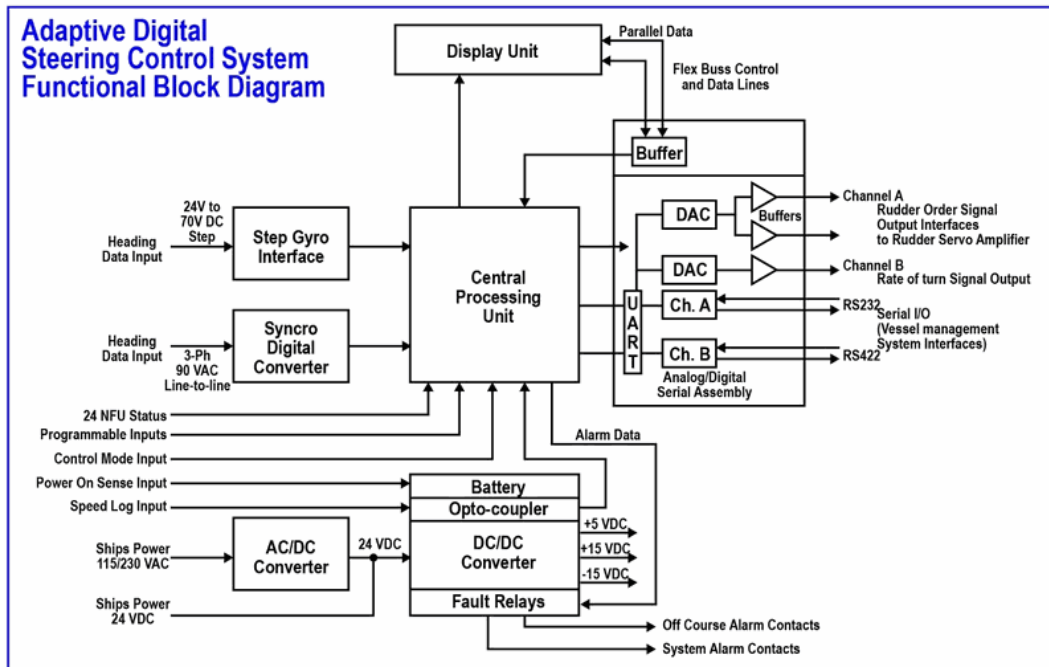


Demo PDF file. This file includes questions: 10 from 169. Full version of file looks the same as demo, but full version includes all questions. You may download file with all questions by link on bottom of this page

Q684 - Electrical, Electronic, & Control Engineering

1. As shown in the illustrated adaptive digital steering control system functional block diagram and listed system interface signals table, what would the rudder order signal output voltage to the rudder servo amplifier be for a rudder order of 20 degrees left rudder, assuming left rudder signals are negative and right order signals are positive in polarity

EL-0191



Adaptive Digital Steering System Interface Signals

Inputs	
Speed log input Pulsed Serial	200 pulse nautical mile (PPNMI) format (contact closure) RS-232 (channel A or C) or RS-422 (channel B) communications in NMEA 0183 format, \$VBW, \$VHW
Navigator (vessel management system) input	Serial data for heading order, rate order, and cross track error information in RS-232 or RS-422 communication on channel A, B or C, in NMEA format \$APB, \$HSC, \$HTR, \$HTC or \$XTE
Compass Step data Syncro	Positive or negative step data (24 or 70 V) 1X, 90X or 360X
Data Serial data	\$HDT (on channels A, B or C)
Mode switch sense contact	External switched opened or closed to inform autopilot to change from Standby mode to an automatic mode
NFU sense contacts	External contacts to indicate when the NFU Controller is active
Power failure circuits	Closed contacts on external power switch to activate power failure alarm
Outputs	
Interface to external rudder Servo control amplifiers	Bipolar analogue voltage proportional to the rudder order. ± 11.25 V (maximum limit) equal to $\pm 45^\circ$ or rudder
Rate of turn interface	Bipolar analogue voltage proportional to a turn rate indicator. ± 4.5 V (Max) equal to $\pm 90^\circ$ turn/min. Resolution equal to 0.5° /min.

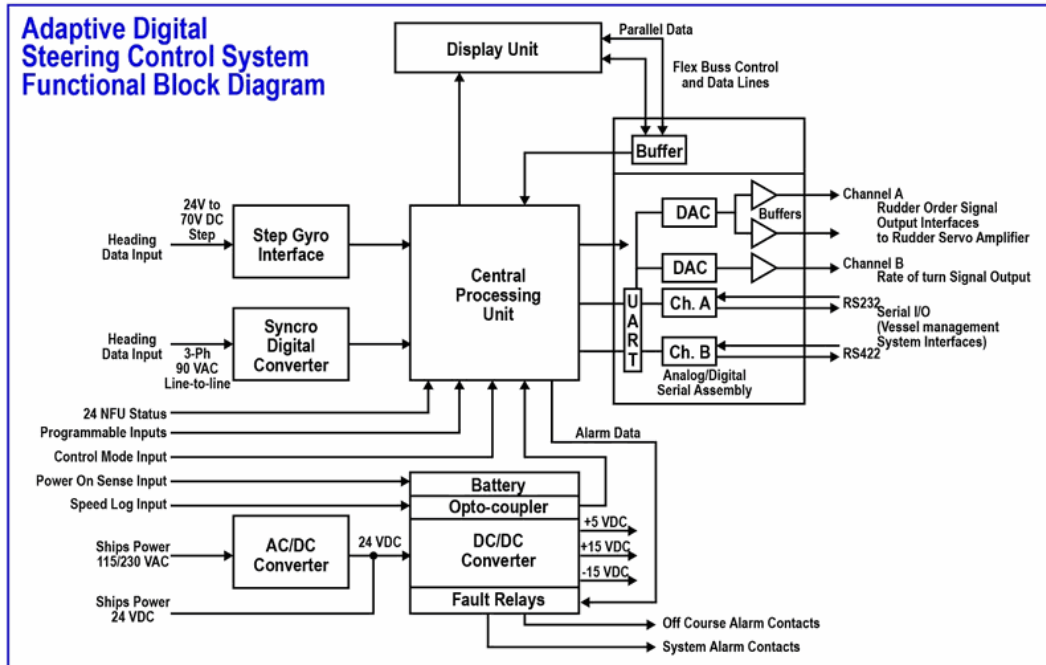
- 2.25 VDC
- 4.0 VDC
- 5.0 VDC**
- +5.0 VDC

Note:

A 20-degree left rudder order results in -5.0 VDC. The system's scale is 0.25 V per degree (11.25 V for 45 degrees), and left rudder signals are negative, therefore the output is -5.0 VDC.

2. As shown in the illustrated adaptive digital steering control system functional block diagram and listed system interface signals table, what would the rudder order signal output voltage to the rudder servo amplifier be for a rudder order of 15 degrees right rudder, assuming left rudder signals are negative and right order signals are positive in polarity

EL-0191



Adaptive Digital Steering System Interface Signals

Inputs	
Speed log input Pulsed Serial	200 pulse nautical mile (PPNMI) format (contact closure) RS-232 (channel A or C) or RS-422 (channel B) communications in NMEA 0183 format, \$VBW, \$VHW
Navigator (vessel management system) input	Serial data for heading order, rate order, and cross track error information in RS-232 or RS-422 communication on channel A, B or C, in NMEA format \$APB, \$HSC, \$HTR, \$HTC or \$XTE
Compass Step data Syncro	Positive or negative step data (24 or 70 V) 1X, 90X or 360X
Data Serial data	\$HDT (on channels A, B or C)
Mode switch sense contact	External switched opened or closed to inform autopilot to change from Standby mode to an automatic mode
NFU sense contacts	External contacts to indicate when the NFU Controller is active
Power failure circuits	Closed contacts on external power switch to activate power failure alarm
Outputs	
Interface to external rudder Servo control amplifiers	Bipolar analogue voltage proportional to the rudder order. ± 11.25 V (maximum limit) equal to $\pm 45^\circ$ or rudder
Rate of turn interface	Bipolar analogue voltage proportional to a turn rate indicator. ± 4.5 V (Max) equal to $\pm 90^\circ$ turn/min. Resolution equal to 0.5° /min.

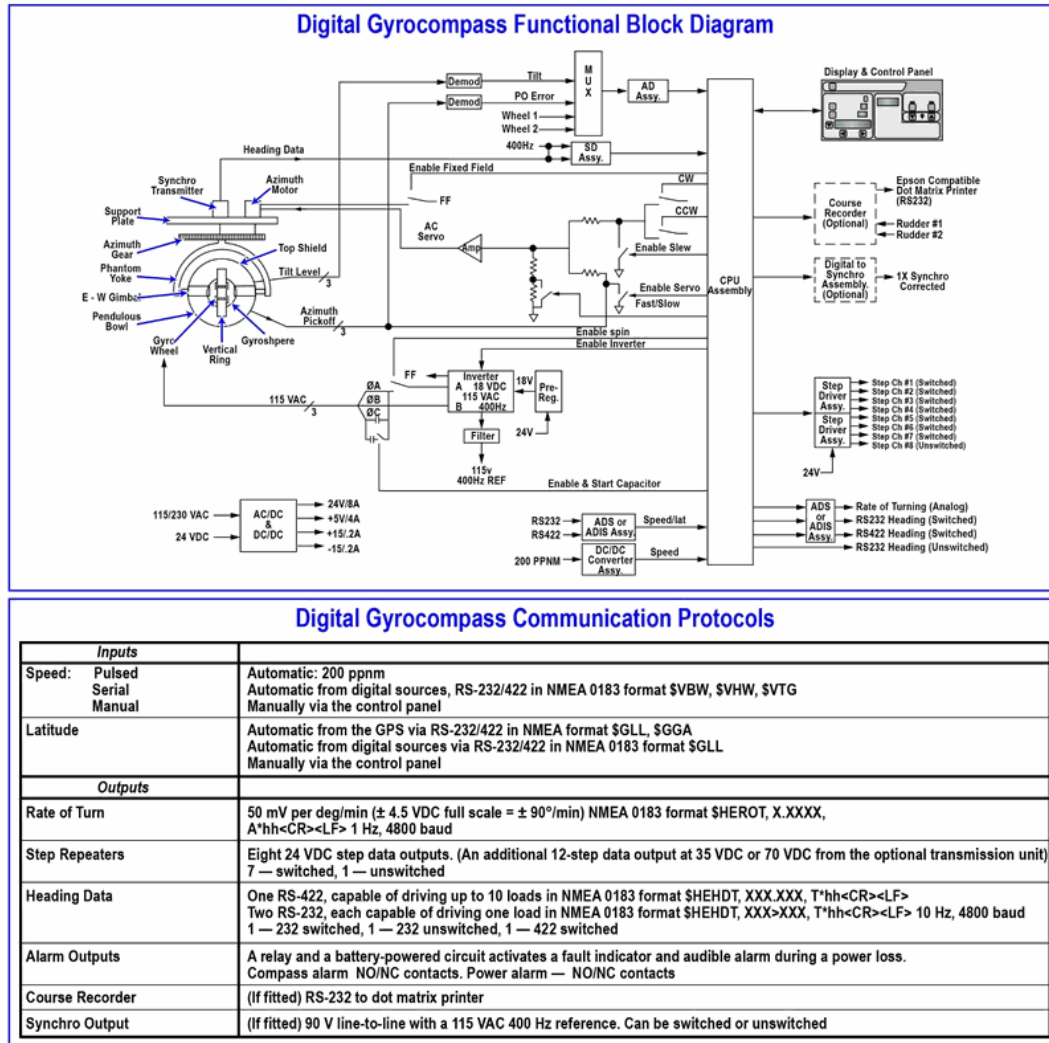
- 1.33 VDC
- 3.75 VDC
- +3.75 VDC**
- +5.0 VDC

Note:

The system's voltage output is proportional to the rudder angle, with ± 11.25 V representing $\pm 45^\circ$. Therefore, the voltage per degree is 0.25 V. A 15-degree right rudder requires a positive voltage, resulting in an output of +3.75 VDC.

3. As shown in the illustrated digital gyrocompass functional block diagram and the associated communication protocols table, what would the rate of turn signal voltage be if the rate of turn is 30 degrees per minute to port? Assume that the rate of turn to port signal voltage is negative in polarity and that the rate of turn to starboard signal voltage is positive in polarity

EL-0194



- -0.5 VDC
- -1.0 VDC
- **-1.5 VDC**
- +1.5 VDC

Note:

The rate-of-turn signal is 50 mV per degree per minute. A 30-degree-per-minute turn to port results in a voltage of -1.5 VDC, as port turns are indicated by negative polarity.

4. Before any work on electrical or electronic equipment is performed, which of the following precautions should be carried out?

- Bypass the interlocks.
- Station a man at the circuit supply switch.
- De-energize the applicable switchboard bus.
- **Secure and tag the supply circuit breaker in the open position.**

Note:

To ensure safety when working on electrical or electronic equipment, secure and tag the supply circuit breaker in the open position to prevent accidental re-energization. This practice involves physically isolating the equipment and implementing lockout/tagout procedures, which are superior to relying on personnel or bypassing safety interlocks. Proper precautions include opening the circuit breaker, securing it to prevent closure, and tagging it to warn others, ensuring a de-energized state and preventing accidental power restoration.

5. Before working on an electric cargo winch master switch or controller, what should be done?

- heat the switch box to remove any moisture
- spray the gasket surface with a solvent
- drain condensate from the box
- **open the circuit breaker in the power supply and tag-out**

Note:

De-energize and tag-out the power supply breaker before working on an electric cargo winch master switch or controller to prevent electric shock or arc flash.

6. Before work may safely commence on a high voltage system, what must first be done after disconnection and isolation?

- The circuit must be tested and proved dead first with an off-line tester, then grounded.
- **The circuit must be tested and proved dead first with a live-line tester, then grounded.**
- The circuit must be grounded first, then tested and proved dead with an off-line tester.
- The circuit must be grounded first, then tested and proved dead with a live-line tester.

Note:

After disconnecting and isolating a high-voltage system, it must first be tested and proven de-energized using a live-line tester before grounding.

7. 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?

- 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.
- The live-line tester should be checked by connecting to a known high voltage source only before testing the circuit to be worked upon.
- **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.**
- The live-line tester should be checked by connecting to a known high voltage source only after testing the circuit to be worked upon.

Note:

A live-line tester must be verified on a known live source before and after use to ensure continuous functionality and reliable voltage detection.

8. What is the minimum threshold voltage at which the skin offers no appreciable resistance to electrical current flow and is known as the "skin-puncture voltage"?

- 208 VAC
- 480 VAC
- **600 VAC**
- 1000 VAC

Note:

At 600 VAC, the skin's outer layer breaks down, minimizing resistance and allowing current to flow through internal tissues. This voltage, known as the skin-puncture voltage, is a standard threshold used in safety training and calculations where skin resistance is considered negligible.

9. Why should an electrical worker determine the nominal voltage of a circuit first before making contact with the circuit?

- **So the worker can select the proper PPE and voltage tester to use before contact with the circuit is made**
- So the worker can select the proper PPE to use before contact with the circuit is made
- So the worker can select the proper voltage tester to use before contact with the circuit is made
- As long as the circuit is properly tagged/locked out, no determination of the nominal voltage is necessary

Note:

Knowing the circuit's nominal voltage is essential for selecting appropriate personal protective equipment and a correctly rated voltage tester before any contact is made.

10. When performing an absence-of-voltage test before commencing repair work, at the minimum where must the absence-of-voltage test be performed?

- At the load side disconnect switch
- **At the point of contact where the work will take place**
- At the main feeder circuit breaker
- At the source disconnect branch circuit breaker

Note:

The absence-of-voltage test must be performed at the point of contact where work will take place to ensure the specific conductors being worked on are de-energized, regardless of upstream device status or potential wiring errors.
