

HELI TIPS HELI TIPS HELI TIPS HELI TIPS

HOVER HINTS

Competitor and Cobra "Fixes" & Modifications by Mike Johnson

Both the COBRA and the COMPETITOR are excellent machines with in my opinion probably the best set of instructions available today. But like all machines they have their faults. Let's assume you are just opening the kit and have not opened the first bag. When you get the operation or component described refer to this set of instructions.

Before beginning let me say a word about RED LOCKTITE. This is a Permanently bonding substance. Heat from a soldering iron or blow torch will loosen it, however use it sparingly and wisely.

Transverse Lever Assembly:

Use red locktite on the 2.6 x8mm screws and apply some in the keyed slots in the pitch levers. This will keep the pitch shaft secure.

Engine Assembly:

The COBRA and COMPETITOR both use a very light grade aluminium for the side frames. This keeps the machine light but will also not take a lot of vibration caused by a poorly aligned engine, clutch, and drive shaft. Refer to HELI TIPS HOVER HINTS "HOW TO GET RID OF VIBRATION", or read John Gorhams' "Give it a Whirl" column in the May issue of R.C.M., or send it to L.M.S. and we'll do it for you for \$10. A poorly aligned assembly will not necessarily manifest right away but is the main cause for cracking in the main frame and foam in the fuel.

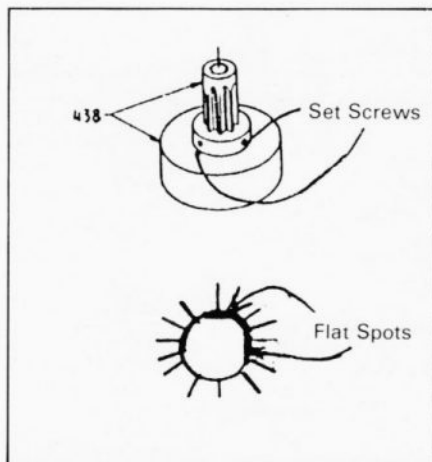


Fig. 1.

One other important thing to mention is the clutch housing/drive gear assembly. This assembly is a "press" fit where the drive gear is kept from rotating in the clutch housing by

two set screws. The wall of the gear is thin enough to be distorted if the two set screws are tightened too much causing the gear to bind on the starter shaft. These two pieces come assembled in the kit and most people leave them alone assuming that since they are assembled, they are OK. The problem is that after a flight or so the gear begins to shift in the bell housing and eventually the gear will work loose. This will cause the engine to over-rev and will disengage the engine from the drive train. Not only could this cause certain damage to the engine, but you may learn to auto sooner than you think! In order to remedy the problem remove the two set screws. Next remove the drive gear from the housing. This can be accomplished by wrapping the gear in a rag and tightening it in a vise. Then pull the housing off the gear. Now locate the two set screw marks on the gear. Use a file or a moto tool with a grinding wheel to file flat spots on the gear at the location of the marks as shown in Fig. 1, align the set screw holes over the flat spots and push the gear back into the clutch housing. Using locktite on the set screws insert them back into the housing. DO NOT TIGHTEN! Slip the clutch and gear assembly over the starter shaft and down over the clutch. Spin the starter shaft and clutch assembly while holding the clutch housing and tightening the set screw against the flat spot on the gear until the clutch just binds. Then back the set screw off just enough so the clutch and starter shaft will run free. With the set screws tightened over the flat spots there is no way the gear can slip in the housing. Now repeat the procedure with the other set screw.

Cooling System

The new kits include the new more efficient fan shroud. Be sure to use the mounting bracket #557s-1. Also, the holes that mount the bracket to the frame are not always drilled in the right location. It's O.K. to drill new holes in the side frames to attach the shroud. Be sure the fan does not touch the shroud while rotating it with the starter shroud.

Collective Mechanism Assembly:

The collective pitch levers are keyed onto the collective lever shaft (#477) so again use red locktite on the end of the pitch lever shaft. Wipe off any excess and let it dry. Then use blue locktite on the screw that holds the lever in place. This will keep the lever from wearing on the shaft and eventually coming loose.

Landing Gear Assembly:

At the bottom of the side frames there is a 90 degree bend that the landing gear mounts to. I recommend you reinforce this area with a 90 degree reinforcing piece. You can have this made at your local sheet metal shop or obtain them from L.M.S. for \$4.00. Also because the side frames are slightly fragile, I recommend you replace the stock landing gear with a pair of the new unbreakable gear. ("TUF STRUTS" available from L.M.S. for \$24.95).

Upper Swashplate Assembly:

The only problem here is to be sure the top piece #509 is just snug. DO NOT OVER

TIGHTEN! This piece is notorious for breaking and cracking so check it often. There is a complete ball bearing and metal assembly available that completely replaces the entire plastic assembly provided in the kit. This "upper swashplate assembly" is available from L.M.S. for \$59.95.

Rotor Head Assembly:

Locate the bolt #233 that inserts through #539 and threads into #540. This should be replaced with a 3x30 allen head screw with a lock nut tightened up against #540. This bolt has been known to back out and cause small disasters. I use red locktite on the threaded collective balls #549.

Gear Box Assembly:

This comes assembled from the factory but you should check a couple of things. First, remove the 2mm bolt that holds the bellcrank to the housing and apply blue locktite. Next, apply red locktite to the blade holder hub #462 before assembling it to the left hand threaded shaft. Finally, trial fit the tail boom insert #453 all the way on to the gear box assembly and be sure the action of the gear box is still smooth and free. If the fit is too tight, it will distort the gear box and bind the gears. Simply file the gear box housing until the boom insert slips easily over assembly. Spin the gears to be sure there is no binding.

Tail Boom Assembly:

Just be sure the brass tube assembly is pushed far enough into the rear end of the tube to accommodate the gear box assembly.

Tail Fin Assembly:

This is not the strongest part of the kit. It is important to reinforce the wire tail skid with 6 oz. fibreglass and epoxy or resin. L.M.S. sells an all metal tail fin assembly for \$9.95 that is almost indestructible and is actually lighter than the wood assembly! Which ever you choose the first hard tail landing will be the test.

Muffler:

Most COBRA & COMPETITOR'S use a ball type muffler. The muffler is usually held to the engine by means of two bolts that screw into the engine. It has been my experience that these bolts come loose often, and have been known to fall off while in flight. If that happens, it is possible the engine will not idle due to loss of back pressure and may quit. A sure fire way of making sure that the muffler stays attached to the engine is to use a hose clamp available from any auto parts store.

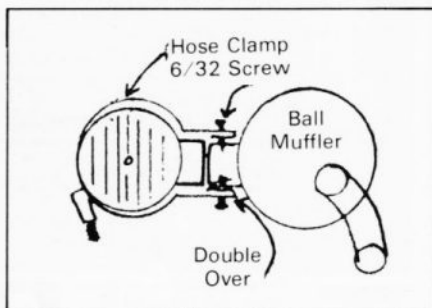


Fig. 2.

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Drill and tap two 6/32 bolt holes on the top and bottom of the muffler as shown in fig. 2. Fold the blade strap over as shown to reinforce the hole. Cut the hose clamp so the tightening screw is in a convenient place on the engine for easy access. Use some clear silicon around the face of the joint between the engine and the muffler to give a better seal. Be sure the muffler and the engine are aligned properly before tightening the strap.

Servo Tray Assembly:

This can be assembled as described in the instructions, however, I like to cut the bottom of the vertical piece up about 1/4" so the bottom of the vertical tray does not touch the fuel tank. This will help prevent the transfer on any vibration to the tank. Wooden servo trays can be painted with black AEROGLOSS dope. Not only will the trays match the rest of the machine (COMPETITOR frames are black) but it dries quickly and is fuelproof. Just be sure to lightly sand the assembly before painting.

Fuel Tank:

The fuel tank should be assembled as shown. I like to insulate the tank using 1/4" double stick tape on the bottom and against the vertical piece #410 or #810. This will keep any vibration from getting to the tank and causing the fuel to foam. (Foam in the tank will cause the engine to run lean and overheat.) Because the tank is flat bottomed, the engine may starve for fuel when the level in the tank gets down to about a 1/4. This can be remedied by running a "sump" tank.

Tail Rotor Blades:

The blades supplied in the kit are fine but they will not take any abuse. L.M.S. sells plastic tail rotor blades for \$6.95 which require no finishing and are very durable. Rotate the tail rotor blades around till the tips touch. Now adjust the tips so they are about 1" apart in a right hand direction when the rudder trim is centred and the T/C stick on the transmitter is in the centre position. This will at least get you on the trim while setting up the machine for the hover. Please note: with the nose of the heli in your stomach as you look towards the tail notice the direction the collars move on the tail rotor input shaft #161 as the rudder stick on the transmitter stick is moved. If the tail rotor input arms are connected to the LEADING edge of the blade holders then right rudder stick on the transmitter should move the collars left and vice versa. Finally, in some of the new kits the collars #458, have been replaced with an assembly that connects a collar to the arm #167. This works fine except it makes it very hard to adjust the collars while trimming the Yaw (Remember, all Yaw trimming is done by moving these collars). I like to install another collar of the same type or hobby shop equivalent on the other side of the arm #167 which will give you the reference you need while trimming, and will give you a little insurance in case the other collar lets go while in flight. Even if you choose not to use another collar at least be sure the one collar is mounted on the outside of the arm. All adjustments made with these collars for the purposes of centering the rudder trim should be done in no more than 1/32" increments.

Gyro Installation and Set Up:

The gyro should be mounted on the front of the vertical servo tray as shown in fig. 3. This can be done by making a gyro tray as shown in fig. 3a. Or you can purchase one from L.M.S. for \$2.95. The sensitivity adjustment varies with each gyro. KRAFT gyro's should be set at half.

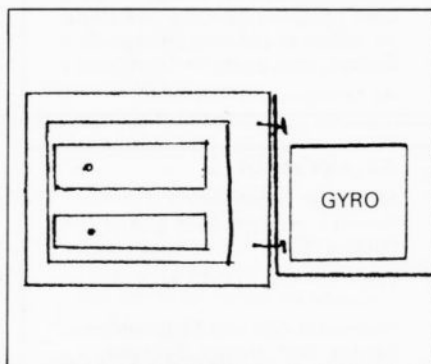


Fig. 3

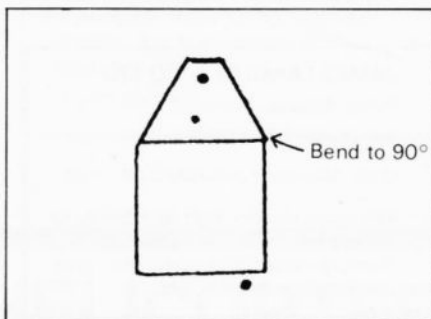


Fig. 3a.

DIGI gyro's should have both pots set to about 2 1/2. To check the action of the gyro turn the receiver and the gyro on and move the transmitter stick to the left. Notice the movement of the rudder servo arm. (Be sure you have double checked the direction as above). Let's say, for instance, the movement of the rudder servo arm moves in a clockwise rotation when the transmitter rudder stick is moved to the left. Now with the gyro on, jerk the heli to the right. You should notice a left clockwise movement of the servo. If not REVERSING THE ACTION OF THE SERVO WILL NOT WORK! The gyro itself must be reversed. Refer to the instructions to reverse the gyro.

Balancing the Machine:

Almost all helis today are tail heavy. If you are using a gyro, a 120mah battery is a must. If this pack is mounted as far forward as possible, the heli should balance perfectly; about 1/4" in front of the main shaft on the main gear. Check the price list for the L.M.S. price on the 1200mah pack and charger. A good idea to move the battery pack forward on the COBRA is to turn the bottom wooden tray around so the tray sticks out about 2" in front of the supports (#408 & 409). The four holes that are already drilled should fit exactly. Now mount your battery pack on the end of the tray. This should help bring the C.G. forward. This "mod" should allow the fuel tank to sit down directly on the rails low enough so that the tank does not touch the

servo tray holder #411. This will prohibit any vibration from being transmitted to the fuel tank from the chassis. Mount the tank using 1/4" double stick servo tape as described above. This will further eliminate any vibration to the fuel.

Set Up:

Set up the heli exactly as shown in the instructions. However, since the lengths of the pushrods given in the instructions can't be the same for all machines, keep in mind some of the following hints: Be sure when setting up the swashplate to be horizontal in both planes, the T/C stick is at the half position. Also, try to adjust the upper swashplate pushrods 'C' so that when the T/C stick is at full or high, the upper mixing arms #536 are slightly above horizontal. Finally, be sure the lower swashplate pushrods 'F' and 'G' are long enough so the swashplate will not bottom out on the mainshaft retainer #413 when the T/C stick is in the low position. Check this by bringing the T/C stick all the way down then moving the cyclic controls and observing that the swashplate does not hit the mainshaft retainer. If you are not running an autorotational clutch, set the low T/C stick blade position to about +1 degree. This will allow the machine to settle a lot softer while learning "HELICOPTER RADIO FUNCTIONS" low and high pitch trims. If you are doing auto's I like to set the low blade positions to a -4 degrees. The high end varies with the type of engine used. I find settings anywhere from +6 to +10 degrees suitable. Just play with the high end pitch trim until the engine just starts to sag at high throttle.

Gear Mesh:

The gear mesh of the main gear and clutch assembly is very important, as if it is too tight it will cause undue drag on the engine, robbing the engine of power and causing it to overheat. This mesh should be free enough to spin freely when you rotate it rapidly with your thumb. BE SURE THERE IS NO BINDING! If you have to, enlarge the holes that hold the starter shaft bearing block (blocks in the COMPETITOR) to allow more adjustment.

Invert Set-Up

Either machine will fly inverted easily if set up correctly. Ball bearing "I" arms and "L" arms should be used on the cyclic controls and are available from L.M.S. The "SUPER K RADIUS ARM" should also be used for best results; also available from L.M.S. The invert hover point should be set at -2 1/2 degrees and the invert high should be no more than -5 degrees.

Conclusion:

These "MODS" are the result of many hours spent with these machines and picking the brains of many expert flyers other than myself. Follow the instructions and incorporate these mods and you'll have a very reliable machine.

N.B.

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