A significant item listed under Aircraft Procurement is money budgeted to modify another F-4 squadron with [deleted] equipment, which will give them an all-weather bombing capability. Also, the \$6.5 million against an automatic targeting system involves sensing and target-designating equipment for [deleted] aircraft. This project—called PAVE NAIL—will be explained to you by Major Anderson shortly. In the other procurement category, most of the money involves procurement of sensors and munitions. Under R. & D., most of the moneys are aimed at accomplishing tasks which I mentioned were a part of our 5-year development plan.

IDENTIFICATION OF FUNDS

Mr. GILLEAS. In line with Senator Goldwater's question why don't you identify what part of that funding package was requested in the authorization bill. Break it out and identify that, if you can? General Evans. I will call on Captain Detweiler to do that.

Mr. DETWEILER. The missile money is carried under the Air Force activity 3, their line item 26, and that is the \$4 million total. That was

for the drone aircraft.

The APAF money which was carried under their line item No. 59 was titled "Additional Southeast Asia Requirements for \$17 million".

The munitions money, I happen to have them broken down here by line item, but these were not in the authorization bill. But if you want those I can give you those. They were under specific line items but the other, but they were not in the authorization bill.

The R. & D. money was carried under the program element

28012F for a total of \$14 million.

So of the total appropriation, there was \$14 million in R. &. D. and \$17 million in APAF, and \$4 million in MPAF which were carried in the authorization bill.

Mr. GILLEAS. So only \$35 million of the \$192 million was in the

authorization bill?

Mr. Detweiler. Yes, sir.

Mr. GILLEAS. Do you recall offhand how much money DCPG released to the Air Force that you didn't spend—was it \$95 million?

General Evans. Yes, sir.

Mr. GILLEAS. Why is it that you don't take these unused funds and apply them to reduce your fiscal year 1971 request rather than the current procedure which as I understand it is to come in with a new request for money and then reprogram the unused \$95 million into

other Air Force projects? Why is that procedure followed, sir?

General Evans. I am not a budget expert. I am not familiar with all of the ramifications of how you can spend 1 year's money, money allocated for 1 fiscal year in another. But I believe that you must spend the money allocated for expenditure in any fiscal year during that same fiscal year. If there is something we can apply that money to in fiscal year 1970, even though it applies to something that will be developed in fiscal year 1971 well—perhaps Captain Wallace could better answer the question.

Mr. Grideas I think this is no year money.

General Evans. This is in the Air Force budget and goes back into a pool of Air Force money that we can use and we do use against priority projects not always associated with the sensor business,

because if it was associated with the sensor business of course it

would be spent in the IGLOO WHITE funds.

Mr. GILLEAS. Does someone here have a record of what you have done with those moneys that were justified on the basis of IGLOO WHITE or DCPG, as to where you reprogramed the money and where

it was spent?

General Evans. I understand from our budget people that the way we keep our books that amount of money loses its identity, its peculiar or unique identity, when it goes back into the Air Force budget. It doesn't keep a label of \$95.1 million of IGLOO WHITE funds. As soon as it goes back on the ledger it is money available for expenses that are incurred by the Air Force, so I cannot tell you except in very limited cases how that money was spent when it was turned back from the IGLOO WHITE accounting.

General Talbott. I don't think we are providing a very good answer. Subject to your concurrence we will provide you an answer

for the record.

Senator Goldwater. This is a complex field.

General TALBOTT. Yes, sir.

Senator Goldwater. It will be helpful when this comes up on the floor, so we can provide them the answers.

General Evans. Could I ask the chief counsel to repeat the question

so we will be sure to get the answer?

You would like to know why we do not apply that money, our

fiscal year 1970 money against our fiscal year 1971 anticipated needs?

Mr. GILLEAS. Yes. You have a request before the Congress now for "x" amount of dollars for fiscal year 1971. Why don't you take unused funds from prior years, including fiscal year 1970, and apply it against your fiscal year 1971 request rather than ask the Congress for a new sum of money. Meanwhile you take the unused funds and spend them on other programs?

General Evans. And the other portion of the question is: You would like to know where that money was spent that was not used

during each of the fiscal years?

Mr. GILLEAS. As best you can determine it, if it is a reasonable request, yes.

General Evans. We will supply that for the record, sir.

Mr. GILLEAS. Thank you, sir. (The information follows:)

The money returned by the Defense Communications Planning Group to the Air Force is applied against the following year budget needs although not necessarily against the next year's Igloo White program needs. The Air Force estimates the amount of recoupment dollars it can expect to get from prior year programs and applies this amount in total against, the estimated Total Obligation Authority (TOA) required in the next fiscal year to derive the New Obligation Authority (NOA) needs. Normally, the dollar turnbacks from the Defense Communications Planning Group occur late in the fiscal year; thus, no definitive dollar amounts can be applied as a following year offset against the Igloo White program as an entity. gram as an entity.

The funds returned by DCPG to the Air Force do not retain their Igloo White identity to enable us to specify where that money is applied. For illustrative purposes, however, fiscal year 1970 formal reprogramming actions in the 3080 Other Procurement, Air Force Appropriation (FY 70-20, FY 70-21 and FY 70-41) show that \$20.5M was used for other valid requirements such as Defense Support Program, Dispenser and Bombs CBU 24/29/49, 7.62MM M-13 Link (A164 and

A165), etc.

General Evans. Can we go to the next chart, please.

OTHER SENSING DEVICES

Operations and maintenance money, as well as the costs of military personnel, supports such activities as our EC-121 and PAVE EAGLE relay aircraft, the operation of our Infiltration Surveillance

Center, and our F-4 delivery squadron [deleted].

Up to now, we have been talking primarily about the IGLOO WHITE system which involves unattended ground sensors. The Air Force has other sensing devices in its inventory which are being employed in our interdiction campaign which I am sure you would be interested in. There are two projects which involve airborne sensors that are particularly interesting: the gunship program, which is already in the field and a program called Pave Nail, which is currently under development and involves the integration of sensors into our [deleted] aircraft. Major Anderson will cover these programs.

GUNSHIP FORCES

Major Anderson. This presentation will recap our previous Southeast Asia operational experience with the gunship and this past summer's activity in preparation for the 1970–71 interdiction campaign. It will also cover the program to [deleted] the AC-130 force by yearend along with the plans for the operational employment of the Southeast Asia gunship forces.

By way of definition, the present USAF gunship has evolved from the side-firing AC-47 "Spooky" or "Puff the Magic Dragon," as it became known, which was first employed in Southeast Asia in 1964.



The improved gunship combines detection and destruction in a single, self-contained night attack system. It has proven to be an extremely effective weapon for both interdiction and close air support missions. The first generation AC-47 assets in South Vietnam were turned over to the VNAF in 1969 after the follow-on AC-119's and AC-130's were

operational.

The Southeast Asia AC-119 (classified exhibit) gunship force consists of [deleted] AC-119G's and [deleted] AC-119K's. The AC-119G has four 7.62-millimeter miniguns and a NOD or night observation device for target detection. It has been used primarily in South Vietnam in support of friendly ground forces. The jet-podded AC-119K with the addition of the FLIR or forward-looking infrared has two 20-millimeter Vulcan cannons and four miniguns. The "K" model is used for both close air support in South Vietnam and interdiction along the Ho Chi Minh Trail.

The original [deleted] AC-130's with their four 20-millimeter Vulcans and four 7.62-millimeter miniguns were used exclusively in the truck-killing role. These AC-130's, like the AC-119K, had only



the NOD and the FLIR as target-detection devices. Although this gunship force of [deleted] AC-119K's and [deleted] AC-130's flew only [deleted] percent of the total attack sorties during the 1969-70 dry season, which ended in May, they accounted for [deleted] percent of

all the trucks destroyed or damaged.

In December 1969, a specially configured AC-130 gunship, nicknamed SURPRISE PACKAGE, was deployed to Southeast Asia (classified exhibit). This aircraft with its improved fire control computer and updated sensors additionally had [deleted]. This improved AC-130 compiled an enviable record during the last interdiction campaign as it accounted for approximately [deleted] trucks per sortie.

Drawing upon lessons learned with SURPRISE PACKAGE, the USAF incorporated most of the improvements in the remaining

[deleted] AC-130's during this past summer's statewide overhaul program. All [deleted] of the AC-130A's used last dry season now have [deleted] guns. The selection of the C-130 airframe with its greater gross weight and increased loiter capability has enabled the Air Force to upgrade its second generation gunship to a more effective and more

survivable weapon system.

In addition to the [deleted] guns, the improved AC-130 SURPRISE PACKAGE configuration includes the [deleted] target indicator (classified exhibit). This device works in conjunction with the [deleted]. It can detect vehicular movement of [deleted] miles per hour at ranges up to [deleted] miles. Another improvement is the [deleted]. These two target detection devices are used to place the gunship in the proper position for an attack. The actual attack on the vehicle is done utilizing either the [deleted] or the [deleted] or forward looking infrared which is located in the forward portion of the left wheel well. [Deleted] is used primarily to augment ambient light under low moonlight conditions. The final sensor is the [deleted]. It is used in the close air support role for locating friendly forces in order to direct fire support at the enemy. [Deleted.]

Several additional target indication devices are under consideration for installation in the follow-on gunship. Improvements in target detection will continue to be made after development indicates

possible application in the AC-130 weapon system.

During the [deleted] the USAF will complete the transfer of the squadron of [deleted] AC-119G's to the VNAF as part of the Vietnamization improvement and modernization program. This will give



the VNAF a self-contained night attack capability of one squadron of AC-47's and one squadron of AC-119G's. Even after a gradual reduction in hostilities, nighttime surveillance will be required. The gunship weapons system can provide this reconnaissance for both the VNAF and the USAF until such time as the requirement no longer exists.

The USAF, in response to the question asked in June by Secretary Packard as to what could be done to increase our gunship capability

by year end, is [deleted].

In addition to updating the original AC-130A's, the Air Force in the spring of 1970 conducted a study aimed at modernizing the gunship force for the decade 1970-80. A decision was reached to modify [deleted] C-130E aircraft to the already proven SURPRISE PACK-AGE configuration. These [deleted] AC-130E gunships, nicknamed PACE SPECTRE, will be fully tested and operationally ready by [deleted].

The AC-119G's will again be utilized mainly in the close air support role in South Vietnam while the AC-119K's will fly some interdiction missions in [deleted] (classified exhibit). The AC-130's and the main AC-119K effort will be against vehicular traffic [deleted]. Both the AC-119K and AC-130 have F-4 fighter escort while they are in the target area for the purpose of flak suppression [deleted]. We expect another successful operation this season [deleted] in the truck killing role. This should enable us to close the gap on killing enemy trucks as we see them.

Mr. GILLEAS. You had [deleted] you will have [deleted]? Major Anderson. Yes; closer [deleted] to [deleted].

Mr. GILLEAS. I don't quite follow the distinction between the [deleted] AC-130 gunships and PAVE SPECTRE where you say you have [deleted] of an AC-130-E. What is the difference between the [deleted] SURPRISE PACKAGE aircraft and these [deleted] PAVE SPECTRE type of aircraft?

Major Anderson. Major Spicka.

Major Spicka. The idea was that we had [deleted] AC-130A's in Southeast Asia last dry season [deleted] of those SURPRISE PACK-AGE. We brought them back to the United States this summer, overhauled them and sent them back. We had in April a decision was made to modify [deleted]. This summer, in June, Secretary Packard asked what could be done to increase our Southeast Asia gunship capability. We produced [deleted] additional AC-130A's which are a slight improvement, with more sensors than we had in the [deleted] previous airplanes, these are exactly like SURPRISE PACKAGE [deleted]. So now we will have [deleted] AC-130's in Southeast Asia this dry season. Next fall for the interdiction campaign of 71-72 we will have the [deleted] additional E models.

Mr. GILLEAS. What are the distinctions between the A and E

model?
Major Spicka. The greatest single thing, the reason for the E-model decision was to give us greater survivability. First and foremost we will be able to add additional armorphate for crew safety, and, secondly, we will have increased loiter time. Time on target will be increased from approximately [deleted] hours which we now have with the A up to [deleted] with the E model; and lastly, it will be capable of carrying more ammunition.

Mr. Gilleas. Thank you."

FUTURE AC-180 FORCE STRUCTURE

Major Anderson. The USAF force structure plans for the next 10 years include a quantity of AC-130 gunships. A decision on the

final number of C-130E's (classified exhibit) to modify to the gunship configuration is presently being examined by the Air Force. The C-130E airframe has many uses in addition to airlift, not the least of which is the gunship. In order to meet all commitments within budget constraints and to prevent any further drawdown on the airlift force, an additional buy of C-130E's solely for the purpose of the improvement and modernization of the gunship force is being considered. A squadron of AC-130E gunships would provide the USAF with a worldwide self-contained night attack capability. The gunship's exceptional capability to provide dusk to dawn monitoring of ground movement by onboard sensors coupled with its ability to deploy worldwide, will give the USAF a unique multisensor weapons system.

Mr. GILLEAS. It is being considered for inclusion in the fiscal year

1972 budget?

General Talbott. No, sir; it is not.

Mr. GILLEAS. What does your statement mean then that it is being considered? If it is not going to be in the fiscal year 1972 budget, then this statement is not accurate; is that correct?

General Talbott. This is one possibility. We are looking at it for

subsequent years, possibly 1973.

Mr. GILLEAS. Are you going to show the moving picture on SUR-PRISE PACKAGE?

General Evans, Yes.

Major Anderson. I would like at this time to show you a film clip from last year's operation. It does an excellent job of putting you on board an AC-130 on an actual combat sortie. The first portion shows the night observation device or NOD as we call it and a few "movers" that didn't make it to their next checkpoint. The second portion of the film includes sound and you will be able to overhear the interphone conversation between the crewmembers as they detect and destroy trucks. You will see both [deleted] and the forward looking infrared or Flir display as seen by the sensor operator. Remember, gentlemen, these photos were all taken at night. The ground action, which the pilot seldom sees, shows the current state of the art in airborne sensors for the detection and destruction of enemy targets at night.

Senator Goldwater. We have both seen that film. Senator Cannon hasn't, We should wait for Senator Cannon to return and let him see it.

PAVE NAIL

Major Anderson. This program, known as PAVE NAIL, interfaces with our IGLOO WHITE sensors, our tactical [deleted] system and laser-guided ordnance to produce an effective method of detecting and, more importantly, destroying trucks at night. PAVE NAIL is the nickname for the integrated night observation device, [deleted], and [deleted] which we are installing on [deleted].

Mr. GILLEAS. You say it interfaces. Is it a part of the IGLOO WHITE program and will you receive DCPG funds to implement this

program?

General Evans. Yes; it is in the development stage right now. Deleted systems are being developed and we have gotten permission to use certain IGLOO WHITE moneys to apply against the PAVE NAIL project. However, there is pure Air Force money in the project as well.

Mr. GILLEAS. Will that be clarified as we go along, as to how much

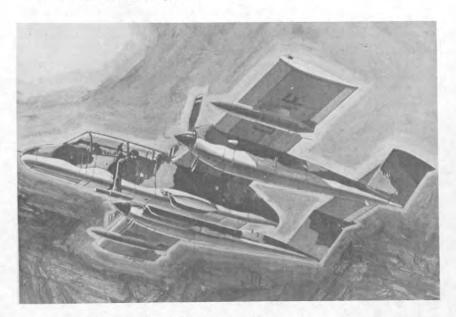
money is involved and a breakout of the Air Force funding?

General Evans. I think the last slide shows the moneys involved. I am not sure whether it identifies which are IGLOO WHITE moneys and which are not. We can get that information for you.

PAVE NAIL

System description Operational concept Procurement program

Mr. GILLEAS. Thank you.



Major Anderson. I will briefly describe the system, then discuss

the operational concept and our procurement program.

PAVE NAIL has two primary elements: the PAVE SPOT system and [deleted]. PAVE SPOT is a night observation device [deleted]. It consists of an external pod which contains the night observation device and [deleted] a biocular display and system controls in the rear cockpit, and a direct view optical transmission channel between the pod and the cockpit.

(Classified exhibit.) The viewing cone and [deleted] may be directed anywhere within the lower hemisphere of the aircraft. [Deleted] power magnification is obtained with a [deleted] instantaneous field of view. Normal viewing is a [deleted] field of view with no magnifica-

tion.

Senator Goldwater. Hanging outside of the airplane?

Major Anderson. Yes, sir.

Also, PAVE SPOT has the capability to operate under ambient lighting conditions ranging from broad daylight to starlight. This is a significant improvement over present night observation devices which normally require ambient illumination equivalent to quarter moon clear. The [deleted] portion of the PAVE NAIL system is a standard

[deleted]. Other components of the PAVE NAIL system are a two-axis heading reference gyro and electronic signal processing equipment. An important factor is that all of these elements have been used separately in the past and merely require engineering integration to form the PAVE NAIL system.

(Classified exhibit.) [Deleted.]

[Deleted.]

ANOTHER AIRCRAFT

Senator GOLDWATER. At what altitude do you have the [deleted]. Major Anderson. Approximately [deleted] feet, sir.

Senator Goldwater. At what distance can you operate from the

Major Anderson. In this slide the ideal distance would be about [deleted]. The system has worked successfully at slant ranges up to [deleted].

Senator Goldwater. Is the problem, to hold the sight on the target?

General Evans. That and seeing the target.

Senator Goldwater. Do you have to fly a circular pattern?

General Evans. No; you are not restricted to a fixed geometry in this [deleted] effort here. This is why we liked the PAVE NAIL.

[Deleted.]

Senator GOLDWATER. [Deleted.]

General Evans. [Deleted.]

Major Anderson. PAVE NAIL is being procured under a twophase program which was initiated with award of a contract (classified exhibit) for the first phase on October 4. Under phase I, [deleted] operational PAVE NAIL systems will have completed testing and will be deployed to Southeast Asia by [deleted]. In [deleted] the Air Force will decide whether or not to proceed, with phase II, based on program performance during phase I. In phase II, the remaining [deleted] systems will be deployed to Southeast Asia in the period [deleted]. Program costs are estimated at \$5.8 million for phase I and \$8 million for phase II.

Mr. Gilleas. Does that take care of all your [deleted] assets? I am

not familiar with your [deleted] inventory.

General Evans. There are approximately [deleted] in Southeast Asia at the present time. To answer your previous question, \$3.3 million of the \$5.8 million phase I money is DCPG IGLOO WHITE money. All of that is R.D.T. & E. money, 3600 money. Additionally, DCPG has authorized us to use \$5 million of 3010 money for this project. If it turns out to be successful in phase I then we will apply that \$5 million in phase II of 3010 money, IGLOO WHITE money, for a total of \$8.8 million of IGLOO WHITE money, out of the total system costs of approximately \$13.8 million. Mr. Gilleas. Very good, thank you, sir.

IGLOO WHITE DETECTION SYSTEM

General Evans, Gentlemen, in closing, let me add some final remarks regarding the IGLOO WHITE detection system.

There is universal agreement within the Air Force that the sensors are fulfilling the purpose for which they were employed; that is, finding truck convoys, regardless of weather and foliage conditions. [Deleted.] Such information is being used to support real-time strike of these targets, such as in the Commando Bolt operation. Analysis of the enemy's logistic flow patterns enabled us to effectively match our strike resources to enemy movements. By directing strike aircraft, such as gunships with their airborne sensor packages, to points where targets actually existed, we were able to increase truck kills to a high of [deleted] per day in February 1970—despite a decline in total interdiction sorties available during this period.

Besides supporting real-time employment of Commando Bolt F-4's and gunships, sensor intelligence is an input for establishing most of the targets in Laos. They are the major source of information on how many trucks are entering and leaving the system and permit us to estimate the enemy's level of throughput for any period of time.

What is most important, gentlemen, is that we can gather this type of intelligence without exposing one American soldier to enemy action.

EFFECTIVENESS VS. DOLLARS SPENT

If someone were to ask me how effective this system is in relation to dollars spent, I would find it difficult to give a direct answer. In the first place, history never assesses its alternatives. What I mean is that we have no way of measuring how successful we would have been in countering the enemy's infiltration measures without IGLOO WHITE. We do know that the number of ground troops required to monitor and gather the type of information that sensors are providing would certainly be considerable, and their support would also pose a large cost factor. Even more difficult to quantify would be the number of casualties which would result from the presence of these troops. You can readily see the difficulties in giving a value to these intangibles—and I, personally, would hesitate to cost out a wounded American, much less a dead one. I think you will agree that IGLOO WHITE, while doing the job for which it was designed, is saving lives.

Gentlemen, I strongly believe that, given the physical environment, tactical situation, and rules of engagement under which we are now operating, the IGLOO WHITE system has proven its worth and continues to be a valuable asset to our Laotian interdiction campaign.

That concludes my statement.

Senator Goldwater. Thank you, gentlemen. You have done a very fine job of presenting this program. Outside of some of the budgetary aspects I think we have it cleared up.

AIR DELIVERED ATTACK MARKER

I had one question. [Deleted,] Whatever happened to that?
General Evans. You are referring to the Air Delivered Attack
Marker. This was a device that we hoped would solve some of our
problems of acquiring and fixing the location of targets at night.
Under night conditions it is very difficult to determine the exact
location of targets and we thought if [deleted].

Senator Goldwarer. Have you explored any other ways other than visual sighting? Could there be instrumentation in the airplane that would indicate the location of the target other than visual observation.

General Evans. [Deleted.]

PAVE SWORD

General Talbott. One other system we haven't considered is PAVE SWORD, and I have Lieutenant Colonel Wacker from our staff.

Colonel WACKER. PAVE SWORD is essentially another [deleted]. Senator Goldwater. Is this the system that would allow [deleted].

Colonel WACKER. No; this is sort of a forerunner to that. The PAVE KNIFE system—I hate to keep using these terms but they do get tied up with the system. The PAVE KNIFE system will be that system. [Deleted.]

Senator Goldwater. Is that bomb about \$8,000 a copy.

Colonel WACKER. Full up is about four.

General Evans. The kit cost of the Laser kits has come down considerably.

Senator GOLDWATER. What is the name of the bridge up north you

used to knock out?

THANH HOA BRIDGE

General TALBOTT. Thanh Hoa Bridge.

Senator Goldwater. I figured out we spent \$28 million on that bridge with these bombs. When I first heard the cost they were \$8,000. We could have saved a lot of money.

General Talbott. And 10 airplanes.

Senator GOLDWATER. I counted the 10 airplanes in there.

That is all I have.

General Evans. Would you like to see the gunship movie?

Senator GOLDWATER. Yes.

(Thereupon a movie was shown.)

THREE DIFFERENT SENSOR DISPLAYS

Major Spicka. This movie will show three different sensor displays. I will point out the sensors showing also the truck in the system. These were taken at night, remember. This is taken through a night observation Starlight scope. You can see the truck coming up there. This platform is unsteady because it is being held, hand-held by a photographer. There is the truck. This is a 20 millimeter being fired, high explosive incendiary. They have a fire started on the truck. In a moment we will have sound coming up. This is one more shot. Noteworthy too is the foliage around the road. This is [deleted] we will now have sound on film. Two trucks. You will hear the crewmembers. This is [deleted] rounds going off. There is a [deleted], He is not firing. This is FLTR, forward looking infrared. Please watch the target center.

Senator GOLDWATER. Is this what the pilot sees?

Major Spicka. This is the sensor display operators. Now we will go back to [deleted]. Make special note of the crewmembers comments. Those by the way were slant ranges of about [deleted].

Senator GOLDWATER. Do they fly about a [deleted] degree bank on

that?

Major Spicka. Pardon me, sir?

Senator Goldwater. Do they fly about a [deleted] degree bank.

Major Spicka. No, we fly a [deleted] degree angle. [Deleted] degree and this can vary between [deleted] and [deleted].

VOLUME OF TRAFFIC

Mr. GILLEAS. You cited, the extensive increase in the Laotian road network. Coupled with the use of sensors [deleted] and the fact you concentrate on these roads day in and day out. Can you tell us the volume and tonnages of traffic coming down through Laos into South Vietnam or Cambodia? Do you have a feel for these figures, sir?

General TALBOTT. I am going to read from the COMMANDO HUNT campaign of last year which was October 1969 through April

1970. This is a very unprecise thing as you well appreciate, sir.

Mr. GILLEAS. Right.

General Talbott. In coming up with these sorts of statistics. But the best estimate we have is that it cost the enemy to transport [deleted] tons of supplies to South Vietnam, it cost the enemy about [deleted] tons to get it there. That is, about [deleted] tons were destroyed by air and he used up about [deleted] tons en route or consumed it getting it down there.

Mr. GILLEAS. How much did he get down there during this period

of time?

General Talbott, About [deleted]—almost, [deleted] thousand tons. Or said another way, out of [deleted] tons that he started with he got about [deleted] into South Vietnam.

Mr. GILLEAS. Are these, 5-ton trucks?

General Talbott. 3.8 I gather the majority are.

General Evans. Zil 157 is the primary truck. It is a 6-wheel drive vehicle capable of carrying about 5,500 to 9,900 pounds of payload

at speeds up to 41 miles per hour over Laos roads.

Mr. GILLEAS. One of the impressive things is the fact he started out with [delted] trucks and he now has [deleted] trucks. In the intervening time, we have destroyed [deleted] trucks in the last dry season, so he must have a fairly rapid replacement system.

General Evans. Yes, he does.

Mr. GILLEAS. For replacing his truck losses.

General Evans. Yes.

Mr. GILLEAS. I would assume you assess the number of trucks coming into Haiphong. I presume that is the primary source of input. Is that a fair question to ask you gentlemen?

General Talbott. Do we assess the numbers coming in?

M1. GILLEAS. Through Haiphong. I presume very few come down the northeast railroad or any other form of input.

General Talbott. I would assume not. I don't have those. I can

supply you with them.

(In response to Mr. Gilleas' question on page 105, the following information is provided:)

The number of trucks coming overland into North Vietnam is very "soft;" therefore, an average of [deleted] per month was arbitrarily added to the "hard" figures available on imports via sea. In other words, if [deleted] is subtracted from each monthly total, the resulting number will accurately represent the number of trucks coming in by sea.

Attachment: [Information was classified and deleted for security reasons.]

Mr. GILLEAS. Thank you, sir.

IGLOO WHITE

General EVANS. I might add there are no IGLOO WHITE resources to monitor the inputs into Haiphong or any other inputs into North Vietnam.

Mr. GILLEAS. In relationship to the IGLOO WHITE program, do you feel this represents a complete or a partial implementation of the McNamara concept as it pertained to preventing antivehicular

infiltration?

General Evans. I think that the operation closely follows the concept as far as the antitruck portion of the concept is concerned. As we visualized, the enemy would take actions and we would have reactions

to his actions, so it has been a rather dynamic system.

We have, for example, improved the detection logics of sensors and I mentioned some of the design changes we have made to make the sensors more efficient. We have gone to the PAVE EAGLE aircraft which has made the relay more efficient.

I think that it is fair to say that we have implemented the concept

quite closely.

TRUCK DETECTION BY SENSORS

Mr. Gilleas. You cited truck detection by sensors, ground sensors and also [deleted]. Do the sensors work at all in conjunction with your

[deleted].

General Evans. I am sure there is some consideration when we put the sensors in, of where the [deleted] are placed. However, the inputs are generally independent of one another. So I guess to answer your question, no, there is no real operational tie-in between the [deleted] and the IGLOO WHITE sensors.

Mr. GILLEAS. Would that be a beneficial thing to do or not, sir?
General Evans. They are considered two different sources of information. However, when it is assessed for intelligence value, of course, both sources are considered in making intelligence estimates.

CHOKE POINTS

Mr. GILLEAS. How many choke points do you effectively try to create in the Laotian road network? I assume you try to establish a certain number of main choke points and then work diligently on those so you can maintain them as effectively as possible?

General Talbott. At the moment we are working on [deleted]. Mr. GILLEAS. What percentage of the time do you feel you are able

to keep them completely impassable, if that would be the proper way

to phrase it?

General Talbott. Since this was started about approximately [deleted] and I am not certain of the exact date, of course the rains are still continuing. [Deleted]. However, with the weather beginning to dry out a little we are beginning to see some trucks move through there, so the number is coming up.

or-2's

Mr. GILLEAS. The Navy this morning alluded to some OP-2's they gave the Air Force Did the Air Force use them operationally and where are they now?

General Evans. I think the statement, sir, was that they provided us with some equipment that was aboard the OP-2's. The Air Force had never flown the aircraft but we did use some of the equipment—ARR52's from the OP-2—and place them in our EC-121 as the gear to receive the sensor activations and also display the activations in the back end of our EC-121. These were called tell-tale units, TTU's. This was equipment that the Navy had developed to monitor the activations of their Sonobuoys. We are still using that equipment in some of our EC-121's. The ARR52 receiver can receive our [deleted]. As we convert our field from [deleted] we will phase out the ARR52 and probably they will go back to the Navy.

(Reference Mr. Gilleas' question on the Air Force use of the U.S. Navy OP-2E aircraft, the following is provided to amplify the answer

provided.)

In response to DCPG tasking, US Navy VO-67 squadron equipped with OP-2E aircraft was placed under the operational control of Seventh Air Force for the purpose of performing the Phase I sensor delivery mission until the Air Force could assume the mission with F-4's. The F-4 aircraft arrived in SEAsia in June 1968, at which time the OP-2E squadron began phasing down, terminating operations in July 1968. The OP-2E squadron redeployed to the CONUS under US Navy control in July and August 1968; the aircraft were not given to the Air Force.

FUTURE AIR FORCE REQUIREMENTS

Mr. GILLEAS. Everyone, is interested in the future. With reference to the IGLOO WHITE technology, is there a requirement for the

tactical air command of the future.

Do you have any idea as to the Air Force future financial requirement to implement IGLOO WHITE in the near or future time frame. By way of background some people believe this program may cost the Government \$20 billion. Hence, we are keenly interested in finding out what each service foresees for the future as far as the ultimate

cost of equipment goes.

General Evans. We are proposing a 5-year development program which I mentioned in my statement. The total cost of that development program is about \$20 million over the 5 years. Now, that is a development program. What comes out of that, of course, depends on how many things we want to buy to put in the inventory and we haven't quantified those requirements. We have gone out to our theater commanders, USAF in Europe, PACAF, and Tactical Air Command, to consider applications for unattended ground sensor systems in the post-Southeast Asia time period so we can do this type of quantifying in order to budget for the systems. For example, what applications can we make of this technology in Europe? And what will it cost us in terms of sensors and terms of relay aircraft and assessment facilities? I personally visualize that we will have one system for which the Tactical Air Command will do the housekeeping. Keep it here in the States and when there is a requirement to use the system, say anywhere in the world, whether it be USAFE or PACAF or some other place [deleted] we will deploy the system to that place as we do other contingency forces.

Senator Goldwater. Does the AWACS program enter into this

area to any extent?

General Evans. As I understand it, the present AWACS program does not include sensor readout, unattended ground sensor readout.

Senator Goldwater. Do you think it would have advantages eventually?

General Evans. Eventually; yes, sir.

General TALBOTT. The scaled down version, sir, as I understand it, will have the extra air conditioning and electronic capacity which could be converted at a later date, but in order to keep the initial cost down we have not included it in the AWACS but tactical AWACS concept does propose the integration of ground sensor technology in the airplane, so I think the answer to your question is "Yes, sir."

Senator GOLDWATER. I would think it would make good sense

eventually.

MUNITIONS

Mr. GILLEAS. I would like to ask you to put your munitions chart back up. I have several questions in order to get a better feel for the money involved in that program. Also I would like to get more detail on the effectiveness of these munitions. We are going to cover that later on in executive session. Do you feel we need each and every one of these antipersonnel munitions? Can we eliminate some of them? My feeling is that in the main you are going to rely on the WAAPM. General, who would like to address those points?

General Talbott. I have a partial answer and I think we can come together on the total. First of all, let me say what are the most effective IGLOO WHITE associated munitions we have in use at the present

time. We would consider the most effective to be the [deleted].

What are the most ineffective? [Deleted.]

BLU-31

Mr. GILLEAS. Why was that land mine put into development originally, recognizing it was for Southeast Asia application where there are no tanks? Was it anticipated that there may be enemy

armor in that area?

Major Anderson. BLU-31 was not developed primarily for Southeast Asia. It was in development before the Southeast Asia conflict became a reality. It was intended to mine railroads. The threshold in the fuze is optimized for very heavy rolling vehicles such as locomotives or a tank, and it was thought that there might be an application for it in Southeast Asia [deleted].

Mr. GILLEAS. But you did use some DCPG money for it.

Major Anderson. There was some DCPG money devoted to it, yes. Mr. GILLEAS. Was the criteria for spending DCPG money that it

be used for Southeast Asia? That was my misunderstanding.

General Evans. I could be corrected by General Deane but his charter at the time that money was applied to the BLU-31 was for a Southeast Asia anti-infiltration system. So I think you are correct, sir.

Mr. Gilleas. The CBU-33 is a cluster. Is that up there?

Major Anderson. Yes, it is on that side.

Mr. GILLEAS. It was optimized to defeat armored and track vehicles. As I understand it, you built 600 units and then canceled it. What was the intended use of this bomb? What was the cost of the program?

Mr. Anderson. You say what was the cost of this program?

Mr. GILLEAS. Right.

Major Anderson. We will have to provide that answer for you. While it can defeat a tank it also would have a capability against any lighter vehicle that came within range of the sensor. So it was really a dual purpose weapon. In addition to being able to defeat a truck it could knock out a heavy vehicle too. There is some little more work being done not with Air Force funds to correct maybe some of the problems with the sensor.

Mr. GILLEAS. Who originated the requirement for this weapon?

Major Anderson. The requirement originated I am fairly sure from Southeast Asia, but to be positive we will have to check on that.

Mr. GILLEAS. You built 600 units and then you canceled it. Why?

Major Anderson. Then we what?

Mr. GILLEAS. Then the program was canceled, as I understand it. Major Anderson. Yes, sir.

Mr. GILLEAS. Why?

Major Anderson. [Deleted.]

Mr. GILLEAS. When was this program first initiated and when was it canceled?

Major Anderson. I would have to check to make sure when it was initiated. It was terminated early this year, early in 1970.

The requirement for the CBU-33 was initially established by OSR (Operational Support Requirement)-240, Aerially Sown Land Mine, dated 2 September 1953, It was further validated by SEAOR (SEAsia Operational Requirement)-42. Anti-Vehicular Land Mine by PACAF on 9 April 1966. The requirement for SEAsia was terminated on 15 May 1970. A total of 650 were procured in 1967 at a cost of \$16.7 million. R&D cost was \$3.348 million. The contractor is presently correcting the deficiencies identified in SEAsia for possible use in other areas of the world.

Mr. GILLEAS. Do you have available relative to the other categories up there—related to funds associated therewith? Do you have funding figures on those—recognizing that these are exclusively Air Force funded?

Major Anderson. Are you talking about the development funds or just procurement funds?

Mr. GILLEAS. Both.

Major Anderson. We would have to get that for you.

Mr. GILLEAS. All right.

Major Anderson. Could I ask a question about that? Do you want the entire program broken out by R.D.T. & E. and procurement from the very inception of the program?

Mr. GILLEAS. Yes, if that is reasonable and readily available infor-

mation that you can supply.

Major Anderson. That will have to be obtained.

(The following information is provided:)

[Dollars in millions]

: -			Develop	Procure	ment cost
<u>.</u>	Munition		Dayelop	cost Fiscal year	Amount
CBU-	24/49	i in the second		§1, 32 1969	
CBU-	46			7 1969	\$1.14 33,0
ČBÚ-		 	1	.7 1969 1,263 1969	7 0
CBU-	38	 		1.3 1970	3, 37
Ĉ₿Û+	58	 		25 1970	46,695

FUTURE COSTS

Mr. GILLEAS. What do you foresee as being the approximate Air Force financial requirement for IGLOO WHITE for the next 5 years

on an average per year, sir?

General Evans. Sir, for fiscal year 1972 we visualize a budget of [deleted] million. That is all-inclusive, procurement, and R.D.T. & E. Beyond fiscal year 1972 I can only talk to R.D.T. & E. money as I have already mentioned. It is an average of about \$4 million annually for R.D.T. & E. Until we can get requirements from the field and evaluate and analyze those requirements, I cannot give you any procurement figures beyond fiscal year 1972.

TRANSFER FROM DCPG TO AIR FORCE

Mr. GILLEAS. Please comment on the transfer of functions from DCPG to the Air Force, as to whether it is the Air Force position that it would prefer to take over the responsibilities that DCPG

perform? What is the Air Force position on this?

General Evans. The Air Force position is that we would like to take over management responsibilities for IGLOO WHITE; that is one of the functions of my office, to insure that we are in a position to take over, without difficulty, management responsibilities for the unattended ground sensor system. We have already taken over certain pieces of hardware connected with DCPG technology. We assumed on the first of September responsibilities for the test portion of the system. This is the effort that has been going on at Eglin Air Force Base. This is now under Air Force management jurisdiction. We plan in the near future to take over the IGLOO WHITE system, the fielded system

that is now being managed by DCPG.

The exact date of that transfer has not yet been determined but we are working with the DCPG staff in establishing a transfer plan. We see no difficulty. As you may know, the Air Force does not produce any sensors. We get all of our air delivered sensors from [deleted]. We are in the process of working with [deleted] to take over production responsibilities for the air delivered sensors. The [deleted] sensors involved are the two models of the ADSID, ADSID short, and the ADSID normal, and ACOUSID which constitute the bulk of our sensor field. Contracts are being prepared now by Air Force Logistics Command which, when let, will produce sensors sometime in the early part of calendar year 1972. We have queried the theater to find out how many sensors they will require in this time period and we are waiting to get those inputs before we let the contracts. So we are in a position to take over responsibilities for the Air Force portion of the DCPG technology and we have already moved in that direction and we are continuing to move in that direction.

MUNITIONS

Mr. GILLEAS. I am not sure whether I let you finish the list of

munitions that you felt were effective or ineffective.

General Talbott. Well, I think that is about all I had. I had the three most effective and those three we considered the least effective. We can talk about consumption rates if you would like that.

Mr. Gilleas. All right, 1 think you have a chart which shows munitions consumption and inventory, if I recall.

General Talbott. That is right.

WAAPM

Mr. GILLEAS. In fiscal year 1971 you requested a substantial sum of \$26 million for WAAPM. How many WAAPM will that buy?

That seems like a lot of WAAPM.

Major Anderson. I will try as best I can to explain the financial business. The WAAPMs that are being procured now are being procured with, I think it goes as far back as fiscal year 1969 money. The production program had been scheduled to a maximum rate of about ideleted a month, and as it was building up, the stockpile of WAAPM in Southeast Asia was increasing all the time. They weren't using it in quantities they thought they were going to. So the production program was cut back. And there is no fiscal year 1971 money on the WAAPM program. It is still money from a couple of years back. And that money is being used to stretch the production program out.

Mr. GILLEAS. I may have misread the nomenclature, but I thought the fiscal year 1971 President's budget contained \$26 million for

WAAPM?`

Major Anderson. It may have had \$26 million in the first budget but it was taken out later on.

Mr. GILLEAS. What is your fiscal year 1971 budget at the present

time?

Major Anderson. I have here a copy of the latest version of P-1 which is the procurement break-out. CBU-42, the last entry is in fiscal year 1970 for \$100,135,000. There is no quantity shown for fiscal year 1971 or fiscal year 1972.

General Evans. We will have to get a clarification on that. Like you, I have an indication there is \$26.2 million worth of money set

aside for WAAPM in fiscal year 1971.

COSTS

Mr. GILLEAS. And it shows your budget for the year to be \$86 million. Is that the figure that you have, General?

General Evans. That is total of OPAF money, \$86 million, of which the total for munitions is \$50 million for fiscal year 1971, of

which \$26.2 million is for WAAPM.

Mr. GILLEAS. I would appreciate it if you would provide us with what the current budget is and whether these numbers are incorrect. Also, an Air Force statement as to the intention to spend those funds, because as we know in prior years we have had a significant amount of moneys that haven't been spent that are put into other programs. In your Air Force paper it says DCPG \$36 million with no more details.

Who can amplify on what the \$36 million is or is not for?

General Evans. I think I can amplify that, sir, in t' squal year 1971 budget, the Air Force Budget?

Mr. GILLEAS. Yes.

General Evans. Thirty-six million dollars under OPAF.

Mr. GILLEAS. Right.

General Evans. We have \$4.6 million for Command Mike II. This is an air-delivered accoustic sensor. We have ADSID III normal \$3.5 million; ACOUSID III of \$5 million. Common modules cost \$12.4 million. Militarization, dual source data package, necessary procurement engineering, \$2 million. Sensor test equipment, \$1 million; Infiltration surveillance center, \$2 million; Automatic data relay, \$1.5 million; Adam rabet, et cetera—these are acronyms, ADAM, RABET—\$1.5 million.

INTENTIONS OF AIR FORCE

Mr. GILLEAS. Is it the Air Force's intention to spend these funds, assuming Congress provides the money for these programs, or are you already in possession of information which would indicate you may not spend as much as you have requested?

General Evans. We are already in possession of information that indicates we will not have to spend this amount of money in all categories of OPAF. I might complete the list so that it adds up to

\$36 million.

Mr. GILLEAS. Fine.

General Evans. The last item is SRP, operational readiness and modifications, \$2.5 million for a total of \$36 million.

Yes, sir, we already know of areas within this category of moneys,

where we will not need all of this money.

Mr. GILLEAS. Would you provide for the record a statement reflecting the monies you believe will be required and what monies you will be able to save. Wouldn't it be appropriate for the Air Force to go to the Appropriations Committee, if it has rather precise information, and say we wish to amend our request and reduce it by "x" dollars? Wouldn't that be a reasonable thing to do or not?

General Evans. Let me call on Mr. Detweiler to identify some of the areas which we have already taken some actions to reduce the amounts

of money.

Mr. Detweiler. The House DOD Subcommittee of the House Appropriations Committee has aleady cut this particular area from a total of \$36 million to \$22 million, and so there has been a \$14 million eut already made in the \$36 million which you talked to.

NO RECLAMA

Mr. GILLEAS. Did the Air Force reclama that cut or not?

Mr. DETWEILER. This particular cut is not being, there is no reclama being submitted on this. So this is a \$14 million cut.

General Evans. Would you like further information in this area?

Mr. GILLEAS. Sir?

General Evans. Would you like further information or will that suffice?

Mr. GILLEAS. I would like for you to tie the loose ends together, namely, whether this cut coincides with the Air Force position?

General Evans. Yes, sir, it does and we have concurred with that

Senator Cannon. Are there other areas where you do not intend to spend all of the money?

General Evan. I will provide that for the record.

FISCAL YEAR 1971 IGLOO WHITE PROGRAM

In millions of dollars

					Original fiscal year 1971 President's budget	House action	Current regulrement
3010 3020	Aircraft procurement, AF			- Ž		1 14. 0 4. 0	
3080	Munition Nonmunition.	i, At			86 (50)	-40, 2 (-28, 2) (-14, 0)	45, 8 2 (23, 8) 3 (22, 0)
3400	Research, develop Operation and mai	ment, test an Intenance	d evaluation		14		14. 0 1 30, 0
	Total				161,0	· · · · · · · · · · · · · · · · · · ·	107, 8

Note: Current programing projects that \$23,800,000 will be spent in the munition area in support of the [Igloo White program. A resume by line Item follows: Incendiary Cluster, 750 pound M-36, \$10,000,000; Bomb, QP 750 pound M-117 \$9,300,000; and Laser bomb guidance kit, \$4,500,000.

1 The Director of Defense Communications Planning Group has Identified to OSD the following reductions in addition to the above: 3010 aircraft procurement, minus \$3,000,000 and 3400 operation and maintenance, minus \$10,000,000, The \$10,000,000 savings in operation and maintenance funds were used to meet increased Air Force requirements for air evacuation, plus \$3,500,000 and dependent medical care, plus \$6,500,000.

2 In the House of Representatives, Report No. 91–1570 Department of Defense Appropriations Bill, 1971, the committee denied the \$63,600,000 requested for CBU-34/42 cluster bombs because the Air Force advised that this requirement had been canceled. Of this total, \$26,200,000 was in support of Igloo White. The Air Force did not reclama the reduction against their line item but requested instead the reduction be reinstated by the Senate for WRM munitions. Thus, the Air Force does not plan to buy CBU-34/42 (WAAPM) in fiscal year 1971.

3 Also in the same report, the \$36,000,000 requested for Defense Communications Planning Group in the Electronic and telecommunications equipment area was reduced by \$14,000,000 because of reduced cost and Increased life of the equipment being procured under this program. The Air Force does not plan to reclama this reduction.

SPECIAL ITEM

Senator Cannon. Gentlemen, we have a special item to be covered. The hearings will now stand in recess. The hearings will be recessed subject to the call of the Chair. It is possible that we will resume again next Tuesday. That is uncertain at the moment. I would like the people involved in this special item to remain.

General Evans. We have a sanitized version that will allow every-

one in session now who has a secret clearance to remain.

Senator Cannon. Then it won't be necessary for the room to be cleared.

General Evans. This really isn't a briefing but I would like to read into the record some excerpts of intelligence that we have derived from various sources. We have a considerable body of material which has been accumulated and which allows us to address the effectiveness of some of the weapons that we have employed in Laos, from the enemy's own viewpoint in a reasonable and coherent manner.

This information does offer the most authoritative exposure of available individual instances of damage, impediment, and attempted countermeasures, and I would like to give you some selected examples.

Here is one of the pieces of information we do have:

Deleted.

Senator Cannon. I think you might submit some of those additional ones for the record.

General Evans. All right, sir, I will do that.

Senator Cannon. Very well.

INTRODUCTION

References to special types of munition, including magnetic-fused and time-delayed bombs as well as other varieties of air-delivered area denial ordnance, are quite common in the enemy's reports relating his situation in Laos. Unfortunately, his descriptions of the munitions are sketchy—leading to difficulty in identifying the type employed in many cases—and his reports of countermeasures are so laden with assumptions of knowledge on the part of the recipient that it is often impossible to form a clear idea of his techniques. Nevertheless, a considerable body of material has been accumulated, which at least allows us to address the effectiveness of these weapons—from the enemy's own viewpoint—in a

reasonable and coherent manner.

A few factors remain unclear in the background of the material, and should be treated as assumptions for the purpose of this study. First, the enemy's major concern is the movement of vehicles and the associated large increments of supplies, an emphasis which is out of proportion to his known commitment to movement of infiltrating personnel and also to localized undertakings within the Laos network. Accordingly, those munitions tending to be effective mainly against vehicular movement probably receive disproportionate attention in his reports. Second, an unknown but probably large part of his reporting has not been obtained. The available information, while sufficient for determining his current posture and assessing the gross impact of the air campaign, probably provides too restricted a sample for rigorous comparative evaluation of munitions.

This information does offer the most authoritative exposition available of individual instances of damage, impediment and attempted countermeasures,

selected examples of which follow.
(Deleted)

Senator Cannon. The hearings will stand in recess subject to the call of the Chair.

Thank you very much, gentlemen.

(Whereupon, at 4:55 p.m. the hearing was recessed subject to the call of the Chair.)

ELECTRONIC BATTLEFIELD PROGRAM

TUESDAY, NOVEMBER 24, 1970

United States Senate,

Electronic Battlefield Subcommittee

of the Preparedness Investigating
Subcommittee of the Committee on Armed Services,

Washington, D.C.

The subcommittee met, pursuant to recess, at 10 a.m., in room 235, Old Senate Office Building, Senator Howard A. Cannon, presiding. Present: Senators Cannon and Goldwater.

Also present: Ben J. Gilleas, Director of Investigations; George

Foster and David Littleton, Professional Staff Members.

OPENING STATEMENT

Senator Cannon. Today is the third day of hearings by the subcommittee to inquire into the electronic battlefield program. In addition to receiving information on the use of sensor surveillance types of equipment, we will receive testimony concerning the use of other intelligence gathering equipment, such as night observation devices, radars, et cetera.

I want to emphasize to the witnesses today that we desire to receive as much information as possible during the open session. Further, that it is the responsibility of each witness to determine whether classified

information is involved.

The first witness is Maj. Gen. William Fulton, and he will be followed by Lt. Gen. John Norton, both from the Department of the Army.

General Fulton, I understand you do have a prepared statement.

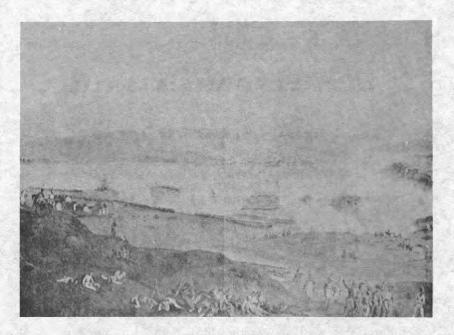
Will you proceed, please?

STATEMENT OF MAJ. GEN. WILLIAM B. FULTON, STANO SYSTEMS MANAGER, CHIEF OF STAFF, ARMY, DEPARTMENT OF THE ARMY

General Fulton. Good morning, gentlemen.

You have heard a great deal over the last few days about the unattended ground sensor program, developed and managed by DCPG and of its success on the battlefield. This morning I would like to talk to you about the Army's overall find-the-enemy program, known as STANO—surveillance, target acquisition, and night observation, which includes as part of its total effort, the unattended ground sensor technology.

The military's problems with finding the enemy are not new. They date back to antiquity. From Napoleon's time—the advent of so-called



modern warfare—many a battle has been lost because the commander involved let his enemy surprise him by massing and then overwhelming him, pass by him, or slip from his grasp because he could not find him



By World War II there had been major advances in mobility and firepower but we still lacked the ability to find the enemy. The Battle of the Bulge, in December 1944, was typical.

There, as history has shown, the Germans were able to successfully increase the size of their force from nine to 26 divisions, in a period of only 6 days. Because they moved during periods of darkness, we had little or no knowledge of the buildup despite over 3,000 air recon sorties a day on 3 of the 6 days.



THE INTELLIGENCE PROBLEM

TWO GERMAN CORPS / WW II

UNITS NOT IDENTIFIED

	INF		37%	٠.
BATTALIONS <	ARMOR		68%	
	ARTY		83%	
	INF		58%	:
REGIMENTS <	ARMOR		100%	
	ARTY		86%	

LOCATION ERROR ON THOSE IDENTIFIED

GREATER THAN I KM ERROR		TER THAN MERROR		GREATER THAN 6 KM ERROR	i
80%		50%	1 1 1 1	.20%	

DIFFICULTY IN LOCATING ENEMY DURING WORLD WAR II

This table gives a further indication of our seeming difficulties in locating the enemy during World War II. Note that even when we did find the enemy, most of the information about his position was grossly inaccurate.

SAME PROBLEMS IN VIETNAM UNTIL 1968

And, unfortunately, as the early history of the war in Vietnam has clearly shown, there were few improvements in our capability during the period separating World War II and Vietnam. As General Williamson noted in his discussion with you earlier in the week, significant improvements in our capability did not take place until 1968 and after.

Actually, by early 1965, the scientific community, under the auspices of the Army and OSD, had begun an intensive effort to push technology into solutions to this problem of finding the enemy.

The scientific community moved into a number of technical areas

across a broad spectrum of functional areas

We are trying to achieve a well-integrated and balanced capability.



TECHNICAL & FUNCTIONAL APPROACHES TO STANO

THERMAL IMAGERY IMAGE INTENSIFICATION LOW LIGHT LEVEL TV. RADAR OPTICS **AURAL DETECTION** CHEMICAL DETECTION RADIOACTIVE DETECTION MAGNETIC DETECTION BIOCHEMICAL DETECTION.

NIGHT VISION SYSTEMS GROUNO SURVEILLANCE RADARS UNATTENDED GROUND SENSORS PHOTOGRAPHIC SYSTEMS AIRBORNE SURVEILLANCE SYSTEMS **ELECTRONIC SUPPORT MEASURES** INFORMATION TRANSMISSION SYSTEMS POSITION DEVELOPMENT SYSTEMS TEST SYSTEMS

The Army's detection problems are compounded because of the great variety of missions in which we are involved. This complex problem is not only a matter of defensive or offensive missions on our part; but the "enemy detection requirement" challenges our operational and technical creativity because there are many potential variables, such as, enemy tactics, terrain features, vegetation cover, weather conditions, day or night operations, deception and camouflage, countermeasures, and others.

It is obvious that we want to detect the enemy as deep in his own territory as is possible and to develop these enemy targets as they move into the range of aircraft and artillery, and to do this before he can

bring his forces to bear against us.

DEVELOPMENT OF INFORMATION ABOUT THE ENEMY

This development of information about the enemy is part of an integrating process, whereby all collection assets, all forms of sensors, are put to full use.

Decisions as to:

Where to employ or install certain sensors.

Where to locate reconnaissance units; patrols and ambushes.

Where to place agents; where to concentrate photography. All require some basic intelligence/information about the enemy.

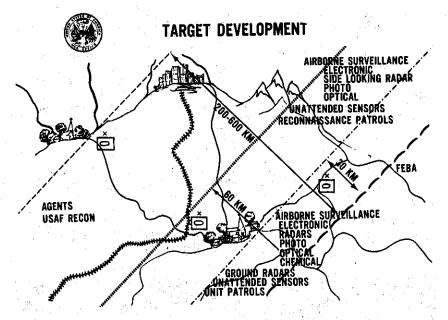
When the enemy is operating at a distance and we have more difficulty in finding where he is, we need sensor devices that will give us a gross cut at his general location. (He is in the XYZ district.)

Then with this information we can target with other devices to achieve greater refinement in our surveillance and learn more precisely

of his location.

Finally, with these relatively broad cuts behind us, for general area location we should be able to put to use the more discriminating devices that will provide refined information to the point of actual detection and even identification so that we can either maneuver against him or engage him with our firepower.

Or, after gaining enough information about the enemy to pinpoint



his location, in time and space we could then track him until to that point on the battlefield where it is determined best to destroy him at least cost to our own effort.

STANO OBJECTIVE—TO MAKE SOUND AND TIMELY DECISIONS

The objective of this is clear; our STANO objective is to develop sufficient information to permit our commanders to make sound and



STANO OBJECTIVES

TO PROVIDE COMMANDERS WITH TIMELY
INTELLIGENCE INCLUDING THE NATURE AND
LOCATION OF ENEMY ACTIVITY TO ASSIST IN
RAPID DECISION AND RESPONSE BY FIRE AND
MANEUVER WHICH CAN RESULT IN THE ENEMY'S
DESTRUCTION.

TO FACILITATE NIGHT COMBAT OPERATIONS.

timely decisions, allowing them to commit their forces in the most effective manner and with the least possible danger to their own

troops.

We and the scientific community have been successful in this pursuit of new systems and are seeing new hardware items that offer more potential for realtime or near realtime information collection. I would like to spend a few minutes to tell you about some of the typical systems and if you have the time, show you some actual hardware in a static display.

NIGHT VISION SYSTEMS

As I have mentioned, we have been working in several functional areas. Night vision systems give us the opportunity to take the night away from the enemy. Obviously if we can see him long before he sees us, the advantage to our force is tremendous.

We have a number of night vision scopes for the small unit, starlight scopes, that take what little light is available from the stars or moon

and amplify it to give us a clear view of the enemy.



Shown here is the 5-pound individual weapon scope. It permits us at company level to see moving men at over 300 meters under only starlight illumination.

This device is the 34-pound medium range night observation device, designed for our outposts to use in a wider surveillance role. Again, with only starlight, we can see over 1,200 meters.



We also have, for company and battalion level use, crew served

and long range night observation devices.

Night vision devices were first introduced in Vietnam in 1964 and since that date thousands have gone in-country. The best testimony to their utility comes from the individual soldier, who, in the crunch, is reluctant to carry with him anything that is not of some considerable value. Once he understood and saw the potential of the starlight scope, the soldier in Vietnam has been more than willing to carry a few extra pounds as a tradeoff for his new night eyes.

THERMAL IMAGING

In addition to follow-on improvements to the starlight scope, we also have much hope for a new technology, thermal imaging, in which we sense temperature differentials in the area we scan with the viewing device. Using the thermal technique we are able to "see" the enemy at extended distances in total darkness and even through a daylight fog.

This device is a handheld thermal viewer, which allows us to see a moving man at close-in ranges. It is still an R. & D. item and copies are being tested successfully right now in Vietnam. This same technology can be applied to use on tanks and other ground vehicles as

well as on night vision systems for aircraft.

I might point out that both the starlight devices and the thermal devices are passive; that is, it is almost impossible for the enemy to detect your use of the devices—there are no visible or invisible beams for him to pick up.



We are also working on radars. We are trying to make them lighter and more reliable and to give them longer range and more effectiveness.

RADARS

This AN/PPS-5 radar is in the hands of the troops in Vietnam. Our experience has shown that this lightweight device, operated at company level, can pick up enemy personnel moving at a distance of over 5,000 meters. As you recall, it was a device similar to this, an earlier model, that provided the first confirmation of enemy activity in General Williamson's story of fire base Crook.

When we went into Vietnam with earlier model radars few troops had faith in their capability, but as these newer PPS-5's came in and were successful in giving early warning or confirming the activations

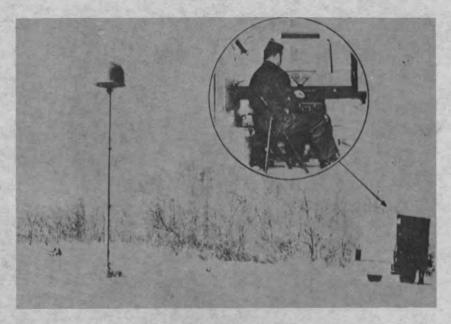
of other sensors, their popularity grew.

The PPS-5, however, has limits in that it is relatively heavy, 95 pounds, and has little ability to penetrate foliage, so it would be of little use for a jungle patrol. We have been testing a smaller developmental radar, approximately 18 pounds, in a radar development effort to produce a radar to support offensive operations at small unit level.



This device, the PPS-14, is a lightweight foliage penetration radar that can give very fine, short range protection to a patrol or an outpost by being able to look through foliage. The PPS-14 is still in R. & D. testing in Vietnam, but looks like a winner.

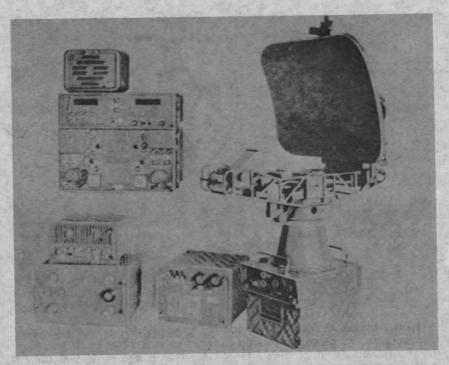




In the bigger picture, to provide the broad coverage, the wide area surveillance, we have been using radars like this TPS-25. It has been in the inventory since 1959. It can scan to range of 18,000 meters and give indications of moving targets. Originally designed as a field artillery target acquisition radar, it has been used most effectively in the surveillance of the areas in around major bases and cities in Vietnam. In a typical mission, one of these operating south of Saigon, provided the first warning to local troops that a large group of enemy was moving toward their village. Since the enemy was still several miles away, there was more than adequate time to take counteraction.

Our principal problems with the TPS-25 are its size, several hour set up time, and its maintainability. It is essentially an electronic device of the electron tube era, in a time when we need solid state electronics to provide lighter weight, maintenance free operation.

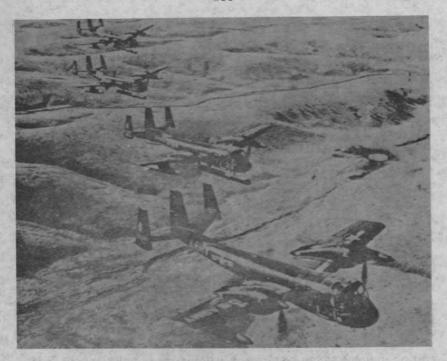
To meet this problem, we are buying the TPS-58 which is the follow-on to the TPS-25, and which should be available in Vietnam



within a few months. Besides being one-third the weight, it is easier to set up (30 minutes), has greater range, and much greater reliability. We also see, in the 58, a future major improvement for our forces in Europe.

AIR SURVEILLANCE

But Vietnam has taught us that we must not be restricted to the ground in our attempt to find the enemy. We are and have been well supported by the Air Force in their long range photo recon missions for us. The Army feels, however, that it must have its own capability for low level, constant surveillance of the immediate battle area.



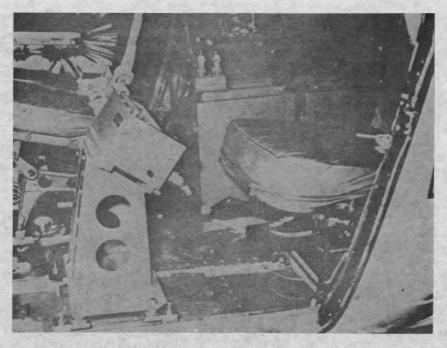
This OV-1 Mohawk has provided us with wide area coverage. Through its IR systems, it has located campfires of the enemy and with its radar has detected enemy sampan traffic.

Right now we are at work on the OV-1D, an improvement that will give us an even better capability against European-type targets such

as tanks, and self-propelled artillery.

"PEOPLE SNIFFER"

Many of you may have heard of the "people sniffer"—the XM-3 chemical detector, shown here. This device is one of the medium discriminator find the enemy devices that I mentioned earlier. Op-



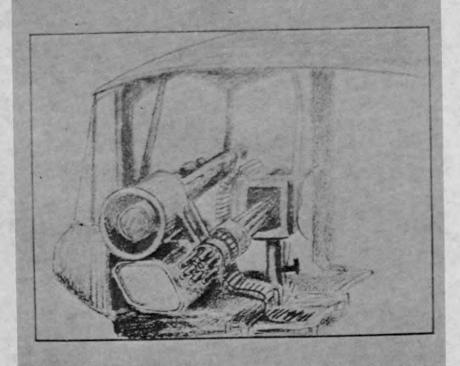
erating in areas where you expect little native population, the XM-3, mounted in a helo, gives indications of human activity in a general area, with enough detail to permit followup the sniffer with higher resolution acquisition devices.

Right now we have sniffers with each of our divisions in Vietnam and more than one commander can tell you how, after getting an initial sniffer reading, he was able to put his patrols right next to an enemy camp and then destroy the enemy force with his firepower. This is far easier than moving in a search through the jungle with troops.

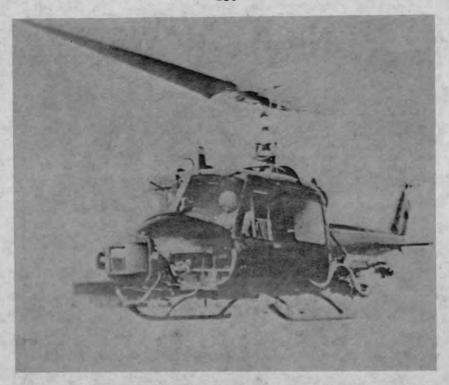
General Williamson already mentioned the Night Hawk which was the first of the aircraft that could both find and shoot, an obvious advantage. Capitalizing on the success of the Night Hawk and the breakthroughs in night-vision technology we are working on several developmental systems that will enable us to give our current helo

fleet better eyes at night.

NIGHT HAWK



NOD XENON SEARCH LIGHT MINI-GUN



This device is the FLIR a thermal imaging night-vision device mounted on a UH-1 helo. We have three of these in Vietnam for evaluation. The preliminary results indicate that by giving the scout helo the ability to see at night and then immediately engage the enemy, we can make major strides in both finding and destroying the enemy.

INFANT

This is the Infant, the UH-1 Iroquois night fighter, night tracker. It is a new attempt to provide both guns and rockets and a night-vision system for our helos. In this case we use low light level TV and an image intensification system, like the starlight scope, for night vision. These systems are also in R. & D. evaluation in Vietnam.

Although we already know that the Infant is not the ultimate system, stories about the Infant spotting enemy moving under what they thought was the cover of darkness and the resultant disruption of the enemy, are sufficient proof of our long-term need for such systems

I have a film which I would like to show you in executive session. It illustrates the capabilities of the two technologies, low light level



TV and thermal imagery. I am sure after looking at those films that you will appreciate the potential offered by these technologies.

Night navigation and operations can certainly be enhanced by these technologies and these same systems can bring greater improvements in the airmobile concepts that we have proven in Vietnam.

UNATTENDED GROUND SENSOR PROGRAM

You have heard over the past days a lot about UGS, as used by the Navy, the Air Force, and the Army in SEA. We in the Army are quite satisfied with the current UGS program and see a definite

potential for the future. A little history might bear this out.

When the DUFFEL BAG program began in April 1968, no one really understood what the unattended sensors really were. By early 1969, only a few visionaries, like General Williamson, truly understood their potential and only a few hundred sensors were actually being employed by the Army. Then as the success made possible by the pairing of the UGS with other sensor devices became well known their use became widespread.

Today each U.S. division and brigade and many ARVN divisions, operating under U.S. guidance, are successfully employing these

unattended ground sensor systems. While the actual number in use is classified, I can say that several thousand are in the ground-a remarkable change in just a few months.

But what good are these devices? They are expensive and, when improperly used can waste ammunition. If every time someone picks up movement he fires on the movement, it could result in an improper response.

PROTECTS KEY INSTALLATIONS

Properly used unattended ground sensors can do much for us. They can provide us wide area surveillance. They can protect our key installations and base complexes. They can assist in security of our lines of communication and as you have already heard, they can when used, in combination with other types of sensors to acquire targets.

You have heard General Williamson's stories and from General Wright, who has recently returned from MR-1, that part of Vietnam near the DMZ. Their accounts are vivid proof of the general acceptance by commanders of the various STANO systems in general and the

unattended sensors, in particular.



In a wide area surveillance role varying mixes of all kinds of sensors have given commanders additional eyes and freed troops from dangerous and continuous reconnaissance missions.

SENSORS DETECTED ENEMY MOVEMENTS

1st Air Cavalry Division unattended ground sensor fields have been successful in contributing to the accurate determinations of enemy movements including not only logistical activities but also the maneuvering of enemy combat units in war zone C.

A sensor field laid along one trail was extremely productive in helping the division keep track of a key Vietcong regiment during several operations in which the regiment used a given town as a commo liaison station and moved troops and supplies up and down the trail.

During the period November 1969 through February 1970, the Vietcong regiment suffered a serious attrition of forces because the 1st Cavalry Division was able to locate its battalions quite accurately and effectively maneuver and place well-directed firepower against

them.

SENSORS USED IN CAMBODIA

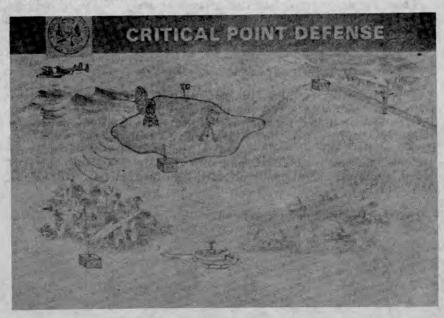
In another surveillance role, during the U.S. forces entry into Cambodia unattended ground sensors were emplaced in selected enemy areas inside Cambodia with the primary purpose of intelligence gathering and the unattended ground sensors did become a major

source of intelligence.

Monitoring of the sensor fields at division level enabled our division to correlate the data from the sensor fields with other intelligence and thus provide the division commanders with an integrated target development effort. For example, enemy activity in one base area indicated a general trend of movement from a transshipment point, west to east. This information substantiated other intelligence reports indicating a border crossing site in the area and permitted the U.S. commander to move against the enemy when adequate forces were available and it was timely to attack.

Sensors have also improved the security around and near our

critical installations.



PROVIDED EARLY WARNING AT QUI NHON

U.S. personnel have used many sensors around the base at Qui Nhon. The majority of the devices were installed around critical areas like petroleum storage areas and ammunition supply points.

Following the emplacement, enemy attempts to infiltrate and attack these areas continued; however, the sensors gave early warning of the attempted infiltrations and unattended ground sensor activations were confirmed by radar sightings and searchlights.

SECONDARY EXPLOSIONS AS RESULT OF SENSOR ACTIVATIONS

During one 90-day period the Qui Nhon command reported several enemy kills and four secondary explosions following their reaction to the activations. There were also good indications that more damage was inflicted on the enemy. The Qui Nhon commander felt that firing on these activations defeated or discouraged many attempts by the enemy to destroy or sabotage critical storage points in his area.

SENSORS SAVED LIVES BY PROVIDING EARLY WARNING

In a broader application of critical area security, sensors have been used to thwart enemy rocket attacks. In one case, the Chu Lai "rocket pocket," sensors were placed on the approaches to a key airfield. In one case, one of the enemy's attempts to fire rockets at Chu Lai was caught by the sensors and reaction forces captured seven 122-millimeter rockets. Sensor intelligence gave a 12-minute prior warning of that attack and saved many lives.

These examples are illustrative of typical usage. They do indicate that our commanders are using these devices to conserve manpower for critical missions and to reduce the exposure of our individual soldier to the hazards of the battlefield. They do indicate successful use.

WHY STANO WAS ESTABLISHED

This success in Vietnam, the potential for the future offered by these new technologies and the inherent difficulties in coordinating the resources required for such a complex effort, are reasons why in the summer of last year, the Secretary of the Army, at the recommendation of the Chief of Staff, approved the appointment of an Army systems manager for STANO and subsequently established, at Fort Hood, a unique, operationally oriented field test activity, PROJECT MASSTER.

General Westmoreland sought to:



STANO/PROJECT MASSTER

.. GET THE MOST FOR THE STANO DOLLARS

- ACCELLERATE DEVELOPMENT & PRODUCTION OF TESTED STANO ITEMS

"SUPPORT DEPLOYMENT OF STANO SYSTEMS TO VIETNAM

"CAPITALIZE ON ADVANCES IN TECHNOLOGY

Get the most for the dollars we were investing in these STANO

programs.

Sort out and accelerate developments and production of the promising field and battle tested items and terminate developments of those with little or no potential.

Support the deployment to Vietnam of the best systems, by backing the deployment with intensified training and doctrine development

and a sound maintenance and logistics program.

Capitalize on the lessons of today to produce, with the new tech-

nologies, a better Army for the future.

Our management concept envisions total Army-wide participation in STANO. As mentioned, I am the systems manager with responsibilities across the board. My job is to provide priorities and guidance to all Army agencies involved in the STANO effort and to support STANO operational activities worldwide. Each of our U.S.-based commands has a STANO element to focus on improvement of the Army-wide capability.

In the area of program management, we feel we are being successful.

STANO FUNDING

This chart illustrates the STANO funding picture, fiscal year 1967 through fiscal year 1971. In the 2 fiscal years of the STANO program,

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STANO FUNDING

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ria de	S. W. A.	1987	1968	1969			TOTAL
ROYE	Total	72.0	102.4	78.2	49.9	44.0	348,5
	DCPG .	[20.7]	[30,0]	[21.8]	[9.2]	(10.0)	[91.7]
PEMA	Total	305.7	422.8	337.0	159.9	172.2	1,397.8
	DCPG	[144.9]	[192.4]	[131.4]	[35.4]	[78.0]	[582.1]
OMA	Total	0	6.9	7.5	11.2	17.5	43.1
	DCPO	0. ,	6 (0)	[7.5]	[7.8]	(9.3)	[24.4]
				_			
	TOTAL.	377.7	532.1	422.7	221.0	233.7	1,787.2
e North Lite	DCPG	[165.6]	[222.4]	[160.7]	[[52.2]	(97.3)	(698.2)
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1970-71, we have been able to focus on the problems and drive down our overall expenditures while not scrimping on either our support of

the effort in Vietnam or the promise of the future.

I would point out that the figures in parentheses are those related to Army support of the DCPG program and have already been discussed by Major General Deane. They were included in his figures and thus should not be added to his figures to determine the total DOD cost of STANO.

What have we done in this STANO effort?

In our support of the SEA effort, we have developed a new focus on

doctrine and training.

Since most of the equipment was new, concepts of employment did not exist and our combat developments people have had to produce new texts to explain how these items are used and to teach both the soldier and the commander how and when to use these devices.

At Fort Huachuca, Ariz., and at most service schools, we have developed new courses of instruction for the technician in how specific pieces of hardware, the new sensors, are installed. In our officer course at the branch schools we have focused on planning and the techniques of employment and to develop an understanding of the potential benefits of these new STANO systems including the unattended ground senors.

We have launched a major analytical effort in our Combat Developments Command to develop the tradeoffs we need to fully assess the impact of these new systems and to determine our best mixes of equipment. We recognized that we must be discriminating. In an

era of complex technology, when scientific breakthroughs are frequent, we know we must focus on a good R. & D. program.

We have made some false starts—but we have been most fortunate—by design—to have restricted most of these errors to the de-

velopment phase. We are flying before we buy.

The key, however, to this effort rests with PROJECT MASSTER, our field test and experimentation activity and with our Combat Developments Command, which is developing the concepts for our future use of these devices. For this reason, I would like to defer discussion of these two areas to Lt. Gen. John Norton, commanding general of the Combat Developments Command and former deputy director of PROJECT MASSTER.

Thank you, gentlemen, for your patience.

Senator Cannon. I think we will go ahead with General Norton now before we ask questions.

STATEMENT OF LT. GEN. JOHN NORTON, COMMANDING GENERAL, U.S. ARMY COMBAT DEVELOPMENTS COMMAND

General Norton. Mr. Chairman, gentlemen: General Fulton has outlined for you the overall Army STANO program, how it is organized

and what it is attempting to accomplish.

I would like to expand on some of the details of this program—specifically—how we are testing proposed items of equipment at PROJECT MASSTER; how the accepted STANO items are working in Vietnam operations; and what the future of STANO equipment and capabilities will be within the overall land combat system.

PROJECT MASSTER

PROJECT MASSTER came about as the result of the Army's need to digest and exploit the rapid explosion in sensor technology that came about in the late 1960's. More specifically, MASSTER was organized to provide the Army with an expanded and accelerated capability to evaluate from the soldier's point of view the merits and weaknesses of proposed hardware. MASSTER also determines if the combat developer's concepts for using the hardware are best matched to the

capabilities of the hardware and the needs of the field units.

PROJECT MASSTER was activated at Fort Hood, Tex., on October 1 of last year. The term "MASSTER" is an acronym which stands for Mobile Army Sensor Systems Test, Evaluation and Review. A soldier at Fort Hood thought a more descriptive meaning for MASSTER was, and 1 quote, "Making American Soldiers Safer Through Electronic Reconnaissance." His thoughts certainly reflected the basic objectives for the initial MASSTER test program. MASSTER conducts field tests of STANO materiel, concepts, tactics, techniques, logistics, and training. Again, the overall objective is to assist the Army in the effective and efficient development of improved capabilities for our forces in the field.

MASSTER conducts three types of field tests—(1) materiel field tests, (2) materiel systems field tests, and (3) systems field tests. Materiel tests look at basic hardware capabilities. Materiel/systems

tests look at the hardware and the basic combat element that will use the hardware or, in other words, the hardware/soldier interface. Systems field tests look at the performance of new capabilities in larger combat units, that is, the battalion and higher echelons.



MATERIEL FIELD TEST

- DETERMINE MILITARY POTENTIAL
- DERIVE INFORMATION ON WHICH TO BASE DECISIONS TO ACCELERATE OR TERMINATE PROJECT
- DETERMINE CHANGES IN MATERIEL CONFIGURATION:
- DETERMINE TECHNIQUES OF EMPLOYMENT
- ESTIMATE IMPACT OF NEW MATERIEL ON ORGANIZATION, TRAINING AND LOGISTICS

In materiel tests, candidate items in various stages of development are sent to MASSTER for a field examination. Materiel items are examined in the fine areas indicated. In the final analysis MASSTER must determine if the proposed item is ready for use by the soldier. If not, does it have to go back for modification or is the idea or technical approach set aside in favor of a better approach? By testing this way early in the cycle, we prevent some items from going into production and undesirable features of other items from getting into production models. This can eliminate costly and time-consuming retrofits.

14 TESTS COMPLETED

To date, MASSTER has completed 14 tests of major STANO materiel items. Some of the items were passed, some were rejected, some were sent back for further engineering, and some were sent back for basic research.

For example: (1) MASSTER looked at night vision goggles for the individual soldier and found that the present equipment fell far short of requirements. MASSTER recommended termination of the current development and the return of the project to basic research.

(2) In another case, when a stabilized night sight for helicopters

MATERIEL	MATERIEL TESTS COMPLETED				
	SENSOR SYSTEMS	5			
	NIGHT VISION DEVICES	6			
111	AIRBORNE SYSTEMS	2			
	RADARS	_1			
	TOTAL	14			

and tanks was examined, it was quickly determined that the maintenance burdens and cost of the sight far outweighed its marginal utility for night operations. MASSTER, therefore, recommended termination

of this development.

(3) MASSTER also examined a radar developed by the Army Land Warfare Lab. MASSTER put the radar through its paces and recommended that it be deployed to Vietnam after some "soldier proofing" modifications. MASSTER also looked into the Combat Developments Command proposed concepts for employment of the radar and suggested several changes that enabled the operators to more effectively

employ the radar.

The second type of test is the materiel/systems test which is used to examine the operation of the hardware in the basic combat organization, that is, a squad, forward observer party, tank crew or gunship team. This type of test combines the features of the materiel test just discussed and the systems field tests where the basic combat organizations are evaluated as part of a larger combat organization. Systems field tests involve battalion and larger size forces which are trained and evaluated on their employment of the new combat systems against various types of threat. We have five basic areas that we examine during the conduct of systems tests, as shown. To date,

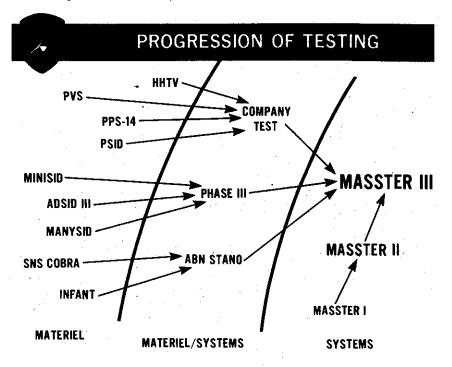


SYSTEMS FIELD TEST

- EXPERIMENT WITH NEW CONCEPTS, AND MATERIEL
- ASSESS COMBAT EFFECTIVENESS (BENEFITS VS BURDENS)
- DETERMINE GAPS OR DUPLICATIONS IN LAND LAND COMBAT SYSTEM
- VALIDATE DOCTRINE, ORGANIZATION, TRAINING AND SUPPORT CONCEPTS
- DETERMINE TECHNIQUES OF EMPLOYMENT

MASSTER has completed three systems tests centered around the battalion STANO system with some evaluation of the brigade and division STANO systems.

MASSTER uses all three types of tests to sequentially examine new combat systems. To date, we have looked at a number of materiel



items shown on the left; then we examined the items in their basic organizations as indicated in the center and finally, we evaluated the

new systems operating as part of a large organization.

In the upper lefthand corner under materiel test you see three small hand-held sensors based on three different types of technology. the infrared and the radar and the seismic intrusion technology. After these have been individually running out we bring them together in a fairly small sample but sufficient to test their value as part of a company combat system.

In the next grouping you see all of the seismic intrusion detectors that were available in this time frame, and they are either used on the ground mode or air delivered mode, and after testing these individually we brought them together in what we call the phase III test, which is

really a DCPG total system called the Bass III test.

In the lower lefthand corner you see the two airborne systems, the COBRA, and the INFANT. As these are tested individually we gather data. At Fort Hood this month we are running a materiel systems test of the airborne systems. We proceed beyond the middle frame here, and we then see a logical progression where in battalion, brigade and division structure we test all of these candidates that succeed earlier. MASSTER I and II are completed. MASSTER III will take place next spring.

A new system may easily pass the first two tests but fail in the third test because it can't be integrated into the overall ground combat force without an adverse impact on other critical systems.

FOUR BASIC CHARACTERISTICS

MASSTER tests have four basic characteristics that distinguish them from other testing and experimentation currently employed by the Army to develop and refine materiel and combat systems.



TEST CHARACTERISTICS

- SHORT TIME FRAME
- SIMPLE INSTRUMENTATION
- MINIMUM ESSENTIAL DATA
- MILITARY JUDGMENT

MASSTER tests can be, and have been, rapidly carried through to completion. Only a minimum of time is needed from start to finish because we use simple instrumentation and we collect only the minimum essential data necessary to reach a decision. Analyses of proposed hardware and concepts are performed by experienced combat officers, and these officers know a lemon when they see one and quickly speak out to insure that the deficient items and concepts are rejected and good ideas are accepted.

ENVIRONMENT IS REALISTIC

Our environment at MASSTER is realistic. As you can see from this picture (in subcommittee files) our fire base at Fort Hood could easily pass for a fire base in Vietnam. We believe that realism increases the credibility of our findings. This, then, makes the chance that field soldiers and commanders will have problems with new systems less likely.

MASSTER AND VIETNAM

Let me expand on the Vietnam interplay with MASSTER. This may be of interest because I believe MASSTER, working with the combat and materiel developers, has been successful in providing our combat forces in Vietnam with tested doctrine, materiel, and organizations. This, in turn, has made a positive improvement in our overall combat operations. We believe that the gap created by the rapid deployment of new STANO hardware to the combat zone, without adequate concepts of employment, logistics and training packages, has largely been closed. New items of equipment are now deployed with fully tested implementing support packages which include handbooks for the operators, maintainers, support and planning personnel. I might note that some of the handbooks for the operators have been printed in a pocketbook size on waterproof paper so that they would not deteriorate while operating in the damp environment of Vietnam.

The developmental process does not stop once new combat systems deploy with operational forces. The material developers keep constant track on equipment performance. Both MASSTER and the Combat Developments Command record and analyze the performance of STANO combat systems in the field to isolate weaknesses which can be corrected in later systems. MASSTER recently analyzed Unattended Ground Sensor operations in Vietnam and consolidated the results into an employment SOP for use by our forces in Vietnam. The Combat Developments Commands analyzes lessons learned on all combat systems operating in Vietnam and provides information on identified weaknesses to the developers, be they hardware men, scientists, conceptualists, trainers or logisticians.

COMMANDERS IN VIETNAM ENDORSE GREATER USE OF SENSORS

In September, General Westmoreland asked me to visit all units in Vietnam to get a first-hand feel for how well these new STANO devices have been working and to get an idea of the commanders reactions to their use. I found that over 80 percent of the Vietnam commanders endorsed the use and expansion of UGS for both United States and

ARVN forces. They indicated that UGS have a great potential for covering critical routes and pockets on the battlefield. For example, I met an officer who had fought in my division in Vietnam during 1966 when he had very few STANO devices and who, in his second tour, was putting the capabilities of the new STANO equipment to good use. In one critical action, he had been alerted by various ground sensors to the presence of an NVA battalion which had slipped across the Cambodian border. He was ready for the enemy when they attacked. The attack soon became a defeat for the enemy and they began to withdraw. The officer had retained a reserve of certain unattended sensors for just such a situation.

ENEMY ATTACK TURNED INTO A ROUT

A helicopter was dispatched to drop the sensors on the possible withdrawal routes. Indication of the direction of withdrawal was picked up so that followup action could be initiated to aggressively pursue the enemy. As a consequence, an enemy attack that could have been a costly surprise several years ago was turned into a rout for the enemy. The use of the sensors to follow the enemy out of the area enabled our force to keep pressure on the enemy by detecting and spoiling his every move as he sought to break contact. Many examples could be cited. Patrolling, for instance, has been greatly aided by the employment of unattended ground sensors and other STANO devices, expecially in the conduct of an ambush.

CONSERVES AMERICAN FIGHTING MAN

Patrols in Vietnam are now monitoring probable avenues of approach into and at the ambush sight without physical presence. Remotely fired munitions or firepower are used to defeat the enemy with minimal or no physical contact thus conserving our most important asset, the American fighting man. Previous testimony has provided evidence on the use of sensors for patrolling.

PROGRESS BY THE ARVN

I was most pleased to see the progress that the ARVN are making in the use of unattended ground sensors. Their soldiers have adapted well to the electronic devices and their commanders are employing them in a skillful, imaginative manner. General Wright's discussion earlier gave you some of his experiences working with ARVN in this area.

SENSORS HAVE LARGELY FILLED THE GAP

Now I would like to pass on my views on where STANO and the related intelligence and control systems are going. There is no doubt in my mind that unattended ground sensors have already filled much of the gap in the surveillance and target acquisition role. Until a few years ago, acquisition systems simply didn't see around hills or into the forests and jungle on a round-the-clock, all-weather basis. The voids and gaps created by this deficiency were freely used by the enemy to deploy and redeploy his forces in order to gain surprise and a favorable advantage over our forces.