

MarsSkin Field of View Test Report

Date: 12-13 August 2004

Test Subject: Guy Murphy

Objective: To compare the reduction in normal field of view caused by the two different MarsSkin helmets. The MarsSkin 2 helmet is a modified motorcycle helmet and is fixed to the head, hence the field of view moves when the head moves. The MarsSkin 3 helmet is a 'fish-bowl' style helmet, fixed to the shoulders. The field of view is fixed.

Test Description:

This test was conducted in four parts:

- 1) Field of View cylinder
 - 2) View Above
 - 3) View along Ground
 - 4) View down torso
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- 1) Field of View cylinder – a circle of diameter 1m was marked out in 45 degree increments on the ground. This gives 7 measurement points (-135, -90, -45, 0, 45, 90, 135, 180 degrees). The subject was seated upright on a chair so that the centre of his neck was directly above the centre of the marked circle on the ground, with his head facing straight ahead towards 0 degrees. A 2m ruler was placed vertically at one of the 7 measurement points, and the subject was asked to identify the highest and lowest points on the ruler that he could see, first without moving his head, and then with head movement permitted. The ruler was then moved to the next measurement point. In this way, the subject's field of view was measured as a cylinder around his body.
 - 2) View Above – The 2m ruler was held horizontally above the subject's head, lying directly above the 0-180 degree line marked out on the ground. The subject was asked to indicate the closest point to the top of his head that he could see, again first without moving his head, then with head movement permitted. The top of the head was defined as 0cm, and the point measured could in fact be behind the head when head movement was permitted. Behind the head is indicated by a negative measurement.
 - 3) View along Ground – The subject was asked to stand and a ruler was placed beside his feet, parallel with the 0-180 degree line. The subject was asked to identify the point closest to his feet that he could see, with and without head movement.
 - 4) View down Torso – With the subject still standing, the ruler was placed along the centre of the subject's torso, from neck to feet. The subject was asked to indicate the closest point to his neck that he could see, with and without head movement.

These four tests were conducted with no helmet, and then with the MarsSkin 2 and 3 helmets.

Results:

The following tables summarise the field of view measurements recorded.

Angle	MarsSkin 3				MarsSkin 2				No helmet			
	Lower Visual Range		Upper Visual Range		Lower Visual Range		Upper Visual Range		Lower Visual Range		Upper Visual Range	
	Eye	Head	Eye	Head	Eye	Head	Eye	Head	Eye	Head	Eye	Head
-135	-	-	-	-	-	0	-	2	-	0.35	-	2
-90	0.9	0.75	1.175	2	0.75	0	1.25	2	0.5	1.45	2	2
-45	0	0	1.4	2	0.4	0	1.65	2	0	0	1.6	2
0	0	0	1.325	2	0.3	0	1.55	2	0	0	1.57	2
45	0	0	1.35	2	0.35	0	1.45	2	0	0	1.65	2
90	0.8	0.9	1.2	2	0.55	0	1.35	2	0	0.2	1.45	2
135	-	-	-	-	-	0	-	2	-	0.3	-	2
180	-	-	-	-	-	-	-	2	-	-	-	2

Table 1: Results of Test 1 – Field of View Cylinder

	View above head		View Along Ground		View Down Torso	
	Eye	Head	Eye	Head	Eye	Head
MarsSkin 3	0.22	0.05	0.7	0.5	0.45	0.1
MarsSkin 2	0.3	-0.15	0.65	0	0	0
No helmet	0.25	-0.15	0.65	0	0	0

Table 2: Results of Tests 2-4

Analysis:

Detailed analysis and modeling of the Field of View for each helmet will be conducted after the completion of Expedition Two.

Preliminary Conclusions:

Both versions of the MarsSkin helmet reduce the natural field of view as expected. However the reduction is comparatively small. The MarsSkin 3 helmet has a greater impact on field of view, but this impact is not as large as expected and it is mainly peripheral vision that is affected. This is an issue for activities such as driving a rover or ATV, particularly when driving close to other vehicles. Perhaps a transparent, polarised visor could be used in place of the current cloth visor to improve peripheral vision for this helmet. For normal scouting activities, field tests show the field of view was acceptable.

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