



British Horological Institute

## Examiner's Report

### Certificate in the Repair, Restoration and Conservation of Clocks / Watches

#### **Unit 1 : Final Grade Part I : Theory of Clocks and Watches and their Repair**

Ten candidates submitted scripts for assessment. They were required to answer four long questions from eight, plus twenty questions from thirty in the short answer section. It is important to read the instructions carefully. One candidate answered three questions only and two others answered more than twenty from the short answer section. The overall standard was higher than in recent years, with all candidates exceeding the minimum pass mark of 40%.

**Q1 Recoil escapement: Refacing pallets.** (5 answers) The action of the escapement was accurately described, but several did not start from the position specified in the question. The procedure for refacing was also well known, but drawing to determine the correct profile, and the need for hardening the new faces was often missed.

**Q2 Lever Escapement.** (10 answers) The required components were correctly named by nearly all candidates and drawings of the double roller assembly were generally good. The action was also well known and understood, but several failed to mention the slight recoil before unlocking and/or the two stages of impulse.

**Q3 Calendar Work.** (3 answers) This was not well answered. The two operating fingers on the same arbor caused confusion over which wheels they operated and explanations of the jumper and corrector action were vague and lacking in detail.

**Q4 Mainspring Theory & calculation.** (1 answer) The candidate had a good knowledge of the theory and the necessary mathematics, scoring well despite a small numerical slip near the end.

**Q5 Keyless Work & Quartz electrical testing.** (8 answers) Several did not know the correct names for the components of keyless work, but the action of the mechanism was understood and well explained with the exception of the return bar spring. The electrical tests were well known but important details, such as disconnecting the coil when necessary, were often omitted.

**Q6 Countwheel Striking & Hammer Spring.** (3 answers) There were two very good answers; the third showing little understanding of the mechanism. The two showed a thorough working knowledge of this form of striking with detailed and accurate explanations of its operation. Types of hammer spring and their function were also well known.

**Q7 Centre Seconds: Roskopf motion work: Watch Cleaning.** (1 answer) Only the second part, on watch cleaning, was attempted and failed to show a good understanding of watch cleaning techniques.

**Q8 Timing Machine: Types of Pivot & pivot faults.** (8 answers) All knew how to use the timing machine to adjust beat and rate, but the need to test in different positions was not widely known. Few understood how to use the machine to check balance amplitude or detect faults. The three types of pivot were well known but the request for details of faults, "due to poor manufacture and wear," was not well answered.

**Short Answers.** This section was answered well by most candidates, with one scoring the maximum of 20. The most popular question was the timing trace produced when a watch is in beat; answered correctly by all candidates. The least popular was why lantern pinions are unsuitable as drivers; answered by only one candidate who gave the wrong answer.

## **Unit 2 : Final Grade Part I : Practical Clock and Watchmaking Techniques**

Candidates were required to make a carriage clock size assembly of cock, plate and squared arbor, designed to ensure that candidates can demonstrate a broad range of practical making skills. These included filing and turning brass and steel to ensure correct working fits and achieving a high standard of finish whilst maintaining required dimensions within tolerance. Where not specified the components must be finished in accordance with good practice.

### **Accuracy**

Side and end shake continue to cause problems for a number of candidates, being too great in several cases. Otherwise dimensional accuracy was very good with 93% of the measured dimensions within or just outside tolerance.

### **Workmanship**

In common with previous years the weakest area was the lifting slot in the cock. Many were unable to remove filing marks from inside the slot, or to achieve sharp corners. The chamfer around the top of the cock always presents a challenge and several very good examples were seen this year, with good flat surfaces and sharp corners. The steady pins were often a loose fit in their holes, rather than a snug fit and few pinholes were countersunk as shown on the drawing. The arbor, including the square section was well done in most cases. The jewel hole for the bottom pivot was generally well fitted, but the countersink underneath was rarely level with the jewel surface.

## **Finish**

Marks were not as high as in recent years. Where a mirror finish was required, only a small number were able to achieve a high polish without scratches and many displayed turning, filing or abrasive marks on the pieces, particularly the inside of the cock, lifting slot and arbor square. The grained surface was often well executed, but the direction of the grain was not always parallel to the edges of the plate.

## **Unit 4 : Final Grade Part I : The Practical Repair of Clocks**

The examination requires candidates to:-

1. Submit a Record of Repairs giving details of eight clock repairs
2. Produce a detailed drawing showing the construction of a recoil anchor escapement.
3. Design and make recoil pallets to work with an escape wheel and plate with two studs which are provided by the Institute; a maximum of eight hours is allocated for this task.

### **1 Record of Repairs**

One candidate submitted a Record of Repairs; this met the requirements fully.

### **2 Drawing showing construction of a recoil anchor escapement**

This was of a good standard but it is expected that for this formal drawing the various conventions for drawing are used throughout e.g. projection lines which should be thin, start clear of the outlines and stop just after the dimension line.

### **3 Design and make pallets for a recoil anchor escapement**

One candidate sat the assessment and achieved a good standard; the action of the escapement was uniform with a small drop both for the entry and exit pallet. Workmanship and finish were satisfactory but the pallets impulse faces were rounded and slight scratches remained. Generally there is a need to obtain better flat and square edges before attempting to provide the final polish, since underlying scratches were evident. The candidate is required to design the escapement for the escape wheel and centre distance provided; there are few dimensions for the pallets. The pallet frame in this instance was oversize when compared with the drawing and the boss was rather mis-shapen.

## **Unit 9 : Final Grade Part I : The Practical Repair of Watches**

The examination requires candidates to:-

1. Submit a Record of Repairs giving details of ten watch repairs
2. Service a quartz watch and mechanical watch movement; candidates are required to achieve a pass on each watch in order to pass this Unit.

### **1 Record of Repairs**

All of the Record of Repairs fully met the requirements.

## **2 Service a quartz watch and mechanical watch movement**

### **Quartz Watch**

Six candidates entered this part of the assessment and four achieved a good standard. The quality of servicing for the quartz watch was generally good but two candidates failed to ensure that their watch was working at the end of the examination. It is clear that the approach to fault-finding is better, suggesting that a more systematic approach is being taken prior to and during the disassembly of the watches.

The work of two candidates indicated that greater care is necessary to prevent damage to screw heads. Screwdriver blades must fit well in both width and thickness if damage is to be prevented. Candidates should provide a wider range for the examination or spend a few minutes adjusting blades to suit the screws in each movement. This is a particular problem with the screws in the quartz movement which tend to have wide slots.

Candidates have to fit a new stem; the button must be sufficiently tight to allow operation of all functions without any risk of becoming loose. Unfortunately this was not always the case. There should be proper, visible, but minimal clearance of the button from the case; one was fitted too close.

A common fault was the failure to clean the inside of the glass; it should be scrupulously clean and without greasy finger prints. All passed the waterproof case test.

A box of parts is provided for each candidate and it is anticipated that parts such as the battery and case seal should be routinely replaced. Some components may be required to correct faults introduced by the Examiner but where parts are used which are not directly required to rectify faults then a loss of marks will result.

### **Mechanical movement**

With one exception the performance of the movements and the standard of work presented were good. The standard of oiling is improving but examples are still found where pivots and keyless work are inadequately oiled. The general standard of cleanliness of the work was good with minimal damage to the screw heads. The tightness of screws is carefully checked; a screw working loose will almost certainly stop the movement. Sometimes one was loose.

The flatness of balance springs is carefully checked most were quite good but curb pin clearance was often too large. The oiling of pivot holes, particularly balance pivot holes and their end stones was reasonable.

Faults were usually found and corrected, particularly by the able candidates.

### **Overall**

Twelve hours is allocated to service the quartz watch and the mechanical movement. It is noteworthy that candidates demonstrated an ability to achieve a good standard on one watch but not always on both watches; there may be a need to work more quickly. Candidates are required to pass both the watch and the movement in order to gain a Pass for the Unit.

**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.**