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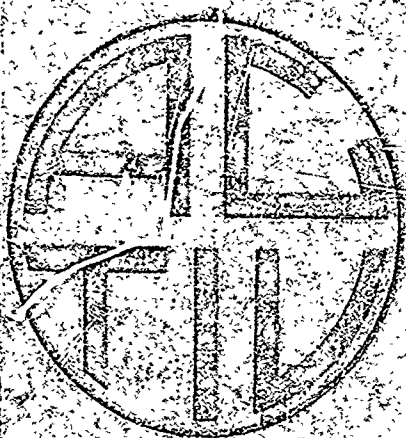
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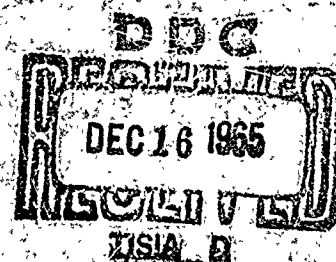
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APO San Francisco 96243

**INFRARED NIGHT VISION
WEAPON SIGHT (U)**

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JOINT RESEARCH AND TEST ACTIVITY

Office of the Director

APO San Francisco 96309

REPORT OF EVALUATION BY DIRECTOR, JRATA

1. I have worked with the infrared night vision weapon sights since about 1947 and am a firm supporter of the potentiality of the device. Consequently, although I concur in the report, I am disappointed in the reaction of the using units. In spite of its stated deficiencies, I believe that the advantages of the system outweigh the disadvantages and the sight gives an advantage to the using units in certain situations. Much of our operations at night are conducted from static positions wherein the advantage of the night vision can be exploited and wherein its disadvantages of bulk and weight are minimized. Flares and other conventional light making devices frequently are as much an advantage to the enemy as they are to the friendly troops. Infrared night vision devices, on the other hand, are of no benefit to the enemy and certainly increase the capabilities of the friendly troops.

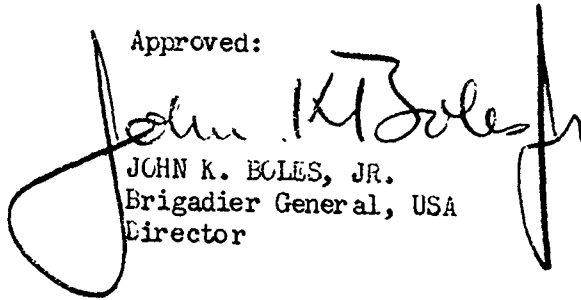
2. I believe that the present Polan Model P-155 sight suffers because of the memory of some people of the previous models of night vision weapon sights which were much heavier, less reliable and had shorter ranges. I also believe that its capabilities are not being exploited because of a deficiency in training and a lack of appreciation for the requirement for such a capability at night.

3. Now that a much larger number of US troops are engaged in operations nightly in the Republic of Vietnam I believe that the infrared night vision weapon sight will become more appreciated and used. I believe that the US units which, during this evaluation period were not using the weapon sight, will begin to use it in the near future. Its use by the American troops may later increase the interest of the ARVN troops which will not be equipped with the sight.

4. Some of the disadvantages of the infrared night vision weapon sight will be eliminated with the advent of the passive light intensification sights. The newer models of the light intensification sights have about one-third or one-fourth the bulk of the infrared sight, have about one-half the over-all weight of the night weapon sight system and because of their not having a requirement for a heavy battery which requires

recharging, will not present the difficulties associated with the recharging of batteries. The Starlight scope will also be more portable in view of the fact that it will not have any dangling wires to catch in the brush as the soldier goes through the woods. It may be that the light intensification devices will have advantages which outweigh the disadvantages attributed to the infrared night vision sight by the RVNAF.

Approved:


JOHN K. BOLES, JR.
Brigadier General, USA
Director

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ARMY CONCEPT TEAM IN VIETNAM
APO US Forces 96243

FINAL REPORT

**INFRARED NIGHT VISION
WEAPON SIGHT (U)**

JRATA Project No. 1B-161.0

30 October 1965

Approved:

Hugh E. Quigley

HUGH E. QUIGLEY
Colonel, Armor
Chief

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Letter, AGAM-P(1) (17 July 1964) ACSFOR, Dept of the Army, 31 July 1964, subject: Army Troop Test Program in Vietnam (U), as amended.

Message, CINCPAC to COMUSMACV, DTG 130247Z February 1965, subject: Project Proposal - Infrared Night Vision Weapon Sight (U).

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CONTENTS

	<u>Page</u>
I. PREFACE	
A. Abstract	v
B. Objectives and Methods	v
C. Summary of Conclusions and Recommendation	vi
II. INTRODUCTION	
A. Purpose	1
B. Background	1
C. Description of Materiel	2
D. Scope	2
E. Evaluation Design	3
III. DISCUSSION	
A. Objective 1 - Weapon Sight Acceptability	7
B. Objective 2 - Doctrine of Employment	16
C. Objective 3 - Basis of Issue	18
IV. CONCLUSIONS AND RECOMMENDATION	
A. Conclusions	19
B. Recommendation	19
ANNEXES	
A. Setting of the Evaluation	A-1
B. Equipment Description	B-1
C. Training	C-1
D. Combat Operations	D-1
E. Equipment Faults	E-1
F. Equipment Maintenance Repairs	F-1
G. Repair Parts	G-1
H. Evaluation Check List	H-1
I. References	I-1
J. Distribution	J-1

FIGURES

<u>Figure</u>	<u>Page</u>
1. Initial issue of infrared weapon sights	3
2. Units that used sights regardless of presence of evaluators	11
3. Units that used sights only when evaluators were present .	13
A-1. Geographical regions, RVN	A-2
A-2. Annual precipitation, RVN	A-4
A-3. Units which participated in the evaluation	A-7
A-4. Operational areas of units with IR sights	A-8
B-1. Metal carrying case for infrared night vision weapon sight.	B-3
B-2. Scheme for storing weapon sight components in the carrying case	B-4
B-3. Weapon sight assembled but not mounted on a weapon	B-5
B-4. M-1 rifle with IR weapon sight mounted	B-7
B-5. Bracket for mounting IR weapon sight on carbine	B-7
B-6. Carbine with IR sight mounted	B-8
B-7. M-16 rifle with IR weapon sight mounted	B-9
B-8. Light machinegun with IR sight mounted	B-9
B-9. Battery charging rack, modified	B-10
B-10. Canvas carrying cases	B-12
B-11. Leather carrying cases	B-12
B-12. Infrared weapon sight mounted on M-79 grenade launcher, sight adjusted for 150-meter range, left-handed shooter . .	E-13
B-13. Infrared weapon sight mounted on M-79 grenade launcher, sight adjusted for 300-meter range	B-14
C-1. Program of Instruction conducted in Saigon	C-2
C-2. Training program followed by 44th Infantry Regiment	C-4

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I. (C) PREFACE

A. (C) ABSTRACT

The purpose of this project was to evaluate employment of the Polan P-155 infrared night vision weapon sight by Republic of Vietnam Armed Forces (RVNAF) in counterinsurgency operations in the Republic of Vietnam (RVN).

During the evaluation, Vietnamese soldiers were instructed in the use of weapon sights. Following this, use of the sights by selected RVNAF units was observed and analyzed. The evaluation was conducted under actual combat conditions.

Although well-trained RVNAF units were capable of using IR weapon sights, most units did not use them enough to justify issue. Reasons given for not using the sights were: 1) RVNAF units did not often operate at night; 2) the sights were too heavy and bulky for the average Vietnamese soldier; 3) RVNAF unit commanders feared loss of the sights to the Viet Cong (VC). No RVNAF unit had electrical facilities for charging batteries. It is recommended that infrared night vision weapon sights not be issued to RVNAF.

B. (C) OBJECTIVES AND METHODS

1. Objective 1 - Weapon Sight Acceptability

Determine whether or not infrared weapon sights should be introduced in operational quantities into Vietnam for use by RVNAF units.

Data for objective 1 were collected in the following ways: Observation by evaluators; interview of appropriate RVNAF soldiers, commanders, and US advisors; questionnaires; and study of supply depot records and after-action reports of units involved.

2. Objective 2 - Doctrine of employment

Develop doctrine for employment of infrared weapon sights in night counterinsurgency operations.

Doctrine was developed by review of US publications, discussion among participants, observation, interview, questionnaires, and search of after-action reports of units involved.

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3. Objective 3 - Basis of Issue

Determine a basis of issue for infrared weapon sights to RVNAF tactical units.

Objective 3 was not met because the weapon sights were not employed often enough to permit a determination of a basis of issue.

C. (C) SUMMARY OF CONCLUSIONS AND RECOMMENDATION

The Polan Model P-155 infrared night vision weapon sight in the environment of South Vietnam met its design characteristics except that it did not provide its rated range. The sight was too heavy for the average Vietnamese soldier and RVNAF unit commanders were reluctant to use it. Although the sight required very few repairs, even through the Military Assistance Program all repair parts were not available during the evaluation. It is not known whether the small number of repairs required was due to lack of use of the sights or due to ruggedness and durability of the sight itself. Electrical facilities for recharging nickel-cadmium batteries were not available to any unit while away from its base station. Even while at base stations, Vietnamese units used US facilities since the Vietnamese lacked proper electrical current for the battery charging rack.

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II. (C) INTRODUCTION

A. (C) PURPOSE

The purpose for this project was to evaluate employment of the Polan P-155 infrared night vision weapon sight by RVNAF in counterinsurgency operations in the RVN.

B. (C) BACKGROUND

On 31 August 1964 the Joint Research and Test Activity (JRATA) sent a memorandum to the US Military Assistance Command, Vietnam (MACV) in which were listed some of the characteristics of the latest infrared (IR) night vision weapon sight, known as the Polan Model P-155. The memorandum pointed out that the sight might be extremely beneficial in counterinsurgency operations.

On 2 October 1964, MACV, in a letter to JRATA, requested that an evaluation of a limited number of infrared weapon sights be undertaken to determine operational needs in RVNAF. The letter further stated that the necessary quantity of weapon sights should be procured by the most expeditious means and it requested JRATA to develop doctrine for employment of the weapon sight and its basis of issue to the Vietnamese if an operational need existed.

On 10 October 1964 the project was assigned by JRATA to the Army Concept Team in Vietnam (ACTIV). It was determined that the most expeditious way to obtain the sights would be through MAP and the sights were procured through MAP funds. ACTIV prepared an evaluation plan, which was approved by the Commander-in-Chief, Pacific on 13 February 1965.

Because the infrared weapon sight was issued for mounting on the M-14 rifle, the Limited War Laboratory (LWL), at the request of JRATA, undertook to manufacture specially designed brackets for mounting IR weapon sights on weapons common in RVNAF: the M1 and M16 rifles, the M1/M2 carbines, and the M1919A4 machinegun.

In order to obtain valid evaluation results, the weapon sight was employed in each of the four corps areas of Vietnam in sufficient quantity to permit development of valid doctrine for their employment. Various types of units were selected so that sights would be used in a variety of tactical situations.

Fifty sights were obtained for the evaluation and a 90-day supply of repair parts was ordered. The initial issue of weapon sights to Vietnamese units was to be based on the United States Army basis of issue to its

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infantry and airborne infantry battalions, as specified in TOE 7-15 and TOE 7-35, respectively. Ten infrared weapon sights were to be issued to the headquarters and headquarters company of each of two ARVN infantry or ranger battalions and ten sights to each of two airborne infantry battalions. In addition, six sights were to be issued to Vietnamese Navy River Assault Groups (RAG).

Subsequent to publication of the evaluation plan, and prior to issue of sights, it was recommended by ACTIV and Combat Development Test Center in Vietnam (CDTC-V) to include reconnaissance, Marine and Special Forces units to broaden the data collection base. As a result, the RAG units were deleted and the initial issue of sights was as shown in figure 1, with three sights for maintenance float and demonstrations. During the evaluation, weapon sights were re-distributed since some units did not use their sights and were therefore not contributing to the evaluation. A complete list of units to which sights were issued at any time during the evaluation is contained in figure A-3, annex A.

C. (U) DESCRIPTION OF MATERIEL

The infrared night vision weapon sight consisted of three main operational components: the light source, the telescope assembly, and the power pack. Together, these components weighed 13 pounds. The complete weapon sight system weighed 31 pounds in its metal carrying case. The system was designed to provide night vision up to a distance of 300 meters for a period of up to 5 hours of continuous use. For a complete description of the characteristics of the IR weapon sight, see annex B.

In addition to the weapon sight, an ancillary battery charging rack was required. The charging rack weighed 70 pounds and was nearly $4\frac{1}{2}$ feet long. It could simultaneously charge 12 of the nickel-cadmium batteries used to provide power for the light source. The rack could operate on either 60-cycle, 110-volt or 9-volt, 40-ampere electrical current. The battery charging rack is also described in detail in annex B.

D. (C) SCOPE

1. Definition of the Project

The project was aimed toward determining whether or not infrared weapon sights should be issued to RVNAF units. It considered technical performance of the sight and its ancillary equipment and documented the RVNAF's tactical employment of the sight. Based on an assumption that the issue of sights to RVNAF would be desirable, the evaluation plan included considerations for development of doctrine for employing the sights both offensively and defensively, and for determining the basis of issue of the sights to RVNAF units.

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<u>Unit</u>	<u>No. of Sights</u>
23d Reconnaissance Company	10
44th Infantry Regiment (2 Battalions)	10
44th Ranger Battalion	5
2d Marine Battalion	6
3d Airborne Battalion	5
6th Airborne Battalion	5
Special Forces, Suoi Da	3
Special Forces, Gia Vuc	3
ACTIV/CDTC-V (for maintenance float and demonstrations)	3
Total	50

(U) FIGURE 1. Initial issue of infrared weapon sights.

2. Setting of the Project

a. Environment

Infrared weapon sights were employed in each corps tactical zone (CTZ) in Vietnam. The sights were used in all the varied types of terrain found in the country in order to bring out any possible differences in doctrine of employment. (See annex A.)

b. Military Elements

Infrared sights were evaluated in the following types of RVNAF units: Special Forces, airborne, infantry, reconnaissance and ranger. To the maximum extent possible, units were selected on the basis of anticipated frequent combat operations to insure maximum use of sights.

E. (U) EVALUATION DESIGN

1. Methodology

a. Data Collection Methods

(1) Evaluators observed the operational employment of the sights by units.

(2) Personnel directly concerned with the sights were interviewed and furnished checklists to fill out. These personnel included RVNAF operators and US advisors.

(3) Records of supply depots and after-action reports of units were examined.

(4) Additional information in the form of field notes and photographs was taken to obtain pertinent data for the final report.

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b. Analysis Methods

(1) Qualitative analysis was based on observation, case studies of missions undertaken, completed checklists, and interviews with RVNAF commanders, US advisors, and selected members of using units.

(2) Quantitative analysis of logistical problems was based on hours of operation, maintenance requirements, repair requirements, nature of repairs, and availability of repair parts.

2. Limitations and Variables

a. Limitations

Sights were normally issued to 8 to 10 different units simultaneously but only 4 officer evaluators were available to observe and gain information on their utility.

Data collection could not be controlled and the conduct of normal combat missions assigned tactical units governed the data collection capability.

Lack of measuring devices prevented the accurate measurement of ambient light and weather conditions during operation of infrared weapon sights.

b. Variables

The types of missions assigned to units, peculiarities of the operational environment, and advisor-advisee-evaluator relationships differed in each unit to which sights were issued.

The degree of support given the project by US advisors varied according to the degree of past experience which advisors had had with IR sights.

3. Support Requirements

Command support of the evaluation was directed by MACV letter, JRATA 0256, 26 February 1965, subject: Evaluation - Infrared Night Vision Weapon Sight (1P-161.0) (U). Four infantry first lieutenants were provided as evaluators on TDY from the 25th Infantry Division in Hawaii for a period of 120 days. One enlisted technician capable of performing maintenance through fifth echelon on the sights was furnished by the 25th Division for a period of 110 days. One clerk-typist was furnished from CONUS for a period of 60 days. Fifty infrared weapon sights were supplied through MAP channels. Sufficient repair parts for first through

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fifth echelon maintenance for 90 days were requested, but all parts were not furnished. Seventy brackets for mounting infrared weapon sights were furnished from IWL as follows: 20 for the M-1 rifle, 20 for the carbine, 20 for the M-16 automatic rifle, and 10 for the M1919A4 caliber .30 machinegun. Headquarters, US Army Combat Developments Command provided TDY funds for the evaluators and the technician and Headquarters, Department of the Army provided TDY funds for the clerk-typist. Instruction facilities, a full-time project officer, and a noncommissioned officer were provided by CDTC-V.

4. Time Schedule

- a. Equipment arrived on 29 January 1965 and was transferred through MAP to RVNAF, then to CDTC-V/ACTIV control.
- b. The TDY evaluators and enlisted technician arrived on 23 March 1965.
- c. Training in Saigon was conducted in two separate courses: 15 through 29 March 1965 and 12 through 21 April 1965.
- d. Data were collected for 106 days, from 31 March 1965 to 14 July 1965.
- e. The TDY clerk-typist arrived on 12 August 1965.

5. Equipment Disposition

Equipment is the property of RVNAF. At the end of the evaluation CDTC-V assumed control of the equipment and planned to distribute sights to ARVN schools for demonstration purposes.

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III. (C) DISCUSSION

A. (C) OBJECTIVE 1 - WEAPON SIGHT ACCEPTABILITY

As an approach to meeting the first objective, four basic questions were asked: 1) What was the performance of the IR weapon sight? 2) Can the average Vietnamese soldier be trained to properly employ and maintain the sight? 3) What are the logistics and maintenance problems associated with the sight? and 4) Is the IR weapon sight suitable for counterinsurgency operations in RVN? Discussion under this objective is generally organized into sub-discussions under each of the questions posed.

1. Weapon Sight Performance

Weapon sight performance was evaluated under conditions varying from full moonlight to no moonlight; from clear to completely overcast; from dry to rainy and misty; and it was operated over water, rice paddies (dry and inundated), and in areas which varied from jungle to high grass to sparse vegetation. The sight was also used on a river operation and from the air. In some instances the sight was mounted on weapons which were supported and in others on weapons which were employed off-hand.

The weapon sight met its military characteristics in the RVN environment with one major exception. In no case during the entire evaluation did the sight provide a range of 300 meters, which is its rated capability. The maximum range attained by any weapon sight was 175 meters and the average range reported was approximately 100 meters. During training, ranges were easily determined since all firing was done at known distances. During operations, ranges were determined either by pacing or by estimation.

The sight provided a magnification of approximately 4.5 power and a field of vision of approximately 8 degrees. It was simple to mount and dismount and was rugged and easy to operate.

On two occasions reticle adjusting knobs were knocked out of adjustment while the weapon sights were being carried mounted on weapons. In both cases the operators were traveling through heavy vegetation and it was surmised that the knobs had struck branches which caused the knobs to turn.

The brackets for mounting the sight on the M-16 automatic rifle and the light machinegun did not interfere with the weapons' standard rear sights. Brackets for mounting the sight on the M-1 rifle and the carbine proved to be unsatisfactory since standard rear sights had to be removed

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from both weapons to install the brackets. The bracket for the M-1 rifle had no substitute rear sight and that for the carbine had only a fixed rear sight which could not be adjusted. Thus, these weapons could not be used for accurate aimed daylight firing as long as the IR sight brackets were attached. (See annex B.)

The standard battery charging rack, as issued with the infrared weapon sights, was not capable of charging the nickel-cadmium batteries provided for the evaluation, as it was designed for an older type of battery. The racks were modified and were then capable of charging the newer batteries providing proper electrical facilities were available.

The nickel-cadmium battery (BB-429), in some instances, exceeded its rated capability of providing power to the light source for 5 hours of continuous use or up to 10 hours intermittent use. On two occasions the 44th Infantry Regiment used sights on extended operations of 4 to 5 days each without recharging batteries. Total operational times for the weapon sights on these operations were estimated to be approximately 12 hours for each sight. The 6th Airborne Battalion, which had no capability to recharge batteries, used its sights intermittently during 20 nights without recharging the batteries. It was estimated that the five sights were each used up to 20 hours until the batteries had been completely discharged. The 23d Reconnaissance Company used its sights for 2 to 3 minute periods at 5 minute intervals for three nights. The operators in this case reported that their range of vision decreased on succeeding nights. Total operational times for the three sights in this unit were estimated to be between 9 and 14 hours.

On 22 September 1965 a special test to determine battery life was conducted by CDTC-V. Five batteries and five weapon sights were selected at random. The batteries were fully charged prior to use and the sights were set in line 100 meters from five white targets. Observations were made at hourly intervals. All targets were clear at the end of the third hour. Vision began to dim on all five targets after 4 hours, and no targets were visible after 5½ hours. It was concluded that battery life did not appreciably exceed the rated 5 hours of continuous use.

2. Individual Training

Since the infrared weapon sight was a new item of equipment to RVNAF, special training was required prior to issue. Training was conducted for some personnel at a special school in Saigon and other personnel were trained in their units either by evaluators in conjunction with ARVN personnel from CDTC-V or by unit officers who had been trained in Saigon. The length of the courses varied but all courses covered boresighting, operation, and first echelon maintenance of sights. Annex C contains a detailed discussion of the training aspects of the evaluation.

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In all, 51 students were trained in Saigon and 43 completed the course successfully. Thirty-three were trained in the first course and eighteen in a second course.

All trainees were competent in boresighting, operation, and first echelon maintenance of the weapon sights. The sights were simple to mount and operate and required no special operator skills. Most Vietnamese soldiers who were trained in IR sights were not proficient in marksmanship and this tended to lower weapon sight effectiveness somewhat. Although the students trained in Saigon and those trained in their units were equally competent in weapon sight operation and maintenance, unit commanders and students showed more interest when training was conducted in the units. Unit training resulted in better command interest which insured better sight maintenance. Also, the use of sights was more often integrated into the overall operational combat plans of these units.

3. Maintenance and Logistics

Maintenance at operator level and higher echelons was not a problem at any time during the evaluation. The few repairs which were classified as third through fifth echelon are listed in annex F.

Logistics might have been a problem had more repairs been required. Concurrent with the initial request for weapon sights a requisition was submitted for a 90-day supply of repair parts plus 26 extra nickel-cadmium batteries. By the end of the evaluation MAP had furnished only 37 of 55 repair part line items and the 26 batteries had not yet arrived in Vietnam. However, during the evaluation few repairs were necessary. No sights were deadlined for lack of repair parts. However, it is not known whether the few breakdowns were the result of infrequent use or of inherent ruggedness of the sight itself.

Batteries, BA-42, for the high-voltage source were difficult to obtain, although they were normally available in RVNAF supply channels. The Special Forces units obtained batteries through US Army Special Forces supply channels. The 23d Reconnaissance Company received 14 batteries two months after submitting a requisition. The Ma Cay subsector bought flashlight batteries on the local economy. Batteries for other units were furnished by ACTIV but only after each unit had submitted a requisition for batteries through their own channels and had not received them.

Recharging nickel-cadmium batteries was a problem which was solved in some units but never solved in others. The battery charging rack required 60-cycle, 110-volt AC, or 9-volt, 40 ampere DC electrical current. Neither current was available to any unit. Some had 50-cycle, 220-volt current, and others did not have any electrical power source. All units had field expedient vehicular charging cables (see annex B), but some units did not have vehicles. Those that did have vehicles did not use them for recharging because of shortages of gasoline. The one unit that charged its own batteries, the 23d Reconnaissance Company in Ban Ma Thuot, bought a commercial step-down

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transformer which permitted satisfactory use of the charging rack. The fact that the current was 50-cycle instead of 60-cycle had no adverse effect on recharging. Previous to its purchase the unit charged its batteries at the US advisory compound in Ban Me Thuot. At one Special Forces camp the US team had a PP-34 generator which was capable of charging batteries. At Ma Cay subsector a non-standard battery charger at the US advisory compound was used for charging the nickel-cadmium batteries. The airborne and Marine units were away from base stations without vehicles for months at a time and had no way to charge their batteries.

Early in June CDTC-V, through RVNAF High Command, requested that appropriate units be furnished with step-down transformers. The only type available in RVNAF depots was approximately 5 feet long and weighed over 200 pounds. None of these were acceptable and the request was later withdrawn.

4. Weapon Sight Suitability

Operators, through use of the sights, were credited with at least eight VC casualties: three KIA confirmed, three KIA unconfirmed, one WIA unconfirmed and one captured. (See annex D.) In view of the number of times the sights could have been used, and were not used, this represents a very small contribution. Weapon sights were in the hands of using units 783 nights during the evaluation but they were used only 79 nights, or barely 10 percent of the time. The total number of nights was derived by crediting a unit with one night whether it had one sight or five sights. The number of nights sights were used was derived by adding the number of nights each unit used one or more sights. Thus, if a unit had five sights for eight nights and used three sights for two of these nights it was credited with using its sights two of eight nights. On the other hand, by "sight-night" computation, the unit would have received credit for only six out of 40 nights. A sight-night is one sight available for one night.

RVNAF units which had sights issued were divided into three categories for analysis: 1) those that used sights regardless of the presence of evaluators; 2) those that used sights only when ACTIV evaluators were physically present; and 3) those that did not use the sights at all.

Of a total of 13 units, 6 used sights whether evaluators were present or not. These were the 23d Ranger Battalion, the 44th Infantry Regiment, the 23d Reconnaissance Company, the Special Forces unit at Ben Soi, the 6th Airborne Battalion, and the subsector headquarters at Ma Cay. These units had sights for 421 nights and used them on 61 nights, or 14.5 percent of the time (figure 2).

Four units used sights only when the evaluators were present. When the evaluators departed the sights were not used. Units under this

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<u>Unit</u>	<u>No. of Nights Sights Could Have Been Used</u>	<u>Nights Used In Offense (a)</u>	<u>Nights Used In Defense</u>
23d Rgr Bn	57	6/57 (b)	0
44th Inf Regt	84	2/8	15
23d Recon Co	84	9/12	0
SF, Ben Soi	55	4/? (c)	3
6th Abn Bn	102	0/0 (d)	20
Ma Cay subsector	39	0/0	2
Totals	421	21/? (e)	40 (e)

(a) Number before/ indicates nights sights were used.
Number after/ indicates nights during which units were reported to have been engaged in night offensive operations away from home station.

(b) 23d Ranger Battalion conducted nightly ambushes north of Tuy Hoa.

(c) Ben Soi used sights on offensive operations four nights. The unit operated offensively without sights other nights, but did not submit a complete report.

(d) 6th Airborne Battalion was in the field on extended daylight offensive operations. At night the unit bivouaced and set out perimeter defenses.

(e) According to available data weapon sights were used 22 percent of the time they could have been used on offensive operations and 12 percent on defense.

(U) FIGURE 2. Units that used sights regardless of presence of evaluators.

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category were the Special Forces units at Suoi Da, Gia Vuc, and Tinh Bien, and the 1st Battalion of the 11th Infantry Regiment. These units had sights for 207 nights and used them on 18 nights, or less than 9 percent of the time (figure 3).

Three units, the 3d Airborne Battalion, the 44th Ranger Battalion, and the 2d Marine Battalion, did not use their weapon sights at all. These units had their sights a total of 155 nights. The 2d Marine Battalion was in the field when the unit's five operators who were trained in Saigon arrived with their sights, accompanied by an ACTIV evaluator. The evaluator reported that the Marine battalion commander looked at the sights which were in the carrying cases, picked up one case and commented that the sights were too heavy and he did not want them. The evaluator persuaded the Marine commander to witness a demonstration of the sights at night. For two nights the evaluator demonstrated the sight. The commander and the US advisor to the battalion were impressed with its capability but the commander still maintained that the sights were too heavy. After five days the sights were returned to ACTIV and subsequently issued to another unit.

The 44th Ranger Battalion had been operating in the field when it was selected to participate in the evaluation. Before the field evaluation began, however, the battalion's mission was changed to IV Corps reserve and it operated as a reaction force. In its new mission the battalion was based in Can Tho and it never operated offensively at night. It manned defensive outposts west of Can Tho nightly but did not use its weapon sights because the battalion commander said there were no Viet Cong in the area. After 48 days the five sights were transferred to another unit.

The 3d Airborne Battalion was permitted to keep its sights for 102 days because the battalion commander maintained that he wanted the sights because of their potential. The sights were not used because the battalion did not operate at night.

It is of interest to note that of the 13 Vietnamese commanders whose units had weapon sights, 7 stated they wanted sights, 1 had no comment, and 5 stated they did not want the sights. The units whose commanders claimed they wanted weapon sights used them 53 out of 541 nights, or 9.8 percent, whereas the units whose commanders claimed they did not want sights used them 19 out of 177 nights, or 10.7 percent.

There were several reasons given by Vietnamese commanders for not using their weapon sights more frequently. Two commanders stated that their units only infrequently had the opportunity to operate at night. One stated that although his unit was in the field on extended operations they rarely made contact with Viet Cong at night and therefore went into bivouac. Five commanders expressed apprehension about using their sights for fear of losing them to the Viet Cong. Two commanders explained that the sights

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<u>Unit</u>	<u>No. of Nights Sights Could Have Been Used</u>	<u>Nights Used In Offense(a)</u>	<u>Nights Used In Defense</u>
SF, Suoi Da	52	3/? (b)	12
SF, Gia Vuc	72	1/3	0
SF, Tinh Bien	19	0/0	1
1st Bn, 11th Inf Regt	64	0/1	1
Totals	207	4/? (c)	14 (c)

- (a) Number before/ indicates nights sights were used.
Number after/ indicates nights during which units were reported to have been engaged in night offensive operations away from home station.
- (b) Suoi Da reported 10 nights of offensive operations, during which sights were used three nights. The unit operated offensively without sights other nights, but did not submit a complete report.
- (c) According to available data weapon sights were used 25 percent of the time they could have been used on offensive operations and 7 percent on defense.

(U) FIGURE 3. Units that used sights only when evaluators were present.

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hindered foot movement through dense jungle. They claimed that branches and brush caught on the many projections on the sight, resulting in delay of movement.

Evaluators and US advisors unanimously believed that weight played a significant role in RVNAF reluctance to use the sights. The average Vietnamese soldier on an extended operation of up to 10 days duration carried approximately 40 pounds of equipment, including his individual weapon, up to 600 rounds of ammunition, clothing, steel helmet, rice and food, mosquito net, blanket, and varying numbers of mines and demolitions. Since the average Vietnamese soldier weighs only 110 pounds, the weight he carried represented more than one-third of his entire weight, or the equivalent of a 55 pound load for a US Army soldier weighing 160 pounds. The added weight of the infrared weapon sight, 13 pounds, raised the weight carried by the Vietnamese soldier to nearly one-half (48 percent) of his entire weight. This would be equivalent to a load of 78 pounds for the 160 pound soldier, compared with a 40 pound basic load prescribed for soldiers in the US Army. Even in defensive positions the sight was considered too heavy for the Vietnamese soldier except when the weapon was supported. The telescope assembly and light source, weighing five pounds, nearly doubled the weights of the carbine and M-16, and increased the weight of the M-1 by 50 percent. For this reason weapons were supported on paddy dikes, sand bags, boxes, etc., whenever possible. The machinegun was always employed on a tripod.

5. Use of IR Sights by US Units in Vietnam

Although not called for in the evaluation, a note describing the attitude of US units in Vietnam toward infrared weapon sights is felt to be valuable. Shortly before and during the evaluation three US units were deployed to Vietnam: the III Marine Amphibious Force, the 173d Airborne Brigade, and the 2d Brigade of the 1st Infantry Division. Representatives from each of these units were queried and, for various reasons, each stated that their units were not using their sights. One unit representative stated that his unit had not been trained in the use of sights and requested an ACTIV evaluator to conduct a short course of training for the unit. When the evaluator reported to the unit several weeks later he was told that the unit was not planning to use its sights and therefore the instruction would not be required. In another unit, officers from one battalion revealed that the battalion could not use its sights because the sights were issued with M-14 rifle brackets yet the unit was equipped with M-16 automatic rifles. The Limited War Laboratory, at the request of ACTIV, fabricated 20 additional brackets for M-16 rifles, 10 for each battalion in the unit, on an expedited basis. When the brackets were delivered it was discovered that the representative from the other battalion in the unit had no idea whether his battalion's sights had been brought to Vietnam or left in the unit's out-of-country base. The unit had been in Vietnam more than three months at the time. The third unit's representative reported that no elements of the unit were using their weapon sights.

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6. Findings

- a. The maximum range of vision obtained from any weapon sight was 175 meters. The average range was 100 meters.
- b. The brackets for mounting infrared weapon sights on the carbine and the M-1 rifle did not allow aimed accurate fire during daylight with the IR sight dismounted.
- c. The standard battery charging rack required modification before it could be used to charge the nickel-cadmium batteries issued with the Polan P-155 weapon sight.
- d. All students who successfully passed their courses of instruction were competent in the boresighting, operation, and first echelon maintenance of sights.
- e. There was more command interest in those units that conducted their own training than in units whose students were trained away from their units.
- f. None of the Vietnamese units employing the sights had the proper electrical facilities for operating the battery charging rack. Two units had no capability to charge batteries and 11 units used US facilities.
- g. Infrared weapon sights were used during only 79 of 783 nights, or 10 percent of the time during the evaluation.
- h. Six of thirteen units used sights when evaluators were and were not present with the units.
- i. Four of thirteen units used their sights only when evaluators were present.
- j. Three of thirteen units did not use their sights at all.
- k. During the 79 nights infrared weapon sights were used, operators were credited with three VC KIA confirmed, three VC KIA unconfirmed, one VC WIA unconfirmed, and one VC captured.
- l. Vietnamese commanders gave varying reasons for reluctance to use their sights: two stated their units did not operate at night; one stated he rarely made contact with VC at night; five feared loss of sights to VC; and two claimed the sights hindered foot movement through jungles.
- m. Vietnamese commanders, operators, officers and non-commissioned officers were unanimous in stating that the infrared weapon sight was too heavy for the Vietnamese soldier.

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B. (C) OBJECTIVE 2 - DOCTRINE OF EMPLOYMENT

As an approach toward meeting the second objective, two basic questions were asked: 1) How can the IR sight best be employed in offensive operations? and 2) How can the IR sight best be employed in defensive operations?

1. Evolution of Doctrine

The doctrine for employment of infrared weapon sights by RVNAF units was initially based on US doctrine. United States Training Circular 5-9 (reference 18, annex H) states that the weapon sight is primarily a defensive weapon because of its weight and bulk. Nevertheless, Vietnamese commanders were encouraged by the evaluators to consider using their sights in various ways, offensively as well as defensively, in view of the increased emphasis on night fighting. Discussions were held among evaluators and project officers and ideas developed during these discussions were then presented to the US advisors and Vietnamese commanders of the participating units. Further discussions were held throughout the evaluation with representatives of these units, primarily commanders and advisors, but also with commissioned and non-commissioned officers and operators.

As a result of these discussions, the following theoretical doctrine evolved for use of infrared weapon sights by RVNAF units:

a. Offensively

- (1) To provide early warning and aimed fire capabilities for night ambushes.
- (2) To contribute to security and provide added surveillance capability during night movements.

b. Defensively

- (1) To assist in the early detection and identification of enemy night movement.
- (2) To contribute to night defenses by providing added surveillance and aimed fire capabilities.
- (3) To select point targets for other weapons through the use of tracer ammunition.
- (4) To delineate area targets for squad or platoon size units through the use of tracer ammunition.

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- (5) To identify friendly patrols by observation or prearranged infrared signals.

c. Multiple use of Sights

To brighten the image at a given range or to increase the range for a given light level, two or more weapon sights could be employed to mutually support each other under any of the above conditions.

2. Acceptance of Doctrine

An analysis of the methods in which the weapon sights were actually used revealed that not all of the doctrinal points proposed were implemented. On offensive operations when sights were employed they were invariably used to provide early warning and aimed fire capabilities for night ambushes. On defensive operations the sights were used to increase the surveillance and early detection capabilities of night outposts and to contribute to night perimeter defenses. All units which used their weapon sights accepted these methods for using their sights.

Four units on eleven different occasions used their weapon sights to contribute to security and provide added surveillance capability during movement at night. These units were the 23d Ranger Battalion, the Special Forces unit at Suoi Da, and the Special Forces units at Ben Soi and Gia Vuc. The only unit among these that considered this technique to be effective was the 23d Ranger Battalion. The other units felt that too much time was lost when the patrols stopped to use the sights for surveillance.

All of the doctrinal points proposed were accepted in theory by the Vietnamese commanders and their US advisors; however, because of the tactical situation and the infrequent use of the weapon sights, not all the proposals were put into practice.

3. Findings

- a. Four of the seven doctrinal points developed were applied.
- b. All units which used sights on offensive operations to provide early warning and aimed fire capabilities for night ambushes accepted the doctrinal point.
- c. All units which used sights in defense to assist in early detection of enemy night movement accepted this doctrinal point.
- d. All units which used sights on defense to contribute to night perimeter defenses accepted this doctrinal point.

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e. Three of the four units which used sights to contribute to security and provide added surveillance capability during night movement rejected the doctrinal point that sights should be used in this capacity.

C. (C) OBJECTIVE 3 - BASIS OF ISSUE

As an approach toward meeting the third objective, three basic questions were asked: 1) To what units should infrared weapon sights be issued? 2) How many should be issued to each unit? and 3) Should the infrared weapon sights be TOE equipment or items of special issue?

This objective was not met because the weapon sights were not used enough to permit a determination of basis of issue.

Even if this objective had been met with firm recommendations, such recommendations would have been unsupportable since the findings under objective 1 lead to the conclusion that it would be undesirable to issue the weapon sights to RVNAF units.

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IV. (C) CONCLUSIONS AND RECOMMENDATIONS

A. (C) CONCLUSIONS

It is concluded that:

1. The Polan Model P-155 infrared night vision weapon sight met its design characteristics except in its rated range.

2. It is undesirable to issue infrared weapon sights to RVNAF units because:

a. The sight was too heavy for the average Vietnamese soldier.

b. Most RVNAF units did not have available to them the electrical facilities required to charge nickel-cadmium batteries. None had such facilities when on operations away from base stations.

c. Weapon sights were not used enough to justify their issue to RVNAF units.

B. (C) RECOMMENDATION

It is recommended that Polan Model P-155 infrared night vision weapon sights not be issued to RVNAF units.

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(C) ANNEX A

SETTING OF THE EVALUATION

1. (U) ENVIRONMENT

The Republic of Vietnam (RVN) occupies a crescent-shaped area of about 67,000 square miles on the southeastern edge of the Indochina Peninsula. Although only 45 miles wide at the 17th parallel, its demilitarized northern border with the Democratic Republic of Vietnam (North Vietnam), it has a seacoast of 1,500 miles on the South China Sea and Gulf of Siam, and western borders with Laos and Cambodia of about 900 miles. The land borders are poorly defined and drawn through difficult and inaccessible terrain.

a. Terrain

There are four distinct geographical regions: The highlands located in the north and central portion, the plateaus of the central highlands, the coastal plain, and the Mekong Delta in the south. See figure A-1.

The northern two-thirds of the RVN is dominated by a chain of broken mountains and rugged hills extending in a northwest-southeast direction and terminating on the northern edge of the delta plain about 50 miles north of Saigon, the capital. The area is characterized by steep slopes, sharp crests, narrow valleys, and dense vegetation. It is sparsely populated, mainly by primitive and nomadic tribes, and it contains few roads or trails.

The central highlands adjacent to the Laos-Cambodia border contain extensive plateau areas. Here, the mountains give way to more gently rolling terrain. The northern plateau is covered by almost impenetrable tropical forests and jungles, which often have two dense overhead layers of foliage at heights of about 40 and 125 feet. The southern portion is typical savannah country, with large open expanses covered by tropical grasses and open forests. This region is more heavily populated than the northern highlands and has more roads and trails.

The coastal plain, varying from 10 to 25 miles in width, extends from the 17th parallel to the Mekong Delta. At several places mountain spurs jut out to the sea, cutting the plain into a series of compartments roughly at Mui Dinh, Mui Ke Ga, Quang Ngai, Da Nang, and Hue, north of which the spurs become more frequent. The area is characterized by sandy beaches and dunes, backed up by rice fields, fertile areas, and marshes extending to the mountains. It contains many small cities.

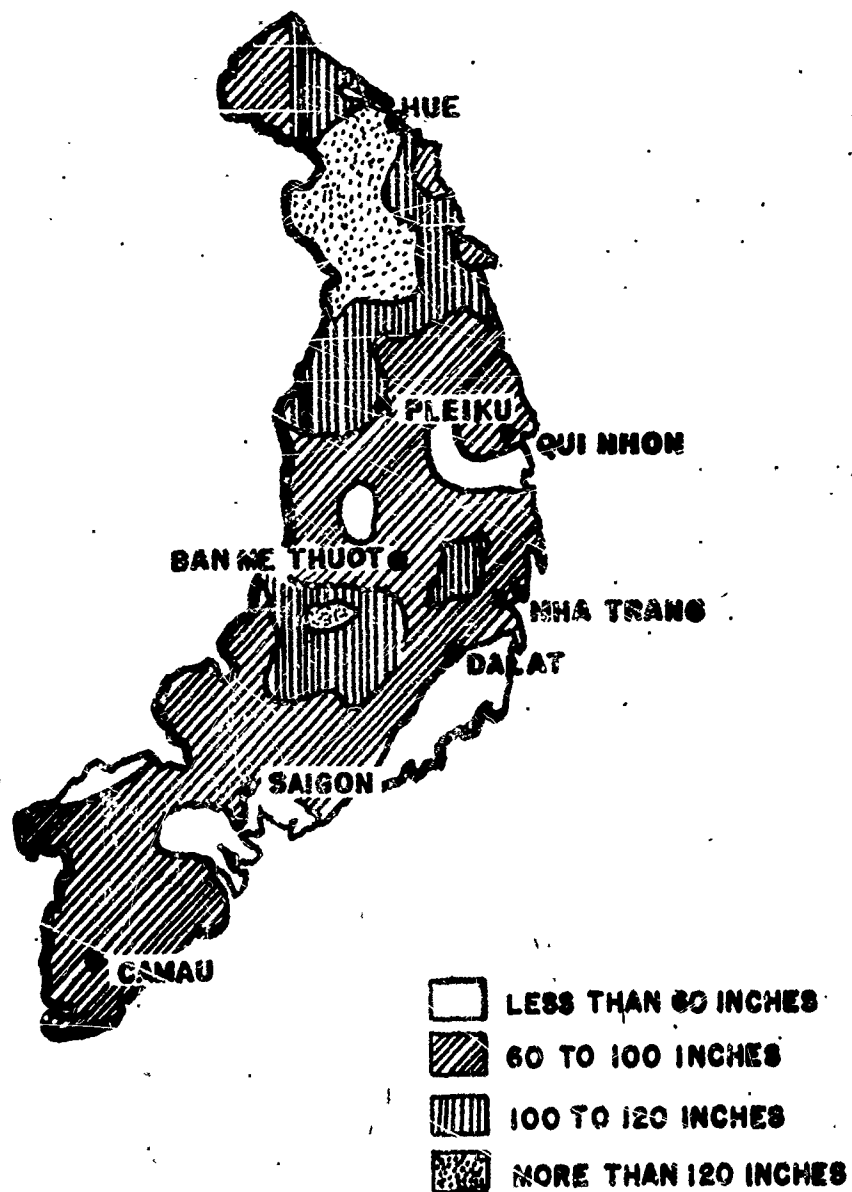
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The southern third of the country is part of the large delta plain formed by the rivers Hau Giang, Mekong, Vam Co, Saigon, and Dong Nai. The Hau Giang flows directly to the South China Sea. The huge Mekong splits into four branches, and the Vam Co and Dong Nai enter the Saigon before reaching the sea. In addition to these major tributaries, the area is cut by a number of smaller streams and a dense network of canals. The plain is relatively flat with few points exceeding an elevation of 20 feet above sea level. It is a very fertile area with more than 9,000 square miles under rice cultivation. Drainage is effected chiefly by tidal action, with the difference between ebb and flood as much as ten feet in some areas. The southernmost tip of the delta, known as the Ca Mau Peninsula, is covered with dense jungles, and mangrove swamps stand at the shoreline and on river estuaries. The eastern portion of the delta plain is heavily forested. The Plain of Reeds, a large marshy area covered with tall reeds and scrub trees, is located in the center of the delta region adjacent to the Cambodian border. During the rainy season, a major portion of the entire area is completely inundated.

b. Climate and Weather

The climate is hot and humid, subtropical in the north and tropical in the south where the monthly mean temperature is about 80 degrees Fahrenheit. The annual rainfall is heavy in most regions and torrential in many. It is heaviest at Hue which has an annual average of 128 inches. The low of 28 inches at Mui Dinh, a small cape on the eastern coast some 62 miles south of Nha Trang, results from the presence of hills in the area. At Saigon, rainfall averages 80 inches annually. See figure A-2.

Seasonal alternation of monsoon winds profoundly influences the weather throughout the year, although geographical features alter patterns locally. The winter monsoon blows generally from the northeast from early November to mid-March and often brings floods to the northern portion of the RVN. This is the period of the dry season in the delta, which usually lasts from December through March. The winds begin to shift in March, and with the exception of the coastal plain, high temperature and humidity prevail in all of the RVN from April to mid-June. The summer monsoon blows generally from the southwest from mid-June to late August or early September, bringing to the delta region maximum cloudiness. Mountains cause clouds to pile up and deposit moisture before the clouds reach the coastal plain or the northern highlands, which areas are dry during this period. In September the winds begin to shift again, and the coastal plain receives its maximum amount of rain and cloud cover, including severe tropical storms and typhoons.



(U) FIGURE A-2. Annual precipitation. RVN.

c. Communications

Roads throughout the RVN are few in number, poorly cared for, and narrow. Road travel to major areas in the north is often stopped completely when bridges and narrow places are destroyed, either by natural causes or the Viet Cong (VC). In the delta region, 2,500 miles of navigable inland waterways ease somewhat the communication burden placed on the 1,200 miles of primary and secondary roads in the region.

A single-track, narrow gauge railroad connects Saigon with the northern provinces by way of the coastal plain. The system and equipment is old and frequently damaged by the VC.

There is no wire telephone communication among the major centers of population. What radio telephone service is available is at the mercy of the often unstable atmospheric conditions over the RVN. Telephone equipment used in major cities is antiquated or makeshift.

In effect, rural areas are virtually isolated. It is not unusual for a VC act of terrorism or sabotage to take place in an outlying delta area and be reported in Saigon a week or more later. Most incidents accounted for take at least two or three days to get into the situation reports to Saigon.

d. Population

The RVN has a population of approximately 15.7 million, with an average density of 234 per square mile. The highland region is generally the least settled of the geographic areas of the RVN, and the coastal plain contains the most people. About 90 percent of the people live on the 13 percent of the land best suited for rice cultivation: the delta and the small river basins of the coastal plain.

Racially, the population is composed of 85 percent ethnic Vietnamese, 6 percent Chinese (who have established a great influence on the economy of the RVN), 5 percent Montagnard (the nomadic aboriginal tribe people living in the highlands), 3 percent Khmer-Cham (of Cambodian descent), and 1 percent European, Indian, and other small groups.

Religiously, about 80 percent profess Buddhism, about 10 percent profess Catholicism, and the rest profess Muhammedanism, Hinduism, Protestantism, Cao Daim, or Hoa Haoism (two local sects).

Socially, there is an upper class composed of old mandarin families, landed gentry, government officials, professional men, intellectuals, clergy, and wealthy businessmen; an urban middle class of civil servants, teachers, and small businessmen; and a lower class, mainly composed of farmers, but with a growing group of urban workers. Mobility upward within the structure is possible but difficult, especially up from the lowest.

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Vietnamese culture is based on traditional Chinese customs and has been profoundly influenced, especially among the upper class living in the cities, by the French. Most rural Vietnamese continue to follow the traditional way of life. The great divergence in racial, religious, social, and cultural structures has produced continued strife and tension among the people who belong to the various groups. There seems to be no evidence of a permanent stabilizing force available within the Vietnamese society to control conflicting elements.

The Vietnamese have a deep and traditional belief in destiny and man's inability to change the natural order of events. This concept, reinforced by religious beliefs, results in a high valuation of the virtues of stoicism, patience, and endurance. The Vietnamese are proud of their ethnic traditions and hold themselves superior to ethnic minorities in the RVN and to the peoples of neighboring countries.

Most of the people living in the countryside, who make up 90 percent of the population and who provide the main targets for the VC, care neither for the government in Saigon nor for the VC. They want to be left alone to grow their crops, raise their families, have a tranquil old age, and die traditionally.

2. (C) MILITARY ELEMENTS

a. Friendly

In order to provide a broad base for data collection, infrared weapon sights were distributed to various types of units located in each of the major terrain areas in RVN. Weapon sights were located in the mountainous area in I Corps, in the central highlands and coastal region in II Corps, near the Cambodian border in III Corps, and in the Mekong Delta region in III and IV Corps. The types of units in which weapon sights were evaluated included Special Forces, airborne, infantry, reconnaissance, ranger and subsector (Regional Forces) units. In addition, although sights were not issued to the units, special one-day tests were conducted with a river patrol and an airborne surveillance element. Insofar as possible, and upon the recommendations of US advisors concerned, units were selected for demonstrated proficiency in skills of night fighting; for anticipated frequent combat operations to insure maximum use of weapon sights; and on the basis of past combat experience and demonstrated professional competence of individual soldiers and leadership qualities of unit commanders.

Units to which weapon sights were issued during the evaluation are listed in figure A-3. Also listed are the home base locations of the units and the inclusive dates during which they had weapon sights. Most units operated at or near their home bases. This was not true, however, for the airborne battalions, the Marine battalion, and the 44th Ranger battalion. During the evaluation the airborne battalions operated in the An Khe-Pleiku-Kontum areas of II Corps; the Marine battalion operated

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in the vicinity of Bong Song (II Corps); and the 44th Ranger Battalion was in the IV Corps Tactical Zone (CTZ). The areas in which units operated during the evaluation are shown in figure A-4.

<u>Unit</u>	<u>Location of Home Base</u>	<u>Dates with Sights</u>
Special Forces	Suoi Da	31 Mar to 21 May 1965
44th Ranger Battalion	Can Tho	2 Apr to 19 May 1965
3d Airborne Battalion	Saigon	4 Apr to 14 Jul 1965
6th Airborne Battalion	Vung Tau	4 Apr to 14 Jul 1965
2d Marine Battalion	Thu Duc	8 Apr to 12 Apr 1965
Special Forces	Gia Vuc	8 Apr to 18 Jun 1965
23d Reconnaissance Company	Ban Me Thuot	22 Apr to 14 Jul 1965
44th Infantry Regiment	Tuy Hoa	22 Apr to 14 Jul 1965
Ma Cay Sub-Sector	Ma Cay	4 May to 11 Jun 1965
1st Battalion, 11th Inf Regt	Ba Dua	12 May to 14 Jul 1965
23d Ranger Battalion	Tuy Hoa	19 May to 14 Jul 1965
Special Forces	Ben Soi	21 May to 14 Jul 1965
Special Forces	Tinh Bien	5 Jul to 23 Jul 1965

(C) FIGURE A-3. Units which participated in the evaluation.

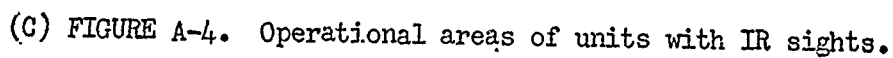
(1) The Special Forces unit at Suoi Da consisted of four Cambodian and two Vietnamese Civilian Irregular Defense Group (CIDG) companies. The unit had the missions of providing one company for the security of a radio relay station on Nui Ba Den Mountain, the predominant terrain feature in Tay Ninh province, and conducting operations in the area surrounding the camp. Operations were usually conducted by one or more F teams of 15-man patrol units, organized one from each company. The F teams conducted reconnaissance and ambush patrols within range of two 105mm howitzers located in the camp.

(2) The 44th Ranger Battalion had a strength of over 400 men. At the time the units were selected for participation in the evaluation it had a mission of conducting normal combat operations. However, when the weapon sights arrived, the battalion's mission had been changed to IV Corps reserve.

(3) The units of the airborne brigade were a part of the reserve for ARVN. Airborne units were subject to being airlifted to critical areas anywhere in RVN in battalion strength and they operated under two concepts: short operations, usually during daylight, in which the units were pulled back to their reserve positions immediately after the action had ceased; and long-range operations, such as search and clear and road security, which lasted 30 days or more. On all operations, units moved on foot since they had no vehicles.

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(4) The Marine brigade was held as a general reserve force and its units were deployed as needed anywhere in RVN. The 2d Marine Battalion was attached to the 22d Division during the time it had weapon sights. Its missions were: combat search and destroy operations of 3 to 4 days duration; road clearing operations which lasted up to 3 weeks, during which time the unit was responsible for route security; and relief of weakened outposts in II CTZ. The unit operated at least at battalion strength, usually as part of a task force.

(5) The Special Forces unit at Gia Vuc consisted of three Montagnard CIDG companies whose missions were: pacification of the area at the head of the Song Be River, conducting civil affairs (CA) operations, and conducting combat operations against the Viet Cong in the general area of the camp. The unit conducted civic action patrols and day and night platoon-size combat and reconnaissance patrols.

(6) The 23d Reconnaissance Company consisted of approximately 120 men including officers. The company has fought in all the provinces of II Corps in operations generally lasting from 5 to 7 days. Its missions were area reconnaissance and ambush. Generally, the unit would occupy an area before dark, then would relocate after dark and set up ambushes along approaches to the first site.

(7) The 44th Infantry Regiment, consisting of two battalions, had the missions of defending the coastal city of Tuy Hoa and of pacifying an area generally south of Tuy Hoa. Normally, one battalion assumed the latter mission while the other secured a chain of bridges which cross the Da Rang River near Tuy Hoa. Generally, defenses were organized shortly before dark and the units remained stationary until first light.

(8) The town of Ma Cay, in Kien Hoa sector, was defended by a Regional Force (RF) battalion which also manned 11 outposts along a 10 kilometer strip of road which led north to Ben Tre. Because of the VC threat in the area, the RF unit was reinforced by an ARVN battalion. The RF unit conducted few combat operations.

(9) The 1st Battalion of the 11th Infantry Regiment had a strength of approximately 300 men and its mission was threefold: to perform in a CA role around the town of Ba Dua, to provide security for Ba Dua, and to participate in combat operations in the 7th Division area.

(10) The 23d Ranger Battalion had the missions of defending the coastal city of Tuy Hoa and of pacifying an area generally north of Tuy Hoa.

(11) The Special Forces unit at Ben Soi consisted of five CIDG companies, one Cambodian company (-) and four Vietnamese companies. The unit had the missions of interdicting VC river traffic on the Oriental River, conducting CA operations in the local area, and conducting combat

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operations in the area between the Oriental River and the Cambodian border. Tactical operations consisted of company size combat patrols and platoon size night ambushes and outposts around the camp and village of Ben Soi.

(12) The Special Forces unit at Tinh Bien consisted of five CIDG companies, of which one was Cambodian and four Vietnamese. The unit's mission was threefold: to conduct combat operations in the surrounding areas, to conduct border surveillance along a specific portion of the Cambodian border, and to conduct civic action within its sector of responsibility.

b. Enemy

It is a well-documented fact that the Communist apparatus in the RVN is an extension of the Communist party of North Vietnam, and that direction and materiel and personnel support is received from the North. Supreme authority in the VC political and military organization in the RVN is the Central Office South Vietnam located in Tay Ninh Province near the Cambodian border. Subordinate thereto are four military regions and one special zone (corresponding roughly to the capital area), each of which has a subordinate series of provincial, district, and village-commune party committees.

(1) Units

The VC military forces can be divided into 3 operational categories: main force, local force (together about 35,000 troops), and militia units (60,000 to 80,000 soldiers). The main force consists of full-time units controlled by the military region. Local force units are controlled by province and district committees. They are well-organized, and the personnel are well-trained and well-equipped. Militia units are full- and part-time local armed groups responsible to district, village, and hamlet authorities. Personnel of these units are used frequently as intelligence gathers, porters, or as reinforcements for main and local force units. They may replace losses in the local force.

A VC battalion is planned for 400 to 500 men but in reality may consist of as few as 250. A company averages 100 men and a platoon about 30. Personnel may be acquired voluntarily, by kidnapping, or by impressment using blackmail or threats of violence. There is evidence that large numbers (a total of about 45,000 in four years since 1960) of native-born North Vietnamese have infiltrated from North Vietnam through Laos into the RVN.

Viet Cong forces are in general lightly equipped and have a commensurate degree of cross-country mobility. In addition to individual weapons, they have a large number of automatic weapons, and light crew-served weapons. The larger units are equipped with mortars and recoilless rifles. Supplies are obtained through capture, local

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procurement, taxation, and infiltration. Food staples such as fish, rice, and manioc are readily available.

(2) Capabilities

Because of support rendered by the country people, familiarity with the area, lack of responsibility for life and property, and the nature of guerrilla organization, equipment, and tactics, the VC are able to move virtually at will throughout much of the RVN. They are able to exploit as necessary the differences in race, religion, class, economic condition, and cultural background of their targets. They have a well-developed intelligence system, good discipline, and a usually effective security system.

Viet Cong military operations have the advantages of speed, surprise, deception, and infiltration. Training, accomplished in small, local areas by well-indoctrinated cadre, probably emphasizes selection of the most vulnerable targets, night operations, movement as small units until concentration is required, terrorism and propaganda, use of weapons, employment of terrain and weather, and infiltration. The VC objective is not, at the present stage of their insurgency, to hold terrain, but rather to inflict losses on government forces, to capture weapons and materiel, and to convince the people that the government in Saigon cannot protect them and will eventually be defeated.

(3) Limitations

Viet Cong limitations stem from their need for strong security and the largely clandestine nature of their activities. Although the people among whom they live afford them a high degree of protection, active and passive, force must often be used, and support based on threats and fear endures only as long as pressure is brought to bear. Primitive living conditions add to the strain of avoiding government troops until the right moment. The VC are vulnerable to air and artillery attack, and less so to armor attack. Limited logistical capability, lack of communications, and insufficient medicine are other weaknesses.

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(U) ANNEX B

EQUIPMENT DESCRIPTION

1. GENERAL DESCRIPTION

The Polan Model F-155 infrared night vision weapon sight is a complete, self-contained, near-infrared optical system. This system is composed of a near-infrared, image forming telescope and an attached reticle projector; an internal high-voltage power supply and battery; a near-infrared light source for mounting on the telescope; a nickel-cadmium battery with canvas bag and connecting cable for furnishing power to the light source; a weapon sight mount; a bag of special tools; spare infrared filter, batteries, and lamps; and a carrying case for all the associated equipment.

2. DESCRIPTION OF MAJOR COMPONENTS

a. Telescope Assembly

The telescope assembly is a near-infrared sensitive, image-forming, optical system consisting of a type 6914 infrared image converter tube, a 10.0 power aspheric eyepiece with rubber eyeshield, and objective and corrector lenses, resulting in a 4.5 power telescope.

Telescope performance data at 70 degrees Fahrenheit with high voltage power supply applying no more than 15,000 volts to the image tube are listed below. These data were furnished by the manufacturer:

- 1) Resolution: minimum of 0.85 minutes for a high contrast line pattern.
- 2) Brightness gain: minimum of 0.4.
- 3) Magnification: 4.5 (+0.4) (-0.3) power.
- 4) Linear distortion: not in excess of 8 percent at 3 degrees from center of field of view.
- 5) Field of view: 8 degrees.

b. Light Source

The infrared light source is basically a narrow beam spotlight with an infrared filter over the reflector. The infrared light source is provided with azimuth and elevation adjustments in relation

to the weapon sight so that the light beam center can be made to coincide with the center of the telescope's visible range.

With 6 volts applied to the lamp, the beam characteristics of the light source without infrared filter are as follows (data furnished by the manufacturer):

- 1) Peak beam: not less than 125,000 candlepower.
- 2) Horizontal beam spread: not less than $3\frac{1}{2}$ degrees between the points having an intensity 10 percent of the peak beam candlepower.

c. Reticule

The reticle is a light projection system that projects a small vertical bar light pattern into the telescope. This spot can be adjusted in azimuth and elevation and is used as the aiming post.

d. High Voltage Supply

The high voltage supply consists of a BA-42 battery and a 16,000 volt DC power supply, which furnish operating power for the 6914 image tube. The high voltage power supply produces, and will store for a considerable length of time, 15,000 to 16,000 volts DC.

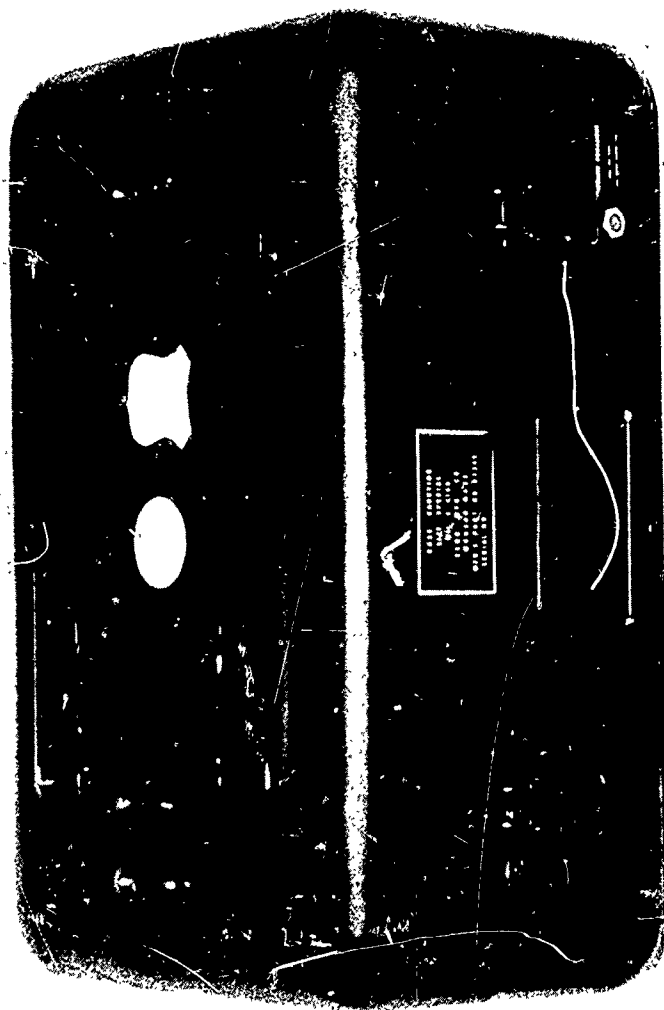
e. Power Pack BB-429

The BB-429 battery is a rechargeable 6-volt nickel-cadmium wet cell. The power pack is carried in a canvas bag which is attached to the cartridge belt by belt clips. The battery supplies 6 volts at 2.8 amperes to the light source through a cable assembly, which is included as part of the power pack. The battery is rated to operate the light source for at least 5 hours before the battery requires recharging, and it can be recharged up to 1000 times.

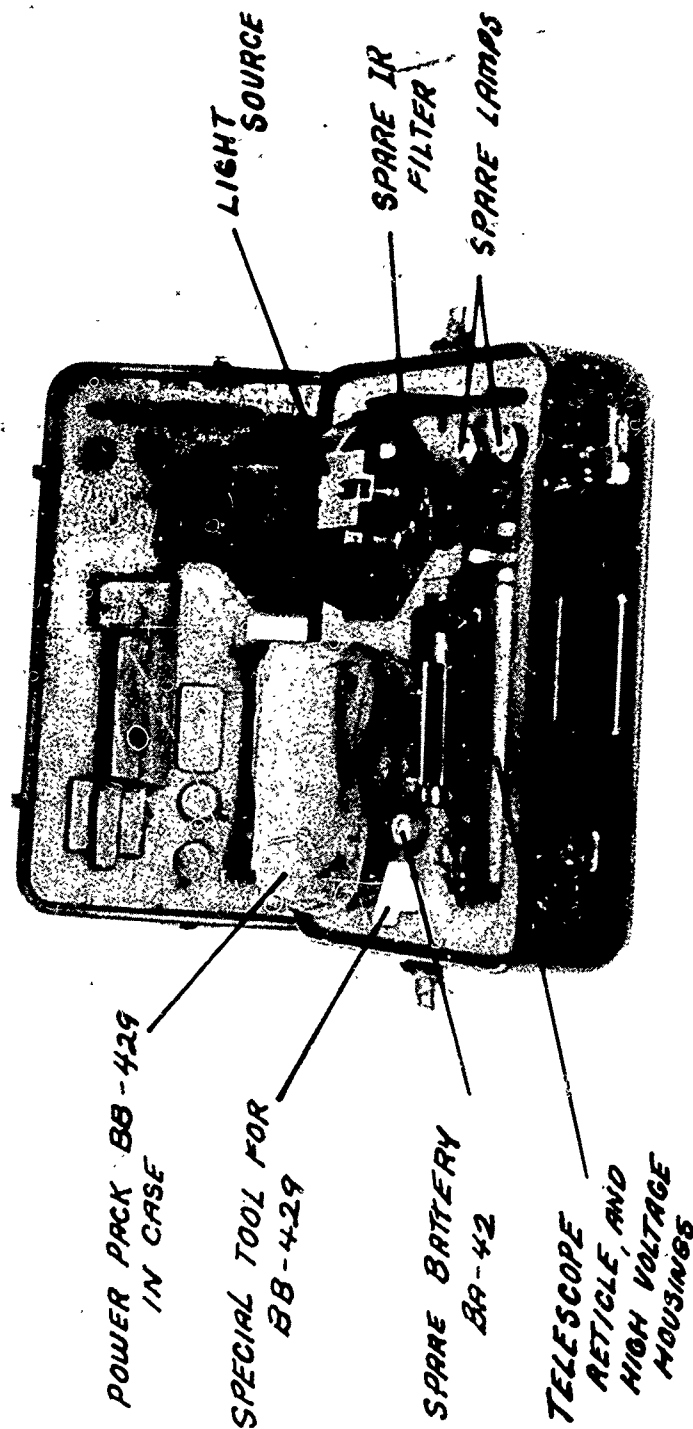
f. Figures B-1, B-2, and B-3 illustrate the metal carrying case, the scheme for storing weapon sight components in the carrying case, and the weapon sight assembled but not mounted on a weapon.

g. Dimensions and Weights

<u>Telescope, Reticule, and High Voltage Housings</u>		<u>Light Source</u>	<u>Power Pack BB-429</u>	<u>End Item in Carrying Case</u>
Length	13 inches	7 inches	8 inches	20 inches
Width	4 inches	7 inches	3 inches	1 1/4 inches

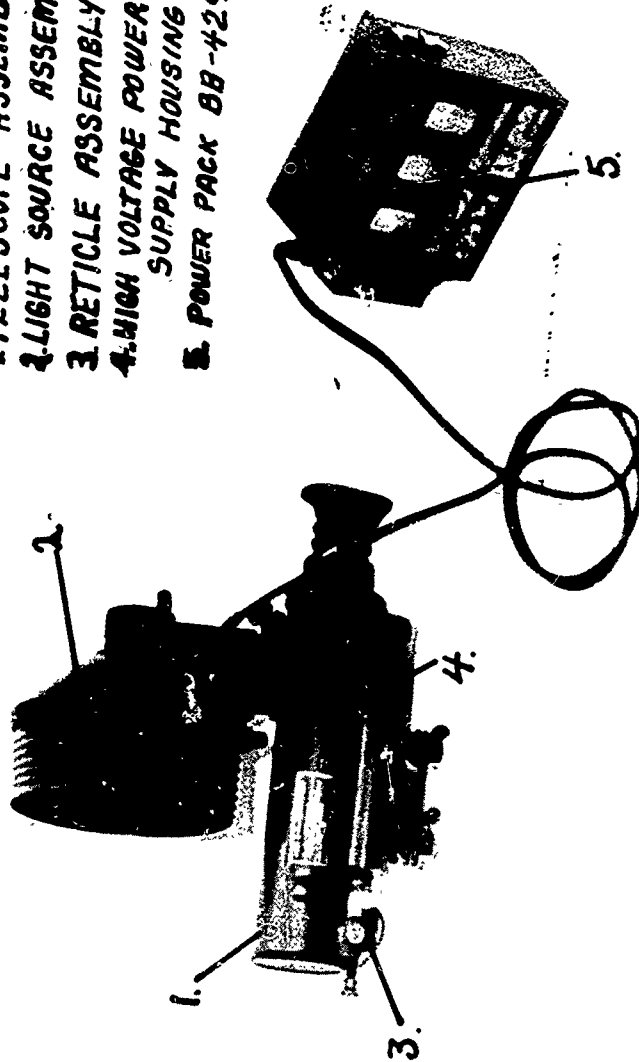


(U) FIGURE B-1. Metal carrying case for infrared night vision weapon sight



(U) FIGURE B-2. Scheme for storing weapon sight components in the carrying case.

1. TELESCOPE ASSEMBLY
 2. LIGHT SOURCE ASSEMBLY
 3. RETICLE ASSEMBLY
 4. HIGH VOLTAGE POWER
 SUPPLY HOUSING
 5. POWER PACK BB-429



(U) FIGURE B-3. Weapon sight assembled but not mounted on a weapon.

	<u>Telescope, Reticle, and High Voltage Housing</u>	<u>Light Source</u>	<u>Power Pack BB-429</u>	<u>End Item in Carrying Case</u>
Height	5 inches	8 inches	5 inches	10 inches
Weight	3 pounds 12½ ounces*	1 pound 12½ ounces*	7 pounds*	31 pounds

*Subtotal weight not including carrying case: 12 pounds, 9 ounces.

3. PERFORMANCE CHARACTERISTICS

The infrared weapon sight is a device for seeing persons and objects in the dark without illuminating them with visible light. Mounted on an individual weapon, it can be used as a fire control device since it has an adjustable reticle which can be zeroed on a known distance range either in daylight, by use of a special sighting disc, or at night. It can also be used in conjunction with another infrared instrument in signalling at night and in detecting enemy infrared equipment. When viewed through the telescope, all objects appear in shades of green.

The weapon sight is designed for use in temperatures ranging from minus 25 degrees to plus 115 degrees Fahrenheit under all humidity conditions. According to the manufacturer, the maximum effective range of the weapon sight is 300 meters. However, infrared has many of the same characteristics as visible light and is dimmed by fog, smoke, and dust. Infrared is also reflected off dust or rain in the air, and by vegetation and objects which are close to the light source. The reflection causes glare which further reduces the range of the system.

4. BRACKETS FOR MOUNTING WEAPON SIGHTS ON VARIOUS WEAPONS

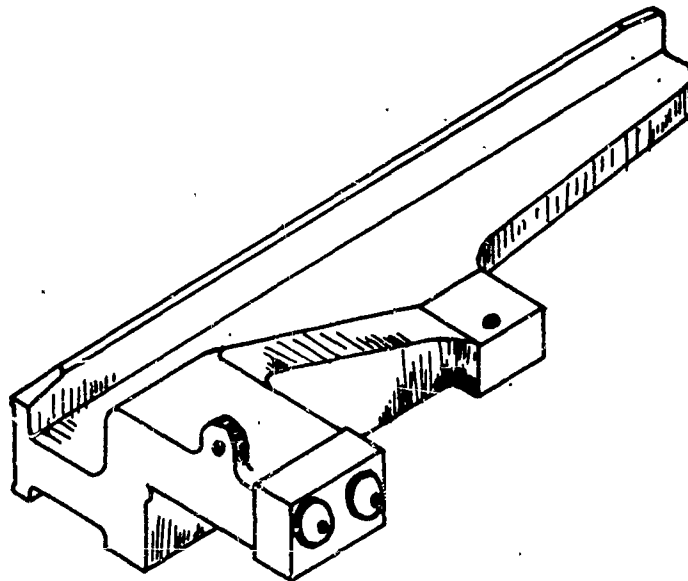
The M-1 rifle with an infrared weapon sight mounted on it is illustrated in figure B-4. In order to install the Limited War Laboratory (LWL) mounting bracket, the standard rear sight of the rifle had to be removed. The bracket had no alternate rear sight to replace the standard rear sight of the weapon.

The LWL bracket for mounting an infrared weapon sight on a carbine is illustrated in figure B-5. In order to install the mounting bracket, the standard rear sight of the carbine had to be removed. The bracket had an unadjustable peep sight to replace the standard rear sight of the weapon. The carbine with the infrared weapon sight mounted is shown in figure B-6.

The M-16 rifle with an infrared weapon sight mounted on it is illustrated in Figure B-7. The LWL mounting bracket was clamped to the weapon in such a way that the standard rear sight of the weapon was not affected. Thus the standard rear sight could be used equally effectively



(U) FIGURE B-4. M-1 rifle with IR weapon sight mounted.



(U) FIGURE B-5. Bracket for mounting IR weapon sight on carbine.

whether the infrared weapon sight mounting bracket was attached to the weapon or not.

The light machinegun with an infrared weapon sight mounted on it is illustrated in figure B-8. The LNL mounting bracket was attached to the weapon in such a way that the standard rear sight of the weapon was not affected. Thus the standard rear sight could be used equally well whether the infrared weapon sight mounting bracket was attached to the weapon or not.

5. BATTERY CHARGING RACK

The Rack, Battery Charging, for Sniperscope, M2, and Sniperscopes, Infrared, Set No. 1, 20,000 volts, charges from one to 12 batteries. Each battery connection on the rack is in parallel, so that each battery is charged independently of the others. The rack operates from either an AC power source or a DC power source. Inserting a selector plug in the proper position automatically makes the connections for operating from whichever type of power source is available. If AC power is available it must meet the following minimum requirements: 110 to 120 volts, 4 amperes, 480 watts, 60 cycles, single phase. If DC power is available, the following minimum requirements must be met: 9 volts, 40 amperes (maximum), 360 watts. The rack is 53 inches long, 8½ inches high, and 8½ inches wide. It weighs approximately 70 pounds and with 12 batteries weighs approximately 160 pounds. (See figure B-9.) Detailed descriptions of methods for connecting and operating the battery charging rack are contained in TM 5-9342 (reference 20, annex H).



(U) FIGURE B-6. Carbine with IR sight mounted.



(U) FIGURE B-7. M-16 rifle with IR weapon sight mounted.



(U) FIGURE B-8. Light machinegun with IR sight mounted.

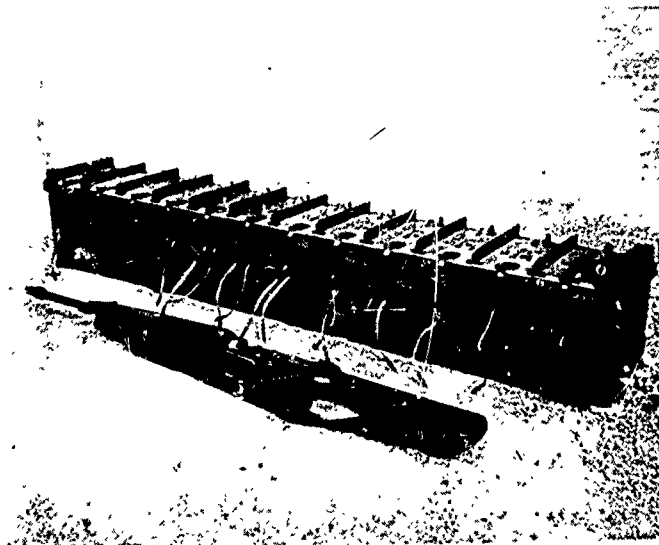
The charging rack was designed to accept an older type of nickel-cadmium battery than is now issued with the Polan P-155 weapon sight. The receptacles on the older battery are rotated 45 degrees from those in the newer battery. In order to permit use of the charging rack with the newer batteries, wires were attached to the underside of the negative and positive terminals of each of the 12 segments of the charging rack. The free ends of these wires could then be inserted into the receptacles of the batteries and the batteries could be charged.

6. CABLES FOR RECHARGING FROM VEHICLES

Because of its weight, size, and electrical requirements the battery charging rack was not carried on operations. To provide a capability for charging nickel-cadmium batteries without charging racks, sets of cables for charging batteries from vehicular batteries were designed.

With one set of cables a single battery could have been charged from a 12-volt vehicular battery or three batteries could have been charged from a 24-volt electrical system. Since these cables represented a field expedient, only a partial charge of batteries could be expected.

Each set of cables consisted of a long pair of cables and a short pair of wires. Each long cable was approximately four feet long and of a diameter sufficient to conduct 12 volts. These long cables had a large



(U) FIGURE B-9. Battery charging rack, modified.

alligator clamp on one end and a blunt fitting for insertion into the charging plugs of the nickel-cadmium battery at the other end. Each short wire, about eight inches long, had blunt fittings on both ends, and was used to charge batteries in tandem.

7. CARRYING CASES

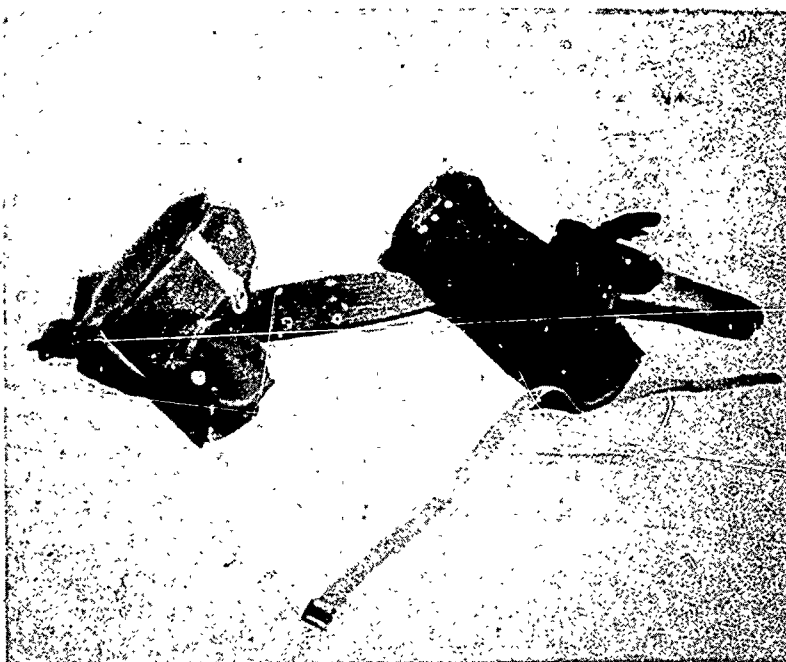
The Polan P-155 infrared weapon sight was issued in a metal water-proof and airtight carrying/storage case which measured 20 x 14 x 10 inches and weighed 18 pounds. The case more than doubled the weight of the infrared equipment. Without exception, all units which had weapon sights complained about the bulk and weight of the infrared system with carrying case.

When attention began to be diverted from the original project of weapon sight evaluation and centered on the size and weight of the system, a method of carrying the sight was devised to reduce the weight of the system components carried on operations, reduce the bulk of the components carried in the field, and enable the weight of the system to be distributed to more than one person. Two sets of carrying cases, one of canvas and one of leather, were designed and made. Each set consisted of two carrying cases, one for the telescope and the other for the light source. Each individual carrying case was designed so that it could be worn on the web belt or attached to a soldier's pack or harness.

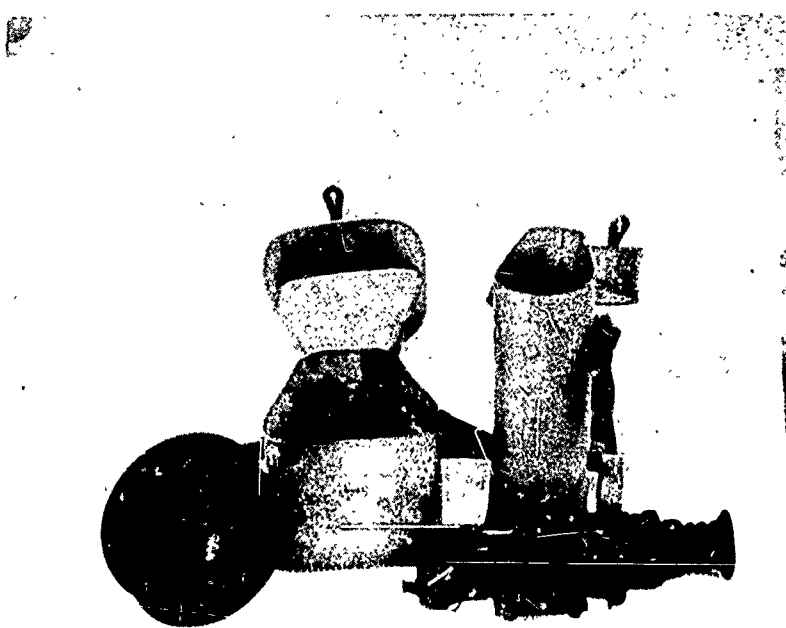
Both canvas and leather provided adequate protection to the items. However, the canvas models proved to be more acceptable than the leather. In comparison to canvas, leather was more expensive, bulkier, and more susceptible to mildew and eventual rot. On the other hand, canvas was more readily available since scraps were adequate, easier to work with, and the cases could be fabricated to form-fit the particular components better. Figures B-10 and B-11 illustrate the carrying cases.

8. MOUNT FOR M-79 GRENADE LAUNCHER

During the evaluation a prototype mount for the infrared weapon sight on an M-79 grenade launcher was locally designed and built. The mount weighed less than two pounds and consisted of a bar attached to the muzzle end of the weapon and extending the length of the barrel, an arc attached near the breech end of the weapon which extended upward to a height of seven inches above the weapon, and a bracket on the bar for mounting the infrared weapon sight. The bar was so attached that the angle between it and the barrel was adjustable. Since the standard front and rear sights of the weapon had to be removed to install the infrared sight mount, the bar was made with a bead welded to its front end and a notch filed into its rear end. This in effect, converted the bar into a sighting plane which permitted firing the weapon without the infrared weapon sight. Accuracies achieved using the bar as a sighting plane were comparable to those with the standard weapon sights. Figures



(U) FIGURE B-10. Canvas carrying cases.



(U) FIGURE B-11. Leather carrying cases.

B-12 and B-13 illustrate the M-79 grenade launcher in firing positions, with the bar adjusted for ranges of 150 and 300 meters, respectively.

The weapon utilizing the infrared sight mount was issued to the 23d Reconnaissance Company. The modified weapon generated much interest among both US and Vietnamese personnel who had the opportunity to see it. The reconnaissance company took this weapon on three operations and employed it in platoon and company-size ambushes. There was no contact with Viet Cong during these operations; however, the company commander and his US advisor considered the M-79 with infrared to have tremendous potential as a night weapon.

Subsequent to the evaluation the prototype mount was transferred to the 1st US Cavalry Division (Airmobile). The division was also enthused over the mount and has since submitted a request to US Army Vietnam for 160 more.



(U) FIGURE B-12. Infrared weapon sight mounted on M-79 grenade launcher, sight adjusted for 150 meter range, left-handed shooter.



(U) FIGURE B-13. Infrared weapon sight mounted on M-79 grenade launcher, sight adjusted for 300-meter range.

(U) ANNEX C

TRAINING

All personnel who were to use the infrared night vision weapon sights were trained in the operation, maintenance, and techniques of employment. Training was conducted in several ways: 1) students were trained in Saigon by personnel from ACTIV and the Combat Development Test Center, Vietnam (CDTC-V); 2) they were trained in their units by ACTIV and CDTC-V personnel; and 3) they were trained in their units by junior officers from the using units after these officers were trained in Saigon.

1. SAIGON TRAINING

Two courses of training were conducted in Saigon prior to the issue of sights to units. The first was run from 15 through 29 March 1965, the second from 12 through 21 April 1965. These courses were taught by personnel from CDTC-V and by project evaluators. Instruction followed a formal program of instruction (see figure C-1). Students instructed were from the 3d and 6th Airborne Battalions, the 44th Ranger Battalion, the 2d Marine Battalion, the 44th Infantry Regiment, and the 23d Reconnaissance Company. A total of 51 students attended classes in Saigon, of which 43 successfully completed the course. The unit from which the eight failures were sent (44th Infantry Regiment) sent eight replacement students to the second course, and all eight replacements passed the course.

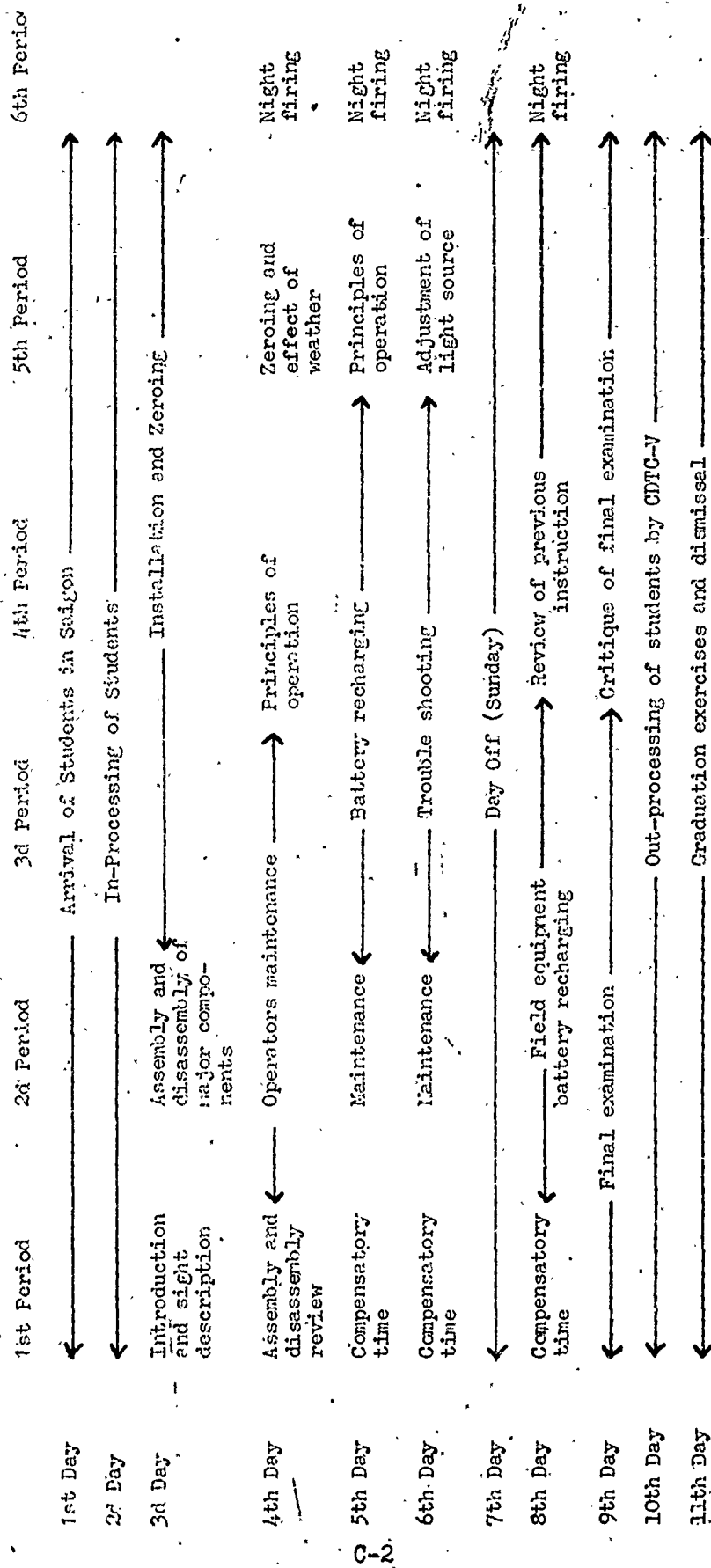
In general, the students' attitude was poor. They appeared attentive but displayed little enthusiasm for the subject. These men had come from the field and considered their stay in Saigon as a rest and recuperation period. In spite of this attitude, evaluators observed that all students who passed the course operated and maintained their sights properly throughout the evaluation.

2. TRAINING IN UNITS BY ACTIV AND CDTC-V PERSONNEL

Training by ACTIV and CDTC-V personnel was conducted in the following units: 1st Battalion, 11th Infantry Regiment; all Special Forces units; and Ma Cay sub-sector. These courses were conducted when weapon sights were issued. The training cycles varied from 3 to 5 days depending on the number of personnel to be trained and existing facilities.

Whereas facilities, training aids, and logistical support were excellent in Saigon, various problems arose in the units. For example, one unit had no tracer ammunition, and another unit had no place for night firing. The Army Concept Team furnished tracer ammunition to the unit requiring it, and on the recommendation of the evaluator, a known-distance rifle range was constructed near the headquarters of the unit lacking a night firing facility.

ANNEX C



(U) FIGURE C-1. Program of instruction conducted in Saigon.

In those units in which operators were trained on location, commanders and officers were able to visit classes and observe their men being trained. These commanders became better acquainted with the weapon sights and took more interest in the project. As a result the students themselves became enthusiastic and displayed more interest.

Instruction generally followed the tables of contents of the operation and maintenance manual published by Polan Industries, Inc. (reference 11) and of TM 5-1090-200-15 (reference 19). Because the classes were small, students received individual attention, and instruction, although compressed into a short amount of time, was therefore satisfactory.

3. TRAINING IN UNITS BY UNIT OFFICERS

The third and most successful form of training was a combination of the two methods previously described. One junior officer from each of three units was trained in the Saigon training courses. These officers, from the 23d Reconnaissance Company, the 44th Infantry Regiment, and the 23d Ranger Battalion, then went back to their units where they trained enlisted weapon sight operators.

Instruction given by these officers was effective. Furthermore, the major advantages of command interest and student enthusiasm were realized. The officers from the 23d Reconnaissance Company, 44th Infantry Regiment, and 23d Ranger Battalion trained, respectively, 30, 20, and 20 operators in their units. Instruction was excellent and formal programs of instruction were followed. As an example, figure C-2 portrays the training program followed by the 44th Regiment.

ANNEX C

Date	Hour	Subject	Location	Instructor
17 May 65	0800-0900 0900-1000 1430-1530 1530-1630	Description and nomenclature Disassembly and assembly of all weapon sights Disassembly and assembly (Practical work) Emergency destruction procedures	Classroom do do do	Lt Chieu Sgt Thain do do
18 May 65	0800-0900 0900-1000 1040-1200 1430-1530 1530-1630	Examination on previous instruction Nomenclature, disassembly, assembly of telescope (review) Disassembly, assembly, adjust light source (review) Adjust light source Electrical system (theory)	Classroom do do do do	Lt Chieu & Sgt Thain do do do do
19 May 65	0800-0900 0900-1000 1010-1200 1430-1730 1930-2130	Light source review Review and examination Zeroing (theory) Battery description and battery charging Firing demonstration for students	Classroom do do do Training center firing range	Lt Chieu & Sgt Thain do do do do
20 May 65	0800-0900 0910-1000 1010-1200 1430-1530 1930-2100	Question hour Written examination Review of all previous instruction Maintenance Night firing	Classroom do do do Training center firing range	Lt Chieu & Sgt Thain do do do do
21 May 65	0900-1000 1010-1400 1930-2130	Critique of night firing Review of previous instruction Night firing	Classroom do Training center firing range	Lt Chieu & Sgt Thain do do
22 May 65	0900-1000 1930-2100	Written examination Record firing	Classroom Training center firing range	Lt Chieu & Sgt Thain do

(U) FIGURE C-2. Training program followed by 44th Infantry Regiment

C-4

CONFIDENTIAL

(C) ANNEX D

COMBAT OPERATIONS

Annex D contains extracts from several after-action and ACTIV evaluator reports. These extracts point out the roles which the sights played in each operation.

1. (C) LAND OPERATIONS

2. Prepared Defense Positions, Special Forces Camp, Suoi Da, 1 April 1965

On the night of 1 April 1965 two IR sights at Suoi Da Special Forces Camp were employed in prepared positions on the defensive perimeter of the camp. Sights were mounted on a light machinegun (caliber .30) and a carbine. It became apparent immediately that the machinegun could not be used since it was employed in a concrete bunker with small firing apertures. The combined height of the machinegun plus the IR sight was greater than the height of the apertures, thus not allowing light from the light source to leave the bunker. The evaluator suggested moving the machinegun outside the bunker but the camp commander disagreed and chose to leave the machinegun in place. The second sight, mounted on the carbine, was employed from the top of another bunker which had sand-bagged walls. The sandbags were used to support the weapon. Operators at the carbine position reported that the IR beam reflected off concertina and triple-apron barbed wire fences immediately outside of the bunker. They also reported that grass and underbrush in the area caused more reflections, with the result that the sight did not provide vision to the outer barbed wire fence, which was 175 meters distant.

b. Ambush Patrol, Special Forces Camp, Gia Vuc, 24 April 1965

On the night of 24 April 1965 a platoon size patrol departed from Gia Vuc Special Forces Camp to set up an ambush at a trail junction 10 kilometers north of the camp along the Song Re River. The patrol carried two IR sights, mounted on an M-1 carbine and an M-16 automatic rifle. As the patrol approached the Song Re River at approximately 0500 hours, 25 April 1965, the point man reported that he saw men moving in the river bed. The IR sight operator identified these men as a group of approximately 10 Viet Cong crossing the river, moving away from the patrol, and at a distance of approximately 75 meters from the patrol. The IR operator opened fire and at the same time another weapon in the patrol opened fire. The IR operator observed hits on three Viet Cong. One dropped behind some large rocks in the river bed; another was floating face down in deeper water; the third was sprawled out on top of a rock in the river bed. The remainder of the Viet Cong group escaped.

CONFIDENTIAL

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The patrol was credited with one VC KIA confirmed, one VC KIA unconfirmed, and one VC WIA unconfirmed.

c. Hasty Night Defense, 1st Battalion, 44th Infantry Regiment, Tuy Hoa, 6 May 1965

On the night of 6 May 1965 the 1st Battalion, 44th Infantry Regiment set up defensive positions south of the Da Rang River. In accordance with policy, the battalion drew five IR sights from the regiment prior to the operation and assigned one sight to each company and retained one at battalion headquarters as a reserve. As a matter of further policy, the regimental commander had stated that he wanted at least a company with each IR sight. Therefore, outposts did not have an IR capability but the sights were used on the most dangerous approaches into the main defensive positions. The sights were turned on for surveillance approximately every 5 minutes or when a VC probe was suspected.

On this operation the battalion used four sights, mounted on a light machinegun, a carbine, and two M-1 rifles. The operator from the 1st Company, whose sight was on the machinegun, spotted three unarmed suspected VC at approximately 2330 hours. The orders were not to fire at any group estimated to be less than platoon size to preclude compromising the defensive position. Therefore, the three VC were not taken under fire. Although no more VC were sighted, the battalion was subjected to sporadic sniper fire throughout the night. The VC snipers fired from a tree line approximately 200 meters distant, which was beyond range of any of the IR sights. On this night the weather was partly overcast with light conditions varying from $\frac{1}{2}$ moonlight to no moonlight.

The 44th Infantry Regiment normally used its IR sights in the manner cited above, sometimes for 3 to 4 days at a time. On the longer operations, operators reported that on each successive night the range of vision decreased due to the discharging battery. Never did 44th Regiment operators report an achieved range of as much as 200 meters.

d. Ambush Patrol, 23d Ranger Battalion, Near Tinh Lam, 27 May 1965

Shortly after dark on the night of 27 May 1965, a 15-man patrol from the 23d Ranger Battalion moved through battalion defensive positions. The patrol's mission was to set up an ambush near Tinh Lam, approximately 10 kilometers north-east of Tuy Hoa. Two IR weapon sights, one for a carbine and one for a light machinegun, were taken on the operation. During movement the sight for the carbine was carried mounted and was used for rear and flank security. The sight for the machinegun was carried unmounted and was used for front and flank security.

As the patrol neared the intended ambush site at approximately 2330 hours, it moved into a Viet Cong position and was taken under fire

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from a distance of approximately 100 meters. The machinegun was then mounted on its tripod and the weapon sight mounted on the machinegun. The entire procedure took very little time and the machinegun was in operation in approximately half a minute. Two VC were reported KIA by the IR sight operator but this was never confirmed. As soon as the fire-fight subsided the patrol withdrew approximately 500 meters to a more easily defended position and set up an L-type ambush but no further contact was made with Viet Cong that night.

On this operation it was observed that the patrol leader used the weapon sight for surveillance only at points known from previous experience to be dangerous. This was probably good judgement on his part since the entire patrol stopped for several minutes each time an IR sight was used for this purpose. The operator with the carbine had little difficulty in moving even though the IR sight was mounted throughout the operation. However, when he fired his weapon he rested it on a rice paddy dike because of the weight. The machine gunners could not have used their IR sight for surveillance during movement had the sight been mounted because together the sight and weapon would have been too heavy for one man to carry. However, it took only about half a minute to mount the sight and place the machinegun in operation on its tripod. In spite of the fact that it was a dark, clear night, the maximum range achieved from either weapon sight was approximately 100 meters.

e. Defensive Outpost, Ma Cay Sub-Sector, 8 June 1965

The Ma Cay sub-sector had two weapon sights employed at an outpost on the night of 8 June. Shortly after dark the outpost and those on either side of it came under attack by a Viet Cong force of unknown strength. The sights were employed initially, but were discarded since the operators could see better without the weapon sights, possibly because of the bright moonlight. Also, the operators felt they were unduly exposing themselves while using the sights as they had to expose the upper halves of their bodies in order to use the sights. As a result of the action, there were four confirmed VC KIA and the next day local intelligence agents reported that two sampans full of dead and wounded Viet Cong were hauled away during the night. None of the VC casualties were attributed to IR sights.

f. Five Day Ambush Patrol, 23d Reconnaissance Company, Ban Me Thuot, 14 to 19 June 1965

On 14 June 1965 a 30-man platoon from the 23d Reconnaissance Company departed from Ban Me Thuot to occupy an area 6 to 9 kilometers north of the town. The platoon's mission was to ambush trails and road networks, and stop VC movements. Three weapon sights, one each for an M-1 rifle, an M-79 grenade launcher, and an M-1 carbine, were taken on the operation. Components for the sights were carried in locally produced canvas carrying cases and each sight was carried by three men. The area of operation was generally flat with marsh in places. Vegetation consisted

CONFIDENTIAL

CONFIDENTIAL

of tall grass, bushes and light tree cover. The nights were usually rainy and the skies overcast.

Each night the platoon set up a 10-man L-type ambush on a trail or trail junction leading into the bivouac area which had just been vacated by the platoon. The IR weapon sights were situated so they could light the entire ambush area and mutually support each other so as to increase the effective range of the sights. Normally one weapon with sight was placed at each tip of the L and one at the corner. The rifle and carbine with sights had tracer ammunition so they could vector in other weapons, but there was no contact made with Viet Cong.

It was observed on this operation that nickel-cadmium batteries remained at a sufficient charge level throughout because the sights were turned on only when a noise was heard rather than at prescribed time intervals; that the effective range of a single weapon sight was less than 75 meters during rain; that the glass area of the weapon sight became fogged during rain and had to be wiped frequently; and that the canvas carrying cases for the major components of the weapon sight (nickel-cadmium battery, telescope assembly, and light source) permitted easy movement when the weapon sight was not mounted.

On two other occasions, 21 to 26 June 1965 and 12 to 14 July 1965, the 23d Reconnaissance Company conducted operations generally similar to the one described above, except that a light machinegun with an IR sight was substituted for the M-79 grenade launcher. On the 21 to 26 June operation no contact with VC was made. On the 12 to 14 July operation contact was made, however, and the weapons with IR sights were credited with two confirmed VC KIA. In addition, an IR sight led directly to the capture of one Viet Cong insurgent.

g. Combat Outpost, Special Forces Camp at Tinh Bien, 8 July 1965

The Special Forces camp at Tinh Bien used two infrared weapon sights for surveillance and security at a company-size outpost on the night of 8 July 1965. The outpost was not surrounded by barbed wire and the terrain on all sides consisted of flat open rice paddies with puddles of water. The night was dark and there was intermittent rain and a thin haze. The sights operated with no breakdowns, but because of the weather, were able to attain no more than a maximum range of approximately 75 meters. The light rain and mist limited the range of the light source because the rain reflected most of the light causing a bright glare in the telescope. No contact was made with the VC.

2. (C) AIRBORNE OPERATIONS

On the night of 25 May 1965 two infrared weapon sights were tested during a scheduled surveillance flight flown by personnel from the US Naval Advisory Group. The weather was broken to overcast with some

ANNEX D

D-4

CONFIDENTIAL

CONFIDENTIAL

surface haze. The weapon sights had been checked out satisfactorily prior to initiation of the flight.

In an attempt to increase the range of the infrared weapon sight an Aldis lamp (portable blinker-type signal lamp) was fitted with an infrared filter. This proved unsatisfactory, however, apparently because the beam width of the lamp was too broad and the light was dissipated. As a result the weapon sight systems were used with their own light sources.

The sights were operated from the plexi-glass enclosed surveillance bubble in the nose of the SP2H aircraft. The aircraft operated at speeds of 150 to 180 knots and at altitudes of 300 to 400 feet. Various targets were used including rocks, shorelines, and lighted and unlighted ships and junks.

The light source failed to illuminate targets from an altitude of 300 to 400 feet. The effectiveness of the weapon sight was seriously degraded due to reflections of infrared light from the plexi-glass of the aircraft. When the weapon sight light source and telescope were separated in an attempt to reduce reflections from plexi-glass, it was difficult to align the light source and the telescope. Target definition was difficult because of aircraft vibration which tended to blur the target and because of the limited (8 degrees) field of view of the telescope.

The infrared weapon sight was unsatisfactory in all aspects of the special test of its use as a surveillance device from a fixed wing SP2H aircraft.

3. (C) RIVER OPERATIONS

On the night of 10 June 1965 a special test with three weapon sights was conducted during a scheduled river patrol in Rung Sat Special Zone (RSSZ). The weather was broken to overcast, and moonlight varied from 3/4 moonlight to no moonlight.

Sights were mounted on an M-1 rifle, an M-2 carbine, and an M-16 rifle. Observers included US Naval advisors, US project evaluators, and Vietnamese Navy personnel. Various targets were observed during the 3/4 moonlight and no-moonlight conditions, and observers reported better results during the no moonlight condition. Observers used the prone or sitting positions with the weapons on an artificial support. These positions worked well but all observers agreed that after 15 to 20 minutes of scanning, eye fatigue was apparent and objects tended to become fuzzy.

The river boat varied its speeds from zero knots (drifting speed) to 10 to 15 knots. At high speeds the viewing time on targets was very

D-5

ANNEX D

CONFIDENTIAL

CONFIDENTIAL

short because of the small field of view of the telescope. Furthermore, the maximum ranges achieved by the light source were approximately 150 meters during the no-moonlight condition and less than 100 meters during the 3/4 moonlight condition. This forced the boat closer to shore than normal.

In an effort to increase surveillance range two and, in some cases, all three light sources were pointed toward the same target. Under these conditions man-size objects were discernible at ranges up to 200 meters.

US Naval advisors and Vietnamese Naval officers felt the infrared weapon sight was unsatisfactory for use in river operations primarily because of the limited range of the system and also because of the limited field of view of the telescope.

ANNEX D

D-6

CONFIDENTIAL

(U) ANNEX E
EQUIPMENT FAULTS

1. DEFICIENCIES

<u>Deficiency</u>	<u>Suggested Corrective Action</u>	<u>Remarks</u>
a. Limited range of observation through weapon sight.	Increase power of light source.	Average range achieved was 100 meters; maximum approximately 175 meters. Rated range is 300 meters.
b. Limited field of view through weapon sight.	Increase field of view.	Field of view of 8 degrees provides a beam of only 15 meters at a range of 100 meters.
c. Carbine sight on bracket precludes accurate daylight firing without the IR sight.	Redesign bracket to permit adjustment of rear sight.	Rear sight on bracket for daytime is not adjustable and is therefore unsatisfactory.
d. M-1 rifle bracket limits accuracy of daylight firing without the IR sight.	Redesign bracket by adding an adjustable rear sight for use without the IR sight.	
e. Battery charging rack cannot be used with 50-cycle, 220 volt current common in RVN.	Replace with more versatile rack.	Racks were operated at nearest US military compound instead of at RVNAF units except for one case, in which a transformer was procured on the local economy.

2. SHORTCOMINGS

<u>Shortcomings</u>	<u>Suggested Corrective Action</u>	<u>Remarks</u>
a. Reticle adjustment knob springs on weapon sight loosen easily.	Install covers over knobs.	Knobs are easily knocked out of adjustment when struck by brush or foreign objects during movement.
b. Allen screws are of varying sizes on sight mounts.	Redesign and standardize screws.	Four different sizes of Allen wrenches are now required.
c. Carbine bracket difficult to install.	Redesign	Requires additional special tool to remove standard rear sight and install IR sight bracket.
d. M-1 rifle bracket is too fragile - is easily damaged during installation.	Redesign bracket or use harder metal.	Bracket can become unserviceable after 2 to 3 installations if extreme care is not used.
e. M-1 rifle bracket difficult to install.	Redesign bracket.	Standard rear sight must be removed prior to installation of IR sight bracket.

3. CORRECTED DEFICIENCIES/SHORTCOMINGS

<u>Deficiency/Shortcoming</u>	<u>Corrective Action</u>
a. Light source elevation knobs stuck.	Spring on knob stops shortened.
b. Bracket screws for all weapons loosened easily.	Screws replaced with self-locking NYLOCK screws.

Deficiency/Shortcoming

Corrective Action

c. Allen head set screw on carbine bracket loosened easily and was difficult to tighten, especially at night in the field.

Filed groove in screw heads, thereby permitting tightening with screw driver or coin.

d. Battery charging rack couplings did not fit BB-429/U batteries for Polan P-155 weapon sight.

Rack modified to fit batteries for Polan as well as Varo weapon sight batteries.

Previous page was blank, therefore not filmed.

(U) ANNEX F

EQUIPMENT MAINTENANCE REPAIRS

<u>Date</u>		
1 April 1965	Adjusted light source elevation knobs on the sights.	Adjustment required when sights were unpacked.
5 April 1965	Cleaned high voltage power packs on two inoperative sights.	Dirt on power packs prevented electrical contact.
15 April 1965	Repaired inoperative telescope on-off switch.	
22 April 1965	Replaced two broken infrared filters.	
25 April 1965	Repaired connector on one cable assembly.	Pin became loose during normal use.
7 May 1965	Replaced one light source bulb.	Burned out.
1 June 1965	Repaired socket wires for light source on three sights.	Wires were broken through improper focusing procedures.

(U) ANNEX G

REPAIR PARTS

A breakdown of repair parts received by date follows:

1. PARTS ON HAND 31 MARCH 1965

<u>FSN</u>	<u>Nomenclature</u>	<u>Quantity</u>
1090-466-5909	Spring, Tension	4
1090-447-2191	Socket, Cup, Front	4
1090-796-8758	Reflector Assembly	4
1090-987-1155	Elevation Assembly, Light Source	4
1090-987-1156	Sleeve, Battery	4
1090-987-1160	Corrector, Lens Assembly	4
1090-987-1161	Spring, Image Tube	4
1090-987-1165	Connector, Top	4
1090-987-1166	Connector, Base	4
1090-987-1167	Shield	4
1090-987-1169	Sleeve, Power Supply	4
1090-987-1171	Contact	4
1090-991-0095	Seal Assembly	4
1090-991-0097	Cap Assembly, Battery	4
5120-240-5242	Key, Socket Head Screw	4
5340-446-5989	Spring, Electrical, Switch	4
5340-987-1174	Clamp Assembly	4
5930-796-8753	Switch	4

2. PARTS RECEIVED 9 APRIL 1965

<u>FSN</u>	<u>Nomenclature</u>	<u>Quantity</u>
1090-987-1157	Tool, Combination	4
1090-987-1158	Spring, Azimuth Click	4
1090-987-1159	End Assembly	4
1090-987-1162	Eye Shield Assembly	4
1090-987-1164	Objective Lens Cell Assembly	4
1090-987-1170	Mount Assembly, Receiver	4
1090-991-0096	Cap Assembly, Reticule	4
1090-991-0098	Cap Assembly, Heavy Power	4

3. PARTS RECEIVED 15 APRIL 1965

<u>FSN</u>	<u>Nomenclature</u>	<u>Quantity</u>
1090-987-1175	Insulator	4
5330-720-2947	Packing, Preformed	4
5330-987-2799	Washer	4

4. PARTS RECEIVED 22 APRIL 1965

<u>FSN</u>	<u>Nomenclature</u>	<u>Quantity</u>
1090-446-5915	Gasket	4
1090-796-8758	Filter, Light Source	4
1090-986-9707	Reticle Assembly	4
5140-987-1179	Bag, Tool Assembly	4
5330-990-2648	Gasket	4
5905-883-1444	Resistor	4
5930-486-8039	Switch	4

5. PARTS RECEIVED 24 APRIL 1965

<u>FSN</u>	<u>Nomenclature</u>	<u>Quantity</u>
6135-120-1010	Battery (BA-42)	14

Except for these 14 batteries, ACTIV furnished all 96 BA-42 batteries which were used during the evaluation.

6. PARTS NOT RECEIVED

<u>FSN</u>	<u>Nomenclature</u>
1090-796-8750	Tube, Image
1090-796-8760	High Voltage, Power Pack
1090-856-3834	Sight, Reticle Alignment
1090-885-8452	Wrench
1090-986-9708	Light Source Assembly
1090-986-9709	Cable Assembly, Coaxial
1090-987-1163	Lens Assembly, Eye
1090-987-1168	Cup Assembly, Rear
1090-991-0094	Mount Assembly
1090-996-3746	Box, Battery
5120-198-5392	Key, Socket Head Screw
5240-989-7682	Ring, Retaining
5330-088-8509	Gasket
5330-265-1078	Packing, Preformed
5330-991-0108	Packing, Preformed
5355-446-5952	Knob
6240-228-7130	Lamp (GE)
6240-796-6916	Lamp

(U) ANNEX H

EVALUATION CHECK LIST

1. GENERAL

- a. Evaluator: (ACTIV) (US Advisor) (Unit Commander) (Operator)
- b. Unit Designation:
- c. Unit Location:
- d. Number of past operations with IR sights:
(Operator) (Unit)

2. OPERATIONAL DATA

- a. Type of Unit Operation:
- b. Location of Operation: Date/Time:
- c. Unit Mission:
- d. Composition of Unit:
- e. Was contact made with VC:
If so, where and when:
- f. Was the IR sight used in the operation: (Yes) (No)
If yes, did the sight contribute to the operation (Yes)
(No)
If yes, how _____

If no, why not _____

g. Comments: _____

Prepared By: _____

Name

Rank

Unit

Position

OBJECTIVE I

3. EVALUATION OF EQUIPMENT

a. Mount

(1) Was the sight mounted on: Cal. .30 MG _____ M1 Rifle _____
Cal. .30 Carb _____ M-16 5.65mm _____ Other _____

(2) Was the sight bracket:

(a) easily mounted _____
Yes No

(b) sturdy _____
Yes No

Explain Negative Answers: _____

(3) Did the sight bracket:

(a) Remain in proper adjustment during use _____
Yes No

(b) Provide easy sighting _____
Yes No

Explain Negative Answers: _____

b. P-155 Sight

(1) Is the P-155 sight, mounted on a weapon, sturdy enough
to be used on an operation: Yes No

(2) For what operation is it best suited:

(3) Does any portion of P-155 need special protection from
the elements: Yes No

If yes, explain: _____

(4) Is the P-155 sight vulnerable to climate or terrain:

Yes No

(a) If yes, explain: _____

(b) Can this vulnerability be (reduced) (eliminated)

1 If not, explain: _____

2 If yes, how: _____

(5) Does the configuration of the mounted sight hinder
mobility of the soldier: _____
Yes No

(a) If yes, how: _____

(b) If yes, can sight be modified _____
Yes No

(c) If yes, how: _____

(6) Is the weapon sight in best operational condition when
carried mounted _____, unmounted _____,
If unmounted, how should it be carried _____

c. Weapon/Sight System

(1) Does the assembled system conform to the build of the
average Vietnamese:

(a) Indicate weapon: _____
Yes No

Yes No

Yes No

(b) If no, what modification can be made to improve
configuration _____

(2) Is the weight distribution of sight to weapon acceptable

Yes

No

(a) If no, why: _____

(b) Can it be corrected? How: _____

(3) Does the sight require frequent adjustments:

Yes

No

(a) If yes, what adjustments are required: _____

(b) How can maladjustments be prevented: _____

(4) Does the sight require a soldier with the weapon system
to carry extra equipment to support the sight: Yes No

(a) If yes, describe equipment: _____

(b) How much does equipment weigh: _____

(c) Is this extra weight excessive: Yes No

(d) Can extra weight be reduced: Yes No

(e) If yes, how: _____

Yes	No
-----	----

d. Power Source.

Yes No

Yes No

Yes No

1. **Содержание:**

Yes No

H-6

(a) If yes, does this leakage cause damage or loss of operational usefulness of the battery: Yes No

.....

a. Can the P-155 sight be used by an untrained man: Yes No

Marksmanship _____ grade _____

... Knowledge of Electronics _____ How much _____

Knowledge of Mechanics	How much
------------------------	----------

Can these skills be developed during training course: Yes No

c. How long should the training course be: _____

SUBJECT _____ Hrs _____

SUBJECT	Hrs
---------	-----

SUBJECT _____	Hrs _____
---------------	-----------

[illegible]

... e... Does training require special areas: Yes No

If yes, what: _____

f. Does training require special equipment: Yes No

If yes, what _____

g. Does training require qualified instructors: Yes No

If yes, explain qualifications required: _____

h. Can training be conducted at unit level: Yes No

If not, why _____

If yes, at what echelon _____

5. EVALUATION OF LOGISTICAL SUPPORT REQUIREMENT

a. Does the P-155 sight require special logistical support:

Yes No

b. If yes, check the areas of support in order of maintenance required. Replacement of spare parts _____

Maintenance of sight _____

Mechanism of sight _____

Power source _____

c. List items which need replacement frequently and rate of replacement: _____

d. Can this sight be supported logistically at unit level:

Yes

No

If yes, at what level: _____

e. List spare parts which require replacement at the following
time intervals of sight operation:

(1) 5 hours _____

(2) 10 hours _____

(3) 16 hours _____

6. EVALUATION OF TACTICAL EMPLOYMENT

OBJECTIVE 2

a. Is the weapons system most effective (indicate priority by
no. from 1 to 8)

- 1) In defense position
- 2) In ambush
- 3) In attack on position
- 4) In pursuit
- 5) In probing action
- 6) In mounted convoy

H-9

ANNEX H

- 7) In dismounted movement _____
8) In other, explain _____

b. Is the use of the sight most effective:
(Indicate priority by number from 1 to 6)

- 1) Unmounted and used as IR binoculars as a fire direction
device _____
2) Mounted and used in offensive operations by dismounted
troops _____
3) Mounted and used in offensive operation by mounted troops

4) Unmounted and used as IR binoculars by security element

5) Mounted or unmounted and used as a signalling device:

6) Other, explain _____

c. What is the most effective range of the sight _____

d. What is the most effective range of the weapon equipped w/

sight: Type weapon _____ Range _____

_____	_____
_____	_____
_____	_____

e. What is the most effective firing position: _____

Explain _____

f. What is the most convenient mode of transportation:

1) By dismounted troops _____

2) By mounted troops _____

g. Does the enemy have the capability to detect infrared light

Yes

No

What is their capability _____

h. Can the enemy develop a capability to detect infrared light
easily

Yes

No

(1) If no, why _____

(2) If yes, how _____

OBJECTIVE 3

7. DETERMINE THE BASIS OF ISSUE

a. To what units should the sight be issued

b. In what quantity should the sight be issued

Number of men/unit _____ Number of sights _____

c. Should the sight be TOE item _____

d. Should the sight be an item of special issue _____

e. Should there be restrictions placed on the use of sight

Yes

No

If yes, explain _____

DATA COLLECTION PLAN - INFRARED NIGHT VISION WEAPON SIGHT, POLAN P-155

The following pertinent questions are to be added to the IR Sight Evaluation Check List and will be asked by evaluators effective 17 May 1965.

1. Does the weapon sight mount adversely affect the daytime use of the weapon? Yes _____ No _____

If yes, Why? _____

2. Did the weight and bulk of the weapon sight outweigh the advantages of the night vision capability afforded on the operation? Yes _____ No _____

3. How did you carry the weapon sight on the operation:

a. In the daytime _____

b. At night, during movement? _____

4. What did you think of the methods used for carrying the sight?

Acceptable _____ Unacceptable _____

If unacceptable, why? _____

(U) ANNEX I

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Security Classification

DOCUMENT CONTROL DATA - R&D

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13. ABSTRACT The purpose of this project was to evaluate employment of the Polan P-155 infrared night vision weapon sight by Republic of Vietnam Armed Forces (RVNAF) in counterinsurgency operations in the Republic of Vietnam (RVN). During the evaluation, Vietnamese soldiers were instructed in the use of weapon sights. Following this, use of the sights by selected RVNAF units was observed and analyzed. The evaluation was conducted under actual combat conditions. Although well-trained RVNAF units were capable of using IR weapon sights, most units did not use them enough to justify issue. Reasons given for not using the sights were: 1) RVNAF units did not often operate at night; 2) the sights were too heavy and bulky for the average Vietnamese soldier; 3) RVNAF unit commanders feared loss of the sights to the Viet Cong (VC). No RVNAF unit had electrical facilities for charging batteries. It is recommended that infrared night vision weapon sights not be issued to RVNAF.			

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Security Classification

Unclassified

Security Classification

14: KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Weaponsight, infrared counterinsurgency operation Vietnam						

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