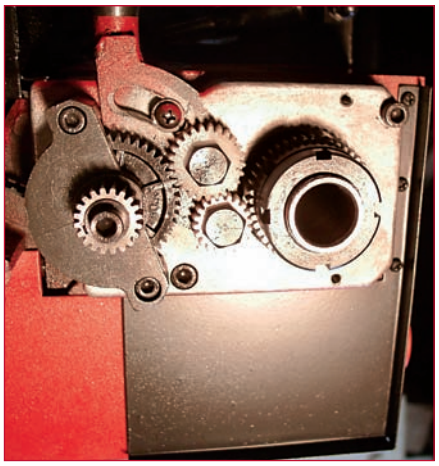
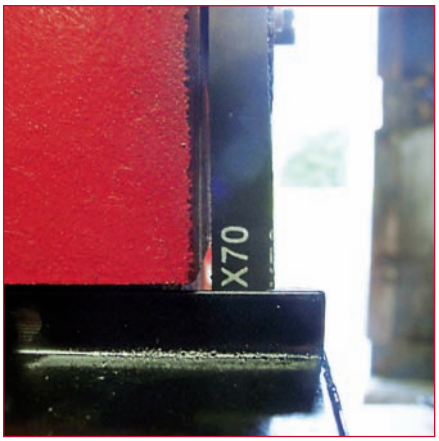


10 Tumbler lever down travel is impeded by contact with the casting.

11 Showing clearance between larger white gear and washer.



12 After adjusting the motor position, clearance has been gained between the belt and the headstock casting.

along the bed and off at the tailstock end. All that remains is to take off the second leadscrew bearing and the leadscrew.

Examination and Reassembly

Jingoistic humorists used to comment that Chinese machines were OK if you treated them as a kit of parts. It seems there is still an element of truth in that view, at least as regards the "Factory assembled" condition. It must be acknowledged that the manufacture is being undertaken using decent production equipment, so the inherent component quality is good. It would appear, however that the assembly process does not benefit from the same care and attention that one comes to expect from say, a Myford.

This element of care and attention can though be introduced by the new owner, who has a certain level of mechanical or engineering skill and or is prepared to spend some time to read through various articles on this subject, as suggested earlier.

Apart from the notes above, the principal points of criticism relate to the cross and topslide, where for each pair of sliding surfaces, one is typically finely ground while the other is milled, showing significant machining marks. Here is where the traditional skilled machine tool fitter would scrape the slides to improve accuracy and smoothness. I do not class myself as having anywhere near the required level of skill for this, so simply gave the milled surfaces a gentle rub with a fine triangular file and a small diamond lap. The lap has been modified by trimming away the plastic backing at an angle to allow it to get fully into the corners of the dovetails, **photo 13**.

The first area to be dealt with is the underside of the bed. The upper surface and vee way are ground all over, but the sides (which make no contact) and the underside appear to be milled, albeit with good finish. The diamond lap was carefully held against the underside and drawn along several times using light pressure. This would remove any local high spots. A small area on the top surface of the bed was also given the lap treatment at this point.

The serial number is stamped into the upper working surface after grinding and this causes metal to be raised around the edges of the numerals. Taking the raised material off with the lap left the number still easily legible, **photo 14** and improved the sliding action over this area. This area is unlikely to be used at the very end of the bed, but model engineers are notorious for stretching machine capacity so you never know. The lower working surfaces of the saddle were then coated with "Copaslip" (Arc use this) and the casting slid back on to the bed.

It may be useful at this point to add a brief description of the adjustment arrangement. Two metal strips are pulled up to the underside by three Allen screws, relative thicknesses of bed and saddle being chosen so that pulling up tight would clamp to the bed. Jacking screws with locknuts are also fitted and these function to push the strips downwards and set a working clearance. The arrangement may be seen in **photo 15**. Thus the adjustment sequence is a repetitive process of lightly adjusting the opposed push - pull actions to achieve a good fit and feel. It should be noted that firm tightening of the pull up screws is not required and in fact, if overdone (according to web notes) may actually cause fracture of the strips.

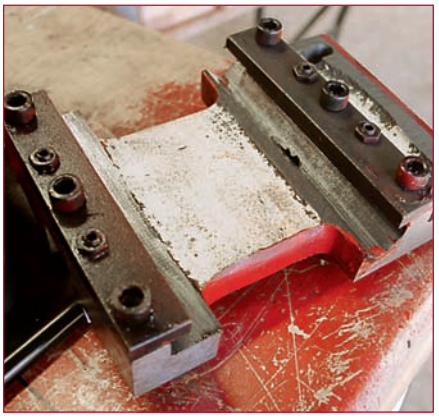
Attention then moves to the apron, leadscrew and associated bearings. Here, Arc drills an oil way and adds internal oil grooves. Many owners may choose not to make this change and rely on oiling from the bearing ends. However, it probably will result in extended life.

While it would be possible to do the drilling on the C3 using the milling attachment, as the lathe was in pieces, the simpler alternative was to use the VMC mill. **Photo 16** shows the RH bearing gripped in the vice canted up 45 degrees and a piece of thin sheet brass used under the point of the drill to get close to the centre of the curved surface. (When the brass was horizontal, the drill was close to the centre.) The bearing length is 20mm so the hole was drilled 10mm from one end.

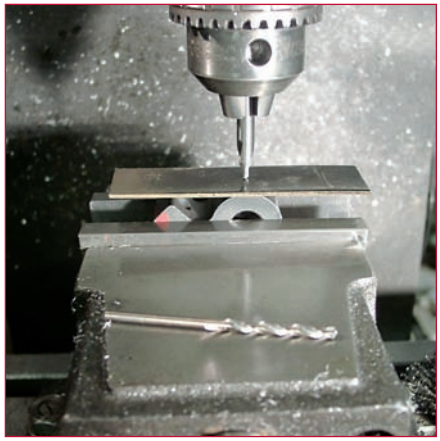
Following the Arc example, a Minicraft drill with a small burr, was then employed to cut a diagonal oil way within the bearing. The 45degree cant mentioned would ensure that the oil hole would be conveniently accessible after assembly. A

13 The diamond lap has been carved away at an angle to permit access to the root of the dovetails.

14 Raised metal around stamped numbers has been dressed off with lap.



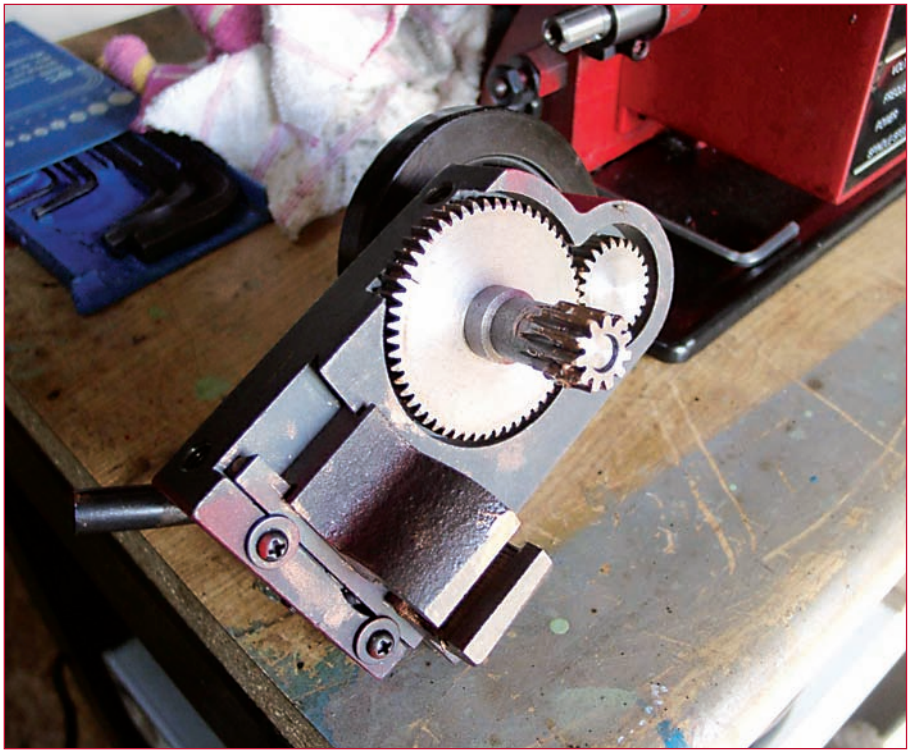
15 Underside view of saddle shows "push – pull" adjustment screws.



16 The RH leadscrew bearing being set up for drilling an oil way.

similar series of operations was carried out on the LH bearing.

Attention was then given to the apron assembly. The half nuts were removed, and their respective dovetails given a touch with the lap. These, the shafts and the gears were reassembled with more Copaslip, **photo 17**. With the bearings and leadscrew also given a dose of Copaslip, the LH bearing with leadscrew could be jury rigged. The apron (with clasp nuts open) was then carefully threaded over the leadscrew and loosely attached to the saddle. After fitting the RH leadscrew bearing, the screws holding the LH were tightened whilst pressing the bearing towards the right. Similarly, the RH bearing was nipped up whilst applying pressure towards the left. (The reason is that the leadscrew end float is set by the relative positions of the two bearings and this sequence aims to minimise this.)



17 Inside view of the apron showing the half nuts and gears.

Now the saddle and apron are moved as far as possible towards the right hand end of the bed. The half nuts are then closed, and the two bolts securing the saddle to the apron are progressively tightened. (The securing bolts pass through elongated holes and this procedure sets the apron position correctly in relation to the leadscrew.) As a final check in this area, with the half nuts still closed, the RH leadscrew bearing bolts may be slackened and retightened, again pushing to the left. This will allow it to move up or down a few thou to centralise the leadscrew on the half nuts.

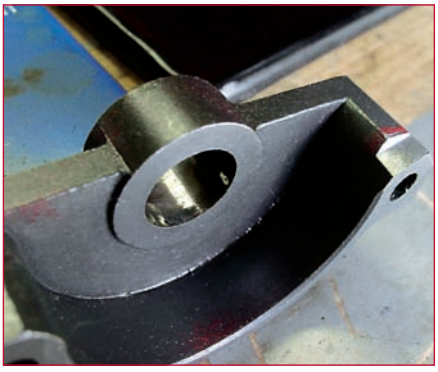
Apparently, it is not unknown for the rack position to be less than perfect, resulting in poor meshing of the carriage gear teeth. If necessary the rack may need repositioning for optimum engagement.

The lap was again brought into play for the cross slide and top slide dovetail surfaces – just a gentle rub to clear any high spots, **photo 18**. The cross slide with its lead screw, bearing and handle were then added, again with a measure of Copaslip lubricant. The gibs on these slides are relatively thick (about 4mm) and adjustment is by socket head grub screws and locknuts. These screws have dog points which locate closely in drilled recesses in the gibs. It was found that there was some reluctance to re-engage with the recesses, and so the screws were each given a very light chamfer on the dog point. (Out of interest, G H Thomas recommended that gibs be pinned, and it may be argued that this arrangement gives much the same effect.

When rotating the topslide, a notable clunk could be felt (and heard). This turned out to be another case of metal raised by stamping (after grinding), in this case the fiducial mark for angle setting. Once again, a few strokes with the lap effected a cure.

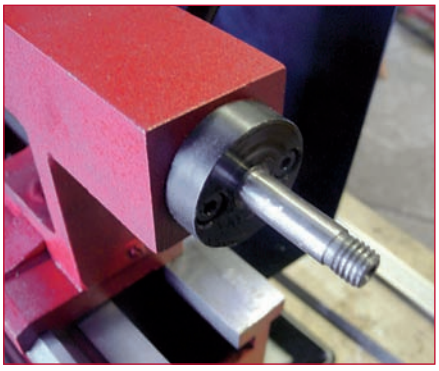
The alloy belt cover was then refitted. Before adding the tumbler bracket, a small amount of metal was filed away from the foul point mentioned above. The tumbler was then fitted, ensuring that clearance existed between the nylon gear and washer mentioned earlier and shown in **photo 11**. Metal was also removed from the cast carrier, **photo 19**, which was then refitted along with the associated gears after lubricating the bearings.

18 Milled surface of the cross slide dovetail is lightly rubbed with the lap.

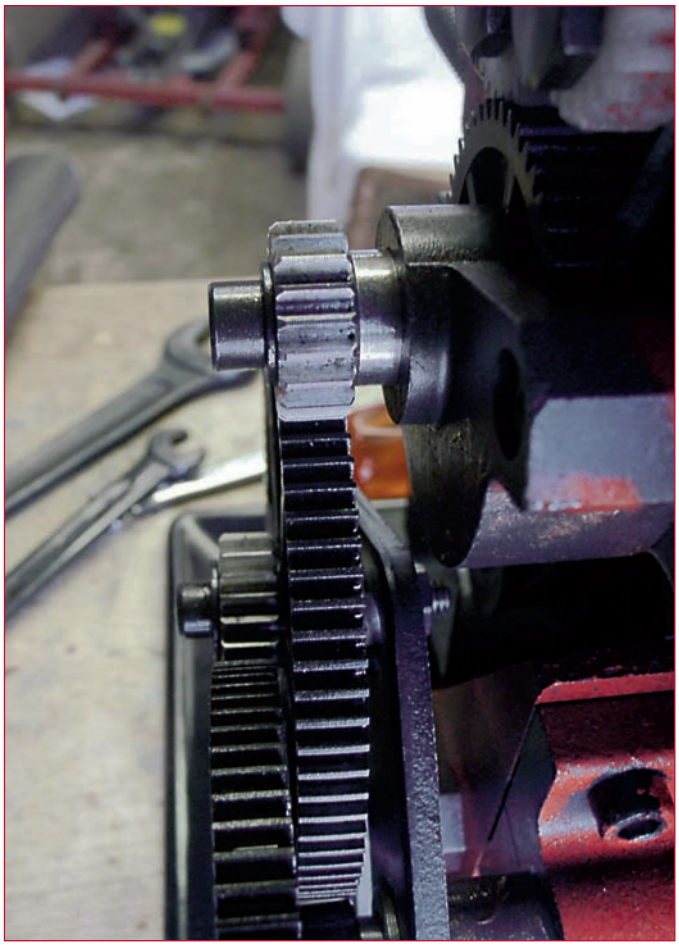


19 Showing the step filed to ensure correct movement of the tumbler assembly.

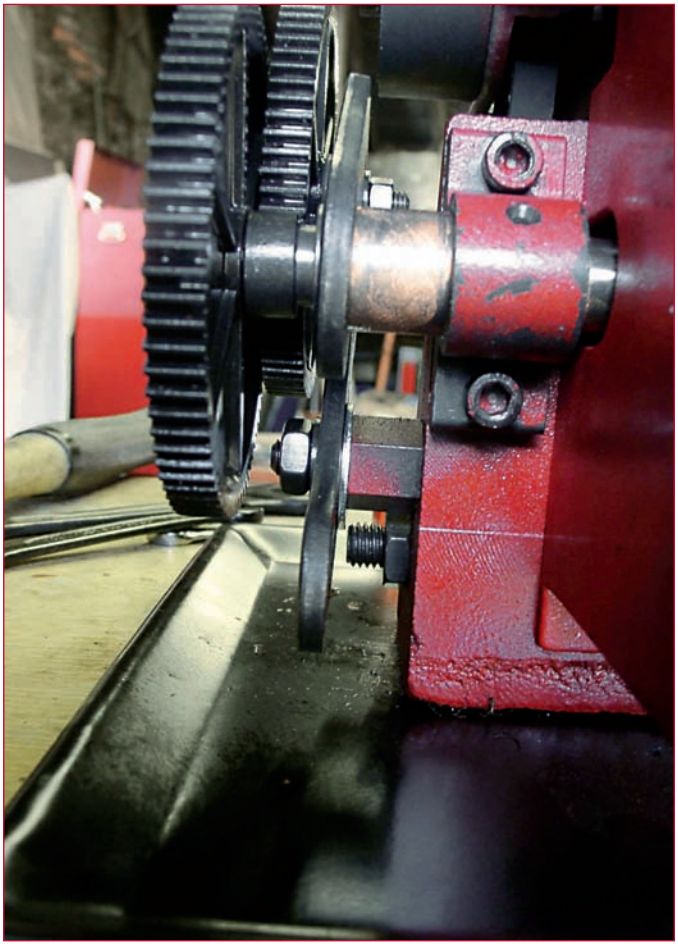
20 The tumbler bracket is a pressing with sharp edges on one face.



22 Shows the burr raised by the tailstock hand wheel grub screw



21A The gear alignment has been improved --



21B --- by the addition of a washer.

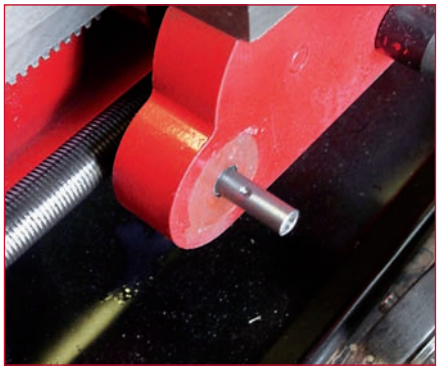
Examination of the changewheel bracket showed this to be a pressing, **photo 20** with sharp edges on one side. These were dressed off with a file before the bracket with wheels was added, after locating a single washer behind, which would bring the gears into better alignment, **photos 21A** & **21B**.

The tailstock upper and lower sections were not separated at this stage although the barrel and screw were removed for lubrication. While this was in pieces, the opportunity was taken to lightly chamfer the end of the barrel, removing a sharpish edge. It was also noted that the hand wheel is retained by a cup point grub screw which had marked the shaft, **photo 22**. The marking was dressed away with a fine file, and a small brass disc inserted below the screw. In contrast, the carriage hand wheel is held by a cone point screw and in this instance, the point locates in a drilled recess, **photo 23**.

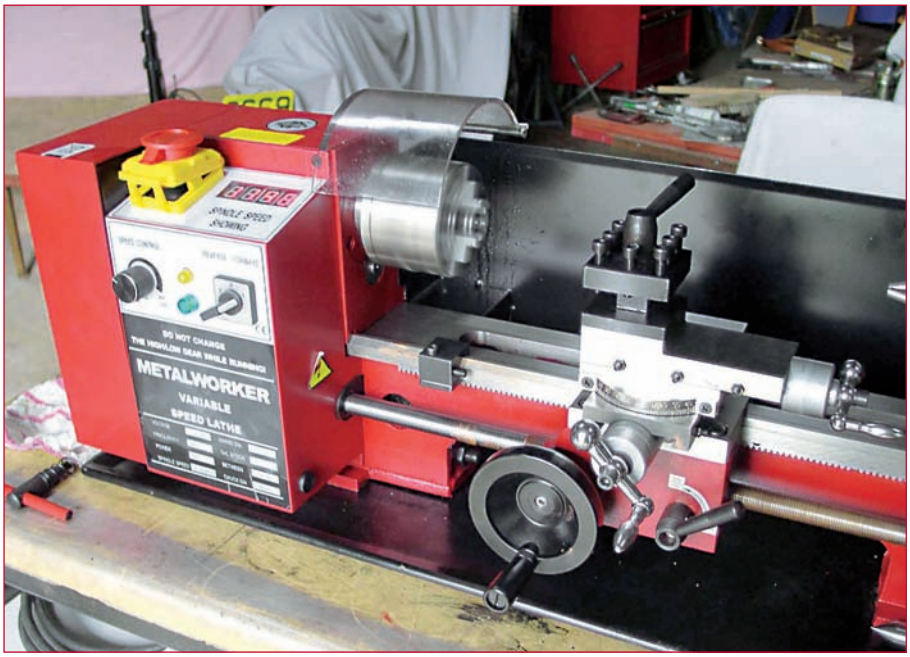
Fitting the change wheel cover, splash back and chuck guard completed the exercise after which the machine was fired up, **photo 24** running the saddle under power feed backwards and forwards several times to check operation. Operating the various slides manually was now noticeably smoother compared to the earlier, as received "Factory assembled" condition.

Whilst this was my experience of the "Factory assembled" model, I understand that Arc's in house preparation process may find other "variables" which may need to be looked at. Any that do arise will be covered on Arc's website in due course, under their projects and articles section.

In the next article, the machine will be put to work, and some of the accessories will be described.



23 The grub screw on the carriage hand wheel has a drilled recess.



24 Assembled and under power.