



Navigation General

Instruments And Accessories

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A sextant having an index error that is "on the arc" has a _____.
negative correction

Illustrations: SEXTANTPARTS

A sextant having an index error that is "off the arc" has a _____.
positive correction

Illustrations: SEXTANTPARTS

The marine sextant is subject to seven different types of errors, four of which may be corrected by the navigator. An error NOT correctable by the navigator is _____.
prismatic error

Illustrations: SEXTANTPARTS

What is a nonadjustable error of the sextant?
Prismatic error

Illustrations: SEXTANTPARTS

In order to remove index error from a sextant, you should adjust the _____.
horizon glass to make it parallel to the index mirror with the index set at zero

Illustrations: SEXTANTPARTS

Which of the four adjustable errors in the sextant is the principle cause of index error?
Index mirror and horizon glass not being parallel

Illustrations: SEXTANTPARTS

Which of these sextant errors is nonadjustable?
Prismatic error
Centering error
Graduation error
All of the above.

Illustrations: SEXTANTPARTS

In what order should the following sextant adjustments be made?

- I. Make telescope parallel to frame of sextant.
- II. Set horizon glass perpendicular to frame of sextant.
- III. Make index mirror and horizon glass parallel when index arm is set at zero.
- IV. Set index mirror perpendicular to frame of sextant.

IV, II, III, I

Illustrations: SEXTANTPARTS

Index error of a sextant is primarily caused by _____.
the horizon glass not being parallel to the index mirror

Illustrations: SEXTANTPARTS

The part of a sextant mounted directly over the pivot of the index arm is the _____.
index mirror

Illustrations: SEXTANTPARTS

The index error is determined by adjusting the _____.
micrometer drum

Illustrations: SEXTANTPARTS

When the index and horizon mirrors of a properly adjusted sextant are at an angle of 45° to each other, the arc reads _____.
 90°

Illustrations: SEXTANTPARTS

A marine sextant has the index arm set at zero and the reflected image of the horizon forms a continuous line with the actual image. When the sextant is rotated about the line of sight the images separate. The sextant has _____.
side error

Illustrations: SEXTANTPARTS

Which of the four adjustable errors in the sextant causes side error?
Horizon glass not being perpendicular to the frame

Illustrations: SEXTANTPARTS

In order to remove side error from a sextant, you should adjust the _____.
horizon glass to make it perpendicular to the sextant frame

Illustrations: SEXTANTPARTS

What causes the error of collimation with regards to the four adjustments to a sextant?
Telescope not parallel to the frame

Illustrations: SEXTANTPARTS

The horizon glass of a sextant is _____.
silvered on its half nearer the frame

Illustrations: SEXTANTPARTS

There are seven sources of error in the marine sextant. Of the four errors listed, which one is adjustable?
Error of collimation

Illustrations: SEXTANTPARTS

Which is a nonadjustable error of the sextant?
Centering error

Illustrations: SEXTANTPARTS

Because of the reflecting properties of a sextant, if the sextant altitude reads 60° on the limb, the actual arc of the limb from 0° to the 60° reading is _____.

30°

Illustrations: SEXTANTPARTS

For a well made and well maintained sextant, the maximum value of which correction is usually so small that it can be ignored?

Instrument correction

Illustrations: SEXTANTPARTS

You are radar scanning for a buoy fitted with a racon. In illustration D017NG below, which radar screen represents the presentation you should expect on the PPI?

B

Illustrations: D017NG_WM_082918

See REF1003

Illustration D011NG below represents the geographic location of a vessel and the radar presentation at the same time. Which statement is TRUE?

A tangent bearing of the headland to the south-southeast should be corrected by adding one-half of the beam width.

Illustrations: D011NG_WM_082918

Illustration D011NG below represents the geographic location of a vessel and the radar presentation at the same time. Which statement is TRUE?

Ship No. 1 does not appear as an individual target due to the effect of beam width.

Illustrations: D011NG_WM_082918

How many degrees are there on a compass card?

360°

Illustrations: COMPASSROSE_WM

How many points are there in a compass card?

32

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading NNW?

337.5°

Illustrations: COMPASSROSE_WM

The heading of a vessel is indicated by what part of the compass?

Lubber's line

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading NW?

315.0°

Illustrations: COMPASSROSE_WM

A vessel heading NNW is on a course of _____.
337.5°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading SSW?
202.5°

Illustrations: COMPASSROSE_WM

A vessel heading NW is on a course of _____.
315.0°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading SW?
225.0°

Illustrations: COMPASSROSE_WM

A vessel heading NE is on a course of _____.
045.0°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading WSW?
247.5°

Illustrations: COMPASSROSE_WM

A vessel heading SSW is on a course of _____.
202.5°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading WNW?
292.5°

Illustrations: COMPASSROSE_WM

A vessel heading WSW is on a course of _____.
247.5°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading SSE?
157.5°

Illustrations: COMPASSROSE_WM

A vessel heading SSE is on a course of _____.
157.5°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading SE?
135.0°

Illustrations: COMPASSROSE_WM

A vessel heading ESE is on a course of _____.
112.5°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading ESE?
112.5°

Illustrations: COMPASSROSE_WM

A vessel heading NNE is on a course of _____.
022.5°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading ENE?
067.5°

Illustrations: COMPASSROSE_WM

A vessel heading SW is on a course of _____.
225.0°

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading NE?
045.0°

Illustrations: COMPASSROSE_WM

A vessel heading WNW is on a course of _____.
292.5°

Illustrations: COMPASSROSE_WM

A magnetic compass card is marked in how many degrees?
360

Illustrations: COMPASSROSE_WM

What is the compass course of a vessel heading NNE?
022.5°

Illustrations: COMPASSROSE_WM

A vessel heading SE is on a course of _____.
135.0°

Illustrations: COMPASSROSE_WM

Which of the following is a compass card without north-seeking capability that is used for relative bearings?
pelorus

Illustrations: COMPASSROSE_WM

A vessel heading ENE is on a course of _____.
067.5

Illustrations: COMPASSROSE_WM

A magnetic compass card is marked in how many degrees?
360

Illustrations: COMPASSROSE_WM

Eight points of a compass are equal to how many degrees?
90

Illustrations: COMPASSROSE_WM

The heading of a vessel is indicated by what part of the compass?
Lubber's line

Illustrations: COMPASSROSE_WM

One point of a compass is equal to how many degrees?
11.25

Illustrations: COMPASSROSE_WM

By convention, the south pole of a magnet is painted _____.
blue

Illustrations: ELECTROMAGNETISM-MAG3, EARTH_AS_A_MAGNET_22494

By convention, the north pole of a magnet is painted _____.
red

Illustrations: ELECTROMAGNETISM-MAG3, EARTH_AS_A_MAGNET_22494

By convention, the Earth's north magnetic pole is colored _____.
red

Illustrations: ELECTROMAGNETISM-MAG3, EARTH_AS_A_MAGNET_22494

By convention, the south seeking ends of a compass' magnets are colored _____.
blue

Illustrations: ELECTROMAGNETISM-MAG3, EARTH_AS_A_MAGNET_22494

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By convention, the Earth's north magnetic pole is colored _____.
red

Illustrations: ELECTROMAGNETISM-MAG3, EARTH_AS_A_MAGNET_22494

Vessels required to have an Automatic Radar Plotting Aid must have a device to indicate the _____.
speed of the vessel over the ground or through the water
See REF992

While underway, a vessel over 100,000 gross tons with an automatic identification systems (AIS) is expected to broadcast all of the following information every 1 to 10 seconds EXCEPT _____.
name of vessel

Yesterday your chronometer read 03h 01m 56s at the 1500 GMT time tick. Today your chronometer read 03h 01m 54s at the 1500 GMT time tick. What is the chronometer rate?
-2s

The spin axis of a gyroscope tends to remain fixed in space in the direction in which it is started. How does this gyroscope become north seeking so that it can be used as a compass?
By mechanically or electrically applying forces to precess the gyroscope

The difference in degrees between true north and magnetic north is called _____.
variation

The difference between magnetic heading and compass heading is called _____.
deviation

When changing from a compass course to a true course you should apply _____.
variation and deviation

Magnets are placed in horizontal trays in the compass binnacle to compensate for the _____.
permanent magnetism of the vessel
See REF998

A Doppler speed log indicates speed over ground _____.
in the bottom return mode
See REF999

Chart information details to be used in ECDIS should be the latest edition of information originated by a government-authorized hydrographic office and conform to the standards of (the) _____.
International Hydrographic Organization
See REF1000

When using an Electronic Plotting Aid (EPA), what should you consider in order to evaluate the information displayed?
Navigational constraints may require a target vessel to change course.

In modern fathometers the sonic or ultrasonic sound waves are produced electrically by means of a(n) _____.
transducer
See REF1001

You are enroute to assist vessel A. Vessel A is underway at 4.5 knots on course 233°T, and bears 264°T, 68 miles from you. What is the time to intercept if you make 13 Knots?
7h 37m

What is the approximate wave length of an X Band Radar operating on a frequency of approximately 9500 MHz?
3 cm

While navigating in fog off a coastline of steep cliffs, you hear the echo of the ships fog horn 2 1/2 seconds after the signal was sounded. What is the distance to the shore?
460 yards
See REF1007

Vessels required to have an Automatic Radar Plotting Aid must have a device to indicate the _____.
speed of the vessel over the ground or through the water
See REF992

While underway, automatic identification systems (AIS) broadcast all of the following information every 1 to 10 seconds EXCEPT the _____.
ship's scantlings

Yesterday your chronometer read 11h 59m 59s at the 1200 GMT time tick. Today the chronometer reads 11h 59m 57s at the 1200 time tick. What is the chronometer rate?
-2s

The directive force of a gyrocompass _____.
decreases with latitude, being maximum at the geographic equator
See REF996

To find a magnetic compass course from a true course you must apply _____.

deviation and variation

Deviation is the angle between the _____.

magnetic meridian and the axis of the compass card

The chart indicates the variation was 3°45'W in 1988, and the annual change is decreasing 6'. If you use the chart in 1991 how much variation should you apply?

3°27'W

Magnets in the binnacles of magnetic compasses are used to reduce the effect of _____.

deviation

See REF998

A Doppler log in the bottom return mode indicates the _____.

speed over the ground

See REF999

ECDIS must give an alarm for which of the following cases?

If the ship, within a specified time set by the watch officer, is going to cross the boundary of a prohibited area

When the specified limit for deviation from the planned route is exceeded

If the ship, within a specified time set by the watch officer, is going to cross a safety contour

All of the above.

See REF1000

Your Electronic Plotting Aid (EPA) has two guard zones. What is the purpose of the inner guard zone?

Warn of small targets that are initially detected closer than the outer guard zone

When using GPS without Selective Availability, you may expect your horizontal accuracy to be better than _____.

20 meters

You are enroute to assist vessel A. Vessel A is underway at 5.5 knots on course 033°T, and bears 248°T at 64 miles from you. What is the time to intercept if you make 13 knots?

3h 44m

You have another ship overtaking you close aboard to starboard. You have 3 radar targets bearing 090° relative at ranges of .5 mile, 1 mile, and 1.5 miles. In this case, the unwanted echoes are called _____.

multiple echoes

While navigating in fog off a coastline of steep cliffs, you hear the echo of the ships fog horn 2 seconds after the signal was sounded. What is the distance to the shore?

360 yards

See REF1007

Your ARPA has automatic speed inputs from the log. Due to currents, the log is indicating a faster speed than the speed over the ground. What should you expect under these circumstances?

The targets true course vector will be in error.

See REF992

Which information must automatic identification systems (AIS) automatically provide to appropriately equipped shore stations, vessels and aircraft?

Vessel's type

Vessel's course

Navigational status

All of the above.

Yesterday your chronometer read 11h 59m 58s at the 1200 GMT time tick. Today your chronometer reads 12h 00m 00s at the 1200 time tick. What is the chronometer rate?

+2s

Which statement about the gyrocompass is FALSE?

Its accuracy remains the same at all latitudes

The Flinders bar on a magnetic compass compensates for the _____.

induced magnetism in vertical soft iron

The horizontal angle between the magnetic meridian and the north-south line of the magnetic compass is _____.

deviation

The chart indicates the variation was 3°45'W in 1988, and the annual change is increasing 6'. If you use the chart in 1991 how much variation should you apply?

4°03'W

Permanent magnetism is caused by _____.

the earth's magnetic field affecting the ship's hard iron during construction

What will NOT induce errors into a Doppler sonar log?

Increased draft

See REF999

ECDIS must give an alarm for which of the following cases?

If the ship is going to reach a critical point on the planned route

See REF1000

Electronic Plotting Aid (EPA) has which built in functions?

Plots at least 10 targets at one time

Time of closest point of approach (TCPA)

Target trails

All of the above.

When navigating using GPS, what is an indicator of the geometry of the satellites that your receiver is locked onto?

Horizontal Dilution of Precision

When using the radar for navigating _____.

and using ranges, the most rapidly changing range should be measured first

You are enroute to assist vessel A. Vessel A is underway at 5.5 knots on course 033°T, and bears 284°T, 43 miles from you. What is the time to intercept if you make 16 knots?

2h 32m

An indirect radar echo is caused by a reflection of the main lobe of the radar beam off the observer's vessel. Which of the following is NOT a characteristic of indirect echoes?

They always appear on a bearing of 90° from the true bearing of the contact.

While navigating in fog off a coastline of steep cliffs, you hear the echo of the ships fog horn 3 1/2 seconds after the signal was sounded. What is the distance to the shore?

640 yards

See REF1007

Which ARPA data should you use in order to determine if a close quarters situation will develop with a target vessel?

Relative track information

See REF992

With respect to automatic identification systems (AIS) which of the following information is broadcast every one to ten seconds?

Navigational status

Yesterday your chronometer read 03h 01m 56s at the 1500 GMT time tick. Today your chronometer read 03h 01m 58s at the 1500 GMT time tick. What is the chronometer error?

01m 58s fast

A system of reservoirs and connecting tubes in a gyro compass is called a _____.

mercury ballistic

Which statement about the Flinders bar of the magnetic compass is CORRECT?

It compensates for the error caused by the vertical component of the Earth's magnetic field.

The compass deviation changes as the vessel changes _____.

heading

The chart indicates the variation was 3°45'E in 1988, and the annual change is increasing 6'. If you use the chart in 1991 how much variation should you apply?

4°03'E

At the magnetic equator there is no induced magnetism in the vertical soft iron because _____.

there is no vertical component of the Earth's magnetic field

You have replaced the chart paper in the course recorder. What is NOT required to ensure that a correct trace is recorded?

Test the electrical gain to the thermograph pens

See REF1000

ECDIS must give an alarm for which of the following cases?

When the specified limit for deviation from the planned route is exceeded

See REF1000

Electronic Plotting Aid (EPA) has which built in functions?

Target CPA and time of CPA (TCPA)

When using GPS, how many theoretical position lines are required for a two-dimensional fix?

3

Coral atolls, or a chain of islands at right angles to the radar beam, may show as a long line rather than as individual targets due to _____.

the effects of beam width

Your radar indicates a target; however, there is no visible object at the point indicated. A large mountain, approximately 50 miles away on the same bearing as the target, is breaking the horizon. You should suspect the radar target is caused by _____.

ducting

See REF1006

When using an ARPA, what should you consider in order to evaluate the information displayed?

Navigational constraints may require a target vessel to change course.

See REF992

With respect to automatic identification systems (AIS), which information is required to be broadcast every 1 to 10 seconds?

None of the above

Yesterday your chronometer read 02h 59m 58s at the 1500 GMT time tick. Today the chronometer reads 03h 00m 02s at the 1500 GMT time tick. What is the chronometer error?

02s fast

At the master gyrocompass, the compass card is attached to the _____.

sensitive element

A single vertical magnet placed underneath the compass in the binnacle is used to compensate for _____.

deviation caused by the vessel's inclination from the vertical

Deviation is caused by _____.

magnetic influence inherent to that particular vessel

Variation is a compass error that you _____.

cannot correct

The greatest directive force is exerted on the magnetic compass when the _____.

vessel is near the magnetic equator

If the electronic chart is part of an ECDIS, it must display the minimum data required by IMO/IHO, to include all of the following EXCEPT _____.

tidal currents

See REF1000

ECDIS must have the capability to preserve the record of the voyage track for the previous _____.

12 hours

See REF1000

When using the Electronic Plotting Aid (EPA) in heavy rain, which action should you take?

Navigate as though the effective range of the radar has been reduced.

Which theoretical minimum number of measurements from satellites does a GPS receiver need in order to provide an exact three-dimensional position?

Four

You are enroute to assist vessel A. Vessel A is underway at 6 knots on course 133°T, and bears 042° at 105 miles from you. What is the course to steer at 10 knots to intercept vessel A?

079°

The signal from a ramark will show on the PPI as a _____.

radial line from the transponder to the center of the PPI

See REF1004

You have been observing your radar screen and notice that a contact on the screen has remained in the same position, relative to you, for several minutes. Your vessel is making 10 knots through the water. Which statement is TRUE?

The contact is on the same course and speed as your vessel.

The ARPA may swap targets when automatically tracking if two targets _____.

pass close together

See REF992

With respect to automatic identification systems (AIS), which information is expected to be broadcast every 1 to 10 seconds?

Latitude and longitude

Navigational status

Rate of turn

All of the above.

Chronometer error may be found by _____.

radio time signal

applying the prevailing chronometer rate to previous readings

comparison with a timepiece of known error

All of the above.

Indications of the master gyrocompass are sent to remote repeaters by the _____.

transmitter

The principal purpose of magnetic compass adjustment is to _____.

reduce the deviation as much as possible

Deviation in a compass is caused by the _____.

influence of the magnetic materials of the vessel

Error may be introduced into a magnetic compass by _____.

making a structural change to the vessel

a short circuit near the compass

belt buckles

All of the above.

The magnetic compass magnets are acted on by the horizontal component of the Earth's total magnetic force. This magnetic force is GREATEST at the _____.

magnetic equator

Which of the following must the electronic chart of an ECDIS display, as required by IMO/IHO?

Hydrography

Regulatory boundaries

Ferry routes

All of the above.

See REF1000

Which data must ECDIS be able to record at one-minute intervals?

Position

Course made good history

Electronic navigational chart source

All of the above.

See REF1000

The speed of sound through ocean water is nearly always _____.

faster than the speed of calibration for the fathometer

See REF1001

With regard to GPS, a civilian receiver may be capable of achieving the same accuracy as a military receiver if _____.

selective availability is set to zero

You are approaching a light fitted with a RACON. The light may be identified on the radar by _____.
a coded signal appearing on the same bearing at a greater range than the light
See REF1003

A radar display which is oriented, so that north is always at the top of the screen, is called a(n) _____.
stabilized display

Your ARPA has two guard zones. What is the purpose of the inner guard zone?
Warn of small targets that are initially detected closer than the outer guard zone
See REF992

With respect to automatic identification systems (AIS), which information is required to be broadcast every 1 to 10 seconds?
Time stamp

A marine chronometer should be rewound once every _____.
day

Gyrocompass repeaters reproduce the indications of the master gyrocompass. They are _____.
accurate electronic servomechanisms

When adjusting a magnetic compass for error, a deviation table should be made _____.
after adjusting the fore-and-aft and athwartships permanent magnets

Variation in a compass is caused by _____.
magnetism from the earth's magnetic field

The lubber's line on a magnetic compass indicates _____.
the direction of the vessel's head

Magnetism which is present only when the material is under the influence of an external field is called _____.
induced magnetism

ECDIS units incorporate Digital Chart Data Formats, which include _____.
vector and raster
See REF1000

Which data must ECDIS be able to record at one-minute intervals?
Course made good history
See REF1000

When operated over a muddy bottom, a fathometer may indicate _____.
two depth readings
See REF1001

Which feature, when set to zero, might allow a GPS unit to have an accuracy equivalent to Precise Positioning Service receiver capability?
Selective Availability

You are enroute to assist vessel A. Vessel A is underway at 5 knots on course 063°T, and bears 136°T at 78 miles from you. What is the course to steer and running time at 13 knots to intercept vessel A?
115°, 7h 20m

You are using a radar in which your own ship is shown at the center, and the heading flash always points to 0°. If bearings are measured in relation to the flash, what type of bearings are produced?

Relative

What is TRUE of the history display of a target's past positions on an ARPA?

In the true presentation, it provides a quick visual check to determine if a vessel has changed course.

See REF992

Automatic identification systems (AIS) are required to _____.

receive safety-related information automatically from similarly equipped vessels

exchange safety-related information with shore-based facilities

provide safety-related information automatically to shore stations, other vessels and aircraft

All of the above.

When using a mechanical (windup type) marine chronometer, how often should it be reset?

Only when it is overhauled

Compass deviation is caused by _____.

magnetism within the vessel

See REF997

Deviation which is maximum on intercardinal compass headings may be removed by the _____.

soft iron spheres on the sides of the compass

Magnetic variation changes with a change in _____.

the vessel's position

The MOST important feature of the material used for making the binnacle of a standard magnetic compass is that it is

nonmagnetic

Induced magnetism is found in _____.

soft iron

Raster-scan chart data is _____.

a digitized "picture" of a chart in one format and one layer

See REF1000

Which of the following must an ECDIS system be able to perform?

Conversion of "graphical coordinates" to "display coordinates"

Transformation of local datum to WGS-'84 datum

Calculation of true azimuth and distance between two geographical points

All of the above.

See REF1000

Which factor has the greatest effect on the amount of gain required to obtain a fathometer reading?

Type of bottom

See REF1001

The highest level of commercial navigational accuracy is provided by _____.

DGPS, within a coverage area

You are enroute to assist vessel A. Vessel A is underway at 5.5 knots on course 033°T, and bears 284°T at 43 miles from you. What is the course to steer and running time at 16 knots to intercept vessel A?

303°, 2h 32m

Your radar is set on a true motion display. Which of the following will appear to move across the PPI scope ?

Own ship's marker

See REF1005

When using the ARPA in heavy rain, which action should you take?

Navigate as though the effective range of the radar has been reduced.

See REF992

The short text messaging feature of the automatic identification system (AIS) allows for messages of up to _____.
158 characters

Yesterday your chronometer read 11h 59m 59s at 1200 GMT time tick. Today the chronometer reads 12h 00m 01s at the 1200 GMT tick. What is the chronometer rate?

+2s

Compass error is equal to the _____.

combined variation and deviation

See REF997

Before a magnetic compass is adjusted certain correctors must be checked to ensure that they are free of permanent magnetism. These correctors are the _____.

Flinders bar and quadrantal spheres

Variation is not constant; it is different with every change in _____.

geographical location

Which would influence a magnetic compass?

Electrical wiring

Iron pipe

Radio

All of the above.

The line which connects the points of zero magnetic dip is _____.

the magnetic equator

Which of the following are data layer categories to be displayed on ECDIS?

ECDIS warnings and messages

Notice to Mariners information

Hydrographic Office data

All of the above.

See REF1000

ECDIS must be able to perform all of the following EXCEPT _____.

determine magnetic compass deviation

See REF1000

The speed of sound in water is approximately _____.

4.5 times its speed in air

See REF1001

A low HDOP (Horizontal Dilution of Precision) number such as 2 indicates a _____.

good fix

You are approaching a sea buoy which emits a racon signal. This signal is most frequently triggered by which type of radar?

3 cm

Your radar displays your ship off center. As you proceed on your course, your ship's marker moves on the PPI scope while echoes from land masses remain stationary. What is this display called?

True motion

See REF1005

The typical operating range of automatic identification systems (AIS) at sea is nominally _____.

20-25 nm

Which of the following statements is TRUE regarding automatic identification systems (AIS)?

AIS is a short-range VHF-FM system that automatically broadcasts a vessel's position, course, speed and other safety related information to all those with similar equipment in the area.

Quadrantal error in a gyrocompass has its GREATEST effect on which of the following

on intercardinal headings

See REF994

Error may be introduced into a magnetic compass by _____.

belt buckles

making a structural change to the vessel

a short circuit near the compass

All of the above.

The Flinders bar and the quadrantal spheres should be tested for permanent magnetism at what interval?

Annually

If a magnetic compass is not affected by any magnetic field other than the Earth's, which statement is TRUE?

Compass error and variation are equal.

As a vessel changes course to starboard, the compass card in a magnetic compass _____.

remains aligned with compass north

The line connecting the points of the earth's surface where there is no dip is the _____.

magnetic equator

Which of the following data layer categories is NOT displayed on ECDIS?

Ship hydrodynamic information

See REF1000

What will cause the Electronic Plotting Aid (EPA) to emit a visual alarm, audible alarm, or both?

A tracked target entering your preset CPA-TCPA limits

When using an echo sounder in deep water, it is NOT unusual to _____.

receive a strong return at about 200 fathoms (366 meters) during the day, and one nearer the surface at night

See REF1001

Which statement concerning GPS is TRUE?

It may be suspended without warning.

In order to insure that the racon signal is visible on your 3 cm radar, the _____.

rain clutter control should be off but, if necessary, may be on low

Your radar has a beam width of 2°. The radar gyro bearing of the right tangent of an island is 316°. The gyro error is 1°E. Which true bearing should be plotted on the chart?

316°

See REF1005

In general, on how many radio channels will an automatic identification system (AIS) operate?

2

See REF993

Which of the following statements is TRUE regarding automatic identification systems (AIS)?

AIS provides near real-time information regarding another vessel's speed over ground and heading regardless of visibility.

What is the gyrocompass error resulting from your vessel's movement in OTHER than an east-west direction?

speed error

The quadrantal spheres are used to _____.

remove deviation on the intercardinal headings

The total magnetic effects which cause deviation of a vessel's compass can be broken down into a series of components which are referred to as _____.

coefficients

The compass error of a magnetic compass that has no deviation is _____.

equal to variation

The permanent magnetism of a vessel may change in polarity due to _____.

being moored on a constant heading for a long period of time

a collision with another vessel

being struck by lightning

All of the above.

The points on the earth's surface where the magnetic dip is 90° are _____.

the magnetic poles

What is an advantage of the magnetic compass aboard vessels?

It is reliable due to its essential simplicity.

An ECDIS is required to display which information?

Hydrographic data

See REF1000

An Electronic Plotting Aid (EPA) will drop off a target's vector if more than _____ minutes elapse between each manual plot.

10

If a sound signal is emitted from the oscillator of a fathometer, and two seconds elapse before the returning signal is picked up, what depth of water is indicated?

824 fathoms

See REF1001

Most GPS receivers use the Doppler shift of the carrier phase to compute _____.

Speed

You are enroute to assist vessel A. Vessel A is underway at 4.5 knots on course 233°T, and bears 264°T at 68 miles from you. What is the course to steer and running time at 13 knots to intercept vessel A?

254°, 7h 37m

The beam width of your radar is 2°. The left tangent bearing of a small island, as observed on the PPI scope, is 056°pgc. If the gyro error is 2°E, what bearing would you plot on the chart?

059°

While navigating in fog off a coastline of steep cliffs, you hear the echo of the ships fog horn 5.5 seconds after the signal was sounded. What is the distance to the shore?

3072 ft (936 meters)

See REF1007

An automatic identification system (AIS) transponder transmits and receives information broadcasts on _____?

VHF maritime band

Which of the following statements is TRUE regarding automatic identification systems (AIS)?

AIS provides the other vessel's identity, dimensions and navigational status regardless of visibility.

If the gyrocompass error is east, what describes the error and the correction to be made to gyrocompass headings to obtain true headings?

The readings are too low (small numerically) and the amount of the error must be added to the compass to obtain true

The purpose of the soft iron spheres mounted on arms on the binnacle is to compensate for _____.

induced magnetism in the horizontal soft iron

Magnetic compass deviation _____.

is the angular difference between magnetic north and compass north

When crossing the magnetic equator the _____.

heeling magnet should be inverted

Which would influence a magnetic compass?

Radio

Iron pipe

Electrical wiring

All of the above.

The vertical angle between the horizontal and the magnetic line of force is the _____.

dip

When a magnetic compass is not in use for a prolonged period of time it should _____.

be shielded from direct sunlight

An ECDIS is required to display which information?

Soundings

See REF1000

What option does an Electronic Plotting Aid (EPA) not have?

Trial Maneuver

When using a recording depth finder in the open ocean, what phenomena is most likely to produce a continuous trace that may not be from the actual ocean bottom?

Echoes from a deep scattering layer

See REF1001

Which type of GPS receiver has at least four channels to process information from several satellites simultaneously?
Continuous

You are enroute to assist vessel A. Vessel A is underway at 4.5 knots on course 233°T, and bears 346°T at 68 miles from you. What is the course to steer at 13 knots to intercept vessel A?
327°

The radar control used to reduce sea return at close ranges is the _____.
sensitivity time control

You are approaching Chatham Strait from the south in foggy weather. You have Coronation Island and Hazy Islands on the radar. Suddenly the radar malfunctions. You then resort to using whistle echoes to determine your distance off Coronation Island. Your stopwatch reads 16.3 seconds for the echo to be heard. How far are you off Coronation Island?
1.5 miles
See REF1007

What does an automatic identification system (AIS) transponder use to transmit and receive information broadcasts?
161.975 Mhz and 162.025 Mhz

Which of the following statements is TRUE regarding automatic identification systems (AIS)?
AIS can be used to make passing arrangements via ship-to-ship text messaging but a vessel operator is not relieved from the requirement to sound whistle signals or make arrangements via bridge-to-bridge radiotelephone.

Which statement about gyrocompass error is TRUE?
The amount of the error and the sign will generally be the same on all headings.

Variation is the angular measurement between _____.
magnetic meridian and the geographic meridian

If a ship is proceeding towards the magnetic equator, the uncorrected deviation due to permanent magnetism _____.
decreases

What are the only magnetic compass correctors that correct for both permanent and induced effects of magnetism?
Heeling magnets

How can the permanent magnetism of a vessel change in strength?
Welding and major structural repair

Magnetic dip is a measurement of the angle between the _____.
horizontal and the magnetic line of force

An ECDIS is required to display which information?
Depth contours
See REF1000

Vessel required to have an Electronic Plotting Aid (EPA) must have a device to indicate the _____.
speed of the vessel over the ground or through the water

What should you apply to a fathometer reading to determine the depth of water?
Add the draft of the vessel.
See REF1001

What does not contribute to the commercial GPS receiver position error?

Ship's speed

You are enroute to assist vessel A. Vessel A is underway at 5.5 knots on course 033°T, and bears 248°T at 64 miles from you. What is the course to steer at 13 knots to intercept vessel A?

262°

When you turn on the fast time constant (differentiator) control of a radar it will _____.

reduce clutter over the entire PPI by shortening the echoes

While navigating in fog off a coastline of steep cliffs, you hear the echo of the ship's fog horn 6 seconds after the signal was sounded. What is the distance to the shore?

1100 yards

See REF1007

With respect to automatic identification systems (AIS), which information is expected to be broadcast every 1 to 10 seconds?

Ship's heading

Which of the following statements is TRUE regarding automatic identification systems (AIS)?

The master may, at his/her discretion, turn off the AIS if he/she believes that it may compromise the safety or security of the vessel.

Which of the following is the most accurate method of determining gyrocompass error while underway?

comparing the gyro azimuth of a celestial body with the computed azimuth of the body

Which compensates for induced magnetism in the horizontal soft iron of a vessel?

Iron spheres mounted on the binnacle

If a ship is proceeding towards the magnetic equator, which is TRUE concerning the uncorrected deviation due to permanent magnetism?

The deviation will decrease

Which compensates for errors introduced when the vessel heels over?

A single vertical magnet beneath the compass

The lubber's line on a magnetic compass indicates _____.

the direction of the vessel's head

What is the basic principle of the magnetic compass?

Magnetic materials of the same polarity repel each other and those of opposite polarity attract

When a magnetic compass is not in use for a prolonged period of time it should _____.

be shielded from direct sunlight

The database resulting from (1) the transformation of the electronic navigational chart (ENC) by ECDIS for appropriate use, (2) the updates to the ENC by appropriate means, and (3) the additional data added by the mariner, is called the _____.

system electronic navigational chart

See REF1000

How many targets can an Electronic Plotting Aid (EPA) track at the same time?

20

All echo-sounders can measure the _____.

actual depth of water below keel

See REF1001

With respect to failure warnings and status indications, GPS receivers should provide, at a minimum, _____.

an indication within 5 seconds if the specified HDOP has been exceeded

a differential GPS status indication of the receipt of DGPS signals

a warning of loss of position

All of the above.

You are enroute to assist vessel A. Vessel A is underway at 6 knots on course 133°T, and bears 343°T at 92 miles from you. What is the course to steer at 9 knots to intercept vessel A?

003°

The radar control that shortens all echoes on the display and reduces clutter caused by rain or snow is the _____.

fast time constant (differentiator)

While navigating in fog off a coastline of steep cliffs, you hear the echo of the ship's fog horn 4 1/2 seconds after the signal was sounded. What is the distance to the shore?

825 yards

See REF1007

What will cause the ARPA to emit a visual alarm, audible alarm, or both?

A tracked target entering your preset CPA-TCPA limits

See REF992

With respect to automatic identification systems (AIS), which information is required to be broadcast every 1 to 10 seconds?

Course over ground and MMSI

Time signals broadcast by WWV and WWVH are transmitted _____.

continuously throughout day

How can the accuracy of an azimuth circle be checked?

comparing observed azimuths at different altitudes with computed values at the times of observation to see if the difference is constant

See REF995

True heading differs from magnetic heading by _____.

variation

If the compass heading and the magnetic heading are the same then _____.

there is no deviation on that heading

Heeling error is defined as the change of deviation for a heel of _____.

1° While the vessel is on a compass heading of 000°

The permanent magnetism of a vessel may change in polarity due to _____.

major structural repair

A Doppler log in the volume reverberation mode indicates _____.

speed through the water

See REF999

The database information that should be shown when a chart is first displayed on ECDIS is the _____.

standard display information

See REF1000

Your Electronic Plotting Aid (EPA) has automatic speed inputs from the log. Due to currents, the log is indicating a faster speed than the speed over the ground. What should you expect under these circumstances?

The targets true course vector will be in error.

An electronic depth finder operates on the principle that _____.

sound waves travel at a constant speed through water

See REF1001

With respect to failure warnings and status indications, GPS receivers should provide, at a minimum, _____.

a warning of loss of position

You are enroute to assist vessel A. Vessel A is underway at 6 knots on course 133°T, and bears 042°T, 105 miles from you. What is the time to intercept if you make 10 knots?

12h 58m

The radar control that reduces weak echoes out to a limited distance from the ship is the _____.

sensitivity time control (sea-clutter control)

While navigating in fog off a coastline of steep cliffs, you hear the echo of the ship's fog horn 4 seconds after the signal was sounded. What is the distance to the shore?

730 yards

See REF1007

Your ARPA has been tracking a target and has generated the targets course and speed. The radar did not receive a target echo on its last two scans due to the weather. What should you expect under these circumstances?

The ARPA will generate data as if the target was still being tracked by radar.

See REF992

Automatic identification systems (AIS) are expected to broadcast all of the following information EXCEPT _____.

port of origin

Yesterday you took a time tick using the 1200 GMT broadcast, and the chronometer read 11h 59m 59s. Today at the 1200 GMT time tick the chronometer read 00h 00m 01s. What is the chronometer error?

Fast 1 second

The reaction of a gyrocompass to an applied force is known as _____.

precession

The vertical component of the Earth's magnetic field causes induced magnetism in vertical soft iron. This changes with latitude. What corrects for this coefficient of the deviation?

The Flinders bar

If the magnetic heading is greater than the compass heading, the deviation is _____.

east

The standard magnetic compass heading differs from the true heading by _____.

compass error

The permanent magnetism of a vessel may change in polarity due to _____.

being struck by lightning

A Doppler speed log indicates speed through the water _____.

in the volume reverberation mode

See REF999

The level of database information which cannot be removed from the ECDIS display and consists of information which is required at all times in all geographic areas and under all circumstances is the _____.

display base information

See REF1000

Which Electronic Plotting Aid (EPA) data should you use in order to determine if a close quarters situation will develop with a target vessel?

Initial range of acquisition

The recording fathometer produces a graphic record of the _____.

depth underneath the keel against a time base

See REF1001

A hand held instrument used to measure distances between objects and the ship is a _____.

stadimeter

See REF1002

You are enroute to assist vessel A. Vessel A is underway at 6 knots on course 133°T, and bears 343°T at 92 miles from you. What is the time to intercept if you make 9 knots?

6h 43m

Radar makes the most accurate determination of the _____.

distance to a target

While navigating in fog off a coastline of steep cliffs, you hear the echo of the ship's fog horn 3 seconds after the signal was sounded. What is the distance to the shore?

550 yards

See REF1007

REF1000

An electronic chart display and information system (ECDIS) is an electronic chart system which satisfies the IMO SOLAS convention carriage requirements for corrected paper charts when used with an ENC or its functional equivalent (e.g. NIMA Digital Nautical Chart.)

REF1001

Speed of Sound In air = 1120 ft/sec or .18667 NM/sec In water - 4800 ft/sec or .8 NM/sec Using the Fathometer Use the fathometer to determine whether the depth of water under the keel is sufficient to prevent the ship from grounding and to check the actual water depth with the charted water depth at the fix position. The navigator must compare the charted sounding at every fix position with the fathometer reading and report to the captain any discrepancies. Taking continuous soundings in restricted waters is mandatory. If the warning sounding is received, then slow the ship, fix the ship's position more frequently, and proceed with extreme caution. Ascertain immediately where the ship is in the channel; if the minimum expected sounding was noted correctly, the warning sounding indicates the vessel may be leaving the channel and standing into shoal water. Notify the vessel's captain and conning officer immediately. If the danger sounding is received, take immediate action to get the vessel back to deep water. Reverse the engines and stop the vessel's forward movement. Turn in the direction of the deepest water before the vessel loses steerageway. Consider dropping the anchor to prevent the ship from drifting aground. The danger sounding indicates that the ship has left the channel and is standing into immediate danger. It requires immediate corrective action by the ship's conning officer, navigator, and captain to avoid disaster. Many underwater features are poorly surveyed. If a fathometer trace of a distinct underwater feature can be obtained along with accurate position information, send the fathometer trace and related navigational data to NIMA for entry into the Digital Bathymetric Data Base.

REF1002

A stadimeter is an optical device for estimating the range to an object of known height by measuring the angle between the top and bottom of the object as observed at the device. It is similar to a sextant, in that the device is using mirrors to measure an angle between two objects but differs in that one dials in the height of the object. It is one of several types of optical rangefinders, and does not require a large instrument, and so was ideal for hand-held implementations.

REF1003

Aids to navigation may be enhanced by the use of radar beacons (racons) . Racons, when triggered by pulses from a vessel's radar, will transmit a coded reply to the vessel's radar. This reply serves to identify the racon station by exhibiting a series of dots and dashes which appear on the radar display emanating radially from the racon. This display will represent the approximate range and bearing to the racon. Although racons may be used on both laterally significant and non-laterally significant aids to navigation, the racon signal itself is for identification purposes only, and therefore carries no lateral significance. Racons are also used as bridge marks to mark the point of best passage.

REF1004

A Ramark is a type of radar beacon occasionally used to mark maritime navigational hazards. The word is an acronym for RADAR MARKer. They are wide-band beacons which transmit either continuously or periodically on the radar bands.

REF1005

True Motion Display: A type of radarscope display in which own ship and other moving contacts move on the PPI in accordance with their true courses and speed. This display is similar to a navigational (geographical) plot. See RELATIVE MOTION DISPLAY. Relative Motion Display: A type of radarscope display in which the position of own ship is normally fixed at the center of the PPI (some sets have off-center capability in relative mode of operation) and all detected objects or contacts move relative to own ship.

REF1006

Duct: A layer within the atmosphere where refraction and reflection results in the trapping of radar waves, and consequently their propagation over abnormally long distances. Ducts are associated with temperature inversions in the atmosphere.

REF1007

Speed of Sound In air = 1120 ft/sec or .18667 NM/sec In water - 4800 ft/sec or .8 NM/sec

REF992

A marine radar with automatic radar plotting aid (ARPA) capability can create tracks using radar contacts. The system can calculate the tracked object's course, speed and closest point of approach (CPA), thereby knowing if there is a danger of

collision with the other ship or landmass.

REF993

Although only one radio channel is necessary, each station transmits and receives over two radio channels to avoid interference problems, and to allow channels to be shifted without communications loss from other ships.

REF994

Quadrantal error has two causes. The first occurs if the center of gravity of the gyro is not exactly centered in the phantom. This causes the gyro to tend to swing along its heavy axis as the vessel rolls in the sea. It is minimized by adding weight so that the mass is the same in all directions from the center.

REF995

azimuth circle. A ring designed to fit snugly over a compass or compass repeater, and provided with means for observing compass bearings and azimuths. A similar ring without the means for observing azimuths of the sun is called a BEARING CIRCLE.

REF996

The American Practical Navigator, 2002 edition, states the following on page 94: "The directive force is maximum at the equator and decreases to zero at the poles."

REF997

Deviation A ship's magnetic influence will generally cause the compass needle to deflect from the magnetic meridian. This angle of deflection is called deviation. If the north end of the needle points east of the magnetic meridian, the deviation is easterly; if it points west of the magnetic meridian, the deviation is westerly. Heading relationships A summary of heading relationships follows : (1) Deviation is the difference between the compass heading and the magnetic heading. (2) Variation is the difference between the magnetic heading and the true heading. (3) Algebraic sum of deviation and variation is the compass error. The following simple rules will assist in naming errors and in converting from one heading expression to another: (1) Compass least (less than magnetic heading), deviation east. Compass best (greater than magnetic heading) deviation west (2) In correcting (going from compass to magnetic to true), apply the sign algebraically (+ East, -West) . In uncorrecting (going from true to magnetic to compass), reverse the sign (-East; + West) Variation Variation is the angle between the magnetic meridian and the true meridian, measured from true north. If this angle is to the right of the true meridian, the variation is easterly, and if the angle is to the left of the true meridian, the variation is westerly. The local variation and its small annual change are noted on the compass rose of all navigational charts. Thus the true and magnetic headings of a ship differ by the local variation.

REF998

A binnacle is a waist-high case or stand on the deck of a ship, generally mounted in front of the helmsman, in which navigational instruments are placed for easy and quick reference as well as to protect the delicate instruments. Its traditional purpose was to hold the ship's magnetic compass, mounted in gimbals to keep it level while the ship pitched and rolled. The construction of many early (mid-18th century) binnacles used iron nails, which were later discovered to cause magnetic deviations in compass readings. As the development of the compass and understanding of magnetism progressed, greater attention was given to binnacle construction to avoid compass disturbances caused by iron. 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 spheres. These are colloquially known as "Kelvin's balls"[1] in the UK, and "navigator's balls" in the United States. Unlike most display binnacles today, which have the balls painted red and green to represent port and starboard side of the vessel, the balls were painted black or some other uniform color.

REF999

Doppler log is an instrument, used in ships, to measure ship's relative speed with water (in which it is travelling) by the use of Doppler effects on transmitted/reflected sound waves. Display of a dual axis Doppler speed log which shows the vessels movement in the Fore and Aft as well as the Athwartship direction.