



British Horological Institute

## Examiner's Report

### Certificate in Clock and Watch Servicing

#### **Unit 1 : Technician Grade : Theory of Clock and Watch Servicing**

Twelve candidates submitted scripts for assessment. A broad range of ability was demonstrated, with the proportion of Passes and Pass with Merits similar to the long term average. Several candidates failed to attempt the correct number of questions. One candidate answered only three long questions, failing to attempt a question from section C, and two candidates answered five questions. If candidates answer too many questions, only the first four are assessed.

#### Section A – Clocks and Clock Servicing

**Q1 Fusee and Countwheel Striking.** This was answered by four candidates only. All knew the basic principles of the fusee and answered that part reasonably well. Most were unable to describe the striking work in any detail and answers were vague.

**Q2 Reasons for Failure, Train Count and Pendulum Length.** Eight candidates attempted this and most produced the correct answers. Failure was due to incorrect formulae for train count or period of pendulum, rather than errors in arithmetic. Few could provide five different reasons for a clock stopping, the majority giving two or three only.

#### Section B – Watches and Watch Servicing

**Q3 Keyless work, Shock Resistance, Timing Machine.** Five attempted this. Most were able to name correctly the components of modern keyless work and to show the timing traces produced when a watch is in or out of beat. The principles of a shock resistant setting were not well understood. No candidate stated that the shock was taken by the arbor or shoulders, not the pivot.

**Q4. Quartz Watch: Battery replacement, electrical tests, end of life.** The seven attempts showed a basic understanding of the topics but often missed essential detail, while explaining less important points at great length. Only three mentioned the need to use plastic tweezers for handling batteries.

#### Section C – Escapements

**Q5 Lever Escapement.** (Not answered)

**Q6 The Recoil Escapement.** (11 attempts) There were many good diagrams but some showed an incorrect tooth form or pallet shape or both. The required labelling was correct in most cases. Points relating to the action were generally well answered but those relating to the construction less well; particularly the type of steel used for pallets, degree of hardness and finish.

#### Section D – Workshop Processes

**Q7 Watchmaker's Lathe.** (8 attempts) Candidates had to explain the importance of using the correct size of collet, routine maintenance of the lathe, construction of the headstock, tools for the compound slide and causes of chattering. Only the sections on the collet and chattering were well answered. Knowledge of maintenance, headstock construction and cutting tools was extremely limited

**Q8 Blind tapping, hardening and tempering, drilling in the lathe, ultrasonic cleaning.** (4 attempts) Three of the four showed a good knowledge of the first three processes and scored well, particularly on tapping a blind hole and hardening and tempering. The principles of ultrasonic cleaning were not well known.

#### Section E - Short Answers

Many high marks were scored on this section, with most able to answer a high proportion of the 20 questions correctly. Surprisingly, the constituents of brass (Q3) were not well known with several giving copper and tin, and few were able to give the correct voltage for a lithium watch battery (Q18).

### **Unit 2 : Technician Grade : Basic Practical Workshop Processes**

Candidates were required to make a longcase sized minute wheel and pinion, without teeth, but crossed out and fitted to a blued post. A range of skills are necessary to complete the piece including turning brass, bluing steel, cutting a screw thread, flush riveting, filing a square and polishing flat and turned brass surfaces.

The assessment was based on the three categories of Dimensional Accuracy, Quality of Workmanship and Quality of Finish. Eleven pieces were submitted for assessment. The majority were of a good standard and demonstrated an adequate level of competence in all the above areas. Two pieces stood out; one of a significantly higher standard than the rest and one lower.

Dimensional Accuracy was of a high standard with 87% of the dimensions within or just outside tolerance. The wheel crossings were found to present the most difficulty. The narrow end of the arms (2.7mm) was within tolerance in just three cases and the inside diameter of the rim (24mm) only once. Dimensions of the post and pinion were within tolerance in the majority of pieces.

Quality of Workmanship Turning threading and riveting were generally well done, with the flush rivet barely visible and the pinions tight and upright. Side shake was often correct, but end shake was excessive in a number of cases. All wheels turned freely on the posts and most spun true both in the round and in the flat. The wheel crossings, however, left much to be desired. Many were not smooth, corners were seldom sharp and

the outer curves did not, in most cases, form a true circle. Overall, the lathe work was very good but the hand filing relatively lower in standard.

Quality of Finish followed a similar pattern to quality of workmanship. Turned surfaces were often well polished to a good mirror finish with little or no evidence of scratches blemishes or turning marks. A similar standard was also often achieved on the flat surfaces of the wheel. In contrast the crossings were often left with a rough or draw filed finish, with no attempt at polishing, and showing file marks in the corners. On the base of the post, the four flats were often well polished to high standard, but few attempted to polish the top and bottom surfaces, which were often left rough with deep turning marks. Bluing was often by blue lacquer, which scores no marks.

### **Unit 3 : Technician Grade : Technical Drawing**

Candidates had to prepare a drawing of a minute wheel and pinion assembly with cock and portion of the front plate. Four elevations were required, including a sectional elevation together with four dimensions for three of the elevations and a title block.

All candidates were familiar with either first or third angle projection and correctly drew the appropriate cone symbol, with nearly all placing the front elevation and plan consistent with it. Most, however, did not know to place the two side elevations one on each side of the front elevation.

The standard of lettering varied from adequate to poor. Most was of uniform height but the formation of the letters was not good, with straight lines often wavy and curved lines inconsistent. Dimensioning was generally good and followed the correct conventions in all cases, with the correct number of dimensions included.

Marks are awarded for layout which was good in most cases and candidates scored well. However, the need for *precise* centring was not understood and in all cases the drawings were only approximately centred. The term, "title block" was not properly understood. Most correctly grouped together the necessary information in one corner of the drawing, as required, but did not include grid lines.

Most were aware of which lines should be thick and which thin, and used two different weights. The convention is for thick lines to be about twice as thick as thin ones. This was seldom the case, with most thick lines only slightly thicker than thin ones. Joining of lines, particularly straight and curved lines, was poor. The cutting plane and sectional view were correctly labelled in all but three cases and the conventions for hatching well understood. Conventions for gears and screw threads were not well known. All but one showed the root circle of the gear in the non-sectional views, which is contrary to the convention, and pitch lines did not extend beyond the outline as they should. All omitted hidden detail of the screw thread in the plan, and only half drew it correctly in the side views.

Several drawings showed the riveting of the wheel and pinion as proud rather than flush. The extension of the riveting diameter below the wheel then resulted in other dimensions being in error. As in the past, the rounded ends of pivots and steady pins were often drawn with only a curved line to show the end; there should also be a straight line to show where the curve meets the tapered portion of the steady pin.

## **Unit 4 : Technician Grade : Practical Clock / Watch Servicing**

Three were assessed. One was fully satisfactory. One included a mainspring-driven record player as one of the six items and will be returned for correction and resubmission. The third Record of Repairs had only four clocks whereas six are required; it will be returned for completion. All the necessary processes had been completed in each of the Record of Repairs.

**The Examiners exercise considerable care to ensure that there can be no error in the final mark awarded. If, however, you believe that a mistake has occurred then you may request that your paper be assessed again. The charge for remarking is £40.00 per unit, which must accompany the request. This should be received on or before 31<sup>st</sup> August 2008. The fee will be returned if it is found that as a result of the appeal process the outcome of the examination (i.e. Pass / Fail or Pass / Pass with Merit) is changed.**