltage monitor is wonderful. Also high-drain applications can take down a marginal capacity battery very quickly and cause negative voltage spikes during maneuvers. Negative voltage spikes are like "drop-outs" in audio recordings. Not a good thing because the receiver and other equipment in the helicopter literally have no power. Some pilots call it "glitching" but it might be due to low battery capacity. Braiding for making the wiring pretty is obtained at any automotive store. I wrapped the batteries in foam and used some insulating plumbing pipe for the receiver.

Moving parts like the pitch slider and washout were treated to a light touch of TriFlo oil. I also lubricated all the bearings in the helicopter too. Bearings are easy to lubricate during building - sometimes nearly impossible when the helicopter is built. Other than the grips, and clutch - the bearings in this helicopter are fairly easy to get to. I would recommend a pinpoint oiler or syringe and apply a drop to all of the bearings.

Bearings are lubricated from the factory, but in my opinion, this is added insurance. I found that by inverting the helicopter, I was able to get at those hidden tail belt bearings and mainshaft bearings, including the swashplate.

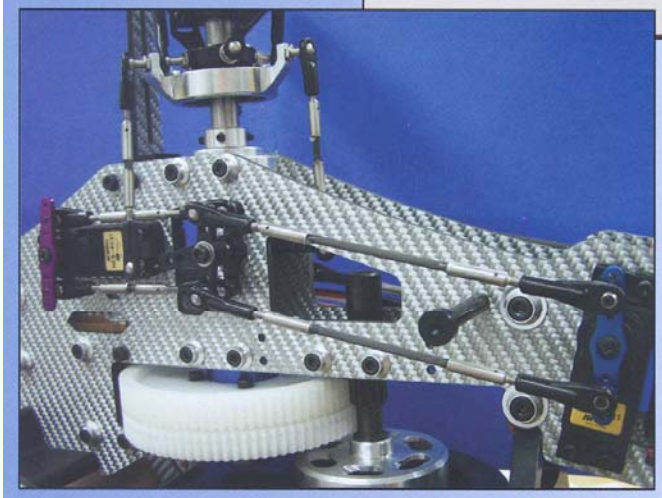
Avoid using oil on the clutch shaft itself in the bell because it will be thrown out on the clutch liner. This causes clutches to slip and/or burn. Too much oil is surprisingly very little in this area, so if you insist and oil away, at least make it a thin film of oil. Remember that the bearings in the clutch are only used when the engine is idling. Once the clutch is engaged, the bearings are essentially "not used" as bearings.

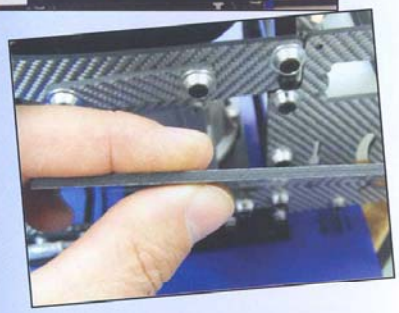
This is a gasoline helicopter. Gasoline engines utilize spark-ignition systems and these engines produce a lot of radio frequency (RF) noise. I did some experimentation with both FM as PPM and PCM and I came to the conclusion that that while you could fly the helicopter on PPM, doing so would be very risky. I received many glitches with the transmitter antenna out or down and very limited range. With PCM (which masks the glitching from the RF interference) the radio control was very solid - even with the transmitter off or down. I did not utilize any spark plug or spark plug wire shielding.

TUNING AND FLIGHT TESTING

I've flown gasoline engines for over 10 years in helicopters and airplanes and so I'm quite familiar with how they work and how to tune them. But it was refreshing to read Miniature

Shown is a custom tuned pipe offered by Quick, which is manufactured in Germany. This pipe adds performance with its .85 litre volume. The header is stainless steel and the pipe is aluminum. It comes complete with all couplings and clamps.





The GasHer has silver carbon fiber side frames, which makes for a rigid system.

Above: Good image of the GasHer's push-pull arrangement on the servos.

Right: The fuel tank is captured between the frames with its own mounting system.

Aircraft's Spectra-G Operator's Guide. In it you'll find information such as; diagnosing the engine by reviewing the spark plug's condition, or what to expect when the engine is too rich or too lean. See their website under the Spectra-G.

Another source of tuning information you may be interested in comes in the form of a DVD from a field rep of Bergen Helicopters called Gary Travis. Although Gary provides information on gasser setup and tuning for the Bergen Gasser, the principles he explains are valid on any gas helicopter.

During my hover testing and engine break-in of my test helicopter, I experienced clutch slippage. QWW had initially shipped a 12-tooth pinion gear but later sent me an 11-tooth pinion saying that the 11-tooth gear would solve the problem. As of the time of this article, I have not experienced further problems, although I do not have extensive flying time on the bird.

The Zenoah engines utilize a plastic spacer between the carburetor and engine. This spacer can leak air into the engine causing an insidious lean condition. This condition will cause the engine to run hot, be difficult to adjust, and to run erratically. After a few tanks of gas, I began experiencing these kinds of problems. They manifested themselves as described, but additionally the engine would continue to "hang on the pipe".

Hanging on the pipe is when the engine is throttled to idle but continues to run at a faster than normal speed and sounds like it's "buzzing". Carburetor settings too lean cause this, but air leaks around the carburetor were the culprit in my case. Viewing the carburetor spacer closely revealed that the plastic around the screw holes was higher than the gasket surface. Because of this, the gaskets were not compressed properly allowing air to be sucked in around the carburetor.

A relatively new company called Z-RC has devised a solution to this problem. A machined aluminum spacer and two thick Teflon gaskets mate carburetor to engine with a warp-free, leak-free mechanical connection. After bolting this new spacer on, the problems of lean running simply went away. I found the needle settings (although still sensitive on Zenoah engines) were reliable and immediately noticeable.

I did not experiment with all combinations of exhaust systems; however, I used the tuned pipe arrangement from QWW. It performed well and is a very well made system consisting of a stainless steel header and an aluminum muffler held together with Teflon tubing and pipe clamps.

Flight testing with the helicopter used an ugly stock can muffler because I felt that mufflers and exhaust systems are discretionary to the pilot and are chosen as to what the pilot desires based upon flying. With such a nice helicopter design, the silver carbon frames, and other features, do investigate other muffler systems from QWW or other suppliers.

Frankly, I was impressed with the performance of this helicopter. After some initial tweaks to the control rods to correct drift, and adjustments to idle setting, and carburetor needle valves, the GasHer settled into a smooth and predictable hover.

When tracking the main blades, mark one of the blades and one of the grips. That way, if you do have to turn a grip control rod differently from the other to get blades tracking, you will be able to reinstall the blades in their same locations. Blades do fly differently and after they are perfectly tracked, reversing them on the grips may put you back to square one.

At the time of this review, the engine is not broken in but the point is that the helicopter is a solid platform. It's a gasoline helicopter using a Zenoah G-26 engine. It's heavier and more deliberate than a glow-powered helicopter and shouldn't be compared to them.

Having said that, AGILE is the word I would use to describe the way the GasHer flies. My swashplate travel adjust settings were initially set to 40%, but I quickly reduced the elevator and aileron to 30% until I got more used to the helicopter. At 40% the helicopter is very responsive – not twitchy, responsive. If you would like the helicopter to feel less responsive; either do what I did and/or add some exponential.

Ability to climb and fly quickly could be attributes of an engine rather than the helicopter, but the GasHer absorbs the engine's power very well. The engine I flew was stock and had plenty of power for me. The QWW vibration absorption system seemed to work well but having the engine adjusted properly really helps. The helicopter tracked very nicely as it flew and responded very well to all control input.

QUICK may be the company, but QUICK also describes this helicopter. It's a fast flying and excellent responding helicopter where a pilot could easily find himself in trouble if not used to fast, powerful helicopters. If you're transitioning from say a .30 sized glow helicopter to the GasHer, allow yourself time to get accustomed to the sound and feel. Fly circuits up and down the runway doing helicopter turns and keep the swashplate travel at 25% or 30% until you're comfortable.

The head's dampening system is comprised of five "O" rings. Removing one or more "O" rings changes the dampening and consequently the flight feel. Personally, I did not experiment

with this, because I was totally satisfied with the solid somewhat harder feel.

I used QWW's 700mm fiberglass blades and was very pleased. First of all, the blades tracked very well with only a turn or two of adjustment on the control rod. Second of all, one of the white gel-coated blades has a red stripe near the tip that makes tracking effortless. No more pieces of tape to fall off. The blades and the head dampening setup worked quite well for me. The blades were so pretty I hated to use them!

SUMMARY

This helicopter is a winner. There are features that are both innovative and refined. The thickness of the helicopter's frames offer robustness. The height of the machine allows it to tower over others. The massive head slyly conveys its strength and agility. Looks are important in today's helicopter wars, but looks alone don't perform. The GasHer is both a good looking and great flying machine. It's responsive and can literally go from eye-popping 3D to rock-solid hover and takes neither money nor extra parts to do so.

The additional items I used on the helicopter such as the temperature gauge, air filter, carburetor spacer, and battery monitor are not performance items for the helicopter. It's nice to have a solid helicopter with a tight control system without having to add aftermarket parts.

Who can argue that gasoline-powered helicopters are cheaper to run than those that use glow fuel? Their simplicity of operation, and the economical cost per flight, combined with ease of starting, and no mess to clean afterwards are something I truly enjoy. Look for a future article on the GasHer when I have more time on it and when I've had time to experiment with tweaks. RM

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www.electrodynam.com	Servo Tester
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