The ART of Rebreather - DIR compliant CCR

I have been diving a DIR / team diving way for a few years now on OC and have configured several CCR over the years trying to make them DIR compliant using Megs and now my JJ-CCR I have also had the pleasure of teaching GUE instructors and other DIR minded folk over the years. So my Q. is this what makes a DIR Rebreather/Diver?

Struggling with the idea diving the long hose and all my bailout gas on my back I asked myself do I really need to configure in a Hogarthian way to be team diving with efficient skills and simplified planning?

My thoughts are as Follows:

The Rig

• The unit should allow for large volume On-board bailout gas supply cylinder to be fitted, not necessarily all diluent on-board, as I like the idea I can pass off BTM mix to a team member in an emergency and not have to long hose gas share in complex dives. I really believe in having larger volume diluent tanks fitted to the rig to simplify bailout, loop flushes, cell checks and Rescue if required. So I decided to continue to carry reserve gas in a stage bailout that can be passed off in an out of gas emergency and remove the long hose and use a larger single supply diluent tank routed to my Bailout valve, maintaining the CCR standard of O2 right (On-board) and diluent supply on the left.

• The units I dive are fitted with a built in bailout valve/ BOV and routed to a cylinder with enough capacity to manage a personal bailout without going to a stage unless required due to primary system failure.

• I felt I needed a back mounted Lung system allowing a clean chest area for streamlining the rig dealing with light cords and allowing easy access to my chest D-rings for stage manipulation and back up light deployment.

• My configuration must be equipped with both oxygen and diluent supply manual bypass systems.

• The units should be able to accept off-board pluggable gas encase of primary supply failure.

• The unit should be fitted with a back up system monitor.

• The system should be maintainable without any special tools and should be in the field repairable.

• The unit should have undergone independent testing to validate unit performance.
• The unit should trim out well without the need for lots of additional weight to allow for streamlining in overhead environments.

The rigs I see fit this configuration are the Meg, JJ-CCR, Hammerhead all electronic!! As the pilot I choose to manually add gas to target PO2 overriding the electronic set-point and using it as a parachute /ABS breaks if required. This way I am in control of my PPO2, loop volume and should I need to go OC via the BOV no gas is entering the loop causing buoyancy problems while I deal with the emergency. It totally works with MCCR or Hybrid as well, so long as its easy to isolate O2 flow into the unit if its required to go to OC to prevent buoyancy loss.

Team diving generally then considers diving standard gases.

It made sense that adopting existing standard gases I Had been taught used by DIR divers already and modifying the MOD of the gases to ensure I can flush the loop to verify PO2 at depth or during toxic loop.

The gases and operating range is then as follows with a note that the dive plan target depth should not exceed a PPO2 of 1.2 and provides a 30m END or shallower

Decompression gasses follow the standard gas format using, 21/35, 35/25, 50
and Oxygen for Open Circuit bailout plans.

I believe there are lots of advantages to using standard gases in CCR operation as it simplifies team bailout, streamlines gas blending and ensure straight forward bailout dive planning allowing ratio concepts for on the fly deco at reasonable shallow depths and range.

Diving standard gases aids the divers as they learn the gases and profiles like the back of their hand as each diver can then provide backup in decompression management and bailout situations to a team member under stress as they are also very clear with the plans and procedures.

It's not my intention to provide a detailed planning session in this art note but the idea is then that I apply minimum gas volumes to a slightly higher breathing rate, assuming a CO2 hit as a possible situation and manage decompression schedules with trusted dive planners like V-Planner of G/F based software. It is then easy enough to apply a pragmatic approach and derive ratio concepts from the data.

It occurred to me that having taught and dived with a reasonable amount of CCR divers there is often no common ground when it comes to dealing with emergencies, I know theirs more than one way to skin a cat but I think it makes sense if we all kind of share the same approach, I am quite sure we could all drive if the clutch took the position of the brake but if every time we got in the car we had to work out which way round they are it might get messy. I have been working on some skill sets and when I am fished editing I will post them for thoughts and comments.

I also felt that Pre-dive can be a stressful time, have I done all my checks, do I have all my gear what’s the plan again? All this needs to be simplified into following the manufactures specified gear checklist and then conducting a full head to toe check with brief overview of the plan, GUE do this with the EDGE I have done it with MONA LISA (after all theirs and ART to this madness).

**M** - Mission
Dive objectives.

**O** - Organization
Define the roles in the team

**N** - Navigation
Direction

**A** - Ascent Profile
Depth & time & Deco

**L** - Linearity Check
Oxygen cell flush at 6m

**I** - Inert gas mixtures
On-board mixes & bailout gases

**S** - Setpoint
Descent, BTM, Ascent

**A** - Apparatus
Head to toe equipment check

The idea being each diver in the team follows along as a team leader chairs the brief, the divers each confirm equipment operation and highlight functions of key components like how to operate the BOV and manually add or flush gas into the diver loop. It also helps as a last minute reminder of the dive plan details from the detailed briefing.

There are lots of other things that make a true CCR teammate including
experience, situational awareness and Physical ability for the level of diving. I can honestly say that since I started to Re-think my CCR diving and integrate the team concept into my CCR dives I have felt happier in many ways ultimately making me feel safer as a diver and a teammate diving CCR.

Safe Diving

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