1.0 INTRODUCTION

- ***A pneumatic system, termed use of compressed air to operates or to do works.***
- ***Beyond than that, when compressed air is controlled using series of pipes and valve, complicated systems with mind blowing capabilities can be created.***
- ***This fact the life force of today's industrial capabilities and automated systems.***
- In the world of technology, there are various methods of introducing work into a system.
- In most systems that require a tangible among of work the use of pneumatic systems is a viable alternative apart from electrical systems (electric motor) and internal combustion engines.
- Compressed air onboard ships is used for various purposes. High-pressure air of 30 bar is mainly used for the main engine/ aux. engine starting.
- The high-pressure of air is reduced to lower working pressures through reducer arrangement to 7-8 bar as service air and control air for a number of applications.
- Some of these include starting of Emergency Generator, System reversing Main Engine, charging of freshwater and drinking water hydrophores, dry washing of Main Engine turbochargers, blowing the ship air horn, spring air for exhaust valves of the Main Engine,soot blowing of Exhaust Gas Economizer, pneumatic pumps for emergency MDO pump and many more applications such as service air for the use of power tools to maintain the condition of the ships as cleaning, painting operations, chipping and as grinders, chisels etc.

2.0 WORK AND SAFETY OF PNEUMATIC

2.1 General

- Trainees should only work with the circuits under the supervision of an instructor.
- Electrical devices (e.g. power supply units, compressors and hydraulic units) may only be operated in training rooms that are equipped with residual current devices (RCDs).
- Observe the specifications included in the technical data for the individual components, and in particular all safety instructions!
- Care must be taken to avoid malfunctions that may impair safety.
- Wear your personal protective equipment (safety goggles, safety shoes) when working on circuits.

2.2 Mechanical Safety

- Switch off the power supply!
  – Switch off working and control power before working on the circuit.
  – Only reach into the setup when it is at a complete standstill.
  – Be aware of the potential overtravel times for the drives.
- Mount all of the components on the profile plate securely.
- Make sure that limit valves are not actuated from the front.
- Risk of injury during troubleshooting!
  Use a tool such as a screwdriver to actuate the limit valves.
- Set all components up in a way that makes it easy to activate the switches and disconnectors.
- Follow the instructions regarding positioning of the components.

2.0 WORK AND SAFETY OF PNEUMATIC

2.3 Electrical Safety

- Disconnect from all sources of electrical power! – Switch off the power supply before working on the circuit. – Please note that electrical energy may be stored in individual components.
- Further information on this issue is available in the data sheets and operating instructions included with the components.
- Use protective extra-low voltage only: max. 24 V DC.
- Establishing and disconnecting electrical connections – Electrical connections may only be established in the absence of voltage. – Electrical connections may only be disconnected in the absence of voltage.
- Always use connecting cables with safety plugs for electrical connections.
- When laying connecting cables, make sure they are not kinked or pinched.
- Do not lay cables over hot surfaces. – Hot surfaces are marked with a corresponding warning symbol.
- Make sure that connecting cables are not subjected to continuous tensile loads.
- Always pull on the safety plug when disconnecting connecting cables; never pull the cable.

2.0 WORK AND SAFETY OF PNEUMATIC

2.4 Pneumatic Safety

- Depressurize the system!
  – Switch off the compressed air supply before working on the circuit. –
  Check the system with pressure gauges to make sure that the entire circuit is fully depressurized.
  – Please note that energy may be stored in air reservoirs.
- Further information on this issue is available in the data sheets and operating instructions
- included with the components.
- Do not exceed the maximum permissible pressure of 600 kPa (6 bar).
- Do not switch on the compressed air until all tubing connections have been established and secured.
- Do not disconnect tubing while under pressure.
- Risk of injury when switching on the compressed air! Cylinders may advance and retract automatically.
- Risk of accident due to advancing cylinders! – Always position pneumatic cylinders so that the piston rod's working space is unobstructed.
- Risk of accident due to advancing cylinders! – Always position pneumatic cylinders so that the piston rod's working space is unobstructed over the entire stroke range.
  – Make sure that the piston rod cannot collide with any rigid components of the setup.
- Risk of accident due to tubing slipping off! – Use the shortest possible tubing connections. – If tubing slips off: Switch off the compressed air supply immediately.

2.0 WORK AND SAFETY OF PNEUMATIC

- Pneumatic circuit setup: Connect the devices using plastic tubing with an outside diameter of 4 or 6 mm. Push the tubing into the push-in connector as far as it will go.
- Switch the compressed air supply off before dismantling the circuit.
- Dismantling the pneumatic circuit. Press the blue release ring down so that the tube can be pulled out.
- Noise due to escaping compressed air
  – Noise caused by escaping compressed air may damage your hearing. Reduce the noise by using mufflers, or wear hearing protection if the noise cannot be avoided.
  – All of the exhaust ports for the components included in the equipment set are equipped with mufflers. Do not remove these mufflers.

2.5 Necessary Accessories

- A stopwatch is required to assess the constructed circuits. The stopwatch is used for the following tasks:
- To ensure that the advancing and retracting times of the cylinders in one-way flow control valves comply with the specifications
- To set pneumatic timers.