External Components of *Titanic's* Marconi Wireless System

By Bob Read, D.M.D

Introduction

This article is being written to assist modelers, both physical and digital, in modeling the external components of *Titanic's* Marconi wireless system. Too often the same attention has not been paid to rigging elements as other aspects of *Titanic's* external structure. The size of many elements of the Marconi wireless equipment was such that the equipment was difficult to visualize in period photos. Period photos, period and contemporary technical drawings, and period documents will be used to describe the components of the external Marconi wireless system. **No *Titanic*-specific documentation of the Marconi installation has survived**. Information from other 5 kw Marconi installations has been used to identify exterior equipment on Titanic.

Aerial flat-top

Overview

The Marconi wireless aerials on Titanic were of the "T" design. The aerials formed a "T" shape. The top of the "T" was formed by the aerial flat-top.

Equipment

aerial wire – The aerial wires were uninsulated silicon bronze wire. This wire was a 7/19 wire. Under the British conventions of the time, this means a wire of seven strands of #19 British standard wire size. #19 British standard wire is 0.04 diameter. The seven strands form a wire of 0.12 diameter. This is shown in Figure #1.

In some modern sources the aerial wires have been correctly described 7/19 wire. However, this has been described as 7 ropes each of 19 stands. There is such a type of wire but it is not size dependent. It only describes the construction of the wire. A reference was found in the Marconi Service News Vol. 2, 1917 which accurately explains the convention of 7/19 as 7 strands of #19 British standard wire. This excerpt is seen in Figure 2.

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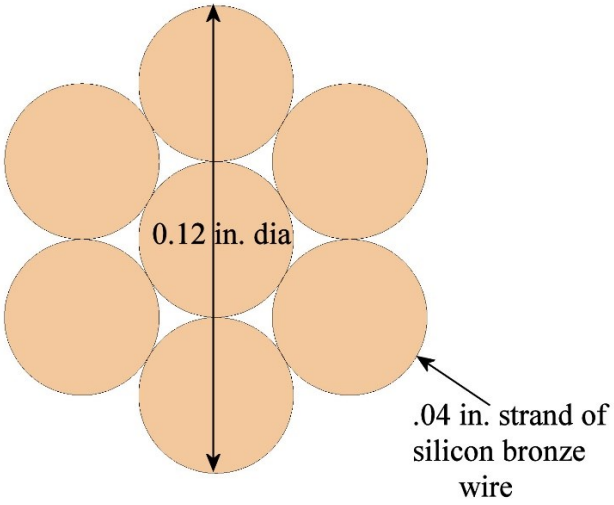

Figure 1

Cross section of 7/19 silicon bronze aerial wire (0.12 dia.)

I will therefore explain certain details of aerial construction.

The wire is made of seven strands of No. 18 B&S silicon bronze, twisted together in a cable. At the end of each wire is placed a hard rubber rod twenty-four inches long and three-quarters of an inch in diameter. A large galvanized eye in each end is provided for attaching it to the eye-bolt in the spreader. The wire is

Figure 2

Explanation of aerial wire size

strop insulators – The aerial wires of the flat-top had to be insulated from other structures. This was accomplished by strop insulators rigged at the ends of the flat-top. These strop insulators are shown in Figure 3.

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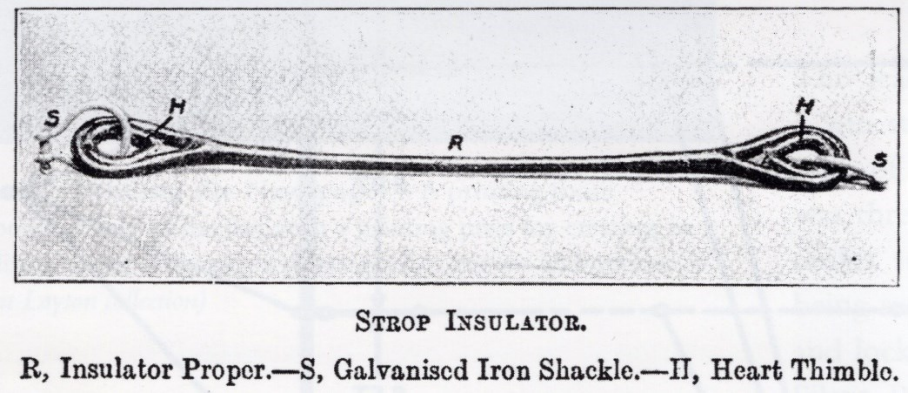

STROP INSULATOR.

R, Insulator Proper.—S, Galvanised Iron Shackle.—H, Heart Thimble.

Figure 3

Strop Insulator

spreader – At the ends near the masts the aerial wires are spaced by an ash wood spreader. The aerial wires are insulated from the spreader by strop insulators. Figure 4 shows the spreader along with other associated pieces of equipment.

bridle – The spreader is held by four wire ropes forming a bridle. The bridle is shown in Figure 3.

halyard - The halyard connected to the bridle then was rove through a block on the mast. It was used to hoist and lower the aerial assembly. Photos are inexact but it appears that the halyards were belayed to the pin rail at the bottom of the mast shrouds. The halyard is shown in Figure 4.

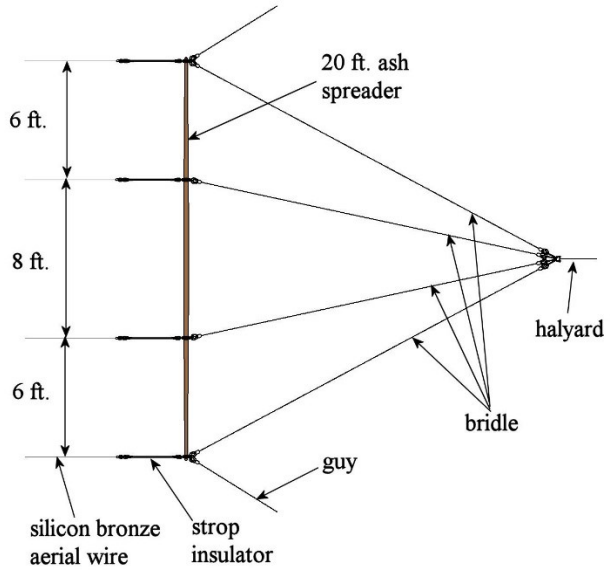

Figure 4

Components used to support the aerial wires

Aerial Attachments to Masts

The attachment of the aerial flat-top to the foremast is shown in Figure 4. The attachment of the aerial flat-top to the mainmast was somewhat different. The downleads had to be attached to the aerial flat-top at the exact midpoint of the flat-top. The downleads had to be attached to the flat-top forward of the second funnel to be able to reach the roof of the Marconi suite unobstructed, so the aft extent of the aerial flat top had to end forward of the fourth funnel. The way this was arranged on *Titanic* was that there was a halyard pendant forward of the block on the mainmast. Forward of this there were four wire rope spans forward to the bridle assembly and the aerial wires attached to it. The aft arrangement of the aerial flat-top is shown in Figure 5.

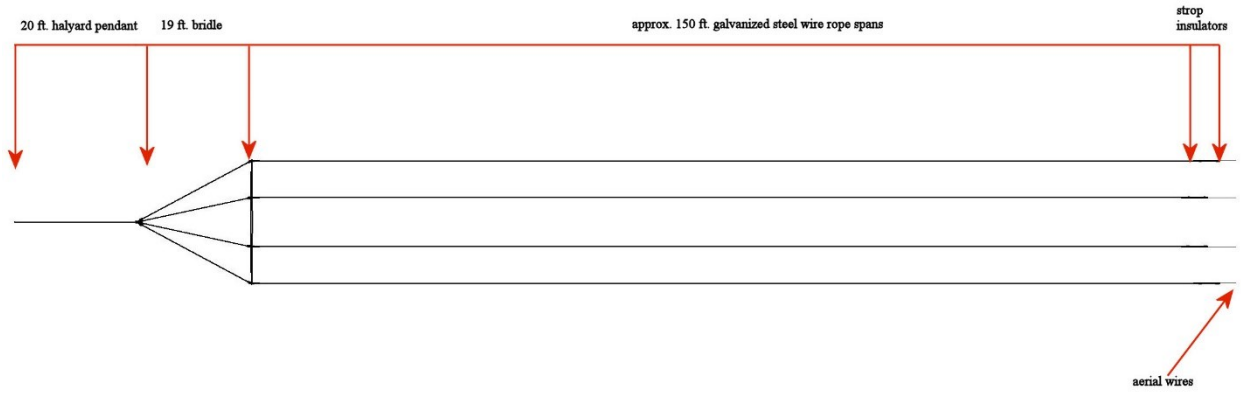

Figure 5

Aft arrangement of Marconi aerial flat-top support structures

Visual arrangement of the Marconi aerial

One aspect of the Marconi aerials that has been a challenge for modelers is the tension of the wires. Some have portrayed the aerials as taut and straight. The actual arrangement of the aerials is that they were *not* taut. They had what is known as a catenary curve. A catenary curve is when gravity causes the wires to "sag". Figure 6 shows the catenary curves of both the aerial flat-top wires and the downlead wires. Also, the two most outboard aerial wires of the flat-top had catenary curves which were slightly lower than the inboard two wires.

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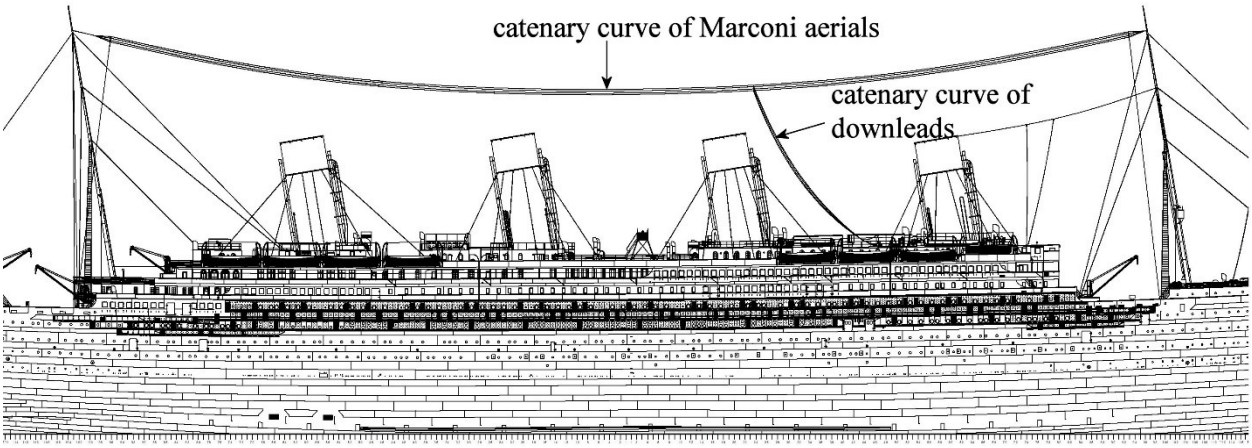

Figure 6

Catenary curves of Marconi aerial wires

Attachment of flat-top aerials to masts

The aerial flat-top was suspended from the mainmast and foremast by halyards which rove through blocks which were attached two feet above the base of the teak pole at the top of the masts. This is shown on the *Titanic* rigging plan in Figure 7.

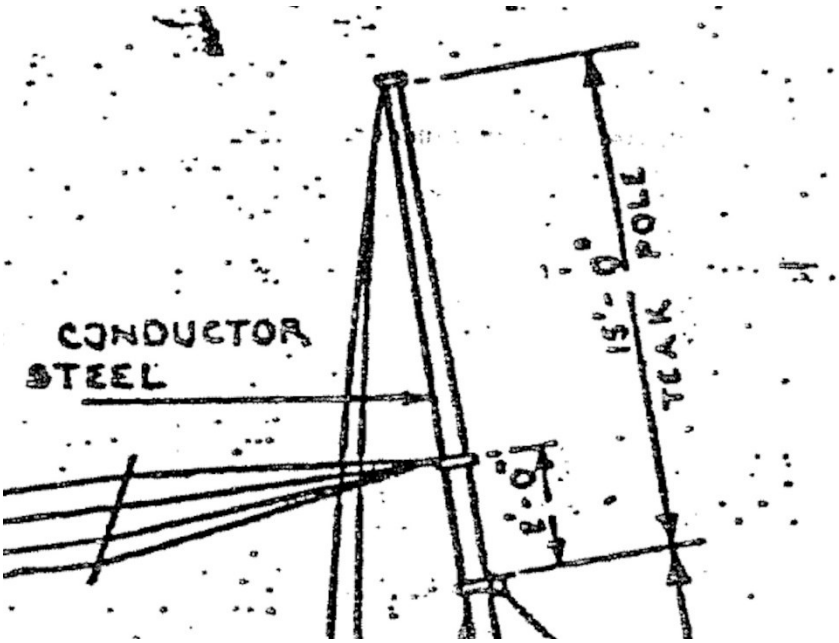

Figure 7

Location of halyard block attachment to masts

Belaying locations of halyards and guys

The halyards to the aerial spreader bridles and the guys for the aerial spreaders did not have belaying locations shown on *Titanic's* rigging plan. The only place where there were belaying pins were at the base of the mast shrouds. Therefore, in the absence of other information it is logical to assume that these lines were belayed to the belaying pin rails. The location of a belaying pin rail at the base of the mast shrouds is shown in Figure 8.

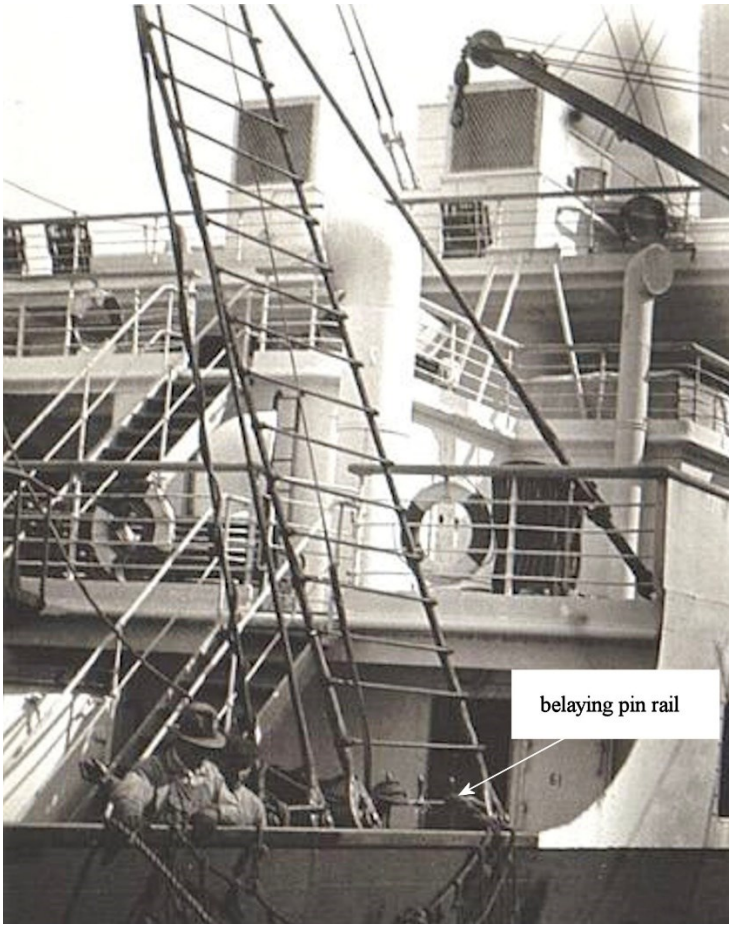

Figure 8

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Aerial downleads

Overview

The aerial downleads formed the vertical part of the “T” aerial. The downleads were connected to the aerial flat-top just forward of the second funnel. They were stayed near the roof of the Marconi suite roof by an ebonite strain insulator.

Downlead connections to aerial flat-top

The aerial downleads were connected to the flat top with small thimbles and shackles. The electrical connections were made by seizing an electrical connection wire to the flat top and then to the downlead wire. The connections were made by seizing the aerial wires with copper wire. The downlead connection to the aerial flat top is shown in Figure 9.

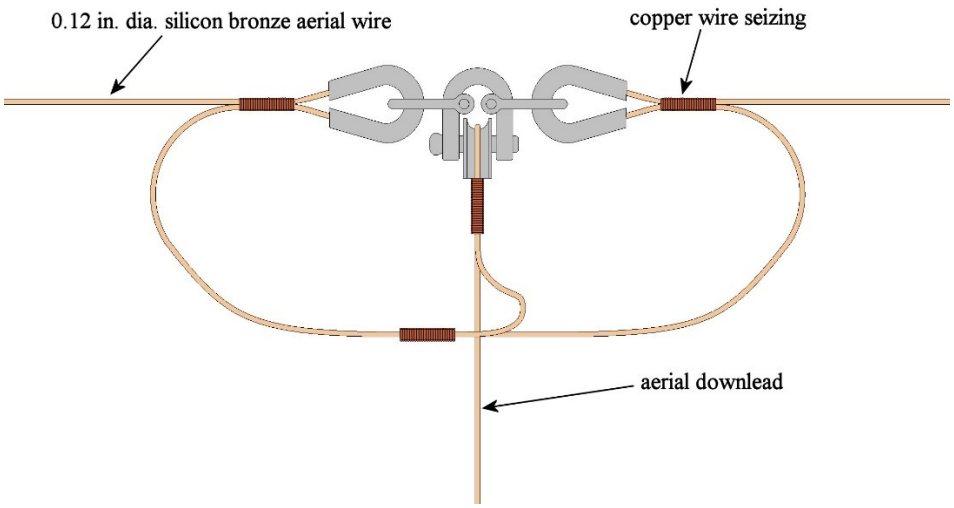

Figure 9

Connection of aerial downlead to aerial flat-top

Aerial Lead-ins

Overview

At the lower end of the aerial downleads, they were stayed by an ebonite strain insulator which was connected to a padeye on the roof of the Marconi suite. The aerial lead-ins were wires from the aerial downleads which connected to the Bradfield insulator atop the aerial mast. The aerial wires passed through the interior of the aerial mast into the Marconi silent room.

Equipment

ebonite strain insulator – The purpose of the ebonite strain insulator was twofold. First, it bore any strain from the aerial downleads to prevent tension being exerted on the lead-in wires. Second, it insulated the downleads and the lead-ins. It consisted of two ebonite rods which were shackled together. At the upper end the rod was protected from rain by a cone shield. Figure 10 shows a representative ebonite strain insulator.

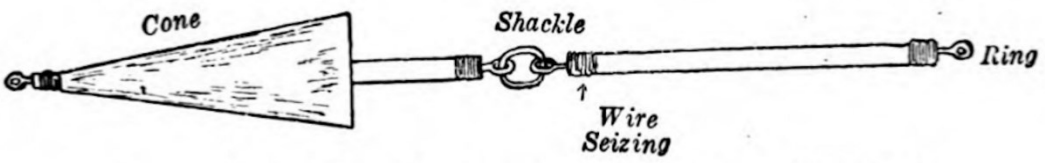

FIG. 179.—Ebonite Rod Insulator (Coned and Shackled).

Figure 10

Ebonite rod strain insulator

aerial mast – The aerial mast was a square cross section pillar whose sides were approximately 10 inches wide. The aerial mast on *Titanic* was roughly 5 ft. tall. We don't know for sure but from RMS *Republic* evidence it is believed that the mast was stayed by four iron rods connecting to a band on the mast and to eyebolts in the deck. The mast will be shown in following figures. The purpose of the mast was to raise the Bradfield connector atop it above the height of an awning which could be rigged in the area.

Bradfield insulator – The Bradfield insulator sat atop the aerial mast and provided an insulated connection through the mast and deck to the Marconi silent room directly below. The Bradfield insulator will be shown in following figures.

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Photos of lead-in installations and equipment

Figure 11 is a photo of the Marconi lead-in structures on RMS *Republic.* The contrast of the photo has been increased to more easily visualize the structures. The mast and ebonite strain insulators on *Republic* than on *Titanic* because this was a passenger area on *Republic.*

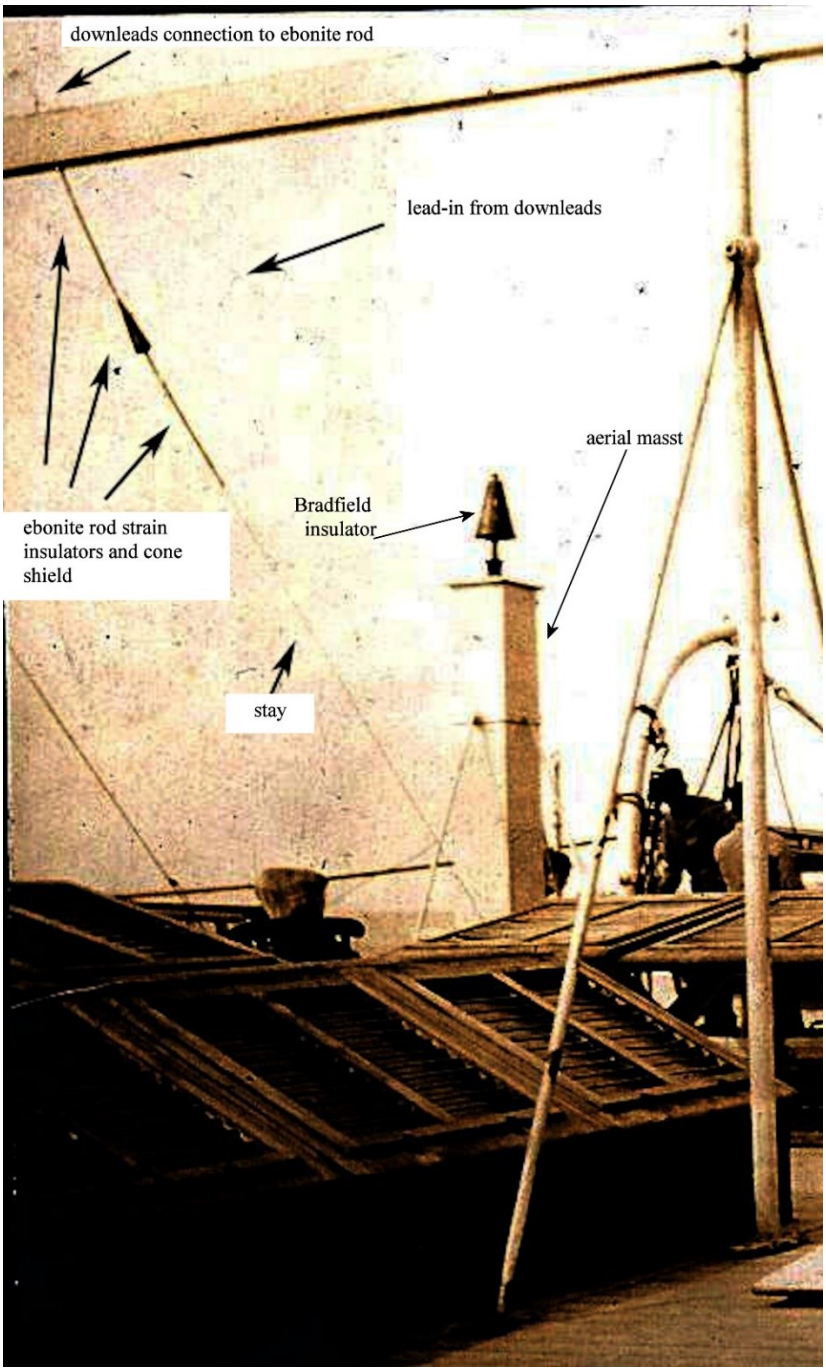

Figure 11

Aerial lead-in structures on RMS *Republic*

Figure 12 is a photo of *Titanic* in Queenstown showing some of the aerial lead-in structures. The contrast in the photo has been increased to more easily visualize the structures.

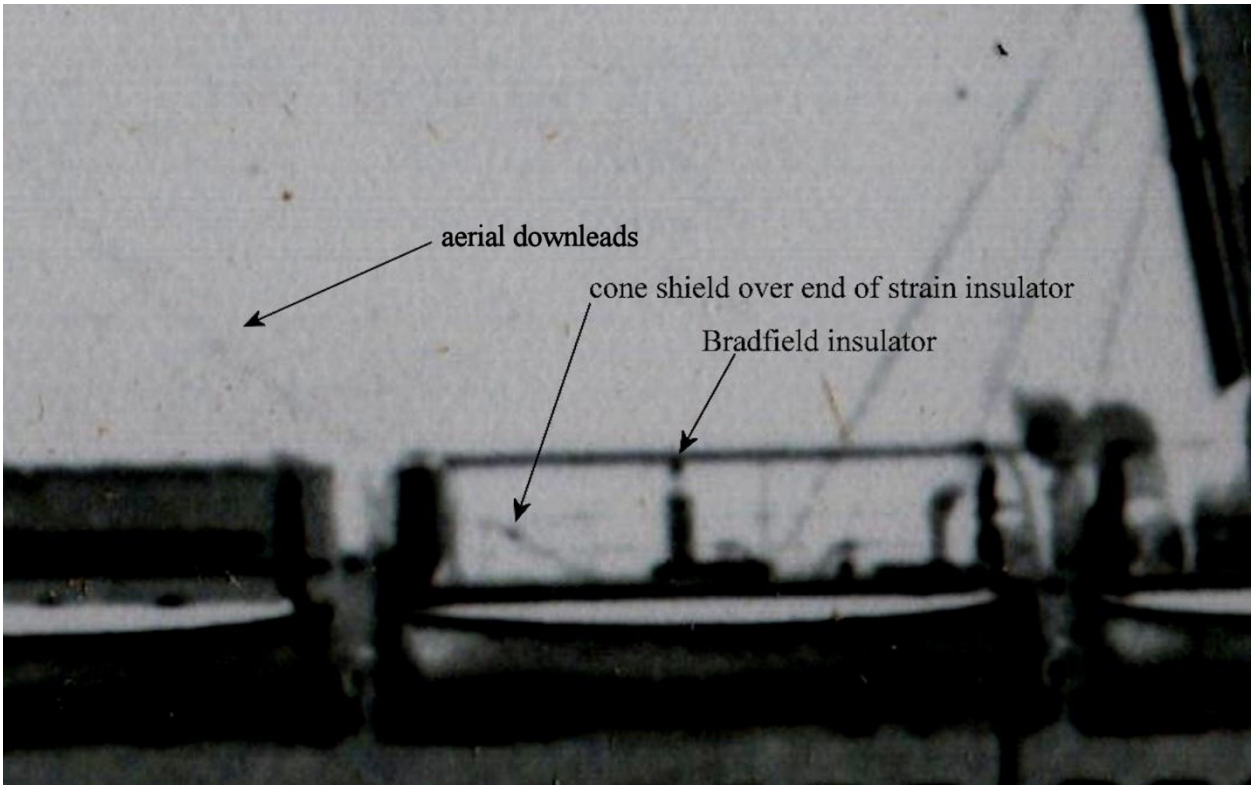

Figure 12

Aerial lead-in structures on *Titanic*

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Figure 13 is an elevation view drawing of what the evidence suggest were the aerial lead-in structures on *Titanic.*

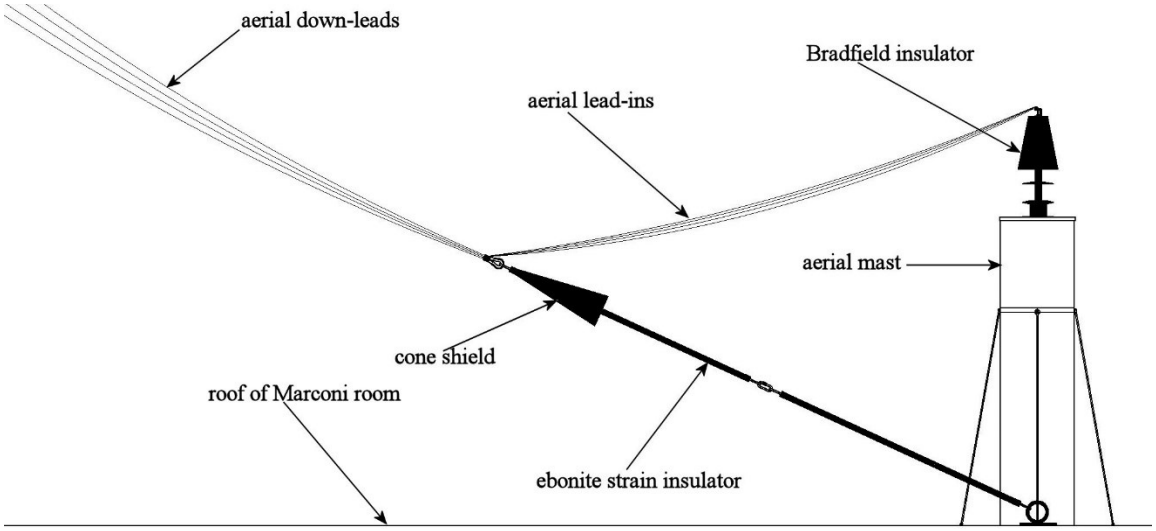

Figure 13

Elevation view drawing of aerial lead-in structures on *Titanic*

Figure 14 is a plan view drawing of what the evidence suggests were the aerial lead-in structures on *Titanic.*

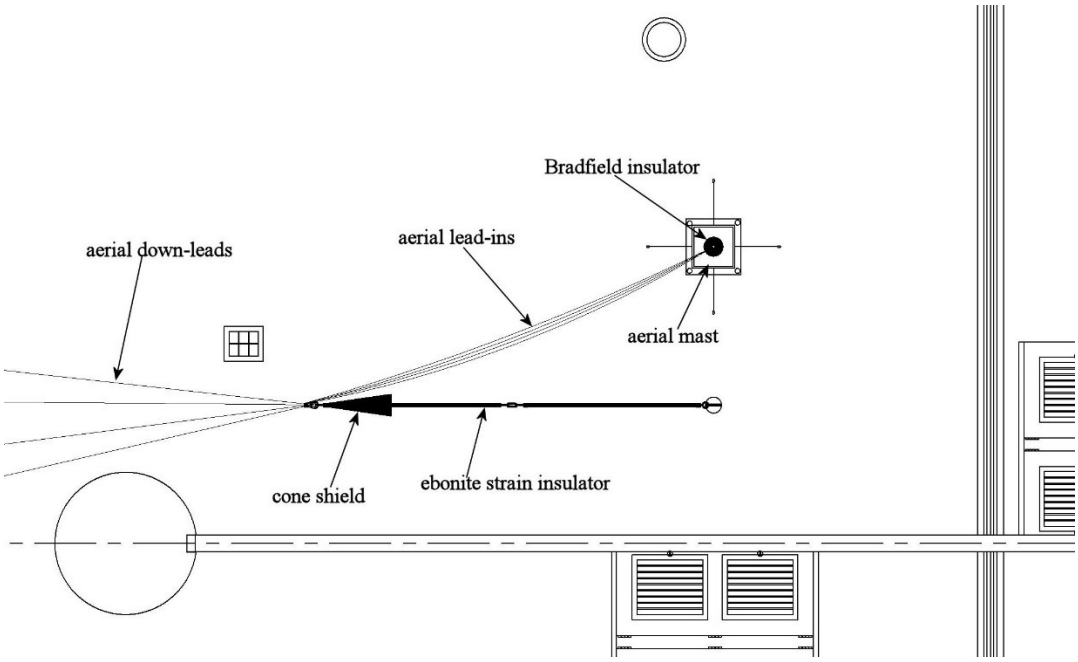

Figure 14

Plan view drawing of aerial lead-in structures on *Titanic*

Downlead and Lead-in Hazard

It has been suggested that the downlead wires and the lead-in wires near the roof of the Marconi suite presented an electrocution hazard. After considerable research, I have found that this appears not to be an actual hazard. An RF burn however, is a possibility. One source explained it this way:

"However, RF radiation is absorbed by the tissues of our bodies and transformed into heat that the body must remove to avoid damage from overheating or burning – to avoid cooking, essentially. Human cells die at about 107 degrees Fahrenheit or above. When you come into contact with an RF transmitting element such as an antenna that is conducting RF electrical currents, those currents may seek a path to ground potential voltage through your tissues, quickly heating your tissues near the point of contact with the antenna. In some cases, this can cause an RF burn."

https://hamradioschool.com/t0c07-rf-burn/

The reason this subject is included is because some have suggested that the aerial mast on *Titanic* was installed to prevent any danger of electrocution. However, even after the advent of *Titanic,* the installation on *Olympic* still left lead in wires well within reach.

On both *Titanic* and *Olympic* at least until after WWI the officers' quarters roof was a crew-only space. As such, crew knew to avoid the Marconi equipment there. The reason there were some precautions taken was to protect the wires and connections from disruption rather than to protect crew.

Conclusion

This article was written primarily with the modeler in mind. It was not meant to be a treatise on the operational details of the Marconi installation aboard *Titanic.* Because of the very small size of the aerial wires on the actual ship, modeling them accurately at most model scales is nearly impossible. While some allowances may have to be made in the size of wires and some small fittings, this article will at least give some information about how the external details of the Marconi installation were configured.