



## CHURCH BELLS

A ring of bells will typically involve 1 to 5 tons of moving metal and so should be considered as heavy machinery. Full-circle ringing puts the greatest demands on the bellframe and tower. To carry the large forces created, the bellframe should be as stiff as possible and should be rigidly attached to the tower, otherwise the bells will be difficult to control.

### Problem Areas

In general, neglect does far more damage than regular use. Attention to the following will do much to keep the bell installation in good order:

- ❖ easy safe access
- ❖ ample lighting (2 x 5' fluorescents as a minimum, more in a large belfry)
- ❖ attention to cleanliness
- ❖ exclusion of rain - immediate repair of roof leaks or broken louvres
- ❖ exclusion of birds - all openings fitted with galvanised heavy wire mesh.

Accumulations of dirt and bird droppings, especially when damp, encourage decay of timber and corrosion of ironwork. The main supporting beams are particularly susceptible to this; the ends of timber beams built into damp masonry are prone to rot. Bolts may be fractured by rust build-up and lamination of steel beams; such build-up underneath cast iron frame members can break off their flanges.

With bells hung outside, corrosion of ironwork is worsened and timber headstocks deteriorate more rapidly. Access for maintenance is often awkward. Heavily galvanised or stainless steel headstocks and fittings should be considered where regular painting would be impractical.

Bells may be cracked by:

- ❖ Cast-in crown staples. The iron corrodes and expands, putting the crown of the bell in tension, and a crack then starts. Such staples should always be drilled out as part of any major restoration scheme.
- ❖ Clocking - sounding the bell by a rope looped around the flight of the clapper. This should be stopped. The bellhangers now offer trigger-action hammers, for stationary chiming, which prevent the hammer being held in contact with the bell after it has sounded.
- ❖ Deep clapper indentations. Prolonged use results in wear of the soundbow. When the indents reach a depth of 15% of the unworn thickness, the bell should be quarter turned to present a fresh surface to the clapper.
- ❖ Collision between a swinging bell and clock hammers or chiming hammers. Where swinging bells are fitted with hammers, there should be a prominent notice indicating exactly how the hammers should be disengaged before the bell can be swung safely. This is especially important where "lay people", unfamiliar with bells, may swing a single bell on which a clock also strikes or which is fitted with an Ellacombe hammer.

## Routine Maintenance

Single bells and chimes tend to be neglected. Whilst their maintenance requirements are small, they are not zero. Cleaning, keeping nuts tight, lubrication of the chiming mechanism and painting of ironwork are necessary tasks.

Rings of bells require more attention; faults are less likely to be overlooked where there is an active band of ringers and a good steeplekeeper. Much can be done, beyond the basics of changing ropes and repairing broken stays, to prolong the life of a bell installation. Safety should be borne in mind at all times, especially if access is awkward, and no work should be carried out when bells are raised. The Ecclesiastical Insurance Office guidelines specify that the bells should be left down during the working week so that workmen, and others who may have legitimate access to the tower, are not put at risk. This is also good practice for keeping the installation in good order. It is a disincentive to maintenance if all the bells have first to be lowered. Raised bells tend to collect moisture: this causes deterioration of the fibre washer fitted between clapper and bell, loosening of the clapper, and corrosion of the staple bolt.

Main bell bearings - Plain bearings: Apply oil little and often - a few drops every few weeks for bells hung for full-circle ringing. Castor oil (veterinary grade adequate and cheaper) is ideal, though mineral oil is better than none. Only if inaccessible should light grease be used, for example on single bells in turrets. Examine gudgeons for wear or scoring - they should present a highly polished appearance. Ensure that bearing covers are in place to exclude dirt; clean out bearings every few years.

Main bell bearings - Ball bearings: These should **not** have grease added; the grease is only to prevent the balls rusting; over-greasing bursts the seals. The housings should be about  $\frac{3}{4}$  full; completely filled housings make bells harder work through churning. The bellfounders now fit plugs (to discourage grease addition) rather than grease nipples or grease caps as formerly used. Only at long intervals (say 20 years) should the housings be opened up, cleaned out and the grease renewed. This is a specialist task requiring appropriate grease (available from the bellfounders) and great care is needed to prevent the ingress of dirt.

Ground pulleys, if sticking or worn, are frequently the cause of bells going badly. If there are several pulleys in the rope path, they will all add some frictional loss. Check that all pulleys rotate freely and that they have not acquired flat spots or deep grooves. Older pulleys are fitted with greasers: these should be turned every few months and refilled with light grease when necessary. Modern pulleys have "sealed for life" ball bearings and plastic pulley wheels. These often show wear grooves but they can be replaced easily and cheaply.

Bellropes can be repaired by splicing. Long splices should be used where the splice would pass over pulleys. Pre-stretched polyester (Marlow 10 mm) is suitable for replacement top ends and should be attached with a short splice close to the sally. Non-pre-stretched polyester or nylon is completely unsuitable, being too elastic.

Clapper pivots require periodic attention. The old type of suspension incorporates a leather lining or baldrick. This wears and allows the clapper to strike too low on the bell and gives excessive sideways movement. The clapper should strike at the middle of the soundbow, the thickest part of the bell. Worn baldricks should be replaced (typically every 5-10 years).

More recent clappers have lignum vitae or other materials for the bearing; their steel pivot pins have greasers which lubricate the bearing through a central drilling. The grease caps should be turned every few months and replenished as necessary. The most recent types have a tufnol bearing running dry on a stainless steel pin. Although these are claimed to need no maintenance, a few drops of oil every 6 months will prevent squeaking and may prolong their life. Nevertheless, rebushing of the bearings must be expected after about 25 years of regular use. With all clappers having an independent crown staple, the nuts must be kept tight otherwise the clapper will ride up and down in the bell (often damaging the thread) and it will eventually fall out. Prior to this the bell may become erratically odd struck.

Wooden sliders and runner boards should not be greased. Graphite or furniture polish may be used to ease the action. Remove any grease or oil which may have dripped from the bearings - with grit this makes a good abrasive. Grooves may be sanded out if the wear is not too severe. Hastings pattern iron quadrants should be lightly oiled to prevent rusting. Replacement stays should only be made from ash (preferably green); Hastings stay dimensions are very critical.

There should be no relative movement between the bellframe and the tower structure. On a timber frame this should be achieved by long bolts through the frame secured to the supporting beams beneath. The through bolts should be tightened in dry weather (when the wood shrinks). Wedges must not be fitted between the ends of the frame and the walls. Even if initially tight, movement gradually develops and turns the frame into a battering ram. Steel beams supporting the bellframe are normally built into the masonry and grouted in place. If these have become loose, professional advice should be sought without delay.

Badly going bells may indicate loose fittings (such as bearings, wheels or gudgeons), warped wheels or frame movement. Check the tightness of all bolts six months or a year after new work (when wood may have shrunk or the high spots worn off metal parts and galvanising) and every few years thereafter. If tightening any obviously loose nuts does not immediately solve the problem (and cure any accompanying thumping noises) expert advice should be sought. **It is extremely dangerous to observe bells in motion at close quarters** - this should be left to the professionals. There are often very small clearances between bells and frame - fingers may be severed: impact with a moving bell (or even a stay) would result in very serious injuries.

Painting of a metal frame should be carried out every 15-20 years to keep it in excellent order; if left for 50 years the job is very much harder. If the ringers are willing to carry out this work they should be given every encouragement, by way of supply of materials etc, as they will save the parish a large expense. Care must of course be taken to avoid inhaling dust, particularly from old lead based paints. The traditional method is to prepare the frame by wire brushing followed by red oxide and undercoats and gloss coats of oil based paint. Galvafruid, a zinc rich primer, may be used on bare metal when all rust has been removed but it must be covered with an acrylic based paint before using the usual alkyd based ones (otherwise the zinc causes the paint to peel). Hammerite, Rust Oleum or similar "one-coat" paints may be used with less surface preparation, however loose rust must be removed for a satisfactory result and two coats are generally necessary. Galvanised steel frames are not permanently immune from rust in a damp or salty atmosphere. Zinc/aluminium touch-up paint should be used where the galvanising has been damaged. For maximum life, these

frames should be painted after the galvanising has dulled, but the first coat should be with an acrylic based paint. In all cases, a light coloured top coat will make belfry maintenance much easier.

### **Major Work to Change Ringing Bells**

Major work, such as rehangng with new fittings, is to be expected every 50-100 years. Regular maintenance will extend the interval. If there is any noticeable tower movement, especially in brick towers, this may be worsened by rehangng unless the hanging parameters are very carefully chosen to avoid exciting a natural frequency. Prior specialist advice should be sought from the Central Council Towers and Belfries Committee in such cases to avoid a result where, after much expense, the bells still go badly, possibly even worse than before.

When major work is contemplated, this is a time to consider whether improvements in internal and external acoustics can be made. For example, a bell hung immediately behind the louvres will tend to "shout" above the others. A more even sound will result if the bells are a little below the louvres; also, if there is noticeable tower movement, then lower positioning will have a beneficial effect.

The appropriateness of all schemes for restoration of derelict bells, augmentation, recasting or welding should be very carefully considered and the DAC advisers should be consulted via Diocesan Church House at an early stage. Amongst the factors to be taken into account are: the size and strength of the tower; the age, weight and quality of the existing bells; and the financial and human resources of the parish. Bells without ringers are little use and are likely to be neglected, but a good ring of bells with an active band of ringers is a parish asset.

Reordering schemes for the internal layout of a church may impact on the tower and bells. For example, there may be pressure to annexe part of the ringing room for storage or to use it as a crèche. There may be proposals to house telecom equipment in the tower or to form a kitchen area at ground level and move the ringers to a gallery above. All aspects of such schemes should be very thoroughly examined before detailed plans are drawn up. It is very easy to wreck a good bell installation. A gallery may improve the ringing conditions where there is a very long rope draught, but restricted height or the absence of a sound-deadening chamber between bells and ringers can be very detrimental. Any scheme should include trapdoors in the floors large enough to allow bell removal and should not block the approach beneath. Proper heating and ventilation of the ringing room should be considered and it is also an opportunity to fit emergency lighting. Telecom installers may expect access to their equipment at any time: this poses very serious safety questions if entry to the bellchamber is necessary to reach the equipment. **Access must not be permitted when the bells are raised.**

### **Information, Advice and Grants**

Information: Central Council of Church Bell Ringers publications ("Schedule of Regular Maintenance"; "Towers and Bells Handbook". See the CC website for ordering details - [www.cccbr.org.uk](http://www.cccbr.org.uk)); George Elphick's book ("Sussex Bells and Belfries").

Advice: DAC; Sussex Churches Bell Restoration Fund; Central Council Towers and Belfries Committee; Bellhangers (who will carry out an inspection for a nominal charge or free).

Grants for Major Work: Sussex Churches Bell Restoration Fund (for existing bells); Council for the Care of Churches (where bells old/listed); The Manifold Trust (where bells hung for change ringing have been unringable for 30 years). Applications must be made in advance of any work. Evidence of substantial local support is needed and is viewed favourably. This may take the form of promises of local assistance to the bellhangers as well as fundraising.