



X-cell

Notes on Converting the Miniature Aircraft Whiplash Gas to "GII" spec

Using the **MA1033-5** conversion kit

Jeremy Harkin

Dec 21, 2017

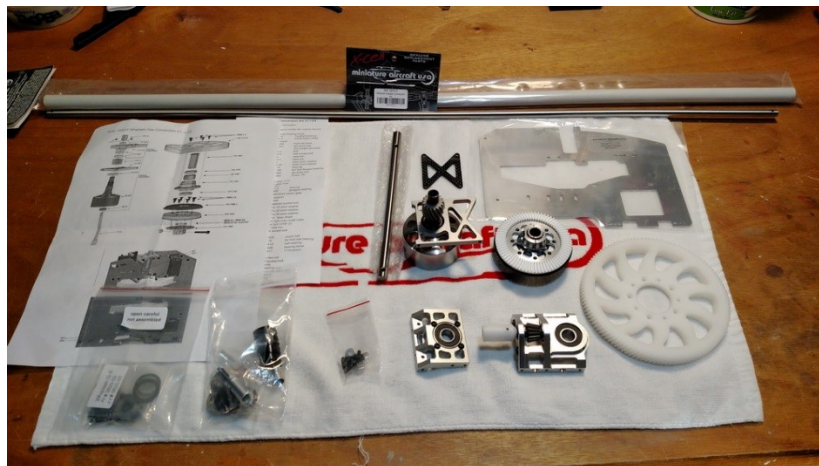
Jeremy.harkin@hotmail.com / "jharkin" @ Helifreak & RunRyder

Full build thread available at <https://www.helifreak.com/showthread.php?t=795214>

1 Getting started - What do you need?

Parts:

To install the conversion on your GI Whiplash, you will need the MA 1033-5 conversion kit. This is available direct from Miniature Aircraft in Germany or through a regional dealer (Cajun Aircraft in the USA or your local rep).



It's not required, but strongly recommended is to also purchase the updated tail pitch assembly MA131-475 and the new CNC aluminum&Delrin tail gear set (MA131-17B, MA131-18B)



X-cell

Tools:

All your standard heli tool used for a typical build, plus tools to cut the frames from the stainless steel template. There are a couple different options for this including drilling and the use of a Dremel which will be covered in the frame modification section below.

Note that I am based in the USA so in some parts of this guide I may make reference to English measurements, USA based vendors, etc. You can obviously substitute as needed from equivalent local components/vendors.

2 Order of operations

There are two basic approaches you can take.

First option is the "rekit" approach. You start by completely disassembling your model down to parts. Then modify the frames, and rebuild. This is a good choice if you plan to do a lot of other maintenance /changes, or its been in a bad crash.

Second option is the rebuild in place. To do this we start by removing the tail assembly and dropping the engine, then take off any wiring that runs outside the frame. Now, without a full tear down you remove one frame half, modify and reinstall. Then remove the second frame half, modify, install the updated gearing and install the second frame half.

3 Time expectations

To install my GII kit I took an approach between these two options. I went beyond a basic upgrade and also installed new servos and moved the onboard electronics around along with having the engine refreshed by my tuner. I put about 18 hours of shop time into this work.

If you take the simple rebuild in place approach and work fast the conversion can probably be completed in one 8-hr work day.



X-cell

4 Frame modification Notes

Approx. time: 1-3 hours to disassemble, 1-2 hr cutting

If you plan to remove the frames one at a time for modification you need to remove the following from the helicopter before taking the frames off to cut:

- Engine
- Fuel tank and rear fuel tank bracket stud
- Tail boom and struts (you can leave the boom mount in place)
- Any external wiring that would block removal of frames
- All cyclic servos
- Rear cyclic servo spacer
- Throttle servo
- Rear canopy mount studs

Once all those components are removed you can take the frames off one side at a time and cut them. Once off I clean them well and then fasten the stainless steel template to the frame side using 2-3 M3 screws and nuts through existing holes to clamp it in place.

Modification of the frames involves both large material removal (i.e. main gear cutout) and drilling some new holes.

The easiest way to do the large material removal is using a Dremel tool with a $\frac{1}{4}$ or $\frac{1}{2}$ inch sanding drum attachment. This makes quick work of all the major areas, but will leave some corners. You can finish those with a small Dremel grinding bit or one of the multipurpose cutters (#561 or better #9903 carbide)

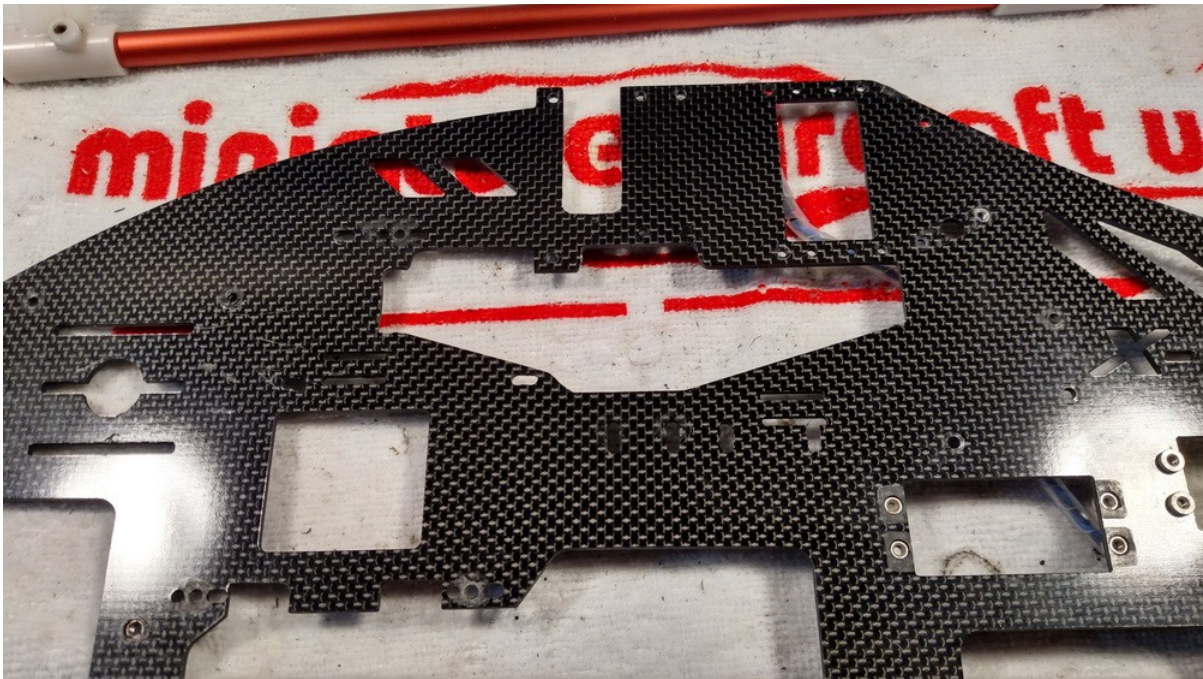
Cutting the new mounting holes and slots involves drilling. There are two possible approaches. Larry Smith likes using a carbide stub drill and running it though the template used as a side cutter following the template contours. If you follow this approach a 3/32 carbide stub drill (available from Henley Tool Supply in USA) works well. Just use moderate pressure and follow it along the perimeter of all holes in the template.

I had some trouble with the stub drill (I broke one) and found another approach. You need a 3mm metric drill bit. Chuck it into your drill press and drill all the new holes. For the slots drill each end, then finish up the slots working by hand with a set of needle files.

Notes:

- Use all carbon precautions when cutting! I used a shop vac and wore a mask.
- Make sure to cut out all areas in the template! The upper servo cutout is slightly larger, its not obvious now but this is important during the main gear install. Also the template makes 4 slots

for the lower bearing block even though it only has 3 screws – the 4th slot will be important later as well.





X-cell

5 Main drive assembly notes

Approx. time: 1-2 hr

Once you have the frames modified you can start assembly of the new drive components and install the bearing blocks.

At this point the following V1 components get removed and discarded:

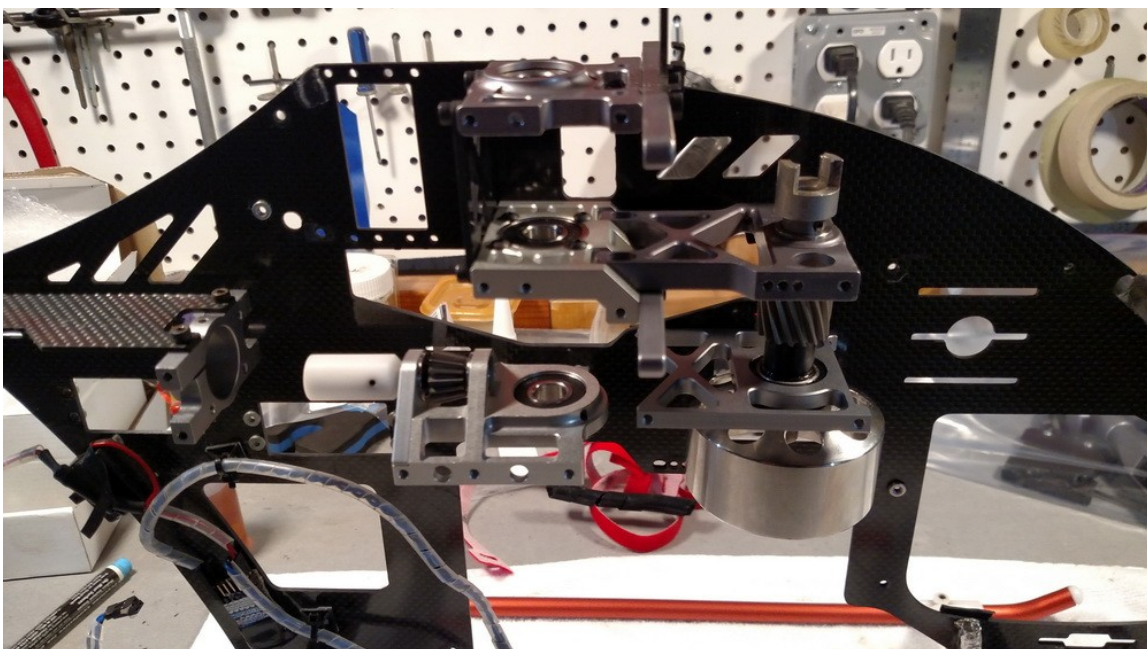
- clutch bell and pinion
- lower main bearing block
- carbon x-brace
- main gear and hub
- main shaft
- front tail transmission

Now we assemble all the new gear train components using a mix of new and old parts according to the diagram in your upgrade kit.

Notes:

- The upper pinion mount and the start shaft aft get re-used. Check the bearings in the upper block for wear before installing on the new pinion/clutch.
- The new main gear is a very tight fit on the hub. You might need to twist it slightly to align the 5 screw, I put the main shaft in and use a big allen key through the jesus bolt hole like a lever to do this.
- IMPORTANT: The concave surface of the main gear faces **down** in the V2. This is opposite of the v1 orientation.
- The kit provides 4 or 5 MA0620 shims. These go between the one way hub and the crown gear. Use as many as needed to eliminate any rubbing, I had to install 3.
- Use usual best practices for assembly – Loctite everything, tighten the gear screws in a criss-cross pattern, etc. If you have the MA special one way oil, lubricate the sprag bearing liberally before assembly.
- IMPORTANT: To get correct main gear mesh with the stock gear ratio, you will use the **front most** of the triple holes for mounting the pinion stack and upper engine mount. This is different than the V1 which used the center hole at the stock ratio.
- The position of the lower bearing block is set by pressing it into place on the assembled auto hub and mainshaft then tightening the screws as in the V1. You may want to have the tail assembly completed before this step to double check that the TT lines up into the new gearing.
- The two MA0857 main shaft collars get installed one above the middle bearing block and one below the lower bearing block. Note that the larger upper servo cutout was necessary to allow room to tighten the upper collar screw, and the mystery 4th slot for the lower bearing block allows access to tighten the lower collar.

- Removing the old tail transmission eliminates one of the two mounting points for the rear canopy post breakaway tabs. If you prefer to use two screws to limit vibrations, you can address this using an M3 nylock, PEM nut or a spare frame spacer to mount the lower bolts.



6 tail upgrade notes

Approx. time: 1 hr

The new torque tube assembles according to the diagram in your kit. It is very important to glue the end cups and bearing sleeves on with [Loctite #648](#). This is a thick version of Loctite green bearing retainer and it sets very fast so check and double check your orientation and measurements before gluing anything. **New conversion kits will be shipped with a carbon torque tube. Please see the additional 131-558-CF Carbon Torque Tube – Note included.**

Notes:

- I fully assembled the bearing cups before install on the TT. Lightly warm the plastic cup with a heat gun before pressing in the bearing, then use a thin coating of Loctite 648 to glue the bearing to the sleeve.
- IMPORTANT: Very carefully study the installation diagrams. The exploded view of the two bearing cups is drawn with the front of the heli to the *left*, however the assembled drawing of the full TT below is shown with the front of the heli to the *right*.
- Once the bearing cups are glued in at the proper spacing, attach the TT ends. Again it's critical to use Loctite 648. The screw alone won't hold and CA doesn't provide a strong enough bond. If you cannot find 648, an epoxy such as JBWeld or Hysol E-20HP could be used, but is harder to remove for repair.
- Once the Loctite has set a few hours, grease the o-rings and install the TT into the boom observing the proper orientation. The new assembly fits better than the V1 TT id, no superhuman force required to press it in place.
- If you are going to update your tail gears and pitch slider, now is the time to do so. I would also check over your grips, all bearings, etc while its apart.
- IMPORTANT: If you do not replace the tail gears with the new -B versions, note that the new TT ends are a very tight fit in the old gears. If the ends are not fully seated, the boom will not fit in the fuselage boom clamp. TO help with install I lightly greased the TT end and gently warmed the tail gears with a heat gun.



7 Putting it all back together

Now you should be ready to start final assembly and reinstall all the components removed for the conversion. I took the opportunity to add some "bling" in the form of the new color matched skids and tail fin, along with the carbon fiber tail rotor pushrod upgrade. These are optional per your preference. I recommend checking and replacing any worn ball links, etc. and reverifying your FBL programming, swashplate level, pitch ranges, etc.

I also strongly recommended that you check your CG and make any adjustments needed at this time. The Whiplash tends to build tail heavy for many pilots and the G2 is slightly more so. If not already done you may wish to move as many of your electronics forward as possible.

I found that the final build increases weight 2-4 oz (55-110g) over the V1 model. This is primarily due to the more rigid main gear, and more substantial auto hub and tail drive components.

I would like to thank Josef & Judith Schreiner for providing us with this great kit; and thank my friends Raja Bortcosh & Larry Smith for their advice and guidance as I put together the conversion.

Happy flying!

