

Nautical Quiz

Binnacle: A case near the helm that supports the ship's compass. The round balls on either side are solid iron. Can you guess what they are for?

Quiz Answer

No they weren't for balance. That would never work on a ship. They were actually to disburse static electricity from the compass. Sea air can become electrically charged.

“FALSE”

Source: TNA website in the “Texas Navy Master Index” article “19th Century Nautical Terms”

Dear Admirals, Commanders and Lieutenants,

The responses to this quiz answer has been wonderful. I was going to include them in my next newsletter, but it has been so much fun that I just couldn't wait to share them with everyone. Many members gave their personal opinion, asked a friend or did research. All responses are included in the following pages.

Thank you all for helping to clear up the “True or False”!

*Best Wishes,
Admiral Judy Fisher
Editor*



Submitted by: Admiral Shiffman

I'd like to join the conversation regarding the iron balls on the binnacle. I believe they are there to provide a magnet field to overwhelm (or overcome) the magnetic field of the ship's metal. If you look at these iron balls, they are each on a track that permits each of them to be moved towards or away from the binnacle independently so as to calibrate the compass card and prevent other "local" magnetic disturbances from affecting the compass. Older, mechanical, car compasses have two screws used to calibrate the compass for the particular car and where it is placed so as to remove the car's magnetic signature from affecting the compass.

Iron is not necessary for dealing with static electricity; in fact copper would be much better. The copper would not have to be a solid ball but just a copper coating over any other material, and could in fact be hollow. Also, there would not be any reason to have these electric protectors mounted in a track so as to be tuned.

Submitted by: Admiral Bill Turner

See the third paragraph.

<http://en.wikipedia.org/wiki/Binnacle>

Submitted by: Admiral Bill Miller

The "balls" are called quadrantal spheres and are used to help offset magnetic compass deviation. Steel ships, ship's wiring, and sailors working nearby with knives, watches, etc. can wreak havoc with a magnetic compass. Anyway, ship magnetic compasses are usually "trued" about every year by trained technicians with proper testing equipment. At this time the spheres are adjusted in-or-out and

other adjusters (including internal magnets and rods) are moved/relocated/adjusted as necessary. Most large ship binnacles are equipped with degaussing coils to help compensate for a build-up of magnetic influences caused by the ship moving through the water.

In my USN days we would pick up a technician with a magic box of electronic gear, then we would head off the coast and steer according to his direction (mostly in large circles) until his gear said we would be good-to-go.

Hope this helps. The bet was for a six-pack of beer - right?

Submitted by: Commander Mark Underhill

With the help of many good people, I have been able to advance through the ranks to now be a BOSN Warrant in the Coast Guard Reserve. During many years underway on Coast Guard small boats, the crew would spend hours debating such topics as you have presented. The fun was in being able to bluff others and convince them that your answer was gospel; no matter how outrageous.

To settle these debates, we often turned to THE OXFORD COMPANION TO SHIPS AND SEA, (1988), edited by Peter Kemp.

In essence, your answer is close....

Under the topic of COMPASS, on page 198, it describes, "With the advent of iron and steel ships, a great deal of study was directed to the nature of ship magnetism with the object of devising a method of neutralizing it at the compass position. Among those who engaged themselves in this important work was the Astronomer



Royal, Sir G. B. Airy, who had the iron steamer Rainbow placed at his disposal in 1838. From his careful examination of the vessel's magnetic condition, he introduced a method of neutralizing a ship's magnetism by placing magnets and pieces of unmagnetized iron (soft iron spheres, "round balls of solid iron", on the on a binnacle – Mark) in the vicinity of the compass." My turn.... Perhaps, your readers can tell me what it means to "comb the cat"?

Submitted by: Admiral Stephen Duncan

I had thought they were a compensation for the magnetic field of a ship - Wikipedia agrees with that stating:

With the introduction of iron-clad ships the magnetic deviation observed in compasses became more severe. Methods of compensation by arranging iron or magnetic objects near the binnacle were developed. In 1854 a new type of binnacle was patented by John Gray of Liverpool which directly incorporated adjustable correcting magnets on screws or rack and pinions. This was improved again when Lord Kelvin patented in the 1880s another system of compass and which incorporated two compensating magnets. These are colloquially known as 'Kelvin's Balls'[1] in the UK, and 'Navigator's Balls' in the US.

also at:

<http://www.ask.com/bar?q=kelvins+balls&page=1&qsrc=2891&dm=all&ab=0&u=http%3A%2F%2Fwww.acecrc.sipex.aq%2Faccess%2Fpage%2F%3Fpage%3Dafcfbb2e-b886-102a-8ea7-0019b9ea7c60&sg=rPYepFuhFDhwDfbPxrPN5WOrE%2BPkex9lJfmd09DGSQ%3D%0D%0A&tsp=1302921440405>

Submitted by: Admiral Martin Arisco

Hi, Judy. I disagree with the "answer" to the question of the purpose of the steel balls on the binnacle. They are actually to neutralize the magnetic effect on the compass from the hull on an iron ship. We have a bronze binnacle in our foyer from a WWII Liberty ship. Not only does it have these iron spheres, it also has a vertical magnet mounted behind it to compensate for the effect of heeling of the steel ship on the compass. Have a good weekend.

Submitted by: Admiral Frank E. Roesch

The magnetic balls are used to align/calibrate the magnetic compass by nulling out the surrounding magnetic properties on the bridge. Normally the compass enclosure used to block excess sunlight and to hold the night light at the top is made of brass.

It is possible to change this alignment by bringing other metal objects near the compass.

I have both seen and done this myself while on the bridge.

Submitted by: Admiral William Schleuse

Thanks, I did enjoy the April issue of "The Invincible" - especially the Texas Navy Timeline - but the answer to the Nautical Quiz is in error in stating that the purpose of the iron balls on either side of a binnacle is to dissipate static electricity. The purpose of navigator's balls is to allow compensation of the magnetic compass.

"With the introduction of iron-clad ships the magnetic deviation observed in compasses became more severe. Methods of compensation by arranging iron or magnetic objects near the binnacle were developed. In 1854 a new type of binnacle was patented by John Gray of Liverpool which directly incorporated



adjustable correcting magnets on screws or rack and pinions. This was improved again when Lord Kelvin patented in the 1880s another system of compass and which incorporated two compensating magnets. These are colloquially known as ‘Kelvin’s Balls’[1] in the UK, and ‘Navigator’s Balls’ in the US.” ---quote from the Wikipedia article on the Binnacle. Keep up the good work!

Submitted by: Admiral Ciambriane, Sc.D.

The iron balls on the side of the binnacle are to compensate for the effects of the iron ship has on the magnetic field which can and does affect the compass. They are adjustable. This is what I was taught.

Submitted by: Commander Shultz,

<http://www.answers.com/topic/binnacle/>

Submitted by: Admiral LeeRoy Lance, Jr.,

With the introduction of iron-clad ships the magnetic deviation observed in compasses became more severe. Methods of compensation by arranging iron or magnetic objects near the binnacle were developed. In 1854 a new type of binnacle was patented by John Gray of Liverpool which directly incorporated adjustable correcting magnets on screws or rack and pinions. This was improved again when Lord Kelvin patented in the 1880s another system of compass and which incorporated two compensating magnets. These are colloquially known as ‘Kelvin’s Balls’[1] in the UK, and ‘Navigator’s Balls’ in the US.

<http://www.acecrc.sipex.aq/access/page/?page=afcfbb2e-b886-102a-8ea7-0019b9e>

The compensating balls were used to allow the compass to work properly without interference from all the ferrous metals on the ship as well as compensating for local differences in the magnetic field.

<http://www.worthpoint.com/article/binnacles-101-bearings-nautical>

Submitted by: Admiral R. J. Ritter

Thanks for the newsletter..... FYI the official (Navy) answer was “Navigator’s Balls”.... and they were used to adjust the ships magnetic compass at various latitudes

Submitted by: Admiral Charles Harrison

Concerning the two balls on either side of the compass, they are properly called “quadrantal correctors“ about which, thus sayeth Bowditch:

“That part of horizontal soft iron (Bowditch is considering the iron of which the vessel is constructed.) which is symmetrically arranged with respect to the compass can be considered equivalent to two rods extending through the compass, one in a fore-and-aft direction (- a rod) and the other in an athwartship direction (- e rod) . The deviation caused by both of these rods is quadrantal, but of the opposite sign. If both rods were equally effective in causing deviation, they would cancel each other and no deviation would result on any heading. In most vessels, however, the athwartships iron dominates, and deviation due to all horizontal soft iron can generally be considered to be that which would result from a single (-) e rod. . . .The field causing this deviation is neutralized by installing two masses of soft iron abeam of the compass, on opposite sides and equidistant from its center. Such iron is usually in the



form of hollow spheres or cylinders, called quadrantal correctors. These can be moved in or out in an athwartship direction along brackets on the sides of the binnacle. Quadrantal correctors act as (+) e parameters which neutralize the (-) e parameters of the athwartships iron.”

Submitted by: Admiral Richard A. Coutermarsh

In response to your request, please find my submission to your quiz question: The iron balls sit on a linear bar opposite port & starboard side of the binnacle, with the center track removed, thus allowing them to move in or out when the ship's compass is calibrated for true north.

Submitted by: Admiral John D. Butler

The ship's gyro compass is a magnetic compass. The two metal balls that are mounted either side of the compass are adjusted by the Navigator to ensure the compass reads true north. This removes any variability in the local magnetic field where the compass is mounted and also accounts any local variability in the earth's magnetic field.

Submitted by: Admiral Tom Knickerbocker,

The iron balls are compensation devices to overcome the effect of the steel hulls that cause magnetic anomalies and errors of the compass card. The steel of the ship floating at sea creates magnetic field distortions that introduce errors in the magnetic alignment of the compass. The balls are built by weight and density to each ship and calibrated by experts at sea during trials after a ship is launched. They are individual to each ship and cannot be swapped

or installed without anew calibration. Static electricity has nothing to do with their operation.

Submitted by: Admiral Tim O'Leary,

I think they were more to adjust for magnetic variance. E.S. Richie Inc still makes Binnacles many of which we have salvaged from the oceans floor. Their company is in Pembroke Mass. I am sure they can answer your question.

I will send pictures in a separate email.

(Photos by: Admiral O'Leary)





April 2011



Submitted by: Admiral Frank Richardson

From my classmate former mariner and ship pilot...Captain Joe Sheppard. "The balls are used to help correct for deviation on a ship caused by iron and steel in the ship which would give a false reading for magnetic north, which is someplace I believe in the Bay of Fundy Canada."

Submitted by: Admiral Lewis Smith,

Judy.... Those who say the "answer" is incorrect are correct.

The balls, mounted on either side of the binnacle/compass are to help compensate for compass deviation caused by metal on the

vessel and in its immediate vicinity. Even quartermasters (or steersmen/helmsmen) going on watch were cautioned not to bring a pocket knife along with them.

The balls were made of soft iron, set on each side of the binnacle (which was made of nonmagnetic brass or other material). The balls were set to compensate for the ship's influence (deviation). The other major influence on compass accuracy was the earth's magnetic fields called variation. Variation and deviation together were calculated to eliminate compass error and provide a true course essential for safe navigation.

Binnacles equipped with the iron balls were called "compensating binnacles". Often the balls were painted red and green for decoration as much as to remind dense helmsmen of port (red or left side of vessel) and starboard (green or right side of vessel).

Hope this does it....

Submitted by: Admiral Francis Essex

Before I left my first tour of active duty as a line officer in the United States Navy my billet was Navigator on USS Vermillion AKA 107. In answer to your question I submit the following:

The iron balls mounted on the binnacle are called quadrantal spheres and are, along with the heeling magnets etc. part of the system to correct magnetic compass errors caused by a steel ship's influence on a magnetic compass. I refer the questioner to Bowditch's American Practical Navigator and to Dutton's Navigation and Nautical Astronomy. They are commonly called, "The Navigator's Balls" perhaps inferring somehow that his manly attributes contribute to the accuracy of the magnetic compass and his efficacy in ensuring safe navigation of the vessel. One guess



as to its origin is that cadets and midshipmen awash in nautical terminology and the mystery of compass calibration and arcane terminology coined the name to relieve academic pressure and inject a little humor into the learning process.

Submitted by: Admiral Bob Callanan,

Recommend that you include a “Naval” Item of interest in every Issue. If you go to Wikipedia you will find that the “balls” were used to accommodate for “magnetic” deviations.

Submitted by: Admiral Jim Hayes, Jr.

The answer is actually incorrect.

Those are compensating magnets used to eliminate as much deviation as possible from proximity iron.

Submitted by: Admiral Mike Barton

A binnacle was a waist high stand that held instruments directly in front of the helmsman. As we learned about magnets it was determined that iron near the compass could create havoc. In the mid-1800's some iron pieces were added to maintain the proper settings. They were called Kelvin's Balls in the UK and American Balls here. Later the term was used to address the sick list of men not able to work.

I got this from several sources. Great feature and one to be looked forward to.

Submitted by: Admiral Lloyd Addy

The following links are submitted by Admiral Lloyd Addy.

[http://www.brassbinnacle.com/Merchant2/merchant.](http://www.brassbinnacle.com/Merchant2/merchant.mvc?Screen=CTGY&Store_Code=br1&Category_Code=BIN1)

[mvc?Screen=CTGY&Store_Code=br1&Category_Code=BIN1](http://www.brassbinnacle.com/Merchant2/merchant.mvc?Screen=CTGY&Store_Code=br1&Category_Code=BIN1)

<http://en.wikipedia.org/wiki/Binnacle>

Submitted by: Lieutenant William Turner

I believe they were used to compensate for magnetic deviations. They were more heavily used once iron clad ships were more popular.

Submitted by: Admiral Chuck Doyle

I called a “friend” for help and you might find his response interesting!

Chuck as a U.S. Navy Boatswain Mate this was right down my field of expertise. I had to know these things to run boats and these were part of the tests for advancement to a higher rate plus I taught seamen classed to advance to the petty officer class. I assume that the two Iron balls are a part of the Binnacle, but to tell you the truth, everyone called them the “Captains Balls” That may shock your Texas Navy friends but that's what the real Navy called them.

Chuck, the answer in the newsletter is wrong “ They were used to distribute static electricity from the compass. Sea air can become electrically charged”

Sea Air has nothing to do with it, Iron, nickel, cobalt and some other metals exhibit a unique magnetic behavior which is called ferromagnetism. The Magnetic compass points to magnetic north this is not true north. The earth's magnetic changes a little bit daily plus the magnetic compass is affected by the magnetic fields around it. This is called deviation. There are ways to correct the effects of



deviation, Navigation maps have what is called variation for any given point of the sea. This is the difference referenced by a number of variance between magnetic north and true north. Deviation is the other factor in correcting the compass. The metal of the ship becomes magnetized causing deviation. There are two ways to correct for deviation. First perform a compass rose, you only have to do this one time. Ships compasses are calibrated before leaving port. The ship is moored on a buoy, turned in different directions by a tug and course is compared with the deviation. Since these deviation numbers are known after performing the compass rose and they never change. You add these numbers for a particular heading to correct the Compass.

Influence of the ship itself is countered by two iron balls left and right near the compass, and iron underneath. Also the ship itself is degaussed. DEGAUSSING is the process of making a (steel) ship's hull nonmagnetic by producing an opposing magnetic field.

It was hard to remember all these calculations so us Navy men had a whole book of terminology that made it easy to remember one of these are along the lines of this subject and is called **Can Dead Men Vote Twice at Elections?**

This is the formula for converting compass headings back to true ones: Compass plus Deviation equals Magnetic heading. Beyond that, add the Variation to get the True heading. In all of these corrections, "at elections" means Add Easterly deviations and variations as part of the calculation (and, by implication, subtract westerly ones).

Binnacle is defined as the stand or housing for the ship's compass located on the bridge. The only name Navy men used for the two iron balls was called "The Captains Balls".

Submitted by: Admiral Richard Cusson, Jr.

We called them Navigator's Balls on all of the U.S. Coast Guard Cutters in which I served.

<http://en.wikipedia.org/wiki/Binnacle>

BINNACLE : A stand or case for housing a compass so that it may be conveniently consulted. Binnacles differ in shape and size according to where used and the size of the compass to be accommodated. A binnacle for a ship's navigating compass consists essentially of a pedestal at whose upper end is a bowl-shaped receptacle having a sliding hood like cover. This receptacle accommodates the gimbals supporting the compass. Compensating binnacles are provided with brackets or arms on either side, starboard and port, for supporting and securing the iron cylinders or spheres used to counteract the quadrantal deviation due to the earth's magnetization of the vessel. This type of binnacle is usually placed immediately in front of the steering wheel, having its vertical axis in the vertical plane of the fore-and-aft center line of the vessel.

from:

http://www.seasources.net/vessel_nomenclature.htm