

# Gas Intrepid Review

By Ben Mann

**Part One - Originally published November  
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When I attended the IRCHA Jamboree from August 8 to August 11, I saw Gary Wright and several others fly the new Intrepid. I was VERY impressed. Several of the Intrepid Gas machines were also there, and even though I had heard that the gas helicopters were heavy and under powered, what I saw changed my mind. If I could do the things that were done with this helicopter, I would be a happy pilot.

I stopped by the busy Bergen Machine and Tool booth, and waited in line to talk to Mr. Bergen himself. In about a minute it was "Larry" I was talking to. He was very interested in my questions and concerns about the Intrepid - the gas version in particular - and took the time to make sure all my questions were answered. Nice guy!

I was very impressed both with the quality of the machined parts on the helicopter, and the fact that Larry was willing to listen to any ideas I had about it. I also liked the idea that Larry was accessible, and that he flew the Intrepid himself. How many times do you get to talk to the person who designs,

*EXCELLENT quality machined parts*



## BERGEN

MACHINE & TOOL

## INTREPID

builds, manufactures and flies a helicopter, and talks your language as a pilot himself?

Larry told me that the Intrepid Gas is powered by a Zenoah G-23. I am familiar with this engine as I have two on giant scale aircraft, and I have had excellent results with the engine. Even though the G-23 used on the Intrepid has a breakerless ignition system to reduce electrical noise, I did add a Bosch shielded plug cover to help reduce any radio interference from the spark. Several pilots are flying their Intrepids without the shield, but I would rather be safe than sorry. The Bosch shield plug cover was purchased from CNH at 1-307-857-6897 for \$12.95. Cheap insurance!

The only options for the Intrepid are a rigid tail rotor drive tube, a third bearing on the main rotor shaft, aluminium tail rotor blade holders, and a thrust bearing on the main rotor shaft. Bergen Machine and Tool also offer an engine fan balancer for all 60 sized helicopters.



*Bosch shielded spark plug cover*

Over the two day period at the IRCHA Jamboree, I stopped, looked, and touched the Intrepid many

times. On Sunday, just before takeoff back to High Point, North Carolina, a friend, Jerry Wrihtenberry, decided to purchase an Intrepid Gas helicopter, and I guess I just could not stand it anymore - I bought one too.



*The Intrepid Kit*

This is the way I justified the purchase. Cool Power 30% fuel costs \$23.95 per gallon . Premium gas costs \$1.35 per gallon. Two stroke oil costs \$0.25 per gallon. That's a \$22.35 per gallon saving, and you also get twice the flight time per gallon, effectively increasing the savings to \$44.70 a gallon. In 30 gallons, or less, I will save enough money in fuel costs to pay for the Intrepid. WOW! A FREE Intrepid Gas Helicopter! Since I have burned over 40 gallons of fuel this summer, I would be well on my way to paying for the JR 10SX radio too. Let me see, with TWO Intrepids I could save twice as much.

#### **OK! OK! Back to reality**

Gary Wright, who knows more than a little about the Intrepid, attended the 5th Annual Mid-Atlantic Model Helicopter Expo in High Point, North Carolina, and I picked his brain on building it. Gary is a great guy and superb pilot. Gary says he can build an Intrepid in four hours, so I offered to let him stay free at my house overnight and prove it. Unfortunately, he was in the middle of building another Intrepid in his hotel room, so I was left to build mine myself. (Almost got him!)

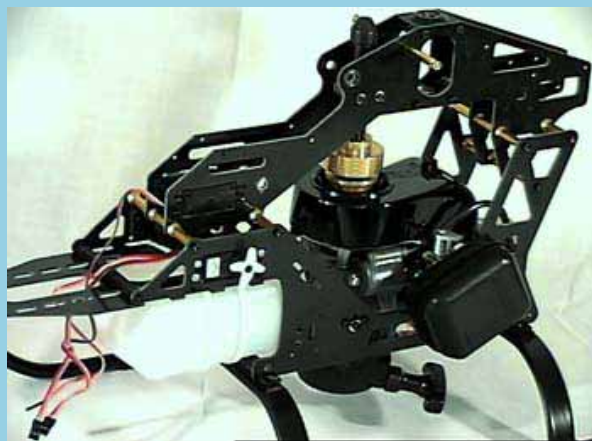


So, after reading the manual several times, and talking to Larry Bergen, Gary Wright, Jerry Wrihtenberry, and Jerry Leonard about possible do's and don'ts, I started construction. I received the early edition of the manual, and the second version too. The newer manual is a greatly improved version of the original manual, but it is still the weak link in the Intrepid kit. If you have built another helicopter, the pictures and diagrams will be enough.

The kit is laid out in a series of numbered bags, each bag containing the parts needed for that step. I found that the bags didn't contain all the parts needed for each step, and that sometimes a step required that I open several bags out of sequence. What helped me was to take all the parts out of the bags and put them into a segregated tray, separating all the different ball links and other parts. This takes a little time at the start, but saves a lot of time later.

If this is your first kit, lucky pilot, you will find that you will have to go back and re-do an assembly from time to time. DON'T follow any of the locking fluid instructions until you are SURE you don't have to disassemble and reassemble part of the helicopter ( I have built several JR Ergo's and find their manual excellent, so maybe I'm spoiled).

The hardware is gorgeous. I wasted a lot of time



*Lower frames and engine mounted*





*MIP temperature gauge to track engine temperature*



*Robertson muffler*

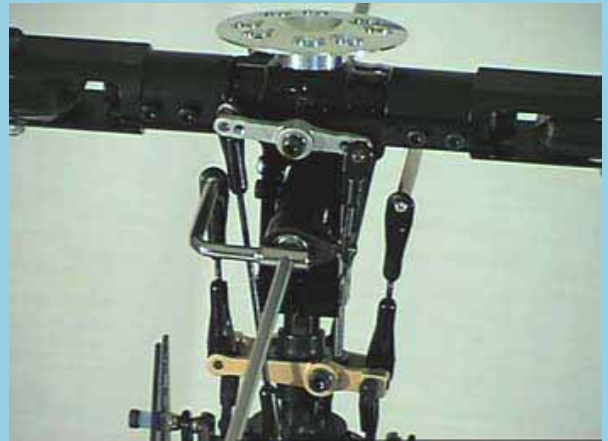


*Muffler bracket*

just admiring the excellence of the parts. All the machined parts are gold anodised. Pretty! Everything fits, perfectly. Everywhere you look there's a ball bearing. I didn't count them, but if it moves, it's got a ball bearing OR TWO. This is one STRONG helicopter and the kit goes together fast, just follow the pictures and some common sense.

You can see the engineering that went into the Intrepid, and Larry should be justly proud of his efforts. Every control, except the rudder, is push/pull. More than just push/pull, the controls are balanced.

It is important to build the frame on a level surface. It can be "racked" to one side or the other if you don't pay attention during the early stages. Once the lower frame is built the Intrepid really starts to take shape fast. Install all the servos when the manual tells you as some of them are hard to reach later and this will save you some time.



*Collective linkage*

On the Gas Intrepid, make sure you drill the holes for mounting the skids before you start building, or you will have to remove the lower brace to line up the holes in the skids. I didn't do this, so I bought a long drill bit and clamped the skids in place and drilled through the braces. This worked well.

After assembling the upper frame, do NOT use locking fluid, as you will need to remove one side of the frame to install the collective frame and bearing rods. After installing the bearing supports

*Rotor head with adjustable Bell-Hiller mixing*





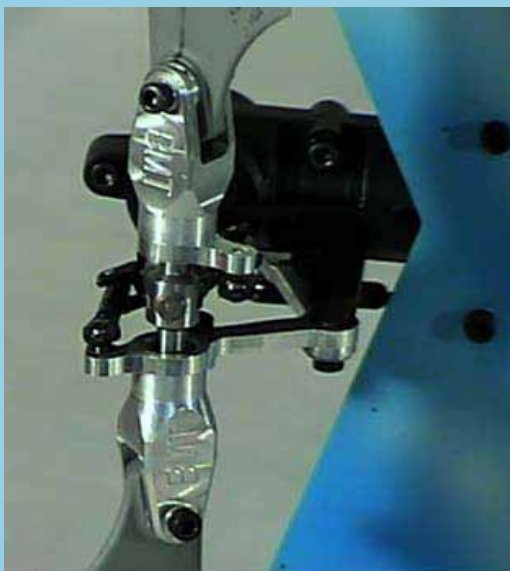
*Main rotor drive gear*



*Above, Left side collective arm  
Swashplate and mixing levers  
shown below*



Optional aluminium tail rotor holders



and bearings in the side frames, use a piece of tape on the inside of the bearings. This will keep you from looking for the bearing on the floor while you're installing the side frames. Remember to remove the tape before you install the cross shafts ( It would be hard not to remember!). When assembling the tail rotor pitch slider, make sure you "flare" the end, and use JB Weld on the end of the slider. I used a tapered screw, a washer, and a nut to do the job. This keeps the tail rotor pitch slider keeper from possibly slipping off during heavy 3D flight.

The linkages took a while to assemble and set up. I used the excellent article by Gary Wright, in W3MH magazine, to set up the linkages. I also used an electric screwdriver with a linkage tip purchased from Dave Carter at Rave's Designs in Orlando, Florida. It saved LOTS of time. The length of the links at the back of the manual must be for a Intrepid 60, as they were incorrect for the gas version. No matter! Setting them up correctly was not hard, just time consuming. But it was well worth taking the time to do it EXACTLY right, and end up with a great flying helicopter.

Another thing I did that was an exception to the manual, was not to use locking fluid on the bearings on the main rotor shaft. I feel there is less friction between the inner and outer bearing races than between the rotor shaft and the bearing, and the locking fluid might not let the bearing find the location where it wants to run. This is just my theory and does not reflect the thoughts, ideas, or wishes of Bergen Machine and Tool, Larry Bergen, Gary Wright, Jerry Leonard and others. If I have a problem, I might change my mind.

Blades come with the kit, but I elected to use a set of NHP 710 mm. symmetrical blades. I have had excellent luck with NHP blades on my other helicopters, so why fight a great thing - besides Nicky at NHP threatened me bodily harm if I didn't use NHP blades :-). Radio equipment used was a JR 10SX transmitter, JR SPCM receiver, and JR 4130 servos on aileron, elevator and collective. I'm using an Arcamax piezo electric gyro and JR 2700G "Ultra Speed Super Servo" on the rudder, and a JR 531 servo with a special Gary Wright / Ben Mann modification on the throttle.

During email discussions about different servos needed on the Intrepid, Gary and I decided we needed a faster servo on the throttle. The throttle servo needs very little torque, so we increased the ratio of servo arm to carburettor arm to a 2:1 ratio, effectively doubling the speed of the servo. The dead band is also doubled, but that doesn't seem to matter. I tried it on another helicopter and it worked great. BTW don't tell anyone, it's a secret.

To summarise, I don't think you can buy a better helicopter than the Intrepid. If there is a weak point in the kit it's the instruction manual. New helicopter designs will undergo changes, but with Larry Bergen being the designer, manufacturer, and pilot, they will be well thought out and well executed.

I wanted to buy a top quality helicopter, with no compromises, and I didn't want to have to go out after purchasing it and

buy another 1,000 upgrades before I had what I wanted. By buying the Intrepid I got what I wanted, and something just as important - value.

I've flown other Intrepids, but not mine yet. Soon! I'm going over the linkages "One More Time" and I'll be ready for trimming in time for next month's W3MH.

### **Part Two** (December 1996 W3MH)

Since the last article on the building of the Intrepid gas helicopter things have been changing at the homes or home of the Intrepid. Larry Bergen and Peter Chao have parted company. Peter and his company, Century Products, will no longer be involved in the Intrepid.

This was to be the second part of the Intrepid gas article describing the tuning and flight testing of the helicopter, BUT the weather here has been BAD. We have had flooding rains, snow and temperatures in the low twenties. Add to that Thanksgiving, Christmas shopping and a decision by Lucent Technologies to send me to New Jersey for a week. I just could not fly the new Intrepid enough to say anything useful. My father used to say, "If you can't say anything useful, you might have a job in politics". All I can say is "If nominated, I will not run, if elected, I will not serve".

So I will save the enlightened comments about the Intrepid's flying qualities to a follow up article. I did manage to hover the Intrepid Gas for a few flights. It's hover is very solid, more so than the sixty sized machines I have been flying. It doesn't "feel" heavy, but the throttle response is different from the normal sixty sized helicopter. This "feeling" goes away after a few minutes in the air. The G-23 engine makes plenty of power and I think the NHP 710mm blades will auto nicely. I have received some questions and feedback from readers of W3MH and builders of the different Intrepid models so I would like to share some of the information with you by way of a Q&A session.

*Why didn't Bergen mount the bearings properly on the Intrepid?*

At first I wondered about the same thing. If you tightened some of the screws that attached the bearings you could tighten them so tight they would not turn or worse still, ruin the bearing completely. After talking to Larry Bergen I found out this was a "feature". I know, I know, everything that doesn't work right is a "feature". Well not so in this case. All bearings have movement between the inner and outer races. Pilots do not desire this movement. Larry designed the Intrepid bearing supports so the outer race would touch the surface of the arm holding the bearings. This would allow the builder to tighten and "pre-load" the bearing so there is no "slop" in the movement. The outer race is held in place by the arm it's attached to and the inner race is held in place by the screw itself. In bearings that do not have a locking nut, as in the mixing arms, Bergen have drilled and tapped the screw hole through the arm and provided locking hex screws to lock the



*Anti-rotation device*



*Pitch and collective servos*



*Radio and battery tray*



*On board battery monitor*

screw in place. They have also provided special screws with a part of the screw unthreaded to mount the bearings. These screws with a plain shank provide a mounting base or the bearing. A builder still MUST be careful not to over tighten the bearing.

*Does the Intrepid allow use of both Futaba and JR servos?*

The answer to that is "yes". I installed JR 4131, JR 531 and JR 2700G servos. Gary Wright flies a Futaba 9Z and the servos fit nicely.

*What did the Intrepid gas weigh ready to fly?*

My Intrepid gas weighs in at 10 pound 5 and one half ounces and is slightly tail heavy. The gas tank is mounted in the front so it becomes balanced around the main rotor at about one half tank.



*Left and right sides ready to fly  
(borrowed canopy from Jerry  
Wrightenberry)*

*Why not use the wire tail rotor drive supplied with the kit?*

In the past I have experienced problems with a wire drive and a piezo electric gyro. The wire drive tends to flex too much which causes the tail to wag. This was made even worst when I installed a JR 2700G "Super Servo". So I elected not to use the supplied wire drive because of these problems. I think the wire drive will work perfectly well with a mechanical gyro.

*Why all the different holes in all the parts?*

Larry has tried to provide adjustments for everything. In building my Intrepid I chose to use the recommended settings and make changes later if desired. You can adjust the stiffness or damping of the head too, via spacers that allow adjustment to one of three different positions. There is also a selection of four different Bell-Hiller ratios, and the

collective arm has four different positions. With some helicopters you must bend and/or fabricate special parts to change an adjustment. The Intrepid allows you to make these adjustments just by moving a ball or link.

*Why did you elect to use the Canfield Engine Auto-Balancer sold by Bergen?*

When I first heard of an automatic engine balancer I thought it was a neat idea, but I didn't know if it would work or not. I called a friend who works for a well known builder of balancing equipment and he told me that it does work. In fact some manufacturers are using the principle to balance car tires. I also talked to Gary Wright and asked him if he used it and he does and has seen a reduction in engine vibration. He also said he was very skeptical at first, but after installing it he was convinced. Gary, in his continuing effort to improve things (*Ed: Or his innate desire to fiddle... :-)*), tried different numbers of balls in the auto-balancer ring, but found the number provided by Bergen worked best.

*Why use the metal tail rotor upgrade instead of the plastic holder provided?*

I guess the answer to this one is, I just thought the metal ones looked "neat". I know they are stronger and will last longer, but the real reason I bought them is LOOKS.



*Did you use the NHP blades because you got them free?*

I wish!!! I used the NHP blades because of the excellent quality and consistency provided by NHP. I have broken 2 1/2 sets of blades in four months. I know I can BUY a set of NHP blades and bolt them on and fly. I don't have to fool with them. I do plan to try several other manufacturers blades on the Intrepid.

*Do you plan to install an electronic ignition system on the Zenoah G-23 engine?*

I thought about it. I have two other G-23's I fly on giant scale airplanes. (Before I was converted to helicopters...) I had no problem starting the engines, but I did install a breaker less ignition system on one and it worked great. I thought about installing it on the Intrepid's G-23 engine, but after a call to Bergen I was told the Zenoah G-23 provided in the Intrepid kits already has a breakerless ignition system installed. So for now I'm just going to fly it "as is" unless I have some problem with the starting or running of the engine.

*Why did you choose the Robertson muffler?*

I saw one installed on an Intrepid gas helicopter at the IRCHA Jamboree and it looked like a quality, well constructed muffler. It was also fairly quiet. I asked the pilot flying the Intrepid gas how he liked it. He said he had tried several different mufflers and the Robertson makes the best power. Most important I stopped by Rick's Hobby tent and they had one in stock at a great price. Ron Lund was more than happy to transfer ownership of the muffler and mounting bracket to me for a small pittance.

*Do you plan to install one of the removable pull starters?*

At this time no. I know it will save some weight, but one of the reason for buying the Intrepid gas was I needed no flight box, glow plus driver or starter motor. Just turn it on, pull and fly. I don't know if the removable pull starter will save that much weight and it's just something else to remember right now. Maybe later.

*Do the neat gold anodized servo arms come with the kit?*

No. Servo hold down mounting brackets are provided, but I purchased the gold servo arms from Ron Lund at Rick's Hobbies. Their phone number is 1-800-321-9909. Ron also has a gold anodized head disk.

*What gear ratios are available?*

The Intrepid gas main

rotor gear ratio is 6.43:1. The Intrepid 60 main rotor gear ratio is 9:1. The tail rotor ratio is 4.66:1 on both Intrepids.

*What are the main and tail rotor diameters?*

The Intrepid gas main rotor diameter is 61 1/2 inches. The Intrepid 60 main rotor diameter is 58 1/4 inches. The tail rotor diameter on both machines is 10 1/2 inches.

*You say it's the best helicopter you can buy?*

I guess "best" is in the eye of the beholder. I have a limited experience with model helicopters and have a Kavan Jetranger, two Kalt Enforcer ZR's, Concept 60, Helibaby 30, Kalt Alpha Baron II, Ergo 46, Morley F1, Legend II (being shipped this week), Intrepid 60 (not yet built) and an Intrepid gas. I have looked at or flown several more.

What I meant to say, in the first article, is considering that the Intrepid is being sold by the same man that designed, builds and flies the Intrepid. A real live person I can call and talk to on the phone. Namely Larry Bergen of Bergen Machine and Tool. And the helicopter is price competitive with others in the same quality range. Then I consider the Intrepid as the "best" helicopter.

I'm still just as satisfied with the Intrepid today as the day I bought it, maybe more so. I'm looking forward to many hours of enjoyable flying at a very LOW fuel cost and as I get more flight time on the Intrepid gas I'll report on what goes right and wrong.

**Part Three** (January 1997 W3MH)

The weather has been much better last month here in the Carolinas. We have had record high temperatures in the upper seventies, with very little rain and some high winds.

*Final Setup*

The Intrepid control system is push-pull. It is important to make sure all the links are the same length so to accomplish this I used a neat device manufactured by RVB Products of Dallas, Texas, (1-214-824-8836). It allows you to make or duplicate links to very exacting standards. Link lengths are shown at left.

#### **Final Setup**

##### **Throttle linkage**

*Servo to Throttle:* 158mm

##### **Collective**

*Servo to Bell Crank:* 49mm

*Bell Crank to Popsicle Stick:* 67mm

##### **Elevator**

*Servo to X arm:* 148mm

*X arm to Elevator Arm:* 70mm

*Elevator Arm to Swash Plate:* 56mm

##### **Aileron**

*Servo to Bell Crank:* 107mm

*Bell Crank to Swash Plate:* 56mm

##### **Bell/ Hiller Mixer**

*Swash Plate to Long Side:* 96mm

*Short Side - Seesaw:* 26mm

*Fly Bar Arm to Washout Arm* 49mm



To date I have burned one gallon of gas in the Intrepid, not enough to bring out all the good and bad points, but enough to give me the flavor of the machine. After re-checking the links making sure the servos moved in the proper direction, I proceeded to track the blades. It only took a minor adjustment and the helicopter was hovering smoothly. The only other adjustment needed was one click of trim on the tail rotor.

Two pulls on the starter and the G-23 came to life. Slowly adding throttle the Intrepid started to get light on the gear. A final check that the controls operated in the proper direction and a little more throttle and the Intrepid was in a six inch hover. My first impression was the Intrepid gas was really solid in the hover. It took no effort to hover the helicopter and was more stable than any sixty-sized helicopter I had flown. At this point, I had no expo dialed into



the aileron or elevator so the pitch and roll was very sensitive. I added 20% expo to both and it made the helicopter feel even more stable. Several pilots hovered the Intrepid gas and all felt that it was extremely stable. Even the least experienced pilots had no problem hovering it.

I flew the Intrepid out and back a few circuits and

the helicopter "felt" heavy and wanted to descend quickly when brought back to hover. At this point I was using 36% throttle and 4 degrees pitch to hover at 1350 RPM. Every time I got out of transitional lift, the helicopter wanted to drop. I added additional throttle at the low end of the throttle curve and the helicopter started to feel better.

I raised the hover to 1550 RPM and the hover became even more stable. The Intrepid felt more like a sixty-sized machine. The throttle curve for the Intrepid gas is strange looking compared to a sixty-size glow engine. You hover at 36% throttle so the top end of the curve is very steep. From



the hover point to idle the throttle curve is almost flat. The "feel" of the Intrepid gas is also different from a sixty-sized helicopters. After adjusting the idle-up 1 throttle curve the response to collective inputs improved to the point where I could not tell much difference between it and other helicopters.

The pitch curve of -9 and +9 is almost ideal for the Intrepid gas. At full power vertical climbs the main rotor speed remained within 20 RPM. I flew the machine faster and faster. At full collective and level flight, the main rotor speed remained within 40 RPM. I had no way to measure the forward speed of the Intrepid gas, but several pilots at the field commented it was the fastest helicopter they had seen fly. The main rotor blade tracking in fast forward flight was right on.

After each flight, I checked for loose or missing parts. I have had no problems so far.

After a full weekend of testing, I talked to another pilot who also uses a Robertson muffler. He told me that the header pipe should be cut to a length of nine and one quarter inches. After a call to Jim



Robertson, (1-918-342-1133), he confirmed that the shorter pipe produced more power when used with the G-23 engine. So I removed the coupling and trimmed the length of the header pipe. The G-23 engine did seem to make more power but after a few flights I heard a loud noise and saw a shiny object falling to earth. The muffler had fallen due to the coupling coming loose. I went to the local automotive parts store and purchased a length of 7/8 inch water hose. This allowed me to continue flying that day, but it was not a good substitute for the proper coupling. The water hose melted in a few flights and almost blew apart. A trip to King R/C yielded a high temperature coupler so I used the previously purchased water hose clamps to attach the coupler. After a flight, the water hose clamps would have to be re-tightened. After a liberal application of locktight the hose clamps seemed to stay tight. I plan to purchase two "pinch" type clamps to replace the "screw" type clamps I'm now using. When attaching the header pipe to the engine, make sure you use a lock washer. I mounted the header pipe using just locktight and the bolts loosened. I now have a lock nut on both bolts and the muffler has not come loose again.

There is a new muffler being offered for the G-23 engine used in the Intrepid gas by Miniature Aircraft. Their part number is MA #4030. I have talked to several people who have flown the new muffler and they say it produces better power than the Robertson. It is also reported to be "very"

quiet and mounts directly to the frame. Charlie, at King R/C, 1-800-448-4712, stocks the new muffler. King R/C have a Web site at [www.twinds.com/kingrc](http://www.twinds.com/kingrc). (Ed: It's on our links page too)

Bergen Machine and Tool also offers a muffler for the G-23 manufactured by Bisson. The Bergen part number is #675. It is one half the cost of the other two mufflers offered and is reported to be quieter than the Robertson.

Jim Robertson is producing a new precision crankshaft for the G-23 engine used in the Intrepid gas which gives the engine a longer stroke for increased displacement. This makes it a 24cc displacement engine. Although this is not a big improvement in displacement, it produces a 20% increase in power. Ron Lund of Rick's Hobbies (1-800-321-9909 or [rlund@trip.net](mailto:rlund@trip.net)) carries the new Robertson "stroker" G-23 engine.

B.H. "Bruce" Hanson also produces two "HOT" re-worked G-23's for helicopters. Hanson's Model AC-1300 is a modified G-23 with pull starter, pump bulb carburetor, velocity stack, hi-compression head,



ported and relieved cylinder. It produces three horse power (3 HP) at 13,500 RPM. The "HOTTEST" engine is the Hanson Model AC-1400. It features all the modification of the AC-1300 plus a lightened and balanced flywheel. The engine is also 'blue printed' and 'balanced'. The AC-1400 produces three point three horse power (3.3 HP) at 14,000 RPM. I have one on order and I'll let you know what I think about it in a future article. H.B. Hanson can be reached at 1-702-436-4422. Bruce also has a web page at <http://members.aol.com/XHYDRO/1.html> or email at [XHYDRO@aol.com](mailto:XHYDRO@aol.com).

One final point, when routing your tail rotor servo wire, make sure you keep it high and away from the spark plug wire. Possible interference can occur if the wires are too close together.

#### **So what have I learned about the Intrepid gas?**

##### *Good Things:*

It's easy to start. Burns inexpensive fuel. Requires no glow plus driver or starter motor and battery. Is "very" stable in hover and forward flight. Remains very clean, no oil build-up.

##### *Not So Good Things:*

The swash plate had an excessive amount of play in the bearings. The amount of free play differs with each bearing, so check yours. If excessive free play is found, Bergen will replace it free. Or you can select a swash plate with four bearing loading screws, like the one X-Cell uses, from Bergen. I saw the free play after someone pointed it out to me, but I could not feel it in the air; maybe a more accomplished pilot would. I'm going to replace the swash plate with one that has the four bearing pre-loading screws in the near future. If I can tell any difference, I'll let you know.

I had to add a split piece of fuel tubing between the fuel tank and the frame on both sides. The frame was cutting through the fuel tank.

The fiberglass canopy hit the lower frame members and cut into the canopy. I repaired the canopy with fiberglass cloth and 5 minute epoxy. I moved the mounting brace that is attached to the lower canopy out as far as it would go. This spaced the lower canopy out as far as possible and eliminated the interference problem.

There have been some complaints by new Intrepid



owners of missing parts and parts not finished properly. I called Larry Bergen and asked him about the situation. He says there have been a few problems with parts being placed in the wrong bag and missing small parts in kits. He says all missing parts will be replaced, no questions asked.

In summary I still feel the Intrepid gas is an excellent helicopter. It's flying qualities have exceeded my expectations. I have fun teasing the "smokers", glow plug helicopter pilots, at the flying field. Just in the last few weeks I have saved over \$80.00 in fuel costs. The helicopter is not a "pocket rocket", but neither is it a "lead sled". It performs well. We now have four GAS helicopters flying at our field, that's three Intrepids and an X-Cell. We now have a "Smoking" and "Non-Smoking" area at our field. Look for me in the "gas passing" area.

Ben Mann

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