INSPECTION OF THE BELLS AT ST MARY AND ST BARLOK AT NORBURY ON 8 JULY 1999

Request for inspection

Mr T Clowes, Church Warden, requested the inspection in a letter to Mr G Halls dated 28 June 1999. The inspection followed an original inspection by Maurice Starkey on 13 September 1992 and a recent visit/report by Andrew Burns on 22/23 March 1999 when some of the original recommendations were implemented.

Tower

The stone built tower is square in cross section and attached to the south side of the church. Entrance to the church is through the base of the tower from where the three bells are also rung. Access to the tower spiral staircase is from the nave.

Ground Floor Ringing Area

Figure 1 shows the layout of the ground floor ringing area where it can be seen that the three ropes fall in a near straight line at a distance of about 24ins from the west wall. Ceiling height is 228ins and there is evidence that an intermediate (ringing?) floor once existed at a height of 149ins. (If this was a ringing floor then the ceiling height would have been only 79ins which is too low for safe ringing).

Clock Chimes

There are clock hammers on all three bells and before the bells can be rung full circle these have to be lifted out of the way. (If they are not lifted clear the bells could be severely damaged during ringing). The present method of achieving this relies on pulling two "washing line" extension ropes and manually tying them to brackets, one on each side of the door. This is unsatisfactory on two counts:

- there is no notice calling for chimes to be pulled off
- the effort to pull the chimes off is more than one would expect and so there is a tendency to stop pulling after just taking up the slack or freeplay.

The chimes should be pulled off by means of two lengths of stout wire with a ring formed on each lower end. Engagement of these rings with a suitably positioned hook on each side of the door will then ensure that the chimes are not only fully disengaged but also seen to be fully disengaged. There need to be two notices calling for <u>both</u> sides to be pulled off prior to ringing.
<u>This is an urgent matter, which should be taken up with Smiths.</u>

Clock Room

Figure 2 shows the layout of the clock room. The clock room is reached via 28 steps up the spiral staircase, each step rising approximately 8ins. The hand wound Smiths clock is housed in a case on the south wall and its weights fall in the southeast corner of the

tower. Behind the clock is the only window in the clock room, measuring 41ins high X 33ins wide. Ceiling height is 109.5ins.
Access to the bell chamber is via a vertical ladder on the north wall and a 15 X 21.5ins trap door in the ceiling.

Bell Chamber

Figure 3 shows the layout of the bell chamber. Entry is gained through a trap door under the tenor bell.
The floor (and much of the bell frame) is supported on three 16 X 5.5ins oak beams running east/west which in turn rest on two 9 X 7ins beams running north/south. The bell chamber is free from birds but has obviously suffered in the past since there is nesting material particularly on the east louvre sill. There is general debris elsewhere. One of the wire netting grills over the louvre on the north side is not fixed properly.
The predominant directions for driving rain is from the south and east and there is no protection for this in the south and west louvres. Use of plastic sheeting held in place by wooden battens is recommended.

Bells

The bells had their canons removed, and were rehung on new headstocks, in the 1890s by Taylors. Bell number 2 is on the diocesan list of bells for preservation and so cannot be recast. All bells have been quarter turned and there is a clock hammer on each bell. Further details are shown in the table below.

BELL	DIA (ins)	APPROX WT	DATE	FOUNDER	INSCRIPTIONS
Treble	28.5	5-2-0	1589	Henry Oldfield	IHESVS BE OVR SPEED 1589 TF RB
Second	33.0	7-0-0	Circa 1500	Richard Mellour	Personet hec celis dulcissima vox gabrielis
Third	35.5	8-0-0	1739	John Halton	GEOR DEO IN EXCELSIS 1739

NB the hang on the treble was measured at 22ins.

Headstocks and Bearings

Each bell hangs on a wooden headstock and rotates via plate gudgeons running in plain bearings. The screw retaining the cap on the bearing to the north side of the tenor is damaged but this is no cause for concern. When swinging full circle the bell always exerts a downward force on the bearing and so the cap plays no part in locating the bell – it functions only as a means for lubrication and as a dust cover.
All bearings are dirty and so should be cleaned.

Clappers

Each bell is fitted with a wrought iron independent clapper with forked crown staple. The clapper is loose on the tenor, it should be tightened and the leather washer between the crown staple and the bell replaced.

Wheels and Pulleys

All wheels are in good condition.
The pulleys are all single and run on worn plain bearings. Replacement of these with ball bearings is strongly recommended.

Bell Ropes

The ropes are nearing the end of their life. It is recommended that they be replaced with ropes having terylene tops since these will have less stretch, reduce wear and resist the elements. Ropes made by Pritchards have been found to be satisfactory.

Bell Frame

The bell frame probably dates from at least 1739 (when the third bell was cast) however parts of it may be older.
A general arrangement drawing of the wooden frame is shown in figure 4. The bells are set in line along a north/south axis, swinging east/west. The two centre transverse frame elements are of queen post design and rest on two substantial foundation beams (16 X 7ins). The two outer transverse frame elements rest respectively on the north and south louvre sills with their top beams set into, but not attached to, the adjacent walls.

These outer transverse frame elements have a high degree of independence of movement relative to the rest of the frame since they have only a narrow footprint on the louvre sills and the load path to the foundation beams is tenuous. The lack of rigidity means that when the bells are rung full circle, movement of the outer frame elements is controlled (to about 2mm) by impact with the tower stonework. The structural integrity of the tower can be degraded by exposure to hammer blows of this type although there is no evidence that damage has occurred to date. There have been attempts in the past to improve the load path by use of steel straps at three of the top corners and by the use of flat steel plates between the foundation beams and short 6ins beams which span the base of pits 1 and 3. It is considered safe to continue ringing, but it is recommended that further thought should be directed at determining ways to improve the frame rigidity.

Each of the transverse top beams has been extensively relieved to allow clearance for the bells to swing. Theoretically the treble and tenor bells would be expected to require only slight relief of their frames since their pit widths are roughly equal to the respective bell diameters. However the poor load path to the foundation beams of the outer transverse frame members means that the treble and tenor bells yaw when rung full circle. This

requires greater than expected relief of the frame. When the treble was test rung full circle it was found to be hitting the frame hard enough to lift its bearing on the north side! Remedial work with a hammer and chisel restored adequate clearance. (It would appear that prior to 1890 the bells might have been hung at a larger radius since there are also clearance slots at a radius beyond the current bell swing path. Reducing the hang of the bells would have eased an even worse yaw problem).

A severe attack of rot is evident in the bottom beam of the north transverse frame. Being in the centre of the beam this is not critical to ringing of the bells but does further reduce the stiffness of the frame. It should be treated, although ideally the beam should be replaced. The north louvre should be made weather proof to prevent ingress of rain on to the frame. There is also woodworm in the wooden inserts under each of the bearings which should be treated.

Summary

1) The clock chime withdrawal mechanism is far from foolproof. Failure to fully withdraw the clock hammers during ringing may severely damage the bells.
2) The treble was found to be hitting the frame when rung full circle. This was rectified during the inspection by hand chiselling an increased frame clearance.
3) Damage to the bearing cap on the north side of the tenor bell is not detrimental to ringing the tenor – the load on the bearing is always downwards and so the cap serves only as a means to lubricate and protect the bearing.
4) The design of the frame is structurally compromised in that the outer frames have a degree of structural independence from the main frame structure resulting in:
    3.1) movement of the outer frames being limited only by impact with the tower structure,
    3.2) yaw of the treble and tenor bells when rung full circle.

    These problems have always existed and are not considered sufficiently serious to prevent continued ringing, but attention in the near future is recommended.
5) There is rot and woodworm in the frame that requires attention.
6) There is a considerable amount of dirt and debris in the narrow spaces between the tower and frame and on the louvre sills – this should be removed.
7) All three bells may now be safely rung full circle (with clock hammers fully withdrawn).

Recommended Actions

1) I**MPORTANT** – make the clock chime pull-off less prone to misuse.
2) Clean out debris on the bell chamber floor, the louvre sills, and the narrow space between the bell frame and wall.
3) Paint the frame with Cuprinol.
4) Fit ball bearings to pulleys.
5) Tighten clapper in the tenor and replace the thick leather washer.
6) Explore ways to stiffen the frame – the Association is willing to do this at its own expense once it is demonstrated that all the other necessary work has been carried out and regular ringing established.
7) Fix the wire netting grill on the north side louvre.
8) Wire brush and paint all ironwork with two coats of Hammerite.
9) Fit new bell ropes with prestretched polypropylene.
10) Clean out the headstock bearings.

A faculty is not needed for any of the above.
Advice is given in good faith, no liability accepted.

Report prepared by M D Banks …….

Approved by G A Halls
Diocesan Bell Advisor …….

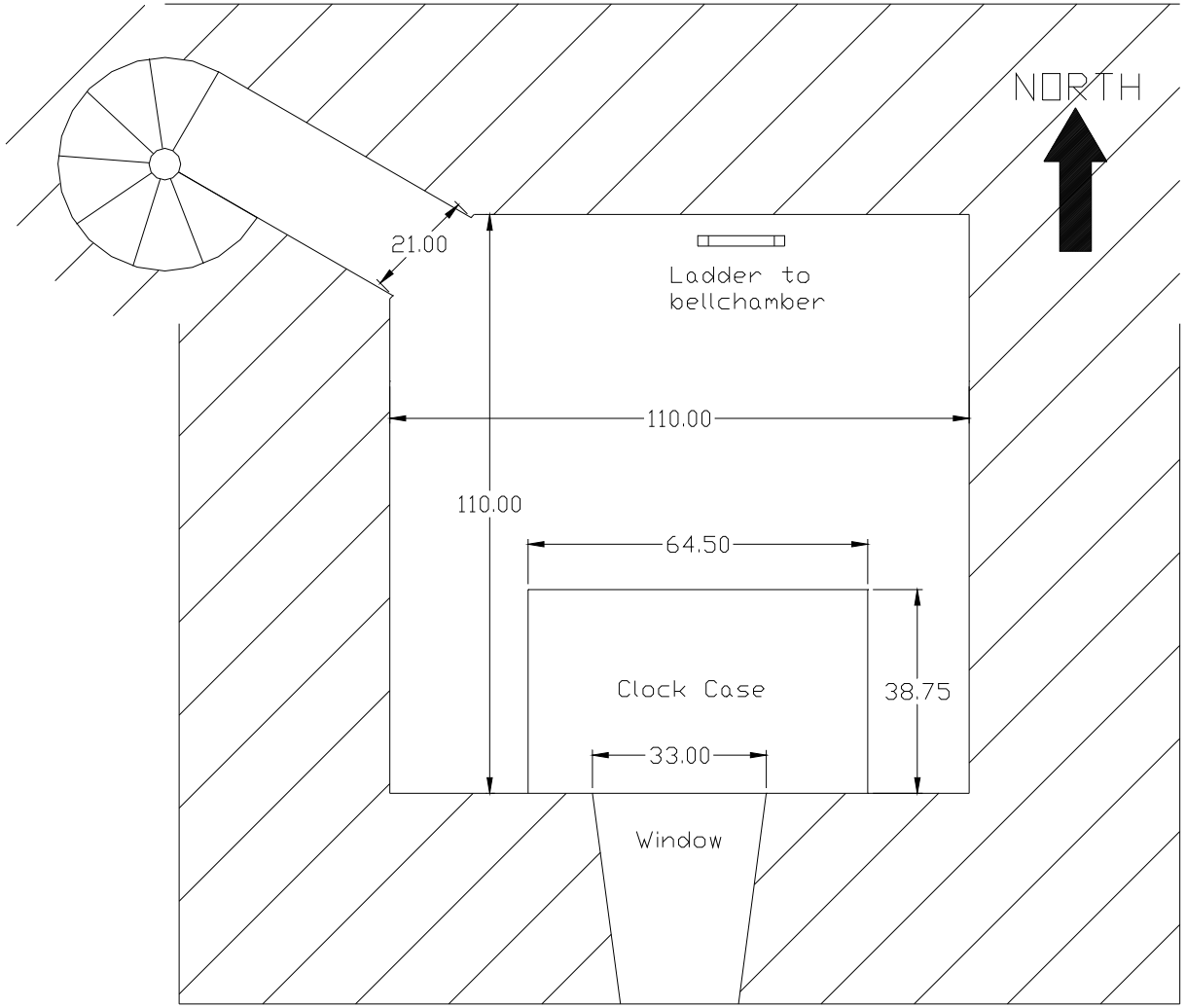

Fig 2 CLOCKROOM LAYOUT

NOTES

1) Height to ceiling - 109.5ins
2) Clockcase height - 83ins

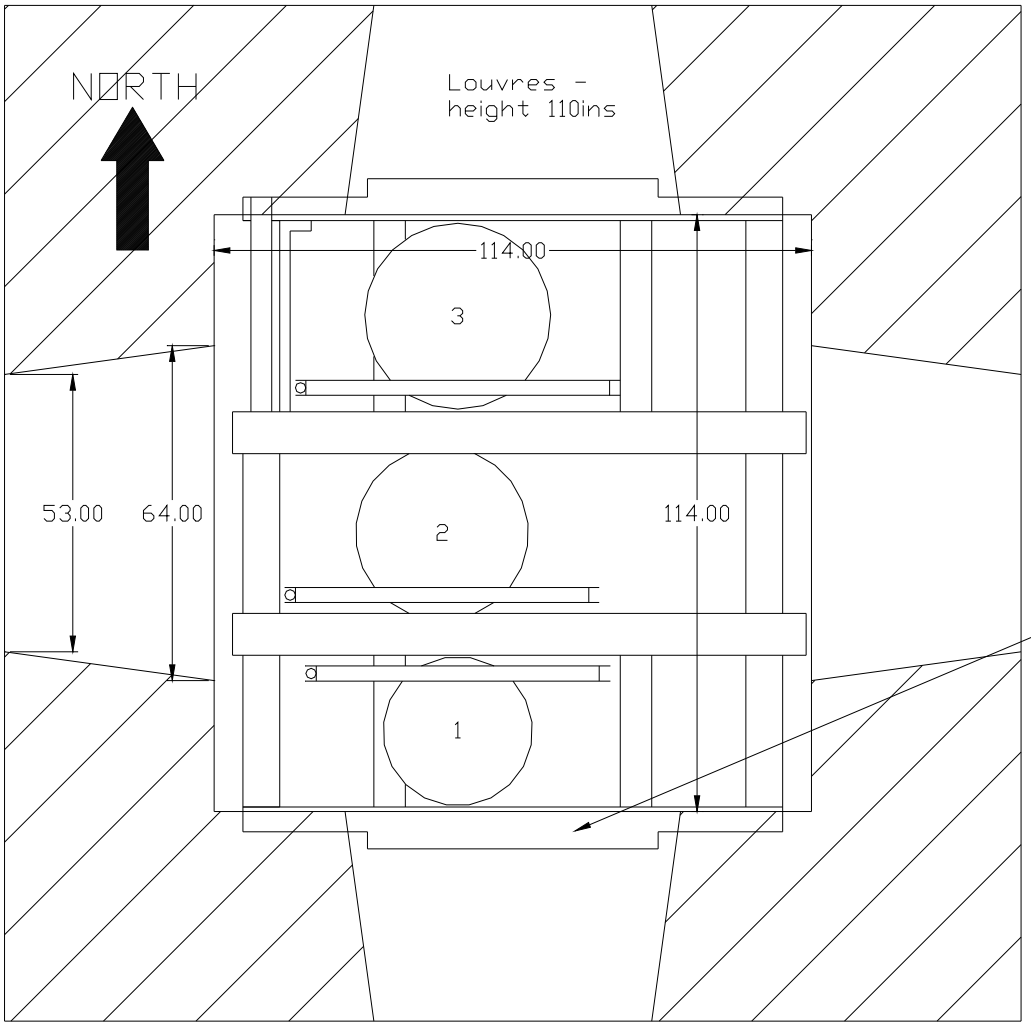

Fig 3 BELL CHAMBER LAYOUT

NOTES

1) Access is via 15X21.5ins trap door under the tenor
2) Frame and belfry floor supported on 3 oak beams (16X5.5ins) running E/W which rest on 2 beams (9X7ins) running N/S.

End frames rest on louvre sills with upper cross beam recessed into wall. Inefficient load path to grillage beams results in movement at cross beam ends limited to 2mm by impact with the tower.

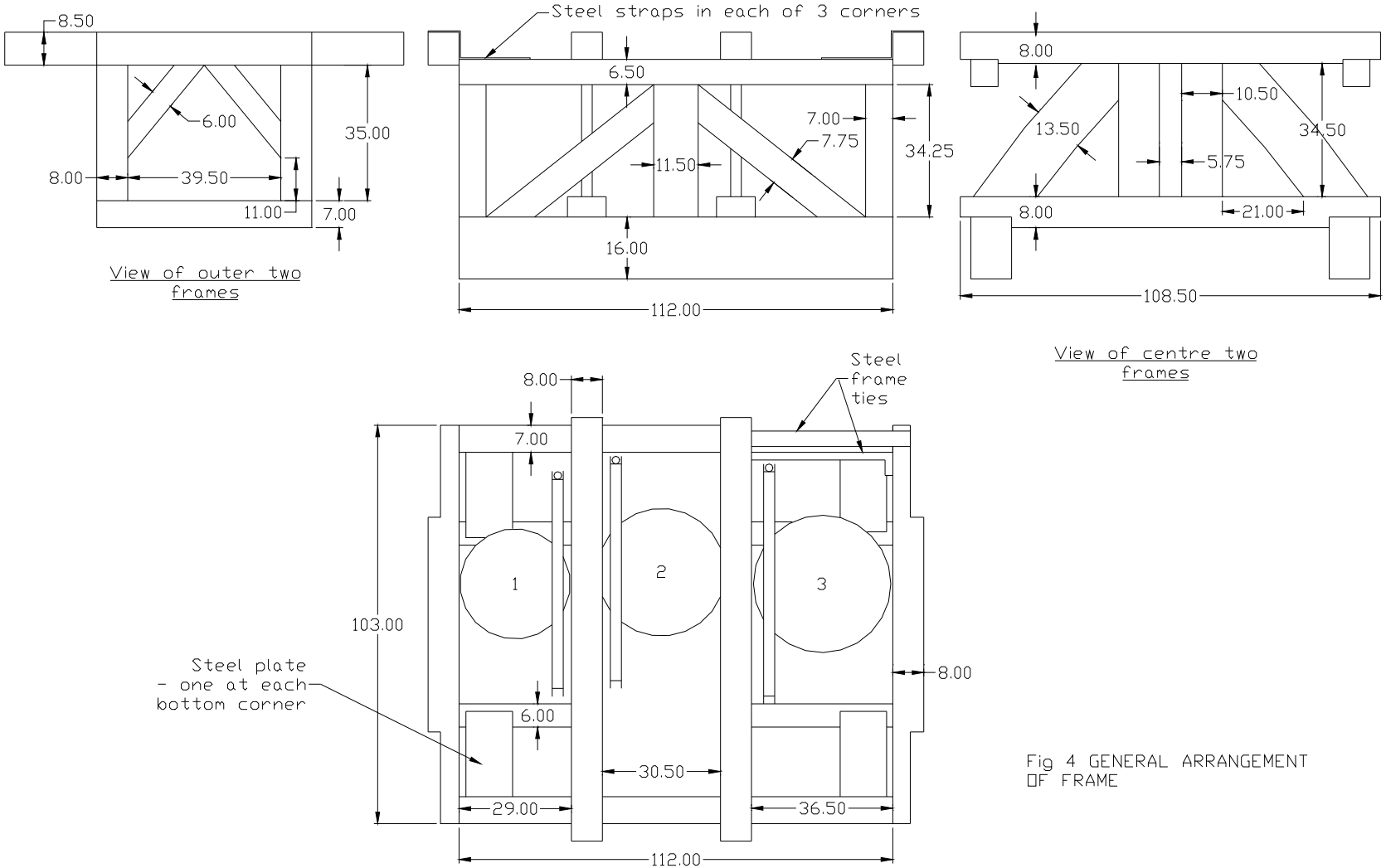

Fig 4 GENERAL ARRANGEMENT OF FRAME

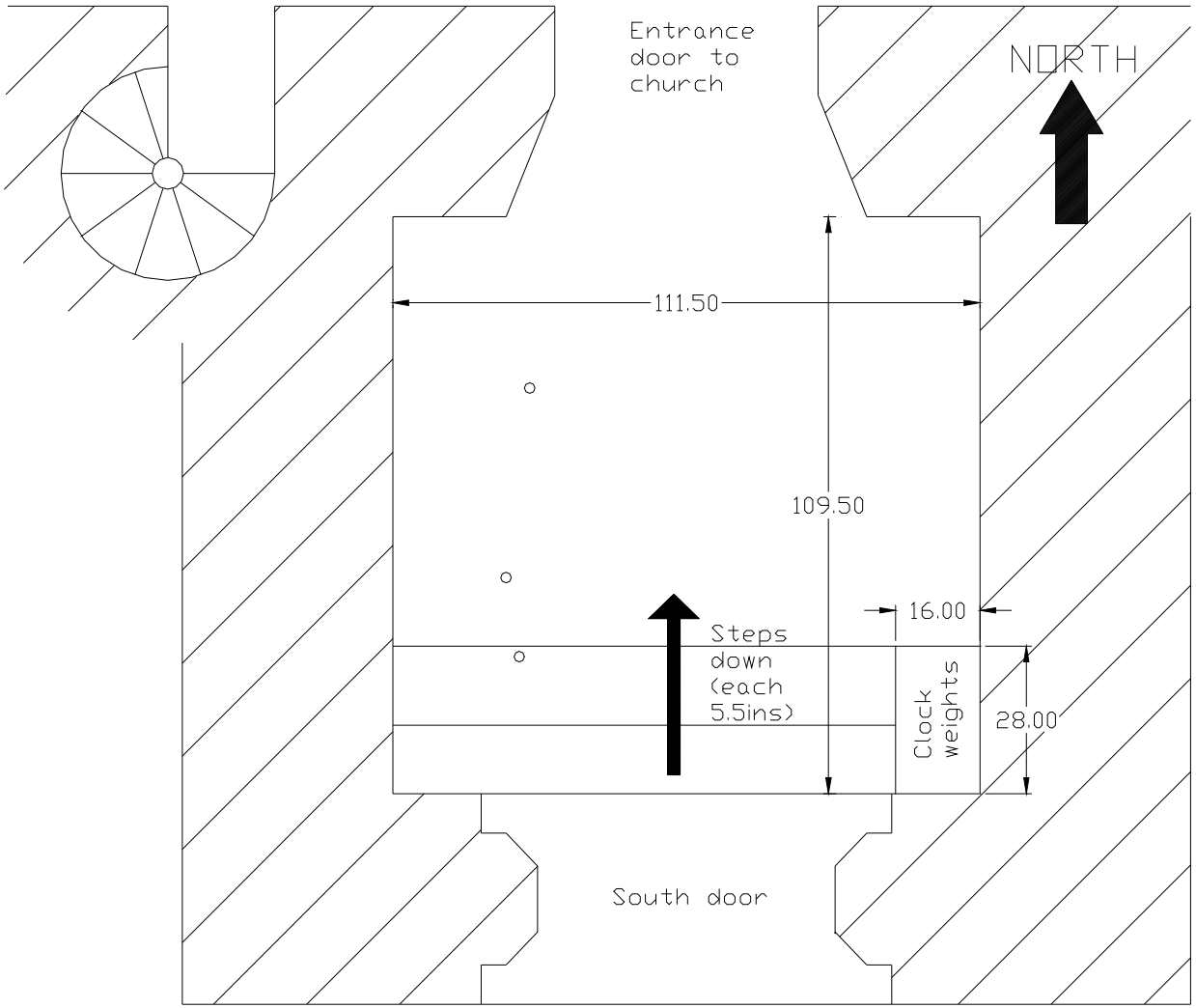

Fig 1 GROUND FLOOR LAYOUT

NOTES

1) Ground floor ring - rope positions shown by circles
2) Ceiling height - 228ins
3) There is evidence of an old floor (now removed) at a height of 149ins.