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USE OF LIFE SUPPORT EQUIPMENT BY AIRCREWS CAPTURED IN  
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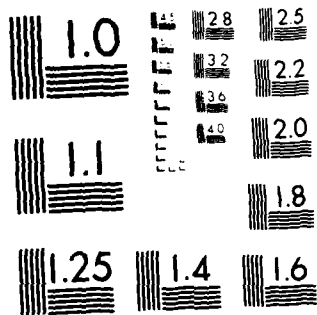
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USE OF LIFE SUPPORT EQUIPMENT BY  
AIRCREWS CAPTURED IN SOUTHEAST ASIA

by

LT COL CHARLES A. LEHMAN  
Air Operations Officer, Life Support

Life Sciences Division  
Directorate of Aerospace Safety  
Air Force Inspection and Safety Center  
Norton Air Force Base, California

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For many years all the military services have collected data on ejection/bailout/survival episodes of crew members who were involved in aircraft accidents. More recently the United States Air Force (USAF) began collecting similar life sciences data from crews recovered after combat losses. The Life Sciences Division of the Directorate of Aerospace Safety has published several papers dealing with the experience of these crews.

This paper and those of Dr Lewis and Mr Shannon provide the first real insight into the life support problems encountered by a third group--our returned prisoners of war (POWs). The returnees were queried by mail as part of a joint HQ USAF and Air War College sponsored study of the POW experience in Southeast Asia (SEA). Col Joe Kittinger developed the form used in that study to query USAF returnees concerning their experience with aircraft egress, life support equipment, and mission data. At the time this paper was being prepared, 209 of the 218 questionnaires completed by returnees documenting their pre-capture experiences had been received, and it is on these 209 questionnaires that our statistics are based. The POW responses were anonymous and voluntary.

It is important to remember that these reports come only from survivors. We know little or nothing of those who received fatal injuries during their ejection/bailout attempts. Also, it seems unlikely that many of those who incurred really severe ejection injuries were able to withstand the rigors of capture and confinement. We have no information on these individuals either.

This paper will analyze the experiences of the POWs who returned, and compare parts of them with the experiences of successful evaders and noncombat survivors. Footnotes would complicate the text and will not be used; however, grateful credit is given to the authors

listed in the bibliography. Some quotes from the returnees are included, not because they are particularly representative of a general feeling, but because they are interesting and tend to give insight into the problems these men faced.

The returnees entered their ordeals under extremely trying circumstances. In general, the speed of their ejections, as reported by Mr Shannon, was far above what is normally encountered outside of combat. As a result of this, and the violent break-up of many of their aircraft, wounds sustained in flight, or injuries incurred during parachute landing, more than one out of five was incapacitated when he entered his evasion challenge, as reported by Dr. Lewis. These injuries had a very direct bearing on the outcome of their evasion attempts.

"I believe that only severe injuries prevented me from evading and possible rescue."

This man had burns on face and neck, a compressed disc, internal injuries and bleeding, two possible breaks in his pelvis, and numerous cuts and bruises. He still evaded for 20 hours.

The flight gear worn by these aircrews was a significant factor in their escape from combat-damaged aircraft. As the canopy was jettisoned prior to ejection, the flight helmet served to protect the crewman from windblast, buffeting, and seat-man contact. However, 19.6 percent of the returnees who ejected (and reported the status of their helmets) said that they lost their helmets during the ejection sequence. In spite of the preponderance of high-speed ejections, this rate is close to the noncombat helmet loss rate (16.6 percent) or the

successful evaders' rate (16.4 percent). Generally, the returnees' rate of helmet loss increased quite uniformly with speed, but there is a dramatic drop in the curve between 450 and 500 knots. This may be due to the relatively small sample at that speed range (20). The low rate between 200 knots and 350 knots was also somewhat unexpected, but may be due to the optimum stability of many of our ejection seats in that speed range.

As shown in a previous study, configuration of the helmet during the ejection/bailout sequence is a key factor in its retention or loss. When the returnee wore his helmet in the optimum configuration (visor down, chin strap and nape strap snug), he had the best chance of retaining it. Only 15 percent of the helmets so configured were lost. This compares to about 12 percent for noncombat situations. With the visor down but one or both of the straps loose, his chances were nearly as good; 16 percent were lost (11 percent in the non-combat study). However, when the visor was up at the moment of escape, the loss rate jumped to 26 percent (for noncombat, 30.5 percent). In view of the high speed of most of these ejections, the relatively good retention rate may be partially explained by considering that crew members in combat usually keep their emergency equipment tight and well fitted. In day to day noncombat flying, they are more lax in this respect. The configuration of the successful evaders' helmets is not known.

Only four helmet failures were reported by the returnees. Three involved broken visors, while one helmet was struck by a cannon shell

fired from a MIG. The aircraft canopy and helmet shell absorbed enough of the impact that the pilot was not seriously hurt.

The 209 reporting returnees listed significant features describing their landing sites. Many used several adjectives to portray a clear picture of the area. For example, one man reported landing through trees onto hard ground and rocks on a steep slope--all four descriptions were considered for this study.

More than a third (38 percent) of the returnees began their evasion attempts in thick brush or trees. Thirty-one percent impacted on hard ground and 16 percent on soft ground. Ten percent hit amid rocks, and more than one-fifth made their parachute landings on steep slopes or ravines. In spite of the unfavorable terrain, there were only 12 major injuries (5.8 percent) and 26 minor injuries (12.6 percent) attributed to parachute landing. In a recent 3-year period, noncombat ejectees experienced a parachute landing fall (PLF) major injury rate of 8.6 percent.

Only 3 percent of the returnees landed in water compared to 19 percent of the successful evaders. Obviously, those crews who made it "feet wet" before ejecting fared better than those who were forced to eject over land.

Capture came rapidly for most of the returnees, just as rescue was quick for most of those who made it back. Many of the returnees were literally captured as their feet touched the ground. Within their first 2 hours on the ground, 65 percent of the returnees had been captured. In that same interval, 49 percent of the successful evaders were rescued. At the end of 6 hours on the ground, 70 percent of the returnees had been captured, and 75 percent of the evaders

rescued. In the densely populated sections of the enemy area, long evasion episodes were not the rule. This would probably be true in future daylight operations in any densely populated area of the world.

Even so, there were some amazing, extended evasions among the returnees. Six of them avoided the enemy for more than 3 days. Of these, two lasted a week and one, 8 days. One, who was captured immediately, escaped and evaded for two weeks before being shot and recaptured. In a densely populated country where an occidental stands out like a sore thumb, this is a tribute to their courage and training. In the noncombat situation, previous studies have shown that 90 percent of accident survivors are rescued within 6 hours.

Life support equipment frequently proved valuable, even for the aircrews who were captured immediately. Many used their radios while descending in their chutes to contact wingmen or rescue forces. Thus, even when no rescue was possible, the psychological boost of knowing that relatives would be notified of their safe escape from the aircraft was an important factor. Also, contact with wingmen or other aircraft during the descent denied the captors the probable psychological advantage of telling the POWs that no one knew where they were or that they were alive. Almost half (48 percent) of the returnees used their survival radios before capture. (This rate is understandably higher for successful evaders or noncombat ejectees--80 and 62 percent respectively) One man summed up a rather general feeling, "The survival radio is the most important piece of gear in this situation." Six returnees lost their radios and 18 (18 percent) of those who used radios experienced failures. Some of these were

extremely critical.

"I lost all radio communication after one hour. Rescue would have been successful with a radio. The chopper was overhead."

"I was flying a rescue helicopter, and probably would have been picked up if I hadn't fallen on my radio and broke the damn thing."

"One radio battery was dead; the other lasted less than one hour. This cost me 6½ years as a POW."

These incidents occurred in 1965 and 1966, before daily battery checks were instituted. Two individuals stated their radios were inadequate, and one expressed a need for a special transmitter:

"I needed a transmitter which could be hidden on a bare body, capable of sending signals, so my movements after capture could have been tracked."

Admittedly, this is a far-out request, especially since it is common practice to strip captives immediately after capture. Such a transmitter would have to be hidden within the body.

The personnel locator beacon was reported used by 46 POWs (22 percent)--nearly as frequently as among those who were recovered (27 percent) and more often than the noncombat group (14 percent). During part of the reporting period, beacons in some aircraft were nonautomatic.

Following radios and beacons, the most used item was water. Nearly all who were forced to leave their aircraft in Southeast Asia (SEA) expressed a profound need for water.

"The need for adequate water cannot be overemphasized."

"All Aircrews should carry water."

Thirty-six (17 percent) of the returnees specifically mentioned using water prior to capture. Five others (2.4 percent) needed more water

than they carried. One cut a banana tree and drank the water which collected in the stump--a procedure taught in the Jungle Survival School. Two reported losing their water flasks during ejection, and one flask failed.

Knives are probably the most classic of survival tools. They were used by 13 percent (27) of the returnees and 10 percent of the successful evaders. Six returnees lost their knives, and one found his inadequate--he wanted a machette, a questionable request when silence and covert action are necessary to avoid capture. However, even small knives served well.

"I lost the leg of my "G" suit due to violent ejection--with it went my MC-1 knife and flashlight. The small knife in the parachute was invaluable."

Another man was captured because of a problem with his knife.

"Couldn't unfasten straps on my survival kit. Couldn't cut them, because survival knife was tied to my harness with nylon, and I couldn't untie the knot. Couldn't cut the knot, because I lost my pocket knife on ejection. Finally, I forced the knife blade through the leather sheath, and was cutting the straps when I was surrounded."

First aid kits were next in order of usage--7 percent. (Compared to 4 percent for the successful evaders.) The same number of returnees, 15 (7 percent), reported opening and using items from their survival kits. The others got along with the items in their survival vests.

In previous studies it was reported that about 5 percent of the aircrews rescued in SEA used their sidearms. Interestingly, the same rate of usage applies to the returnees. However, two returnees expressed conflicting views of personal weapons:

"Rather than a large caliber sidearm which was a good signaling device but a poor survival weapon, aircrews should have a small caliber

weapon with a silencer and large clips of ammunition, such as a .22 with a silencer."

"I continue to have reservations about carrying a weapon. I was captured immediately--another American weapon for their arsenal."

Ten (5 percent) returnees reported using their flashlights. This was somewhat surprising in view of the need to remain hidden. However, in the deep blackness of a jungle night, some illumination is required for most tasks. Only 2 percent of the successful evaders reported using flashlights.

Signals have predominated among survival items in previous studies. For example, about half of the successful evaders in SEA reported using visual signals such as flares, strobe lights, mirrors, or tracers. In contrast, only 26 (13 percent) of the returnees said they used these signals. In most cases there was simply no one to signal, because they were in an area where rescue was impossible or there was no time. Only one man reported a signal failure--a penguin flare. Four individuals stated they needed visual signals and didn't have them.

A small percentage of the returnees reported needing items of equipment in addition to what they carried. However, there was no trend. Among the items mentioned were burn ointment, burn treatment instructions, rations, bandages, luminous button compass, morphine, machette, map, and a helmet radio jack. None of these items was reported as needed by more than 1 percent of the returnees responding to the questionnaire, even though this question was specifically asked. Evasion in the heart of a hostile country is a tough challenge. One returnee said the item he needed most was "vanishing cream." Another wanted wings. Still another expressed a more practical requirement:

"I was captured on the third day by a dog. Perhaps pepper in the survival kit would help when the enemy uses dogs."

One felt he was carrying too much equipment:

I feel we were overloaded with equipment for this environment--to the point of being encumbered in the cockpit."

Such comments were definitely the exception rather than the rule, and most of the reporting returnees were very satisfied with their life support equipment.

Although water landings were quite rare, two individuals used their rafts, and four used life preservers. One of these made a pertinent observation:

"Recommend a method be devised for automatic actuation of LPU upon immersion in water.... I was rendered unconscious by the wind-blast from an excessively high-speed ejection. I remained unconscious for about 15 minutes. Had I landed in a nearby river, or any body of water, I would have drowned. How many did we lose in VN this way?"

The Air Force is actively developing an automatic life preserver.

Only five failures of flotation equipment were reported; however, two life rafts were lost during the ejection sequence and three failed to inflate when the kit was deployed.

The returnees experienced many survival/rescue problems in addition to their injuries. Thirty-four (16 percent) said they suffered from thirst, but only six (3 percent) reported acute hunger.

"I was weak and tired from no food--lost mental acuity. Many people around. If I'd been stronger I probably could have prevented their seeing me and continued to a safe area."

He'd been evading for four days.

One-fifth of the returnees stated the topography worked against them. Almost as many (17 percent) said they had communications problems. A high-speed ejection from a burning or disintegrating aircraft

is a harrowing experience at best. When it happens over enemy territory, the physical and psychological pressures are enormous. Fourteen percent of the returnees said they were confused, dazed, or disoriented for varying periods after ejecting. Weather had an adverse effect on 10 percent, and 5 percent complained of exposure.

"It was very cool and rainy, and I was probably in slight shock. This, coupled with the cool weather, made exposure a possibility." Even Southeast Asia is not always warm--at least at night, in the mountains.

Fatigue or poor physical condition (8 percent and 4 percent respectively) played a role in some evasion attempts. Seven men (3 percent) had trouble with insects or animals.

Of course the enemy was the biggest factor in all these cases. Frequently the location of the parachute landing made the outcome of the evasion attempt a foregone conclusion. As one man wryly put it:

"Don't parachute into an enemy camp!"

In other cases injury was the deciding factor--and one returned pilot suggested:

"Don't get hurt."

Probably the best summation of all was simply, "WHEW!"

#### CONCLUSIONS

Although we normally think of life support or survival equipment as serving to get our crew members home as soon as possible after a catastrophic airborne emergency, the returnee reports show another facet. Even when the evasion attempt is unsuccessful, life support and survival equipment can help keep the crewman in the best possible shape



TABLE I

AIRSPEED AT EJECTION\*  
VS  
HELMET LOSS

<u>Airspeed</u>	<u>Number Involved</u>	<u>Helmets Lost</u>	<u>Percent</u>
0-99	9	1	11
100-199	9	1	11
200-299	27	2	8
300-349	20	1	5
350-399	10	2	20
400-449	14	4	29
450-499	19	1	5
500-549	31	11	36
550-599	9	5	55
600+	9	4	44
Unknown	<u>26</u>	<u>4</u>	<u>15</u>
TOTAL	183*	36	19.6

\*24 individuals gave no information about their helmets.

TABLE II

HELMET CONFIGURATION  
VS  
HELMET LOSS

<u>Configuration</u>	<u>Involved</u>	<u>Lost</u>	<u>Percent</u>
Optimum	100	15	15
Visor Down (Chin or Nape Strap Loose)	32	5	16
Visor Up (Chin or Nape Unspecified)	38	10	26
Unspecified	<u>13</u>	<u>6</u>	<u>46*</u>
Total Ejections	183**	36	

\*Most of these were unconscious from the effects of the ejection.

\*\*24 individuals gave no information about their helmets.

TABLE III

## LANDING ENVIRONMENT

<u>Environment</u>	<u>Number Reporting</u>	<u>Percent* Reporting</u>
Marsh/Swamp/Paddy	31	15
Hard Ground	65	31
Soft Ground	33	16
Ravine/Steep Slope	45	22
Rocks	21	10
Trees/Thick Brush	80	38
In Trees	(28)	
Through Trees	(39)	
Fireball (In or Near)	8	4
Water	6	3
Shallow	(4)	(2)
Deep	(2)	(1)
Hills/Mountains	3	1
Buildings	3	1
Unknown/Not Reported	<u>17</u>	8
	312	

\*Many individuals reported more than one environmental situation.

TABLE IV

TIME BEFORE CAPTURE

<u>Duration of Evasion</u>	<u>Number Reporting</u>	<u>Percent Reporting</u>
Immediate Capture*	63	30
1-29 Minutes	45	22
30-59 Minutes	12	6
1 hr-1:59	14	7
2 hrs-5:59	11	5
6 hrs-11:59	7	3
12 hrs-23:59	13	6
24 hrs-47:59	7	3
48 hrs-71:59	4	2
72 hrs-Over**	6	3
Unknown/Not Reported	27	13

\*One man was captured immediately, but escaped and evaded for 2 weeks before recapture.

\*\*3 days - 1  
 4 days - 1  
 5 days - 1  
 7 days - 2  
 8 days - 1

TABLE V

## LIFE SUPPORT EQUIPMENT USED

<u>Item</u>	<u>Number Who Used</u>	<u>Percent</u>
Radio	101	48
PLB	46	22
Water	36	17
Knife	27	13
Weapon	11	5
Flashlight	10	5
Voice Attenuator	10	5
Survival Kit	15	7
First Aid Kit	15	7
MK-13 Flares	7	3
Pengun Flares	5	2
Signal Devices (Unspecified)	6	3
Strobe Light	4	2
Tracers	4	2
LPU	4	2
Raft	2	1
Go Pills	1	-

TABLE VI

LIFE SUPPORT EQUIPMENT  
LOST, FAILED, INADEQUATE

<u>Item</u>	<u>Lost</u>	<u>Failed</u>	<u>Inadequate</u>
Radio	6	18 (18%)	2 (2%)
PLB		3	
Couldn't Silence		4	
Water/Container	2	1 (3%)	
Knife	6	0	1
Flashlight	1		
Attenuator	1		
Survival Kit	6	10	1
First Aid Kit	2	1	
MK-13 Flares	2		
Pengun Flares		1	
Signal Devices (Unspecified)	2		
Raft	2	3	
Helmet	36 (19.6%)	3 (Visors)	1
Gloves	8 (4%)		1

TABLE VII

EQUIPMENT NEEDED, BUT NOT AVAILABLE

<u>Item</u>	<u>Number Who Needed</u>	<u>Percent</u>
Water	5	2.4
Radio	3	1.4
Mirror	2	<1
Burn Ointment	2	<1
Rations	2	<1
Bandages	2	<1
Compass (luminous)	2	<1
Flashlight	1	<.5
Morphine	1	<.5
Machette	1	<.5
Pengun	1	<.5
Burn Instructions	1	<.5
Map	1	<.5
Signals	1	<.5
Helmet Radio Jack	<u>1</u>	<u>&lt;.5</u>
	26	12.4

TABLE VIII

SURVIVAL PROBLEMS

<u>Problem</u>	<u>Number Reporting</u>	<u>Percent Reporting</u>
Incapacitated by Injury	44	21
Thirst	34	16
Topography	41	20
Communication	36	17
Darkness	31	15
Confused, Dazed, Disoriented	30	14
Rescue Vehicle/Personnel (None, delayed, shot down, limitations)	51	24
Weather	21	10
Fatigue	16	8
Enemy in Area	21	10
Lack of Survival Equipment	10	5
Exposure	10	5
Poor Physical Condition	9	4
Animals, Insects, etc	7	3
Hunger	6	3
Survival Equipment Problems	4	2
Miscellaneous	3	1

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