Lark 2-40

INSTRUCTIONS

Construction of the LARK 2-40 is straightforward and essentially similar to the lower-powered Lark 2-25. However, there are certain important differences to be considered. Consequently, a complete Lark 2-25 manual is included, together with these additional pages which should be referred to in place of the existing page in the 2-25 manual.

Where either the text or illustrations are changed, the page number has been suffixed with an 'A'. e.g. - Page 5 (Lark 2-25) now appears as Page 5A for the LARK 2-40. Similarly, where illustrations are altered, the new or revised drawing has its figure number suffixed with an 'A'.

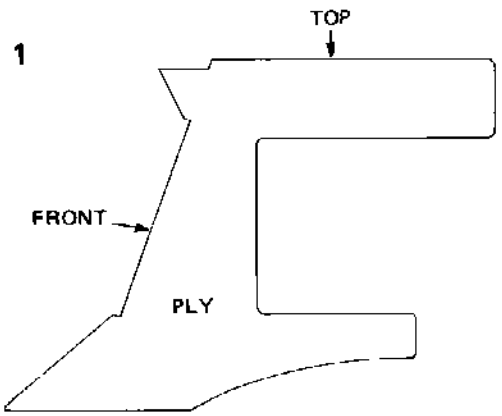
When the information on a page of the Lark 2-25 manual is generalised, although not necessarily relating to the LARK 2-40, the page remains unchanged and may be read in conjunction with the new pages herewith.

Some builders may find it preferable to remove the original pages from the Lark 2-25 manual and replace them with the appropriate new page and thus avoid any unnecessary confusion.

Refer to Page 48A for LARK 2-40 parts information.

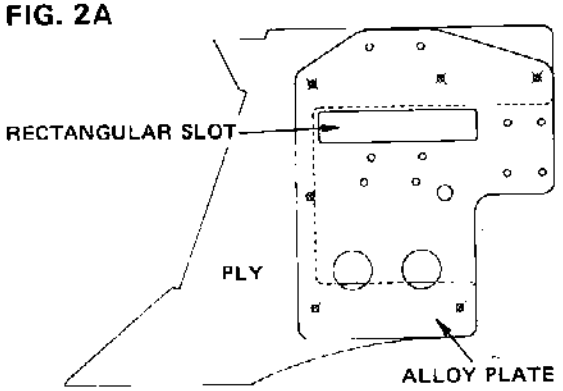
The centre of the whole model is a 3/8" piece of ply as shown in FIG. 1.

FIG. 1



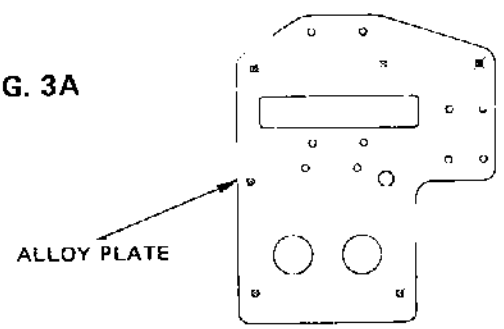
An aluminium alloy plate, which carries the engine, gears, tank etc., bolts to the left (port) side of the ply former. FIG. 2A.

FIG. 2A



Place the alloy plate over the ply former and, using the holes already drilled in the plate at the positions shown as x, use a pencil to mark the position of the holes to be drilled in the ply former. (N.B. the large rectangular slot in the alloy plate should line up as shown in FIG. 2A.

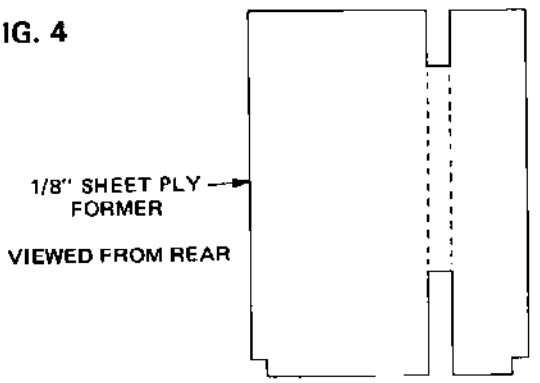
FIG. 3A



Obtain two drills 1/16" and 7/64". Use the 1/16" drill to make six pilot holes where the pencil marks were made on the plywood former. Use the 7/64" drill to finish the holes (7/64" is a tight clearance on a 6 BA bolt).

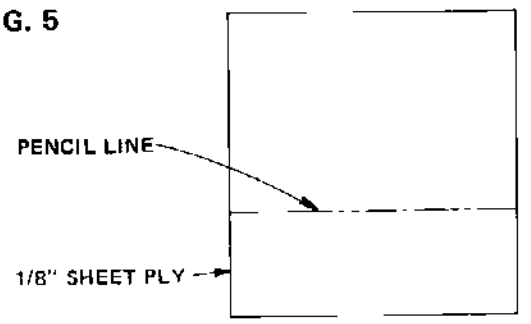
Put the alloy plate to one side.

FIG. 4



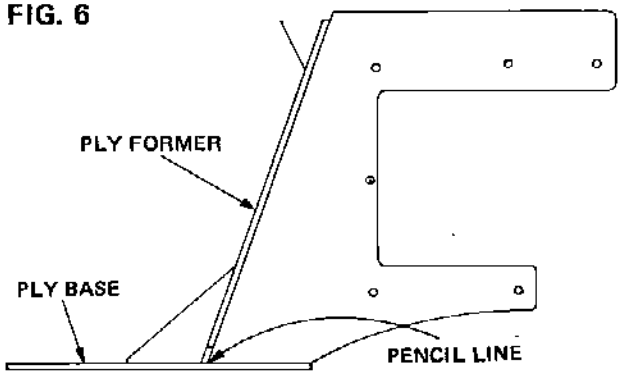
Locate the plywood fuselage back FIG. 4, and epoxy glue it to the previously drilled plywood former. The slots should be to the right (starboard) side of the model so that the rotor shaft is in the centre.

FIG. 5



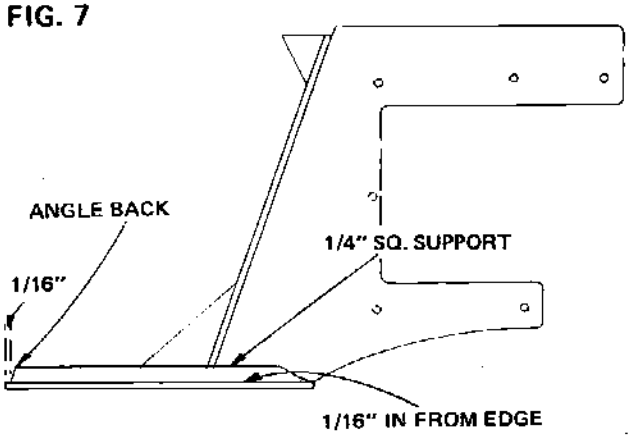
Locate the 1/8" ply fuselage base ($4\frac{3}{4}$" x $4\frac{1}{2}$") draw a line 1 5/8" from one of the shorter sides and parallel with it, FIG. 5. Glue the previous construction to the base using the line as a guide, FIG. 6. The line should correspond with the rear of the fuselage back. Some sanding of the construction may be required before gluing. The fuselage base will overlap the back by 1/16" either side.

FIG. 6



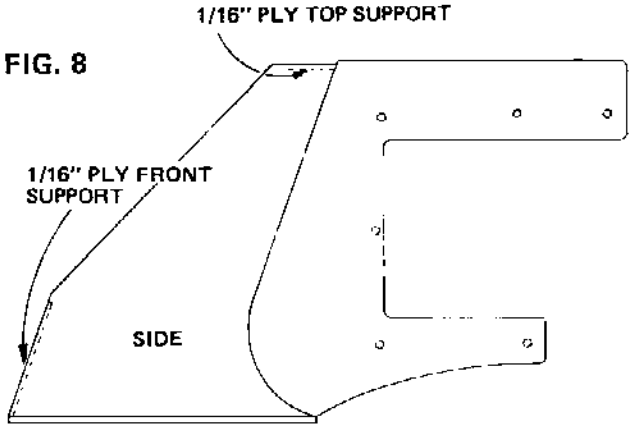
Glue the $\frac{1}{4}$" square hardwood supports to the base. The ends of the supports should be 1/16" from the front edge of the base. The sides of the $\frac{1}{4}$" supports should be 1/16" from the sides of the base.

FIG. 7



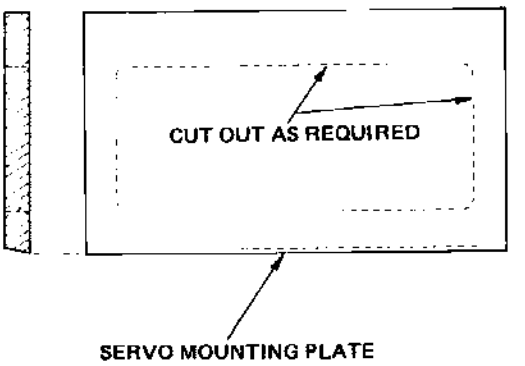
The fuselage sides are now glued in place FIG. 8. The 1/16" ply top and front supports can also be glued in position. These pieces butt against the inside of the sides. The ends of the $\frac{1}{4}$" sq. hard-wood pieces should be angled back before the sides are fitted FIG. 7 - use plenty of glue.

FIG. 8



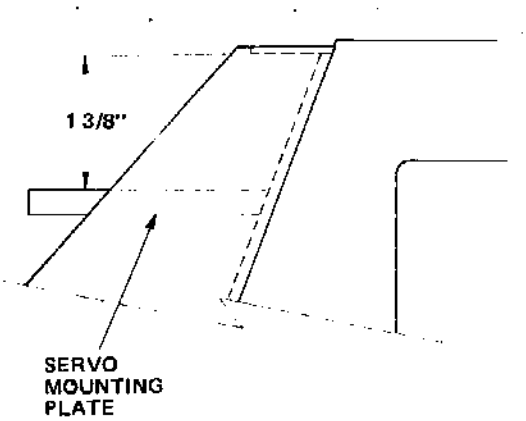
The servo mounting plate (6.5 mm. x $2\frac{1}{2}$" x 4 3/8" ply) shown in Fig. 9 should be epoxied in place inside the fuselage base.

FIG. 9



Before this is done, it will be necessary to cut out the centre of the servo mounting plate to accommodate whatever type of servos are to be fitted. The area will approximate to the dotted line shown in the drawing. The rear edge of the servo mounting plate should be chamfered to butt firmly against the 1/8" ply bulkhead. Fig. 10.

FIG. 10



Sand the whole structure as required.

Using 6 BA bolts as guides make sure the engine plate fits the fuselage. Relieve any holes that are out of alignment with a 7/64" drill, using the engine plate as a guide. Remove the engine plate when satisfied.

The large nylon crown gear and steel pinion gear are next mounted on the port (left) side of the engine plate in the following manner:-

Take the two main rotor shaft mounts, with phosphor bronze bearings, and trim off any flashing that may be present with a sharp modelling knife. Be careful to avoid cutting yourself should the blade slip. Ensure that any flash is removed from the bearing holes.

Take each bearing separately and, using the $\frac{1}{4}$" dia. silver steel main rotor shaft insert it through each bearing (one at a time) and move back and forth with a twisting action. This assists the bedding in of the Oilite bearings and the addition of a little light machine oil will aid the process.

The ensuing operations are very important and call for probably the most patience and care of any of the assembly in the Lark Kit. The object is to obtain a perfect mesh of the main nylon crown wheel and steel pinion with both head rotor and counter shaft revolving freely without any unnecessary play in their respective bearings. This requirement is slightly complicated by manufacturing limitations viz:- a very small shrinkage variation in the mounting blocks, a slight curvature induced in the engine plate when it is punched out and the fact that it is not possible when pre-jig drilling these to work to tolerances better than $\pm$ approx .00[illegible]".

There are two holes in the rotor shaft. The small hole, 15/16" from lower end, takes the roll pin which fixes the nylon crown gear. The hole at the side of the crown gear boss is countersunk on one side. Push the roll pin through this hole until it is about to emerge into the centre bore of the gear. The edge of your workbench can be used to help it in using gentle pressure and care. Push the crown gear on to shaft (teeth facing downwards) until it reaches fixing hole position.

Holding the nylon gear, rotate the rotor shaft until the small hole in the shaft comes into line with the roll pin hole in the gear boss.

Give the roll pin another push on the corner of your workbench to locate its end in the rotor shaft. When you are certain all is in line, (this is easily seen since the roll pin is hollow) force the roll pin through with the aid of a vice. (N.B. the vice jaws should be either side of the gear boss, FIG. 1).

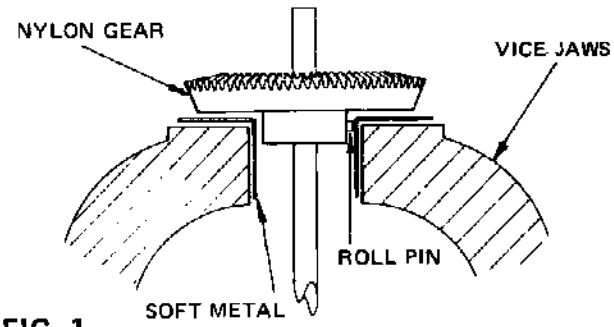


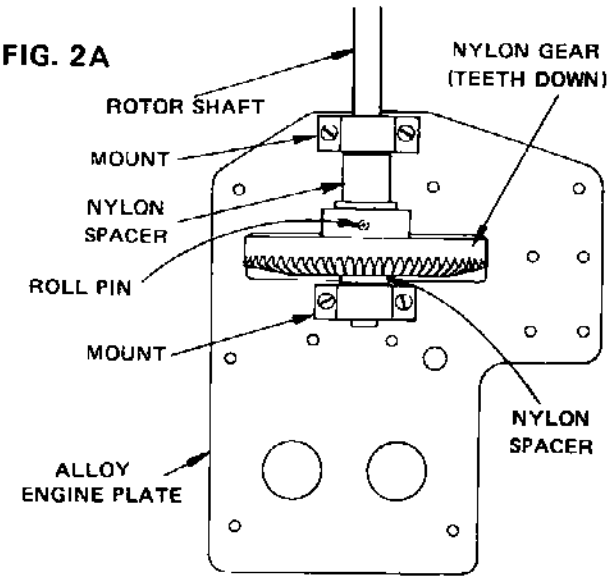
FIG. 1

A flanged bearing is used above the gear wheel (see Fig. 2A), slide this into position with the flange end resting on the crown gear boss. Then slide a shaft bearing on the top of the shaft with the bronze lip facing down to flanged spacer. Slide the 1/4" nylon spacer (HD14L) on shaft below crown gear followed by a second shaft bearing with the bronze lip upwards towards spacer.

Place gear into slot in engine plate and insert 6 BA x $\frac{1}{2}$" bolts, with washers under heads, through respective holes in plate (FIG.2A). Add nuts (no washers under these nuts) and temporarily tighten, the shaft must revolve freely. If this is not the case, slacken the nuts a little and try slightly moving the assembly bodily, if this does not still give free rotation of shaft a little judicious work on the mounting holes with a round needle file will give the desired perfect line up of shaft and bushes. Before

tightening nuts add a little Torqseal (this takes 3 hours to set so if necessary you can again slacken nuts during this period) do not over tighten or this will cause distortion of nylon mounts — recheck for free rotation of shaft.

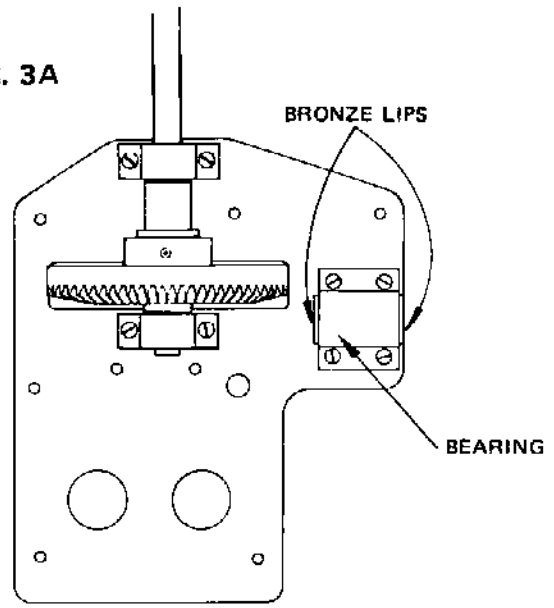
FIG. 2A



Now mount the bearing for the counter shaft using 6 BA x $\frac{1}{2}$" screws with washers under heads as for main drive shaft. (Fig. 3A). Ensure that oiling hole in bearing block is to the top.

Insert $\frac{1}{4}$" dia. x 2" long counter shaft and try for line-up and ease of rotation. If it is tight and you have access to a $\frac{1}{4}$" reamer, this can be used carefully through both the Oilite bearings until the shaft rotates freely but do not over do it.

FIG. 3A



Put the steel pinion in position and slide the counter shaft through. Check the mesh of the gears. If this is not correct then the countershaft bearing can be loosened and adjusted, the above process being repeated.

(N.B. the gears are in correct mesh when there is a small amount of play between them. Small inaccuracies in the crown wheel could cause binding, so rotate it to make sure there is none).

Add dabs of Torqseal to the countershaft bearing fixing screws and re-tighten nuts, but again, it is important not to over-tighten.

The counter shaft spacer (HD16L) goes on the other end of the counter shaft, followed by the 25 tooth pulley. Two flats must be filed on the counter shaft to provide seats for the grub screws in the pulley and pinion. (Don't tighten the grub screws until these flats have been made or you won't be able to remove the pulley and pinion).

To find the position of the flats mark the counter shaft with a pencil through the grub screw holes with the pulley and pinion in position on the mounting plate.

Hold the counter shaft in a vice when filing but use a soft material between the shaft and vice jaws to protect the bearing surfaces. Aluminium sheet angle brackets are ideal.

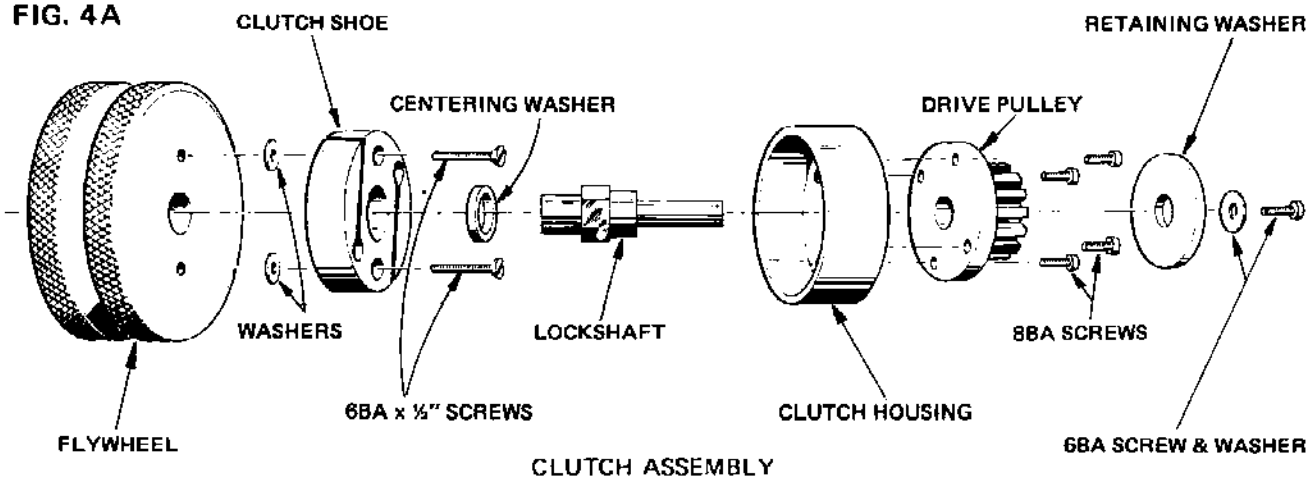
Slide the counter shaft through the bearings and through the pinion. Tighten the grub screw with the Allen key provided. Make sure it tightens onto the flat.

Fit the spacer (HD16L) and the 25 tooth pulley on the other end of the counter shaft and tighten the grub screw in the pulley. The entire assembly should now rotate freely with gears meshing smoothly and virtually no side movement in bearings.

A good reliable engine, not one which has been worn out, is of paramount importance. Any modern engine of reputable manufacture of .40 c.i. capacity is considered suitable.

THE INFORMATION ON THIS PAGE IS APPLICABLE TO THE LARK 2–40 ONLY

FIG. 4A



CLUTCH ASSEMBLY

If the engine hasn't been run in then do it now, with a propeller, to the manufacturers instructions. Next, carry out the following instructions for fitting clutch to engine. (See Fig. 4A).

Select the correct lock nut/shaft to suit your engine shaft thread. Two are supplied in this kit, a 1/4" U.N.F. and a 6 mm. thread, one or the other of which should be suitable for the majority of .40 c.i. capacity motors currently available.

Remove lock nut supplied with engine, (this is not used but keep safe in case you wish to use engine for other purposes) place flywheel on shaft, holes facing outwards. Slip the centering washer on the lock shaft and then screw this unit to the shaft ensuring that the centering washer is against the flywheel - tighten with a box or ring spanner. It is a good idea to score the back of the flywheel where it fits against prop driver on engine, this reduces the chances of flywheel coming loose when starting engine. Fix one-part shoe to flywheel using spacer washers shown in FIG.4A. Fix 12 tooth pulley to clutch housing with the 4 x 8 BA x 3/16" screws supplied, first making sure that any small flash on rear face of pulley is trimmed off. Slide this unit on to shaft and over the clutch shoe.

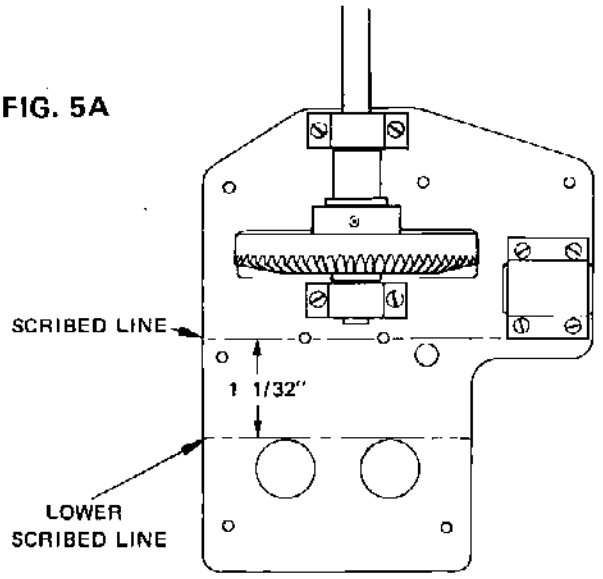
Press nylon washer on to end of shaft and add 6 BA x $\frac{1}{4}$" retaining screw with steel washer under head, to end of shaft and tighten.

Since no two makes of engine are alike the mounting holes have to be drilled by the builder.
The following method is recommended.

With the aid of a straight edge and the tip of your modelling knife, scribe a line across the mounting plate, parallel to, and in line with, the bottom edge of the counter shaft bearing block flange (See Fig. 5A).

Scribe another line parallel with the first and 1 1/32" below it (See Fig. 5A).

FIG. 5A



Measure the distance X between the back of the teeth on the 12 tooth pulley on the clutch housing and the centre of one of the front engine mounting holes. FIG. 6A.

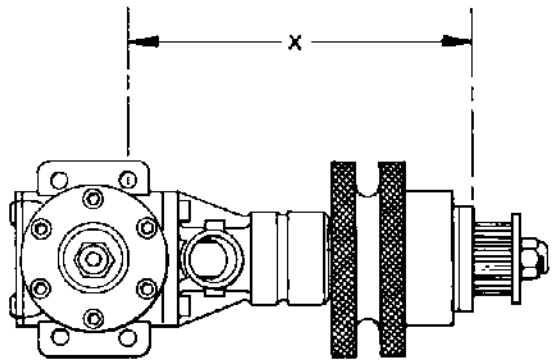
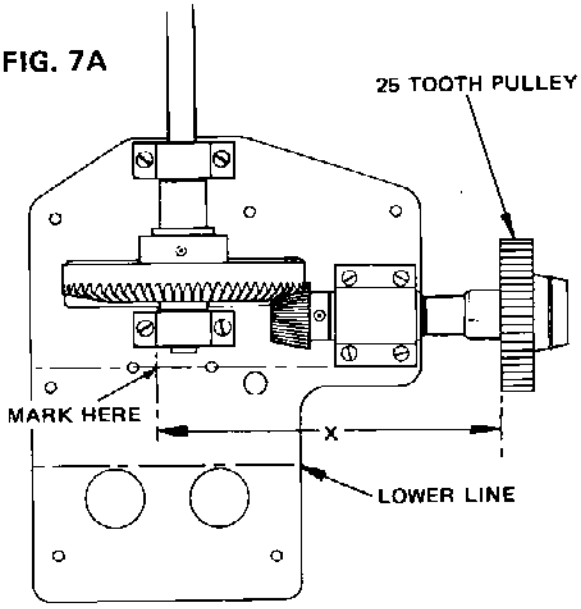


FIG. 6A

Measure off the same distance X from the back of the teeth on the 25 tooth pulley along the upper scribed line on the mounting plate. Make a mark on the upper line. FIG. 7A.

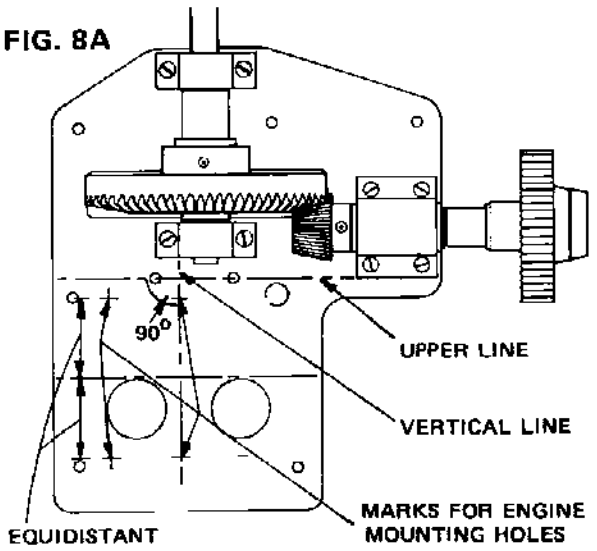
FIG. 7A



Scribe a line at 90° to the mark to cross the lower scribed line. (Use a set square). FIG. 8A.

The lower line is the centre line of the engine and the new line crossing it is the centre line of the front engine mounting holes (i.e. front of the engine not front of the model).

FIG. 8A



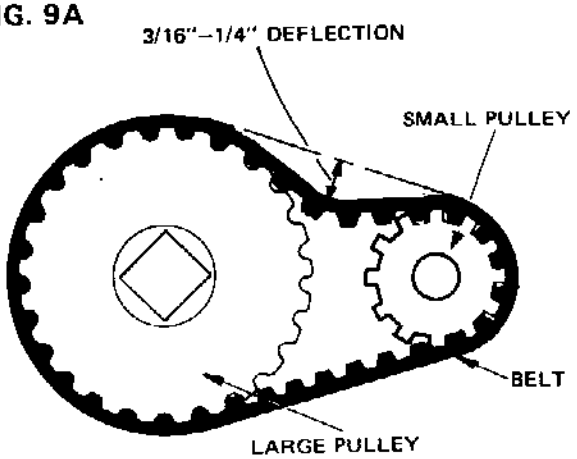
Measure the distances between the engine mounting holes and make four marks on the mounting plate to coincide with these using the scribed lines as a reference. You should have two marks equidistant from the lower scribed line on either side of it. FIG. 8A.

Drill four holes at these marks using a 1/16" drill as a starter and a 9/64" drill to finish.

Mount the engine using the aluminium alloy pillars 1/4" x 3/8" x 7/8" and 4 BA bolts. (The silencer should be removed from the engine for this). Don't use washers. Slightly tighten the nuts.

Fit the rubber toothed belt over the pulleys.

FIG. 9A



The belt should have a slackness of 3/16" to $\frac{1}{4}$". FIG. 9A.

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If all is correct, loosen off the nuts holding the engine. Put a dab of Torqseal on the mounting holes and bolt threads and tighten the nuts at the same time checking the belt for correct tension. This all requires a little patience. (If the correct belt tension can't be achieved then the engine mounting holes will have to be relieved with a small file in the direction required. The Torqseal will fill the oversize holes).

4 off .003" shim washers are supplied. Should a minor realignment of the 12 tooth and 25 tooth pulleys be necessary, these shims may be used as required between the counter shaft bearing and the spacer/25 tooth pulley (See Fig. 10A).

Fit the engine silencer with the efflux facing to the rear of the model (i.e. the opposite way it fits on the engine to usual).

Using 6 and 4 BA bolts as a guide offer the completed drive unit to the fuselage. Make indentations in the 3/8" ply main bearer with the ends of the bolts which attach the upper rotor shaft bearing (6 BA) and the lower engine mounting pillars (4 BA).

Remove the drive unit.

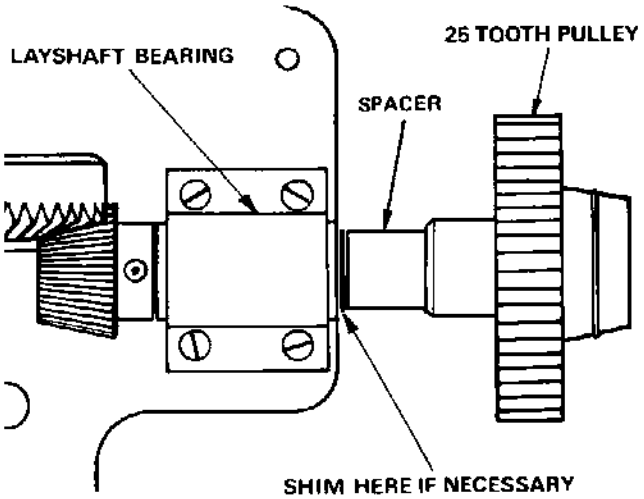


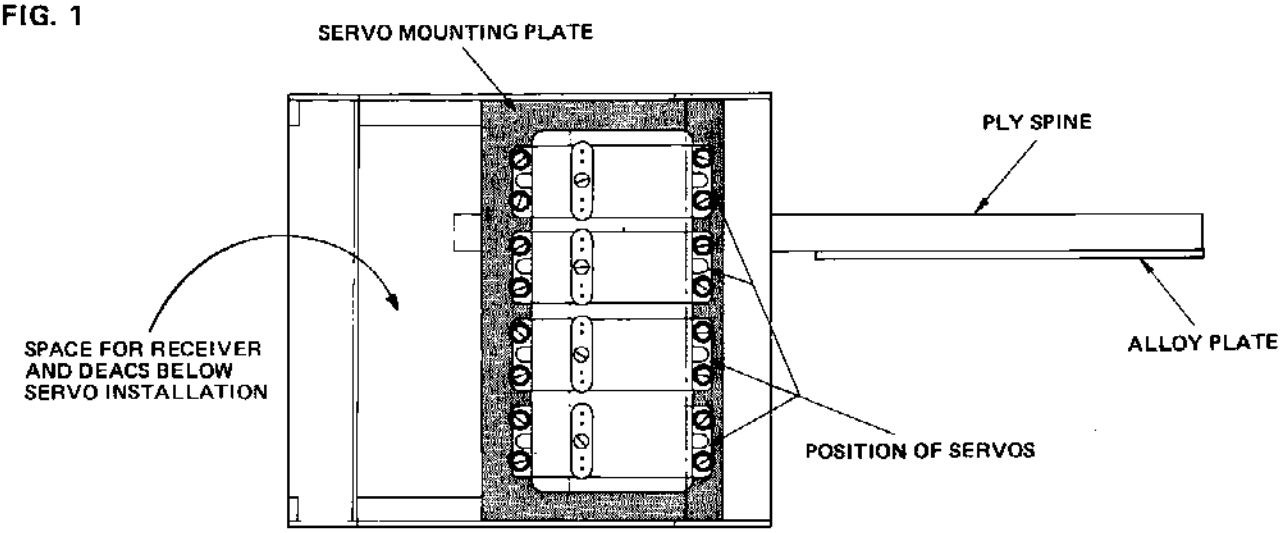
FIG. 10A

With a 7/64" drill for 6 BA and a 9/64" drill for 4 BA make holes in the ply just deep enough to clear the ends of the bolts. Use a $\frac{1}{4}$" drill to clear the 6 BA nuts and a 5/16" drill for 4 BA. Check the drive unit for fit and temporarily bolt into place.

Only four bolts are required. The two holes at the top rear of the drive unit also serve to mount the tail boom and extra long bolts are provided for this. Don't mount the boom yet.

Make sure no oil gets on the woodwork from the engine.

FIG. 1



Temporarily bolt the undercarriage in place.

The radio, naturally, fits in the fuselage. All modern radios should suit the model. A four channel digital system is essential. Either mini or standard servos will fit across the fuselage side by side.

A suggested layout is shown Fig. 1. The fuselage is seen from the top.

The servos are fitted to a $\frac{1}{4}$" (6 mm.) ply plate, which is made to fit across the fuselage and cut out to suit servos. A side view is shown in Fig. 2.

The purpose and position of each servo is shown in Fig. 3.

With the foregoing considerations in mind install the radio.

FIG. 2

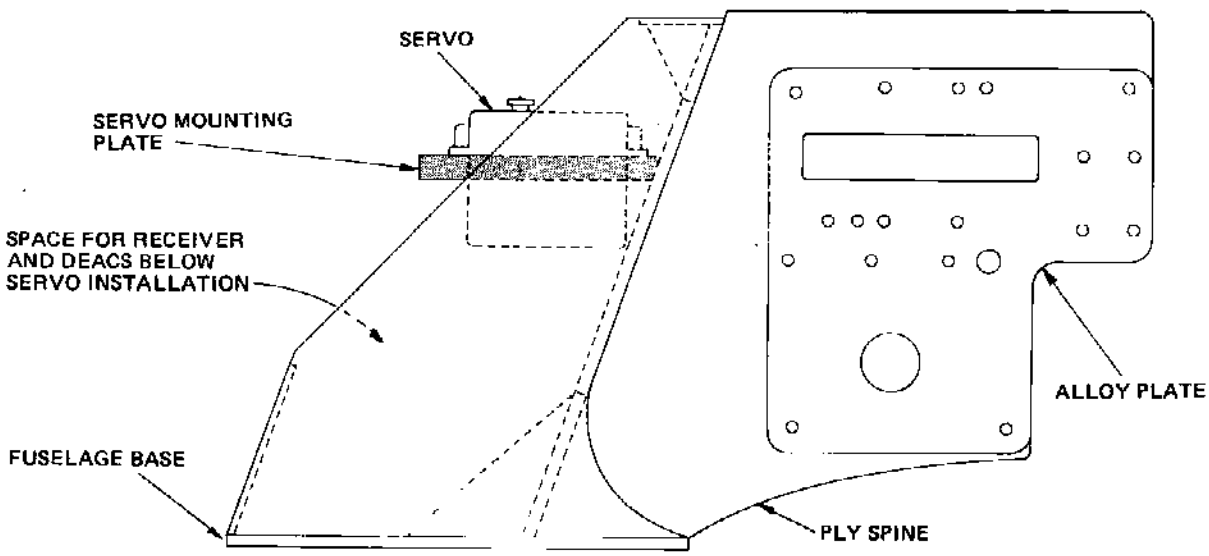
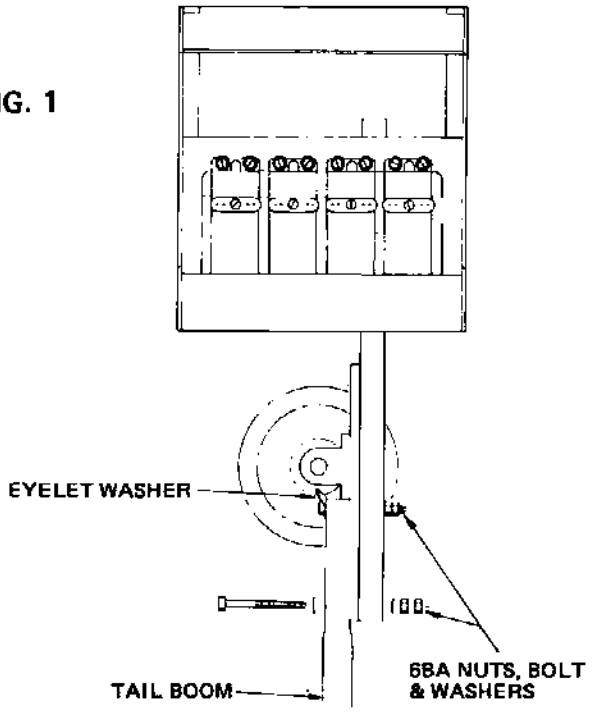
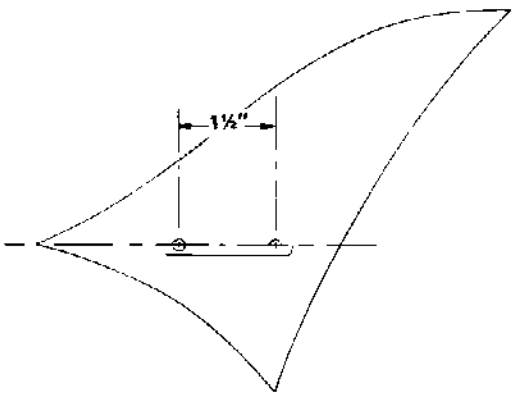


FIG. 1



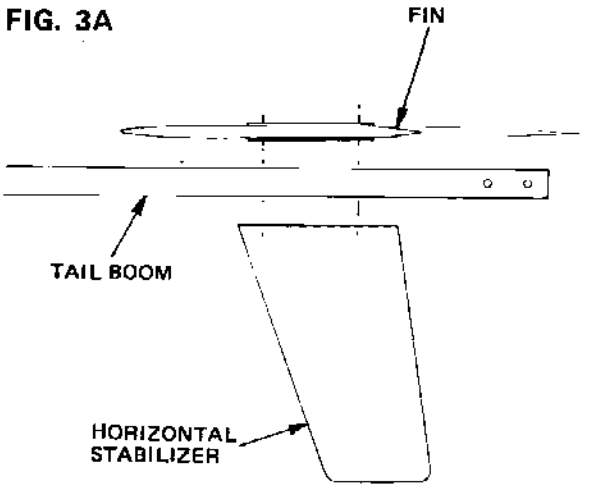
As previously mentioned, the tail boom is bolted to the drive unit and plywood mounting plate. Temporarily fit the boom in position with socket type hardened 6 BA bolts and nuts supplied. Fig. 1.

FIG. 2



You have already built the fin. Drill two holes with a 3/32" drill $1\frac{1}{2}$ inches apart through the plywood reinforcements of the fin. Fig. 2. These holes should match up with the predrilled holes in the boom.

FIG. 3A



Temporarily bolt the fin and pre-formed horizontal stabiliser in position with 6 BA bolts and nuts. The fin is located on the starboard (right) side of the boom; the larger side of the fin upwards. The stabiliser is located on the port (left) side of the boom, flange down (See Fig. 3A).

The tail skid is pre-bent from 12g wire as shown in Fig. 1 and fits to skid bush with lock screw, bush then fits into end of boom and is held by rear gear cage fixing bolt.

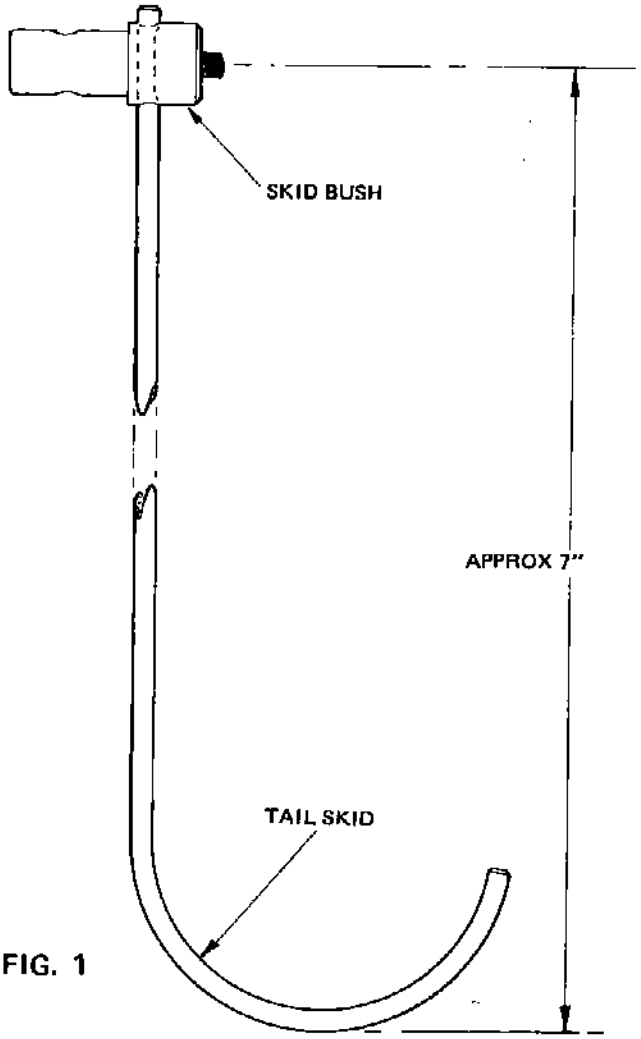


FIG. 1

The tail rotor assembly contains two shafts 3" long and 1 1/8" long. FIG. 2.

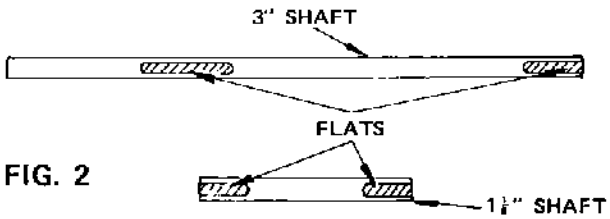


FIG. 2

Install the small shaft in the gear cage as in Fig. 3. Screw a brass mitre gear on the inside and the universal drive shaft rear coupling on the outside with grub screws. Insert a washer in the position shown. Make sure the grub screws are tightened on the flats and the shaft rotates freely.

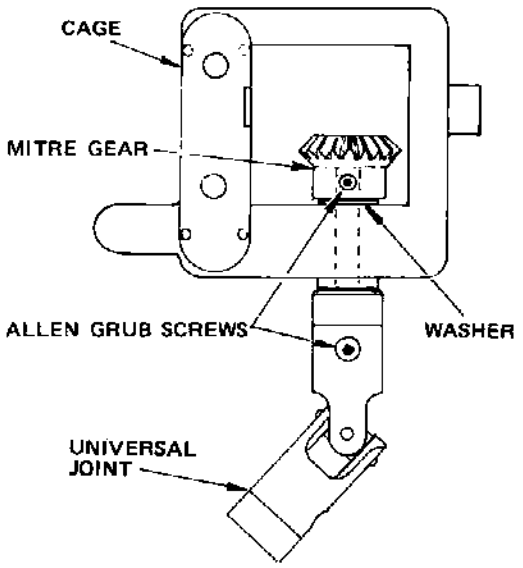


FIG. 3

Install the large shaft in the gear cage as in Fig. 4. Fit the other brass mitre gear on the inside, and the aluminium alloy collar on the outside. Make sure the end of the large shaft has the flat on it as shown in Fig.4. The mitre gear screws on to the inner flat. There is a second bearing hole for the long shaft - ensure that it fits into this. Make sure the drive is perfectly free but with no end play.

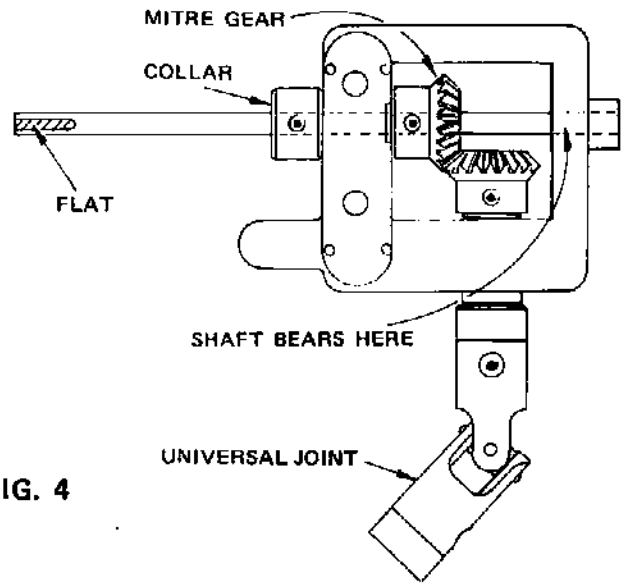


FIG. 4

The tail rotor pitch crank is the next item to fit. This goes on a spigot, which is part of the gear cage moulding. Secure the crank with a washer and self-tapping screw.

Fit the tail rotor spring after final assembly of tail unit to boom by hooking one end over tail skid wire and the other into hole in back edge of pitch crank FIG. 5.

The reason for the spring is to take up any play in the tail rotor control linkages. Make sure the crank is perfectly free.

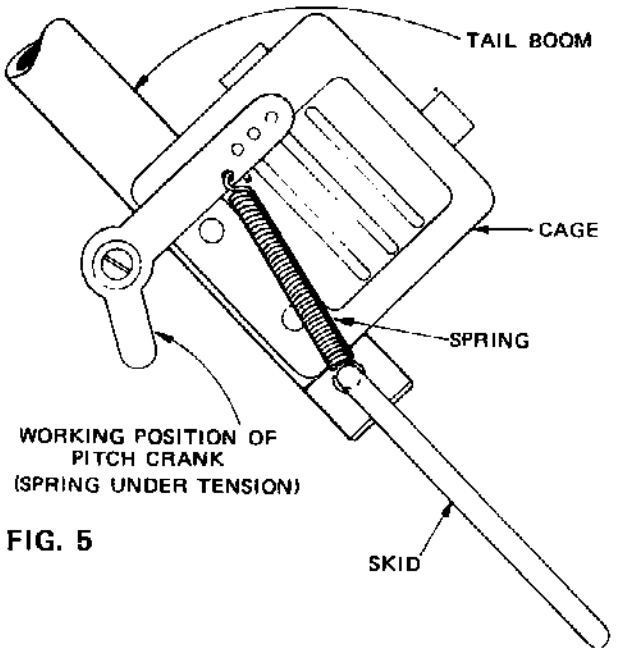
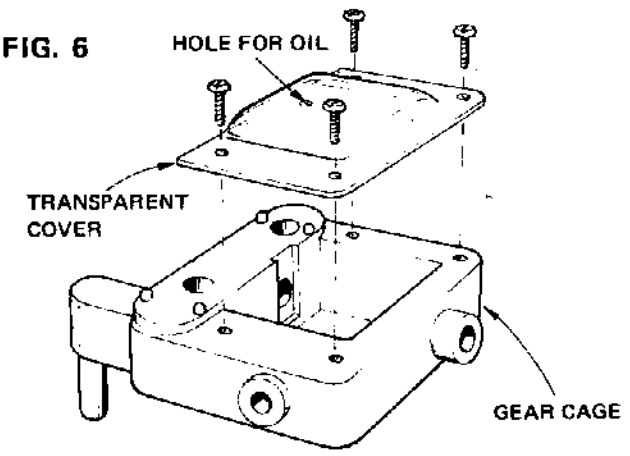


FIG. 5

A small transparent cover is supplied to retain oil in gear cage, drill cover and gear cage moulding and fix in place with small self-tapping screws supplied, Fig. 6. Also drill small hole for replenishing with machine oil.

FIG. 6



Fit the tail rotor blade holders to the tail rotor teeter head as shown in Fig. 7A, using

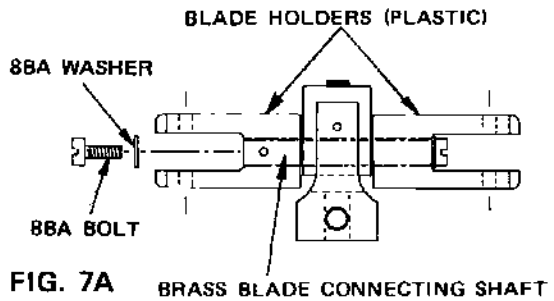


FIG. 7A

the brass blade connecting shaft and 8 BA bolts and washers. Use Torqseal to secure the bolts – a little only so it doesn't jam up the mechanism.

Each blade holder has a 10BA piece of studding moulded into it. This is to take the ball of a ball and socket joint.

Screw a 10BA nut on to the studding to act as a spacer.

Cut the ball from the sprue and slide it over the studding.

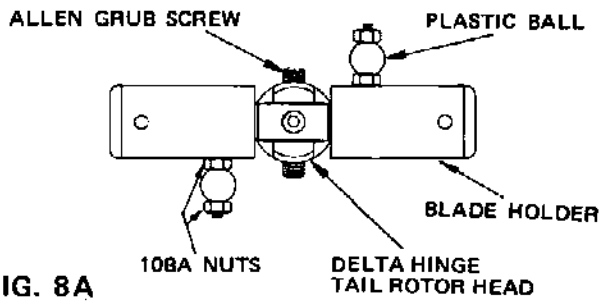


FIG. 8A

Secure the ball with another 10BA nut, using Torqseal to hold the nut in place. Fig.8. Repeat for the second blade holder.

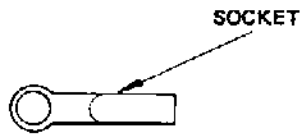


FIG. 9A

Use ball joint sockets as supplied. Fig. 9A.

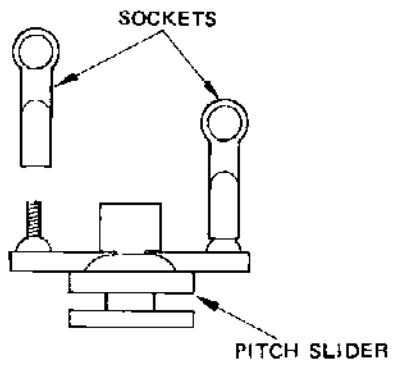


FIG. 10

Screw the sockets on to the 8BA studs, which are moulded into the tail rotor pitch slider. Fig.10. Angle the sockets as shown in Fig.11.

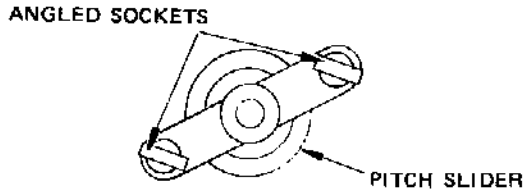


FIG. 11

Slide the pitch slider on to the tail rotor shaft with the sockets facing away from the tail rotor bracket. Engage the steel pin of the bellcrank in the slot of the pitch slider. Push the tail rotor head on to the tail rotor shaft, ensuring that the end of the shaft does not foul the teeter block, but as far as possible bearing this in mind. Tighten the grub screw on to the flat of the tail rotor shaft.

The plastic balls fitted to the tail rotor blade holders are on the same side of the holders as the leading edge of the tail rotor blades. The tail rotor rotates in a clockwise direction when viewed from the left side of the model. (The tail rotor is on the right side and its bracket will be fitted underneath the boom.) Fig.12A.

Connect the ball and socket joints.

With a set of dividers and a ruler, adjust the distance between the tail rotor head and collar until it is 7/8". The grub screws in the mitre gear and collar must be slackened for this. N.B. Don't move the rotor head position on the shaft. Fig.13A.

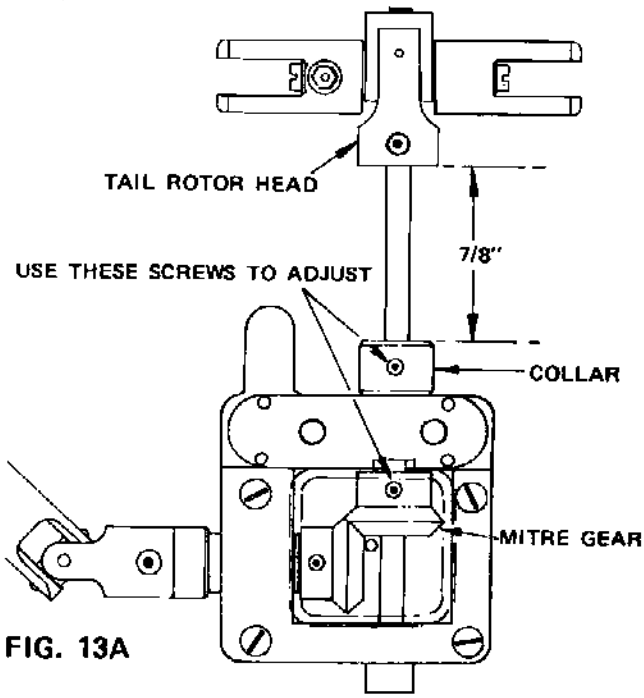
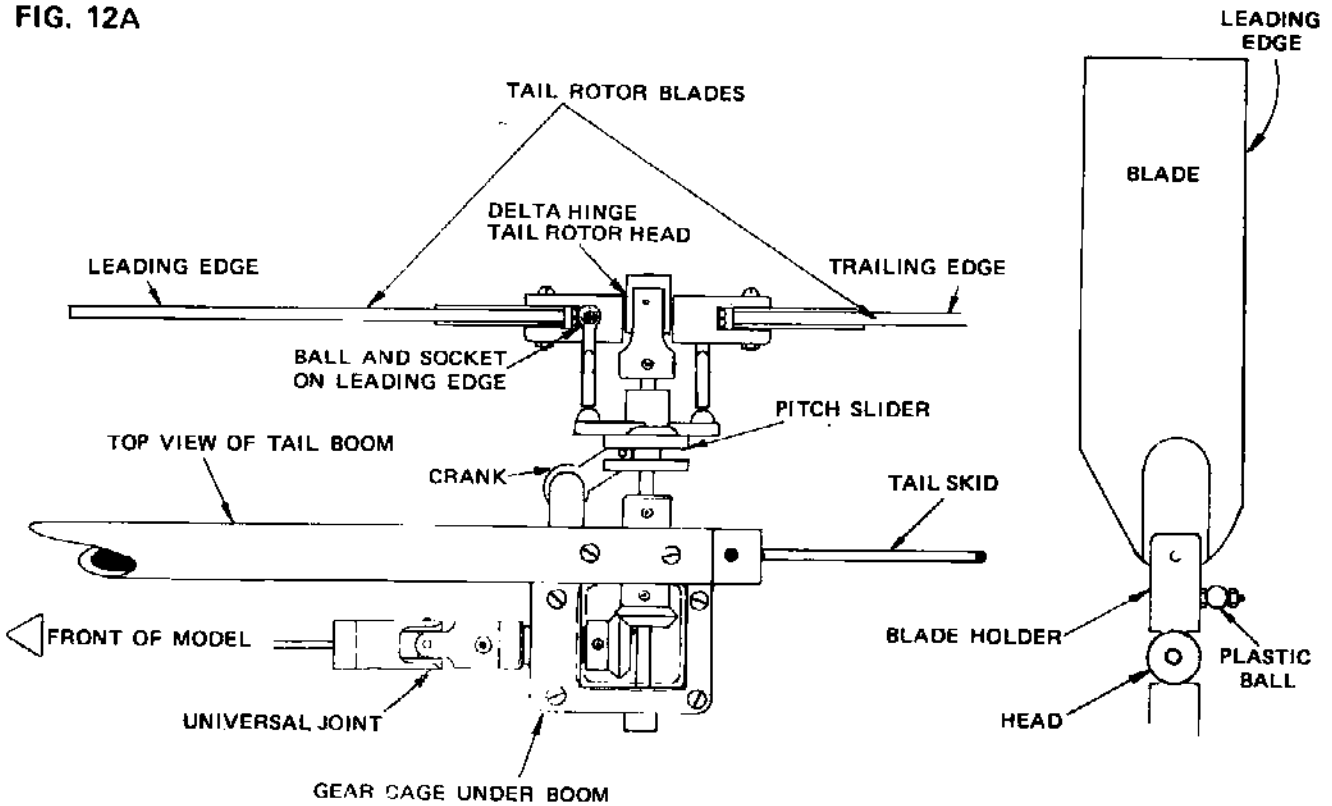


FIG. 13A

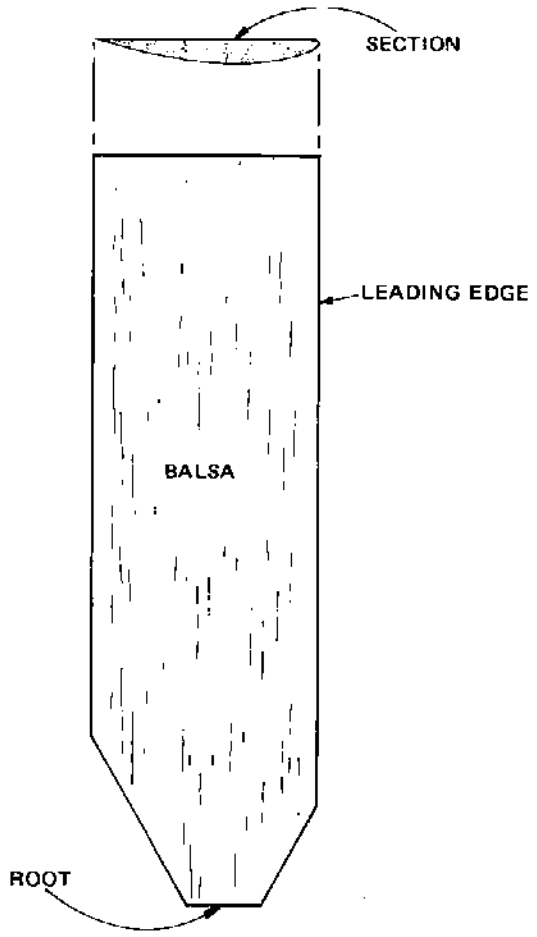
Fit the tail rotor assembly to the underside of the boom, at the same time locking the skid in position with the rear assembly fixing bolt.

FIG. 12A



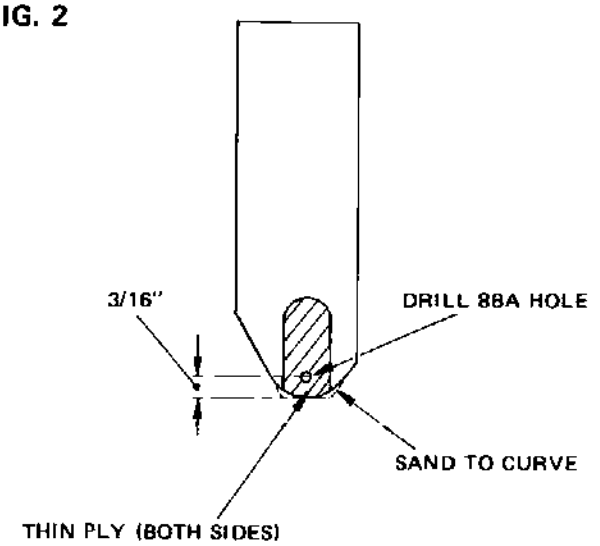
The blades are supplied cut to outline in balsa wood and should be sanded to airfoil section as Fig. 1A.

FIG. 1A



The leading edge of both blades should be to your right. Sand two identical blades.

FIG. 2



Glue the thin ply reinforcing pieces to the roots of the blades, one at either side. Fig.2.

When the glue is dry sand the roots to a curve.

Drill a hole in each root, to clear an 8BA bolt, 3/16" from the end. Fig.2.

Check the blades for fit in the blade holders of the tail rotor assembly. (To allow for painting or covering with Micro-Cover the fit should be quite free).

Note: Tail Rotor Assembly should measure 8½" diameter when completed

FIG. 1

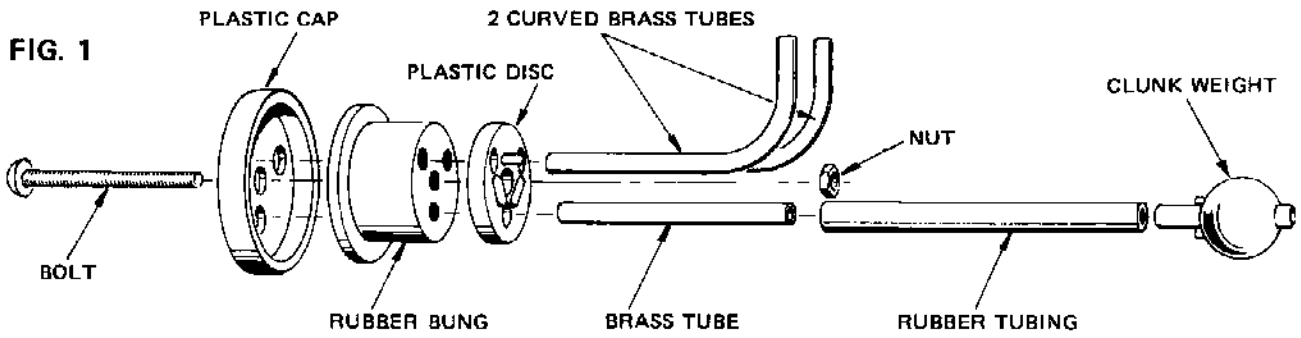
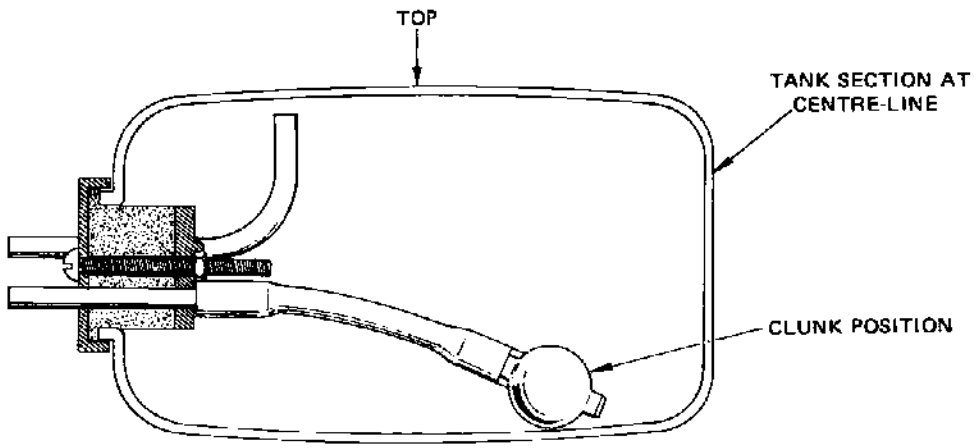


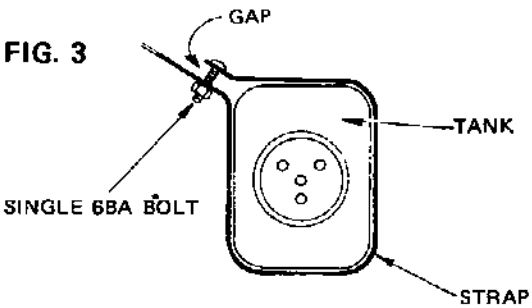
FIG. 2



Assemble the tank as shown in the diagrams Figs. 1 and 2.

The clunk weight should rest on the bottom of the tank in the position shown in Fig.2.

FIG. 3



The tank is attached to the engine plate with a strap made from the $1\frac{1}{4}$" wide aluminium supplied.

Fold the strap round the tank carefully as shown in Fig.3.

Drill two holes to take a single 6BA bolt, as shown, in the centre of the strap. Leave a gap of about $\frac{1}{4}$" so that the strap bites into the tank when the bolt is tightened. The two remaining holes in the engine plate are used for fixing the tank strap.

The free end of the strap should be trimmed to length and bent so that when bolted in position it locates the fuel tank to the starboard side of the model. Fig.4.

Drill two 6BA holes in the end of the strap to coincide with the holes in the engine plate.

Rotor blades for the Lark 2-40 are supplied spindle finished from hardwood and require only light sanding to prepare them for assembly.

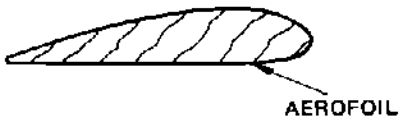


FIG. 1A

If necessary, round off the leading edges and lightly sand all over to obtain smooth finish.

Ensure the blades are identical in length — 17½" from tip to root. Fig. 2A

The overall finished diameter of the rotor, when completed, should measure 39½" from tip to tip.

Weigh the blades and sand the heavier one if necessary. Blade weight can also be adjusted at the painting or covering stage if preferred.

The rotor turns in a clockwise direction when viewed from the top, which means that the root of each blade is as shown in Fig. 2A. N.B. Make two identical blades, not a left and a right!

Glue the plywood strengthening pieces to each root, top and bottom, in the positions shown in Figs. 3A and 4A.

Drill three holes in the blade roots, as shown in Fig. 4A, using 1/16" and 7/64" drills.

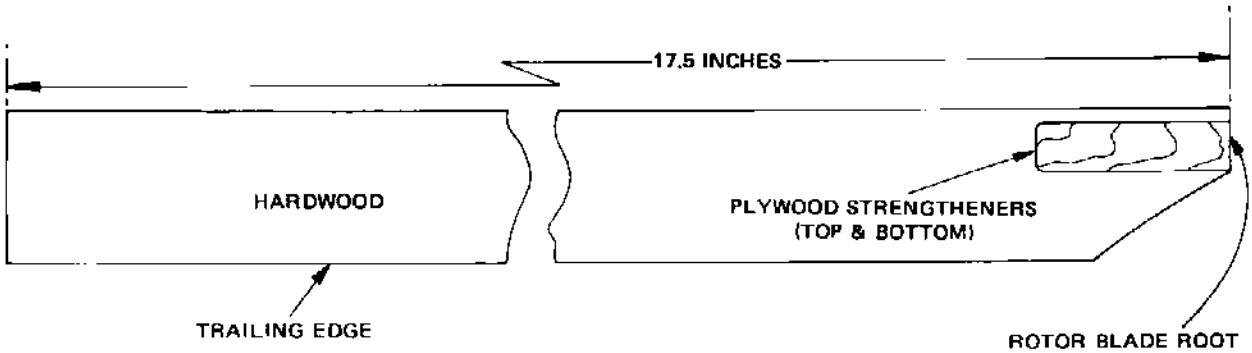


FIG. 2A

Use the steel blade holders for positioning and mark centres for drilling.

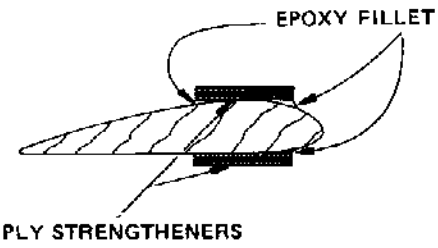


FIG. 3A

Don't bolt the blade holders in position yet.

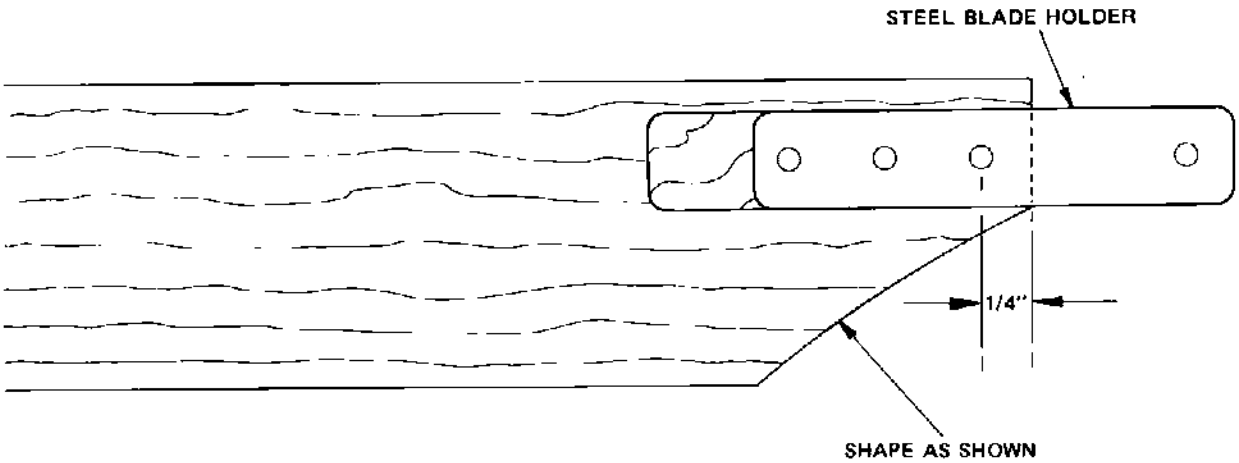


FIG. 4A

Remove the tail boom.

Remove the tail rotor, fin and skid from the boom.

Remove the fuel tank.

Remove the radio.

Unsnap the ball link to the swash plate roll control arm so that it can be withdrawn from the wire steady.

Remove the engine plate and associated components by unscrewing the remaining 6BA bolts, four in all. Take care the connections to the servos are free to clear their holes in the fuselage.

Remove the undercarriage.

Finish, paint and decorate the following:
Fuselage Cabin and Base, Fin, Main Rotor Blades, Tail Rotor Blades.
Polish and decorate the Tail Boom and Undercarriage.

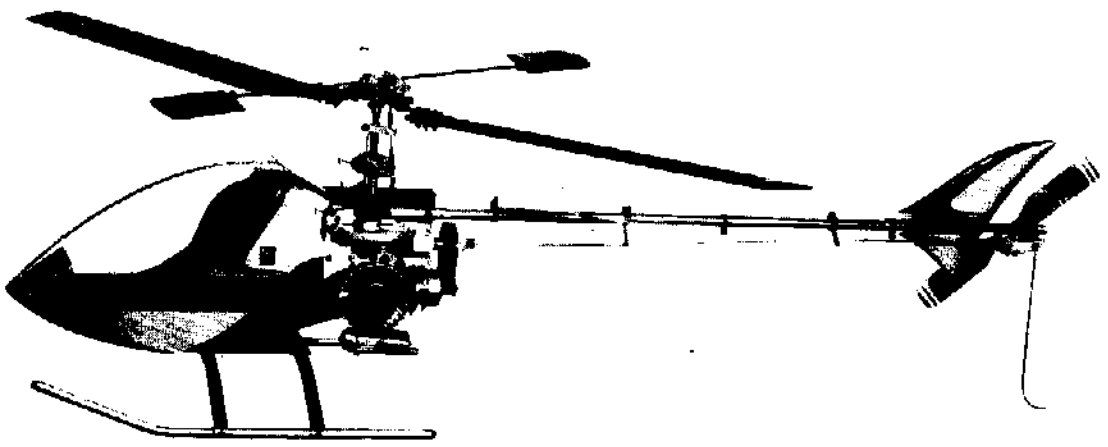
The transfer/trim sheet includes many items of decoration including colour flash and lettering for fuselage cabin and fin, plus signs and lettering for use at points as desired. Stripes for adding to main rotor and tail rotor blade tips etc. Use clear varnish to protect them from fuel.

The cabin unit is built and finished last. This unit is held in place with Velcro tape (supplied).

100% polyeurethane paint is advised for finishing, especially round the engine bay. The first coat over wood acts as a filler, and after sanding makes a good base for subsequent coats. White is suggested as a basic colour for maximum visibility.

Take care when applying the large transfers, and use clear polyeurethane to protect them.

MicroCover or similar covering materials may be used as an alternative to a painted finish on the rotor blades.



Areas are provided for a paint scheme similar to the one illustrated above. Colour areas are divided into sections to make application easier.

N.B. Use Torqseal only where recommended

Bolt the undercarriage to the fuselage.

Reinstall the engine unit, making sure the engine crankcase backplate bolts are tight.

Reinstall the radio and connect up the swash plate and engine servos.

Bolt the tail boom in position, not forgetting the swash plate retaining spring.

Bolt the fin and horizontal stabiliser in place (fin to starboard, stabiliser to port). Secure the nuts with Torqseal.

Reinstall the fuel tank and connect it to the engine.

Bolt the tail rotor assembly and skid in place.

Install the tail rotor blades, using 8BA nuts, bolts and washers. When viewed from the port (left) side of the model the leading edge of the uppermost blade should be facing to the rear of the model. Rotate the blades to check and refer back to Section 8. The nuts should be finger tight and secured using Torqseal. The blades should be just unable to fall, due to gravity, when rotated to a horizontal position.

The tail rotor is balanced by loosening the grub screw, which holds the brass mitre gear on the rotor shaft, and spinning the rotor on its bearings. The pin in the bellcrank should not be in position when this is done. Use paint or MicroCover to balance the blades.

Relocate the bellcrank pin in the slot in the slider and retighten the brass mitre gear on its flat.

The tail rotor is connected to the main gear train using a shaft of 16G wire. The components used are shown in Fig.1A

File a flat on one end of the 16G shaft.

Fit the square section drive shaft front coupling to the flat end of the drive shaft.

Remove the universal joint drive shaft rear coupling from the tail rotor assembly.

Locate the front coupling in the square hole in the 25 tooth pulley.

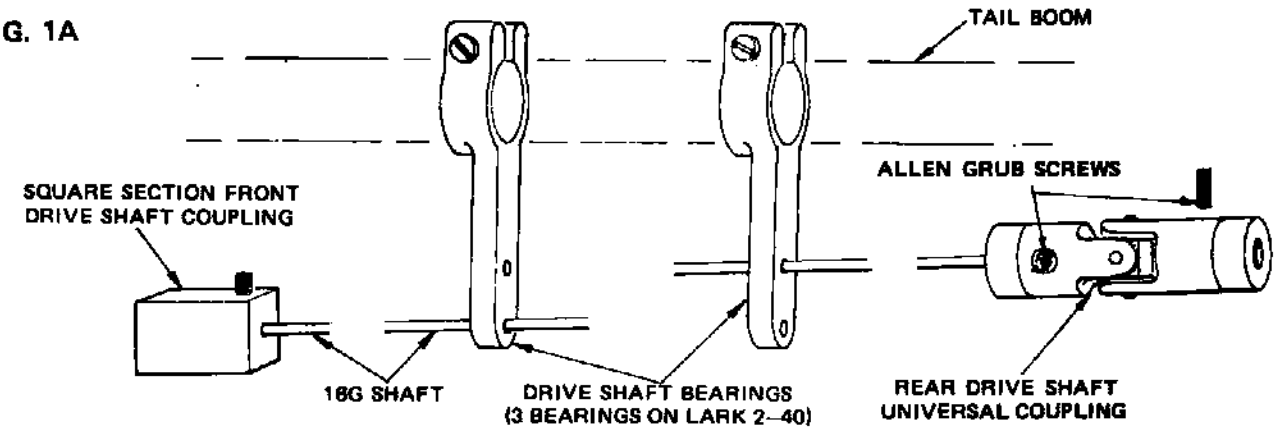
Mark and cut the drive shaft to length (the front coupling should not quite reach the bottom of the square hole in the 25 tooth pulley). The rear end of the drive shaft should just touch the small rotor gear shaft.

File a flat on the cut end of the drive shaft. Slide the three drive shaft bearings on to the drive shaft. Use the lower hole for the front and centre bearings and the upper hole for the rear bearing (See Fig. 1A - Extra drive shaft bearing provided in kit).

Slide the rear drive shaft coupling on to the drive shaft, using the small hole.

Locate the square section front coupling in the square hole in the 25 tooth pulley.

FIG. 1A



THE INFORMATION ON THIS PAGE IS APPLICABLE TO THE LARK 2–40 ONLY

Snap the drive shaft bearings over the tail boom. Slide the rear coupling over the tail rotor shaft and tighten the grub screw on to its flat.

Push the drive shaft as far back as it will go and tighten the other grub screw in the rear coupling on to its flat.

Fit the drive shaft bearings with 6BA bolts washers and nuts. Don't tighten yet.

Position the bearings on the boom so that the drive shaft is as near as possible in a straight line.

Tighten the 6BA bolts.

The tail rotor pitch crank is connected to its servo by means of a 22G wire running in a nylon tube. (Refer back to Section 11).

Route the nylon tube as described in Section 11.

Use the three plastic clips to secure the tube to the tail boom. The front clip should be approximately ¾" behind the 25 tooth pulley. The rear clip should be just in front of the fin. The centre clip can be anywhere in the middle of the boom. The nylon tube should end 1" behind the rear clip.

Solder one end of the 22G wire to the small brass cable link adaptor. Bend the end of the wire into a tight loop to give a better grip. (If you are not too good at soldering it is worth asking a friend to help.)

Screw the ball joint in place using most of the thread.

Slide the 22G wire into the nylon tube and connect the ball joint to the outer hole on the tail rotor pitch crank.

Make sure the ball link doesn't catch the grub screw in the tail rotor drive coupling. This problem can be cured by filing a deeper flat on the small drive shaft in the tail rotor cage.

Connect the other end of the 22G wire to the tail rotor servo. Bind and solder a piece of 16g wire to servo end and use N.12 quick keeper to connect linkage to servo arm.

When the tail rotor servo is in neutral, the tail rotor pitch slider should be in the middle of its travel. Adjust the ball link to do this.

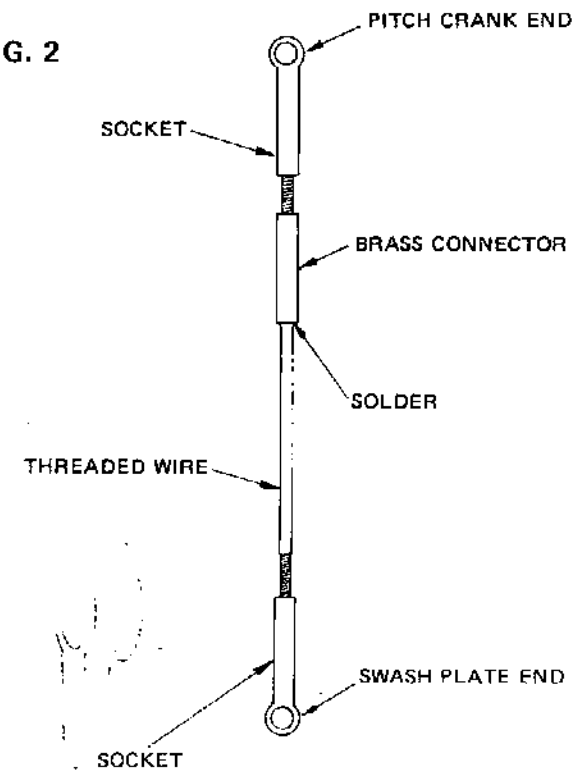
Attach the heat sink to the engine. One or two corrugations can be cut off if necessary on smaller diameter head engines. A wire clamping strap is supplied and a close fit for good heat dissipation is required.

Make sure the throttle opens and closes fully at extremes of control. A final check can be made during ground run up trials.

Temporarily fit the rotor head.

The flybar pitch crank must now be connected to the upper disc of the swash plate. This coupling is shown in Fig.2.

FIG. 2



Screw the socket pieces most of the way on to the threads.

juggling with all four controls at once. At the risk of being a bore, keep leaning forward on the stick, keep flying into wind by tail rotor and swash plate adjustments, and finally adjust the rate of descent with the throttle.

The above is a very brief description of a learning process, which will take some time to complete. The important thing is to take it slowly and relax. If you are using floats these will help to preserve rotor blades etc. in the early stages; but the model will have to leave the ground before a true feel of the tail rotor can be obtained. Some right tail rotor control is required, at the point of lift-off, when the tail rotor pitch is set correctly for hovering.

It is much easier to hover with teeter movement, but for manoeuvres such as stall turns the head should be set up without any teeter using the hard stops.

The Lark 2-40 is a much more responsive model than the 2-25 and for this reason is more difficult to fly for the raw beginner. This responsiveness can however be used for basic aerobatics to good effect.

The stall turn should be approached from fast forward flight. Pull back the stick until the nose is pointing upwards. Centralise the stick and add a small amount of tail rotor in the direction you wish to turn. The model will rotate in a stall turn much like a fixed wing model. Be prepared to apply opposite tail rotor if required. Pull out of the dive. Use plenty of height.

The reversal (half roll and loop out). Again climb to a safe height. Fly the model into fast forward flight. Pull back the stick to a nose slightly up position and apply roll control. The model will hesitate inverted refusing to roll. Loop out by pulling back on the stick.

Rolls have been achieved with the 2-40 but it is hit and miss with a simple Hiller system. If you try one, climb to a good height. If it doesn't go, convert the manoeuvre into a reversal as described above, then try again having regained a safe height.

Loops are possible, but it is important to adjust the pitch control to give maximum movement. Again climb to a safe height.

Fly into fast forward flight. Do not dive, it is not necessary. Pull back the stick to its maximum position. Keep the tail straight with tail rotor control. The first half of the loop is quite tight. Again, with a simple Hiller system the model will hesitate inverted, but keep the stick fully back. The model will suddenly pull out of its inverted dive. If this happens quickly at a good height two consecutive loops can be achieved by holding back on the stick.

Do not attempt the above aerobatics with floats. Make sure the tank is nearly full to minimise fuel starvation. Pressurising is not strictly necessary.

CONCLUSION

The subject of helicopter aerodynamics is obviously a complex one and there are few books readily available written in layman's terms. One exception is a book called "The Helicopter and How it Flies" by John Fay and published by Pitmans. Model helicopters are still in their infancy, although the original Lark has contributed much to their popularity in the U.K. The "Lark 2-40" should open the door wider so that a larger number of modellers can have a try at fathoming the complexities of rotary flight.

Peter Valentine.

2LM1	One Manual + Cabin Structure/Fuselage base drawing + printed instrument panel		
2HW1	Engine Bearer	- 9 mm. (3/8") Ply	Pack One
2HW2	Fuselage Back	- Ply 3 mm.	
2HW3	Fuselage Base	- Ply 3 mm.	
2HW4	Fuselage Sides	- 2-Ply 1.5 mm.	
2HW6	Fuselage Top & Front Supports	- 1 each in 1/16" ($1\frac{1}{2}$ mm.) Ply	
2HW7	Fuselage Reinforcing Struts	- 2 off Hardwood $\frac{1}{4}$" sq.	
2HW8	Servo Mounting Plate	- 6.5 mm. Ply $2\frac{1}{2}$" x 4 3/8"	
2HC1	Cabin Body Base	- A.B.S. Forming	Separate
2HC2	Cabin Canopy	- Butyrate Forming	Separate
2HC3	Seat Forming	- A.B.S. Forming	Separate
2HC4	Cabin Sides	- 2 off 1/16" (1.5 mm.) ply	Pack Two
2HC5	Velcro Tape 6"	- For fixing cabin to fuselage body	
2HC6	Seat Cross piece	- $\frac{1}{2}$" rt.angle balsa	
2HC7	Seat Backing	- 1/16" (1.5 mm.) ply	
2HC8	Seat Top Reinforcement	- 1/8" (3 mm.) ply	
2HC9	Cabin Top Support	- Preshaped 1/8" balsa	
2HC10	Cabin U Former	- 1/8" (3 mm.) ply	
2HC11	Cabin U Former reinforcement	- 1 out of $\frac{1}{4}$" balsa	
2HC12	Console and Console Base	- ABS Forming and 1/8" (3 mm.) balsa	
HFT1	Fuel Tank + Filter	- 4 oz. with fittings + Filter	Pack Three
HFT2	Tank Strap	- Dural Strip 9" x $1\frac{1}{4}$" Fxg. 3 off 6 BA x $\frac{1}{2}$" bolts, nuts and washers - included in	Separate Pack One
HU1	Undercarriage Cross Struts	- Two in formed dural Fxgs. 4 off 6 BA $\frac{1}{2}$" bolts, small washers, nyloc nuts - included in	Separate Pack One
HU2	Undercarriage Skids	- Two in formed dural with four nylon end caps, 4-6 BA x $\frac{3}{4}$" bolts, small washers & nyloc nuts	Pack Four
2HC11	Transfer Sheets	- Cabin Flashes, name, markings, blade stripes, Union Jacks etc.	Separate
HH1	Main Rotor Head - teeter type	- Dural parts - main lower plate, 2 triangle side plates and pivot block. 4 off 6 BA x $\frac{1}{4}$" screws	Pack Five
HH2	Head Pivot Pin	- Silver Steel + 2 Starlock washers	

HD13	Hexagon Lock Shaft	- Steel ¼" U.N.F. (Veco, O.S. 20/25 etc., HB25)	Pack Ten
HD13A	Hexagon Lock Shaft	- Steel 6 mm. (Enya 19 BB etc.)	
2HT1	Boom End Plug with wire skid	- Dural with lock screw Pre-bent 12g wire skid	Pack Eleven Separate
HT2A	Tail Gear Cage with integral oil bath and transparent cover	- Nylon with phosphor bronze insert bearings. 2 x 6 BA x 1" bolts, 2 nyloc nuts, 4 washers. 4 x ¼" S.T. Screws for fixing oil cover	
HT3	Rotor Pitch Crank	- Nylon with 1 off No. 2 x ½" self tapping screw plus large washer	
HT4	Rotor Crank Return Spring	- Spring Steel	
HT5	Rotor Pitch Slider	- One in Nylon	
HT6	Tail Rotor Blades	- 1 pair, precut in balsa +2 ply reinforcements, 2 off 8 BA x ½" bolts, nuts, 4 washers	
HT7	Bevel Gears	- Two in Brass (or steel) with 2 off 4 BA x 3/16" socket set screws plus 2 thrust washer 4 BA.	Pack Eleven
HT8	Tail Rotor Head	- Dural with 2 off 4 BA x ¼" socket set screws	
HT9	Tail Rotor Shaft	- 10 gauge Steel - 3" plus 1 collet (P.11) with 1 x 4 BA x 1/8" socket set screw	
HT10	Blade Connecting Shaft	- Steel with 2 x 8 BA x 3/16" screws	
HT11	Rotor Blade Holders	- Two in nylon	
2HT12	Drive Shaft Rear Coupling	- Universal Joint + 2 x 4 BA x ¼" socket set screws	
HT13	Gear Shaft	- 10 gauge Steel	
HT14	Tail Drive Shaft	- Wire 16 gauge x 22"	Separate
HT15	Rotor Pitch Linkage	- Nylon Tube 28", 22g wire, 1 P.6 adaptor, 1 x 1/16" A/F wrench, 3 N.68 Ball Socket + hardware, 3 plastic tube straps, tube Torqseal	Pack Twelve
HT16	Tail Drive Bearings	- Two in Nylon with 2 6 BA x ½" bolts, nuts and washers	
2HT17	Tail Fin Parts	- 1 Precut Ply, 2 precut balsa parts plus two ply reinforcing plates & 2 off 6 BA x 1" bolts, nuts and washers	Included in Pack One

HT18 Tail Boom	- Aluminium predrilled - hardware 2 x 6 BA x 1¼" hardened steel bolts, 4 nuts, 2 large & 2 small washers. 1 off 5/64" A/F Hex Wrench	Boom separate Hardware in Pack Twelve

Adhesives required
NOT SUPPLIED IN KIT

- Evostik Impact or Dunlop Thix-o-fix, for A.B.S. to wood
- P.V.A. White Glue, for wood to wood
- Quick Set Epoxy, as directed

Paint for finishing trim (Enamel or Polyurethane NOT Cellulose) Micro-Cover for covering blades if required.

LARK 2-40

The Following Alternative or additional parts are contained in the 2-40 Kit, the part number shown in brackets (-) is the number of the 2-25 part which it replaces.

HD1/L	.40 Aly engine mount plate pressing (HD1)
HD5/L	.40 Aly engine mount pillars - long, set of 4 + 4 BA nuts & bolts (HD5 + 6 BA nuts and bolts
HD10/L	.40 size Flywheel (large) (2 HD10)
HD11/L	Clutch housing, heavy duty - no ferodo liner required (2 HD11)
Py12	12 tooth Clutch housing drive pulley (Py8)
HD16/L	Counter shaft spacer (N/A)
HH14/L	Swash plate spacer 40 type assembly (HH14)
HD6/L	.40 type Heat sink and strap - long (HD6)
HFT1A	Fuel tank - square 6 oz. (HFT1)
HFT2/L	Fuel tank strap - long (HFT2)
HT8D	Delta hinge tail rotor head (HT8)
HH7A	Hardwood main rotor blades (HH7)
HD15/L	Main gearwheel spacer - upper (N/A)
HH13/L	Main shaft - short (HH13)
HD14/L	Main gearwheel spacer - lower (HD14)
HC11/L	Transfer (decal) sheet (2 HC11)
HT19/L	Tail elevator - aly. (N/A)
HT16	Tail drive bearings - 3 supplied with necessary screws and washers (HT16 - 2 only)

The makers in their continued efforts to further improve the product reserve the right to vary the contents of this Kit as necessary without prior notice. Any major changes will be covered by an Errata notice included with the manual.

Made by: MICRO-MOLD, East Preston, West Sussex, England.

THE INFORMATION ON THIS PAGE IS APPLICABLE TO THE LARK 2-40 ONLY