

APPENDIX E
BRITISH (RNPL) DECOMPRESSION TABLES



AIR DIVING TABLES 1972

INTRODUCTION

As a result of testing present RN and other air decompression tables at depths in excess of 30m (100 ft) and for bottom times in excess of 15 minutes, it has been realised that these schedules yield a higher number of bends than is desirable, in some instances over 20% in a group of healthy young divers. Selection of resistant men could reduce this value, but there is no method of doing this other than in retrospect. Further, there is considerable evidence that whereas some men are resistant for long dives at shallow depths, this may not be true when the diving changes to short dives at deep depths. The desirable solution to the problem in the light of these unresolved complexities is to evolve decompression schedules which markedly reduce the overall bends incidence.

1. Caisson and tunnel work in compressed air has encountered similar difficulties and minor modifications of their schedules have failed to influence the situation. Accordingly, entirely new decompression procedures were requested from the Royal Naval Physiological Laboratory. These tables have been called "The Blackpool Trial Tables" because they were first tested on compressed air work at Blackpool in 1966. A certificate of exemption from the table printed in the statutory instrument (The Work In Compressed Air Special Regulations 1958) to enable contractors legally to employ these new Tables is readily granted on request by HM Factory Inspectorate, and all major compressed air work in this country, since their introduction, has been carried out using them. Over 50,000 entries into compressed air in caissons and tunnels have been made at pressures in excess of 10m (30 ft) of sea water, including some working times in excess of 8 hours at pressures of nearly 30m (100 ft) of sea water. To date there have been no fatalities, only few cases of serious acute decompression sickness and a low incidence of bends.

Further, as regards bone necrosis, it has been established, after approximately 6 years of usage, that no cases of bone necrosis sufficiently serious to require surgical intervention have occurred, and that the incidence of radiologically detectable bone lesions has been reduced. Thus, by adopting a more conservative decompression schedule there is a good basis for believing that diving may be conducted more safely and for longer periods and at greater depths than hitherto. The new Air Diving Tables as given in Table 1 have been calculated on exactly the same principles as those of the Blackpool Trial Tables.

2. However, experience gained with the Air Diving Tables (1968) issued via Construction Industries Research and Information Association and tested by Royal Navy Divers, has confirmed beyond doubt that the no-stop dives currently available in the RN Diving Manual (BR 2806) are adequately safe, and that the modifications proposed in the Air Diving Tables 1968 were slightly over-cautious. Accordingly, a return has been made to these old established no-stop dive times.

3. Further, although tests at sea by Royal Navy Divers revealed that such dives as 1 hour at 60 m (200 ft) could be performed without even minor occurrences of decompression sickness, there were indications in subsequent laboratory testing, that some sensitive persons would not escape ill-effects.

4. It was proposed therefore to alter the decompression requirement for this dive and others in the Air Diving Tables 1968 of similar severity, but, a worldwide survey of air diving by military, commercial and sporting organisations, showed that such dives as 1 hour at 60 m breathing air were never used. Clearly, therefore, there seemed little point in attempting minor modifications to schedules that would never be used in the foreseeable future.

Consequently, the limits of depth and time given in Table 1 represent what is considered to be normal usage plus allowance for any emergencies or unusual commitments that may occur on rare occasions. These Tables have now been tested over a range of pressures, times, water conditions and numbers of different men necessary to establish their reliability. It is now completely certain that the new Tables will be less liable to provoke attacks of decompression sickness than those currently in use. However, there is always a small number of seemingly unavoidable incidents which occur following the use of even extremely well established procedures. No relaxation of recognised safe practices is permissible.

USING THE TABLES

Notes

- 1. The bottom time is taken as the time between leaving the surface and leaving the bottom.
- 2. All descents to depth are to be not faster than 30 metres/min.
- 3. All ascents are at 15 metres/min.
- 4. All time spent ascending from one stop to another – including from depth to the first stop – is included in the stop time. The final pressure change from 5 metres to the surface, which takes 20 secs, is also included in the final stop time.
- 5. Air and pure oxygen decompression commences for any dive where decompression time on air alone would exceed 31 minutes. Such dives are indicated below the double black line drawn in the tables.
- 6. If pure oxygen is not available or in case of emergency multiply the oxygen stop time by 2 and add to the air stop time (if any) to give the equivalent air decompression stop time.
- 7. Ascent to the first stop must always be on air.

DOUBLE DIVES

- 1. For regular diving no more than 8 hours in any period of 24 hours must be spent under pressure (bottom times plus decompression times).
- 2. If the surface interval between two dives is *2 hours or less*, add the bottom times of the two dives together, and decompress for this bottom time at the deeper of the two dive depths.
- 3. If the surface interval between two dives is *greater than 2 hours but less than 4 hours*, add one half of the bottom time of the first dive to the bottom time of the second dive, and decompress for this bottom time, and the deeper of the two dive depths.
- 4. If the surface interval is *greater than 4 hours but less than 8 hours* add one quarter of the bottom time of the first dive to the bottom time of the second dive, and decompress for this bottom time, and the deeper of the two dive depths.
- 5. If the surface interval is *greater than 8 hours but less than 16 hours* add one eighth of the bottom time of the first dive to the bottom time of the second dive, and decompress for this bottom time, and the deeper of the two dive depths.
- 6. After a *16 hours* surface interval the diver need not take any account of the previous dive.
- 7. If *both* dives are at *depths less than 40 m and above the double black line* in Table I then the above rules can be amended to state that if the surface interval is *greater than 4 hours but less than 6 hours* then add one quarter of the bottom time of the first dive to the bottom time of the second dive and decompress for this bottom time and the deeper of the two dive depths. After a 6 hours surface interval the diver need not take any account of the previous dive.
- 8. If the *second* dive does not exceed a depth of 9 metres then it is safe to surface from this second dive without stoppages.

SURFACE DECOMPRESSION

No attempt must be made to use this method unless a well-drilled and experienced team is available.

- 1. **Rate of Ascent in the Water.** 15 m per minute.
- 2. **Chamber Pressure.** Immediately the diver surfaces he is assisted into a pressure chamber and this chamber is then pressurised to the air pressure equivalent to the maximum depth of the dive. The time from commencing ascent in the water to arriving at this maximum pressure in the chamber must not exceed 5 minutes, and the diver is kept at this pressure for 5 minutes, after which the pressure in the chamber is reduced in accordance with the decompression tables.
- 3. **Decompression.** An extra 10 minutes must always be added to the actual bottom time of the dive and the total combined bottom time thus obtained is used to determine the decompression required. This total combined bottom time should never exceed the last entry in the table.

DIVING AT ALTITUDE

If a diving operation is carried out at altitude (eg in a mountain lake) adjustments should be made to the decompression schedules to compensate for the surface pressure being less than 1 bar (1 atmosphere). Adjustments should be made as follows :

- 1. Altitudes of less than 100 m (approx 300 ft) – no adjustment.
- 2. Dives between altitudes of 100 and 300 m (approx 300 and 1000 ft) – add one quarter of the depth to give the depth of dive.
- 3. Dives between altitudes of 300 and 2000 m (approx 1000 and 6500 ft) – add one third of the depth to give the depth of dive.
- 4. Dives between altitudes of 2000 and 3000 m (approx 6500 and 10 000 ft) – add one half of the depth to give the depth of dive.

DECOMPRESSION – FLYING RESTRICTIONS

It is inadvisable to fly above 600 m (approx 2000 ft) in any aircraft within 24 h of completing a dive.

A period of 2 h should elapse between diving operations and flying in a pressurised aircraft, if dives were carried out with no stops, and a period of 24 h if dives were carried out with stops.

If flying following diving operations is essential ,then the following rules will minimise the risk.

Type of dive	Time interval between diving and flying	Max altitude (or effective altitude in pressurised aircraft)
Requiring no stops	Up to 1 h	300 m (approx 1000 ft) (eg Helicopter)
	1 to 2 h	1500 m (approx 5000 ft)
	Over 2 h	5000 m (approx 16 500 ft)
Requiring stops	Up to 4 h	300 m (approx 1000 ft) (eg Helicopter)
	4 to 8 h	1500 m (approx 5000 ft)
	8 to 24 h	5000 m (approx 16 500 ft)

NOTE : Commercial aircraft normally fly at an effective cabin altitude of 1500 – 3000 m.

RNPL AIR DIVING TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 9 METRES (Approx 30 ft)
NO LIMIT

DEPTH NOT EXCEEDING: 10 METRES (Approx 33 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂	AIR	
	25m	20m	15m	10m		5m		
230								1
420							5	5
480							10	10

READ TABLE NOTES

RNPL AIR DIVING TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 15 METRES (Approx 49 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂	AIR	
	25m	20m	15m	10m		5m		
80								1
85							5	5
90							10	10
100							15	15
110							25	25
120							30	30
150						25	-	25
180						30	-	30
240						40	-	40

READ TABLE NOTES

RNPL AIR DIVING TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 20 METRES (Approx 66 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)						TOTAL TIME FOR DECOMPRES- SION (mins)	
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂		AIR
	25m	20m	15m	10m		5m		
45								1½
50							5	5
55							10	10
60							15	15
65							25	25
70							30	30
75						20	-	20
90						30	-	30
120						45	-	45
150						55	-	55
180				5	-	55	-	60
240				5	-	60	-	65

READ TABLE NOTES

RNPL DIVING AIR TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 25 METRES (Approx 82 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂	AIR	
	25m	20m	15m	10m		5m		
25								2
30					5	-	5	10
35					5	-	10	15
40					5	-	15	20
45					5	-	20	25
50				5	-	15	-	20
55				5	-	20	-	25
60				5	-	30	-	35
75			5	-	-	40	-	45
90			5	5	-	50	-	60
105			5	5	-	60	-	70
120			5	10	-	60	-	75
150			5	15	-	60	-	80
180		5	-	20	-	60	5	90

RNPL AIR DIVING TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 30 METRES (Approx 98 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂	AIR	
	25m	20m	15m	10m		5m		
20								2
25					5	-	5	10
30					5	-	10	15
35					5	-	20	25
40				5	-	20	-	25
45				5	-	25	-	30
50			5	-	-	35	-	40
55			5	5	-	40	-	50
60			5	5	-	45	-	55
75			5	5	-	55	-	65
90			5	10	-	60	-	75
120		5	-	20	10	60	5	100

READ TABLE NOTES

RNPL DIVING AIR TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 35 METRES (Approx 115 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂	AIR	
	25m	20m	15m	10m		5m		
15								2½
20					5	-	5	10
25					5	-	15	20
30					5	-	25	30
35				5	-	20	-	25
40			5	5	-	30	-	40
45			5	5	-	40	-	50
50			5	5	-	45	-	55
55			5	5	-	50	-	60
60			5	5	-	55	-	65
75		5	-	15	-	60	-	80

READ TABLE NOTES

RNPL AIR DIVING TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 40 METRES (Approx 131 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂	AIR	
	25m	20m	15m	10m		5m		
11								3
15					5	-	5	10
20					5	-	10	15
25					5	-	25	30
30			5	-	-	25	-	30
35			5	5	-	35	-	45
40			5	5	-	45	-	55
45			5	5	-	50	-	60
50		5	-	10	-	55	-	70
55		5	-	10	-	60	-	75
60		5	-	15	-	60	-	80

READ TABLE NOTES

RNPL DIVING AIR TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 45 METRES (Approx 148 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)						TOTAL TIME FOR DECOMPRES- SION (mins)	
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂		AIR
	25m	20m	15m	10m		5m		
9								3
15					5	-	10	15
20					5	-	20	25
25			5	5	-	20	-	30
30			5	5	-	35	-	45
35			5	5	-	45	-	55
40		5	-	5	-	50	-	60
45		5	-	10	-	55	-	70
50		5	5	15	-	60	-	85
55		5	5	20	-	60	5	95

READ TABLE NOTES

RNPL AIR DIVING TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 50 METRES (Approx 164 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂	AIR	
	25m	20m	15m	10m		5m		
7								3½
10					5	-	5	10
15					5	-	10	15
20			5	5	-	15	-	25
25			5	5	-	30	-	40
30			5	5	-	40	-	50
35		5	-	5	-	50	-	60
40		5	5	10	-	60	-	80
45		5	5	15	-	60	-	85
50	5	-	5	20	-	60	5	95

READ TABLE NOTES

RNPL DIVING AIR TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 55 METRES (Approx 180 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂	AIR	
	25m	20m	15m	10 m		5m		
6								4
10					5	-	5	10
15			5	-	-	-	15	20
20			5	5	-	20	-	30
25			5	5	-	35	-	45
30		5	-	5	-	50	-	60
35		5	5	10	-	60	-	80
40		5	5	15	-	60	-	85
45	5	-	5	20	5	60	5	100

READ TABLE NOTES

RNPL DIVING AIR TABLES 1972
TABLE 1

DEPTH NOT EXCEEDING: 60 METRES (Approx 197 ft)								
BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)						TOTAL TIME FOR DECOMPRES- SION (mins)	
	AIR			OXYGEN OR AIR				
				O ₂	AIR	O ₂		AIR
	25m	20m	15m	10m		5m		
5								4
10					5	-	10	15
15			5	-	5	-	20	30
20			5	5	-	25	-	35
25		5	-	5	-	45	-	55
30		5	5	10	-	55	-	75
35	5	-	5	15	-	60	-	85
40	5	-	5	20	5	60	5	100
45	5	-	10	20	20	60	5	120

READ TABLE NOTES

RNPL AIR DIVING TABLES 1972
TABLE 2

DEPTH NOT EXCEEDING (metres)	BOTTOM TIME NOT EXCEEDING (mins)	STOPPAGES AT DIFFERENT DEPTHS (mins)							TOTAL TIME FOR DECOMPRES- SION (mins)
		AIR			OXYGEN OR AIR				
					O ₂	AIR	O ₂	AIR	
		25m	20m	15m	10m		5m		
65m (213')	10					5	-	10	15
	15			5	5	-	15	-	25
70m (230')	10			5	-	5	-	10	20
	15			5	5	-	20	-	30
75m (246')	10			5	-	5	-	15	25
	15		5	-	5	-	25	-	35

READ TABLE NOTES