Improving the Breed

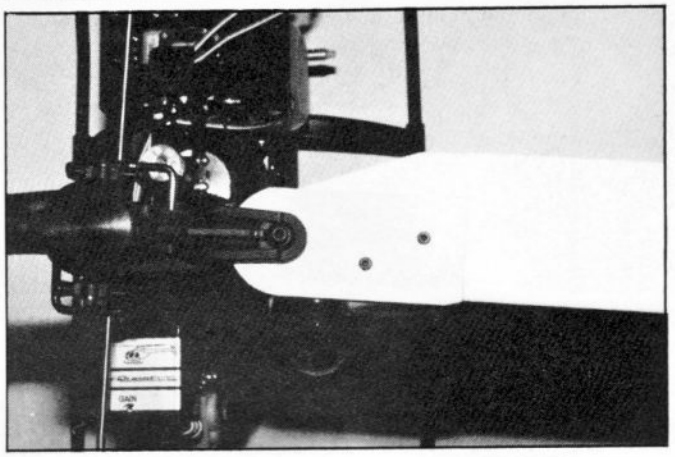
X-CELL 50 BUILD

John W. Bottomley builds the X-Cell 50 from Miniature Aircraft USA

When the first pictures and stories were released on the new X-Cell range I knew that sooner or later I would own one. Many years ago when I first graduated from the Lark I tried to buy a 50 size Competitor (this was before the GMP Cobra was released) but to no avail — I ended up with a 60 size M/C. I have remained convinced that the slightly smaller 50 size is the most versatile: on the one hand they are large enough to be visible at all angles whilst learning, they can carry a wide range of scale bodies, and they are a little more economical than their bigger brothers.

During the summer of '88 I visited the USA to renew acquaintances with some of my flying friends (?), and whilst there I had the opportunity to fly an X-Cell 50. This M/C had a Royal 46 heli engine, Magna pipe and an economy heli radio. I found it a super M/C to fly — this particular one was very docile. A feature of the USA modelling scene is low mail order prices, and so whilst over there I purchased an X-Cell 50 kit, OS 50H, and a Magna pipe plus manifold. I don't want to raise a hornets nest on the USA prices versus UK prices, but suffice it to say that I paid the equivalent to £376 for all of the above items. With more time to 'phone around I could have saved more money!

When I had completed the model I sent to Miniature Aircraft a detailed five page critique of my findings on building this superb kit. Almost all of my comments arise from the fact that I built the 50 size machine rather than the 60 size. I personally feel that an addendum to the excellent instructions should be included in the 50 size kits. From their written reply I'm not sure whether they will do this or not. However to their credit they sent a parcel by air mail containing all of the updates that had evolved since the first kits were released. Some of these updates are probably the results of reviewers findings (see end of article for a reference list), and others are product development. The bottom line is that improvement and fine tuning continues apace at Miniature Aircraft, and the shortly to be released X-Cell 30 further attests to that. I predict that this small size machine is going to give the others a run for their money — providing it is competitively priced.



Birds eye view of the latest main rotor blade roots. A bolt-on reinforcing is now used. (Photo by John Bottomley.)

To my mind, the heart of any kit is its instruction manual and having built Kalts, GMPs and Schlüters, the X-Cell manual, comprising some 40 pages, plus two large double-sided sheets of schematic drawings, is probably the best to date. There are also copious notes with the updates — each explaining in detail the differences from the manual. As mentioned previously the X-Cell 60 has been widely reviewed in all the major specialist periodicals, so I spent a couple of evenings carefully reading these reviews and adding notes to the manual, then I compared the build standard of my kit (Serial No 001583) with the latest known specifications. The only update I was missing was the change from #0459 to #0458 and #0460 (special step bolt is replaced by a standard bolt plus sleeve). In the air mailed update package I received the very latest version of the tail rotor gearbox casing. This has the #0421 tail rotor gear housings with a lug at the front of the mouldings — so now there are four joining lugs, three rear and one front.

The comments detailed below are listed by the headings used in the manual, i.e. section number, section title, and step number.

Section 1: Rotor Head Assembly: Step 3

Comments here apply to the Bell Mixer Update:

a. NUTS No 0017 are difficult to hold in place whilst the threads get started. I suggest the use of a 5.5mm open ended wrench (eg as supplied by OS with some of their engines) and a small piece of 'Scotch Tape' to hold the nut to the wrench.

b. BOLTS No 0093: As supplied the bolts were too long and cut at an angle. Correct length of bolts is 18mm. Any longer and the bolt fouls on No 0289 at extremes of pitch.

Section 1: Rotor Head Assembly: Step 5

I would recommend an amendment to the procedure as follows:

a. Weight each blade and note CG position.

b. Put equal lengths of lead wire in each blade; and use lead 'shavings' to equalise overall weights.

c. Paint blade tips and exposed root areas with white fuelproof paint — this will complement supplied covering material.

d. After covering use heat gun sparingly to 'stress relieve' covering material. Warm a section of the blade at a time and press covering into place with a clean cloth.

Section 2: Main Frame Structure: Step 3:

Drill Chuck *Not* necessary, a 7mm open ended wrench is perfectly OK.

Section 2: Main Frame Structure: Steps 4 & 2:

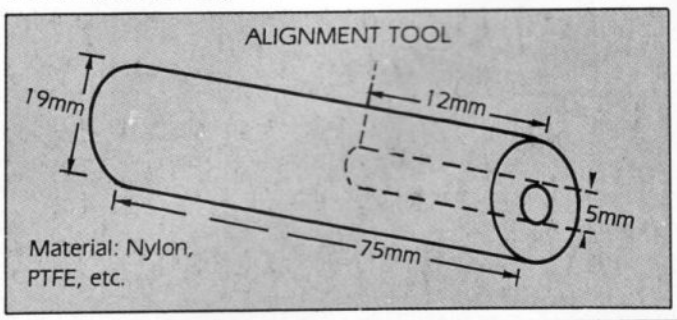
Special bolt No 0099 has a 5mm head not 5.5mm. Worthy of comment in instructions.

Section 2: Main Frame Structure: Step 5:

Upper bearing block, No 0182, had through holes drilled out of line and out of parallel. The problem was caused by a drill wandering. Solution was to use a slot drill to 'pull' the holes into line. An alternative would have been to drill oversize holes. Had this problem not been noticed the top bearing would have been out of line when the main shaft was installed — with resulting early failure.

Section 2: Main Frame Structure: Step 6:

I had problems ensuring that



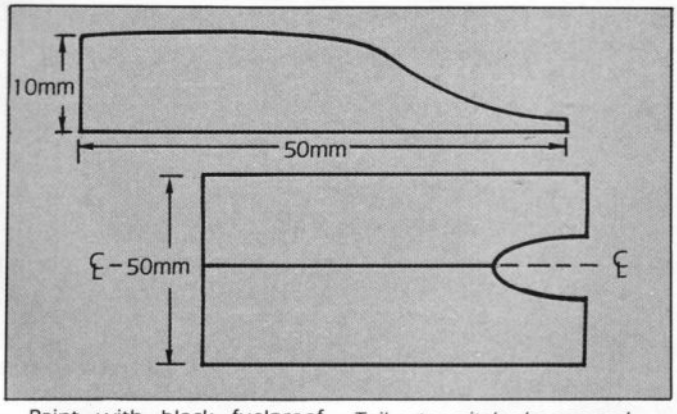
the front tail drive was correctly meshed and parallel to the tail boom centre-line. In the end I made a simple alignment tool (see sketch).

Procedure as follows:

1. Push rear end of front tail drive (No 0239) into alignment tool.
2. Push bolts No 077 through sideframes to hold sub-assembly.
3. Fit tail boom clamps around alignment tool and bolt in place.
4. Tighten bolts holding tail boom clamps.
5. Tighten tail drive bolts (No 077).
6. Remove tail boom clamp bolts.
7. Remove tail boom clamps and alignment tool.
8. Check gear mesh — if too tight, loosen bolts carefully, and adjust mesh, being careful not to mess up alignment.
9. Retighten sub-assembly bolts.
10. Tighten set screw on drive gear No 0231.

Section 2: Main Frame Structure: Step 7: M

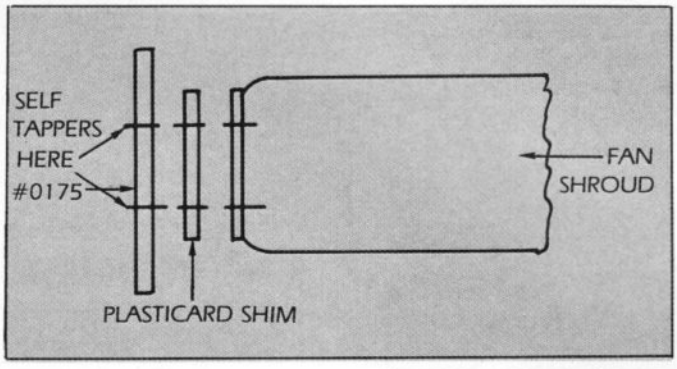
Fan shroud is too long for 50 size engines and therefore a fairing is required to force air through the cooling fins of the shorter motors. I made a two-piece balsa fairing to the shape shown below:



Paint with black fuelproof paint and stick in place with CA glue.

A neater solution would be a plastic vacuum formed moulding which would allow the 10mm dimension to be varied dependent upon the height of the engine used.

The second problem with the fan shroud is more difficult to explain, but is again caused by differing dimensions of say the OS50 and a 60. The crankshaft centre-line is slightly closer to the Front Frame Support Plate (No 0175) than would be the case if a 60 and its associated mount is used. This means that the base of the fan contacts the shroud at the front. The problem is compounded by the fact that the Fan Shroud has a moulded in "boss". In my case this "boss" was too thick, so I ground it away and then used a piece of Plasticard as a shim between the fan shroud and No 0175. I used black Plasticard 20mm x 30mm x 2mm thick; and then sanded this shim until it was thick enough to align the shroud centrally relative to the fan.



Section 3: Radio Tray Assembly: Step 1: A/B

Small stand off blocks for Throttle servo should be referred to by size, because there are two different sizes of blocks in the Wood Parts Package.

Section 4: Tail Assembly: Step 1: Parts List

Despite containing the update details in which No 0459 is replaced by No 0458 and No 0460 my kit still had No 0459. I received the update in a package from Miniature Aircraft when I wrote to them with my findings.

Section 4: Tail Assembly: Step 1: H

No 0449 Delta Hub Damper is too long as supplied — I suggest adding a note to the instructions to cut it to the same length as the hub thickness.

Section 4: Tail Assembly: Step 1: M

I would suggest a variation in the assembly sequence to enable the hub, blade holders, and blades to be balanced on a Hi-Points Balancer. I think this would be a worthwhile note.

Section 4: Tail Assembly: Step 1: P/Q

No 0025 Phillips Screws are only just long enough — I would recommend the substitution of M2 Socket Head bolts, nuts, and Loctite; particularly since there have been reports in this country of tail gearbox casings coming apart in use. When screwing Special Bellcrank Bolt No 0095 into the boss on the Gear Housing, hold the upper and lower boss's together with needle nose pliers. This prevents them opening up as the bolt is screwed home.

Section 4: Tail Assembly: Step 2: A

Use a 3/8in. diameter Dowel marked 5 9/16 (141mm) from one end to centre brass tube. Push brass tube in until mark on dowel aligns with end of boom. Note this dimension is different for 60 size machines.

Section 6: Rotor Head and Tail Assembly Installation: Step 2: C/D

I would suggest a variation here: make up an assembly consisting of No 0187, No 0493/5, No 0483. Use a flat surface as a jig and incorporate the update at the same time.

Section 6: Rotor Head and Tail Assembly Installation: Step 3: A

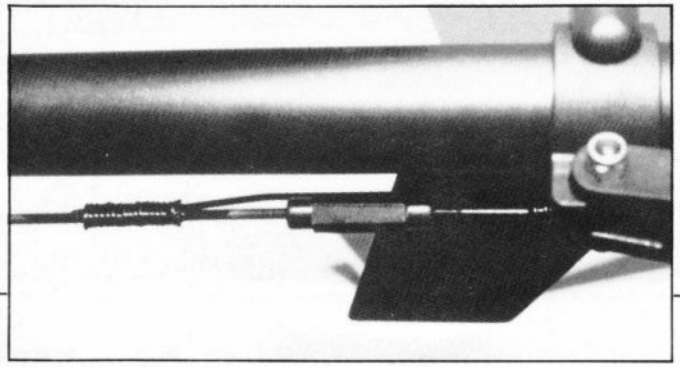
Both Control Rods No 0375 and No 0379 had threaded ends which would not fully enter the coupler, even though they were screwed in 7mm. In order to avoid fracture due to vibration and fatigue I soldered on a wire bridging piece. The coupler needs to be longer or the threaded ends shorter (see photo).

Section 6: Rotor Head and Tail Assembly Installation: Step 1: B

Control Rods No 0337: 9mm Reference Dimension. But 8.5mm is noted on drawing. Not critical, but slightly confusing.

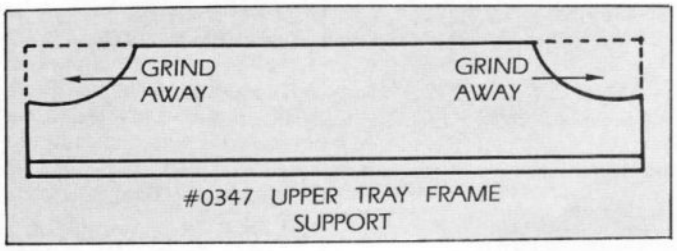
Section 8: Final Set up & Balance: Step 3: A

The threaded portion of 12 x 5 threaded ball (#0101) is too short to fit through #0359 roll servo link retaining bar and screw completely onto the M2 hex nut. I assembled this critical component using thick cyano, since loosening or disassembly would be catastrophic. I also found the relative heights of the collective and roll servos to be incorrect. No mention of this is made at all in the instructions — but maybe my Kraft KPS 23/24 servos are different to the current crop of Japanese servos. At this juncture I decided to assemble the roll link retaining bar a little differently to compensate for the height discrepancy. My solution was to mount the cent-

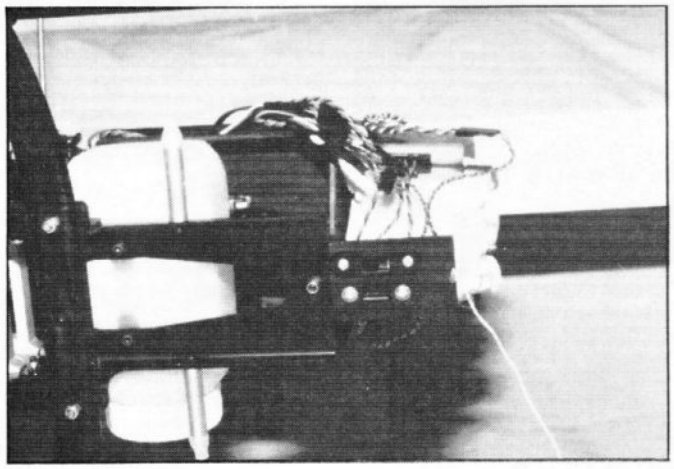


Tail rotor pitch change rod — joiner modification. This method of 'bridging' the screw on plastic joiner has been well proven on the author's Champion which uses a similar joiner. Walt Schoonard says that there have been no reported failures, unless there is excessive vibration. Where threads start or finish is a well known stress raiser — better to be safe than sorry. (Photo by John Bottomley.)

ral threaded ball on top of the link retaining bar. This has not given any problems in use. I then found that the aileron control rods fouled on the upper tray frame support (#0347). Using my trusty Dremel I modified it as follows.



#0347 UPPER TRAY FRAME SUPPORT



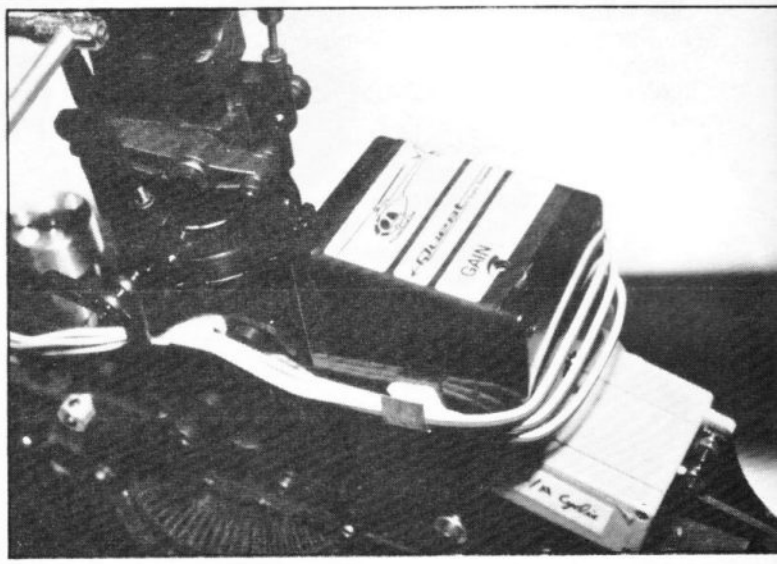
Underside view showing switch plate which holds the on/off switch and charging socket. Advantage of this location is that no extra cutouts are required in the canopy. (Photo by John Bottomley.)

General Comments

After completing the basic construction I was very pleased with the end result. My own concern was the main transmission which felt a little lumpy. This was due to a slight eccentricity or unevenness of the main gear — a fact which the instructions do comment upon. It loosened up a treat after the first tankful of fuel.

I took the opportunity of fitting a Helimprovements No-Load starting system and also their large diameter Head Button (see photos). I find the larger diameter fits the palm easier than the small buttons. Also it is raised up above the main blade holders, so a downwards force can be applied without one's hand fouling on the blade holders.

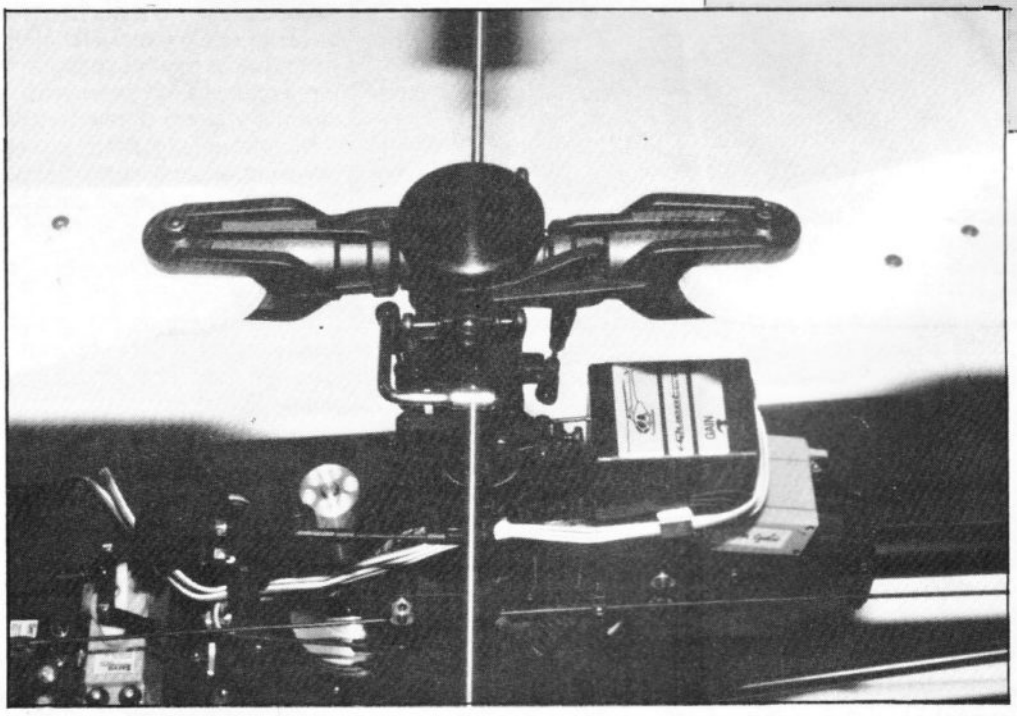
I ordered a Quest gyro with extra long leads so that I could use a rear gyro mount — but I underestimated the lead length even so. In order that the leads can be safely routed through the mechanics, leads of at least 18 inches are required. These are available by contacting Roger Gedge at Quest. I would also recommend that the leads be sleeved in say black heat shrink for neatness and to protect them from fuel, oil, etc. In the limited amount of flying completed so far I have found the stock gyro position to be fine. This forward position also helps the CG. On the muffler front I am using a Kalt baffled type which is reasonably quiet and causes a minimal power loss. Once I became acclimatised to the beast I shall be fitting the Magna Pipe and manifold — more anon. When it came to the switch and charging jack, I was determined not to cut holes in the canopy, so I decided to use the access pro-



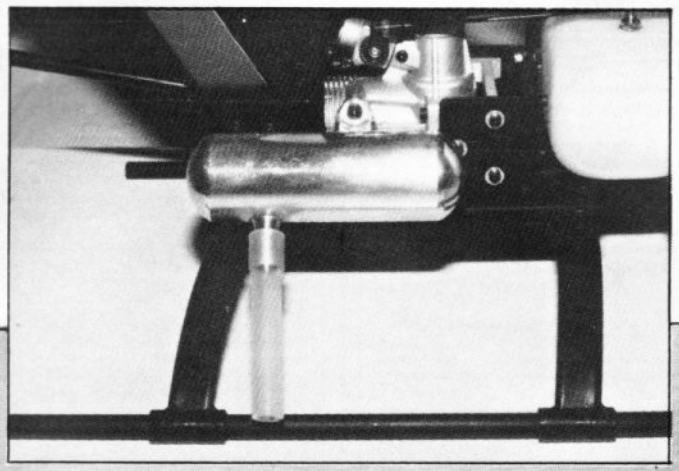
Installation of rear mounted gyro. In this case a special order Quest gyro with extra long leads (at least 18 inches are required to route them safely through the mechanics). (Photo by John Bottomley.)

She flies and how! After the initial tightness had gone from the transmission, circuits were performed on the first tankful of fuel. Response is similar to the Champion and with the rotor rpm turned up the control response and vertical performance is spectacular. (Photo courtesy of Craig Brookes.)

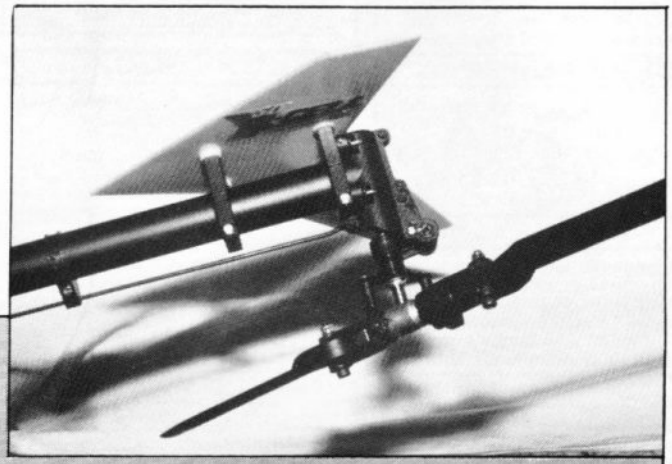
Overview of mechanics showing Helimprovements Head Button and No-Load starting system adaptor. Also colour coding of main rotor blade holders to match blade tip tracking tape; and routing of gyro cables through mechanics. (Photo by John Bottomley.)



Kalt muffler installation — quiet and no discernible power loss. Later on magna pipe and manifold will be installed for expected power gain and reduction in noise.



New tail rotor gearbox — the author used three M2 nuts and bolts plus one self tapper near the pitch change bellcrank mount. The additional joining lug can be seen opposite the rear fin mount. (Photo by John Bottomley).



Completed M/C emulating the box top colour scheme courtesy of local paintwork expert Chris Handley. (Photo by John Bottomley.)

vided by the cut-out in the bottom of the canopy. I mounted a 3mm ply plate (nominally 30mm x 80mm) on the tank mounting tray, and bolted the switch and charging socket in place in the normal way. Finally, I set the machine up using the very detailed instructions. This was made easier by using the unique flybar lock available from Miniature Aircraft USA and their stockists. The flybar lock snaps in place on the rotor head and guarantees repeatability of settings.

Flying

I had run-in the OS50H for approximately one hour on the test bench and so it burst into life immediately. As mentioned, initially the transmission was a little tight, and indeed made 'noises' for the first few minutes of running, thereafter it all smoothed out and the X-Cell lifted effortlessly into the hover. After a few gentle hovering manoeuvres I took the machine straight into the circuit. Control response was crisp and I immediately felt at home. Interestingly the rotor head remains controllable over a wide range of rotor speeds. Over the coming months I'll report on developments and my experiences with the X-Cell 50.

One idea I have had is a Westland Lynx — anyone out there done anything along those lines?☐

Suggested Further Reading:

1. Field and Bench Review: X-Cell 60 by David Trost; *Model Airplane News*, March 1988.
2. Hover Column: X-Cell 60 by Ray Hostetler; *RC Modeller*, June 1988(?).
3. Radio Control Helicopters: Overview of X-Cell Range by Larry Jolly; *Model Aviation*, September 1988.
4. Helicopter Challenge: X-Cell Upgrades; *Model Airplane News*, June 1988.

List of suppliers of items used on review model

1. Helimprovements, % 5 New Walk, Shillington, Hitchin, Herts, SG5 3LN. Tel: 0462 711893, 0473 328418. No Load starting system head button.
2. Quest Gyro Systems, 47–51 Waveney Road, Ipswich, Suffolk. Tel. 0473 462633. Special order gyros with extended leads.
3. Hyatt Hobbies, 45 Marchwood Road, Exton, PA, 19341, USA. Tel: 0101-215-363-2070. Stemco rear gyro mount.