U.S.C.G. Merchant Marine Exam

MODU - Chief Engineer

Q750 General Subjects

(Sample Examination)
Choose the best answer to the following Multiple Choice Questions:

1. A hydraulic fluid flow control circuit, used to control linear actuator speed during retraction, with the pump operating at above maximum pressure, is known as a __________.
   - (A) metered-out circuit
   - (B) bleed-off circuit
   - (C) metered-in circuit
   - (D) bleed-in circuit
   
   *If choice A is selected set score to 1.*

2. The line labeled “E”, as shown in the illustration, would be identified as the _______. Illustration GS-0175
   - (A) processed water outlet line
   - (B) waste oil outlet line
   - (C) oily bilge water inlet line
   - (D) clean water inlet line
   
   *If choice C is selected set score to 1.*

3. As shown in the illustration, a section of standard weight, seamless steel pipe, has an external diameter of 4.0 inches. When the pipe, is bent into a 90 degree turn, the length of the outside edge of the curve "A-B" will exceed the length of the inside edge of the curve "C-D" by __________.
   Illustration GS-0108
   - (A) 1.05 inches
   - (B) 1.25 inches
   - (C) 2.67 inches
   - (D) 6.28 inches
   
   *If choice D is selected set score to 1.*

4. What is the length of the stud used to secure the packing gland shown in the illustration? Illustration GS-0012
   - (A) 1 inch
   - (B) 1 1/4 inches
   - (C) 1 1/2 inches
   - (D) 2 1/2 inches
   
   *If choice D is selected set score to 1.*
5. A water line ruptures under pressure and floods the engine room causing $30,000(USD) damage to the machinery. By law, this must be reported to the __________.

- (A) engine manufacturer
- (B) insurance underwriter
- (C) U.S. Coast Guard
- (D) owner or his agent

If choice C is selected set score to 1.

6. Packing extremely soft grease into a roller bearing will cause __________.

- (A) emulsification of the thickener additive
- (B) gelling of the base oil
- (C) high temperatures to develop as result of churning
- (D) excessive channeling of the grease

If choice C is selected set score to 1.

7. The size of ball and roller bearings can be identified by the __________.

- (A) manufacturer's numerical code
- (B) outer ring width
- (C) rolling member size
- (D) inner race cone width

If choice A is selected set score to 1.

8. Which of the following statements is true concerning the application for an isochronous governor?

- (A) An isochronous governor is ideally suited for a ship’s geared propulsion drive driving through a fixed pitch propeller.
- (B) An isochronous governor is ideally suited for a pump drive associated with maintaining a constant pump discharge pressure.
- (C) An isochronous governor is ideally suited for a ship’s direct-reversible propulsion drive driving through a fixed pitch propeller.
- (D) An isochronous governor is ideally suited for a ship’s service alternator drive associated with maintaining a constant system frequency.

If choice D is selected set score to 1.
9. What statement is true concerning the door interlock devices associated with a winding drum or traction drive passenger elevator onboard ship?

- (A) Door interlocks are used to over-ride elevator emergency status in a shipboard emergency when elevators are required to be used.
- (B) Door interlocks are used to prevent elevator operation in a shipboard emergency when elevators are not to be used.
- (C) Door interlocks are used to prevent elevator operation if the doors are still open and only allow elevator operation if the doors are proved closed.
- (D) Door interlocks are used to prevent elevator operation if the doors are still closed and only allow elevator operation if the doors are proved open.

*If choice C is selected set score to 1.*

10. Hydraulically, servo-operated, automatic, change over valves, utilized in a two ram hydraulic steering gear, serve to __________.

- (A) prevent both units from operating simultaneously which could result in doubling the flow of oil and pressure leading to over pressurization of the system
- (B) allow an alternate main pump to start in the fully loaded condition thus developing immediate full torque
- (C) prevent either main pump from being hydraulically motored when idle by cross pressure flow
- (D) all of the above

*If choice C is selected set score to 1.*

11. When new piping sections have been fabricated for installation in a hydraulic system, prior to installation the piping should be __________.

- (A) hydrostatically tested to 100% of maximum working pressure
- (B) descaled by using a pickling solution
- (C) cleaned using a water-based detergent
- (D) all of the above

*If choice B is selected set score to 1.*

12. A hydraulic cylinder is fitted with a cushioning device. The piston abruptly slows towards the end of its stroke, then continues to creep to the completion of its stroke. Which of the following represents the probable cause?

- (A) The exhaust oil is flowing freely through the cushion nose.
- (B) The cushion adjustment needle valve is not open sufficiently.
- (C) The cushion adjustment needle valve is open too far.
- (D) The rod wiper is jammed in the cushion spear.

*If choice B is selected set score to 1.*
13. If oil under pressure is supplied to the area noted as "N" on the vane in the illustration __________. Illustration GS-0116
   - (A) "O" will rotate clockwise as oil is returned from the area between "M" and "I"
   - (B) "O" will be hydraulically locked in place even though oil is returned to the main pump from the area between "M" and "I"
   - (C) "O" will rotate counter-clockwise as oil is returned from the area between "M" and "I"
   - (D) "Q" will rotate counter-clockwise as oil is returned from the area between "M" and "I"

   If choice C is selected set score to 1.

14. As chief engineer, to prevent the motorization of an alternator what safety device would you have checked quarterly?
   - (A) The reverse power relay.
   - (B) The overcurrent relay.
   - (C) The high load alarm point for the alternator.
   - (D) The high frequency alarm for the alternator.

   If choice A is selected set score to 1.

15. As shown in the illustrated alternator protection scheme diagram, under what circumstances would an earth leakage relay (EL) be used? Illustration EL-0067
   - (A) in high voltage systems with a high impedance earthing resistor or transformer
   - (B) in ungrounded low voltage systems
   - (C) in high voltage systems with a low impedance earthing resistor or transformer
   - (D) in grounded low voltage systems

   If choice A is selected set score to 1.

16. By what means should motor controller contacts be routinely cleaned?
   - (A) wiping with a clean dry cloth
   - (B) dressing with crocus cloth
   - (C) blowing with compressed air
   - (D) filing with a bastard file

   If choice A is selected set score to 1.

17. If the motor of the illustrated circuit fails to start and gives a loud hum when the start button is pushed, what is most likely the problem? Illustration EL-0007
   - (A) an open main contactor "M" coil
   - (B) an open overload "OL" heater
   - (C) the disconnect switch "DS" is open
   - (D) an open overload "OL" relay contact

   If choice B is selected set score to 1.
18. Which of the following electric propulsion motor types requires no brushes or electrical connections to the rotor?

- (A) AC squirrel cage induction motor
- (B) AC wound rotor induction motor
- (C) DC shunt wound motor
- (D) AC synchronous motor

*If choice A is selected set score to 1.*

19. Which of the listed classes of electrical insulation is suited for the highest operating temperature?

- (A) Class 90 (O)
- (B) Class 105 (A)
- (C) Class 130 (B)
- (D) Class 180 (H)

*If choice D is selected set score to 1.*

20. To check the three line fuses protecting a three-phase motor using a multimeter set up as a voltmeter, what should be done FIRST?

- (A) place the starter in the "stop" position
- (B) place the leads across the bottom ends of the fuses
- (C) make sure the motor is operating at full load to guard against a false reading
- (D) place the leads across the "hot" ends of the fuses

*If choice A is selected set score to 1.*

21. Which of the following actions can be carried out in order to prevent thermal runaway in a transistor?

- (A) Increase the potential difference between the emitter and the base.
- (B) Install a heat sink.
- (C) Shift the "Q" point to increase collector current.
- (D) Increase the current through the collector-base junction.

*If choice B is selected set score to 1.*

22. When troubleshooting a printed circuit board, one technique that can be used is component substitution. Upon what basis would a suspected defective component be substituted with a known good component?

- (A) Methodical substitution of components starting at one end of the board and working towards the opposite end.
- (B) Component substitution is not recommended as a troubleshooting technique.
- (C) Random substitution of components in no particular pattern.
- (D) Visual inspection of components or the use of live signal tracing with test instruments.

*If choice D is selected set score to 1.*
23. What statement is true concerning temporary protective grounds used to establish an equipotential zone for the purposes of eliminating the electric shock hazard?

- (A) A shock hazard exists when there is a difference in potential between conductors or a conductor and hull ground.
- (B) A shock hazard exists when there is no difference in potential between conductors or a conductor and hull ground.
- (C) A shock hazard exists only when there is a difference in potential between a conductor and hull ground.
- (D) A shock hazard exists only when there is a difference in potential between conductors.

*If choice A is selected set score to 1.*

24. In order for a live-line tester to be used to test and prove dead a high voltage circuit, what must be done to verify the ability of the tester to detect a voltage?

- (A) The live-line tester should be checked by connecting to a known high voltage source before and after the circuit to be worked upon is tested.
- (B) The live-line tester need not be checked prior to testing the circuit to be worked upon as long as it has not been declared inoperative.
- (C) The live-line tester should be checked by connecting to a known high voltage source only before testing the circuit to be worked upon.
- (D) The live-line tester should be checked by connecting to a known high voltage source only after testing the circuit to be worked upon.

*If choice A is selected set score to 1.*

25. If a mechanical mouse of a computer workstation is operating erratically, what maintenance should be performed?

- (A) Remove the plastic surround on the underside of the mouse, and after removing the ball, mechanically clean the limit switches.
- (B) Solvent should be sprayed onto the underside of the mouse.
- (C) Remove the plastic surround on the underside of the mouse, and after removing the ball, mechanically clean the two wheels.
- (D) Compressed air should be directed onto the underside of the mouse.

*If choice C is selected set score to 1.*

26. Using the trouble analysis chart and faults table provided in the illustration, if the gyrocompass was malfunctioning, but no fault codes are present on the display unit, what is most likely the problem if the DC/DC converter LED status indicator is functioning properly, but the CPU LED status indicator is not blinking? Illustration EL-0195

- (A) The CPU assembly is malfunctioning.
- (B) The AC/DC power supply is malfunctioning.
- (C) The DC/DC converter is malfunctioning.
- (D) Ship's power is not available.

*If choice A is selected set score to 1.*
27. If item "1" in the illustrated oily-water separator indicates an abnormally deep vacuum, which of the following conditions is the most probable cause? Illustration GS-0153

- (A) Coalescer beds are severely fouled.
- (B) Suction line inlet strainer is obstructed.
- (C) Process water inlet valve, item "5", is open.
- (D) No problem exists as a high vacuum should be maintained in the chamber whose vacuum is to be measured.

*If choice B is selected set score to 1.*

28. A pneumatic pressure tank is installed in a sanitary system to __________.

- (A) reduce excessive cycling of the sanitary pump
- (B) increase water flow through the system
- (C) provide a higher pressure in the system than the pump can deliver
- (D) prevent the sanitary pump from losing suction

*If choice A is selected set score to 1.*

29. For a process control system using the proportional control mode, what statement is true?

- (A) Decreasing the proportional gain within limits will decrease the steady-state error, but too little gain may cause instability.
- (B) Increasing the proportional gain without limit will always decrease the steady-state error.
- (C) Increasing the proportional gain within limits will decrease the steady-state error, but too much gain may cause instability.
- (D) Increasing the proportional gain without limit will always increase the steady-state error.

*If choice C is selected set score to 1.*

30. In a closed-loop process control system, what term is used to describe the action of measuring the difference between the actual result and the desired result and using that difference to drive the actual result toward the desired result?

- (A) Gain
- (B) Deadband
- (C) Feedback
- (D) Instability

*If choice C is selected set score to 1.*
31. Control system diagrams use standard symbols to describe the component function required for the system to achieve its intended control functions. Standard symbols are used to allow engineers to describe the logic and component functions. Define the function of symbol "I" as shown in the illustration. Illustration GS-0180

- (A) Difference Signal Processor.
- (B) Integral Processor.
- (C) Low Select Signal Processor.
- (D) High Select Signal Processor.

*If choice C is selected set score to 1.

32. In general, the thermal bulb for a thermal expansion valve used in a reciprocating air conditioning system is usually charged with what substance?

- (A) the same refrigerant as the system
- (B) distilled water
- (C) bees wax
- (D) mercuric sulfate

*If choice A is selected set score to 1.

33. A room humidistat initiates the lowering of the humidity of the conditioned supply air to a space, while the actual process is accomplished by what means?

- (A) lowering both the cooling coil temperature and the reheater temperature
- (B) lowering the cooling coil temperature and raising the reheater temperature
- (C) raising the cooling coil temperature and lowering the reheater temperature
- (D) raising both the cooling coil temperature and the reheater temperature

*If choice B is selected set score to 1.

34. Using the illustrated chart giving the boiling point of moisture at various depths of vacuum, with an ambient temperature of 72°F, what depth of vacuum would be associated with the BEST chance of achieving a dehydration evacuation with a deep vacuum pump? Illustration RA-0056

- (A) 28.75" Hg gauge or 31,750 microns of Hg absolute
- (B) 29" Hg gauge or 25,400 microns of Hg absolute
- (C) 29.20" Hg or 20,320 microns of Hg absolute
- (D) 29.90" Hg or 500 microns of Hg absolute

*If choice D is selected set score to 1.
35. Why can CFC or HCFC refrigerants leaking into a confined space or in limited surroundings cause suffocation?

- (A) Refrigerants are heavier than air and displace oxygen.
- (B) Refrigerants lighter than air will rise.
- (C) Refrigerants obnoxious odor prevents breathing.
- (D) Refrigerants contain an acidic substance.

*If choice A is selected set score to 1.*

36. When installing a mechanical shaft seal on a refrigeration compressor, extreme care must be taken to prevent what from happening?

- (A) dirt and foreign particles from coming in contact with the highly polished sealing surfaces
- (B) any lubricant from contacting the stationary seal face that would cause etching of the face surface
- (C) any lubricant from contacting the carbon surface that would cause the expulsion of the saturated Teflon film
- (D) the spring from being damaged by the corrosive effects of excessive handling

*If choice A is selected set score to 1.*

37. Which of the listed statements describes the reason why oil foaming occurs when starting a refrigeration compressor?

- (A) If the oil level is not initially high, this condition is the result of agitation created by the movement of the mechanical components.
- (B) This phenomenon is inherent only in hermetically sealed units and is always provisional.
- (C) This will occur only if crankcase heaters are used.
- (D) This condition is the result of the sudden low-pressure created in the crankcase at start up causing the release of refrigerant absorbed within the oil.

*If choice D is selected set score to 1.*

38. A liquid line solenoid valve controls refrigerant flow to the evaporator by what means?

- (A) throttling the refrigerant
- (B) sensing the superheat in the tail coil
- (C) sensing the temperature in the liquid line
- (D) fully opening or closing

*If choice D is selected set score to 1.*
39. Vapor bubbles present in the liquid upon arrival to the thermal expansion valve in a refrigeration system may cause erosion of the expansion valve’s needle and seat. This, in turn, could cause what condition?  
  
  - (A) TXV overheating  
  - (B) TXV freezing shut  
  - (C) TXV hunting  
  - (D) TXV freezing open  

*If choice C is selected set score to 1.*  

40. Refillable tanks used to ship CFC and HCFC refrigerants or used to recover these refrigerants must meet the standards of what entity?  
  
  - (A) the Environmental Protection Agency  
  - (B) the Underwriters Laboratories  
  - (C) the United States Coast Guard  
  - (D) the United States Department of Transportation  

*If choice D is selected set score to 1.*  

41. What is the purpose of running a refrigeration compressor in short intermittent spurts or throttling the suction isolation valve when starting the system after a prolonged shutdown?  
  
  - (A) allow refrigerant vapor cycling time  
  - (B) let the refrigerated compartment cool gradually  
  - (C) prevent liquid slugging or overloading the compressor  
  - (D) determine actual compressor oil level  

*If choice C is selected set score to 1.*  

42. In order to establish a good climate for communication it is important to minimize status barriers. Which of the following techniques would be the best way to minimize status barriers on a one-on-one, face-to-face conversation of a sensitive nature with an employee?  
  
  - (A) Conversing with the employee in his/her workspace or a neutral area without regard to being interrupted.  
  - (B) Conversing with the employee in his/her workspace or a neutral area with privacy assured.  
  - (C) Conversing with the employee in your office with the employee sitting on the opposite side of the desk from you.  
  - (D) Conversing with the employee in the ship’s office with the employee sitting on the opposite side of the desk from you.  

*If choice B is selected set score to 1.*
43. When it comes to motivating employees, it is important to distinguish between intrinsic and extrinsic motivation. What statement best represents the difference?

- (A) Intrinsic motivation is derived from the consequences of doing the job (such as pay), where extrinsic motivation is derived from doing the job itself (such as enjoyment).
- (B) Intrinsic motivation is derived from the consequences of doing the job (such as pay), where extrinsic motivation is derived from the fear of the consequences of not doing the job (such as getting fired).
- (C) Intrinsic motivation is derived from doing the job itself (such as enjoyment), where extrinsic motivation is derived from the fear of the consequences of not doing the job (such as getting fired).
- (D) Intrinsic motivation is derived from doing the job itself (such as enjoyment), where extrinsic motivation is derived from the consequences of doing the job (such as pay).

*If choice D is selected set score to 1.*

44. Leadership style sometimes must change with the readiness level of the employees. Which of the following employee readiness level scenarios would be best suited for adopting a delegating leadership style?

- (A) Where the employees are able but unwilling or insecure.
- (B) Where the employees are able and willing or confident.
- (C) Where the employees are unable and unwilling or insecure.
- (D) Where the employees are unable but willing or confident.

*If choice B is selected set score to 1.*

45. Which of the following shipboard groups would be an example of an informal group?

- (A) Those officers and crew assigned to a particular ship.
- (B) Those officers and crew assigned to a maintenance task on a ship.
- (C) Those officers and crew assigned to the engineering department of a ship.
- (D) Those officers and crew assigned to the safety committee of a ship.

*If choice B is selected set score to 1.*

46. What statement is true concerning stress and personal psychological makeup of managers and supervisors?

- (A) Managers and supervisors are more likely to exhibit type "A" behavior, and this behavior is more likely to subject them to stress over long periods.
- (B) Managers and supervisors are more likely to exhibit type "A" behavior, and this behavior is less likely to subject them to stress over long periods.
- (C) Managers and supervisors are more likely to exhibit type "B" behavior, and this behavior is less likely to subject them to stress over long periods.
- (D) Managers and supervisors are more likely to exhibit type "B" behavior, and this behavior is more likely to subject them to stress over long periods.

*If choice A is selected set score to 1.*
47. As a manager conducting a meeting, what action should you take when an attendee exhibits disruptive or inappropriate behavior?

- (A) Aggressively confront the offending trainee.
- (B) With respect, respond in a way appropriate to the behavior.
- (C) Immediately expel the offending attendee from the meeting.
- (D) Ignore the disruptive or inappropriate behavior.

*If choice B is selected set score to 1.*

48. When planning for a fire and emergency drill, the crew should be motivated and challenged to do their very best. What type of simulation promotes this level of motivation and meeting the challenge?

- (A) Choosing an often-repeated scenario with which the crew is very familiar.
- (B) Choosing a realistic scenario representing a high fire risk in terms of flammables.
- (C) Choosing an often-repeated scenario associated with a low fire risk area.
- (D) Choosing a scenario representing a low fire risk in terms of flammables.

*If choice B is selected set score to 1.*

49. Which of the following comprehensive computerized maintenance system database modules would be used to generate a report tracking consumable supplies consumption?

- (A) Planned maintenance management module
- (B) Requisitions management module
- (C) Inventory management module
- (D) Equipment management module

*If choice B is selected set score to 1.*

50. Which of the following condition-based maintenance data continuous monitoring techniques has the greatest value in predicting wear?

- (A) Vibration analysis
- (B) Thermography
- (C) Lubricating oil analysis
- (D) Acoustic analysis

*If choice A is selected set score to 1.*

51. What maintenance management scheme does trend analysis support?

- (A) Run-to-failure maintenance management.
- (B) Planned maintenance management.
- (C) Preventive maintenance management.
- (D) Predictive maintenance management.

*If choice D is selected set score to 1.*
52. As a root cause analysis tool, what is the primary disadvantage to the fishbone (also known as the cause-and-effect) graphical approach to root cause analysis?

- (A) The fishbone diagram does not show any cause sequences leading to failure.
- (B) The fishbone diagram does not attempt to group possible causes into categories.
- (C) The fishbone diagram does not allow for more than one potential cause to be considered.
- (D) The fishbone diagram does not attempt to identify all the possible causes.

*If choice A is selected set score to 1.*

53. If it is desired to perform a thermographic analysis of new equipment to gain a thermal signature for purposes of comparison to the thermal signature for the same equipment at a later date, what is the name of the thermography performed on the equipment when new?

- (A) Thermal trending.
- (B) Baseline thermography.
- (C) Spectral thermography.
- (D) Comparative thermography.

*If choice B is selected set score to 1.*

54. A self-propelled mobile offshore drilling unit is required to have its emergency storage batteries tested in accordance with 46 CFR regulations applicable to tests, drills, and inspections for MODU operations. What is the test criteria?

- (A) The emergency batteries are to be tested once each 6 months and furnish power to the actual connected loads for a period of not less than 18 continuous hours.
- (B) The emergency batteries are to be tested once each 6 months and furnish power to the actual connected loads for a period of not less than 2 continuous hours.
- (C) The emergency batteries are to be tested once each month and furnish power to the actual connected loads for a period of not less than 2 continuous hours.
- (D) The emergency batteries are to be tested once each 6 months and furnish power to the actual connected loads for a period of not less than 6 continuous hours.

*If choice B is selected set score to 1.*

55. In accordance with 33 CFR Subchapter O (Pollution), which of the following statements is true concerning the signature of the Oil Record Book?

- (A) The officer in charge of the engineering watch signs each entry occurring on the watch, and the chief engineer signs each page.
- (B) The person in charge of an operation signs for that entry, and the chief engineer signs each page.
- (C) The person in charge of an operation signs for that entry, and the master signs each page.
- (D) The officer in charge of the navigational watch signs each entry occurring on the watch, and the master signs each page.

*If choice C is selected set score to 1.*
56. One of the means of alternative dispute resolution regarding a collective bargaining agreement dispute is arbitration. What is meant by arbitration?

- (A) Direct, in-house negotiated settlement between company and union representatives.
- (B) Negotiated settlement between company and union representatives facilitated by a mediator.
- (C) Settlement reached as the result of litigation as part of a judicial proceeding in court.
- (D) Agreement to abide by a binding decision rendered by a company and union agreed-upon impartial person.

If choice D is selected set score to 1.

57. As you manage the engine room familiarization training program for new engine department employees, what should you explain to these new employees?

- (A) There is really insufficient time for familiarization training that is mandated, and the new employee should not worry about it.
- (B) The employee should do his or her best and the appropriate entries shall be made in the training record book regardless of familiarity achieved.
- (C) The employee has the obligation to notify his or her supervisor if they don't feel sufficiently familiar to be competent.
- (D) The familiarization training that is mandated is excessive overkill, and the new employee should not worry about it.

If choice C is selected set score to 1.

58. In consultation with the other ship's management level officers, you are planning a required fire emergency drill. In addition to selecting a scenario as functionally realistic as possible (such as a high fire risk area) what follow-up activity would best maximize the training effectiveness for future applicability to an actual fire emergency?

- (A) Write up a critique of the fire drill and distribute to shore side management.
- (B) Hold a post-drill conference among the management officers to discuss the drill.
- (C) Document the fire drill training as required to authenticate proof of training.
- (D) Debrief the entire crew after the drill to critique what went right and what went wrong.

If choice D is selected set score to 1.

59. As Chief Engineer you join a vessel enrolled in Continuous Machinery Survey. Approximately what percent of the machinery should be surveyed per year throughout the Special Survey cycle?

- (A) 10%
- (B) 20%
- (C) 25%
- (D) 50%

If choice B is selected set score to 1.
60. What statement is true concerning the checks to be undertaken in the "checks prior to transfer" section of the bunkering safety checklist where the transfer is from barge-to-ship?

- (A) These are checks to be performed jointly by the person in charge (PIC) of the ship's role of the bunkering operation and the USCG marine inspector.
- (B) These are checks to be performed solely by the person in charge (PIC) of the ship's role of the bunkering operation.
- (C) These are checks to be performed solely by the person in charge (PIC) of the barge's role of the bunkering operation.
- (D) These are checks to be performed jointly by the persons in charge (PICs) of both the barge's and ship's roles of the bunkering operation.

*If choice C is selected set score to 1.*

61. The coil temperature measured at the expansion valve sensing bulb of an operating system is 10°F. The low side pressure with the compressor running as shown on the gauge illustrated indicates 15 psig. What adjustments or changes, if any, should be made to the system? Illustration RA-0016

- (A) The filter drier needs to be changed to increase the suction pressure.
- (B) The liquid line strainer is obviously fouled and needs to be cleaned.
- (C) The expansion valve should not be adjusted, as the degree of superheat is within the accepted range.
- (D) The evaporator coils need to be steam cleaned or high-pressure washed.

*If choice C is selected set score to 1.*

62. When the sensing bulb of a thermostatic expansion valve is charged with a fluid different from the charge used in the system, what name of the charge is associated with the power element?

- (A) blended charged
- (B) cross charged
- (C) straight charged
- (D) mixed charged

*If choice B is selected set score to 1.*

63. What statement is true concerning assessment validity and assessment reliability?

- (A) Assessment reliability is a pre-condition for assessment validity, and assessment validity is a pre-condition for assessment reliability.
- (B) Assessment reliability is a pre-condition for assessment validity, but not vice versa.
- (C) Assessment reliability is not a pre-condition for assessment validity, and assessment validity is not a pre-condition for assessment reliability.
- (D) Assessment validity is a pre-condition for assessment reliability, but not vice versa.

*If choice C is selected set score to 1.*
64. As shown in the illustration, what is the purpose of the main contacts of contactor "1S"? Illustration EL-0012

- (A) The "1S" contactor connects the autotransformer in delta configuration during the starting/acceleration period.
- (B) The "1S" contactor connects the autotransformer in wye configuration during the starting/acceleration period.
- (C) The "1S" contactor connects the autotransformer in wye configuration during the run period.
- (D) The "1S" contactor connects the autotransformer to the line during the starting/acceleration period.

*If choice B is selected set score to 1.*

65. What is one major advantage of a diesel-electric propulsion plant?

- (A) excellent maneuverability
- (B) less maintenance
- (C) lower fuel consumption
- (D) low cost and weight

*If choice A is selected set score to 1.*

66. On a digital numerical display readout, what would be the minimum number of LED segments required to form and display any digit 0 through 9?

- (A) 6
- (B) 7
- (C) 8
- (D) 9

*If choice B is selected set score to 1.*

67. As shown in figure "B" of the illustrated block diagram of the signal processing flow path, the block "TRANSDUCER" represents a sensing and transmitting device designed to sense and measure a physical parameter and convert it into a proportional force or signal of what type? Illustration EL-0095

- (A) pneumatic signal
- (B) electro-mechanical force
- (C) digital electrical signal
- (D) analog electrical signal

*If choice D is selected set score to 1.*
68. For the purposes of shipboard practice, voltages above what threshold would be considered high voltage?

- (A) 440 VAC
- (B) 1000 VAC
- (C) 4160 VAC
- (D) 6600 VAC

*If choice B is selected set score to 1.*

69. For troubleshooting purposes, the key indicator to the safety and general condition of high voltage circuitry is insulation resistance. For a 6.6 kV high voltage system, what would be the recommended minimum insulation resistance value?

- (A) 1 megohm
- (B) 5.6 megohms
- (C) 6.6 megohms
- (D) 7.6 megohms

*If choice D is selected set score to 1.*

70. If an 8-bit digital to analog converter (DAC) produces an analog output voltage with a range of 10 volts (0-9 volts), what is the smallest incremental step in voltage that can be generated at the output?

- (A) 0.03 volts
- (B) 0.04 volts
- (C) 0.625 volts
- (D) 1.25 volts

*If choice B is selected set score to 1.*
Direct Digital Control

A

Input System

Computer (CPU)

Output System

Analog D/A

Operator Console

Digital Output

Measured Variables

Plant Process

Manipulated Variables

Actuators

Sensors

Analog A/D

Digital Contact

Signal Processing Flowpath

B

Pressure

Temperature

Flow

Sample and Hold

Computer Processor

Transducer

Signal Conditioner

Filter

Multiplexer Analog

Analog/Digital Converter

Digital/Analog Converter

Displays

To Final Analog Control Elements
**Sperry MK 37 VT Digital Gyrocompass Trouble Analysis Chart**

The MK 37 VT gyrocompass is malfunctioning

Are fault codes present on display unit?  
No
Check LED status indicator on DC/DC converter assembly in electronic unit
Is LED status indicator functioning properly?  
No
1. Check associated wiring  
2. Replace DC/DC Converter Assembly.  
Is problem solved?  
No
Replace AC/DC power Supply Assembly  
Is problem solved?  
No
Replace CPU assembly  
Yes
Is LED status indicator on CPU assembly blinking?  
No
Check ship's power and associated wiring.
Yes
See fault location chart for suggested Corrective action.

---

**Partial List of Sperry MK 37 VT Digital Gyrocompass Faults**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course recorder leaves a blank page every 8-10 inches or has paper feed problems</td>
<td>Printer paper-release lever not in the middle, push-tractor position</td>
<td>Place level in the middle position for push-tractor installation</td>
</tr>
<tr>
<td>Repeater does not follow MK 37 VT heading</td>
<td>Repeater channel may not be on or not synchronized to the MK 37 VT Heading</td>
<td>Check repeater switch on step driver assembly. Make sure repeater is synchronized to the MK 37 VT gyrocompass</td>
</tr>
<tr>
<td>Speed value does not change</td>
<td>Speed selection may not be in Auto</td>
<td>Verify that speed menu selection is in Auto. Check for faults on serial channel</td>
</tr>
<tr>
<td>Latitude value does not change</td>
<td>Latitude selection my not be in Auto</td>
<td>Verify that latitude menu selection is in Auto. Check for faults on serial channel</td>
</tr>
<tr>
<td>Manual transfer (dual system) does not occur</td>
<td>Other system may not be powered, attached, or may have a critical fault. Manual transfer must be initiated from the primary compass only</td>
<td>Verify that other system is powered, attached, and does not have a critical fault</td>
</tr>
<tr>
<td>Unit makes buzzing sound for at least 15 min after being switched on</td>
<td>If sound persists longer than 15 min, the AC/DC power supply assembly relay is bad</td>
<td>Replace AC/DC power supply assembly</td>
</tr>
</tbody>
</table>

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Q750 General Subjects

10/10/2018
### Table

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Impeller</td>
<td>NI-CU Alloy</td>
<td>3H1A</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Volute</td>
<td>Gunmetal</td>
<td>3H4C</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Suction Cover</td>
<td>Gunmetal</td>
<td>3H193</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Volute Wear Ring</td>
<td>Valve Bronze</td>
<td>A-3H180A</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Volute Gasket</td>
<td>PTFE/ Glass Fiber Reinforced</td>
<td>P/N 3H37</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Impeller Wear Ring</td>
<td>NI-CU Alloy</td>
<td>3H180</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Motor Bracket</td>
<td>Cast Steel</td>
<td>2L3C</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Shaft Sleeve</td>
<td>NI-CU Alloy</td>
<td>P/N A-014-20A-0-01</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>Throat Bushing</td>
<td>NI-CU Alloy</td>
<td>P/N 4L26-4</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>Lantern Ring</td>
<td>NI-CU Alloy</td>
<td>4L169</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>Gland Half</td>
<td>Bronze</td>
<td>B-017-5AH-A</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>Slinger</td>
<td>Neoprene</td>
<td>1 47/64 X 3 ¾ X 1/8TH</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>Impeller Washer</td>
<td>NI-CU Alloy</td>
<td>17/32 X 9/16 X 3/16TH</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>Impeller Key</td>
<td>NI-CU Alloy</td>
<td>¾ SQ X 2 5/16 TH</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>SKT HD Capscrew</td>
<td>SST</td>
<td>½-13 NC X 1 1/4 LG NYLOCK</td>
</tr>
<tr>
<td>16</td>
<td>5</td>
<td>Packing Rings</td>
<td>Plastic Metallic</td>
<td>1/4 X 2 5/8 X 7/16 SQ</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>Name Plate</td>
<td>Brass</td>
<td>P/N A-226-00N-0-03</td>
</tr>
<tr>
<td>18</td>
<td>8</td>
<td>Hex Head Capscrews</td>
<td>NI-CU Alloy</td>
<td>½-13 NC X 1 1 LG</td>
</tr>
<tr>
<td>19</td>
<td>4</td>
<td>Hex Head Capscrews</td>
<td>NI-CU Alloy</td>
<td>3/8-16 x 1 LG</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>Hex Head Capscrews</td>
<td>NI-CU Alloy</td>
<td>½-13 NC X 1 1/4 LG</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>Stud</td>
<td>SST</td>
<td>3/8-16 NC X 2 1/2 LG</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>Hex Nut</td>
<td>Bronze</td>
<td>3/16-16 2</td>
</tr>
<tr>
<td>23</td>
<td>3</td>
<td>Setscrew</td>
<td>NI-CU Alloy</td>
<td>10-24 NC X 1/4 LG CUP</td>
</tr>
<tr>
<td>24</td>
<td>3</td>
<td>Setscrew</td>
<td>NI-CU Alloy</td>
<td>10-24 NC X 1/4 LG CUP</td>
</tr>
<tr>
<td>25</td>
<td>4</td>
<td>Drive Screw</td>
<td>Brass</td>
<td>6-24 X 1/4 LG</td>
</tr>
<tr>
<td>26</td>
<td>3</td>
<td>Pipe Plug</td>
<td>Bronze</td>
<td>½ NPT</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>Vent Valve</td>
<td>Bronze</td>
<td>¼ NPT</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>O Ring</td>
<td>Buna “N”</td>
<td>1 5/16 ID 1/16 WIDE</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>Pipe</td>
<td>70-30 CU-NI</td>
<td>4 11/16 LG ¼ NPT</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>Pipe</td>
<td>70-30 CU-NI</td>
<td>3 3/16 LG ¼ NPT</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>Flange</td>
<td>Valve Bronze</td>
<td>⅛ INCH 150#</td>
</tr>
</tbody>
</table>

Note: Inside dia. of Wearing Ring, PC No. (4) is .020 undersize outside dia. of Wearing Ring, PC No. (6) is .020 oversize when finished as repair parts and are designated as part No. 5 A3H180A-1 U/S and 3H180-1 O/S

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A \[ \times \]  B \[ \div \]

C \[ \sqrt{\ } \]  D \[ \Delta \]

E \[ \Delta K \]  F \[ \Sigma \]

G \[ H/A \]  H \[ \text{Diagram} \]

I \[ < \]  J \[ > \]
## Pressure Vacuum Equivalents

<table>
<thead>
<tr>
<th>Absolute Pressure above zero base (microns)</th>
<th>Vacuum below one atmosphere (inches Hg)</th>
<th>Vaporization temperature of water at each pressure (Fahrenheit)</th>
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<tr>
<td>0</td>
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<td>-</td>
</tr>
<tr>
<td>50</td>
<td>29.92</td>
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<td>500</td>
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<td>500,000</td>
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<tr>
<td>760,000</td>
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