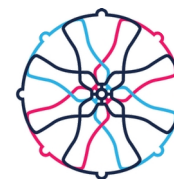




Stewardship & Management Workgroup

of The Central Council of Church Bell Ringers



THE CENTRAL COUNCIL OF CHURCH
BELL RINGERS

Common Problems with Bells

A Guide to diagnosing most Problems found in Towers and how to tackle them

Introduction

This document is designed to help ringers diagnose the cause of most problems that they might find with their bells and to indicate how they may be solved. This may be by getting out some spanners or by calling a bell hanger for advice.

The problems are grouped into the following categories:

Category	Section	Page
Striking	1 - 3	3
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Stays and setting	13 -14	15
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Many of the problems can be found causing symptoms in various categories. In these cases information is often repeated for ease of use but in some cases the reader will be referred to another problem and cause for further information, e.g. 'see 9B'

The central council's stewardship and management workgroup (SMWG) can offer free, impartial, expert advice on all matters relating to bell maintenance, acoustics and engineering. Email sminf@cccbr.org.uk for advice

The difficulty and urgency of each diagnosis is indicated by the codes detailed on the next page, as are the primary sources of further information and a guide to the permissions required before work can be carried out (based upon Church of England faculty law).

Key to Codes

C Codes People to Contact for Advice

- C1 CCCBR SMWG. (email sminf@cccbr.org.uk)
- C2 Professional bell hanger
- C3 Acoustic engineer
- C4 Clock engineer

D Codes Levels of Difficulty

- D1 Can usually be done by a novice steeple keeper with the instructions provided or other reliable reference.
- D2 Can usually be done by a novice steeple keeper with expert advice required for the specific situation.
- D3 Can usually be done by or with an experienced steeple keeper with the instructions provided or other reference.
- D4 Can usually be done by or with an experienced steeple keeper with expert advice required for the specific situation.
- D5 Can only be done by an expert or professional.

P Codes Levels of Permission

- P1 Routine maintenance, usually no special permissions required. Refer to your local regulations.
- P2 Heavy maintenance, permissions are usually required. Refer to your local regulations.
- P3 Alteration or overhaul work, permissions almost always required. Refer to your local regulations.

U Codes Levels of Urgency

- U1 May be done when convenient.
- U2 Should be done as soon as possible.
- U3 Must be done before the bell or bells are used again.
- U4 Must be done IMMEDIATELY, bells absolutely to NOT be used.

In some cases only C codes are provided. This is for situations where expert examination of the specific situation is the only option and D, P and U codes are quite irrelevant.

Problems

Symptom	Possible cause	Test	Solution
1 Bell is slow at one stroke and quick at the other	a Clapper is off centre	Take the weight of the rope off the wheel so the bell hangs free and measure from strike point on bell to strike point of clapper on each side of the bell.	If the clapper is off centre, adjust it. Refer to the manual of belfry maintenance or contact SMWG or a bell hanger for advice. C1. C2. D1. P1. U1.
2 Bell is slow on both strokes	a Stiff clapper bearing	Hold the bell still and swing the clapper. If it is stiff or stops swinging very quickly (e.g. within 5 swings) the bearing is stiff.	Lubricate bearing where suitable. If lubricating does not rectify the problem contact a bell hanger. C2. D1. P1. U1.
	b Fast clapper	Measure small angle swing period of bell and of clapper (with bell held still). If the clapper period is less than that of the bell, the clapper dynamics/geometry need altering.	Contact SMWG or a bell hanger. C1. C2. D5. P3. U1.
3 Irregular striking	a Stiff clapper bearing	Hold the bell still and swing the clapper. If it is stiff or stops swinging very quickly (e.g. within 5 swings) contact your bell hanger.	Lubricate bearing where suitable. If lubricating does not rectify the problem contact a bell hanger. C2. D1. P1. U1.
	b Loose clapper	Is the clapper staple loose? The staple nuts may still be locked together but the fibre or leather washer in the crown of the bell may be worn out. If the staple nuts are loose the clapper may be swinging further out than intended and touching the frame, wall or slider in passing.	Replace fibre/leather washer and/or tighten staple nuts. Refer to 1a to ensure even striking. C1. C2. D1. P1. U1.

Symptom	Possible cause	Test	Solution
3 Irregular striking (continued)	c Badly worn clapper bearing	With the bell down, gently push the clapper sideways, less than 1/2" movement is OK. More than 1/2" means that the bearing is worn and needs attention. Lift clapper vertically, if it moves relative to the staple the bearing is worn and needs attention. Check baldric is not worn out (where present).	Clapper bearing requires re-bushing or baldric renewing. C1. C2. D5. P1. U2.
4 Difficult or unruly rope	a Rope is drawn badly	If the rope is drawn watch it in action to see if it snags, flaps or drags anywhere.	Fit slap board, tube or pulleys to suit the situation. Tubes should be perforated at regular intervals to avoid problem 15. C1. C2. D4. D5. P2. U1.
	b Incorrect distance between rope guides	If the distance between guides (including floors) is wrong the rope can flap at a particular frequency and cause handling difficulties.	Raise or lower an existing rope guide to alter rope harmonics. Fit slap board, tube (see section 15) or pulleys to suit the situation. C1. C2. D4. D5. P2. U1.
	c Splice in rope snagging	If the rope has been spliced watch for this catching on a boss or other obstacle.	Replace the rope, re-splice if the original is poorly done or smooth the path past the obstacle. C1. C2. D2. P1. U1.
5 Rope slips wheel	a Wheel is not running true	Watch the edge of the wheel while the bell is rung. If it moves sideways as the bell turns the wheel is not flat or not square on the headstock. Wheel twist may indicate loose shrouding or loose wheel bolts.	Tighten wheel bolts, tighten any loose screws in shrouding. Insert shims between wheel and headstock lugs/angle blocks/angle irons to straighten wheel. Adjust wheel stays. C1. C2. D3. P1. U1. U2.

Symptom	Possible cause	Test	Solution
5 Rope slips wheel (continued)	b Obstruction in wheel groove	Check for splinters, screws or other obstructions in the groove. Also make sure that the end of the tied rope is not long or loose enough to swing over the groove and obstruct it.	Remove obstruction. Sand or file away rough timber or screw tips showing through. C1. C2. D1. P1. U1. U2.
	c Rope is drawn under (or away from) the wheel	Watch the rope while the bell is rung. Does it float a long way off the wheel as the back stroke falls? Does the rope droop over the pulleys?	A slap board may help guide the rope through the pulley box. C1. C2. D2. P1. U1. U2.
	d Pulley offset from wheel	Is the pulley on the same plane as the wheel or is the rope pulling towards one side of the wheel?	It may be possible to fit spacers/shims to move the wheel or pulley box into line. Re-fit wheel mountings. Move the pulley and ceiling boss into line. C1. C2. D3. D4. P2. U1. U2.
	e Excess rope drag	Is the sally slightly tight in any rope bosses or in the pulley box? Rope drag will slow the fall of the lower rope and may cause it to slip wheel.	Replace or modify the pulley box, rope boss or rope tube. C1. C2. D3. P1. U1. U2.
6 One bell heavy going for its weight	a Stiff pulley	Check that the pulleys spin freely and are round! Wooden pulleys may be warped or the plain bearing may be worn out, this will usually cause a loud rattle when spun. Ball race bearings may be dirty or worn.	If the pulley is not round, replace it. Plane the pulley flat if warped. Replace pulley or fit bearings if wooden bearing is worn out. Replace bearings. C1. C2. D3. P1. U1.

Symptom	Possible cause	Test	Solution
6 One bell heavy going for its weight (continued)	b Moving parts touching the frame	Inspect the frame for clean scuff marks where the lip of the bell, the end of the stay or other parts may touch the frame in passing. Tie the bell and listen while it is rung for rubbing or scuffing noises. If the staple nuts are loose the clapper may be swinging further out than intended and touching the frame, wall or slider in passing.	Stay may be angled outwards or too long. Fix by straightening or trimming but only if it will not impare the function of the stay. DO NOT cut away the frame to make space. Identify what is rubbing or scuffing and then contact SMWG or a bell hanger for advice. C1. C2. D1-D5. P1. P2. U3.
	c Stiff, worn or pinched bearings	Tie the bell and watch it being rung. If the bearings rumble they may be worn out. Loud rumbling may indicate complete failure of the bearing even if the bell still rings fairly well. With wooden frames check that the bearing housing has not tilted over to touch the shoulder of the gudgeon.	Contact SMWG or a bell hanger in ALL cases for advice. C1. C2. D4. D5. P2. P3. U2.
	d Broken gudgeon	Inspect the gudgeons for misalignment or signs of movement (cracked paint, scuff marks, etc.). Tie the bell and watch while it is swung slightly for signs of movement and listen for thumping noises.	Contact SMWG or a bell hanger immediately and in ALL cases for advice. C1. C2. D5. P2. P3. U4.
	e Stiff slider mechanism	Check that slider or dinger moves freely. With Hastings stays look for signs of wear on the sides of the dinger and top edges of the quadrant, the stay may be a tiny bit too long, causing binding. Slider may be warped and thus tight in the runner board or on its pivot.	Hastings stays; May need to be re-aligned to prevent rubbing on the side of the quadrant. Shorten the stay very slightly to prevent rubbing on the top of the quadrant. Tight sliders; sand smooth and wax the runner board where the slider rests if it is rough. Ease the pivot hole slightly if it is tight. Other stay mechanisms; contact SMWG or a bell hanger for advice. C1. C2. D2. P1. U1.

Symptom	Possible cause	Test	Solution
6 One bell heavy going for its weight (continued)	f Wheel is too small for bell weight	Is the wheel size limited by space constraints? Do the wheels follow a 'nice' graduation in diameter?	Contact SMWG or a bell hanger for advice. C1. C2. D5. P3. U1.
	g Bell loose on headstock	Check if bell can move relative to headstock. This may indicate tensile failure of hanging straps on cannon mounted bells or a weakened timber headstock. Check crown bolts/cannon straps are tight. Timber headstocks may shrink in prolonged dry weather causing bolts to become loose.	Contact SMWG or a bell hanger immediately and in ALL cases for advice. C1. C2. D4. D5. P1-P3. U4.
	h Debris in bell pit	Check that pit is free of debris left by workmen, birds or collapse of structures above or adjacent to frame (e.g. netting fallen from behind louvres).	If debris is from birds, clear it with care and appropriate PPE. Take appropriate steps to improve bird exclusion measures as soon as possible. If debris is left by other tower users, put procedures in place to ensure that tower use/access is properly controlled. If debris is from collapse, inform relevant people and inspect for other potential collapses. Check all fittings for damage and check all other pits for debris.
7 Bells are hard to ring as a group	a Several bells are hard going	See 6a-6h and check each bell as described.	

Symptom	Possible cause	Test	Solution
7 Bells are hard to ring as a group (continued)	b Frame movement	<p>With all other bells lowered, ring various bells individually (e.g. tenor, furthest from centre of frame, heaviest on upper level). If the ropes of the bells which are down move there is probably some movement in either frame or tower.</p> <p>With wooden frames check that the tie bolts have been kept tight, they should be checked every 3 months.</p> <p>Watch for relative movement between wall and frame/foundation beams.</p> <p>Two bells swinging in parallel (either side by side or mouth to mouth) can affect each other.</p> <p>Watch for localised frame movement e.g. one frame side dipping.</p>	<p>Tighten loose tie rods in wooden frames in correct sequence. C1. C2. D2. P1. U1.</p> <p>Contact SMWG or a bell hanger for advice in ALL other cases. C1. C2. D5. P2. P3. U2-U4.</p>
	c Tower movement	<p>Do the pictures on the wall swing when the bells are rung?</p> <p>Can you feel movement when you lean against the wall in the ringing room or bell chamber with your eyes shut (if safe!).</p> <p>Try ringing rounds faster or slower and judge if the difficulties increase or decrease, this may indicate tower resonance being excited.</p>	<p>Contact SMWG or a bell hanger for advice. C1. C2.</p>
	d Bell loose on headstock	<p>Check if bell can move relative to headstock. This may indicate tensile failure of hanging straps on cannon mounted bells or a weakened timber headstock.</p> <p>Check crown bolts/cannon straps are tight. Timber headstocks may shrink in prolonged dry weather causing bolts to become loose.</p>	<p>Contact SMWG or a bell hanger immediately and in ALL cases for advice. C1. C2. D4. D5. P1-P3. U4.</p>

Symptom	Possible cause	Test	Solution
<p>8 Bell sometimes pulls and sometimes drops</p>	<p>a Stretchy rope</p>	<p>Bell will pull when near the balance. Check if it is the tail end stretching or the top rope (where synthetic top ropes are present).</p>	<p>Hang weights on the rope (tail end stretch or natural fibre ropes only) between ringing sessions to take the stretch out until problem is solved (as in a newly fitted rope) or a replacement can be fitted. C1. C2. D1. P1. U1.</p> <p>With synthetic top rope, weights will make no difference and the rope should be replaced.</p> <p>If other considerations allow, ropes should be left hanging down with a ringers knot, not on a spider or hooks; the weight of the tail end is often enough to noticeably reduce the stretch in a rope.</p>
	<p>b Tower movement</p>	<p>Do the pictures on the wall swing when the bells are rung? Can you feel movement when you lean against the wall in the ringing room or bell chamber with your eyes shut (if safe!). Try ringing rounds faster or slower and judge if the difficulties increase or decrease, this may indicate tower resonance being excited.</p>	<p>Contact SMWG or a bell hanger for advice. C1. C2.</p>

Symptom	Possible cause	Test	Solution
8 Bell sometimes pulls and sometimes drops (continued)	c Frame movement	<p>With all other bells lowered, ring various bells individually (e.g. tenor, furthest from centre of frame, heaviest on upper level). If the ropes of the bells which are down move there is probably some movement in either frame or tower.</p> <p>With wooden frames check that the tie bolts have been kept tight, they should be checked every 3 months.</p> <p>Watch for relative movement between wall and frame/foundation beams.</p> <p>Two bells swinging in parallel (either side by side or mouth to mouth) can affect each other.</p> <p>Watch for localised frame movement e.g. one frame side dipping.</p>	Tighten loose tie rods in wooden frames in correct sequence. C1. C2. D2. P1. U1.
			Contact SMWG or a bell hanger for advice in ALL other cases. C1. C2. D5. P2. P3. U2-U4.
9 Thumping or rattling every time bell is rung	a Loose clapper	<p>Is the clapper staple loose? The staple nuts may still be locked together but the fibre or leather washer in the crown of the bell may be worn out.</p> <p>If the staple nuts are loose the clapper may be swinging further out than intended and touching the frame, wall or slider in passing.</p>	Replace fibre/leather washer and/or tighten staple nuts. Refer to 1a to ensure even striking. C1. C2. D1. P1. U1.
	b Moving parts touching the frame	<p>Inspect the frame for clean scuff marks where the lip of the bell, the end of the stay or other parts may touch the frame in passing.</p> <p>Tie the bell and listen while it is rung for rubbing or scuffing noises.</p> <p>If the staple nuts are loose the clapper may be swinging further out than intended and touching the frame, wall or slider in passing.</p>	Stay may be angled outwards or too long. Fix by straightening or trimming but only if it will not impare the function of the stay. DO NOT cut away the frame to make space. Identify what is rubbing or scuffing and then contact SMWG or a bell hanger for advice. C1. C2. D1-D5. P1. P2. U3.

Symptom	Possible cause	Test	Solution
9 Thumping or rattling every time bell is rung (continued)	c Bell, clapper, wheel spokes or stay touching clock/Ellacombe hammers or wires	<p>Look for scuff marks on stay, wheel spokes or excess top rope (wrapped around top spokes), these may indicate clock hammers not pulled off far enough.</p> <p>Look for scuff marks on clock hammer face or Ellacombe hammer ball or tail. Look for chips in the lip of the bell where Ellacombe hammers are present.</p> <p>Tie the bell and watch while it is rung up for impact with clock/Ellacombe hammers or wires.</p>	Contact SMWG or a bell hanger for advice. C1. C2. C4. D5. P1. U3.
	d Broken gudgeon	<p>Inspect the gudgeons for misalignment or signs of movement (cracked paint, scuff marks etc.).</p> <p>Tie the bell and watch while it is swung slightly for signs of movement and listen for thumping noises.</p>	Contact SMWG or a bell hanger immediately and in ALL cases for advice. C1. C2. D5. P2. P3. U4.
	e Loose bearing housings	<p>Watch the bearing housings for signs of movement while bell is slowly rung up.</p> <p>Check locating blocks or wedges are present and that bolts are tight.</p>	Replace locating blocks or wedges. Tighten housing bolts. C1. C2. D2. P1. U3.
	f Plain bearings 'climbing out'	<p>Watch for the gudgeon climbing out of the brass bearing and dropping back in.</p> <p>Lack of oil may cause this.</p>	<p>If dry, lubricate the bearings. This should be done weekly in most cases (with castor oil).</p> <p>If this does not rectify the problem contact SMWG or a bell hanger immediately for advice. Do NOT ring the bell as the gudgeon may break and cause serious damage or injury.</p> C1. C2. D2. P1. U3. U4.

Symptom	Possible cause	Test	Solution
9 Thumping or rattling every time bell is rung (continued)	g Bell loose on headstock	<p>Check if bell can move relative to headstock. This may indicate tensile failure of hanging straps on cannon mounted bells or a weakened timber headstock.</p> <p>Check crown bolts/cannon straps are tight. Timber headstocks may shrink in prolonged dry weather causing bolts to become loose.</p>	<p>Contact SMWG or a bell hanger immediately and in ALL cases for advice.</p> <p>C1. C2. D4. D5. P1-P3. U4.</p>
	h Frame movement	<p>With all other bells lowered, ring various bells individually (e.g. tenor, furthest from centre of frame, heaviest on upper level). If the ropes of the bells which are down move there is probably some movement in either frame or tower.</p> <p>With wooden frames check that the tie bolts have been kept tight, they should be checked every 3 months. Watch for relative movement between wall and frame/foundation beams.</p> <p>Two bells swinging in parallel (either side by side or mouth to mouth) can affect each other. Watch for localised frame movement e.g. one frame side dipping.</p>	<p>Tighten loose tie rods in wooden frames in correct sequence.</p> <p>C1. C2. D2. P1. U1.</p> <p>Contact SMWG or a bell hanger for advice in ALL other cases.</p> <p>C1. C2. D5. P2. P3. U2-U4.</p>
	i Loose gudgeon plates	<p>Check that bolts are tight. Timber headstocks may shrink in prolonged dry weather.</p>	<p>Contact SMWG or a bell hanger immediately and in ALL cases for advice.</p> <p>C1. C2. D2. P1. U4.</p>

Symptom	Possible cause	Test	Solution
10 Scraping or zinging noise when bell is rung or at the balance	a Worn clapper bearings causing clapper roll	With the bell down, gently push the clapper sideways, less than 1/2" movement is fine. More than 1/2" means that the bearing is worn and needs attention. Can the clapper be lifted vertically upwards? If so, the bearing is worn and needs attention. Look at striking point on the soundbow, a wide mark will show that clapper roll has been going on for a while.	Contact your bell hanger to arrange for clappers to be re-bushed. C1. C2. D5. P1. P2. U2.
	b Bell lip touching clock/Ellacombe hammers or wires	Look for scuff marks on clock hammer face or Ellacombe hammer ball or tail. Look for chips in the lip of the bell where Ellacombe hammers are present. Tie the bell and watch while it is rung up for impact with clock/Ellacombe hammers or wires.	Contact SMWG or a bell hanger for advice. C1. C2. C4. D5. P1. U3.
	c Bell lip brushing frame	Check frame sides for marks in the paint caused by bell lip contact. If frame contact is found, check that the bell is not loose on its headstock (see 9g), gudgeons are not broken (see 9d) and bearing housings are not loose (see 9e).	Contact SMWG or a bell hanger immediately and in ALL cases for advice. C1. C2. C4. D2. P1. U4.
	d Bell is up wrong (esp for metallic zing near balance)	Bounce test for bell being up wrong.	Lower and raise again or turn clapper if safe. C1. C2. D1. P1. U1.

Symptom	Possible cause	Test	Solution	
11 Honking or squeaking noise when bell is rung	a Stay brushing past frame side or end	Inspect for marks of contact on stay end and outside (especially if stay is not upright). Inspect for marks on frame sides or ends. Watch while bell is gradually raised and note angle of bell when noise occurs, this may indicate what is scuffing.	Stay may be angled outwards or too long. Fix by straightening or trimming but only if it will not impare the function of the stay. DO NOT cut away the frame to make space. Identify what is rubbing or scuffing and then contact SMWG or a bell hanger for advice.	C1. C2. D1-D5. P1. P2. U3.
	b Gudgeon shoulder rubbing on frame side or bearing housing	Check that there is clearance between gudgeon shoulder and frame etc.	Contact SMWG or a bell hanger for advice.	C1. C2. D5. P2. P3. U3.
	c Dry or worn clapper bearing	Swing clapper With the bell down, gently push the clapper sideways, less than 1/2" movement is OK. More than 1/2" means that the bearing is worn and needs attention. Lift clapper vertically, if it moves relative to the staple the bearing is worn and needs attention. Check baldric is not worn out (where present).	Clapper bearing requires re-bushing or baldric renewing.	C1. C2. D5. P1. U2.
12 Excessive mechanical noise	a Worn bearings on clappers, gudgeons and pulleys	See 11c, 6a and 6c.		
	b Clattering sliders	Sliders may be noisy because they move so freely that they bounce off the end stops when barely touched by the stay. Free movement is a good thing and the noise is difficult to prevent without adding friction which will make the bell less easy to ring.	In extreme cases contact SMWG or a bell hanger for advice.	C1. C2.

Symptom	Possible cause	Test	Solution
12 Excessive mechanical noise (continued)	c Poor acoustic isolation of frame from tower structure	If nothing else is worn, loose, knocking or scuffing then it may be that the normal noise of the clappers etc. is being transmitted to the ringing room ceiling and amplified. This is most likely when the ringing room ceiling is supported by the same beams as the bell frame.	Contact SMWG or a bell hanger for advice. Advice from an acoustic engineer may be required. C1. C2. C3. D5. P1-P3. U1.
13 Stay feels spongy when setting the bell	a Cracked stay	With the bell down, try pushing and pulling on the stay and look for a crack where the stay meets the headstock or fixing bolts.	Replace stay. C1. C2. D1. P1. U3.
	b Loose stay or fittings	Check that stay and slider parts are all firmly attached.	Check alignment and tighten bolts. C1. C2. D1. P1. U3.
	c Stretchy rope	Is the rope stretchy? Check if it is the tail end stretching or the top rope (where synthetic top ropes are present).	Hang weights on the rope (tail end stretch or natural fibre ropes only) between ringing sessions to take the stretch out until problem is solved (as in a newly fitted rope) or a replacement can be fitted. With synthetic top rope, weights will make no difference and the rope should be replaced. If other considerations allow, ropes should be left hanging down with a ringers knot, not on a spider or hooks; the weight of the tail end is often enough to noticeably reduce the stretch in a rope. C1. C2. D1. P1. U1.

Symptom	Possible cause	Test	Solution
13 Stay feels spongy when setting the bell (continued)	d Undersized stay	The stay may simply be too thin and thus very elastic. It may still be plenty strong enough. Do not replace with a thicker stay without consulting your bell hanger, you may make it too strong and risk damaging other parts of the installation.	Contact SMWG or a bell hanger for advice. C1. C2. D2. P1. U1.
14 Bell sets too deep or too light	a Incorrect or damaged stay	The replacement of a stay may have introduced incorrect geometry causing depth of set to change. A loose or damaged stay may cause a bell to feel deep set even if not spongy. See 13a and 13b.	Adjust depth of set by appropriate measures for the type of stay. Contact SMWG or a bell hanger for advice. C1. C2. D3-D5. P1. U1-U3.
	b Maladjusted, loose or missing end-stops	Dependant upon slider type, end-stops may never have been set correctly or may have been moved. They may have come loose or be missing entirely.	Re-fit or replace end-stops. Contact SMWG or a bell hanger for advice. C1. C2. D3-D5. P1. U1-U3.
15 Sound coming and going	a Rope tubes or bosses blocked by sallies	If the bells are quieter at the end of the handstroke row and beginning of the backstroke row, the sallies are blocking the acoustic path from the bells to the ringing room.	Create alternative acoustic pathways by drilling holes in the sides of rope guide tubes above the highest point reached by the sallies or by drilling small holes in floors or ceilings. Contact SMWG or a bell hanger for advice. C1. C2. C3. D3-D5. P2. P3. U1.
16 All bells too loud or quiet	a Trapdoors not shut properly or similar	If the problem has appeared suddenly check for new holes in floors and ceilings and that doors and hatches are shut as before. A small hole will let through a great deal of sound!	Shut trapdoors etc. or close new holes (such as when cables have been run) by appropriate means. C1. C2. D1. P1-P3. U1.

Symptom	Possible cause	Test	Solution	
16 All bells too loud or quiet (continued)	b Poor internal acoustics	There can be many causes of poor acoustics and it is a VERY complex subject.	Contact SMWG, a bell hanger or acoustic engineer for advice.	C1. C2. C3. D4. D5. P1-P3. U1.
17 Some bells too loud or quiet	a Poor internal acoustics	There can be many causes of poor acoustics and it is a VERY complex subject.	Contact SMWG, a bell hanger or acoustic engineer for advice.	C1. C2. C3. D4. D5. P1-P3. U1.
18 Worn top rope	a Rough edge or sharp point in the path of the rope, e.g. protruding nail head next to a rope boss	Wear may be localised at one or two points on the rope between the wheel and sally. These points likely indicate the position of the rope at hand and back stroke balances. Careful inspection of all surfaces near the path of the rope will find the culprit.	Where possible remove the sharp or rough edge or adjust the path of the rope slightly to avoid it. Contact SMWG or a bell hanger for advice.	C1. C2. D2-D5. P1-P3. U1.
	b Double pulley cutting	If the rope is drawn under the wheel by means of a double pulley, the down spinning backstroke pulley will apply significant friction to the rope as the rising rope passes from the handstroke pulley. The wear in this case is very localised at about 2/3 of the wheel radius from the garter hole. Watch from a safe position while the bell is rung to see this happening.	Wax the pulley surface regularly to reduce friction. In extreme cases consider re-routing the rope by moving the ground pulley and garter hole and drawing the rope lower down. Contact SMWG or a bell hanger for advice.	C1. C2. D5. P2. U1.
19 Rope worn at garter hole	a Rough or sharp edges near garter hole	Remove rope and feel in garter hole, all should be perfectly smooth. Minimum radius for the rope to bend round should be twice the rope diameter; more is preferable.	Sand smooth any roughness found and apply wax polish to the whole area to reduce friction.	C1. C2. D2. P1. U1.

Symptom	Possible cause	Test	Solution
19 Rope worn at garter hole (continued)	b Lost bobbin	Lost bobbins will make a very sharp corner for the rope to bend over and will shorten rope life.	If bobbins are missing contact a bell hanger to provide replacements or a wood turner can make these if a suitable prototype is available to copy. C1. C2. D2. P1. U1.
	c Rope not lubricated	It will be apparent if a rope has been lubricated or not.	Natural fibre top ropes will benefit greatly from being lubricated near the garter hole with tallow or other suitable products. Shift rope up or down marginally to spread wear. Fit a leather garter sleeve ensuring that it is well attached within the wheel to prevent it slipping down the rope to the sally. Contact SMWG or a bell hanger for advice. C1. C2. D2. P1. U1.
20 Tail end worn through	a Ringing mats not used or worn out	Ringing mats are thick, pure wool and will not wear out the rope when it lands on them. Other synthetic fibre carpets, even thick and soft pile, will wear out the rope due to microscopic barbs on the fibres.	Procure pure wool ringing mats. New specially cut and edged mats of thick pure wool carpet are not very expensive. C1. C2. D1. P1. U1.
	b Box edges not smooth	Rough box edges will wear the tail end in a very localised manner about 3' from the place where the rope is held.	Modify boxes as appropriate. Contact SMWG or a bell hanger for advice. See CCCBR website or contact SMWG for information and designs for ringing boxes. C1. C2. D2. P1. U1.
	c Box not used	Long ropes used without a box will wear by rubbing against itself, a box should be used on any bell where the tail end forms a coil on the floor during ringing, usually about 16cwt or more. The box should be high enough to prevent the rope coiling, if practical.	Contact SMWG or a bell hanger for advice. See CCCBR website or contact SMWG for information and designs for ringing boxes. C1. C2. D2. P1. U1.

Symptom	Possible cause	Test	Solution
21 Bell goes up wrong	a Stiff clapper bearing	Hold the bell still and swing the clapper. If it is stiff or stops swinging very quickly (e.g. within 5 swings) contact your bell hanger.	Lubricate bearing where suitable. If lubricating does not rectify the problem contact a bell hanger. C2. D1. P1. U1.
	b Poor hanging geometry	Has the flight been shortened? Measure small angle swing periods for bell and clapper independently, a faster clapper will tend to go up wrong. Clapper and bell geometry and dynamics are very complex but can be remedied in many cases.	Contact SMWG or a bell hanger for advice. C1. C2. D5. P3. U1.
	c Clapper scuffing during swing	If the clapper scuffs the bell frame or slider as it swings, it will go up wrong. Check for scuff marks on end of the flight, the slider and frame end. Check clapper is not loose or the bearing worn. Check for additional washers under the staple e.g. tapered washers to correct striking.	Tighten staple bolt if loose. Contact SMWG or a bell hanger for advice. C1. C2. D3-D5. P1-P3. U1.
22 Short handstroke	a Pulley or garter hole incorrectly positioned	If the rope is not dragging or catching then this is the likely cause.	Garter hole or pulley box may need to be re-positioned. Contact SMWG or a bell hanger for advice. C1. C2. D5. P2. U1.
	b Rope dragging	The rope may be piling up somewhere overhead and not coming all the way down from the backstroke. This is always accompanied by snatching and twitching of the rope making it very difficult to control. Check rope guides are working properly.	A slap board or guide tube may help. A guide (ideally the lowest) should be halfway up the tenor sally when at backstroke. Contact SMWG or a bell hanger for advice. C1. C2. D3. D4. P1. P2. U1.

Additional Information

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Version Control

Version	Date	Author	Format/Copy Editor	Changes
1.0				
2.0				
3.0	Jan 2021	Alison Hodge	Susan G Hall	New formatted version
3.1	Jun 2021	David Roskelly	Susan G Hall	Minor corrections