

**ACN 1/R7 to U. S. Navy Diving Manual (SS521-AG-PRO-010), Change A**

ACN 1/R7 provides the operating guidelines for enclosed or confined space diving utilizing Interspiro MKII, DP 1/2 Surface Supply Diving Apparatus.

1) Remove page 6-62, Change A and replace with attached pages 6-62 and 6-63.

2) The following changes are attached (Pages liii, 2-xiii, 6-28, 6-6, 8-30, Flyleaf 1):

In the List of Illustrations on pages liii and 2-xiii, change the title of Figure 6-27 from "Interspiro Divator DP-1 Surface Supply Apparatus General Characteristics" to "Interspiro Divator MK II, DP 1/2 Surface Supply Apparatus General Characteristics".

In Figure 6-14 on page 6-28, replace "DP-1" with "DP 1/2" (three places).

On page 6-6, next to last sentence of paragraph 6-2.9, replace "system" with "source".

On page 8-30, last sentence of paragraph 8-11.4, replace "system" with "source".

On Flyleaf 1, Record of Changes, record entry of ACN 1/R7.

3) Insert a copy of this page of the ACN following the Record of Changes.

## Interspiro Divator MK II DP 1/2 Surface Supply Apparatus

### Principle of Operation:

Surface augmented dive apparatus

### Minimum Equipment:

1. Divator DP 1 surface box with adequate cylinders per dive plan
2. Divator MK-II open-circuit SCUBA with octopus regulator and MK 20 Full Face Mask
3. Life Preserver
4. Weights (if required)
5. Dive knife
6. Swim fins
7. Submersible wrist watch
8. Depth Gauge

### Principal Applications:

1. Shallow water search
2. Inspection
3. Light repair and recovery

### Advantages:

1. Rapid deployment
2. Portability
3. Minimum support requirements
4. Excellent horizontal and vertical mobility
5. Minimum bottom disturbances
6. Greater endurance, air supply not limited to man carried cylinders

### Disadvantages:

1. Limited physical protection
2. Influenced by current

### Restrictions:

1. Work limits:
2. Maximum 130 fsw
3. Standby diver with minimum of 100 scf cylinder for all DP 1 diving
4. Within no-decompression limits
5. Current – 1 knot maximum
6. Diving team – minimum 4 persons

### Open Water Operational Considerations:

1. Standby diver required. Standby diver may be supplied from the DP 1 surface box or a stand-alone SCUBA diver. Standby must be tended. In either case the designated Standby diver must wear minimum of 100 scf capacity cylinder(s).
2. Small craft mandatory for diver recovery during open-ocean diving
3. Moderate to good visibility preferred

### CAUTION

**In the DP 2 configuration with two divers, if one diver experiences an umbilical casualty (cut) the primary air supply for both divers will be lost. Both divers must shift to EGS and abort the dive. If two DP 1 systems are being utilized for diving and one diver's umbilical is cut only that diver's air supply will be affected.**

**NOTE: Addition of an authorized T-piece to attach the secondary umbilical allows two divers to use the same topside panel (DP 2).**



**Figure 6-27.** Interspiro Divator MK II, DP 1/2 Surface Supply Apparatus General Characteristics. (Sheet 1 of 2)

## Interspiro Divator MK II DP 1/2 Surface Supply Apparatus

Operating guidelines for enclosed or confined space diving utilizing Interspiro Divator MK II, DP 1/2 surface supply diving apparatus in reserve mode with AMU approved flasks or cylinders as a primary air source and an emergency gas supply (EGS), provided applicable guidance listed below is followed:

Air source will meet analysis guidelines in accordance with Chapter 4 paragraph 4-3.

The DP UWSH and Enclosed Space Diving Supervisor Pre-Dive Checklists are located on the SECURE SUPSALV website on the 00C3 publications page in the Interspiro Divator SCUBA and Divator DP 1 section. The applicable checklist must be completed prior to diving.

Underwater Ship Husbandry (UWSH) Enclosed Space Diving:

- All current enclosed space safety precautions must be followed as outlined in Chapter 8.
- An individual depth gauge or approved dive computer will be used for each diver.
- For submarine ballast tanks, cofferdams, and mud tanks only, the diver may wear a harness with the “EGRESS” Divator Regulator Assembly attached (Interspiro drawings 99644 A and 99645 A). EGS will be provided as outlined in Chapter 8.
- NEC 5345 divers are not authorized to conduct enclosed space diving.
- UWSH standby diver guidance provided for in Chapter 6 must be followed.
- Standby diver will be supplied air from DP 2 or a separate DP 1 but cannot be a SCUBA diver.

Salvage Operation Enclosed Space Diving:

- An individual depth gauge or approved dive computer will be used for each diver.
- As the primary diving rig it will only be used for short duration operations, for example, examining item(s) of interest, quick recovery, etc.
- As a support or secondary rig, it may be used for ancillary purposes, for example, underwater photographer, shuttling underwater tools, etc.
- DP 2 is not authorized for one primary diver and standby. In this case, it must be DP 1 for the primary diver and a separate DP 1 for standby.
- DP 2 is authorized for two primary divers with standby diver in DP 1, provided both divers are outfitted with EGS.

**Figure 6-27.** Interspiro Divator MK II, DP 1/2 Surface Supply Apparatus General Characteristics. (Sheet 2 of 2)

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NORMAL AND MAXIMUM LIMITS FOR AIR DIVING		
Depth fsw (meters)	Limit for Equipment	Notes
60 (18)	MK 21 MOD 1, KM-37 NS diving equipment, maximum working limit without Emergency Gas Supply (EGS)	a
60 (18)	MK 20 MOD 0 equipment surface-supplied	a
60 (18)	Maximum depth for standby SCUBA/DPAB diver using a single cylinder with less than 100 SCF capacity	
100 (30)	Open-circuit SCUBA/DPAB with less than 100 SCF cylinder capacity	b
130 (40)	Open-circuit SCUBA/DPAB, normal working limit	b
190 (58)	Open-circuit SCUBA, maximum working limit with Commanding Officer's or Officer-in-Charge's permission	b
190 (58)	MK 21 MOD 1, KM-37 NS and EXO BR MS (air) diving equipment with EGS, normal working limit	c, d
285 (87)	MK 21 MOD 1, KM-37 NS and EXO BR MS (air) diving equipment with EGS, maximum working limit, exceptional exposure with authorization from the Chief of Naval Operations (N873)	c, d
<p><b>General Operating Notes (Apply to all):</b></p> <ol style="list-style-type: none"> <li>These limits are based on a practical consideration of working time versus decompression time and oxygen-tolerance limits. These limits shall not be exceeded except by specific authorization from the Chief of Naval Operations (N873).</li> <li>Do not exceed the limits for exceptional exposures for the Air Decompression Table.</li> <li>The requirements for a recompression chamber are contained in <a href="#">Tables 6-1</a> and <a href="#">6-2</a>.</li> <li>In an emergency, any operable recompression chamber may be used for treatment if deemed safe to use by a qualified Chamber Supervisor.</li> </ol> <p><b>Specific Notes:</b></p> <ol style="list-style-type: none"> <li>When diving in an enclosed space, EGS must be used by each diver.</li> <li>Under normal circumstances, do not exceed the limits of the No-Decompression Table. Dives requiring decompression may be made if considered necessary with approval by the Commanding Officer or Officer-in-Charge of the diving command. The total time of a SCUBA dive (including decompression) shall not exceed the duration of the apparatus in use, disregarding any reserves.</li> <li>A Diving Medical Officer is required on the dive station for all air dives deeper than 190 fsw and for exceptional exposure dives.</li> <li>Exceptional exposure dives have a significantly higher probability of DCS and CNS oxygen toxicity.</li> </ol>		

**Figure 6-14.** Normal and Maximum Limits for Air Diving.

ballast tanks, mud tanks, or cofferdams, which may be in either a flooded or dry condition. Access to these spaces is normally restrictive, making it difficult for the diver to enter and exit. Enclosed space diving shall be supported by a surface-supplied air system. Refer to [Section 8-11.4](#) for more information on the hazards of enclosed space diving.

## **6-3 GENERAL PLANNING AND ORM PROCESS**

A successful diving mission is the direct outcome of careful, thorough planning. The nature of each operation determines the scope of the planning effort, but certain general considerations apply to every operation.

- **Bottom Time.** Bottom time is always at a premium. Developing measures to conserve bottom time or increase diver effectiveness is critical for success. Use of a dive computer can increase available bottom time by giving credit for time spent shallower than the maximum depth of the dive.
- **Preplanning.** An operation that is delayed due to unanticipated problems may fail. Preplanning the use of the time available to accomplish specific objectives is a prerequisite to success.
- **Equipment.** Selecting the correct equipment for the job is critical to success.
- **Environmental Conditions.** Diving operational planners must plan for safely mitigating extreme environmental conditions. Personnel and support facility safety shall be given the highest priority.
- **Diver Protection.** It is critical to protect divers from all anticipated hazards. Application of the ORM process will identify hazards prior to the operation.
- **Emergency Assistance.** It is critical to coordinate emergency assistance from outside sources before the operation begins.
- **Weather.** Because diving operations are weather dependent, dive planning shall allow for worst-case scenarios.

### **6-3.1 Concept of ORM:**

- ORM is a decision making tool used by people at all levels to increase operational effectiveness by anticipating hazards and reducing the potential for loss, thereby increasing the probability of successful mission.
- Increases our ability to make informed decisions by providing the best baseline of knowledge and experience available.
- Minimizes risks to acceptable levels, commensurate with mission accomplishment. The amount of risk we will take in war is much greater than that we should be willing to take in peace, but the process is the same. Applying the ORM process will reduce mishaps, lower costs, and provide for more efficient use of resources.

### **6-3.2 Risk Management Terms:**

- **Hazard** – A condition with potential to cause personal injury or death, property damage, or mission degradation.

4. A linear search pattern (Jack-Stay) can be established by laying two large buoys and setting a line between them. A diving launch, with a diver on the bottom, can follow along the line from buoy to buoy, coordinating progress with the diver who is searching to each side of the established base line. These buoys may be readjusted to enlarge search areas.
5. Once the object of a search is located, it is marked. The diver can secure the circling line to the object as an interim measure, while waiting for a float line to be sent down.

**8-11.4 Enclosed Space Diving.** Divers are often required to work in an enclosed or confined space. Enclosed space diving shall be supported by a surface-supplied air supply and use a surface-supplied UBA.

**8-11.4.1 Enclosed Space Hazards.** The interior of sunken ships, barges, submarine ballast tanks, mud tanks, sonar domes, and cofferdams is hazardous due to limited access, poor visibility, and slippery surfaces. Enclosed spaces may be dry or flooded, and dry spaces may contain a contaminated atmosphere.

**NOTE** When a diver is working in an enclosed or confined space with the exception of submarine ballast tanks, the Diving Supervisor shall have the diver tended by another diver at the access opening. Ultimately, the number of tending divers deployed depends on the situation and the good judgement of the Diving Officer, Master Diver, or Diving Supervisor on the site.

**8-11.4.2 Enclosed Space Safety Precautions.** Because of the hazards involved in enclosed space operations, divers must rigorously adhere to the following warnings.

**WARNING** During enclosed space diving, all divers shall be outfitted with a MK 21 MOD 1, KM-37 NS, MK 20 MOD 0, or EXO BR MS that includes a diver-to-diver and diver-to-topside communications system and an EGS for the diver inside the space.

**WARNING** For submarine ballast tanks, the divers shall not remove their diving equipment until the atmosphere has been flushed twice with air from a compressed air source meeting the requirements of Chapter 4, or the submarine L.P. blower, and tests confirm that the atmosphere is safe for breathing. Tests of the air in the enclosed space shall be conducted hourly. Testing shall be done in accordance with NSTM 074, Volume 3, Gas Free Engineering (S9086-CH-STM-030/CH-074) for forces afloat, and NAVSEA S-6470-AA-SAF-010 for shore-based facilities. If the divers smell any unusual odors they shall immediately don their EGS.

**WARNING** If the diving equipment should fail, the diver shall immediately switch to the EGS and abort the dive.

**8-11.5 Working Around Corners.** When working around corners where the umbilical is likely to become fouled or line-pull signals may be dissipated, a second diver (tending diver) may be sent down to tend the lines of the first diver at the



A

**RECORD OF CHANGES**

CHANGE NO.	DATE OF CHANGE	TITLE AND/OR BRIEF DESCRIPTION	ENTERED BY
A	10-15-11	Changes throughout the manual to provide new procedures for use of KM 37 (NS) in contaminated water diving, use of MK 16 in non-EOD diving operations, and revised requirements for use of recompression chambers.	JGJ
ACN 1/R7	02-04-13	ACN 1/R7 provides the operating guidelines for enclosed or confined space diving utilizing Interspiro MKII, DP 1/2 Surface Supply Diving Apparatus.	JGJ

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**Change A**