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DEPARTMENT OF THE ARMY  
ARMY CONCEPT TEAM IN VIETNAM  
APO San Francisco 96243

ACTIV-AAD

17 November 1966

SUBJECT: Final Report of Essential Load of Scout Helicopters (U)

TO: Commanding General  
United States Army Vietnam  
ATTN: AVHAV-R  
APO 96307

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1. (U) REFERENCES

- a. FM 17-1, Armor Operations, 20 June 1963.
- b. FM 17-35, Armored Cavalry Platoon, Troop and Squadron, 11 February 1960.
- c. FM 17-36, Divisional Armored and Air Cavalry Units, 8 October 1965.
- d. Training Text 17-95-1, USACDC, Air Cavalry Squadron, Airmobile Division, 20 January 1966.
- e. Memo Report No. 1717, USAMC, Vulnerability of the Light Observation Helicopter, September 1965.
- f. OH6A Deployment Plan 1-66, (S), LOH Field Office, 10 June 1966.
- g. Letter, AVAV-R, Headquarters, US Army Vietnam, subject: Essential Loads for Scout Helicopters, to Chief, ACTIV, 15 April 1966.
- h. Message, CGUSAMC, #42869, 4 October 1966, subject: Increase in OH6A Empty Weight.

2. (U) PURPOSE

The purpose of this project was to determine the essential loads for scout helicopters in the ~~theater environment~~ environment of the Republic of Vietnam (RVN).

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### 3. (C) BACKGROUND

a. (U) The traditional mission of the cavalry squadron is to perform reconnaissance and provide security for designated major combat elements of a division. The primary function of the air cavalry troop (scout platoons) is to extend the reconnaissance and security capabilities of the squadron. The aero-scout platoons of the cavalry squadrons in the 1st Infantry Division and 1st Cavalry Division (Airmobile) are authorized scout helicopters to accomplish these tasks.

b. (C) The OH-13S is presently being used as the aero-scout helicopter. The OH-13S rated capacity is less than the capacity required to carry the present USARV scout helicopter mission load. Consequently, the OH-13S is normally operated above design gross weight, which results in sluggish performance and shortened life of the helicopter components. The OH-6 helicopter is scheduled for deployment to RVN with two of the essential scout helicopter mission items included in its configuration: the XM-27 weapons subsystem and armor protection for crew and critical components. The OH-6, because of its greater power and weight carrying capability, is being provided to replace the OH-13S and satisfy the USARV scout helicopter requirement. USARV directed this present ACTIV study to establish the essential load for scout helicopters in RVN and to provide data basic to succeeding evaluations of the OH-6.

c. (C) The study was conducted by making an evaluation of statistics, doctrine, and professional opinions of commanders, pilots, and scout observers from the 1st Squadron, 9th Cavalry, 1st Cavalry Division (Airmobile) and the 1st Squadron, 4th Cavalry, 1st Infantry Division. These squadrons have performed aero-scout missions in the highlands, the delta, and the coastal plains of the Republic of Vietnam during actual combat operations. Personnel of these squadrons were, therefore, most competent to identify actual, as opposed to theoretical, mission requirements.

### 4. (C) DISCUSSION

#### a. (C) Objective 1 - Armament Subsystems

(1) The purpose of this objective was to determine the most desired armament subsystem, including ammunition, for the scout helicopter. At the time of the evaluation, the scout helicopters in the 1st Cavalry Division had either two 7.62mm machineguns or eight 2.75-inch rocket tubes mounted on the OH-13S. The 2.75-inch rockets were used in various combinations of white phosphorous, fragmentation, incendiary, and marking rounds. The scout helicopters of the 1st Infantry Division had two 7.62mm machineguns, but utilized no rocket capability. The two machineguns installed on the aero-scout helicopters

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of both divisions each had 550 rounds of 7.62mm ammunition. With a rate of fire of 600 rounds per minute, less than one minute of continuous fire was available in both instances.

(2) Doctrinally, a scout helicopter should not become heavily engaged with enemy forces (ref 1c). However, experience in Vietnam shows that time is a critical factor once the enemy has been located. The scout helicopter normally takes the enemy under fire, dependent upon the size force encountered, and designates the target area with marking rounds until aero-rifle and aero-weapons elements can reach the targets. The time between the scout's detection of the enemy and arrival of the attack elements varies from a few minutes to as many as 30, depending upon the situation and the distance to be traversed by the attack elements to reach the enemy. For these reasons, aero-scouts must be capable of light defense and target marking to accomplish their mission in the RVN. When the aero-scouts in RVN do not have a machinegun as well as a rocket capability, the enemy's movement is not inhibited and he immediately relocates or hides. The reconnaissance and security mission is then of very little value.

(3) It was found from the data collected, as well as from the expert opinion of all the combat aviators queried, that the armament required to destroy or hold the enemy up to 30 minutes is between two and three minutes of machinegun fire and a minimum of fourteen 2.75-inch rockets. The variance in machinegun fire required was largely attributed to differences in terrain and enemy encountered. The mix of white phosphorous, fragmentation, and incendiary folding fin aerial rockets (FFAR) carried on any mission is tailored to meet the requirements of the most recent intelligence reports. It was agreed, however, that marking rounds should be carried on every mission.

(4) The existing weapon subsystem which most nearly fulfills the requirements disclosed by this study is the XM-21. It consists of two XM-134 machineguns (high rate), 6000 rounds of 7.62mm linked ammunition, two pods carrying a total of fourteen 2.75-inch FFAR's, a sighting station, control panel, 12 ammunition boxes, an ammunition box rack, two boosters, two gun mounts, necessary chuting, and rack assemblies. The total weight of the XM-21 subsystem, with ammunition, is 1,172 pounds. (See Incl 1.)

b. (C) Objective 2 - Individual and Survival Equipment (Crew)

(1) The purpose of this objective was to determine the individual and survival equipment required for the scout helicopter crew. The individual equipment carried by aero-scout crews, as

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determined by this study, varied from unit to unit. Because of this, questionnaires were prepared for completion by aero-scout personnel to determine only those items of individual equipment essential for an aero-scout mission.

(2) The analysis of survival equipment requirements was oriented to mission requirements against normal operating distances and terrain. It was found that an aero-scout in Vietnam normally operates within a 50-mile radius of friendly troops. The terrain encountered varies from level delta to thick jungle-covered mountains. When an aero-scout is downed in Vietnam, the crew must have survival equipment sufficient to sustain itself until recovery and return can be accomplished.

(3) The following listed individual and survival items (also shown in incl 1), in addition to the normal clothing and web equipment issued to soldiers in Vietnam, were identified as essential from the questionnaires and the interviews:

<u>Quantity</u>	<u>Item</u>	<u>Weight (pounds)</u>
1	.38 cal revolver (pilot) w/30 rds ammo	2.5
1	M16 rifle (observer) w/7 clips (20 rds ammo ea)	12.0
1	"Survival Seven" pencil flare gun	.5
2	Ration	10.5
1	Radio, emergency, URC-10	3.9
2	Survival kit, individual, w/compass	2.5
2	Repellent, insect and leech (bottles)	.4
1	Machete, w/scabbard	2.3
2	Grenades, smoke	2.5
	Total weight, individual and survival items	37.1

c. (C) Objective 3 - Helicopter and Crew Protection

(1) The purpose of this objective was to determine the armor required to protect the helicopter, pilot, and observer. The OH-6 helicopter (with armor), identified as the replacement for the OH-135, is used for discussion of the armor protection of an aero-scout. The most general threat to the aero-scout is from the 7.62mm projectile, because of the frequent use of that round by enemy troops. It is, therefore, the primary threat considered in this study. The most vulnerable components of a light observation helicopter have been identified, in reference 1e, in order of priority as the pilot, fuel system, engine, and transmission.

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(2) The Project Manager OH-6, Army Materiel Command, was queried on this subject. He reported the increase in basic aircraft weight attributable to seat armor as 91 pounds, component armor as 53 pounds, and the XM-27 gun subsystem as 283 pounds. A crew of two is factored at 400 pounds. (See reference 1h.)

d. (C) Objective 4 - Aircraft Mission Requirements

(1) This objective was to determine the flight endurance necessary to perform the aero-scout mission.

(2) Although the aero-scout does not normally perform reconnaissance and security at great distances from a parent unit, it is necessary that continuous coverage of the mission area be provided during the accomplishment of assigned missions. The collective experience over an eight month period involving aero-scout operations, as determined from commanders and aero-scout personnel in the evaluated squadrons, shows that the flight endurance of an aero-scout should be at least two hours plus a 30-minute reserve. Endurance for at least two hours coverage over an objective area plus time to and from the objective area is needed. It is equally evident, however, that all missions will be initiated in RVN with a full load of fuel, since so much terrain is uncontrolled. The total weight with full fuel (endurance 3.4 hours) is therefore considered to be the practical standard which will be followed. The increase in basic weight for fuel is 400 pounds.

e. (C) Discussion of OH-6 Load Carrying Capabilities

(1) The OH-6 is normally capable of carrying approximately 1000 pounds above its helicopter basic weight of 1,663 pounds. Although the OH-6 has an overload capability of 1537 pounds, it cannot be expected to carry continuously the 537 pound overload in the RVN high density altitude. The basic weight includes the empty aircraft, trapped fuel and oil, and normal operating equipment (including communication equipment), safety belts, seat cushions, and shoulder harness. The basic weight does not include crew, fuel and oil, armament and ammunition, armor plating or individual and survival equipment. The design maximum gross weight for the OH-6 is 2,163 pounds; the overload maximum gross weight is 2,700 pounds.

(2) The load allowable in the OH-6 against the overload

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and design maximum gross weight follows:

	<u>Overload Max Gross</u>	<u>Design Max Gross</u>
Maximum weight	2,700	2,163
Less basic weight	<u>1,163</u>	<u>1,163</u>
Allowable Load	1,537	1,000

(3) The load desired, from the preceding, is:

<u>Source</u>	<u>Item</u>	<u>Weight (pounds)</u>
Para 4a	Armament (XM-21)	1,172
Para 4b	Individual and survival equipment	37
Para 4c	Crew and component armor	164
Para 4d	Fuel	400
Para 4e	Crew	<u>400</u>
		2,173

(4) Contrasting the load desired against the load allowable, the OH-6 will not carry the desired load in either configuration.

<u>Source</u>	<u>Overload Max Gross</u>	<u>Design Max Gross</u>
Para 4e(2)	1,537	1,000
Para 4e(3)	2,173	2,173

(5) It will be noted that the OH-6 helicopter cannot carry the load which users in Vietnam identify as "essential." The OH-13S now carries less armament than scout helicopter aviators consider essential, so they seek significant improvement in the replacement helicopter. The major variance is that the OH-6 does not include the armament the scout helicopter pilots believe to be required. The XM-27 will not provide the duration of fire desired and has no rocket capability.

5. (C) CONCLUSIONS

a. The aero-scout must be capable of self-defense and enemy containment during light engagements.

b. The armament subsystems mounted on the aero-scout helicopter should provide a 2.75-inch rocket as well as a 7.62mm machine-gun capability.

c. The machinegun firing time capability of an aero-scout should be between two and three minutes duration.

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d. The 2.75-inch rocket system of an aero-scout should provide 14 rockets (seven per pod) of various types with selective firing capability.

e. The individual and survival equipment should include a .38 caliber revolver with 30 rounds for the pilot, an M16 rifle with seven magazines for the observer, two rations, one "Survival Seven" pencil flare gun, one survival radio, two individual survival kits with compass, two bottles of insect and leech repellent, one machete with scabbard, and two smoke grenades.

f. The aero-scout helicopter requires sufficient fuel for a minimum of two hours of flight plus a 30-minute reserve. Any such helicopter will probably, in Vietnam, begin each mission with full tanks.

g. The aero-scout helicopter should have armor protection to protect vital components.

h. Both the OH-13S and OH-6 helicopters are incapable of carrying the load deemed essential for scout helicopters in RVN.

## (C) RECOMMENDATIONS

a. The list of essential items for loading in scout heli- (incl 1) be established as a standard.

b. The essential loads of scout helicopters be continuously monitored by commanders for identification and elimination of non-essential items.

c. The ability of the OH-6 to carry the essential load be monitored closely when that aircraft is introduced into RVN. (incl 1) be established as a standard.

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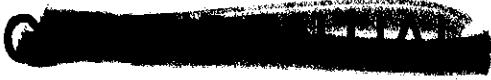
## (C) RECOMMENDED ESSENTIAL LOADS FOR A SCOUT HELICOPTER IN RVN

<u>Quantity</u>	<u>Item</u>	<u>Weight (pounds)</u>
1	XM-21 armament subsystem	
	External stores	
	2 gun mounts, chuting, rack assemblies, 2 pods, 14 FFAR's and two XM-134 machineguns	648.32
	Internal stores	
	Sighting station, control panel, 12 ammo boxes, ammo box rack, 2 boosters, gun control box, and 6000 rounds of 7.62mm linked ammunition	523.90
	Sub Total	<u>1172.22</u>
1	.38 cal revolver (pilot) w/30 rounds ammo	2.5
1	M16 rifle (observer w/7 clips - 20 rounds ammo ea)	12.0
2	Rations	10.5
1	Radio, URC-10	3.9
1	"Survival Seven" pencil flare gun	.5
2	Survival kit, individual w/compass	2.5
2	Insect and leech repellent (bottles)	.4
1	Machete, w/scabbard	2.3
2	Grenades, smoke	2.5
2	Seat, armor (pilot and observer)	91.0
2	Chest protector (pilot and observer)	20.0
	Sub Total	<u>145.6</u>
	<b>TOTAL</b>	<b>1317.82</b>

Incl 1

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