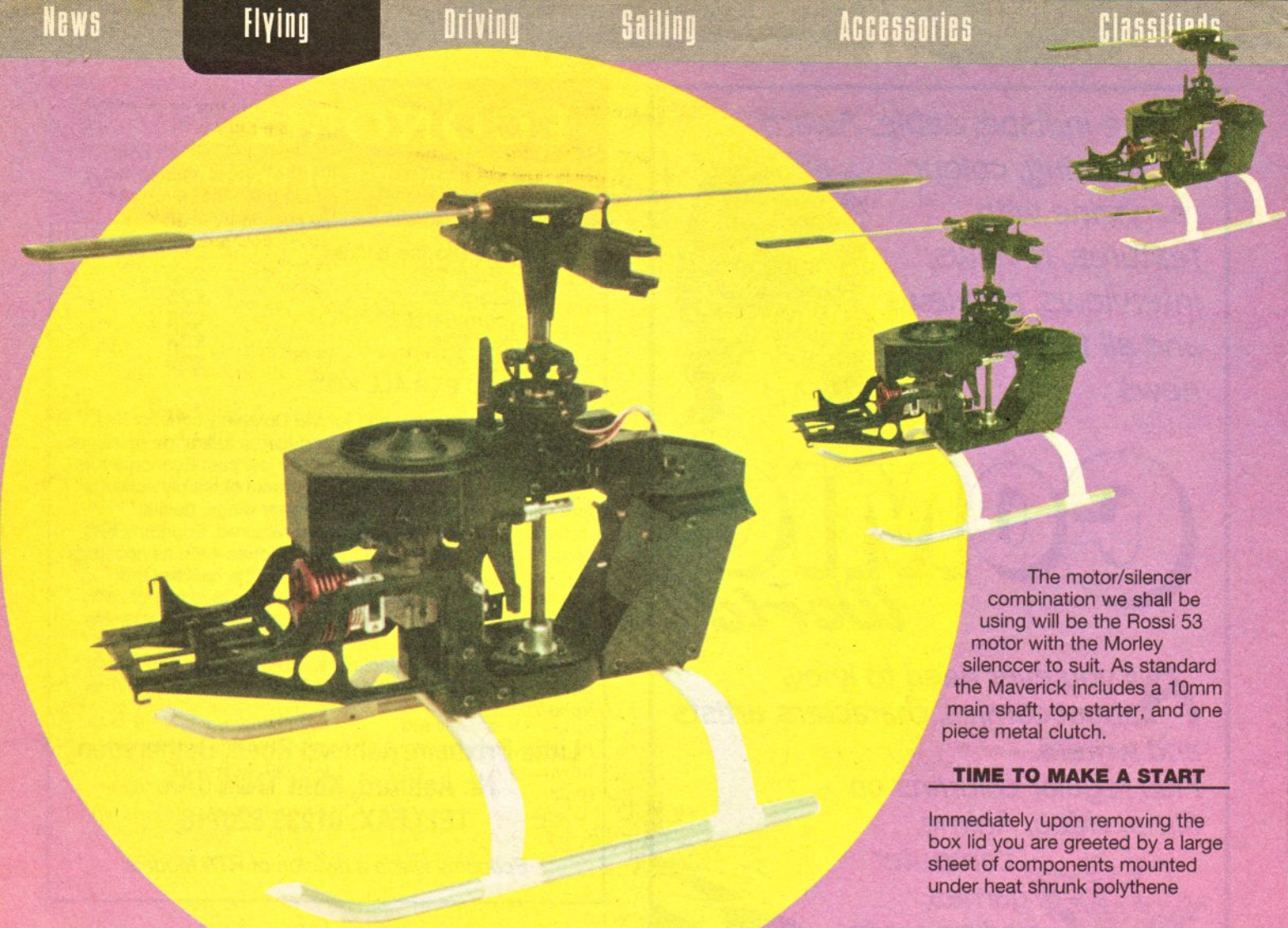


The motor/silencer combination we shall be using will be the Rossi 53 motor with the Morley silenccer to suit. As standard the Maverick includes a 10mm main shaft, top starter, and one piece metal clutch.

TIME TO MAKE A START

Immediately upon removing the box lid you are greeted by a large sheet of components mounted under heat shrunk polythene which gives an immediate impression of the high quality of the basic parts and sub assemblies. Removing this layer reveals the canopy, a two piece ABS plastic moulding enclosed in bubble wrap material, the tail boom, main blades, under carriage and other assembly parts.

The instruction manual is in 4 parts comprising:

After flying model helicopters for many years, starting way back with the Micro-Mold Lark, Kavan Allouette, Schluter Mini Boy etc. etc., it has been very interesting to see the improvements both in construction and control of helicopters to the present date.

It was with this in mind that I jumped at the chance to review the latest model from Morley Helicopters, the Maverick 'XR'.

The Morl Maverick

THE MODEL

The Maverick was designed to fill the requirement of a strong, very stable and easy to fly helicopter without compromising the sports potential for the more experienced pilot.

The model uses a composite construction of light alloy, hardened steel, carbon fibre and fibre reinforced plastic parts. The XR version as supplied follows the same building sequence as the standard Maverick but comes as standard with longer and and wider main blades, a longer tail boom with boom support kit and carbon fibre composite main frames. With a 52' rotor diameter the XR fits neatly into a space in the market predominantly dominated by the 30 and 60 size models available, giving the option for a larger model at a reasonable price in both the basic Maverick kit (RRP £249.95) and the XR kit (RRP £289.95).

Motor ranges for both these models are in the 40 to 53 size with the manufacturers recommending ASP 46-53 or Super Custom 46-53 engines for training. The larger 53 size engines are recommended for sports flying.

The Maverick can be fitted with the standard aircraft type silencer or fitted with Morleys own custom silencer which can be purchased to suit a variety of motors. This part, ACC/M/SIL has a RRP of £34.95.

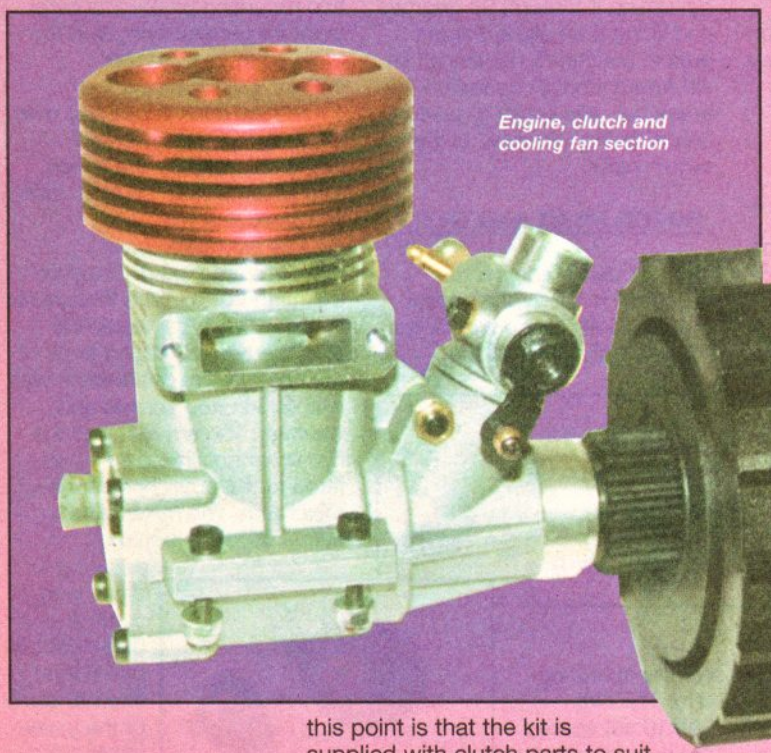
ey 'XR'

1. A written building sequence.
2. A booklet of assembly diagrams.
3. A parts check list including their replacement cost.
4. A list of upgrade items available.

Reading the building instructions whilst referring to the appropriate diagrams gives the impression of an easy to assemble model which should not unduly tax the abilities of the newcomer to our hobby.

ENGINE CLUTCH AND COOLING FAN

This sequence can only be started with the chosen engine present as it is an integral part of the finished assembly. An item worth noting at this point is that the kit is supplied with clutch parts to suit the SC/ASP motors recommended. If a different motor is to be installed it will be necessary to return these parts to Morley helicopters for exchange or stipulate the motor to be used when ordering or purchasing your kit.



Engine, clutch and cooling fan section

Fitting the Rossi 53 motor necessitated the removal of the prop driver, washer and collet as suppleid with the engine, and fitting of Morley collet (Pt. No. 1505/1).

Adjustment of the throttle arm is necessary to allow the control rod to operate from under the crankcase.

The clutch assembly consisted of gluing a 'Tufnol' resin fibre one piece clutch liner into the clutch bell. The clutch bell already has an 'oilite' bearing bonded into place. Final assembly comprised of fitting the plastic spacer washer over the crank shaft followed by the steel clutch tapered I/D centre pillar. The clutch bell is now slid down on the pillar. The clutch is a tapered fit onto the centre pillar and is located with two holes in the fan/starter assembly. This is then all secured with the engine nut and washer supplied. If using the Rossi motor it is necessary to enlarge the hole in the washer to allow fitting over the crank shaft. The metal clutch has 2 x M4 threaded holes located either side of centre to allow removal of the clutch from the tapered shaft.

UNDERCARRIAGE

The undercarriage legs are bolted to the main chassis base with the rake angle to the front. Alloy skid tubes are then inserted making sure that the unit sits square on a flat surface. To ensure that this stays true I locked the tubes with a small self tapping screw on each down leg. A nice finishing touch is the provision of moulded plastic skid end caps which are a tight fit at each end.

TRANSMISSION

The transmission system on the Maverick is different to many other helicopters in that the engine sits vertically with the cylinder head facing forward. The clutch drive gear mates up to the first stage drive gear which has a shaft running down to the chassis base where it is supported by a ball raced housing. On this shaft a bevel gear is fitted which mates with the tail drive gear. At the bottom of the shaft is the second stage pinion gear. Viewed from the top the secondary shaft is offset to the left side and in front of the main rotor shaft, allowing clearance for the tail rotor drive. At the base of the main shaft is fitted the main gear with integral autorotation unit. This is driven from the secondary pinion gear.

1ST STAGE TAIL TRANSFER GEARING

The tail drive transfer shaft comes with one ball race fitted and requires the second ball race to be thread locked onto the shaft and locating into the bearing recesses in the take off gear case. Next the alloy tail drive coupling is fitted onto the end of the shaft, locating the set screws onto the flats provided. A ball race is fitted on the drive shaft so it locates against the back of the bevel gear. The first stage drive shaft is pushed up through tail take off shaft assembly until the two bevel gears mate up. Fill the gearcase cavity with grease and fit the case lid taking care not to overtighten the screws. The large first stage drive gear is now pushed down over the protruding shaft and held in place with a split pin. Care must be taken not to damage the gear and to ensure that the pin is fitted securely with cyno or loctite.

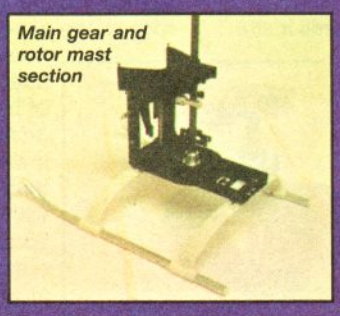
Finally the second stage gear is located on the bottom of the shaft with 2 x M4 grub screws, followed by the sceond ball race.

FORWARD CHASSIS AND ENGINE INSTALLATION

The main gear and mast assembly is placed in the chassis base moulding and secured

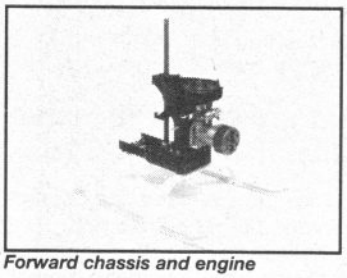
MAIN GEAR & ROTOR MAST

The autorotation unit is placed in the centre of the main drive gear and located with 5 screws and washers. The screws need to be tightened in a gradual sequence so as not to distort the gear. Four nylock nuts are placed in the recesses in the lower mast support moulding followed by the bottom mast bearing. The main mast is placed down through the main gear inserting the smaller diameter end into the bottom bearing. A circlip is fitted above the auto unit to stop it moving up the shaft. The mast locking collar is positioned loosely on the flats as high up the mast as possible with the top bearing lowered onto it. The final positioning of the collar can only be completed when the unit is fitted to the chassis.



Main gear and rotor mast section

temporarily with 4 x M3 screws and washers. The lower mast support moulding is offset to allow the fitting of different pinion gears if required. It is therefore necessary to ensure that you have the correct gear mesh at this point. Next lower the first stage gear and shaft



Forward chassis and engine

assembly over the mast, locating the lower ball bearing in the recess adjacent to the main gear. The left hand engine mounting plate is now bolted in position. The top two screws hold the fuel tank bracket in place and are left loose until the motor is fitted. Next the right hand plate is fitted. The bottom two screws hold the radio switch plate. The top screws hold the upper fuel tank support bracket and are left loose at this point. The engine and clutch assembly can now be fitted. Care must be taken to ensure that the motor is central in the mount, and that the bell and fan have adequate clearance on the first stage gear. Once the motor is secure the first stage gear box should be pulled towards the motor ensuring there is no backlash between the gears. The mount top screws can now be tightened. It is worth checking once again the mesh of the gears to ensure that the system is not too loose or notchy.

Place the upper mast bearing down into the recess in the gear case so it is hard up against the mast lock collar. With the bearing located firmly in the recess gently raise the mast assembly and tighten the collar set screws. Slide the small pinion down until it sits on the bearing and tighten its set screws. Now pull the main gear until it meshes correctly with the pinion and tighten the four screws under the chassis. The mast bearing hold down moulding can now be lowered down the mast and secured in place. The fan duct enclosure is secured onto the gear case shroud leaving a 2mm clearance between the duct and the fan. The fan shroud and anti-rotation pin guide slider are now located via keyways and are held in place with 2 self tapping screws.

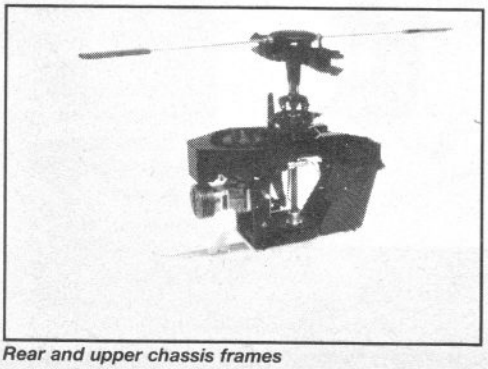
Next the two forward radio tray supports and the radio tray are fixed onto the engine mounting plates.

REAR AND UPPER CHASSIS FRAMES

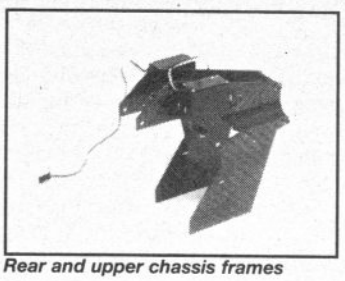
Before starting to assemble the rear frames it is advisable to temporarily connect up the servo's, receiver and nicads so that the servo arms can be pre-set to the correct positions. The instruction book supplied shows the arm positions and control ball placements for each servo.

The rudder and throttle servo's are now mounted on either side of the upper frames.

The tail boom clamp/frame spacer is in two halves which must be joined together by means of two short tie rods for the top mounting and two long rods at the base. Both side frames can now be attached to the top of boom clamp with 3mm bolts. The lower tie rods go through the frames with the two side spacers sliding onto these. The lower frames can now be fitted to the spacers and the chassis base. Leave the left hand frame loose for the time being as it will be necessary to remove it later in the assembly.



Rear and upper chassis frames



Rear and upper chassis frames

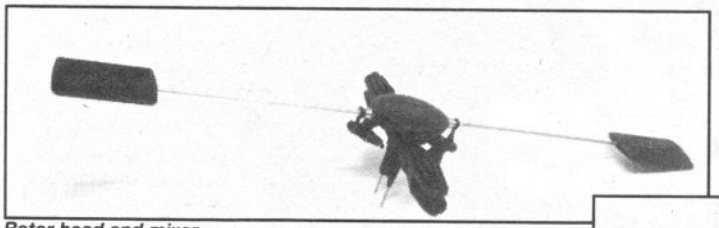
SWASHPLATE

The swashplate comes as a factory assembled unit and only requires 3 control balls to be fitted to the outer ring and location of the anti-rotation pin. To ensure trouble free operation it is advisable to thread-lock the 2mm nuts and screws on the balls. The central brass ball can be removed from the assembly by turning it through 90 degrees and lifting it up along the cut outs in the centre moulding. To aid future smooth operation the brass ball was lightly greased before being relocated in the swash plate.

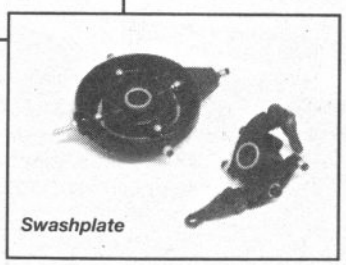
ROTOR HEAD AND MIXER

The first part of the head assembly is the flybar control system. Commence by fitting the two brass balls to the central operating arm. The two M4x10 set screws are now fitted but not fully tightened. next slide the flybar through the pre fitted bearings, locating the central arm in the flybar cradle/head button. At this stage ensure that the operating arm is located correctly and is central on the flybar, fixing in position with the two M4x10 set screws provided. A brass flybar operating ball is now slid down each side of the flybar and is locked into position next to the head button. A short double ended ball link is then snapped onto each ball end. The paddles can now be screwed onto each end of the flybar.

Provision is made in the paddles for two mounting points. The hole closest to the front edge is recommended for the novice pilot, whilst the rearward hole is best suited to the more experienced sport/aerobatic pilot.



Rotor head and mixer



Swashplate

The main rotor hub comprises a plastic moulding into which two tapered rubber dampers are inserted. The steel feathering spindle is now slid through the head so that an equal amount protrudes at either side. A conical washer with the dish facing outwards is slid up to the damper followed by the main blade grip. These in turn are followed by another conical washer and the M5 socket screw. Thread locking compound must now be used and the whole assembly securely tightened.

A pair of brass balls must next be fitted onto the upper mixer arms. The inner ball has two mounting points; the outer point for general flying and the inner point for a greater collective pitch range.

A steel bush is pressed over the stub axle on the blade holder followed by the mixer arm which is then secured with an M3 socket screw.

The two flybar pivot ballraces are next pressed into the head button from the inside. Position the flybar assembly over the two extending arms of the head centre and secure with two socket cap screws and washers. The small end of the flybar control link can now be fitted to the outer ball on the mixer arm. The mixer slider needs its 'oilite' bearing securing in place with cyno. A brass control ball is then fitted to each of the lower mixer arms. The mixer arms can now be fitted to the slider base with the steel bushes and cap screws.

Slide the mixer unit down the main shaft and snap fit the two driver arms onto two of the brass balls on the inner ring of the swashplate. The main rotor head can now be bolted onto the main mast, ensuring that the slider pins on the underside locate into the slots in the mixer unit below it.

John White

That's all for now. In the next issue we shall deal with the tail boom and gearbox assembly; the cabin assembly; radio installation and test flying of the fully completed model.

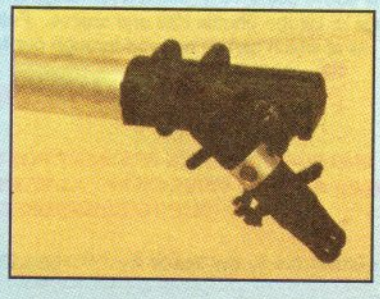
Morley Maverick 'XR' Part 2

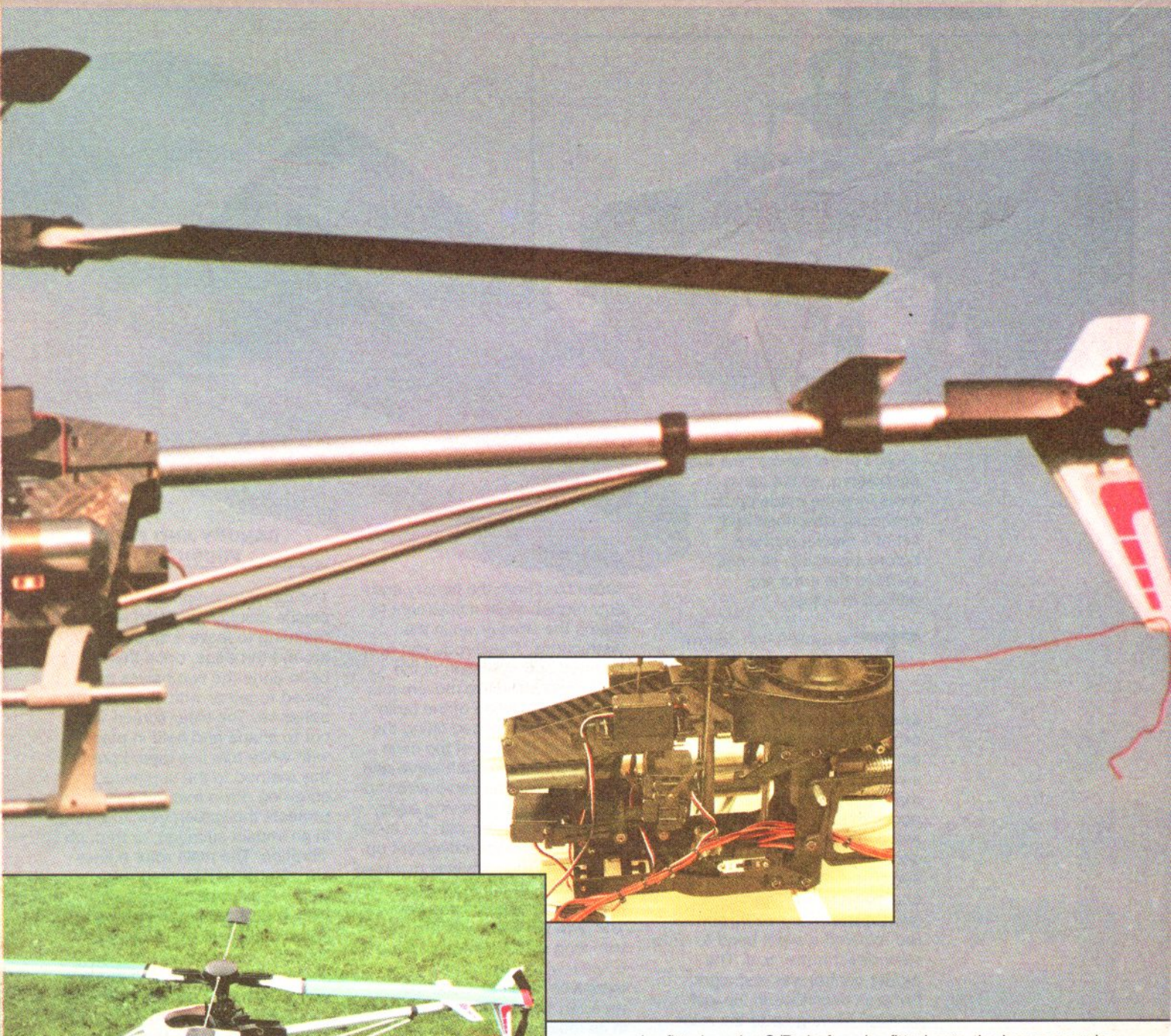
Last issue saw the completion of the main frame engine installation and rotor head/mixer assembly. This month we shall be looking into the construction of the tail assembly, radio installation, set up and test flying of the model.

The next sequence of building is the tail rotor gearbox, tail boom and associated parts.

TAIL ROTOR AND TAIL BOOM

Both the tail rotor imput and output shaft come pre-fitted with one ballrace, a second ballrace must be secured onto each shaft with Locktite and placed into the appropriate recesses in the bottom half of the gear case. Once this has been done two plastic spacers are fitted on to the input shaft followed by the female tail drive coupling. This is held in place by two set screws locating into ground flats on the shaft. The cavity around the bevel gears is filled with the grease provided with a small amount inside the drive coupling. Now the top case moulding is fitted and carefully screwed together so as not to distort the mouldings. The four rear screws can be fully tightened but





"A model that is agile to fly yet is strong in construction"

the three forward screws are left loose to allow fitment of the tail boom.

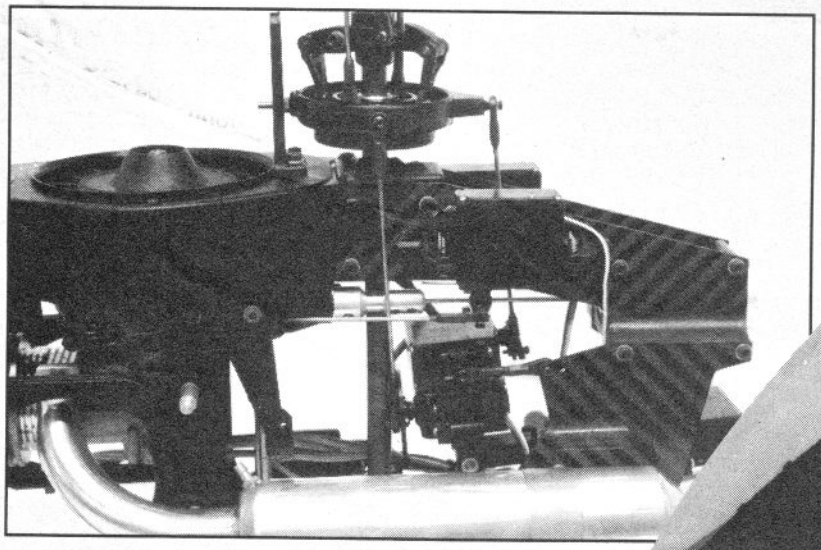
The tail yoke and pitch slider come pre-assembled and only require two small ball connectors fitting before sliding down the output shaft. The tail rotor hub has to have two ballraces Locktited on each side with a retaining screw on each end. Before the Locktite has set the tail blade holders must be fitted and secured in place. Two brass balls are located with 1/2" screws, one on each blade holder. At this stage I balanced the tail blades to ensure lack of vibration at a later time. The hub can now be fitted on the O/P shaft and the pitch slider fitting onto the brass balls. At this stage it was found that operation of the pitch slider was very tight and required a gentle squeeze of the plastic ball connectors with a pair of pliers to ensure free movement. Last part of this assembly is the fitting of the control bellcrank to the bottom of the gear case.

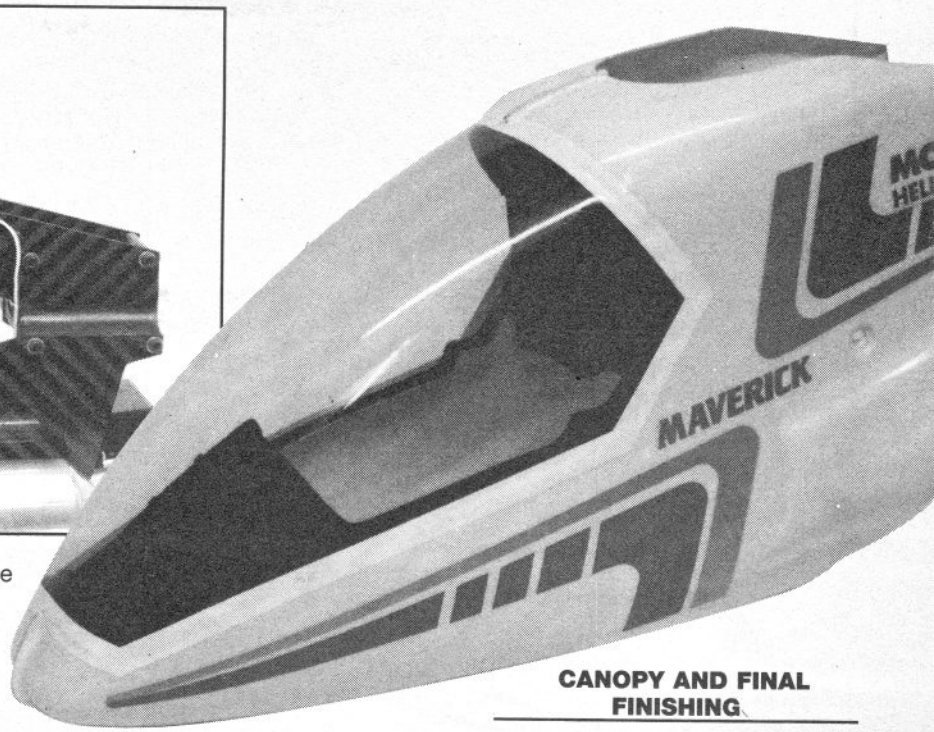
The tail boom is unusual in that both the tail drive wire and the tail pitch change wire are both run inside the boom. This is accomplished by inserting a brass and aluminium tube with a support moulding at each end into the tail boom tube. The drive and control wires are now inserted down the tubes from the rear end ensuring that the pitch wire is firstly inserted through the opening in the gear box case. The male end of the tail drive coupling is fitted onto the drive shaft. The gear box can now be fitted onto the boom ensuring alignment of the drive couplings and fitment of the pitch wire into the bellcrank.

Next slide the tail boom into the main frame feeding the drive wire into the alloy drive coupling and the pitch wire into the servo arm connector. Lock the pitch change wire in place ensuring that both the servo arm and bellcrank are at 90o to the boom. Secure the tail drive wire into the coupling with the four set screws. The horizontal and vertical fins plus the tail boom supports can now be fitted and lined up for square to the main frame. After checking tightness of all the screws we can next move onto the radio installation.

RADIO INSTALLATION

As we previously installed the throttle and tail pitch servo, the next stage involves fitting the two





cyclic control servos plus the pitch servo. All the servo arms must be made up as previously described and set at a neutral position before assembly, as once installed the arms are difficult to adjust.

The cyclic/pitch control works on a pivoted cradle which allows direct control from the swashplate down to the cyclic servos. These servo in turn control the pitch by sliding the swashplate up and down the main shaft. This operation is accomplished by locking the pitch servo arm to the main frame by a short link. Operation of the pitch servo now rocks the cradle up and down so moving the swashplate. The throttle control rod required a slight bend to allow clear direct movement. The rudder control was a straight fixing as described in the last section. Moving up to the rotor head the control links come assembled from the factory and only require slight adjustment to match the sizes given in the instructions. These rods can now be fitted and operation of the cyclic and collective movements tested. Completion of the radio installation comprised fitting the receiver at the rear of the main frames under the pitch servo and neatly running the servo wires so as not to foul any moving parts, care must be taken with the cyclic servos to allow for movement up and down. The gyro was mounted at the front on the radio plate with the receiver battery fixed below it. The gyro we used was a quest with long leads previously fitted in a Xcell, which saved using extension leads to reach the receiver. The switch was mounted in its mounting plate and all the wiring tidied up.

CANOPY AND FINAL FINISHING

The canopy comprises of two plastic mouldings which require trimming to leave a small lip around the edge, once this has been done the two halves are joined together with Cynacrolate adhesive. The clear screen was cut to shape and held in place with white trim line tape. I prefer this method to the suggested screwing down method as it protects the screen from cracking in an impact situation, or through vibration. The main rotor blades are a hardwood leading edge with a Balsa trailing edge with slots machined in the leading edge to allow fixing of the lead weights provided. This is best accomplished by glueing in place with a 24 hour Epoxy adhesive to give a strong bond. White Fablon is supplied to cover the blades, but in this case I used heatshrink tubing for the final finish. The blade roots are pre-finished only requiring the brass sleeves for the blade bolts to be glued in place. After balancing the blades the fluorescent tracking tape was applied to each tip. The custom silencer was screwed to the engine manifold with a small amount of Silicone Sealant applied to act as a gasket. With the long length of the silencer, a support bracket was fitted at the rear of the silencer and to the rear side frame.

Hopefully in a future issue we will give a long term test of the model and look at some of the upgrades available. Until then – happy landings

John White

OUT TO THE FIELD

Due to the amount of bad weather we get up North and the deadline for this half of the review, unfortunately it was only possible to have one short flight with the Maverick. The model was fuelled up using Duraglow straight and initially with the glow plug removed spun over on the starter to lubricate the piston and liner. The plug was refitted, connected up and the motor fired up almost immediately. The first tank was used up just allowing the mechanics to bed in with the model still on the floor.

The model was refuelled and started again, this time bringing up the power till the Maverick was in a steady hover about four feet off the ground, a slight amount of adjustment on the blade tracking was necessary, other than that the model was flying straight off the board. A few circuits were flown before the night closed in on the session. Initial impressions of the model were a very well thought out design, with a performance which can be tailored to suit both the newcomer to the sport or the advanced pilot who is looking to progress his skill with a model which is agile to fly yet strong in construction.