



OPERATIONS & MAINTENANCE

MANUAL

for the

ULTRAFLOW 501 18B BANDMASK

Part No: A10330



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PREFACE

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NATIONAL APPROVALS AND MARKINGS:

◆ ULTRAFLOW 501 18B BANDMASK MARKING:

CE 0088

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1.0 INTRODUCTION

The **ULTRAFLOW 501** Bandmask for open circuit air and Heliox diving operations consists principally of **ULTRAFLOW 501** demand regulator fitted to a conventional DSI Superlite 18B Bandmask. **ULTRAFLOW 501** is suitable for depths down to 50 msw on air and 500 msw on Heliox.



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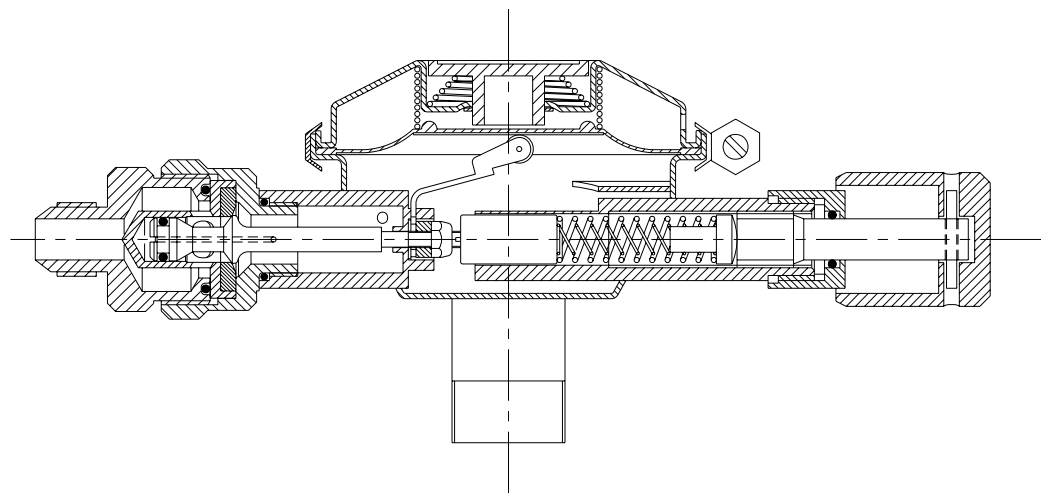
2.0 GENERAL DESCRIPTION AND FUNCTION

2.1 Bandmask Assembly

This manual covers the maintenance of the Ultraflow 501 Demand Valve and the operation of a converted 18B Bandmask with Ultraflow 501.

For maintenance of the “Superlite” standard components then refer to the DSI manual.

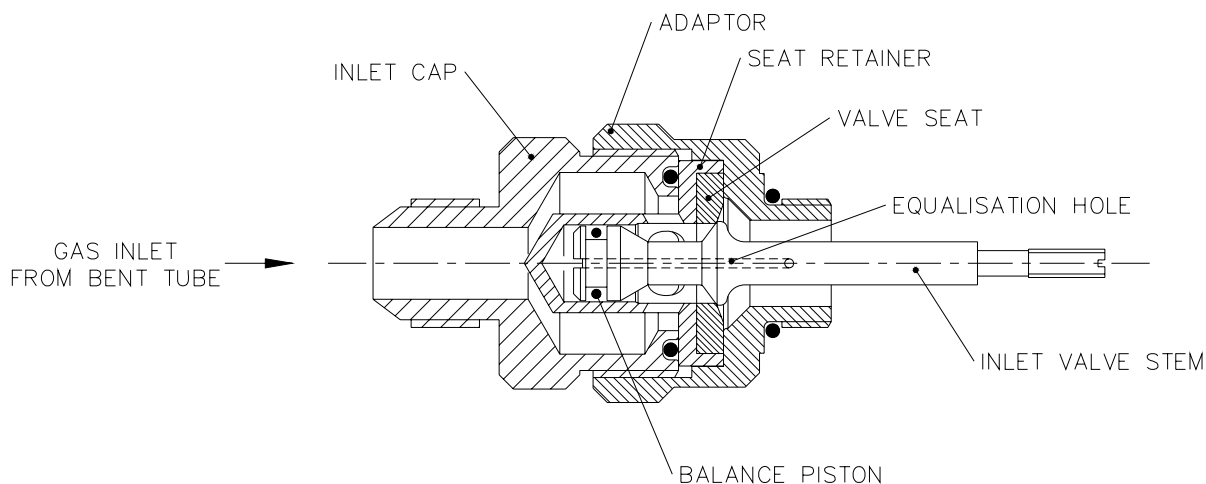
2.2 Ultraflow 501 Demand Regulator



The **ULTRAFLOW 501** is a balanced design of demand regulator which gives excellent gas flow over a wide range of supply pressures.

The components of the inlet valve consist of a 316 SS housing, a brass seat retainer with a specially developed valve seat material and the brass inlet valve which connects to the roller lever. In the closed position the supply pressure acts on both the valve and an ‘O’ Ring on the balanced piston part of the stem. The balanced piston is inside the seat retainer and the pressure on the other side of the piston is equalised to the divers side of the inlet valve via a small hole in the stem connected to a point sensing the pressure in the regulator body. The balance piston is slightly smaller in diameter than the inlet valve and this tends to keep firmly closed using the supply pressure itself. As the diver inhales, this reduces the pressure in the regulator body which reduces the closing balance force enabling the diaphragm acting on the roller lever to easily lift the valve off of its seat. At the end of the inhale cycle, the dial-a-breath springs will reseat the valve and restore the rest configuration with supply pressure again holding the valve.

ULTRAFLOW 501 INLET VALVE ASSEMBLY



Note: - That the “dial-a-breath” adjustment is crucial to easy breathing. If it is over-tightened, a large force will be required to lift the inlet valve, requiring a considerable effort on the part of the diver during inhalation. Similarly, if there are large gas supply pressure changes, the pre-load set by the “dial-a-breath” must be altered. Thus, changes in gas supply pressure over bottom, produced by either a change in the actual gas supply pressure or a change in the divers depth, will require “dial-a-breath” adjustment. As the regulator inlet valve assembly is balanced, the “dial-a-breath” movements are minimal for small pressure changes compared to a standard DSI regulator.

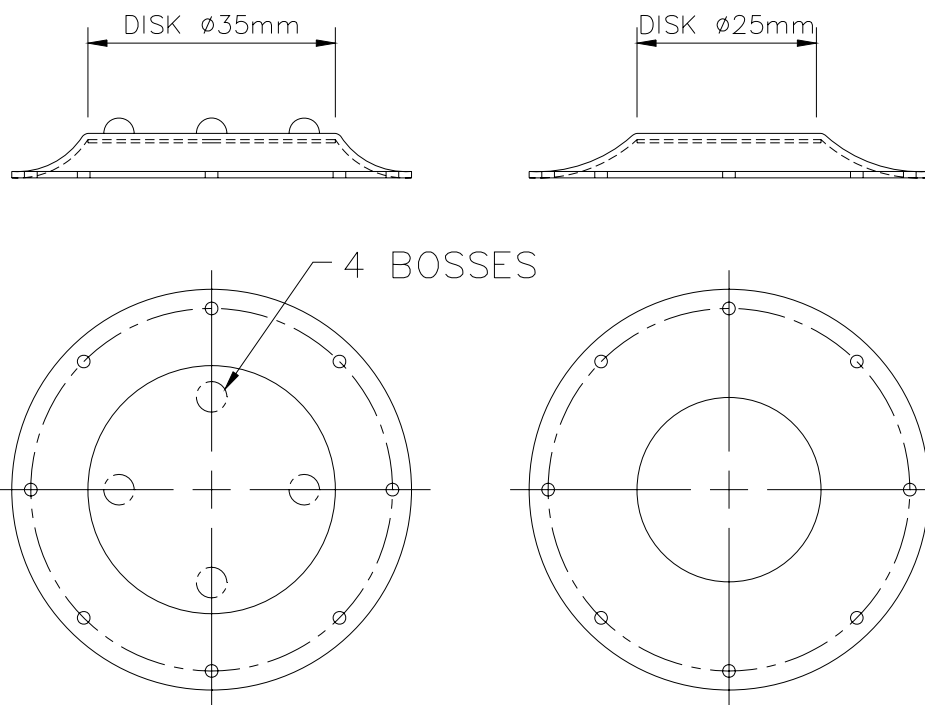
2.3 Modifications From The Standard DSI Superflow Regulator

The **inlet tube** which penetrates the bandmask body is increased to 22mm ($\frac{7}{8}$ ”) bore compared to the Superflow’s $\frac{3}{4}$ ” bore.

The **large swirl** plate in the bottom box is also removed and the “**dial-a-breath**” tube is turned down in the area of the milled flat. Both of these changes allow better gas flow through the regulator.

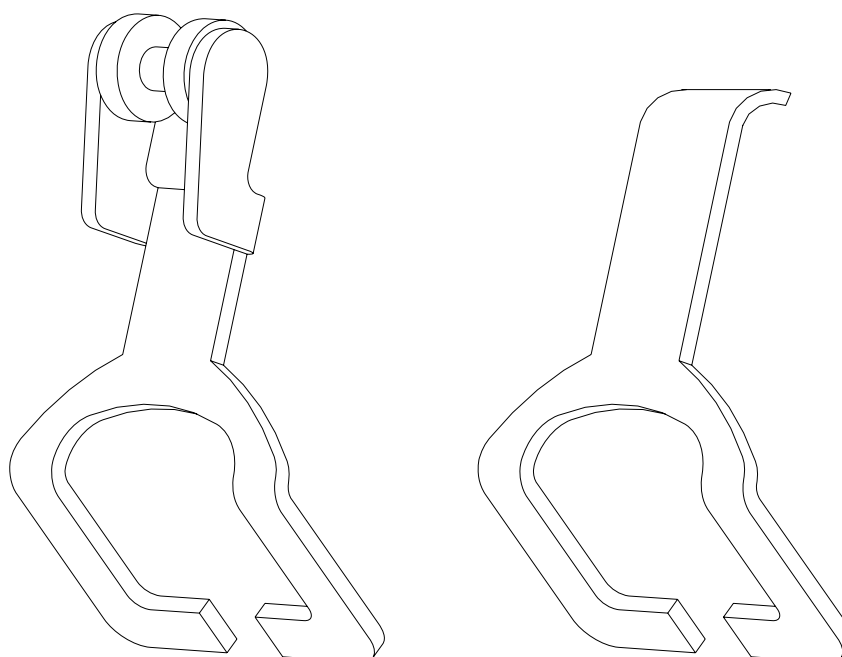
The **diaphragm** is changed for one which has a larger centre disc and more flexible material. This improves the effective action of the diaphragm.

Diaphragm DE024 (510-552) is replaced with a diaphragm with a larger backing Plate 35mm DE057. This provides a diaphragm having 1.9 times greater effective area.



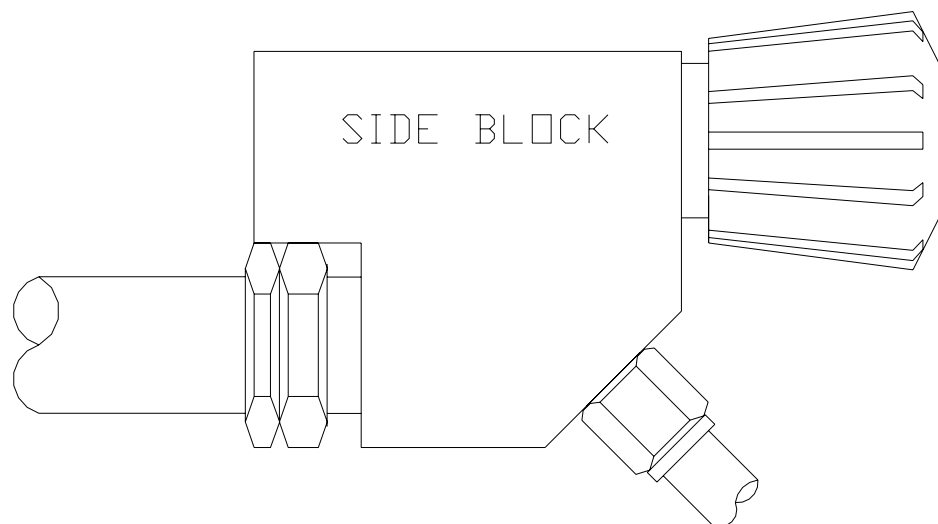
ULTRAFLOW 501 NOT RECOMMENDED

The **lever** on which the diaphragm acts is of the roller end type and none of the other types should be used. The roller type provides least resistance to movement. The roller type is DE058 (545-038).



ULTRAFLOW 501 NOT RECOMMENDED

The **side block/bent tube** assembly as supplied by **DIVEX** is modified by the replacement of the Standard DSI Teflon Washer with an 'O' Ring. **DIVEX** Part No. RT011, which improves gas flow at this point, together with the special bent tube assembly, **DIVEX** Part No. DM 2009, to interface with the **ULTRAFLOW 501** Inlet Valve.



NOTE: - (A) From 1991 onward, the Check Valve and fitting DE121 (555-118) are manufactured as one. Current Check Valve is Part No. DE189.



3.0 SERVICE & MAINTENANCE OF ULTRAFLOW 501 DEMAND REGULATOR

3.1 Ultraflow Disassembly

To be read in conjunction with Drawing on Page 3.7

1. Remove the cover Clamp Screw (Item 29) and Cover Clamp (Item 15) lift the Cover (Item 13) off with Spring (Item 14) and pull out the Diaphragm (Item 11).
2. The “dial-a-breath” control is removed by backing the knob (Item 27) out until the Nut (Item 25) is exposed enough to use a wrench. The knob (Item 27) Nut (Item 25), ‘O’ Ring (Item 28), Washer (Item 24) and Shaft (Item 23) all come out as one. The Knob (Item 27) may be removed from the shaft (Item 23) by punching out the Lock Pin (Item 26). A $\frac{3}{32}$ ” diameter punch should be used. The ‘O’ Ring (Item 28) and Washer (Item 24) remain on the shaft (Item 23) and may now be removed. Tilt the helmet so that the Spacer (Item 22), Spring Set (Item 21) and Piston (Item 20) fall out of the adjustment Shaft Tube of the Regulator Body (Item 8).
3. Remove the Bent Tube Assembly from the Inlet Valve Assembly.
4. Remove the complete Inlet Valve Assembly from the Demand Regulator Body (Item 8), using a wrench on the **ULTRAFLOW** Adapter Flats (Item 3).
5. The Inlet Valve Assembly can now be carefully pulled away from the Demand Regulator Body leaving the Valve Stem (Item 1) in place in the Regulator.
6. The Valve Stem can be removed from the Regulator by removing the Nut (Item 19). Use a straight slot screwdriver to rotate the Valve Stem (Item 1) while Retaining Nut (Item 19) is held with the correct spanner from the DSI Service Tool Kit.
7. Undo the Nut (Item 9) which secures the inlet tube to the Bandmask. Remove the Regulator Body (Item 8). Nut (Item 9) and ‘O’ Ring (Item 10). All parts should be thoroughly cleaned and parts replaced as indicated with ‘O’ rings being lubricated only with Christo-Lube fluorinated grease before installation.



3.2 Ultraflow 501 Assembly

To be read in conjunction with the drawing on page 3.7

During re-assembly of the Demand Regulator, replace all questionable and damaged parts with new. Lubricate all 'O' rings and threaded metal parts lightly only with Christo-Lube fluorinated grease.

1. Install the Inlet Valve Stem (Item 1) in the regulator Body. Fit the Washer (Item 16), Lever (Item 17) and Spacer (Item 18) on to the Shaft of the Inlet Valve Stem. Screw the nut on to the threaded end of the Inlet Valve Stem until the Inlet Valve threads protrude slightly (about 2 threads past the Nut). Use a straight slot screwdriver and special DSI spanner for this operation.

CAUTION: The Lock Nut (Item 19) is a Nyloc Nut and should always be replaced with new if removed from the Inlet Valve.

2. Assemble the **ULTRAFLOW** Adapter (Item 3), Seat Retainer (Item 4) and Inlet Cap (Item 2).
3. Install the Piston (Item 20), Spring Set (Item 21) and Spacer (Item 22) into the Adjustment Tube of the Regulator Body. Generously apply Christo-Lube Fluorinated Grease to this assembly.
4. Thread the main adjustment Shaft (Item 23) into the tube. Slide the washer (Item 24) and 'O' Ring (Item 28) onto the adjustment shaft (Item 23). Slide the packing Nut (Item 25) onto the shaft and tighten in onto threaded tube of the Regulator (Item 8).
5. Fit the knob (item 27) onto the adjustment Shaft (Item 23) and align the holes for the Retaining Pin (Item 26).

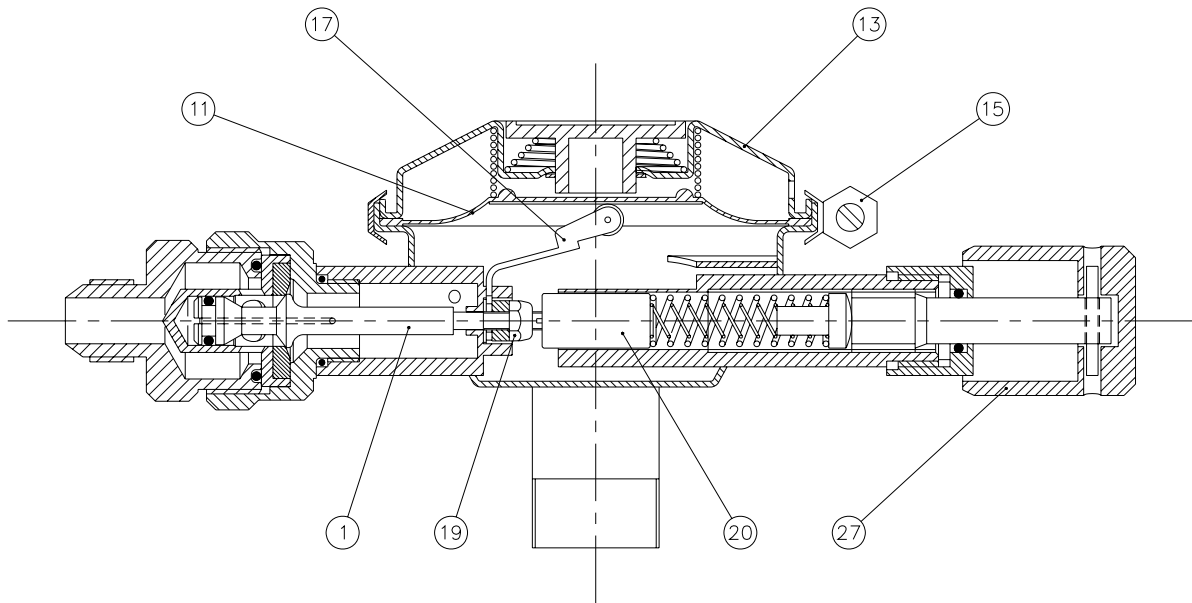
CAUTION: Support the adjustment knob (item 27) while tapping Retaining Pin (Item 26) to prevent damage to the Shaft (Item 23) and Body (Item 8).

6. Assemble the Bent Tube Assembly to the Inlet Valve Assembly.

NOTE: The sealing washer should be DIVEX Part No. RT011 which improves flow characteristics.

Adjust the Regulator as described in Section 3.3.

3.3 Adjustment



1. Remove the Clamp (Item 15), Cover (Item 13), Spring (Item 32) and Diaphragm (Item 11).
2. Fully loosen the “dial-a-breath” (Item 27) by turning counter-clockwise to the stop.
3. Insert the DSI service tool between the Inlet Valve Stem (Item 1) and the Piston (Item 20) as shown in the diagram above. The blade of this tool should be aligned with the small slot in the end of the Stem. This prevents rotation of the Stem.
4. Connect to a gas supply and set pressure between 10-15 BAR.

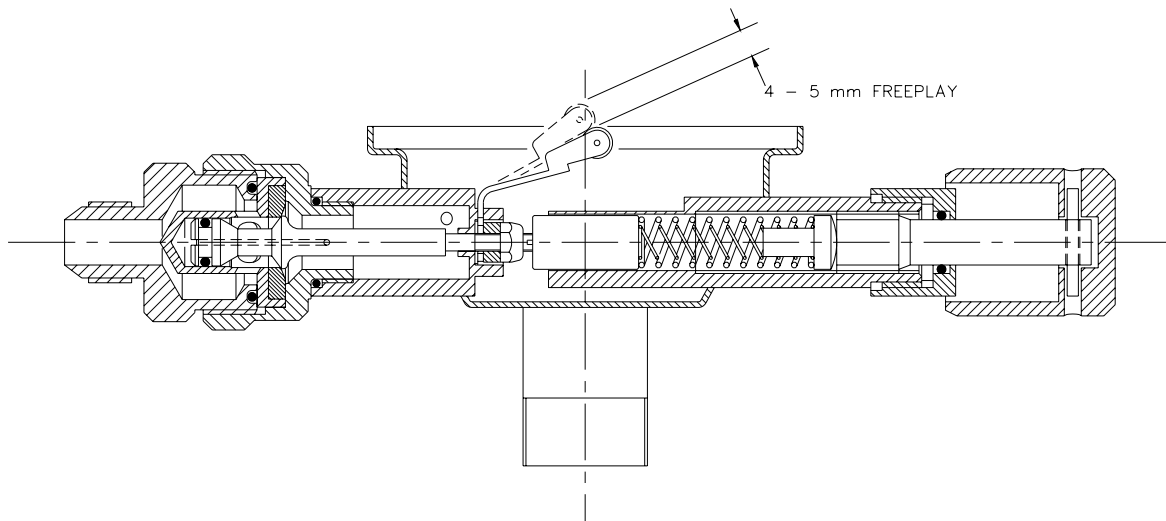
NOTE: - For operational gas supply pressures, refer to Regulator Setting Guidelines in Section 8 of this manual.

5. Tighten the “dial-a-breath” (Item 27) until free flow has just stopped. Depress the roller fork (Item 17) a few times to allow the valve stem to centralise.
6. Adjust the Nut (Item 1) until there is 4-5 mm of freeplay at the end of the Lever (item 17).
7. Remove the DSI service tool from the Inlet Valve Stem.

NOTE: - The regulator will require the “dial-a-breath” turned in 1 to 2 turns to compensate for the thickness of the DSI tool.

8. Check that there is still 4-5mm of freeplay at the end of the Lever (Item 17).

9. Shut the gas supply to the regulator and vent the remaining gas in the side block by pushing the Lever (Item 17).
10. Turn the Nut (Item 19) 90° in a clockwise direction using the DSI spanner.
11. Repeat steps 4, 8, 9 and 10 until the valve stem has rotated through 360°.



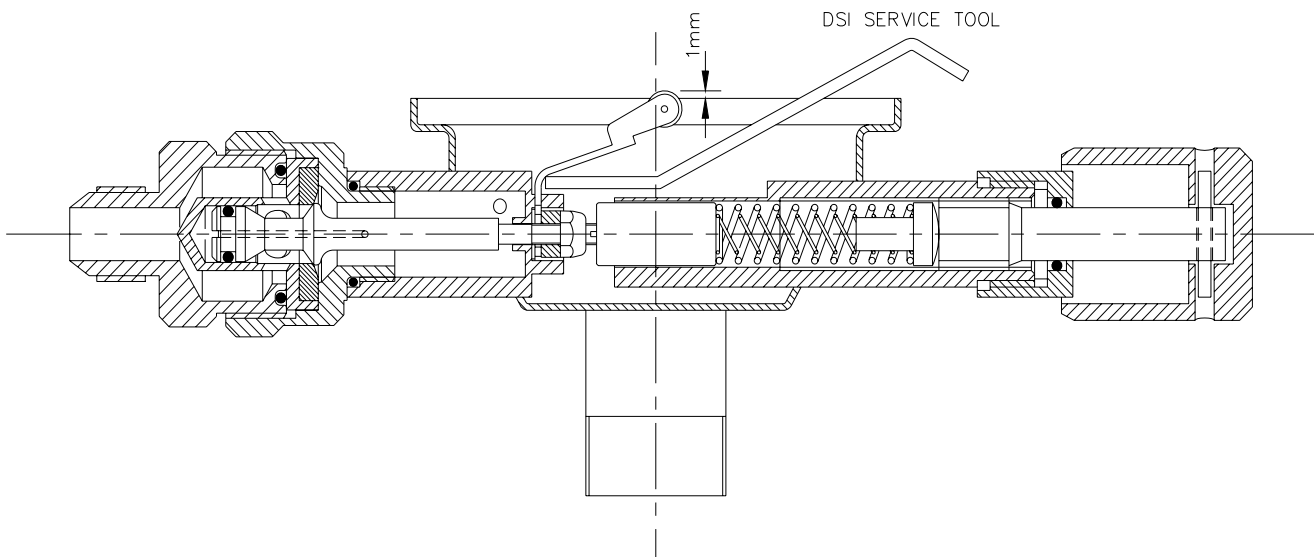
12. If there is less than 4-5mm freeplay at the end of the Lever (Item 17) or the regulator freeflows, repeat steps 3 to 11 until there is a minimum 4-5mm of freeplay at the end of the Lever (Item 17) in all 90° increments of the valve stem movement.
13. Refit the diaphragm (Item 11) and Cover (Item 13), holding cover firmly in place by hand.
14. Depress the Purge Button in the centre of the cover (Item 13) ensuring that there is clearance between the Button and the Diaphragm. If the Lever height requires adjustment, it must be bent, as described in paragraphs 15 and 16 below.
15. To decrease the Purge Button clearance, grip the lever with the first finger of the right hand under the lever and with the thumb on top, push down to bend the roller end of the lever upwards.

NOTE: - It is essential that undue stress is not placed on the lower arms of the Lever, as this will distort the blades resulting in spongy operation.

16. To increase the clearance, place the “disc end” of the DSI service tool inside the Regulator, under the Lever as shown below.

The lever may then be bent down to the desired height by hand (i.e. roller projects approximately 1mm above the top edge of the demand regulator body and this should be checked using a straight edge).

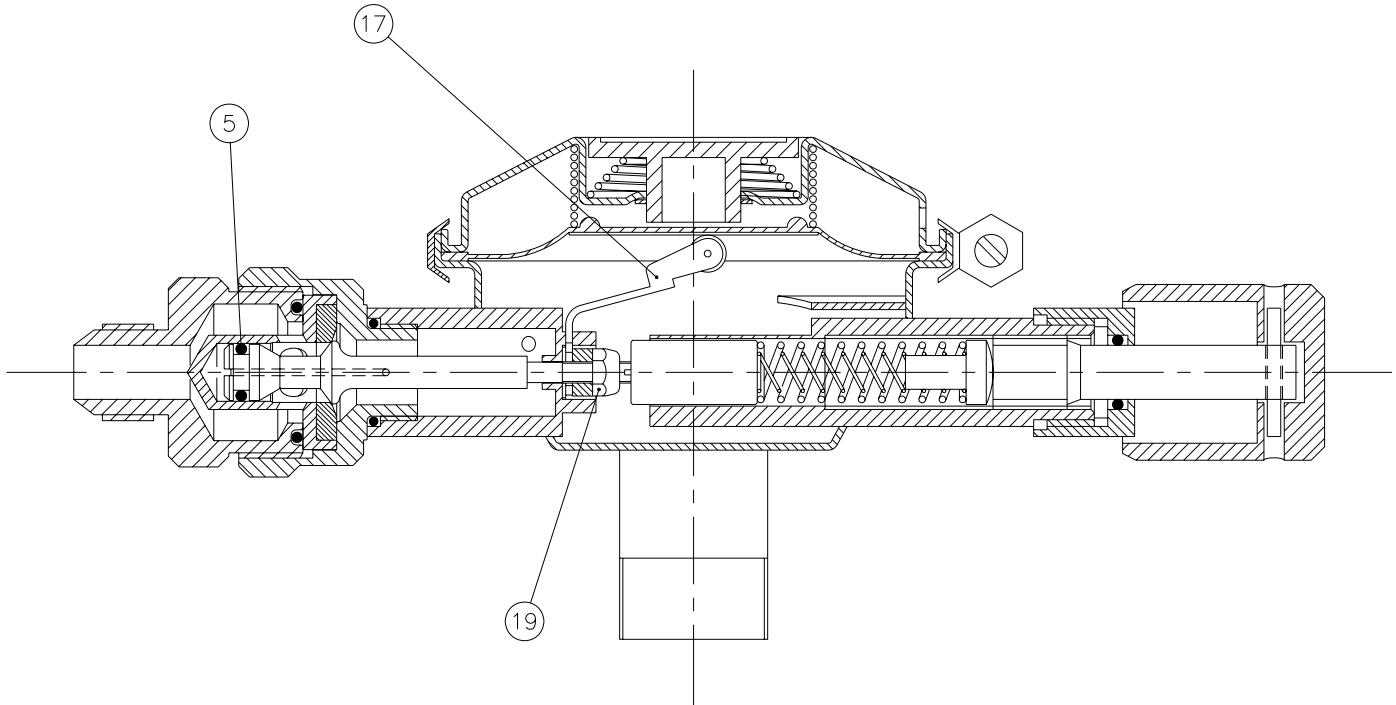
CAUTION:- Do not bend the Lever too far.



17. Replace the Diaphragm with Bias Spring and Cover and re-test the regulator as follows:

Tighten the “dial-a-breath” fully and connect to a gas supply of recommended pressure. Depress the Purge Button gently. If there is no gas flow, dismantle the Regulator and re-check adjustment as described in Paragraph 1 to 10 above.

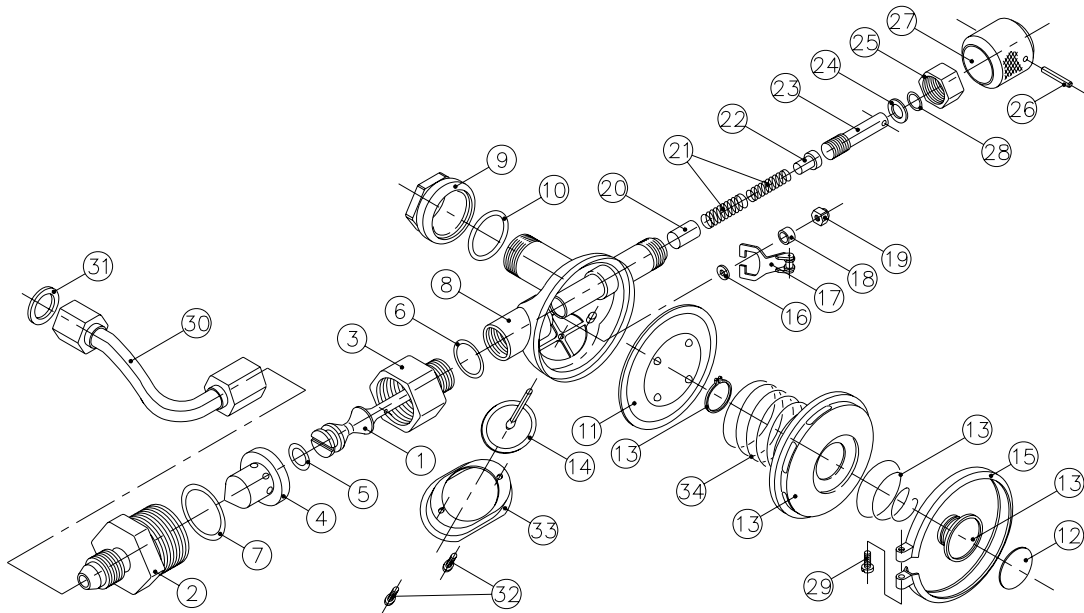
18. Re-set the “dial-a-breath” by unscrewing the “dial-a-breath” knob till the Regulator freeflows then tighten one (1) full turn.



NOTES: -

- (a) It is not permissible to loosen the Nut (Item 19) more than one eighth of a turn to adjust the Lever height. If the nut is loosened beyond this amount, the regulator will not flow to its maximum rate.
- (b) It is essential that all Regulator parts should be free from dirt and rubber components should be inspected for any sign of deterioration.
- (c) All internal parts should be lightly lubricated with Christo-Lube Fluorinated Grease; especially 'O' Ring
- (d) The two opposing blades on the bottom of the Lever (Item 17) must be accurately aligned with each other and be free from tool marks or burrs.

ULTRAFLOW 501 REGULATOR



ITEM NO	DESCRIPTION	QTY	PART No	TORQUE SETTINGS	
				Inch Pounds	Nm
1	VALVE STEM	1	D1995	-	-
2	INLET CAP	1	D1996	100	11.3
3	ADAPTER	1	D1997	40	4.5
4	VALVE SEAT RETAINER	1	D1998	-	-
5	O-RING	1	E13991	-	-
6	O-RING	1	RN014-7	-	-
7	O-RING	1	RN017-7	-	-
8	ULTRAFLOW BODY	1	D1434A	-	-
9	NUT	1	D1433	100	11.3
10	O-RING	1	RN214-7	-	-
11	DIAPHRAGM	1	DE057	-	-
12	DECAL (ULTRAFLOW 501)	1	T14753	-	-
13	COVER ASSEMBLY (BLACK)	1	D1149	-	-
14	MUSHROOM VALVE	1	DE028	-	-
15	CLAMP	1	DE069	-	-
16	WASHER	1	DE067	-	-
17	ROLLER LEVER	1	DE058	-	-
18	SPACER	1	DE068	-	-
19	NUT	1	DE025	-	-
20	PISTON	1	DE062	-	-
21	SPRING SET	1	D13800	-	-
22	SPACER	1	DE063	-	-
23	SHAFT	1	DE064	-	-



24	WASHER	1	DE019	-	-
25	PACKING NUT	1	DE065	40	4.5
26	RETAINING PIN	1	DE021	-	-
27	ADJUSTMENT KNOB	1	DE066	-	-
28	O-RING	1	DE020	-	-
29	SCREW	1	DE022	8	1.0
30	BENT TUBE ASSEMBLY	1	DM2009	100/40	11.3/4.5
31	O-RING	1	RT011	-	-
32	RETAINING SCREW	1	DE076	-	-
33	WHISKER ADAPTER	1	DE096	-	-
34	BIASING SPRING (LIGHT YELLOW)	1	D1158	-	-



4.0 SERVICE AND MAINTENANCE OF SIDE BLOCK

Maintenance of the Side Block with regard to DIVEX equipment consists of checking the condition of the 'O' Ring at the top of the bent tube assembly. If there is any doubt about the condition, replace. For maintenance on the remainder of the side block refer to the DSI Manual.



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5.0 SERVICE AND MAINTENANCE OF ORAL NASAL MASK

Remove the Oral Nasal Mask first removing the nose block device by unscrewing the knob and removing the packing nut and 'O' rings. Pull the nose block device out of the oral nasal. Unscrew the outer nuts on the communications posts and remove the microphone wire lugs.

Grasp the oral nasal and slowly pull of the regulator mount nut and the connector. The oral nasal is now out of the headgear and can be inspected. Replace if necessary noting that a light coat of silicone lubricant will preserve the rubber.

Re-assembly is the reverse of the above sequence.



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6.0 ROUTINE MAINTENANCE

Maintenance Schedule

24 Hours

Clean and inspect mask inside and out.

Check operation of all moving parts

Refer to DSI Manual for detailed procedures.

Monthly

Inspect oral nasal for signs of deterioration.

Inspect and adjust demand regulator.

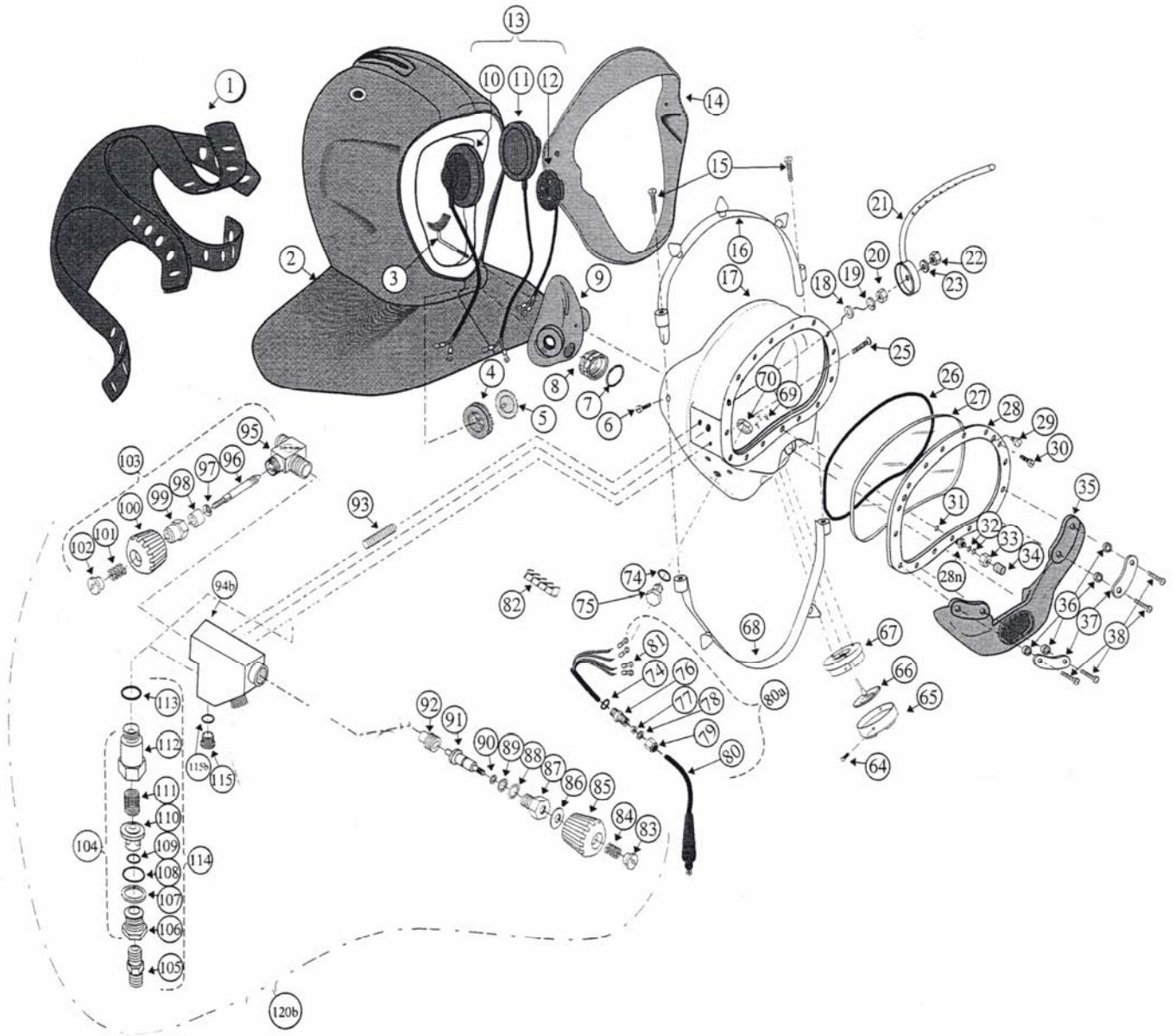
Lubricate packing on nose clearing device as described in DSI Manual.

Test Check Valve on main supply connection as described in DSI Manual.



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7.0 18B EXPLODED PARTS



NOTE:- This drawing relates to proprietary helmet components supplied by DSI. Your helmet is fitted with a **DIVEX** Ultraflow 501 demand regulator. Ultraflow 501 components are detailed in sections 1.0 to 7.0 of this manual.



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KMB 18

Location No	Part Number	Divex Number	Description
1	510-509	DE002	Head Harness (Spider)
2	510-510	DE001	Hood & Seal Deluxe
3	545-015	DE003	Nose Block Device
	510-575	DX2374	Nose Block Pad
	510-576	~	
4	520-020	DE150	Valve Body
5	510-550	DE004	Valve, Oral Nasal
6	530-060	DE074	Screw (18 only)
7	510-490	DE2714	O-Ring (18 only)
	510-211	DE120	O-Ring (28 only)
8	550-038	DE122	Regulator Mount Nut (28 only)
9	510-690	DE2717	Oral Nasal Mask
10	515-005	DE077	Earphone, Right
11	515-006	DE042	Earphone, Left
	510-542	~	Earphone Cover Set
	515-008	~	Speaker
	520-015	~	Speaker Protector
12	515-009	DE097	Shure(r) Microphone
13	515-030	DE086	Communications Set
14	520-051	~	Comfort Insert (18 only)
15	530-095	DE008	Screw
16	545-007	DE009	Top Band
17	520-056	DE1432	Mask, Fibreglass (18 only)
	520-096	DE2801	Mask, Xenoy Frame (28 only)
18	530-535	DE175	Washer
19	530-415	DE173	Washer
20	530-317	DE171	Nut
21	545-016	DE080	Air Train
22	530-317	DE171	Nut
23	530-535	DE175	Washer
24	545-065	DX1528	Standoff (28 only)
25	530-050	DE010	Screw
26	510-260	DE011	O-Ring
27	520-004	DE012	Face Port (Lexan) (18 only)
	520-128	DE0121	Face Port (Lexan) (28 only)
28	560-070	DE193	Port Retainer
28n	550-116	DE1716	Nose Block Guide
29	530-052	DE014	Screw, Port Plug
30	530-035	DE013	Screw
31	510-010	DE016	O-Ring



Location No	Part Number	Divex Number	Description
32	510-008	DE015	O-Ring
33	555-180	DE190	Packing Nut
34	550-062	DE161	Knob, Nose Block
35	510-554	DE107	Whisker, Rubber
36	550-061	DE108	Spacer
37	540-015	DE106	Plate
38	530-045	DE017	Screw
64	530-021	DE076	Screw
65	545-024	D1136	Exhaust Cover (18)
	545-041	DX1527	Exhaust Cover (28)
66	510-561	DE081	Main Exhaust Valve
67	550-063	DE095	Exhaust Body (18 only)
68	545-009	DE029	Bottom Band
69	530-035	DE013	Screw (18 only)
70	550-040	DE087	Nut
71	530-308	DE090	Hex Nut
72	530-525	DE089	Washer
73	515-035	DE031	Communications Post
74	510-481	DE032	O-Ring
75	550-043	DE088	Plug
76	555-175	DE084	Packing Gland
77	520-035	DE033	Ferrule, Front
78	520-036	DE034	Ferrule, Back
79	555-178	DE085	Packing Nut
80	515-045	CO074	W.P Connector, Male (4 pin)
80a	505-047	DE1767	W.P Connector Assembly. Complete
81	515-049	DE2794	Terminal
82	515-061	DE1733	Terminal Block
83	550-019	DE093	Locknut
84	535-802	DE177	Spring
85	520-016	DE035	Knob, control
86	520-030	DE036	Washer
87	550-020	DE181	Bonnet
88	510-015	DE037	O-Ring
89	520-031	DE038	Washer
90	510-010	DE016	O-Ring
91	550-022	DE156	Valve Stem
92	550-023	DE040	Seat Assembly
93	550-024	DE182	Stud – Side Block
94a	550-026	DE183	Side Block – “A”
94b	550-029	DE125	Side Block - “B”
95	550-140	DE1851	Emergency Valve Assembly
96	550-138	DE1581	Stem
97	540-095	DE1571	Washer
98	520-024	DE0411	Packing



Location No	Part Number	Divex Number	Description
99	550-091	DE1841	Packing Nut
100	520-025	DE0351	Knob, Control
101	535-802	DE177	Spring
102	550-019	DE093	Locknut
103	505-070	DE0781	Emergence Valve Assembly
104	555-195	DE189	One-Way Valve
105	555-117	DE079	Adapter, Brass, 1/4 " NPT/O2
106			Seat
107			Wiper
108			O-Ring One-Way
109			O-Ring Valve Kit
110			Poppet
111			Spring
112			Body
113	510-483	DE043	O-Ring
114	505-060	DE1321	One-Way Valve Assembly
115	550-095	DE005	L.P. Plug, w/O-ring
115b	310-003	DE2702	O-Ring
116a	510-011	DE020	O-Ring
116b	520-033	DE083	O-Ring, Teflon
117a	555-152	DE049	Regulator Hose
117b	555-154	DE039	Bent tube Assembly
118a	510-010	DE016	O-Ring
118b	510-012	DE030	O-Ring
119a	555-152	DE049	Regulator Hose w/O-Rings
119b	555-155	DE155	Bent Tube Assembly w/O-Rings
120a	505-022	DE1331	"A" Side Block Assembly Complete
120b	505-024	DE1341	"B" Side Block Assembly Complete



8.0 RECOMMENDED SUPPLY PRESSURES

The operation of the ULTRAFLOW 501 Bandmask is no different from that of a standard DSI Superlite 18B Bandmask and optimum diver breathing resistance can be achieved by rotation of the Demand Regulator adjustment knob.

Recommended Supply Pressure for Air Diving Applications

To assist users of the ULTRAFLOW 501 Bandmask to gain maximum diver comfort and safety, it is recommended that the following minimum overbottom supply pressure settings are provided at the supervisors panel. The maximum overbottom settings should not exceed 20 barg.

Diving Depth MSW	Surface Supply Pressure (Barg)	
	300' Umbilical	600' Umbilical
10	10	10
20	10	10
30	10	10
40	11	12
50	13	14

Recommended Supply Pressure for Mixed Gas Diving Applications

To assist users of the ULTRAFLOW 501 Bandmask to gain maximum comfort and safety, it is recommended that the following minimum supply pressure settings are provided in the Diving Bell. This pressure setting should no exceed 20 bar g.

BELL DEPTH	DIVER SUPPLY (BELL)
MSW	BAR
30-150	10
151-180	11
181-215	12
216-250	13
251-280	14
281-315	15
316-350	16
351-400	17
401-430	18
431-460	19
461-480	20
481-500	20