Quarter Chime and Hourly Strike Mechanism 1911 Memorial Turret Clock

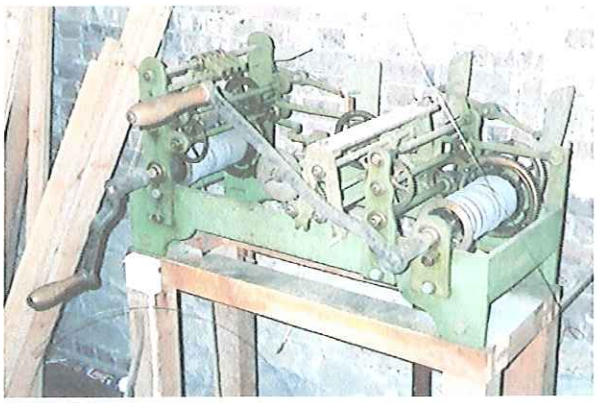
Ardingly College

History The mechanical clock mechanism is a three train cast iron flatbed of substantial construction with a setting dial bearing the makers mark "David Glasgow 1911". It is a Westminster Tune (Big Ben) quarter chime with an hourly strike both of which are governed by a central going train with a recoil anchor escapement originally driving the two archway dials through vertical leading off work to bevel gears and counterpoised motionwork. The pendulum is a fine wood rod and cast iron cheese bob with a regulation nut below. The chime and hourly strike hammers are located in a small open belfry above the roof on a gable end and visible from the grounds. The wires connecting the clock to the hammers are visible leading down through lead pipes into the roof space. There are four large comtoise bells nested inside each other, the chime hammers strike on the left and the single hour bell strikes on the right. The clock was entirely mechanical, and required winding up with a handle every week. To keep good time, the attendant would rotate the regulation nut underneath the pendulum. The clock needed oiling and greasing at regular intervals, including the bell hammers which required a precarious trip to the top of the roof via a hatchway.

Over many decades of use, the clock slowly developed faults and became unreliable, serveral attempts had been made to repair the worn parts but after 50 to 60 years service an electro-mechanical Gent 24v Pulsynectic ratchet and pawl synchronous pendulum impulse drive was installed to drive the dials, but it did not drive the chime and hourly bells strikes which fell silent for many years. In its turn the Gent electro-mechanical clocks was replaced by a modern electronic radio controlled master clock which since 1996 has driven the two Archway dials.

Restored Bells

The old 1911 clock lay disused until 13th February 2004 when Thwaites & Reed

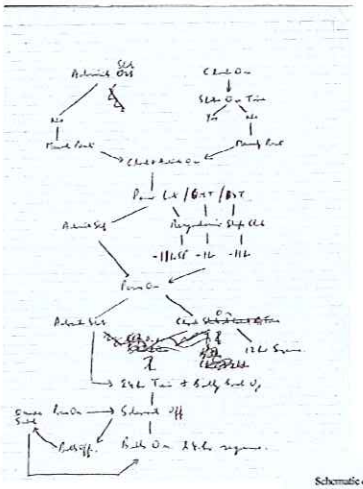


Original Clock Mechanism

were instructed to do a feasibility study to see if the old clock could be used to re-instate the bell strikes with modernisation to automate the running of the clock, night silencing of the bells, and remote control of the bells so that during examinations the bells did not disturb students.

Design and Manufacture The first task was to examine the clock to see if it was safe to operate, and although some parts were missing and other broken, previous clockmakers had followed best practice by leaving old parts next to the clock so that future generations of clockmakers could read the history of the mechanical failures and have a template for new parts.

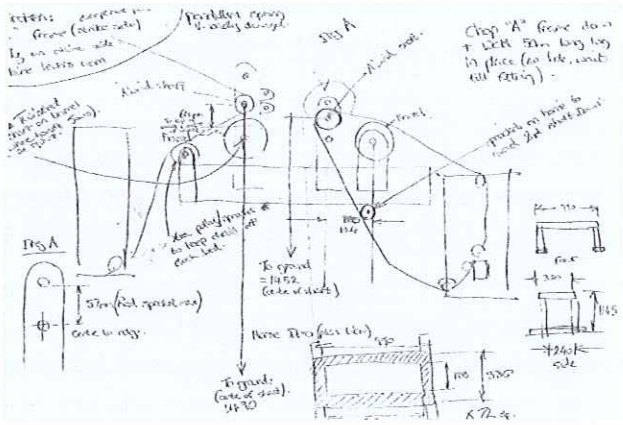
Function Path



The next step was to draw out a function path to see what components would be needed to meet the College's specification for electronic automation and wireless remote control for a clock made before such concepts were thought of. Clockmaking is not a precise science, and the matching of the characteristics of a Victorian design with modern components to give longevity, accuracy and ease of use, can take time as each function is bespoke to the clock.

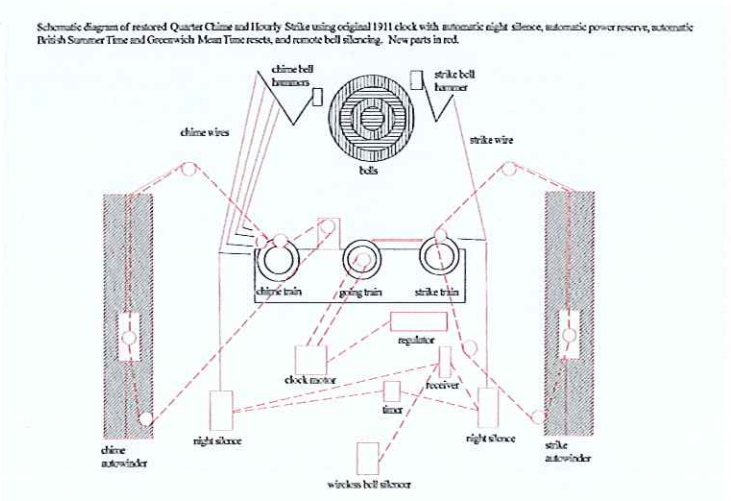
A number of sketches were then made of how everything could fit together, the wiring and mechanical drive runs, and the mechanical power requirements to operate the bell hammers with enough power to make an audible strike, without overloading the bell hangings, and damaging the existing fittings which were made for the more gentle power of gravity weights.

Sketch System Plan



A schematic drawing with new components coloured red, was then made to check function, and component did not cause problems for each other.

The next stage was to fabricate the parts and components into an integrated package. As each part was bespoke for this

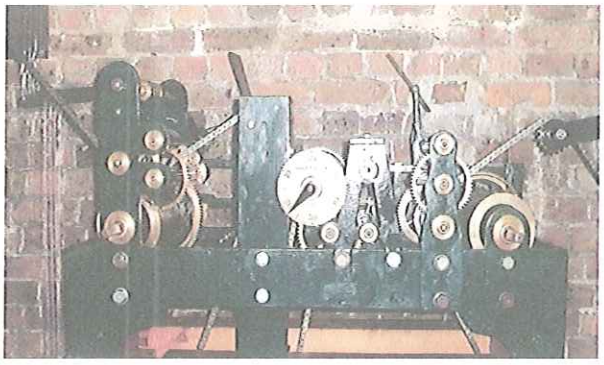


Schematic Drawing - New Components In Red

clock, each had to be specified, the autowinders alone required 35 CAD drawings and most other components had some customisation to fit the clock functions.

In the meantime, scaffolding to the roof had allowed for the bells and bell hammers to be dis-assembled, restored, and then re-assembled, lubricated and rewired ready for use. The old clock was taken apart and each part cleaned and restored, and then re-assembled on site over many days.

Strike Autowind



Restored Clock Mechanism

Automation Components

Chime Autowind

The main part of the clock remained untested. The clock was disused because it did not work, but the reasons why it did not work, had to remain unsolved until all the other components had been fitted and the clock ready for commissioning.

Commissioning Once all the parts were fitted, the clock was set up to operate, and to trace the the old faults. Therefore train by train, part by part, the clock was taken apart again and each part checked in turn, to see if it was causing the problem. This process was slow and time-consuming, but simply cannot be rushed, because an old mechanical clock is not symetrical, it will operate at certain hours, and not others. It can be quite contrary if two parts have worn together, and then married to a new part, or even taken apart and put back together with fresh oil and grease. From this process several arbors were found to be not true, new brackets had to be fabricated, and the chime and strike levers and pins, minutely adjusted over many hours. After each adjustment the clock would be re-assembled and left to run until it stopped again, when the whole process would be repeated, in all the clock was taken apart 8 times.

The clock was reset to time and finally left to run on 26th March 2007. Thereafter, the clock will bed itself in, old bearings

will readjust to new loads, and the power required to run the clock will reduce. Over several months the clock will be given reduced power, until the minimum is achieved, this will reduce the load on old clock parts, and increase longevity, so that apart from consumables, the mechanical parts of the clock should last the life of the building.

Operations The clock is fully automatic in use, there is no need to wind it, or regulate it, the bells will fall silent between 8.00pm and 9.00pm and restart at 8.00am to 9.00am. There is a wireless remote control handset to switch off the bells at any time.

It has a power reserve to cover short power cuts, but if the cuts are prolonged, it will switch off for up to 12 hours and restart again at the correct time.

Maintenance The clock requires cleaning and lubrication at least once a year. Due to the exposure, the bells and hammerwork should be cleaned and lubricated every opportunity there is for access.

THWAITES+REED®
1740
Thwaites & Reed Clockmakers Ltd

Horological Engineering
Services Design- Consultancy
www.thwaites-reed.co.uk

YOUR ASSURANCE OF QUALITY SERVICE

Licensee
THWAITES & REED ENGINEERING LIMITED
P.O. Box 51 Rottingdean
Brighton BN2 8YQ
Registered Co.No.3064963
82 Bevendean Avenue
Saltdean East Sussex BN2 8PE

Telephone: 0845 230 1740
Email:
thwaitesandreed@aol.com
Fax : 0845 230 1740

Date	MAINTENANCE RECORD Comments	Clockmaker
26th March 2007	Clock restored, chime and strike side autowinders fitted, night silence fitted, resynchroniser fitted, 24 hr timer fitted, remote wireless strike controller fitted, synchronous going train drive unit fitted, hammerwork restored, bells cleaned, bell wires replaced, clock horse cleaned and varnished, clock commissioned, regulated, chime and strike synchronised, and set to time.	R Riedel M Lee A Ball