# Normoxic Trimix Closed Circuit Rebreather Diver

## A. Purpose

1. This Program is designed to train divers who wish to dive between 90 fsw (27 msw) and 200 fsw (60 msw). But do not wish to breathe air diluent below 90 feet (27) msw on CCR. In the safe use of the CCR for dives using normoxic helium-based gas mixtures for diluent, and for stages.
2. This program qualifies divers to perform Trimix Dives outside of training up to 200 fsw (60 msw)

## B. Prerequisite

1. Must be qualified as an IANTD CCR Diver. Divers who are qualified as OC Normoxic Trimix Diver, see note below under the Program Content section (Section D.).
2. Must provide proof of a minimum of 100 logged dives, of which at least 30 were deeper than 90 fsw (27 msw) or sufficient experience doing technical dives to satisfy the instructor that the student has the ability and knowledge to continue into this level of training.
3. Must be qualified as a CCR Diver
4. Must have 20 dives and 25 hours on the CCR being used
5. Must be a minimum of 18 years of age.

## C. Texts

1. IANTD *CCR Normoxic Trimix Diver Student Manual and Workbook.*
2. CCR Owners Manual.

## D. Program Content

1. Complete all academic portions of the IANTD *Normoxic Trimix Student Workbook*, IANTD
2. Complete a written exam specific to Normoxic Trimix Diving on CCR with a minimum score of 80%.
3. This Program must include a confined water session prior to a minimum of 4 dives using the CCR with normoxic helium-based gas mixtures with a $FO_2$ in the diluent that will provide a $PO_2$ no greater than1.1 ATA and an END that does not exceed 120 fsw (36 msw) in the mixture for diluent. Bailout gas should have a $FO_2$ of no less than 20% and an END no greater than 120 fsw (36 msw). Students may use EANx or Air diluent mixtures for dives more shallow than 120 fsw (36 msw).
4. Three of the dives must be deeper than 90 fsw (27 msw). No dives may exceed a depth of 200 fsw (60 msw)
5. For those who are already OC Normoxic Trimix Divers or OC Trimix Divers with at least 20 trimix dives, this Program must include a confined water session and a minimum of 120 minutes of run time, using Trimix or Heliox, completed within at least 2 open-water or overhead-environment dives. The course may be combined with the CCR Diver Program for divers previously qualified as OC Normoxic Trimix Divers, but certification will not be awarded until the diver has logged 20 dives and 25 hours on the CCR

## E. Equipment Requirements

1. Must own or have unlimited access to a CCR.

## F. Program Limits

1. There may be no more than 4 students per Instructor. This ratio may be increased by 2 students (for a maximum of 6 students) with an assisting IANTD Trimix Diver Supervisor. If the course is conducted in conjunction with a Cave or Wreck Programs, the limits for those Programs will prevail.
2. No dives may be conducted to depths greater than 200 fsw (60 msw). .
3. Oxygen partial pressure may not exceed 1.3 during the working portion of the dives, nor exceed 1.4 ATA during the decompression portion of the dives.
4. Trimix dives must be conducted using a Bailout mixture containing at least 20% oxygen and a diluent that will allow for a $PO_2$ no greater than 1.1 ATA
5. Equivalent Narcosis Depth (END) may not exceed 120 fsw (36 msw).
6. Surface oxygen must be available for use in the event of Decompression Illness (DCI).
7. All dives must be performed as a single dive team.
8. All appropriate safety or required decompression stops must be performed.
9. Each team must carry stages or adequate bailout gas or bailout rebreathers to get 1 ½ divers to the surface on CCR

## G. Water Skills Development

1. A confined water session demonstrating **all** skills must be completed to the instructor's satisfaction prior to conducting any open water dives.
2. Complete all Water skills listed under the Rebreather Diver Standards in Sport Diver Programs.
3. Perform one manual operation dive, which will also have emergency drills incorporated into them.
4. Perform at least a 33-foot (10 meter) vertical ascent on bailout gas from a depth greater than 160 fsw (48 msw). Record the amount of gas used during this period and calculate how much gas would be needed to reach the surface
5. On a dive do a SCR bailout for at least 15 minutes
6. If the diver has a bailout rebreather do a complete ascent on the unit.
7. Become proficient in the following propulsion techniques: modified flutter, modified frog, modified dolphin and standard shuffle kicks.
8. React to simulation of oxygen by pass due to faulty manual addition valves or switching assemblies
9. Practice plugging off board gas into the CCR (if compatible)
10. Connect buddies stage into the unit (if compatible) and add gas to simulate loss of gas supply
11. At least once simulate the oxygen supply has been lost. Go to low a set point lower than the off board stage capability, connect the off board stage to the manual oxygen fitting (if compatible) (note! The off board should have a higher $FO_2$ than the diluent cylinder) and maintain a safe PO by manual addition of the gas for at least 10 minutes
12. Deploy lift bag in less than 1½ minute, and repeat at least 3 times during the Program.
13. Swim a distance of at least 75 feet (23 meters) without wearing a mask.
14. Practice removing and replacing a stage cylinder, both at rest and while swimming.
15. Have 2 divers swim side-by-side, in full equipment, simulating an out-of-gas situation (without breathing, and exhaling slowly), for a distance of 60 feet (18 meters), then stop and switch to bailout stage (or rebreather). Divers should remain a rest for 3 breaths, then swim for 3 minutes and then switch stages and continue breathing from the stages just switched to at an average pace for at least 3 additional minutes then switch stages back to the original ones and go back on the loop.
16. Remove the CCR and cylinders from a simulated unconsciousness diver in less than 2 ½ minutes.
17. Do a simulated loop failure and go to bailout, simulate reaching 50% of bailout gas capacity and switch bailout cylinders with dive buddy.
18. Divers using a quick-release on their harness or backpack must, in confined water, swim the system while the instructor disconnects the quick-release to simulate a failure. The student is to swim the system demonstrating control of buoyancy and body positioning with the quick disconnect released for sufficient duration to satisfy the instructor that the student may manage this type of failure.
19. Demonstrate an ability to respond to a single-bladder BCD failure by the two methods listed below.
    a. Completely deflate BCD and swim while maintaining buoyancy control with the counter Lungs for two minutes.
    b. Completely deflate BCD, ascend safely to the surface, and remain afloat for at least 3 minutes.

**NOTE: If at any time the student starts to over-exert, or if it is obvious that the skill cannot be accomplished, the instructor is to ensure that the BCD is inflated.**

14. In confined or shallow water, have a student lose buoyancy by deflation of the BCD and then attempt to utilize a lift bag or other secondary buoyant device as a BCD.

**NOTE: This skill is to demonstrate how effective these devices are and to reinforce that even if not suitable for a redundant BCD they still provide an option for self rescue in an emergency situation.**

15. Following a means of reference (pool wall, guide line, ship railing, etc.) with eyes closed, remove stage cylinder and swim a distance of at least 15 feet (4.5 meters). Reverse direction, return to stage cylinder and replace it on correct side.
16. Two divers approximately 60 feet (18 meters) apart, with blacked-out masks or eyes closed, and while simulating an out of air situation, locate each other (using side of pool, rail on wreck, guide line, etc. for orientation) and bailout to their bailout system (OC or rebreather) then while still blacked out exchange bailout systems. (This should be done in shallow water or confined water)
17. Prior to dives, students must use match gas turn points based on oxygen metabolism.
18. At least two times on each dive, Instructor is to signal to student(s) that they have an emergency.