SIMBELL V5 WIRELESS HARDWARE

INSTALLATION GUIDE

The latest information and setup videos are available from our product website

www.simbell.co.uk

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Introduction

Thank you for purchasing the SIMBELL WIRELESS HARDWARE, we trust that it will give years of trouble free service to you and your tower.

We want you to get up and running as quickly as possible and therefore to complement this installation guide, you can find videos on the installation of the system in various configurations on our YouTube Channel - "Simbell Technical"

The Hardware

The SIMBELL V5 Wireless system consists of two main components, the TRANSMITTER Unit and the RECEIVER Unit and then there is an optional REPEATER unit to extend the range and overcome difficult tower configurations.

The **transmitter** is installed onto the bell frame and is used to detect the position of the bell wheel using a self adhesive reflector that is placed on the bell wheel to indicate the position of Bottom Dead Centre (BDC) of the bell.

The **receiver** is connected to a laptop or pc using a USB 2.0 or 3.0 connection and will communicate the detection of the bell as the reflector passes the sensor in the transmitter unit.

The **repeater** is a standalone unit that is placed between the Transmitter and Receiver and will take the signal from the transmitters and repeat it thus extending the range and removing "blind" spots.

There is NEVER a requirement with the SIMBELL System to install any part or parts with the bells in the "up" position. You should never attempt any installation when the bells when not fully down and care should be taken at all times when moving in and around the belfry.

Installation of the Transmitter

If you are using a single transmitter, for example as a simple learning tool, then the transmitter will usually be shown with a number 1, you should note that this transmitter will work on all bells, so you can install on the 5th bell in your tower, you should consider it as the "first bell with a sensor" and not necessarily the treble.

If you are installing sensors on all the bells, then your transmitters will be numbered from 1 upwards, and you should install each transmitter on its respective bell (although this is not absolutely essential it does make sense when it comes to configuring the software later).

Fixing the Reflector
With the bell in the DOWN position, first identify the position where the transmitter will be located on the bell frame.

In this picture you can see a typical bell frame and bell wheel. The bells are in the down position and we can see that we can easily mount the transmitter on the horizontal frame

The sensor on the side of the transmitter must be facing the wheel and then the reflector is placed on the wheel itself . The reflectors are rectangular and the longer side should be at the top (across the wheel) as this gives the best target for detection.

Position of the sensor and reflector

The reflectors that are provided with your transmitter are self-adhesive, however you will need to give them a decent surface to adhere to, clean the area you are going to place the sensor with an alcohol based cleaner (spectacle cleaning wipes are great for this) and then peel off the backing and stick the reflector onto the wheel.

If the wheel is very dirty and you cannot get the reflector to adhere, on a wooden wheel, you can use a small staple in the centre to the reflector to hold it in place

In the picture shown (left) you can see the reflector strip on the bell wheel and the transmitter placed and fixed with hook and loop (Velcro) to keep it in place.

Fixing the transmitter

Now you have installed the reflector, you need to align the transmitter unit so that the detector lens point towards the wheel so when the reflector passes, the transmitter unit will detect and transmit the signal.

Distance: We have done a lot of testing with distance from the wheel to the transmitter and have reliably detected the reflector from 25cm in low light, however 10cm is more usual and should there be a problem with detection, mounting the transmitter on a small bracket is a simple solution, or alternatively you can adjust the sensitivity of the sensor, there is a video on our website that shows how this can be done. If your belfry is very light, then you may need to shield the sensor from direct light with a small piece of card.

When you have aligned the transmitter with the reflector, fixing it in place can be completed with either hook and loop (Velcro) fastening, this can be seen in the picture above, or in a more permanent installation the use of zip ties is simple and quick, we have also had good results with neodymium magnets on metal bell frames. Be mindful of protecting the sensors from being dislodged, if your frame allows it, you can mount them lower down so they are not immediately exposed.

Power Connections

The transmitters require 12V power to be applied to them to operate, this can be achieved with either a portable, rechargeable battery pack or alternatively, if you have power in your belfry then you can use a 12V DC Power Supply of at least 1A for 6 Sensors.

The transmitters are very low power with an approximate working current load of under 100mA, we can power 6 transmitters with a single rechargeable battery pack (4800mAh) for over 7 hours. If you have an appropriate mains power supply and can use a 12V DC Supply then you should look for a rating of 1A or higher to support 8 sensors.

WE STRONGLY RECOMMEND THAT YOU TURN OFF THE POWER WHEN THE TRANSMITTERS ARE NOT IN USE TO STOP PREMATURE FAILURE OF COMPONENTS

We have used standard power connectors 5.5mm / 2.1mm that are used in many low voltage applications, you can purchase splitter cables that will allow you to cable around the bell frame to get power to all the transmitters without having to make any complex wiring connections.

IMPORTANT NOTE ON POLARITY! – the transmitters all use a POSITIVE TIP connection and therefore any power supply that you use should have a diagram on it as shown here, NEVER connect a supply if it does not have this diagram, it <u>will</u> damage the equipment immediately, if you are in any doubt then consult a competent electrician or send a picture of the supply showing any text / diagrams / specifications to support@simbell.co.uk and we will try and assist you in selecting a suitable power supply for your tower.

Completing the Transmitter installation

When you have installed all the sensors you require and completed the power cabling, if you have removed them for fitting, re-attach the aerials to the units and if possible angle them so that they are horizontal with the floor and overhang the frame, this will give the best signal to the receiver which will almost certainly be below you.

Take a last few minutes to ensure that all cables are secured and cannot get caught in any moving parts including ropes, and also that they will not foul any striking hardware for a tower clock or chiming mechanism.

We recommend that if you are using one, the battery unit is placed where is it easily accessible as you will want to remove this for recharging between sessions. It is simple to use a couple of Tie Wraps that are around the frame but not tight, to hold the battery when in use. Some users have glued Neodymium magnets to the bottom of the battery (and in some cases to the sensors) and used this to position them on Steel Frames securely, but make sure that the units are held securely if you use this method.

Installation of the Receiver

One receiver can handle up to 16 transmitters so you will only require one receiver in all normal installations.

The receiver is connected to a laptop or other computer via a USB 2.0 connection, if you only have USB 3.0 then these are all downwards compatible with USB 2.0 so should not be a problem.

Modern operating systems (Windows 8.1 and 10) should have the correct drivers installed to provide a plug and play installation, however in older systems this may not be the case and you will need to download the drivers to allow the computer to communicate with the Receiver unit., again there is a video on our website showing how this is done.

The latest drivers are available 24/7 from our website, http://www.simbell.co.uk in the software section.

Currently the software is only compatible with Windows computers running Windows 7 or later, you can use either 64 or 32 bit operating systems.

To install the receiver, simply plug power into the receiver unit and the USB Cable into the laptop and it should be detected and the drivers installed. If not then you may need to download the drivers from our website and install these using the windows device manager. If you open device manager you should see the receiver under the Com Port section, if you don't see it there and do see an "unknown device", right click the device and select "update driver" and then select the folder containing the drivers you have downloaded previously. There are more details about installing drivers on our website, these will be updated when a change is made.

Power requirement:

The v5.0 Simbell Receiver can operate from a USB connector alone, however if you require maximum power (the default setting) then for some laptops, the receiver requires external 12v power and this can be provided by a suitable DC Supply to the 5.5mm/2.1mm socket this can be either from another rechargeable pack or a mains 12V DC Adapter.

The same specification power supply is required for the receiver as for the transmitters.

If you do not require the full power mode for transmission and would like to utilize the power from the USB Port only, you can reduce the power using the switches inside the receiver unit.

To change the Power Setting (Receiver ONLY):
Power off the **receiver** and unplug the USB Cable from your computer
1.   Remove the bottom cover
2.   Change the 12 way switch bank as follows:

Sw6	Sw7	Power Level / Range
OFF	OFF	FULL
ON	OFF	MINIMUM
OFF	ON	LOW
ON	ON	HIGH

4. Replace the cover
5. Plug back in and test

Note: If you cannot operate from USB alone when the power is Minimum, then your computer is not providing enough power and you will need to use an external 12v DC supply.
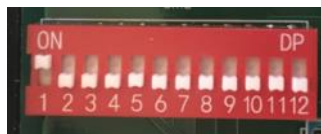
Multiple Workstations

You can select to select up to 16 Channels for the transmitters , repeater and receivers so that you can have more than one PC operating at the same time within the tower without interference.

This is simply done by removing the bottom of the transmitter and receiver units that you want to pair and changing SW2 9 - 12 to any setting other than all switches in the OFF position. If all switches are off then the unit will use Channel 0—this is the default setting.

Channel Settings for 16 Channels / Switches:

Channel	9	10	11	12	Channel	9	10	11	12
0	Off	Off	Off	Off	8	Off	Off	Off	On
1	On	Off	Off	Off	9	On	Off	Off	On
2	Off	On	Off	Off	10	Off	On	Off	On
3	On	On	Off	Off	11	On	On	Off	On
4	Off	Off	On	Off	12	Off	Off	On	On
5	On	Off	On	Off	13	On	Off	On	On
6	Off	On	On	Off	14	Off	On	On	On
7	On	On	On	Off	15	On	On	On	On

Note: Ensure that you power the unit off and on after changing a switch and disconnect the receiver from USB to ensure the channel is changed

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Changing the Bell Number on the Transmitter

When the transmitters are setup, they are allocated as bell number 1 (or if you have a set then these will have been allocated to your requirements)

Changing the bell number can be achieved changing SW2 in the **TRANSMITTER** as follows using the table on the right:

1. Remove Power

2. Set Switches 1-4 according to the table to give the bell number required.

Notes: This is only required on the TRANSMITTER unit, these switches have a different use on the Receiver, also take care not to set the bell number to the same as another active bell on the same channel—this will be most distracting and will not work as expected !

	1	2	3	4
1	On	Off	Off	Off
2	Off	On	Off	Off
3	On	On	Off	Off
4	Off	Off	On	Off
5	On	Off	On	Off
6	Off	On	On	Off
7	On	On	On	Off
8	Off	Off	Off	On
9	On	Off	Off	On
10	Off	On	Off	On
11	On	On	Off	On
12	Off	Off	On	On
13	On	Off	On	On
14	Off	On	On	On
15	On	On	On	On

Setup / Installation Mode

To assist with the location and installation of the transmitters, we have implemented a Setup Mode where the transmitter can be set to send out a "strike" signal every 3/4 Second automatically without any requirement for the sensor to be used, (in fact when in this mode the sensor is disabled) , to set this mode proceed as follows:

Setup Mode is selected by changing SW7 in the **TRANSMITTER** as follows:

1. Remove Power

2. Set Switch 7 to the ON position

3. Power up

The Transmitter will now start to send its selected bell number (see above how this can be set). It will continue to send until you power off and return SW7 to the OFF position. With a Battery connected, you can move around the belfry and find the best position and aerial setting to achieve the best signal.

Note: This is only relevant to TRANSMITTER units

Installation of a Repeater.

The repeater unit can be used to receive the signal from the transmitter and then repeat this by transmitting it again, this option takes a few microseconds to achieve and therefore should not make any significant requirement to reset the delays within the software used.

There are no connections for the Repeater, but it does require 12V DC Power the same as the Transmitter and optionally for the receiver.

The repeater will use two channel setting, one for receive and one for transmit, if this was not the case then signals may be received from both the repeater and then transmitter almost simultaneously which would cause double strikes and confusion, therefore before installing you should decide the channels that you are going to use and set these up in the repeater unit and also within the receiver and/or transmitters.

The simple configuration is to leave all the transmitters on the default channel 0 and then adjust the repeater to transmit and the receiver to receive on a separate channel.

To do this, remove the bottom cover.

The RECEIVE CHANNEL for the repeater is selected on SW1 (8 way) using Switches 1-4.

The TRANSMIT CHANNEL for the repeater is selected on SW2 (4 way) using Switches 1-4

In the default configuration for the transmitters, you can leave SW1 with switches 1-4 all in the OFF position. You should then change SW2 on the REPEATER and the RECEIVER to another setting that matches , e.g. OFF ON ON OFF would be channel 6, in this case. The transmitters would use Channel 0 to transmit the information to the repeater and then the repeater would use channel 6 to transmit to the receiver which would then process the signal as usual.

Channel	1	2	3	4
0	Off	Off	Off	Off
1	On	Off	Off	Off
2	Off	On	Off	Off
3	On	On	Off	Off
4	Off	Off	On	Off
5	On	Off	On	Off
6	Off	On	On	Off
7	On	On	On	Off

Channel	1	2	3	4
8	Off	Off	Off	On
9	On	Off	Off	On
10	Off	On	Off	On
11	On	On	Off	On
12	Off	Off	On	On
13	On	Off	On	On
14	Off	On	On	On
15	On	On	On	On
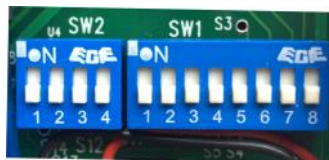
Note: Ensure that you power the unit off and on after changing a switch and disconnect the receiver from USB to ensure the channel is changed

When you physically install the repeater you may need to move it around to get the best receive and transmit signals.

If you need to change the TRANSMITTER Channel , then you will need to adjust the REPEATER RECEIVE Channel to match.

Note: Although it is theoretically possible, we do not recommend using more than one REPEATER within the tower as this is not tested as a solution

It is recommended that you power on the repeater before the transmitters, this will stop any spurious signals being transmitted as the repeater carries out its start up checks and operations.

DIAGNOSTICS:

We have included some diagnostic options with the Transmitter, Repeater and Receiver units, these can be used to check the status of the unit and to provide feedback to our technical team should it be required.

The diagnostic information is obtained by powering off the unit, in the case of the repeater, removing the bottom cover and carefully connecting a MICRO USB Cable to the microprocessor board, turning on SW2 Switch 8 (on Repeater this is SW1 Switch 8) and then applying power and plugging in the USB Cable to a computer with the **SIMBELL MONITOR TOOL** installed. (Free download from our website) .

Setting the COM PORT on the diagnostic program to the one used, and starting will provide a set of data that you can then send to us to review as required.

You then need to turn off the switches when completed.

NOTE: If you find that when you start your Ringing Software that a number of bells seem to randomly sound, then you should check that Switch 8 is in the OFF position!

Software Installation:

Once you have installed the receiver and can see the Com Port in the device manager, you are ready to either install and use the SIMBELL Software or any of the compatible software such as Abel, Virtual Belfry or Beltower.

We have produced videos of the software installation and basic setup for each of these products and we suggest that watching these before installation will give you all the basics you will need to get started.

We have put a selection of installation and advisory videos on our YouTube channel, please have a look at them as a lot of the information on installation is further explained in the video format.

Troubleshooting

We have tried to make the hardware installation as quick and easy as possible, however if you have difficulties then the following information may help.

ENSURE THE BELL(S) ARE IN THE DOWN POSITION FOR ALL TROUBLESHOOTING IN THE BELFRY

Problem	Possible Solutions
Bell is not triggered	**When the receiver is installed and plugged into the USB Port and power, there is a detection LED that will flash as follows:** 3 Short and 1 Long Flash indicates that the port is opened and active (happens when you start the software and open the connection) Short flash when a signal is detected from any transmitter **If you get the initiation flashes then the port is opening to receive data, if you then don't get any detection pulses check the following:** **Is there power on the transmitter(s) ?** – when powered you should see a faint glow within the unit from the indicator LED's. **Can the sensor "see" the reflector ?** – rock the bell wheel by hand to move the sensor in front of the sensor and see if the detection LED flashes on the receiver **Transmitter is too far away ?** – to test, try moving the transmitter next to the receiver, try adjusting the aerial to get better reception, avoid metal or thick timbers between the transmitter and receiver. **If you have more than one transmitter are any of them operating ?** – if not then check power connections on the transmitter and the receiver and ensure that you have the correct polarity for your chosen power unit.
Bell ringing at the wrong time	Ensure you have setup the delays for each bell, this is trial and error and is done differently for each software program. See videos on setup on our website for information
Intermittent Triggering of bells	Ensure that the sensors are clean and that the reflector has not moved on the wheel. If necessary gently clean the sensor with a soft brush to remove any debris. Check that the transmitter is still aligned with the Reflector. Try adjusting the sensitivity of the Transmitter (see video) Try using external power from a 12v Power Supply to the receiver
Receiver does not flash when connected	Check for the Com Port in Windows Device Manager, Make sure power is applied, try a different USB Port, listen for the connect / disconnect sound in Windows. Open the receiver and make sure the USB Cable has not been dislodged **Are you only using USB power at the receiver ?** - Try using external power from a 12v Power Supply

Problem	Possible Solutions
Lots of bells trigger when you start your ringing software	**Diagnostic Mode active** Ensure that SW8 is <u>not</u> in the ON Position on the Receiver.
Bell Constantly rings regularly	Ensure that you have not left a TRANSMITTER in Setup Mode (SW7 ON) if this is the case then you will get the affected bell ringing every 3/4 of a second when power is applied
Some Transmitters so not appear to work when installed	Check the transmitter when close to the receiver. Use Setup Mode (SW7) to check that you are getting a signal received from the transmitter, if there is a dead spot then try adjusting the aerial on the unit. If dead spots are a problem, then consider purchasing a SIMBELL Repeater Unit to resolve this problem.
No signals being received	Check that the CHANNEL Selection (SW9-SW12) is the same on the Transmitter and Receiver, or if using a repeater, then the channel is the same between the Transmitter and Repeater and the same between the Repeater and the Receiver, but that these two Channels are NOT the same as each other !
Anything else	Please feel free to get in contact and we will do our utmost to get you working !

We are here to help!

If you have any questions on installation and the use of the Simbell Hardware or Software Products, then please contact us by email support@simbell.co.uk and we will do our very best to assist with any queries.

If you require assistance on the use of other simulator software not produced by us, please refer to the documentation and help files in the first instance.

If you want to check that your receiver and transmitters are working correctly you can download the **Simbell Monitor Tool** from our website, this will allow you see what is received and can help us to troubleshoot the issue with you.

We love to hear from you too !

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