Confédération Mondiale des Activités Subaquatiques

World Underwater Federation

C.M.A.S. Diver

TRAINING PROGRAM

CMAS TC Version 9/2002

THE C.M.A.S. INTERNATIONAL DIVERS CERTIFICATES SYSTEM

The C.M.A.S. has established standards which form the basis of a system of International Divers Certificates, which are recognised by all national federations and other bodies which are member of the C.M.A.S. Technical Committee.

The standards describe the knowledge and skills required in order for a diver to be granted the appropriate C.M.A.S. International Divers Certificate.

The certificates may be awarded as an equivalent to a national qualification held by the divers, or may be awarded directly by a C.M.A.S. recognised Diving School or by certain national federations.

The standards describe four grades of divers

- One Star Diver *
- Two Stars Diver **
- Three Stars Diver ***
- Four Stars Diver ****

Details of the standards will be found in the C.M.A.S. publication " Standards and Requirements "

In most cases divers will be trained in accordance with the training programmes used by their national federation, and these will have been closely considered during the process of granting approval for International Certificate Equivalents.

The Diver Training Programmes outlined here are intended to:

1. Act as an example to federations wishing to become members of the C.M.A.S. Technical Committee, and aiming to issue divers certificates which will have equivalent C.M.A.S. International Divers Certificates.
2. Indicate to existing members of the Technical Committee the current standards of training considered necessary in order to reach the minimum levels of proficiency required for the award of C.M.A.S. International Divers Certificates
3. Act as a basis for the training programmes to be adopted by C.M.A.S. recognised Diving Schools for courses resulting in the direct issue of C.M.A.S. International Divers Certificates.

The programmes are described as a sequence of theoretical and practical lessons, wherever possible the practical lesson builds on theoretical knowledge already taught to the student. Suggestions are offered on the time each lesson can be expected to occupy in a normal programme.

The lessons have been given codes to describe their place in the programmes. For example, " 2T6 " is a theoretical lesson (T) for two stars diver (2) and is the sixth in the sequence (6). 1P2 is therefore the second practical lesson in the one star diver programme.

ONE STAR DIVER

TRAINING PROGRAMME

A diver who is competent in the safe and correct use of all appropriate open water scuba diving equipment in a sheltered water training area is ready to gain open water diving experience in the company of an experienced diver. Practical teaching sessions should take place in a swimming pool or confined water with swimming pool like conditions.

THEORY LESSONS

1T1 Course aims and administration
1T2 Introduction to equipment
1T3 Elementary signals
1T4 Pressure/Volume relationships
1T5 Principles and use of SCUBA
1T6 Basic physiology
1T7 Buoyancy devices
1T8 Diving suits & other equipment
1T9 Equipment care
1T10 Self Rescue & Buddy Rescue
1T11 Safe Diving Practices
1T12 Site selection, Conservation

PRACTICAL LESSONS

1P1 Introduction to equipment
1P2 SCUBA Skills 1
1P3 Snorkelling and SCUBA Skills 2
1P4 SCUBA Skills 3
1P5 SCUBA Skills 4
1P6 Rescue Skills
1P7 SCUBA Skills review
1P8 Skills assessment
1P9 5 Open Water Dives

CONTENT OF THEORETICAL LESSONS

1 T 1 COURSE AIMS AND ADMINISTRATION

This introductory lesson should explain the purpose of the training programme and its position in the diver certification system, the relation ship between the school/club/federation and C.M.A.S., and the basis of the C.M.A.S. International Divers Certificate System. Administrative details concerning meeting times and location, timetable, equipment to be supplied or brought. Aims of the course, organisation of the school/club. Logbook and qualification records.
(Time: 20 minutes)

1 T 2 INTRODUCTION TO DIVING EQUIPMENT

The selection, purpose and function of the mask, fins, snorkel and weight belt.
Mask, fins, snorkel: construction, features, fitting, maintenance, testing, suitability
Weight belt: features, fitting, release operation, importance of neutral buoyancy
Brief description of SCUBA elements
Equipment to be used on the course
Warnings about breath-holding, squeeze
(Time: 30 minutes)

1 T 3 ELEMENTARY SIGNALS

Reasons for using hand signals underwater and at the surface.
Importance of using the C.M.A.S. International Code of Underwater Signals.
Diver to diver signals
Diver to surface party signals
Signals to be used during course
Importance of response to signals
(Time: 25 minutes)

1 T 4 PRESSURE/VOLUME RELATIONSHIP

The basic physics affecting diving
Atmospheric pressure and hydrostatic pressure, absolute pressure.
Relationship between pressure and volume (Boyles laws).
Gases under pressure, composition of air.
Effects of pressure on body air spaces, changes in pressure.
Compression problems: mask squeeze, ear and sinuses under pressure, equalisation.
Expansion problems, breath holding..
Buoyancy factors and adjustment
(Time: 40 minutes)

1 T 5 PRINCIPLES AND USE OF SCUBA

The function of SCUBA, in principle only. Reduction of air pressure from high to ambient. Ability to carry large amount of air with the diver..
The air cylinder, its charging and care
The regulator, its function and care
Pressure gauges and other ancillary equipment
Using SCUBA, preparation and fitting.
(Time: 30 minutes)

1 T 6 BASIC PHYSIOLOGY

The human life support system, the respiratory system, the metabolic process.
The gas exchange within the lungs, the role of each gas.
Exhaustion, drowning, hypoxia, hypothermia, prevention.
(Time: 40 minutes)

1 T 7 BUOYANCY DEVICES

Importance of wearing a buoyancy compensator for comfort during the dive and for use in an emergency, at the surface or underwater.
Essential features of different types.
Suitability for different types of diving.
Dangers of rapid ascent, controlling ascent
Use for buoyancy adjustment, recommended procedure
Methods of inflation, MP air, HP air, oral, CO2, advantages / disadvantages
Preparation, fitting, care
(Time: 30 minutes)

1 T 8 DIVING SUITS AND ANCILLARY EQUIPMENT

Need for protection in all but warmest waters, abrasion and marine life protection. Equipment to be used on course. Advantages / Disadvantages of different types.
Wet / dry suits.
Selecting a suit, type.
Fitting and care.
Instrumentation, depth gauge, watch, compass, HP gauge, combinations, decompression computers.
Lamp, knife, buoys, lines, bag, slate.
Time: 30 minutes)

1 T 9 EQUIPMENT CARE

Importance of a proper maintenance procedure for all diving equipment.
Pre-dive preparation, after-dive care.
Value of fresh water rinse and general cleanliness
Special care for perishable items, rubber, suits.
Prevention of corrosion to metal parts.
Protection for damage in transport.
Regular testing and servicing.
Storage, off-season.
(Time: 30 minutes)

1 T 10 SELF RESCUE AND BUDDY RESCUE

Accident prevention through careful planning.
Recognise the signs and take early action.
Assess the required action and select, correct course of action.
Self-help an self-rescue techniques.
Correct techniques for shared ascent, buoyant ascent, and free ascent.
Expired air resuscitation, on the surface and in the water.
Towing and landing a victim.
Summoning and using help.
(Time: 40 minutes)

1 T 11 SAFE DIVING PRACTICES

The correct conduct for open water diving practice.
The dive leader, his role in the dive.
Dive planning, to identify and avoid problem areas.
The buddy system and essential elements in dive safety.
Pre-dive preparation, equipment checks, briefing.

Entry, buoyancy check, descent, conduct of the dive, ascent, surfacing, leaving the water.
Emergency procedures, separation.
The International Diving Code.
International Code of Signals.
(Time: 40 minutes)

1 T 12 SITE SELECTION AND CONSERVATION

How to choose a dive site.
What features to look for and what to avoid.
The effect of weather and tides.
Marine and aquatic life, what to look for, how to recognise it.
Attitude to marine life and the environment, importance of conservation.
Reasons to dive and things to do.
Dangerous marine life, avoidance, treatment.
(Time: 30 minutes)

CONTENT OF PRACTICAL LESSONS

1 P 1 INTRODUCTION TO EQUIPMENT

In this course the student will be introduced in mask, fins and snorkel and their use, an will gain an appreciation of the effects of mask squeeze and ear clearing in shallow water. The buddy system will be employed from the first opportunity.
Fitting the mask, adjustment, demisting, ear clearing.
Fitting the snorkel, surface breathing, clearing by blowing and displacement.
Fitting the fins, adjustment, correct finning action, practice period.
Surface swimming, surface dives, and surfacing technique using mask, fins and snorkel.
Treading water, vertical finning, surface support stroke.
Brief introduction to SCUBA, fitting, breathing and swimming.
Adjusting buoyancy.
(Time: 60 minutes)

1 P 2 SCUBA SKILLS 1

Assembling the SCUBA set, fitting and checking the regulator, air supply, fit of harness, buoyancy/weight equipment.
Entering the water, breathing from the aqualung in different attitudes, checking and adjusting buoyancy.
Finning and moving while wearing SCUBA.
Remove, replace and clear mouthpiece.
Remove, replace and clear mask.
Breathe from alternative air supply.
Static sharing SCUBA.
Surfacing and leaving water.
(Time: 60 minutes)

1 P 3 SNORKELLING AND SCUBA SKILLS 2

Snorkelling skills, entering the water, leaving the water.
Feet first descent.
Surface dives while swimming.
Longer breath-hold dives.
Removing and recovering basic equipment.
Using and fitting a weight belt.
Repeat mask and snorkel clearing
SCUBA skills, entering and leaving the water.
Improve mouthpiece clearing and mask clearing technique.
Improve finning technique.
Demonstrate buoyancy control.
Share SCUBA following " out of air " simulation.
Remove SCUBA at surface.
(Time: 60 minutes)

1 P 4 SCUBA SKILLS 3

Further entry techniques.
Improve basic techniques, mask clearing, finning.
Mobility exercises, rolls, buoyancy control.
Remove and replace weight belt underwater.
Remove and replace SCUBA underwater.
Surface, fit snorkel and swim on surface using snorkel while wearing SCUBA, replace SCUBA mouthpiece and descend.
Exit from water via ladder from deep water.
(Time: 60 minutes)

1 P 5 SCUBA SKILLS 4

Improve familiarity with buoyancy device or life-jacket.
Inflate for surface support.
Control buoyancy at bottom and in mid water.
Control rate of ascent by release of air, demonstrate ability to stop.
Use of buoyancy for lift in an emergency, controlled buoyancy lift.
Rapid dumping of air, use of alternative inflation systems.
(Time: 60 minutes)

1 P 6 RESCUE SKILLS

Controlled buoyancy lift of victim to surface.
Surface support and towing.
Correct position for expired air resuscitation at surface, importance of neck extension.
Calling and signalling for help.
(Time: 60 minutes)

1 P 7 SCUBA SKILLS REVIEW

In this lesson, all the equipment which will be used on open water dives, including suit, is introduced and the skills already learned are practised while fully equipped.
Exercises are carried out in the full depth of sheltered water available and the opportunity is taken for final improvement of any techniques still required.
(Time: 60 minutes)

1 P 8 SKILLS ASSESSMENT

All skills learned so fare are checked and assessed to ensure that they can be performed at the required standard. The combination of exercises is performed in sequence will also provide a measure of the student's fitness and stamina.
It must be remember that, after this lesson, suitable students are considered ready to continue their training in open water.
(Time: 60 minutes)

On completion of each lesson the instructor should assess the student's ability and ensure that they have adequately acquired the skills included in each lesson. It is particularly important that this assessment is made during lessons 1P4 and 1P6.

1 P 9 5 OPEN WATER DIVES

TWO STAR DIVER

TRAINING PROGRAMME

The two star diver is a diver who has gained some open water diving experience and is considered ready to take part in dives partnered by a diver of at least the same or a higher grade. The two star diver may dive with a One Star Diver in sheltered shallow water .

The course must be conducted by qualified instructors and supervised by an instructor of at least one star grade. The early practical teaching sessions should take place in sheltered open water, following which the diver should gain experience in a broad range of varying water conditions.

THEORY LESSONS

2T1 Diving related illnesses
2T2 First aid and rescue procedures
2T3 Calculating air requirements
2T4 Nitrogen absorption
2T5 Deep diving
2T6 Decompression tables
2T7 Dive planning and organisation
2T8 Unterwater Navigation

Knowledge Assessment

PRACTICAL LESSONS

2P1 Open water diving procedures
2P2 Rescue skills
2P3 SCUBA skills – open water practice
2P4 Unterwater Navigation

Dives 1 -20

Skills Assessment

CONTENT OF THEORETICAL LESSONS

2 T 1 DIVING RELATED ILLNESSES

Revision of effects of pressure on the body, gas laws, partial pressures.
Ear and sinus disorders: causes, prevention, treatment
Burst lung (Pneumothorax, Emphysema), symptoms, causes, first aid, treatment.
Hypoxia: causes, treatment.
Decompression sickness (basic introduction only).
Nitrogen narcosis: causes, symptoms, treatment.
Carbon monoxide poisoning: causes, symptoms, treatment.
Carbon dioxide poisoning: causes, symptoms, treatment.
Oxygen poisoning: causes, symptoms, treatment.
Exhaustion, hypothermia, hyperthermia.
Drowning: causes, first aid, treatment.
(Time: 60 minutes)

2 T 2 FIRST AID AND RESCUE PROCEDURES

Expand on lesson 1T10, and prepare for lesson 2P2.
Analysis of the accident.
Whether to assist or rescue.
Assess, plan, act
Reaching the victim, recovering the victim.
Towing methods.
Landing the victim, on a beach, on a boat.
Techniques to be employed and why.
Expired air resuscitation
External cardiac compression.
Aftercare.
(Time: 40 minutes)

2 T 3 CALCULATING AIR REQUIREMENTS

Importance of pre-dive planning.
Identifying stages of dive: descent, main dive, ascent, stops, reserve.
Air consumption rates.
Cylinder sizes and pressures.
Calculating air available for the dive.
Calculating air needed for the dive.
Practice calculations.
(Time: 40 minutes)

2 T 4 NITROGEN ABSOPRTION

Absorption of gases in liquids, absorption of air into body tissues.
Toxic effects of gases.
Physiological problems; narcosis.
Decompression sickness, mild forms, severe forms.
First aid and treatment for decompression sickness.
Avoidance of decompression sickness.
(Time: 40 minutes)

2 T 5 DEEP DIVING

The problems related to deep diving.
Reasons for and against deep diving.
Physiological problems, narcosis, decompression.
Depth limitations.
Physical problems, buoyancy, thermal isolation, air density and purity.
Equipment considerations.
Planning requirements.
Response to emergencies.
(Time : 30 minutes)

2 T 6 DECOMPRESSION TABLES

Used to avoid decompression sickness and related problems.
Principle of operation, review of nitrogen absorption.
The form and layout of the tables.
Using tables for no-stop diving.
Single dives.
Multiple dives.
Diving at altitude.
Flying after diving.
Keeping records, log-books.
Instrumentation used.
Importance of planning.
Practice in decompression table use.
(Time: 90 minutes)

2 T 7 DIVE LANNING AND ORGANISATION

Planning is an essential element of diving safety.
Avoid the predictable problems.
Make allowance for all predictable needs and for emergencies.
Planning your own dives.
Site selection, objectives, timing, personnel, weather, tides.
Pre-dive preparation.
On-site organisation.
(Time: 90 minutes)

2 T 8 UNDERWATER NAVIGATION

Underwater navigation, without a compass.
The compass, types, suitability.
How to use a compass when diving.
Taking a bearing, planning a course.
(Time: 30 minutes)

KNOWLEDGE ASSESSMENT

Before granting the qualification, the instructor should ensure that the student has retained and understood the knowledge required to be a safe two star diver. The assessment will usually take the form of a prepared written text using " multi choice " questions which allow a coverage of many topics in a short period. Weaknesses which are suggested by the result of this paper can then be investigated by further oral questioning if necessary.

CONTENT OF PRACTICAL LESSONS AND EXPERIENCE DIVE

2 P 1 OPEN WATER DIVING PROCEDURES

Practice snorkelling skills in open water, medium distance swim with surface dives.
Experience in dressing in all appropriate equipment for dive, equipment checks, buddy checks.
Water entry, buoyancy checks.
Leaving the surface.
Buddy diving, conduct during the dive.
Exchange signals.
Ascent and surfacing procedure.
Leaving the water.
Debriefing and equipment aftercare.
(Time: 120 minutes)

2 P 2 RESCUE SKILLS

Following lesson 2T2, the skills described should be practises in an open water situation.
Towing victim on the surface, various methods.
In-water E.A.R.
Removing equipment.
Towing and landing to a beach, to a small boat.
Practice E.A.R. and E.C.C. on land.
Complete emergency exercise.
(Times: 90 minutes)

2 P 3 SCUBA SKILLS OPEN WATER REVIEW

Improve diver's confidence by repeating skills acquired in one star course in the open water situation.
Various forms of water entry.
Buoyancy adjustment procedures, use if weight belt and buoyancy compensator.
Review surface and underwater signals.
Remove and refit mask at medium depth.
Remove and replace mouthpiece at medium depth.
Practise buddy breathing and use secondary air supply or octopus.
Leaving the water on a beach, into a boat.
(Time: 90 minutes)

2 P 4 UNDERWATER NAVIGATION

Using a compass on land.
Using a compass on the surface.
Using a compass underwater.
Swimming in straight lines, swimming reciprocal courses.
(Time: 60 minutes)

EXPERIENCE DIVES

The 20 dives which go to make up the experience of the two star diver should cover a suitably wide range of different diving conditions and, as far as possible, include the following:

- Beach dives with sloping entry.
- Sea water dives.
- Fresh water dives.
- Diving from small boats.
- Diving from larger boats.
- Limited visibility dives.
- Diving during the night
- Moving water dives
- Dives in cold water.
- Dives to 25 / 30 metres.

It is appreciated that this combination of variety of dives will not always be available to the dive centre or club. However, the underlying principle is that the diver's experience should equip him for a variety of diving conditions, and should not represent a repeat of a similar experience on each occasion.
Each dive should be at least 20 minutes duration and should be in the 10 – 30 metres depth range.

SKILLS ASSESSMENT

The diver's ability should be assessed by the instructor during the course of the dives being carried out. It will not normally be necessary to carry out a final assessment of all skills at the end of the course, but this can be done if the need exists. It is preferable to check one or two skills on each experience dive and to look for a steadily improving ability over this period.

THREE STAR DIVER

TRAINING PROGRAMME

The three star diver is a fully trained, experienced and responsible diver who is considered competent to lead other divers of any grade in open water.

The course must be conducted by qualified instructors and supervised by an instructor of at least two star grade. The course will require the availability of suitable open water diving sites, together with some specialised facilities.

The dive experience element of the qualification will require the diver to accumulate a broad range of experience under varying conditions and varying depths.

THEORY LESSONS

3T1 Small boat handling
3T2 Underwater navigation
3T3 Underwater search and recovery
3T4 Compressor operation
3T5 Accident management
3T6 Organising a group dive
3T7 Physics / physiology review)
3T8 Diving equipment review

Knowledge assessment

PRACTICAL LESSONS

3P1 Small boat handling
3P2 Underwater navigation
3P3 Underwater search and recovery
3P4 Compressor operation
3P5 Assisting a dive organiser
3P6 Acting as a dive organiser
Further experience as dive organiser:
40 experience dives

Skills assessment

CONTENT OF THEORETICAL LESSONS

3 T 1 SMALL BOAT HANDLING

A preliminary to practical experience in small boat handling.
Basic seamanship, weather, tides.
" Rules of the road ", obligations of the boat handler.
Buoyage.
Ropes and their use, knots.
Using boats for diving, types, suitability.
Outboard engines and their use.
Safety equipment and special equipment.
Boat handling techniques, launching, anchoring, loading, low speed / high speed, emergency action.
(Time: 60 minutes)

3 T 2 UNDERWATER NAVIGATION

Underwater navigation, without a compass.
The compass, types, suitability.
How to use a compass when diving.
Taking a bearing, planning a course.
Measuring distance, time, depth.
(Time: 40 minutes)

3 T 3 UNDERWATER SEARCH AND RECOVERY TECHNIQUES

Situations requiring use of these techniques.
Planning and selection of appropriate techniques.
Search methods: compass search, Jackstay search, grid search, circular search, swim-line search.
Marking and evaluation an object.
Lifting with buoyancy, calculations.
Attaching lifting bags, air supply, the lift.
Safety considerations.
(Time: 60 minutes)

3 T 4 COMPRESSOR OPERATION

Principles of operation of a compressor.
Purity of air, filtration.
Operating procedures, filling cylinder.
Compressor controls.
Use of storage bank.
Records and legal obligations.
(Time: 60 minutes)

3 T 5 ACCIDENT MANAGEMENT

What can go wrong.
Avoiding accidents, importance of planning.
Actions in an emergency.
Weather and water conditions.
Condition of divers, fitness, health, experience.
Missing diver(s).
Boat breakdown.
Diving related problems.
Injuries.
Rescue management.
First aid and aftercare management
(Time: 60 minutes)

3 T 6 ORGANISING A GROUP DIVE

Composition of group.
Selection of dive site, access, transport.
Timetable, planning requirements.
Personnel, dive group composition.
Equipment needs, safety equipment.
Diver briefing.
Diver log, records.
Safety precautions.
(Time: 60 minutes)

3 T 7 PHYSICS / PHYSIOLOGY REVIEW

A review of material from 1T5, 1T7, 1T8, 1T9 together with a general review of future trends and current developments.
The gas laws.
The human life-support system.
Effects of pressure on the body.
Diving disorder, symptoms, treatment.
(Time: 60 minutes)

3 T 8 DIVING EQUIPMENT REVIEW

A review of material from 1T5, 1T7, 1T8 et 1T9 together with a general revue of future trends and current developments.
Cylinders, care, testing.
Regulators, performance, servicing needs.
Protective clothing, suitability for type of diving, care.
Buoyancy systems, .relationship to other equipment
Diving equipment as a " system ".
Instrumentation, new developments.
National standards, legal requirements.
(Time: 60 minutes)

KNOWLEDGE ASSESSMENT

Before granting the qualification the instructor should ensure the student has retained and understood the knowledge required to be a safe C.M.A.S. three star diver.

The assessment will usually take the form of a prepared test using " multi-choice " questions which allow the coverage of many topics in a short period. Weaknesses which are suggested by the result of this paper can then be investigated by further oral questioning if necessary.

CONTENT OF PRACTICAL LESSONS

3 P 1 SMALL BOAT HANDLING

The student should gain sufficient experience to be capable of handling z small boat, up to 5.5 m length, in normal diving conditions..
Checking and preparing a boat prior to use by divers.
Launching, loading, starting, leaving mooring / berth.
Sage operation under conditions not exceeding Force 4.
Techniques for use with divers, following divers, picking-up divers.
Action in an emergency.
Return to mooring / berth.
Removal from water (if appropriate).
(Time: 45 minutes)

3 P 2 UNDERWATER NAVIGATION

Using a compass on land.
Using a compass on the surface.
Using a compass underwater.
Swimming in straight lines, swimming reciprocal courses.
Taking bearings and planning courses.
Measuring / estimating distance.
Show ability to bring back a dive team to the departure point (Time: 60 minutes)

3 P 3 SEARCH AND RECOVERY

Identify area to be searched.
Select technique to be employed.
Prepare equipment, brief personnel.
Carry out search plan, locate object.
Evaluate object and select lifting equipment.
Secure lifting equipment and bring object to surface.
Bring object ashore or to new location.
(Time: 2 – 3 hours)

3 P 4 COMPRESSOR OPERATION

Pre-operation checks, starting procedure.
Inspection of cylinders prior to filling.
Connection of cylinders to compressor panel.
Charging operations, use of bank.
Shut-down procedure, care of filters.
(Time: 60 minutes)

3 P 5 ASSISTING A DIVE ORGANISER

Understand all the pre-dive planning requirements.
Consider the allocation of divers and dive-leaders / instructors.
Consider the timing requirements.
Ensure that equipment required is available / functioning.
Record all activity.
Plan for emergency procedures.
Adapt plan to site / facilities.
(Time: 4 hours)

3 P 6 ACTING AS DIVE ORGANISER

3 P 7 As for 3P5, carried out under supervision but following student's plan.

(Time: 4 hours)

EXPERIENCE DIVES

The CMAS Three Star Diver must have minimum 50 dives at the time of certification of which 20 dives should be on the 30 meter range
The dives logged should demonstrate the diver's broad experience of diving under varying conditions and ver a period of time suitable for the accumulation of skills and knowledge. The log should indicate those dives where the diver has been responsible for other divers or for the planning of the diving operation.

SKILLS ASSESSMENT

The main qualities to be assessed by the instructor will be the student's ability to organise and lead other divers, together with a demonstration of competence in the areas covered by the programme. The three star diver must be " fully trained " and should therefore not display areas of weakness in the practical performance of diving.