

## THE FUTURE OF R.A.F. SURVIVAL EQUIPMENT

### Introduction.

1. This paper is intended to outline the factors that have determined the shape of survival kit present in RAF aircraft today, to highlight how some of these factors are changing, and how these changes must be addressed if the RAF is to provide the best support to aircrew survivors/evaders.

### History

2. Perhaps the earliest RAF garment that was specialized to be used as flying clothing was when the standard blue battle dress was produced in much larger sizes to accommodate enough thermal undergarments to combat the cold of prolonged missions at high altitude during WW2. The famous sheepskin flying jacket was also issued to airmen around this time. Various varied flying clothing was issued during this time, but the main focus was on combating conditions encountered during flying. Survival kits were rudimentary, and the downed aviator had no direct means of communicating with any assets capable of effecting rescue. Due to the relatively long period of hostilities SOE and MI9 were able to set up, with the assistance of the resistance organizations of occupied countries, “pipelines” to assist and process evading aircrew to return to fight again.

3. This meant that by the end of the war, the ethos was that downed aviators would be expected to try to get back on their own if contact with the pipeline could not be affected. Water rescue was through maritime reconnaissance assets and dedicated Navy and RAF launches. Due to harsh conditions, no radio aids and rudimentary survival aids only around 30% of aircrew survived ditching / bailing out over the sea despite the relatively small expanses of water involved.

4. The advent of the cold war in the late forties / early fifties, and the very real possibility that any major war fought, would indeed be a nuclear one created a sea change in aircrew survival. An all out war with the Soviets would be extremely destructive to both sides, and that the survival of aircrew could be argued had become a moot point as the survival of any personnel could not be guaranteed. A series of regional and conventional wars followed, with the superpowers furthering their interests in other theatres. It is in the Vietnam conflict where modern day survival doctrine was born. This conflict was the first one in history where events could be beamed directly into the nation’s living rooms with little or no censorship. Downed aviators were soon being used for propaganda and political objectives to great effect. Images of US aircrew had a strong negative effect at home, contributing to a widespread anti-war movement. The fate of airmen in enemy territory now had much more wide reaching consequences.

5. The harsh jungle terrain, hostile indigenous people and vastness of the country meant that rescue of a downed aviator was beset with problems. Initially, available assets were used to rescue downed airmen, then due to high losses on these rescue missions the first dedicated combat search and rescue unit was created. Using HH-3/ CH-3 “jolly green giant” helicopters as the extraction vehicle, over 100 aircraft of varying types could be used to put together a rescue package.

6. After the Vietnam War these units continued to develop in the US. Studies were done by the RAF into CSAR, but it was concluded not cost effective to have a dedicated CSAR unit and the requirement would be

filled as a secondary role by in theatre assets. It was also considered imperative to introduce training to allow interoperability with the USAF CSAR assets where possible.

7. The Gulf War was the next major conflict to involve numerous aircrew survival situations. Unfortunately, due to the nature of the terrain and number of enemy ground units very few aircrew evaded successfully. In Vietnam 70% of all rescues took place in the first 2 hours. In the Gulf no rescues were made in the same period. It did, however, reinforce the need for good, covert comms and has led to the UK to review its conduct after capture policy.

### The Present.

8. Whilst some key areas remain the same, other aspects of SERE are very different from the situation faced only a few years ago. The differences are that with the collapse of the Soviet Block, conflicts/ peacekeeping operations are more likely to occur over a much wider range of environments. There is no longer a “most likely scenario”. Even operations in the Middle East, which is an easy prediction to make, offer different environments. Iraq is relatively flat and hot compared to the mountainous cold, arid Afghani highlands in winter. Even low funded enemies can have sophisticated hand held anti aircraft systems. The enemies desire to capture downed aviators has always been very strong. In today’s warfare the use of the Internet allows much greater use of the aviator as a propaganda tool. The media has always given hostage/ POW footage highest billing, and the political pressure these individuals can bring to bear is now stronger now than ever before. Even small organizations can put themselves on the world stage, without compromising their own security.

9. All the above changes make the world a harder place for our downed aviator. It is not all bad news. Advances in technology allow effective communications from hand held covert beacons which can also pass worldwide pinpoint position accuracy, and blue force tracking is now a very real possibility for the first time. Knowing the exact location of the evader as soon as he hits the ground allows rapid and coordinated rescue missions. Coupled with the improving capability of the CSAR aircraft, the evader can be reached almost anywhere in a relatively short time. The UK has its own extraction force / CSAR assets. 28 Sqn now operate with RAF Rgt personnel to conduct CSAR Ops. Precision munitions allows greater firepower to be used in close air support to effect evader rescue. Although the expected time to rescue will be formalized very soon on the strength of the QinetiQ review, it is now expected to be in the region of 48 hours.

10. Hand held, robust night vision equipment allows the evading aviator to level the playing field with even the most well equipped enemy. Advances in materials and survival equipment now offer smaller, lighter, cheaper, higher performance kit. These items must be utilized if another trend is to be neutralized. The space in ejector seats given over to survival aids is getting smaller and smaller.

11. Although the expected time to survive may have reduced, the actual principles of survival remain Protection, Location (concealment), Water and Food. Some basic assumptions must also remain. The Evader is:  
Dressed to survive.

Fully Hydrated

Has good communications with CSAR assets (for reasons set out below.)

12. Any change in equipment must be within this framework if it is to improve survival chances. The basic mission of an evader also remains the same: avoid capture and return with honor.

### Implementation.

13. How the RAF implements the results of the QinetiQ review has yet to be decided. An environmental scaling for each aircraft should remain extant (Temperate, Arctic, Jungle, Desert and Desert Winter as appropriate). If it does decide to alter/ modernize these scalings the SERE Training Centre input to these revisions would be as follows:

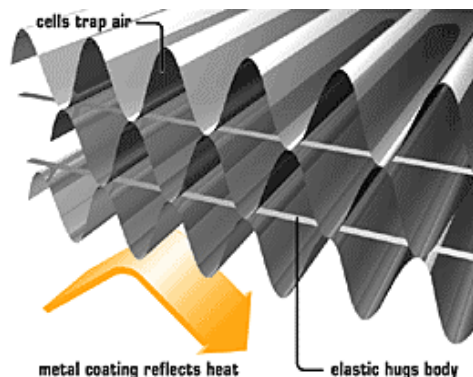
### Protection.

14. Strong consideration be given to including a gas permeable Bivvy bag in all temperate aircraft packs.



Not only waterproof instant shelter, but the gas permeable nature of the fabric allows them to be closed without build up of CO<sub>2</sub>, which can build up a temperature differential of up to 19°C. An injured aviator can instantly hide in a weatherproof shelter. The small packed size allows them to be considered for inclusion in fast jet personal survival packs (PSP) as well as the larger multi engine and helicopter “A” Packs.

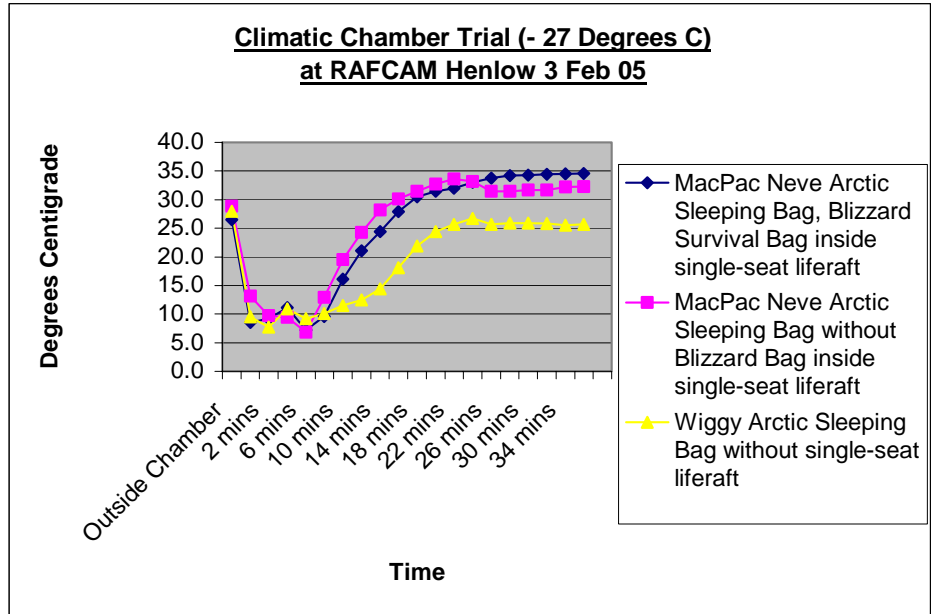
15. Where additional thermal protection is required and pack size is limited then Blizzard Bags should be considered for inclusion. Tests in conjunction with conventional sleeping bags have shown that a Blizzard Bag inside the standard Neve sleeping bag considerably augments its thermal properties. It should be noted that cold weather flying clothes and thermal items from the survival pack e.g. Headover, mittens etc were worn, and the subject was also inside the single seat dinghy. A 2.3°C increase in fingertip temperature was recorded at -27°C outside air temperature. This may seem a small increment, but this it very noticeable to the subject, and in extreme circumstances (shock, injury, exhaustion etc) could be very significant.



## Climatic Chamber Trial

### Finger Tip Temperature Data Accumulated At RAFCAM Henlow On 3 Feb 05

	Neve+Bliz	Neve	Wiggy
Outside Chamber	26.5	28.9	28.0
0 mins	8.5	13.1	9.5
2 mins	9.2	9.7	7.7
4 mins	11.1	9.4	10.9
6 mins	7.2	6.8	9.2
8 mins	9.6	12.9	10.1
10 mins	16.1	19.5	11.5
12 mins	21.1	24.3	12.5
14 mins	24.4	28.2	14.4
16 mins	27.9	30.1	18.1
18 mins	30.5	31.5	21.9
20 mins	31.5	32.7	24.4
22 mins	32.0	33.6	25.7
24 mins	33.0	33.2	26.7
26 mins	33.8	31.5	25.7
28 mins	34.2	31.5	25.9
30 mins	34.3	31.7	25.9
32 mins	34.4	31.7	25.8
34 mins	34.5	32.2	25.5
36 mins	34.6	32.3	25.7



16. The new generation of cold weather flight gear is available, totally weatherproof, fire retardant and with IR remission. This must be pursued if we are to give the evader the best chance of surviving, as the FR Mk 3 Cold Weather gear is a quantum leap in performance.



Location (concealment).

17. Location is covered by hand held GPS / Covert radio and overt radio beacon for peacetime / permissive operations. In the very near future sending CSAR assets the survivor's location, both overt and covert will be worldwide, and instantaneous using PELS (Personal Emergency Locator System) and PRESS (Personnel Recovery Enabled by Smart Sensors) overtly and covertly respectively.

18. In a non-permissive environment, location in survival terms is also about not revealing your location to your adversaries i.e. concealment. The new FR Combat 95 flying clothing will go some way to doing this for rotary and multi engine aircrew. For fast jet and for augmentation of other aircrew any extra camouflage items can only increase their survivability. When no room exists in the survival packs then items such as cushions and backrests could be filled with camouflage. One such item is the Camo-Tek system. It is able to provide protection from sensors in the visual, IR, near IR, thermal and radar ranges, whilst allowing the concealed evader to still see out.



Even in the most crude demonstrations it shows how effective it can be to conceal, even day-glow orange from close range.

## Water.

19. The present means of providing instant drinking water in survival packs is sachets of water. These are bulky, relatively heavy and only provide enough for initial needs. For land conditions, sustained provision of water means items that can obtain water from the environment must be scaled. Chemical purification is provided in the form of puritabs, and hand operated purification pumps are also included. These methods are not ideal as puritabs do not kill viruses, and the water pump needs physical input and cannot be used on the move. The BW inline filter removes all viruses, bacteria and chemical impurities and can be used with a camelbak or water carrier on the move. This means water can be collected quickly, reducing the possibility of detection by the enemy, and purified on demand. With at least 250 liters output before fail in bad water conditions, it easily provides for the expected time to extraction.

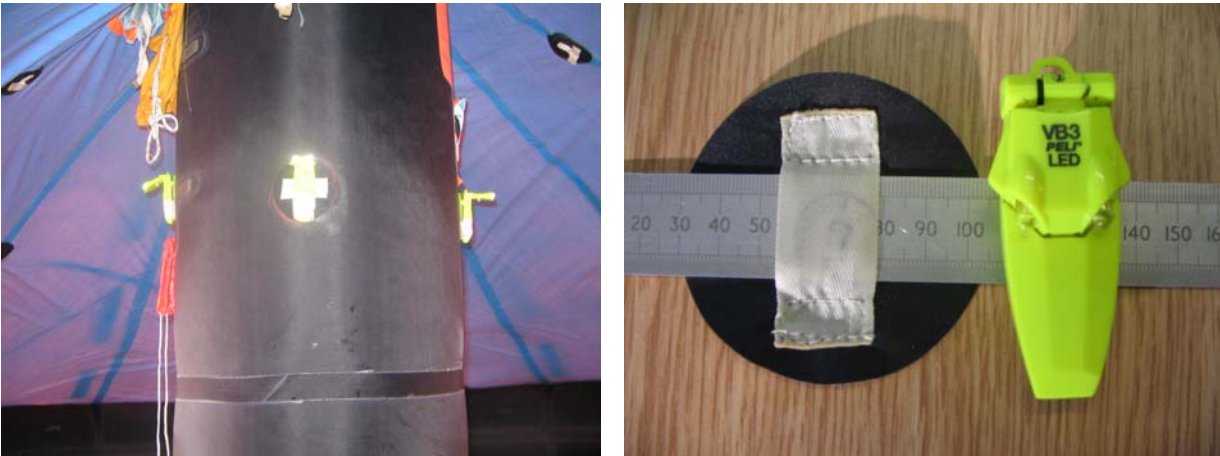


20. For obtaining drinking water from brine the present method is using a reverse osmosis pump (ROP). This is relatively bulky (some of the smaller PSPs do not have room for it), heavy and expensive. It also requires effort, which an ejectionee may have injuries that render this impossible. The hydrationtech sea-pack uses a high concentrate sugar syrup in an inner bag to obtain an isotonic drink by drawing the fresh water from sea water in an outer bag. Little effort is required, and can be done one handed. The only drawback is that it takes up to eight hours to make 1.75l of drink, but with reduced rescue times this now becomes a viable alternative. Two bags and two charges are still less bulky and far less expensive than an ROP.



## Miscellaneous.

21. The list of technology innovations that could benefit survival pack scales is too large to cover by this means, however one line of advance is of such significance that an overview of equipment, no matter how brief, would not be complete without it. If the main direction of change for all survival aids is better performance from smaller, cheaper and lighter items, then nothing encapsulates this than LED torches/ lights. Beacons, Liferaft internal lights and torches on present RAF equipment are all conventional bulbs which have a higher electrical current rating, and therefore require larger batteries. LEDs can easily replace all of these functions.



## Conclusion.

21. With no Air Force Wide formal review of aircraft survival kit ever having taken place with all the changes in technology and capability the QinetiQ review is long overdue. The trend of smaller PSP sizes can be neutralized by use of modern equipment. This equipment is not, on the whole, any more expensive than the old stock used today. This unique opportunity to modernize the equipment included in survival packs cannot be lost. Saving money whilst increasing capability is a rare occurrence.