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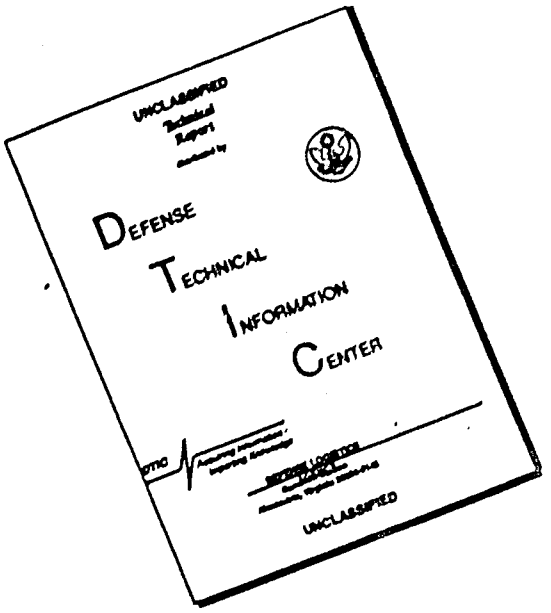

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DEPARTMENT OF THE ARMY
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AGDA (M) (12 Aug 69) FOR OT UT 692155 19 August 1969

SUBJECT: Operational Report - Lessons Learned, Headquarters, 7th Squadron, 17th Cavalry, Period Ending 30 April 1969 (U)

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1. Subject report is forwarded for review and evaluation in accordance with paragraph 5b, AR 525-15. Evaluations and corrective actions should be reported to ACSFOR OT UT, Operational Reports Branch, within 90 days of receipt of covering letter.

2. Information contained in this report is provided to insure appropriate benefits in the future from lessons learned during current operations and may be adapted for use in developing training material

BY ORDER OF THE SECRETARY OF THE ARMY:

Kenneth G. Wickham

KENNETH G. WICKHAM
Major General, USA
The Adjutant General

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  7th Squadron, 17th Cavalry

DEPARTMENT OF THE ARMY
HEADQUARTERS 7TH SQUADRON 17TH CAVALRY
APO SAN FRANCISCO 96262

AVBACB-GC

15 May 1969

SUBJECT: Operational Report of Headquarters, 7th Squadron, 17th Cavalry for Period Ending 30 April 1969, RCS CSFOR-65 (R1) (U)

SEE DISTRIBUTION

1. (C) Section 1 Operations: Significant Activities.

a. (U) General.

(1) This report covers the period 1 February 1969 through 30 April 1969, and is submitted in accordance with AR 525-15, USARV Regulation 525-15, and 17th CAG Regulation 525-15.

(2) The mission of the 7th Squadron, 17th Cavalry is to perform reconnaissance and to provide security for the 4th Infantry Division or its major subordinate combat elements; to engage in combat as an economy of force unit, and to provide limited air and ground anti-tank defense for the division. When directed by IFFV, the squadron may detach one or more troops to support other major combat elements in the II Corps Tactical Zone.

(3) Organizational Structure. The Headquarters, 7th Squadron, 17th Cavalry is located at Camp Enari, Dragon Mountain, RVN, and is commanded by LTC Calvin R. Bean. The squadron has its full complement of cavalry troops as per TOE 17-95T, and is currently OPCON (minus B and C Troops) to the 4th Infantry Division, Camp Enari, Dragon Mountain, RVN. Troop B is OPCON to Task Force South. Troop C is OPCON to the 173rd Airborne Brigade.

(a) Headquarters and Headquarters Troop, Camp Enari, Dragon Mountain, RVN, is equipped with five UH-1H helicopters. This troop is organized IAW MTOE 17-98T.

(b) Troop A, Camp Enari, Dragon Mountain, RVN, is equipped with AH-1G, OH-6A, and UH-1H helicopters and organized IAW MTOE 17-98T. The 568th MD Det and the 288th RL Det provide DS maintenance and avionic support to the troops.

(c) Troop B, Phan Thiet, RVN, is equipped with AH-1G, OH-6A and UH-1H helicopters and is organized IAW MTOE 17-98T. The 569th MD Det and the 414 RL Det provide DS maintenance and avionics support to the troops.

(d) Troop C, Lane AAF, An Son, RVN, is equipped with AH-1G, OH-6A, and UH-1H helicopters and is organized IAW MTOE 17-98T. The 412th MD Det and the 238th RL Det provide DS maintenance and avionics support to the troops.

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(c) Troop D, Camp Enari, Dragon Mountain, RVN is a standard wheel vehicular mounted ground cavalry troop organized IAW MTOE 17-99T.

(f) During this reporting period there was only one significant change in the tactical structure of the squadron. Troop C was assigned OPCON 173rd Airborne Brigade on 17 April 1969.

b. (C) Personnel.

(1) During the reporting period the following major changes in command and staff positions occurred:

(a) LTC Calvin R. Bean, 084900, assumed command of 7th Squadron, 17th Cavalry on 15 March 1969 replacing LTC Robert M. Reuter, 070225.

(b) MAJ William T. Glover, 02291685, assumed command of Headquarters and Headquarters Troop on 25 Feb 69 replacing MAJ Willard D. Conklin, 079567.

(c) MAJ Scott T. Lyman, 01937913, assumed command of B Troop on 5 Mar 69 replacing MAJ James A. McCracken, 05301776.

(d) MAJ Richard H. Marshall, 081697, assumed command of A Troop on 25 Feb 69 replacing MAJ William T. Glover, 02291685.

(e) MAJ Thomas L. Martin, 05401932, assumed duties of Squadron S-3 on 25 Feb 69 replacing MAJ Richard H. Marshall, 081697.

(f) MAJ James A. McCracken, 05301776, assumed duties as Squadron Executive Officer on 5 Mar 69, replacing MAJ Scott T. Lyman, 01937913.

(g) CPT Robert D. Bruegger, OF107560, assumed command of D Troop on 11 Feb 69 replacing CPT David M. Hennessy, 05240766.

(h) CPT Wayne E. Overturf, 05247673, assumed duties of Squadron S-2 on 6 Apr 69 replacing CPT Michael W. Hodge, 05240786.

(i) CPT Howard M. Newhouse, 02299940, assumed duties as Squadron S-4 on 16 Feb 69 replacing CPT Paul M. Roberts, 05328628.

(j) SGM Robert M. Couch, RA34913502, assumed duties as Squadron SGM on 2 Apr 69 replacing SGM Billy W. Lightfoot, RA14337393, who was medevaced on 14 Mar 69.

(2) The following are personnel occupying major command and staff positions:

(a) Squadron Commander LTC Calvin R. Bean

(b) Squadron Executive Officer MAJ James A. McCracken

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(c)	S-1	MAJ Roger D. Winslow, Jr.
(d)	S-2	CPT Wayne E. Overdorf
(e)	S-3	MAJ Thomas L. Martin
(f)	S-4	CPT Howard M. Newhouse
(g)	Chaplain	CPT Clarence M. Brooks
(h)	Signal Officer	CPT William T. Hunt, Jr.
(i)	Flight Surgeon	CPT David Wallack
(j)	Safety Officer	CPT Charles B. Murphy
(k)	Maintenance Officer	MAJ Frank R. Meegan
(l)	CO, Headquarters Troop	MAJ William T. Glover
(m)	CO, A Troop	MAJ Richard H. Marshall
(n)	CO, B Troop	MAJ Scott T. Lyman
(o)	CO, C Troop	MAJ Jerry G. Ledford
(p)	CO, D Troop	CPT Robert D. Bruegger
(q)	Squadron Sergeant Major	SGM Robert M. Couch

(3) Unit strength and miscellaneous related data is attached at inclosure 1.

c. (C) Intelligence.

(1) During the reporting period the S-2 Section initiated and validated:

Confidential Clearances -- 2
Secret Clearance Validations -- 119
Top Secret Clearance Validations -- 10
Secret Clearances Initiated -- 9
Top Secret Clearances Initiated -- 6
Security Debriefings upon PCS or Separation -- 24

(2) Intelligence Summary for the 4th Infantry Division's operations supported by the 17th Cavalry:

(a) Kontum. Kontum experienced an increase in enemy activity. Enemy initiated incidents centered around three basic areas: Ben Het, Plei Trap

Road, and Polei Kleng. The Ben Het Special Forces camp was the object of intense attacks by fire during February. Ben Het also received a coordinated armor and infantry attack on 3 March 1969, which resulted in the destruction of two Russian built PT 76 tanks. This was the first recorded armor attack in the Highlands. The first report of armor activity was in November 1968 when 7-17 Cav spotted an armor vehicle in the area. After the attack on 3 March, Ben Het was attacked by fire from elements of the 40th NVA Arty Regt. 85mm artillery and possible 105mm Howitzer were employed in the attacks. The Plei Trap road system was used extensively by vehicular traffic. New roads were discovered throughout the area. Construction of the roads, fortifications, and weapons positions was accomplished by the K25A and K25B Engr Bns. On 2 March, 7-17 Cav identified and damaged a CAZ 63 truck that was later captured by elements of the 4th Inf Div. A total of 9 trucks were identified in the area by 7-17 Cav. All nine trucks were either destroyed or damaged by US forces. Enemy forces attempted to establish a supply-base area 20-25 Km WNW of Polei Kleng. The Plei Trap road was the main infiltration and supply route used. Friendly troops occupied firebases surrounding the road system and with the aid of B-52 strikes successfully interdicted the enemy's infiltration and resupply. US firebases received heavy attacks by fire, including 105mm artillery fired from positions inside Vietnam. 7-17 Cav identified 5 of the 9 X 105mm artillery guns that were destroyed or captured by US Forces during the period. In the Polei Kleng area, the approach of regimental size enemy forces through the lower Plei Trap and the Chu Pa area became evident by late January. The enemy apparently planned to attack Polie Kleng SF Camp, or possibly Kontum City, with multi-battalion size forces from the 66th and 24th NVA Regts. To deny the enemy access to his objectives, friendly forces were inserted into firebases 10-15 Km, W, S and SE of Polei Kleng. US elements S and SE of Polei Kleng remained in moderate contact throughout February and effectively prevented enemy forces from moving east toward Kontum City. Elements of the 24th Regt, after harassing Hwy 14 along the Kontum-Pleiku border, moved south into Pleiku Province in late February. US Forces on firebases W and SW of Polei Kleng were attacked by fire throughout February and March. However, the 66th Regt was blocked and its activity was restricted to a company size attack on Polei Kleng on 4 March. Enemy battalion size forces withdrew to base areas 25 Km SW of Polei Kleng. Friendly forces pursued, occupied firebases farther W and blocked enemy exfiltration. Heavy contact was made during the first week of March and April. The 66th Regt suffered heavy losses from ground action, airstrikes, helicopter gunships, and B-52 strikes. Elsewhere in Kontum Province, action centered around Kon Horing village, with sporadic action along Hwy 14 N of Kontum City. Enemy forces avoided military installations in this area, but conducted up to battalion size attacks on lightly defended villages along Hwy 14 SE of Dak To. Hardest hit was Kon Horing which was attacked by the 304th LF Bn on 23 and 25 February. Kon Honong, Dien Binh and Tanh Canh also received attacks. The enemy forces involved were the 304th LF Bn, 5th Bn/24th Regt, and the K20 Sapper Bn, with probable support from the 33d Bn/40th Arty Regt. Other action included mining and ambushes along Hwy 14, 10-15 Km NW of Kontum City. These were probably conducted by the 304th LF Bn, 5th Bn/24th NVA Regt, and elements of the K25B Engr Bn. The most effective operation was a sapper at-

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tack conducted by elements of the 37th Sapper Bn against the 584th Engr compound at Tan Phu on 23 March.

(b) Pleiku. Activity was moderate in the Pleiku Province throughout the reporting period. The 24th NVA Regt operated throughout Northern Pleiku Province, and other sapper, local force, and artillery units continued to operate in their traditional operation areas. The only coordinated offensive effort was the Spring Phase of the Winter-Spring offensive which was initiated on 23 Feb 1969. With the conclusion of heavy fighting in the Chu Pa Mountain area in early February, the 24th Regt moved across the Se San River to resupply in the southern Plei Trap Valley. After receiving supplies and replacements, the regiment moved across northern Pleiku Province and positioned itself east and west of Highway 14. The K-5 Bn, 24th Regt moved north of Kontum City, while the K-4 and K-6 Bn's conducted harassment along Hwy 14. During early April, the 24th Regt returned to the southern Plei Trap area. It is anticipated that it moved west to Base Area 702 in Cambodia. Throughout the reporting period Viet Cong local forces have harassed friendly units in the area west of Pleiku City between Hwy 509 and 19. Harassment consisted of small arms and RPG-2 fire. Large amounts of rice and other equipment were uncovered by US and CSF units sweeping the area. Elements of the K-31 Arty Bn harassed allied installations in the Pleiku City-Camp Enzi area with rocket, mortar, and recoilless rifle attacks conducted in conjunction with ground probes by squad to platoon size sapper units. The only enemy artillery attacks in Pleiku Province were reported in the Duc Co area during February and March. These artillery attacks were harassing in nature and were not followed by any ground effort. During April, in southern Pleiku Province, 7-17 Cav acting on information provided by CI Section, 4th MI Det, found and destroyed VC District Three Headquarters, along with several infiltration way stations and rest areas.

(c) Darlac. Enemy activity during February was characterized by small scale contact and standoff attacks. Enemy elements located in the area were of battalion size or smaller. Ban Me Thuot was subjected to several attacks by enemy forces utilizing 75mm RR, 60mm mortar, 82mm mortar, and 122mm rockets. The units believed responsible for these attacks were the K-34 Arty Bn, and the K-39 Inf Bn. The 301st LF Bn was believed to be guiding infiltration groups across northern Darlac Province. The 401st LF Bn was believed to be in vic of the Mewal Plantation. During April, CSF elements at Ticu Attar made contact with NVA forces infiltrating through northern Darlac Province. Friendly forces were moved into the area to block the infiltration routes. Contact with enemy forces was light to moderate as the infiltration forces attempted to avoid contact. Two companies of the 1063 Infiltration Group were identified. Captured documents mentioned the existence of Infiltration Groups 1062, 1063, and 1064. The 12th and 19th Regts were mentioned in conjunction with these infiltration groups; however, these are believed to be training regiment designations.

d. (C) Operations. (Operational statistics attached at inclosure 2)

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(1) Units Supported: (Number of Days)

(a) General.

UNIT	4th INF DIV	TF SOUTH	173 ABN	B-23 SFG
HHT	89	---	---	7
TRP A	82	---	---	7
TRP B	---	89	---	---
TRP C	75	---	14	---
TRP D	89	---	---	---

(6) 4th Infantry Division.

UNIT	1st BDE	2d BDE	3d BDE	SQDN (-) DIV CTL*	OTHER	MAINT DOWN
TRP A	39	20	8	8	7	7
TRP B	--	--	--	--	--	14
TRP C	17½	29	3½	8	21	10
TRP D	1	--	18	7	49	14

* NOTE: The Squadron operated a total of 33 days on Squadron (-) missions as follows: Division Control, 12 days; 1st Brigade Control, 7 days; 3d Brigade Control, 14 days.

(2) Operations.

(a) The 4th Infantry Division's general operations plan is Operation Hines. The Sqdn (-) provided support for subordinate operations.

(b) Operation Putnam Panther. This was a Search and Clear Operation controlled by the 2d Bde, 4th Inf Div. Normally, the Squadron provided reconnaissance and security. During the period of this report, Troop A was committed 20 days and Troop C was committed 30 days to provide support for the operation.

(c) Operation Wayne Gray. This Search and Destroy operation was the most significant operation this Squadron participated in during this reporting period. An After Action Report of this operation is attached at Inclosure 3. The units of this Squadron participated in this operation as follows: Troop A, 33 days; Troop C, 19 days; Troop D, one day. Normally, the Squadron was tasked to provide one and on occasion two air cavalry troops each day to support the operation. The Squadron assets were committed to support the operation under Squadron control a total of five days.

(d) Operation Greene Purple. This was a search and destroy operation conducted by the Squadron (-) under OPCON of the 3d Bde, 4th Infantry Division. The After Action Report for this six day operation is attached at Inclosure 4.

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(3) Attachments and Detachments.

(a) On 25 April 69 Troop A was assigned OPCON to B-23 SFG for the remainder of the reporting period.

(b) Troop B has been OPCON to Task Force South since September 1968. An After Action Report of Troop B operations during the reporting period is attached at Inclosure 5.

(c) Troop C was assigned OPCON to the 173rd Airborne Brigade on 15 April 1969. Duration of the OPCON is estimated to be for a period of six to nine months.

(d) Troop D was OPCON to 2-1st Cav during the period 23 March - 1 April 69, OPCON to 2-35th Inf 21-23 April 69, and OPCON to 1-10th Cav 29-30 April 69.

(e) On 12 April, one Lift Section from A/4th Bn was OPCON to the Squadron.

(f) On 15 April, D/1-10 Cav (- ARP), A/2-35 Inf, D(-)/2-35 Inf, 1/A/5-16 Arty and two Lift Sections A/4th Avn Bn were OPCON to the Squadron. Duration of OPCON of D/1-10 Cav and the Lift Sections was one day. All other units were OPCON to the Squadron for six days.

(g) On 21 and 22 April, D/1-10 Cav (Reinf), and four squad carriers and one flare ship from the 4th Avn Bn, were OPCON to the Squadron.

(h) On 24 April, D/1-10 Cav was OPCON to the Squadron.

(i) During the period 25-29 April, C/1-10 Cav and D/2-1 Cav were OPCON to the Squadron.

(4) Armor Defeating Munitions Test. Due to the enemy armor threat in the Central Highlands, the Squadron has the mission of employing organic armed helicopters in an anti-tank role. Because no immediate data was available describing the effectiveness of the 2.75" rocket as an anti-tank defeating system, the Squadron initiated, planned, and conducted a firing test of the ammunition. The initial results of a series of tests were included in the ORLL, this headquarters, dated 10 February 1969. Test results indicated the 10 and 17 pound HEAT warheads with point detonating (PD) fuzes were effective armor defeating munitions. The 17 pound HE warhead was not effective against armored vehicles. A final report is attached at inclosure 6.

(5) 40mm Grenade Proximity Fuse (VT) Test. The Squadron was directed by CO, 17th CAG to plan and conduct a series of tests of the 40mm grenade with VT fuse to validate a one-to-one ratio of VT and PD for use in the Central Highlands, and to test fire the VT fuses in the XM28 subsystem mounted on the AH-1G. It was determined after firing approximately 1300 rounds of VT fuzed 40mm rounds in the XM28 subsystem that the round is 100% compatible with the

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armament system. It was recommended that a one-to-one mix of 40mm VT and PD fuzes would provide maximum effectiveness in the Central Highlands. The test results are attached at inclosure 7.

e. (U) Training.

(1) The AARTS Program: The Squadron made maximum use of AARTS allocations available through 17th CAG. These schools proved to be extremely valuable and highly beneficial to the Squadron's maintenance program. Breakdown of allocations is included in inclosure 8.

(2) Generator Training: On 2 and 5 March 1969, Mr. Elmore, DAC, USARV Engineer Section, presented classes to 26 selected generator operators on the 1.5 kw, 5 kw and 10 kw generators. The instruction covered proper operation procedures and operator maintenance. As a result of the instructions the deadline rate of generators dropped from 35% to 9% within 20 days.

(3) Aviation Training: (See inclosure 8)

(4) Special Training:

(a) In April, two individuals attended the Projectionist School at Long Binh, RVN.

(b) During the period, a total of 18 personnel graduated from the 4th Infantry Division Pre-Recondo School.

(c) In April, two individuals completed the 4th Infantry Division Sniper Course.

(d) In April, three individuals attended the Avionics Equipment Mechanics Course at Vung Tau, RVN.

f. (C) Logistics.

(1) Supplies:

(a) Class I-Rations for the Squadron were drawn daily from 88th Stock Control, and issued to the individual troops by the Squadron S-4.

(b) Class II-Supplies were requisitioned from the 88th Stock Control in Pleiku, RVN.

(c) Class III-POL was handled in two parts. Package POL was requisitioned through 88th Stock Control on a normal requisition and held in the S-4 yard for issue to the troops. Mogas and diesel were not handled by the S-4. All JP-4 was requisitioned telephonically as needed by the S-4.

(d) Class IV-Construction was requested through the 4th Infantry Division Engineers and PA & E.

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(e) Class V-Ammunition was requisitioned from the 88th Stock Control. The ammunition was stored in the Central Ammunition Storage Area (CASA) and at the Squadron re-armament point. Ammunition was supplied to the troops on request.

(f) Class VIII-Medical material was requested through the 4th Infantry Division Medical Officer.

(g) Requisitions submitted during this period:

Non-Expendable - 211
Requisitions completed - 31
Requisitions cancelled - 30
Turn-Ins made - 99

(h) A reconciliation of all outstanding requisitions with the 88th Stock Control was conducted each month.

(i) Report of Surveys submitted to higher headquarters - 17

(j) Combat losses submitted to higher headquarters - 20

(2) Aircraft Maintenance (See Inclosure 9)

g. (U) Organization. No change since last ORLL.

h. (U) Civic Action.

(1) General: During the quarter the CA team participated in two major village consolidations. The villages of La Son (AR817376) and Plei Poo Ngo (AR803366) were assigned to Squadron and the village of Plei Do ([illegible]) was lost. Efforts during the quarter were concentrated on educational, health and recreational facilities for the people.

(2) Operation and Training Activities: During the months of February and March, the CA teams in Blue Sector moved the villages of Plei [illegible], Plei Cham Bon, and Plei Cham Ngol to the vicinity of the village of Plei Cham Prong. This consolidation was called Blue #2. In the new village of La Son (AR817376) a dispensary was constructed, recreational facilities were almost completed, and the villagers were vaccinated for plague. Repair of the school house in Plei Poo Ngo (AR803366), construction of a house for the school teacher, and a medcap shelter have been the major projects in this village.

(3) Logistics: Most of the building materials were donated by the Squadron.

(4) Civil Affairs: The following is a list of projects completed during this quarter:

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(a) Six villages moved to new locations.

(b) DDT spraying.

(c) Plague vaccination.

(d) Dispensary construction.

(e) School house repair.

(f) Recreational facilities construction.

(g) Main village gates repaired.

i. (U) Signal and Message Center Operations.

(1) During the quarter, the total messages sent and received increased 4% and total messages couriered increased 3% over the previous quarter. These slight increases represent an average of one message per day. A detail list of statistics is included in inclosure 10.

(2) Switchboard operations indicated an average decrease of 10 calls per day. This decrease is largely attributed to the installation of the Camp Enari dial system on 21 March 1969. The dial system will have a greater impact on the tactical switchboard operation when all programmed circuits are in service. A 100 pair cable will be installed within the Squadron area to provide additional service and should be completed during the next quarter. Statistics on switchboard operations is included, in inclosure 10.

j. (U) Medical Section. (Statistics attached at inclosure 11)

(1) Patient visits at the 7-17 Cavalry Squadron Aid Station decreased from 20.6% during the quarter as compared to the previous quarter. Factors that might be involved in this patient load decrease were more troops away from base camp for greater periods with initial medical treatment supplied by other facilities; general good health of the command; and, seasonal variation.

(a) There was a 55.5% decrease in the number of immunizations given during the quarter. During the previous quarter a great effort had been made to bring many delinquent shot records up to date and thus most of these troops will not need shots again until the next quarter. Troops not stationed at Camp Enari were immunized at their present base camps.

(b) There was a 23.2% decrease in the incidence of venereal disease during the quarter. Increased command interest at the Troop level and factors cited previously contributed to this improvement.

(c) The incidence of cases of malaria initially seen at this aid station increased from five to six during the quarter. This change was not statistic-

ally significant. What was significant was that the injob unit at Camp Enari (the 4th Infantry Division) continued to have an incidence of about 100 cases/1000 troops/year, while the Squadron rate remained about 24 cases/1000 troops/year.

(d) The incidence of hepatitis decreased from two cases during the previous quarter to none during this quarter. The change was not statistically significant. Statistics for the quarter are attached as inclosure 12

(2) During the quarter this Squadron lost the services of seventeen of its infantrymen in the Aero-Rifle Platoons for periods of three weeks or greater because of lower limb injuries sustained during helicopter insertions. The majority (75.6%) of the injuries involved severe fibular collateral ligament strains. Other injuries included one each of an avulsion fractures fracture of the oscalcis, fracture of the first metatarsal, and a tibial collateral ligament strain. Sixteen of these injuries required the use of a walking cast for at least three weeks and the loss of the infantryman for at least four weeks. Their loss was especially damaging because there has been a critical shortage of members with infantryman's MOS. The source of these injuries was traced to their insertion into poorly prepared LZ's from UH-1H helicopters that were unable to land and discharge their passengers. Frequently the troops jumped from helicopters that were hovering at heights of two to twelve feet. The resulting injury occurred if the man did not land squarely on both feet on level ground. From a sufficient height even a small hole or a small mound of earth contributed to injury, especially when the trooper is fully combat-loaded.

(3) The Squadron aid station continued to support the Squadron's Civil Affairs Team. A medic accompanied the Team every day and the flight surgeon joined them at least twice weekly. The Squadron's area of interest changed from the Montagnard village of Plei Do to the Vietnamese village of La Son and two near by Montagnard hamlets. A well-equipped dispensary was built at La Son and was the center of the Team's activities. The Squadron's goals were aimed primarily at preventive medicine (Immunizations are given by a MILPHAP Team), initial basic medical care, and referral to the appropriate medical or dental facility when required.

k. (U) Accident Prevention.

(1) The accident rate (per 100,000 flight hours) was 37.14 for this quarter. The accident rate for the last quarter was 43.96. This shows a decrease in accident rate of 6%.

(2) Accident rate statistics for this quarter are as follows:

Month	Total Flying Hours	Number of Accidents	Rate
Feb	5456	1	18.32
Mar	5499	3	54.56
Apr	5194	2	38.50

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Month	Total Flying Hours	Number of Accidents	Rate
	1614.9	6	37.14

(3) Accident Summary for Quarter by Months

(a) February: One accident

11 Feb 69, OH-6A, A/C #67-16305, Major: Pilot was hovering down wind out of ground effect and A/C started yawing to the right. Pilot lowered collective, and the tailboom struck a tree. Pilot error was the established cause factor. The pilot was operating behind the power curve.

(b) March: Three accidents

1. 10 Mar 69, OH-6A, A/C #67-16003, Major: Pilot flew aircraft until the fuel was exhausted, autorotated, and executed an unsuccessful landing resulting in severence of the tail boom. Pilot error was the established cause factor.

2. 13 Mar 69, AH-1G, A/C #67-15630, Major: Cyclic control was partially frozen in aft position and this resulted in a critical loss of the pilot's control of the aircraft. Pilot made an emergency landing in a river bed which resulted in a hard landing and major damage to the aircraft. Investigation revealed material failure of the bearing housing and/or bearing housing nut of the fore and aft cyclic servo assembly pending analysis.

3. 25 Mar 69, AH-1G, A/C #67-15611, Major: Aircraft began to yaw to the right at a hover, and the pilot attempted a hovering autorotation which resulted in a hard landing and major damage to the aircraft. Pilot error was established as the primary cause factor. The pilot was hovering down wind with a wind velocity of 14 knots with gusts to 21 knots. A contributing cause factor was a density altitude of 5042 feet.

(c) April: Two accidents

1. 1 Apr 69, AH-1G, A/C #67-15620, Major: Cyclic control was partially frozen in aft position and this resulted in a critical loss of the pilot's control of the aircraft. The pilot made an emergency landing on the beach which resulted in a hard landing and major damage to the aircraft. Investigation revealed material failure of bearing housing nut of the fore and aft cyclic servo assembly pending analysis.

2. 13 Apr 69, AH-1G, A/C #67-15624, Major: Pilot was initiating take-off when the aircraft began to yaw to the right. The pilot continued take-off in the direction the aircraft was headed. RPM began to bleed off and the aircraft fell through from an altitude of 25-30 feet. To avoid collision with a building, the pilot pulled pitch and then flared to avoid landing in the Bao Loc ammo dump. The pilot was unable to cushion the aircraft adequately

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and this resulted in a hard landing and major damage to the aircraft. An established cause factor was the fact that the pilot did not use the -10 procedure to compensate for loss of directional control. Material failure of the engine is unknown pending analysis.

1. (U) Religious Activities:

(1) The Chaplain conducted services at Camp Enari, Phan Thiet, Lane Airfield, and Ban Me Thuot.

(2) The following programs were initiated:

(a) A Friday evening prayer group.

(b) Sunday morning services were changed from 1015 to 0915 so the Chaplain would have more time during the remainder of the day to conduct services in the various staging areas in which the units were operating.

(3) The Chaplain attended the monthly 17th CAG Training Conferences at Nha Trang.

(4) The Chaplain made arrangements at Lane Army Airfield for Chaplain coverage for Troop C.

(5) The program started last quarter of writing to parents and the churches of new personnel, after the Chaplain had met with each, has proven to be of great value. The Chaplain has received many letters of appreciation from parents and wives. Some local churches have also responded in a favorable way. This activity is not only a ministry to the soldiers here, but also to his parents or wife at home. The Chaplain discovered that this is a good method of public relations, and improves our image at home. Public opinion can be greatly influenced when concern is expressed toward one's family.

(6) Statistical information is attached at inclosure 12.

(7) The Chaplain's philosophy of area coverage is attached at inclosure 13.

2. (C) Section 2, Lessons Learned: Commander's Observations, Evaluations and Recommendations.

a. (U) Personnel. Request for Article 27 Counsel.

(1) OBSERVATION: In Special Court Martial cases, the accused exercises his right to request counsel in the sense of Article 27, a JAG Officer.

(2) EVALUATION: Supreme Court decisions have modified the warning given an accused under Article 31. All accused/suspected personnel are now advised of their right to an attorney. If the accused requests Article 27 counsel, the request must be processed through the chain of command to the General

Court Martial Convening Authority. Normally a letter is used to forward the request. Experience has proven that four to eight weeks elapse before a reply is received. From the trial counsel's standpoint, delay of this duration can adversely effect the results of the case. Witnesses forget the exact circumstances in a case and some of the witnesses are lost to DEROS, emergency leave, infusion, and occasionally death. Units may process requests for Article 27 counsel by TWX. TWX replies are usually obtained within hours and court action can be expedited.

(3) RECOMMENDATION: That requests for Article 27 counsel be forwarded by TWX.

(4) COMMAND ACTION: This process has been implemented within this Squadron.

b. (C) Operations.

(1) Night Combat Assault.

(a) During operation GREENE LION, a successful night insertion coordinated with the movement of ground troops was found to be highly effective. Careful preparation and coordination were necessary to perform such an operation. These preparations included developing a simple yet detailed OPLAN, a thorough OPORD briefing, a timed sequence of events, and an air movement plan.

(b) Several lessons and techniques were learned in marking of LZ's, illumination of LZ's and target areas, and staging area procedures. A detail description of the operation is attached at inclosure 14.

(2) Effective Employment of the Air Cavalry Squadron:

(a) OBSERVATION: During this quarter, several successful operations were conducted by this Squadron. The Squadron habitually required as a minimum two Air Cavalry Troops and one ground cavalry troop to be effective.

(b) EVALUATION:

1. See Operation WAYNE GRAY (inclosure 3). During the period 27 March through 3 April, Squadron operation required employment of two air cavalry troops.

2. See Operation GREENE PURPLE (inclosure 4). During the period 15 April through 20 April, Squadron operations were conducted using two air cavalry troops, one ground cavalry troop, and one infantry company. The operation was highly successful.

(c) RECOMMENDATION: That all organic elements of the Squadron be placed under the command of the Squadron, the Squadron habitually be employed as an integral unit and under no instances more than one air cavalry troop be de-

tached or placed under the operational control of another headquarters.

(d) COMMAND ACTION: A staff study dealing with the employment of this Squadron is being prepared and will be distributed to interested headquarters.

c. (U) Training. A staff study on aviator training deficiencies is being prepared and will be submitted at a later date.

d. (U) Intelligence. None.

e. (C) Logistics.

(1) Utilization of Sling Loads.

(a) OBSERVATION: The use of slings and netting for resupply and movement of material has not been a common practice of the Squadron.

(b) EVALUATION: During Operation GREENE PURPLE vicinity of Phu Nhon, the S-4 borrowed slings and cargo nets from elements of the 4th Inf Div to use for resupplying the Squadron Task Force. One of the primary considerations for using the slings and nets was the requirement to use hastily prepared and small LZ's in the vicinity of the ground elements. This method of resupply, as compared to loading the resupply ships internally, reduced the resupply time by 75%. The overall effectiveness of the task force was greatly enhanced. Headquarters Troop helicopters are used primarily for resupply missions.

(c) RECOMMENDATION: That slings and cargo nets be used where practical to gain valuable time during resupply to conserve flying hours on the resupply helicopters and reduce exposure of resupply helicopters located in unlisted landing zones.

(d) COMMAND ACTION: The S-4 has obtained slings and cargo nets on temporary loan to insure the Squadron of an external load carrying capability. Also, the pilots of the Hq Troop Aviation Platoon had received additional training in techniques of flying with external loads.

(2) Planning Logistical Support for Squadron (-) Operations.

(a) OBSERVATION: In the initial phase of operations in a new AO, the Squadron always has enough foresight to establish a refuel-rearm point for the Squadron's anticipated requirements. Experience has shown, without exception, other elements using the same staging area have never used the initiative to plan ahead for resupply of Class III A and V; therefore, they depend upon the Squadron's refuel-rearm points for assistance. Whithin a short span of time this assistance becomes a burden on the Squadron and does materially degrade Squadron operations.

(b) EVALUATION: The above observation is best exemplified in considering Operation GREEN QUEEN, at Ban Blech. The Squadron was OPCON to the 3rd

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Bde, 4th Inf Div and moved to Ban Blech to develop the situation between Ban Blech and Tieu Atar. The Squadron immediately dispatched a convoy to Ban Blech which included Class III A and Class V and programmed additional follow-on resupply to meet the requirements anticipated in the proposed 3-5 day operation. By the time the Squadron had the refuel-rearm point established on the airstrip at Ban Blech, the 3d Bde was tasked to airlift an infantry battalion with supporting artillery into the area. No one, except the Squadron, had anticipated or planned resupply requirements. The volume of fuel used by the Chinooks working in the AO soon exhausted the fuel supply. Eventually, the 3d Bde was able to establish its refueling capabilities by using the Squadron POL personnel, pumps, filter-separators, reducers and 5-ton wrecker.

(c) RECOMMENDATION:

1. During the planning phase of any operation involving helicopters, one of the first considerations be the planning for refueling and rearming requirements in the initial stages of the operation.

2. The responsible headquarters be advised of all elements operating, or anticipated to be operating from the staging area, the resupply capabilities of these units, and the logistical support that will be required by the units.

3. When more than one Aviation battalion and this squadron are programmed to operate from a forward staging area, 17th CAG either designates one of these elements as the responsible Aviation Headquarters or preferably, establish a forward command post at the staging area to control and coordinate logistical requirements.

(d) COMMAND ACTION: The Squadron now requests a listing of elements staging from the same area as the Squadron and coordinates with those elements to preclude, if possible, degradation of squadron capabilities due to logistical short falls.

f. (U) Organization: None.

g. (U) Safety: Safety hazard on AH-1G Aircraft Cyclic Service Assemblies.

(1) OBSERVATION: Investigations of two recent accidents of AH-1G aircraft revealed that the bearing housing nut was parting from the bearing housing on the fore and aft hydraulic cylinder assembly.

(2) EVALUATION: Due to the separation of the bearing house nut from the housing assembly, severe cyclic control problems were encountered which resulted in major damage to two aircraft.

(3) RECOMMENDATION: That purging requirements be increased to 25 hour intervals in sandy areas; that during 100 hour inspections the bearing housing nut be backed off and the threads inspected for wear, and that two (2)

heavier, lock wires be used on the nut.

(4) COMMAND ACTION: All aircraft in this unit were checked for worn threads in the bearing housing nut and the nut is now adjusted so that 5 pounds force applied at rod-end bearing is required to move the cylinder laterally. The frequency and the amount of adjustment of the bearing housing nut is now recorded in appropriate aircraft maintenance records.

h. (U) Aircraft Maintenance Personnel:

(1) OBSERVATION: Contract civilian aircraft maintenance personnel are not familiar with all organic aircraft.

(2) EVALUATION: Contract civilian maintenance personnel receive no training on new aircraft being used by the supported unit. The contract terms state that the civilian personnel cannot be supervised by military personnel. Civilian personnel can only work on aircraft which they are familiar with, therefore their effectiveness is frequently marginal.

(3) RECOMMENDATION:

(a) That civilian maintenance personnel be assigned to units that can fully use their skills.

(b) That civilian maintenance personnel being assigned to units possessing new aircraft, receive training on the new aircraft before their assignment.

(4) COMMAND ACTION:

(a) Civilian maintenance crews are assigned to perform specific tasks with military personnel designated to provide technical assistance.

(b) A unit training program for civilian personnel has been initiated.

i. (U) Civic Actions:

(1) Hospitalisation of Civilian Personnel.

(a) OBSERVATION: Many Montagnards are reluctant to go to the hospital.

(b) EVALUATION: In one village a 19 year old Montagnard had suffered severly with the symptoms of plague for two days. Efforts to take the man to the hospital were fruitless. It was learned that according to their customs a man should die in his house. After using persuasive pressure, the man was evacuated to a hospital and cured.

(c) RECOMMENDATION: Civic Action teams orientation programs specifically emphasize the availability and versatility of medical treatment.

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(2) Safeguarding Medicine.

(a) OBSERVATION: Liquid rubbing compound was given to an adult villager for sore muscles. During the absence of the adults from the house, a 15 month old child drank the compound and died.

(b) EVALUATION: Toxic effects of medicine issued in the Medcap program are not clearly explained and labeled on bottles.

(c) RECOMMENDATION: All medicines given to people in the villages be labeled in their language and the dangers of improper use and storage be verbally explained to the recipient.

CALVIN R. BEAN
LTC, AR
Commanding

1k Incl
as
Incl 1, 3-5, and 8-13 wd Hq, DA

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AVBACB-CC (13 May 69) 1st Ind
SUBJECT: Operational Report of Headquarters, 7th Squadron, 17th Cavalry for Period Ending 30 April 1969, RCS CSFOR-65 (R1) (U)

DA, HEADQUARTERS, 17TH COMBAT AVIATION GROUP, APO 96240 24 May 1969

TO: Department of the Army (ACSFOR-DA) Washington, D.C. 20310
Commanding General, I Field Force Vietnam, APO 96350
Commanding Officer, 7th Squadron, 17th Cavalry, APO 96262

1. (U) This headquarters has reviewed the attached report, considers it to be adequate, and concurs with the contents as stated, except as indicated below.

2. (C) The following comments and recommendations are submitted.

a. Section 1, Operations: Significant Activities:

(1) Paragraph 1a (3) (f), Troop C was assigned OPCON to 173rd Airborne Brigade on 15 April 1969 instead of 17 April as stated. Correct date reflected in paragraph 1d (3) (c), Page 7.

b. Section 2, Lessons Learned: Commander's Observations, Evaluations and Recommendations:

(1) Paragraph 2a, Request for Article 27 Counsel, Page 13: Concur with use of TWX for requesting Article 27 Counsel. Subordinate units of this command are encouraged to expedite requests via teletype.

(2) Paragraph 2b (1), Night Combat Assault, Page 14: Concur that planning is essential to all combat operations. Although the operations detailed in Inclosure 14 appears to have been well planned and excuted, no significant new lesson learned is apparent. The use of LOH's with landing lights to mark LZ is effective for unopposed assaults. However, the same results could be obtained with pathfinders, properly equipped and used, with less exposure to aircraft and crews.

(3) Paragraph 2b (2), Effective employment of the Air Cavalry Squadron, Page 14: Concur that the Air Cavalry Squadron is most effective when unity of command is maintained and that it should be employed as a Squadron whenever possible. Limited air reconnaissance and security elements (ACS) and the tactical situation in the large II CTZ has necessitated piece-mealing the Air Cavalry Squadron. Recommend OPCON units of the Cavalry Squadron be returned to squadron control whenever tactical situation permits.

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(4) Paragraph 2c, Training, Page 15: The contents of this paragraph should be deleted and annotated as "None". Observation, Evaluation and Recommendations should be stated when staff study is complete and deficiencies are known.

(5) Paragraph 2e (1), Utilization of Sling Loads, Page 15: Concur. The subject of resupply by UH-1H using external loads was a matter discussed at the 17th CAG Commanders Conference on 17th May 1969. The capability to resupply via sling loads must be maintained; however, no concrete policy can be established. The 7/17th Cavalry Squadron has been advised that a change to MTOE is necessary to authorize sling load equipment. Upon submission of MTOE change, equipment can be obtained on loan pending approval of MTOE.

(6) Paragraph 2e (2), Planning Logistical Support for Squadron (-) Operations, Page 15: Concur. The problem is recognized by this headquarters. Contingency plans have been developed to provide a forward Logistical Command Post when two or more aviation battalion/squadron sized units are committed to a combined operation.

(7) Paragraph 2g, Safety Hazard on AH-1G Aircraft Cyclic Service Assemblies, Page 16: Concur with recommendation. The frequency and scope of services and inspections should be increased when required by the operational environment. See TB 55-1500-301-25, Paragraph 3d, in this respect. Nonconcur with command action. The adjustment so that 5 pounds force is required at the rod-end bearing to move the cylinder laterally is unauthorized. The unit has been instructed to make this adjustment IAW USAAVSCOM Safety of Flight Message AMSAV-R-MV 2-1331 dated 062200Z February 1969, which states that the adjustment should be made so approximately one pound of force applied at the top of the extension tube is required to move the uniball bearing.

(8) Paragraph 2h, Aircraft Maintenance Personnel, Page 17: Concur. Civilian personnel assigned in support of organizational maintenance should receive prior training on the particular aircraft on which they are programmed to perform maintenance. Recommend this problem area be brought to the attention of 34th General Support Group.

(9) Paragraph 2i (1) Hospitalization of Civilian Personnel, Page 17: Concur. Medical channels are aware of this continuing problem. No solution to this problem is possible at this level.

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The problem will be solved in time through educating the Vietnamese population.

(10) Paragraph 2i (2) Safeguarding Medicine, Page 18: Concur. 17th CAG is preparing a letter to all flight surgeons pointing out this problem, with instructions to label medicines in native language. Recommend this lesson learned be widely disseminated.

FOR THE COMMANDER:

[redacted]
[illegible] L. TUTAS
CPT, [illegible]
Adjutant

AVFA-GC-HIST (13 May 69) 2d Ind
SUBJECT: Operational Report of Headquarters, 7th Squadron, 17th Cavalry for Period Ending 30 April 1969, RCS CSFOR-65 (R1) (U)

DA, Headquarters, I Field Force Vietnam, APO 96350 8 JUN 1969

TO: Commanding General, 1st Aviation Brigade, APO 96384

This headquarters has evaluated subject report and first indorsement and concurs.

FOR THE COMMANDER:

FREDERICK E HOLLAND
LT AGC
ASST AG

Copy furn:
2-ACSFOR, DA
1-Hqs, 7/17th Cav

AVBAHC-O (13 May 69) 3d Ind
SUBJECT: Operational Report of Headquarters, 7th Squadron, 17th Cavalry for Period Ending 30 April 1969, DCS CSFOR-65 (RI) (U)

DA, HEADQUARTERS, 1ST AVIATION BRIGADE, APO 96384 12 JUN 1969

THRU: Commanding General, United States Army Vietnam, ATTN: AVHGC-DST, APO 96375
Commander-in-Chief, United States Army Pacific, ATTN: GPOP-CT, APO 96558

TO: Assistant Chief of Staff for Force Development, Department of the Army, Washington, D.C. 20310

This headquarters has reviewed this report, considers it to be adequate and concurs with the contents as indorsed.

FOR THE COMMANDER:

DAVID R. ANDERSON
CPT, AGC
Asst. AG

AVHGC-DST (13 May 69) 4th Ind
SUBJECT: Operational Report of Headquarters, 7th Squadron, 17th Cavalry for Period Ending 30 April 1969, RCS CSFOR-65 (R1)

HEADQUARTERS, UNITED STATES ARMY, VIETNAM, APO San Francisco 963752 6 JUN 1969

TO: Commander in Chief, United States Army, Pacific, ATTN: GPOP-DT, APO 96558

1. This headquarters has reviewed the Operational Report-Lessons Learned for the quarterly period ending 30 April 1969 from Headquarters, 7th Squadron, 17th Cavalry.

2. Comments follow:

a. Reference item concerning Safety Hazard on the AH-1G Aircraft Cyclic Service Assemblies, section II, page 16, paragraph 2g; concur with 1st Indorsement. Unit has been advised of proper procedures to follow in USARV letter, subject: Safety of Flight Advisory Message, dated 12 Feb 69, pertaining to UH-1 and AH-1G servo mount assemblies.

b. Reference item concerning Aircraft Maintenance Personnel, section II, page 17, paragraph 2h; concur. The terms of all contracts involving aircraft maintenance personnel stipulate that these personnel will be qualified to perform the required maintenance on all aircraft assigned to the supported unit. If the contracting officers representative located at the worksite determines that a contracted employee is not qualified to work on all of the unit's aircraft he should take action through the lead-man and the 34th General Support Group (GSG) Technical Assistance Officer to have the unqualified person replaced.

c. Reference item concerning Safeguarding Medicine, section II, page 18, paragraph 1(2); concur. An appropriate entry will be included in the June 1969 USARV Commander's Notes regarding the recommendation.

FOR THE COMMANDER:

C. D. WILSON
1LT, AGC
Assistant Adjutant General

Cy furn:
7/17 Cav
1st Avn Bde

GPOP-DT (13 May 69) 5th Ind (U)
SUBJECT: Operational Report of HQ, 7th Squadron, 17th Cavalry for Period Ending 30 April 1969, RCS CSFOR-65 (R1)

HQ, US Army, Pacific, APO San Francisco 96558 24 JUL 69

TO: Assistant Chief of Staff for Force Development, Department of the Army, Washington, D. C. 20310

This headquarters has evaluated subject report and forwarding indorsements and concurs in the report as indorsed.

FOR THE COMMANDER IN CHIEF:

C. L. SHORT
CPT, AGC
Asst AG

OPERATIONAL STATISTICS FOR THE PERIOD

1. (C) Results:

UNIT	SORTIES FLOWN	TROOPS LIFTED	CARGO (TONS)	KIA	STRUCTURES DAM	STRUCTURES DEST	SAMPANS DAM	SAMPANS DEST
A TROOP	11,250	6,601	24	135	6	66	—	—
B TROOP	4,751	3,364	31	62	74	97	—	—
C TROOP	9,305	5,168	83	16	27	74	—	6
HQ TROOP	1,535	1,903	92	—	—	—	—	—
D TROOP	——	——	—	1	—	34	—	—
TOTAL	26,841	17,036	159	214	107	271	—	6

Material captured:

42,086 lbs Rice

60 X NVA Packs

1 X US M1 Rifle

1 X US Springfield Rifle

1 X AK-50

9 X SKS's

2 X 60mm Mortar Tubes

1 X 82mm Mortar Base Plate

4 X AK-47

2 X RPD 7.62mm

9 X US M1 Carbines

1 X French 9mm SMG

1 X Danish 9mm SMG

2 X Red Chinese Flag

1 X Russian Flag

Encl 2

2 X US Cal .45 SMG

45 X 60mm Mortar rds

10 X M40 rds

10 X Chicom grenades

3 X 82mm Mortar rds

3 X 85mm Arty rds

Material destroyed:

4 X 2½ ton trucks

2 X AK-47 rifles

1 X 57mm Recoilless Rifle

1 X Cal .50 MG

1 X 105mm Howitzer

2 X US M1 Carbines

32,865 lbs of Rice

1 X 60mm Mortar tube

2 X 82mm Mortar tubes

1 X 105mm Howitzer rd

3 X 60mm Mortar rds

2. (C) Aircraft Lost and Damaged:

UNIT	AIRCRAFT TYPE	LOST NR	AIRCRAFT TYPE	DAMAGED NR
HQ TROOP	UH-1H	—	UH-1H	1
A TROOP	OH-6A	6 (NOTE 1)	OH-6A	2
	UH-1H	4 (NOTE 2)	UH-1H	6
	AH-1G	3 (NOTE 3)	AH-1G	6

Incl 2

UNIT	AIRCRAFT TYPE	LOST NR	AIRCRAFT TYPE	DAMAGED NR
B TROOP	OH-6A	2 (NOTE 4)	OH-6A	14
	UH-1F	0	UH-1H	0
	AH-1G	4 (NOTE 5)	AH-1G	5
C TROOP	OH-6A	1 (NOTE 6)	OH-6A	6
	UH-1H	0	UH-1H	1
	AH-1G	1 (NOTE 7)	AH-1G	2

NOTE # 1: Five were combat loss and one was crash damage.

NOTE # 2: Three were combat loss and one was excess maintenance.

NOTE # 3: Two were combat loss and one was crash damage.

NOTE # 4: Both were crash damage.

NOTE # 5: Two were crash damage and two were excess maintenance.

NOTE # 6: Combat loss.

NOTE # 7: Combat loss.

3. (C) Operational Statistics from CHECO:

UNIT	COMBAT SORTIES	OTHER SORTIES	AH-1G HOURS	OH-6A HOURS	UH-1F HOURS	TOTAL HOURS
HQ TROOP	1,214	291	———	———	1,112	1,112
A TROOP	10,946	304	1,932	1,814	1,759	5,505
B TROOP	4,457	294	1,596	1,729	1,424	4,749
C TROOP	8,271	1,024	1,672	1,618	1,611	4,908
TOTAL	24,928	1,913	5,207	5,161	5,906	16,274

DEPARTMENT OF THE ARMY
7th SQUADRON, 17th CAVALRY
APO San Francisco 96262

CONFIDENTIAL

AVBACB-GC

22 February 1969

SUBJECT: Final report on 2.75 rocket as an Armor Defeating Munitions.

TO: See Distribution

1. (U) PURPOSE: The purpose of this report is to provide the final results of the testing of the 2.75 rocket as an armor defeating munitions.

2. (C) OBJECTIVES: The test objectives were to determine:

a. The effectiveness of the 2.75 inch HE and HEAT Rocket with VT and PD fuse as an armor defeating munitions.

b. The best techniques and procedures for employment of the aerial weapons aircraft as an anti-armor vehicle.

c. The operating limitation to include; effects of terrain, exposure to enemy armor and anti-aircraft fire and the accuracy of the rocket weapons system against point targets.

3. (C) TEST PLAN:

a. A test plan was developed to test the AH-1G Huey Cobra firing M-488, 17 pound HE warhead with proximity fuse (VT) and M-490, 10 pound HEAT warhead with point detonating fuse (PD) at four point targets consisting of three nonsalvageable, M113, APC's and one (1) French Armor Reconnaissance Car.

b. The firing exercises were broken down into six basic exercises as follows:

EXERCISE	TYPE FIRE	TARGET RANGE	ALTITUDE	REMARKS
1	Low level	1200-3000m	25-100ft	Pop-up
2	Normal angle 25-35 degrees	1200-3000m	2000ft	Normal fire
3	High angle 35-60 degrees	1000-2000m	above 3000ft	
4	Low level	1200-3000m	25-100ft	Fire thru trees
5	Normal angle	1200-3000m	2000ft	Fire thru trees
6	High angle	100-2000m	above 3000ft	Fire thru trees

Incl 6

CONFIDENTIAL

c. The targets were acquired from property disposal at Qui Nhon Depot, transported to Camp Enari on low boys, and then transported to a free fire area approximately 15 kilometers east of Camp Enari by a CH-54 helicopter.

d. Troop A, 7th Squadron, 17th Air Cavalry was assigned the responsibility for conducting the firing test which included:

(1) Furnishing equipment and personnel for conduct of test.

(2) Evaluation of firing after each gun-run using each type of ammunition designated for the test.

(3) Submitting a final report of test.

(4) Establishing an SOP for employment of the AH-1G Huey Cobra as an anti-armor vehicle.

e. Approximately 300, 17 pound HE (VT fuse) and 250, 10 pound, HEAT (PD fuse) rockets were fired during the test.

4. (C) RESULTS OF TEST:

a. Techniques and Procedures: The three methods of attack employed were low level, normal angle, and high angle.

(1) Low angle: This method, although it required less exposure time, proved less accurate. The low level pop-up method of attack made target identification difficult. A high reconnaissance to identify target eliminated the element of surprise, therefore this method of attack was considered less desirable for covered or concealed terrain.

(2) Normal angle: The normal dive angle proved the best method of attack resulting in a minimum of one (1) direct hit per aircraft per firing pass. The best results were achieved when firing a minimum of four pair of rockets per target engagement. This pair selection achieved more direct hits per pass, while, at the same time, it furnished complete area coverage, which would have surpressed ground to air fire.

(3) High angle: The high angle of attack afforded little benefit due to the inability of the pilot to adjust his fire on the target. In addition, airspeed limitations of the aircraft are rapidly reached at the high angle of attack. This method also proved to be the most exposed method of the three tested methods.

b. Effectiveness of munitions:

(1) M-488, 17 pound HE warhead with proximity fuse (VT): This warhead produced an enormous amount of fragmentation effect around the armor vehicles, but failed to penetrate the armor protection. All personnel exposed on or around the vehicle would have been wounded or killed by explosive or fragmentation effect. Total immobilization of the armor vehicle by a direct hit is remote. The French Armor Car was immobilized by this warhead.

(2) H-490, 10 pound HEAT warhead with point detonating fuse (PD): This warhead was capable of penetrating the armored vehicles and producing fragmentation, both from the warhead and displaced armor from the vehicle. In addition, direct hits to the armor vehicle penetrated the engine compartment destroying all engine components. Had fuel been in the vehicle, fire would have resulted. Armor plate was found 30-50 meters from the vehicles and outside vehicle accessories were blown off of the vehicle. The French Armor Car was completely destroyed by this warhead.

c. Limiting factors that must be considered when employing the AH-1G Huey Cobra as an anti-armor vehicle are:

(1) Enemy's anti-aircraft capability.

(2) Cover and concealment furnished by terrain within the area of operation.

(3) A direct hit is required to furnish desired results.

(4) Training of aircrew.

(5) Availability of 2.75 HEAT warhead.

5. (C) CONCLUSION:

a. The 2.75", 10 pound HEAT warhead with point detonating fuse is an effective aerial armor defeating munitions.

b. The 2.75", 17 pound HEAT warhead with point detonating fuse, when available, would be more effective.

c. The 2.75", 17 pound HE warhead is not an effective armor defeating munitions.

d. The normal angle method of attack (firing 4 pair of rockets on each target engagement) is the best technique for target engagement of armor vehicles in the Central Highlands of RVN.

FOR THE COMMANDER

s/ RODGER D. WINSLOW JR.
t/ RODGER D. WINSLOW JR.
MAJOR, ARMOR
Adjutant

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EVALUATION OF THE

XM596 PROXIMITY FUZE

FOR

THE XM28 ARMAMENT SUBSYSTEM

FEBRUARY 1969

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ABSTRACT

(C) The US Army Harry Diamond Laboratories developed a proximity fuze (VT) for the helicopter borne M384 40mm cartridge. Tests conducted in the IV Corp area in July 1968 were considered successful and resulted in the 1st Aviation Brigade, USARV, recommending a mixed ratio of proximity fuzes and impact fuzes (PD) for use in RVN.. In addition, 1500 VT fuzes were requested for use in the Central Highlands to validate the mix ratio.

(C) VT fuzes were fired in mixed and non-mixed loads and fired in the Central Highlands under various conditions and a mixed ratio is considered to be the optimum method of issue.

1. (C) Introduction

a. The Project manager for aircraft weaponization (AMCPM-Al) in response to insure item 180.2 requested the U.S. Army Harry Diamond Laboratories to develop an improved fuze for the helicopter borne 40mm M384 cartridge.

b. The fuze nomenclature has been designated as: Fuse, proximity, XM596, (VT). The fuse has been designed as a direct replacement for the M533 impact (PD) fuze and meets the same overall length, diameter and intrusion requirements. It contains an all solid state electronic circuit, a miniaturized liquid reserve battery and a M84 electric detonator in addition to the M533 setback Pin and housing assembly (S & A) with its associated explosive train.

c. The VT fuse will provide a cost effective increase in lethality when compared to the PD fused round against prone troops in open terrain and a significantly greater increase when the VT fuze is used against troops in spider holes, rice paddies or revetments.

d. Tests conducted in the IV Corp area of RVN by the 175th Combat Helicopter Assault Company, 1st Avn Bde, were highly successful and resulted in a request for the establishment of a requirement of a one to one mix ratio. In addition, the 1st Avn Bde requested an additional 1500 rounds for tests in the highlands to verify the validity of a one to one mix ratio.

2. (U) Fuze Operation

a. Impact Fuze:

(1) The M533 fuse presently used with the helicopter borne M5 and XM28 armament subsystems contains a mechanical arming mechanism and an impact element that initiates the explosive train upon impact on a target.

(2) Upon gun launch, a set back locking pin is released enabling a spin driven clock mechanism to rotate a M55 stab detonator from a safe unarmed condition to a fully armed condition. Arming takes place from a minimum of 18 meters of shell travel to a maximum of 36 meters. When fully armed, the M55 detonator is located directly above a RDX booster cup and directly below the impact firing pin.

(3) Upon impact, the firing pin is forced into the stab detonator whose explosive force initiates the RDX lead which in turn detonates the HE explosive charge.

(4) The latter explosion causes the body assembly (shell) to fragment into numerous high velocity particles having a lethal area of approximately 14 square meters.

b. VT Fuze:

(1) In addition to the same mechanical arming mechanism and explosive train described above, the VT fuze also includes an M84 electric detonator and an independent impact element.

(2) The VT fuzes operates as follows: Upon launch, mechanical arming begins and a small glass ampul containing electrolyte is broken.

(3) Shell spin continues the mechanical arming function and distributes the electrolyte to 14 cells in the battery which begins activation of the VT fuze.

(4) Fuze activation starts the electrical arming cycle which consists of biasing a firing circuit and electrically charging a firing capacitor.

(5) Mechanical arming is completed within 36 meters of shell travel. Electrical arming is completed at 100 meters. Between completion of mechanical arming and electrical arming (100 to 250 meters) the VT fuze functions as an impact fuze.

(6) Upon completion of electrical arming and approach to a target, the radio waves transmitted by the fuse, and reflected by the target, increase in amplitude as the shell nears its target. When a predetermined amplitude is reached, an electrical firing circuit is initiated, firing the electric detonator which in turn initiates the stab detonator, RDX lead and the HE charge.

(7) Due to the variations in reflectivity of targets (80% for water and 20% for dry sand) and approach angles, function heights will vary. In the event of a proximity fuze failure, the independent impact element will initiate the stab detonator and explosive train upon impact with the target in the same manner as the PD fuze.

(8) The electrical arming is designed to provide a safe separation distance between the shell and aircraft while operating from -40 degrees to +140 degrees F.

c. Tests conducted in the RVN Central Highlands.

(1) A safety release was granted by the US Army Test and Evaluation Command for use of the XM596 Fuze in the M-5 subsystem. One half of the safety tests were conducted by USATECOM from the XM28 subsystem prior to the US Army Harry Diamond Lab consultant leaving CONUS and consisted of firing 250 rounds from the XM28 subsystem while the AH-1G aircraft was sitting on the ground. The second phase of the safety test which consisted of firing 250 rounds while the aircraft was in the air was in progress.

(2) Telephone conversations by the HDL consultant and Washington,

D.C. verified that the safety tests were completed without any malfunction. Tests were therefore conducted from the AH-1G aircraft in the Central Highlands after a confirmatory compatibility test was conducted by the project officer and the HDL consultant.

(3) Loading of mixed rounds were supervised by the project officer or the HDL consultant. Mixed lots of PD rounds and links were used without any malfunction being reported.

3. (U) Purpose of the test:

a. To validate a one to one mix ratio of proximity fuzes (VT) and impact fuzes (PD) for use in the Central Highlands.

b. To test fire the VT fuzes in the XM28 subsystem, AH-1G.

4. (U) Objectives.

a. To determine dispersion characteristics of the VT fuze when fixed in the XM28 subsystem as compared with the PD fuze.

b. To determine the compatibility of the VT fuzed round in the XM28 subsystem.

c. To test the effectiveness of the VT fuze on the M384 cartridge, 40mm, in the Central Highlands of RVN.

d. To determine the reliability of the VT fuzed round.

e. To obtain pilot reaction under combat conditions, on the employment and effectiveness of the VT fuzed round.

5. (U) Test Plan.

a. Dispersion Test: The purpose of this test is to determine if the sighting system is accurate for both the VT and PD fuzed rounds. This will be determined by firing both 1:1 mixed ratios of PD-VT rounds and non-mixed loads of each type. The same crew and aircraft will be employed in the initial dispersion tests. The test will be conducted by firing at a target with special interest being taken to any round, or rounds, which impact outside the normal plan of dispersion for a 40mm.

b. Compatibility Test: The purpose of this test is to determine the compatibility of the VT and the 1:1 mixed fuzed rounds for use in the XM28 armament subsystem. This test will be conducted in conjunction with all other phases of the testing and the results will be obtained by recording all malfunctions which can be attributed to the VT fuzed 40mm.

c. Effectiveness Test: The purpose of this test is to determine the effectiveness of the PD and the VT fused rounds in varied canopy. The targets will take the form of rocket boxes and will be placed in both the prone and standing position. The PD and VT rounds will be employed separately on the same targets with an assessment after each attack.

d. Reliability Test: The purpose of this test is to determine, to the best of our ability, the number of rounds which go off prior to reaching 25 feet above the terrain. This test will be incorporated into each of the other tests.

e. Pilot Reaction: The purpose of this test is to obtain pilot reaction in the use of the 40mm VT fused round. The pilot will fire both the 1:1 mixture and straight VT under actual combat conditions with varied missions, terrain and targets.

6. (C) Test Results.

a. Dispersion, compatibility and reliability, Test No. 1: Two hundred rounds of VT fuzes were fired at three nonsalvageable, M113, APC's. The terrain was open with partial trees and brush; observation was made of most rounds. Numerous attacks were made using various angles and airspeeds. The XM28 system was fired in both ttcsod and gunner control mode. Using the gunner control mode the target was engaged using the full traverse of the turret.

Test Results: All rounds appeared to be on target. There was no compensation needed as a result of firing the VT fuze in the XM28 system. There were no gun jams. Three rounds functioned prior to reaching the target (approximately 300 to 500 meters in front of the aircraft). All other rounds appeared to function reliably.

b. Dispersion, Compatibility and reliability, Test No. 2: Two hundred rounds of a one-to-one ratio were used in this test. The rounds were fired into three different areas with varied terrain and targets. First the open area was used with the APC representing a point type target. 50 rounds were expended in this area. Next we moved to a draw which was between 30 and 50 meters wide and approximately 1500 meters in length. The center of the draw appeared to be double canopy while the sides tapered out to a clear terrain. We expended 100 rounds on this area type target. Thirdly we moved to a small stream which was approximately 10-20 meters wide. Here we used the remaining 50 rounds. Various attack angles, airspeeds, and modes of fire were used on each engagement.

Test Results: All rounds appeared to be on target. There were no gun jams. Two rounds functioned prior to reaching the target. In the draw it was observed that some of the VT rounds did penetrate the top layer of the canopy.

c. Effects Test. The effects test was the most controlled test we

ran and hence became the most difficult to complete. The test was originally designed to take about 6 hours to complete using all the resources of an AIR CAV TROOP. During the past 30 days the tactical situation has been such that the entire troop could not be released for the test. The test was modified and the entire troop was only employed for approximately two hours and this was in the triple canopy area. Each type of canopy is analyzed separately below as it relates to:

(1) Target Area--Triple Canopy. The target area was triple canopy with the top canopy located about 150 to 200 feet above the ground. Ten rocket boxes were inserted, 5 in the prone and 5 in the standing positions. The target area was about 10 X 10 meters.

(a) PD Tests: Two gun runs were made using PD rounds; 50 rounds were expended. Damage assessment: Negative hits in the targets.

(b) VT Tests: Due to the ineffectiveness of the PD round the test with the VT fuze was suspended in the triple canopy.

(2) Target Area Single Canopy: The target area was light single canopy. Targets were 2.75 in rocket ammunition boxes placed in strategic locations behind trees and in craters simulating dug in positions. The target area was approximately 15 X 15 meters and arranged as shown in figure I.

(a) PD Tests: Two gun runs with PD fused rounds were made against the target, expending approximately 50 rounds total. A damage assessment was made as follows: Target No. 2 had less than 5 fragments on two sides of the box. Target No. 3 had an impact crater 3 feet from the target, Symbol A, and the entire side was filled with fragments. A second impact, Symbol B, 9 feet from the target did not result in any fragments in the target. Target No. 5 had less than 5 fragments on one side.

(b) Summary of PD Tests: The PD fused rounds would have resulted in one KIA. This assessment is based on the fact that fragments were numerous and penetrated the 3/4 inch thick box. It is also assumed that two WIA's could be included as a result of the limited number of fragments entering the boxes. Penetration of vital areas in the latter two were not considered in this assessment.

(3) VT Tests: Gun runs were made against the target expending approximately 50 rounds. A damage assessment was made as follows:
Target No. 1: 5 to 10 hits were received on one side.
Target No. 2: 10 to 15 hits were received on 2 sides.
Target No. 3: In excess of 25 hits were received on 3 sides.
Target No. 4: 5 to 10 hits were received on two sides.
Target No. 6: Less than 5 hits were received on one side.
Target No. 7: Less than 5 hits on two sides.
Target No. 9: 5 hits on two sides.
Target No. 11: In excess of 100 hits were received on 3 sides.
Target No. 12: In excess of 25 hits were received on 3 sides.

d. Summary. The VT fuzed rounds would have resulted in 4 KIA's and 5 WIA's. Again, penetration of vital organs were not considered but it is noted that included in the WIA's were 4 targets with hits on two sides whereas the WIA's assumed in the PD test had one target hit on two sides. It should also be noted that at the conclusion of the PD tests, each target was wrapped with heavy wrapping paper to exclude any confusion in damage assessment.

7. (C) PILOT REACTION: Mixed loads were provided to pilots on combat missions on different days in order to cover as many situations as possible with the limited number of VT fuzed rounds made available for these tests. The loads consisted of a one to one mix, i.e., one VT and one PD fuzed round in a staggered load. The total loads were approximately 125 rounds of each type of fuze. Upon completion of each mission, pilots or co-pilots were interviewed to obtain their reactions. Summaries of the interviews follow:

a. Stephan T. Hance, WO1. Experience is approximately 7 months in the AH-1G aircraft. The mission was convoy escort and terrain features were light to double canopy. Used a complete load of rounds on a suspected enemy position and actual contacts. No gun jams were encountered nor any early bursts. Some rounds functioned at the tree tops and some below the trees. Would prefer mixed loads of VT and PD fuzed rounds.

b. John Everheart, WO1. Experience is 7 months in AH-1G aircraft. The mission was recon and terrain features were light to triple canopy. Targets were suspected enemy positions and actual contact. Five to ten early bursts were observed and some concern was expressed due to the fact the unit had experienced 37mm anti-aircraft fire previously. No damage to the aircraft resulted even though he felt that the units functioned between 75 to 100 feet from the aircraft. (Note: Minimum arming takes place at a minimum of 100 meters from the aircraft for proximity fuze action). He indicated that he experienced fewer early functions when shooting off-axis. He also test-fired against a stream and reported that the VT fuze produced fragments in a thin line perpendicular to the axis of firing while the PD fuse produced a small geyser of water. No jams were encountered. Some rounds penetrated the canopy and some functioned at the tree tops. Would prefer mixed loads of VT and PD rounds.

c. Jack G. Mazzuca, 1st Lt. Experience one year (5 months with the AH-1G aircraft). Mission was recon and escort. Contact was made with a squad size or larger enemy force. Terrain was open to single canopy. One enemy KIA with an additional 7 KIA's suspected but not confirmed. Does not use 40mm in triple canopy because bomb damage assessment in this type of terrain usually results in minimal damage and feels that the same would be true of the 40mm. Uses the 40mm on break from the target. Experienced no gun jams or early functions. Would prefer mixed loads of VT and PD fuses.

d. Jonathan Hartzell, WO1. Experience 4 months in the AH-1G aircraft.

Mission was recon and to cover LOH's. Terrain was tall canopy, approximately 100 feet tall, and fairly rocky. Experienced approximately 8 early functions 200 to 400 feet from the aircraft. No damage to the aircraft was experienced nor were any gun jams. Would prefer mixed loads of VT and PD fuzes.

e. John A. Jackson, 1st Lt. Experience approximately 70 missions with AH-1G aircraft. Mission was recon. Terrain was single to double canopy. Could see some rounds function at the tree tops (30 to 50 feet tall). In the open, he could see VT's function above the PD rounds. He seemed to think the VT's went faster than the PD's. Experienced no early functions or gun jams. Likes a mixed load of VT and PD rounds.

f. Richard T. Schuler WO1. Experience is 7 months with the AH-1G aircraft. Mission was recon route area of convoy. Made contact with the enemy twice. Terrain was heavy ground cover to single and double canopy. Functions occurred at tree tops and below. Tree top functions seemed to blow off the tops of trees and enabled him to see through. Experienced no early functions or gun jams. Would prefer mixed loads of VT and PD rounds.

g. Daniel Normann, CW2. Experience is 8 months in gunships, 6 months in the AH-1G aircraft. Mission was recon. Engaged a 50 Cal. emplacement. Terrain was brush to single canopy. Four gun runs were made to destroy the gun emplacement and 4 enemy observed in the area. VT fuzes functioned well. Observed 3 early functions well in front of the aircraft. Would prefer mixed loads of VT and PD rounds.

8. (C) RECOMMENDATIONS AND CONCLUSIONS

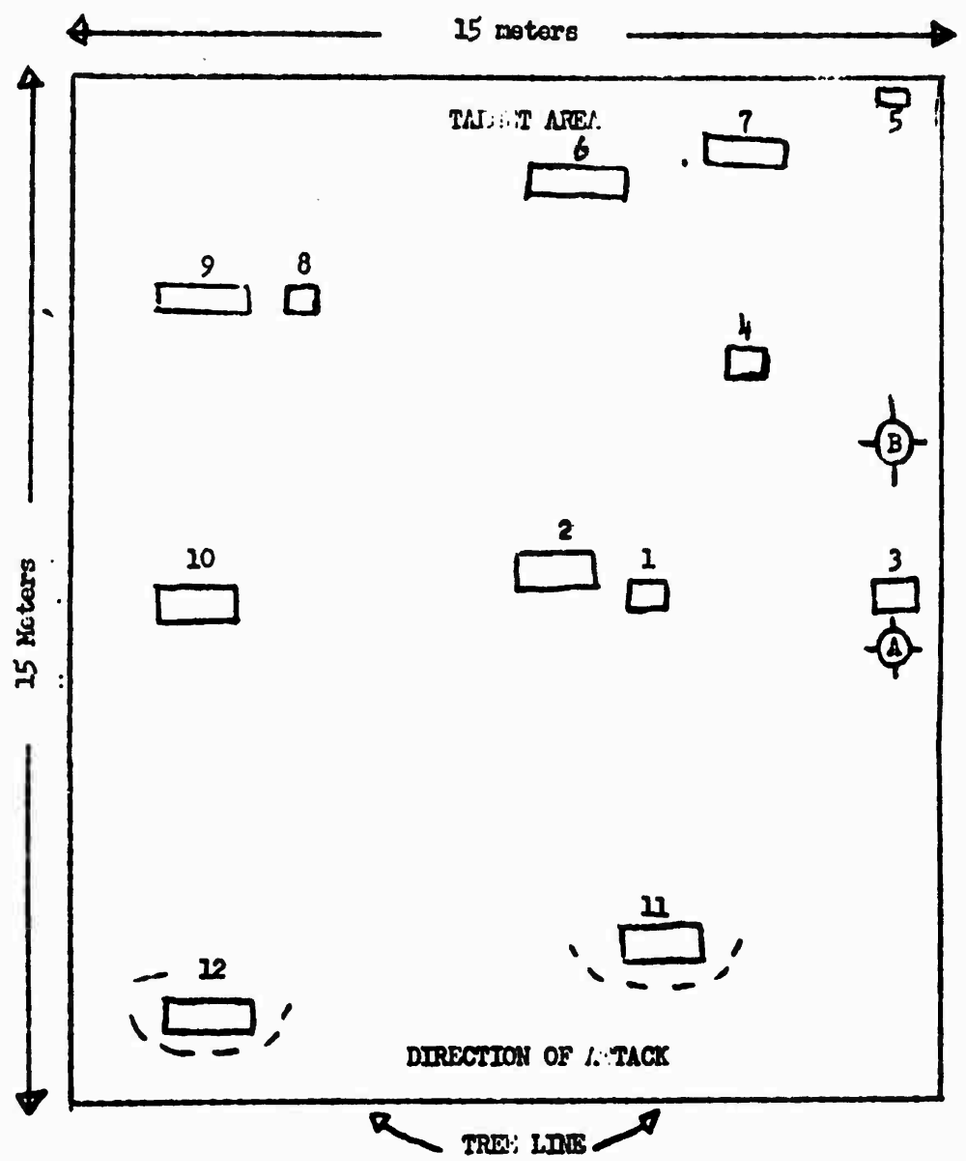
a. It has been determined after firing approximately 1300 rounds of VT fuzed 40mm rounds in the XM subsystem that the round is 100% compatible with the armament system. The sighting and feeding system needed no modification for the VT round. During the test, there were no problems with gun jams or dispersion that could be attributed to the VT round. It was very difficult to determine the reliability of the VT round since the only malfunctions that could be observed were early functions. These early functions represent only one half of the malfunctions that could occur since a non-operating VT round can function at impact, therefore, it was impossible to determine if impact functions were the result of non-operating VT rounds or PD rounds. It is estimated that between 3 and 6% of the VT fuzed rounds functioned as early functions or impact functions.

b. From the results of the effects tests, it was determined that the effectiveness of the 40mm round is directly proportional to the height of burst above the target. The maximum effectiveness appears to occur when the function height is between 10 and 25 feet above the target. To obtain this type of detonation is single to double canopy, the VT round is most effective. When the PD round is fired into this type of canopy, the majority of the effectiveness is absorbed in the ground immediately surrounding the impact area.

c. The 40mm round had negative effect on the targets located in triple canopy. This is due to the extreme heights the rounds were detonating above the target. It is estimated that the VT rounds function between 150 and 175 feet and the PD rounds function between 100 and 150 feet above targets located on the ground in triple canopy. It is felt important to point out that even in triple canopy, the 40mm is an effective round when used to cover a break from the target because it minimizes enemy fire directed at the aircraft after the break since its low velocity allows the rounds to reach the target area while the aircraft is out-bound in the attack pattern. This holds true for all types of canopy.

d. Due to the varied terrain found in the Central Highlands, it is impossible to say one fuze is better than the other. It is however felt that an airburst round 10 to 25 feet above the target will yield the best results. It is noted that the PD fuze will yield these results in some types of canopy.

e. It is therefore recommended that a one-to-one mix of 40mm VT and PD fuzes would provide maximum effectiveness in the Central Highlands.



Symbols:
- Impact fuse craters
- Rocket Box Prone
- Rocket Box Standing
- Fox hole
- (numerals indicate target number)

NOTE: All targets were protected by trees, etc., from attack direction.

FIGURE 1. Target area of effects test.

NIGHT COMBAT ASSAULT (C)

1. (U) OBSERVATION: Night Combat air assault in Coordination with Night Movement of Ground Troops.

2. (C) EVALUATION: During operation GREENE LION a successful night insertion coordinated with movement of ground troops was found to be highly effective. Careful preparation and coordination is necessary to perform such an operation. Preparations include OPLAN, development of a tight time schedule with exact times from start engines through touchdown with a complete air movement plan. The personnel involved in the planning of this operation used a "School Solution" type planning sequence. The areas which gave the most concern in the planning stage were, "Order of take-off and line-up, illumination of LZ's, marking of LZ's and movement of the vehicles along the routes during hours of darkness."

a. The plan for take-off and line-up was solved by applying a straight forward plan allowing the aircraft time for separation in the move to the marshalling area where ground guides were waiting. Also, the line-up was facilitated by using the west end of Hensel Field allowing a large enough area so that conjestion was not a critical consideration.

b. The aircraft were lined up west to east in order of take-off facing generally in the direction of the objective which allowed the various flight leaders to plan their separation times strictly on the basis of a direct flight rather than timed turns, etc. The illumination of the LZ's was accomplished by means of flare ships which were given strict instruction that no flares would be dropped over friendly villages and that all flares would be dropped from sufficient altitude with the proper settings so that burn out was assured before ground contact, as fire was an important consideration throughout the operation. Further precautions were taken to prevent the possibility of extensive fire damage by illumination by assigning the ground elements already in place the additional duty of extinguishing fires before they became too large. Fortunately, only one small fire started, but this was not inside any village or landing zone and was quickly extinguished. The problem of marking the landing zones was solved by using LOH's with landing lights and navigational lights hovering in the landing zone until the head squad carrier was on final approach, at which time the LOH's dropped a "bean bag landing light" into the upwind portion of the landing zone and then leaving the area. The bean bag landing lights were used as another precautionary measure to assure that no fires were started in the landing zone. The technique worked in a most satisfactory manner.

c. The movement of the ground troops was satisfactory and all units moved on either roads or pathways which had previously been mapped. The ground movement was satisfactory except that one unit became disoriented. This unit received directional assistance in finding its way from the aircraft in the area. A problem arose when the aircraft overhead indentified the wrong convoy and gave instructions to the lost element while observing the wrong element thus causing even more confusion.

3. (C) RECOMMENDATIONS Based on the experience gained in the operation it is felt that missions of this sort can succeed only if proper planning and coordinating procedures are followed. It is further recommended that on night insertion every possible precaution be taken to avoid unnecessary fire hazards being created by illumination with flares and that some provision be made for controlling fire that may result accidentally. The measures taken during this operation proved sufficient, but in different circumstances might not prove adequate. The hazards of fire are always present and should be considered in planning an operation this complex.

a. It was determined that the use of LOH's in marking the landing zone was very successful and recommended that they be used in this manner on future operations. Also the use of an electrical light in the landing zone at night worked very well. Fire-fly aircraft might also be used to mark LZ's. The problem of moving ground troops at night was, as always, dependent on the ability of persons involved, but we feel that perhaps the operation would have gone even more smoothly had manned check points been used in moving the convoy into position. Manned checkpoints could be very helpful to the convoy commander.

b. It is further recommended that when a ground element is being guided by aircraft at night that lights or pyrotechnics be used for positive identification.

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