

## PNEUMATIC TORPEDO TUBE SAFETY PRECAUTIONS

1. Check tube inboard vent OPEN before opening breech door. Leave vent open as long as breech door is open.
2. Check tube Dry before opening breech door.
3. Before checking liquid level in firing valve (every six months) insure that impulse bottle drain valve is open.
4. When blowing water from tube to WRT Tank, maintain internal tube pressure at about 2 psi gauge.
5. Prior to loading a torpedo into the tube, check that stop bolt is down and that speed, depth, and gyro spindles agree with torpedo settings and are retracted and disengaging levers latched.
6. With a torpedo tube in the cruising condition, the poppet valve emergency stop should be opened wide and backed off 1/2 turn.
7. Check that jacknut is in proper position.
8. In the operation of interlock levers make sure that they are latched in the proper position.
9. NEVER use tube blow valve to equalize tube pressure with sea pressure. Always equalize through WRT Tank.
10. Tube interlock mechanisms should never be deranged EXCEPT under the supervision of the torpedoman in charge and only with the permission of the C.O.
11. Insure poppet valve is not gagged when preparing to fire tube.
12. Never use over 100 psi impulse air when firing inboard slugs.
13. To insure thorough lubrication of all fittings, the lub chart should be used.
14. Check proper impulse pressure prior to firing torpedo.
15. To prevent damage to the breech door mechanism and to prevent injury to personnel, always hold the breech door when opening until it is fully open and the stops bear on the hinge bracket.
16. To prevent the buffer plate and seal from striking the propeller nut and the guide stud from jamming against the stop bolt when loading a torpedo, the tail stop must be backed off fully before the breech door is shut. After loading torpedo, set up tight on tail stop. Just prior to firing, back off 1/4 turn so that stop bolt will not be jammed down.
17. The guide stud must be brought gently against the stop bolt to avoid bending the bolt or binding any parts of the stop bolt assembly.
18. Failure to lash down the torpedo before an air charge (inboard slug) is fired may result in its sliding forward in the tube past the stop bolt, damaging the muzzle door mechanism, and possibly necessitating drydocking for repair.
19. Except when preparing to fire, tube vent should be open whenever a torpedo is stowed in a tube to prevent a buildup of air pressure in tube from air leaks in tube or torpedo.

## GENERAL CHARACTERISTICS OF THE MK32-35 PNEUMATIC TORPEDO TUBE

### DIMENSIONS

- A. Forward tube nest. (6 tubes)
  - 1. Length-20' 10"
  - 2. Usable length-20' 8"
  - 3. Diameter (between lands)-21' 1/8"
  - 4. Thickness-3/4" gun bronze
  - 5. Capacity
    - (a) 3520 lbs.-Salt water
    - (b) 1004 lbs.-WRT
  - 6. Poppet system intake per torpedo.
    - (a) Wt. of Mk 14-3A torpedo-warshot-3282 lbs.
    - (b) Displacement of Mk 14-3A torpedo-2516 lbs.
    - (c) Negative buoyancy-(-)766 lbs.
  - 7. Capacity of WRT Tank-11,200 lbs. SW
  - 8. " " Poppet Main Tank-5760 lbs. SW
  - 9. Impulse Air SYSTEM
    - (a) Six bottles located topside in superstructure.
    - (b) Capacity-7.0 cu. ft. air per bottle.
  - 10. Shutters on muzzle doors to fair in superstructure forward.
- B. After tube nest. (4 tubes)
  - 1. Length-23'
  - 2. Usable length-22' 10"
  - 3. Capacity
    - (a) 3840 lbs.-SW
    - (b) 1324 lbs.-WRT
  - 4. Capacity of WRT Tank-11,840 lbs. SW
  - 5. Impulse Air System
    - (a) Four bottles located in bilge below tubes.

### PRESSURES, TEST AND WORKING

- A. Internal test pressures.
  - 1. Light hull subs-165psi.
  - 2. Heavy hull subs- 300 psi.
- B. Impulse bottles-900 psi hydrostatically
- C. Internal tube pressures limited by pressures which torpedo afterbody can withstand-135 psi(constant), 150 psi(momentarily).
- D. All lines, fittings, housings and appurtenances have 50% safety factor above designed working pressures.
- E. 5-10 psi above sea pressure will cause muzzle door to chatter.
- F. Firing valve designed to give a differential pressure of 60 psi for correct ejection velocity of 50 ft/sec.
- G. 225 psi ship service air operated.
  - 1. Poppet system.
  - 2. Blow and vent system.
  - 3. Stop cylinder
- H. Ship's main hydraulic plant pressure operates muzzle doors in power.
- I. Maximum keel depth for firing Mk 14 and Mk 16 torpedos-200'

## OPERATING PROCEDURES FOR THE PNEUMATIC TORPEDO TUBE

### 1. LOADING THE TUBE AND PLACING IT IN THE CRUISING CONDITION

- A. Impulse firing mechanically set torpedoes.
  1. Check tripping latch in normal position.
  2. Check tube dry.
  3. Open tube vent.
  4. Check drain valve interlock lever in down position.
  5. Open breech door.
  6. Set tube speed spindle on low and disengage.
  8. Check gyro spindle disengaged.
  9. Inspect tube bore to insure that: stop bolt is down; speed, depth, and gyro spindles and tripping latch out; and no foreign matter in tube.
  10. Check torpedo depth set at 10 feet.
  11. Check torpedo speed set on low.
  12. Check torpedo gyro spindle scribe on zero and spindle square.
  13. Check torpedo stop valve and blow valve (exercise shot) open.
  14. Load torpedo into tube removing starting lever lock when starting lever is even with breech door. Ease torpedo against stop bolt. Remove propeller lock.
  15. Back off all the way on tail stop.
  16. Shut the breech door. Check to insure that the tripping latch is lowering when shutting the door.
  17. Check the breech door fully shut by raising and lowering the drain valve interlock lever.
  18. Take up hand tight on the tail stop.
  19. Engage speed spindle. Change speed from low to high and disengage spindle.
  20. Engage depth spindle. Test setting from minimum to maximum setting of loaded torpedo. Set depth on 10 feet and disengage spindle.
  21. Set G.S.I.R. to 000° forward or 180° aft. Engage gyro spindle and lock in.
  22. Check ship service air out in to the stop cylinder valve firing plunger.
  23. Position the jacknut in the breechward position for opening the muzzle door in hand or power.
  24. Check selector valve in normal position.
  25. Build up correct impulse pressure.
  26. Check poppet valve ungaged (ungagged).
  27. Check poppet emergency stop valve open.
  28. Report tube in cruising condition.
- B. Impulse firing, electrically set torpedoes.
  1. Check tripping latch in normal position for torpedoes that can be started mechanically or electrically. Lock tripping latch in Rigged For Depth Charge position for electrically started torpedoes with shroud rings.
  2. Check tube dry.
  3. Open tube vent.
  4. Check drain valve interlock lever in down position.
  5. Open breech door.
  6. Inspect tube bore to insure that: stop bolt is down; tripping latch and depth, speed, and gyro spindles out; and no foreign matter in tube.
  7. Connect A cable to torpedo.

## OPERATING PROCEDURES FOR THE PNEUMATIC TORPEDO TUBE CONT'D

8. Load torpedo into tube removing starting lever lock when starting lever is even with breech door. Ease torpedo against stop bolt. Remove propeller lock.
9. Reset Switch Box Mk 5.
10. Connect A cable to breech door.
11. Back off on tail stop.
12. Shut breech door. Check to insure that the tripping latch is lowering when the breech door is almost shut unless the tripping latch is in the Rigged For Depth Charge position.
13. Check the breech door fully shut by raising and lowering the drain valve interlock lever.
14. Take up hand tight on tail stop.
15. Check ship service air cut into the stop cylinder valve firing plunger.
16. Position jack nut in the breechward position.
17. Check selector valve in normal position.
18. Build up correct impulse pressure.
19. Check poppet valve ungagged.
20. Check poppet emergency stop valve open.
21. Report tube in cruising condition.
- C. Runout or silent fire, swim out torpedoes.
  1. Check impulse bottle drain valve open.
  2. If torpedo to be fired has a shroud ring of greater than 19" O.D., lock tripping latch in Rigged For Depth Charge position.
  3. Check tube dry.
  4. Open tube vent.
  5. Check drain valve interlock lever in down position.
  6. Open breech door.
  7. Inspect bore to insure that: stop bolt is down; tripping latch and depth, speed, and gyro spindles out; and no foreign matter in tube.
  8. Connect A cable to torpedo.
  9. Load torpedo into tube. Remove propeller lock (if any).
  10. Reset Switch Box Mk 5.
  11. Connect A cable to breech door.
  12. Shut the breech door. If tripping latch is in Rigged For Depth Charge position, insure that it does not lower as door is shut.
  13. Check the breech door fully shut by raising and lowering the drain valve interlock lever.
  14. Check ship service air cut in to the stop cylinder firing valve. Secure air supply at any time when notified that the torpedo will be fired in silent fire.
  15. Position jack nut in breechward position.
  16. Report tube in cruising condition.

## II. FLOODING AND FIRING THE TUBE

- A. Flooding and firing the tube when the order is given to flood the tube but to leave the muzzle door shut so that there is no pressure on the tube.
  1. Check drain valve interlock lever down.
  2. Open the drain valve.
  3. Check tube vent open.
  4. Check WRT tank vent shut.
  5. Open WRT tank blow valve.

OPERATING PROCEDURES FOR THE PNEUMATIC TORPEDO TUBE CONT'D

6. When water flows through the tube vent into the bilges, shut tube drain valve.
  7. Shut WRT tank blow valve when pressure in WRT tank equals sea pressure.
  8. Report to conning tower that tube is ready with the exception of opening the muzzle door.
  9. When the conning tower orders the muzzle door open, shut the tube vent.
  10. Open and shut the tube drain valve.
  11. Raise drain valve interlock lever.
  12. Open muzzle door.
  13. Back off 1/4 turn on tail stop (if in use).
  14. Cock the poppet (if impulse firing).
  15. Raise ready-to-fire lever. If tripping latch is not in use, raise latch on shutter bar as ready-to-fire lever is being raised.
  16. In silent fire, Move the silent fire lever to the silent fire position.
  17. Turn on the ready light.
  18. In normal or runout fire, stand by to fire by hand if the firing circuit fails to function on the order to fire.
  19. In silent fire, stand by to retract the stop bolt manually on the order to fire.
- B. Flooding and firing when the order is given to make the tube ready in all respects.
1. Check drain valve interlock lever down.
  2. Open the drain valve.
  3. Check tube vent open.
  4. Check WRT tank vent shut.
  5. Open WRT tank blow valve.
  6. When water flows through the tube vent into the bilges, shut tube vent.
  7. Shut WRT tank blow valve when pressure in tube equals sea pressure.
  8. Shut tube drain valve.
  9. Raise drain valve interlock lever.
  10. Open muzzle door.
  11. Back off 1/4 turn on tail stop (if in use).
  12. Cock the poppet (if impulse firing).
  13. Raise the ready-to-fire lever. If tripping latch is not in use, raise latch on shutter bar as ready-to-fire lever is being raised.
  14. In silent fire, move the silent fire lever to the silent fire position.
  15. Turn on the ready light.
  16. In normal or runout fire, stand by to fire by hand if the firing circuit fails to function on the order to fire.
  17. In silent fire, stand by to retract the stop bolt manually on the order to fire.

## OPERATING PROCEDURES FOR THE PNEUMATIC TORPEDO TUBE CONT'D

### C. Procedure on firing.

1. In normal impulse firing, after the proper time interval, open the tube vent to shut the poppet.
2. In normal impulse firing, lower the ready-to-fire lever.
3. In normal impulse firing, shut the tube vent when water flows through the tube vent into bilges.
4. In silent fire, manually release the stop bolt after 20 seconds.
5. In runout fire, manually shut the firing plunger after 20 seconds.
6. In normal impulse fire when the poppet valve is not used, immediately shut the firing plunger by hand.
7. Shut the muzzle door.
8. Lower the drain valve interlock lever.
9. Open the tube vent.
10. Open the WRT tank vent.
11. Open the tube drain valve.
12. Shut tube vent.
13. Open tube blow valve admitting about 2 psi of pressure.
14. When the tube is about 2/3 empty, shut tube blow valve.
15. When the tube is dry, open the tube vent.
16. Shut tube drain valve.
17. Open breech door and inspect the bore. Report to tube captain that the bore is/is not clear.

### III. INBOARD SLUGS

#### A. Procedure

1. Check tube dry.
2. Open tube vent.
3. Check drain valve interlock lever down.
4. Open breech door.
5. Check depth and speed spindles disengaged.
6. Engage gyro spindle.
7. Check ship service air cut into stop cylinder valve firing plunger.
8. Inspect tube bore to insure that: gyro spindle and stop bolt are down; tripping latch, speed and depth spindles out; no foreign matter in tube. Torpedo should be completely withdrawn from the tube, or lashed down in the tube (lashed into tube).
9. Build up impulse pressure of about 50psi.
10. Do not cock poppet since impulse pressure not sufficient to prevent poppet from opening prior to firing.
11. Disconnect firing interlock bolt and drift stop.
12. Raise ready-to-fire lever. Raise latch on shutter bar while raising ready-to-fire lever.
13. Turn on ready light.
14. After firing, shut firing plunger by hand.
15. Lower ready-to-fire lever.
16. Reconnect interlocks.