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ORD 1006-70

13 February 1970

MEMORANDUM FOR: Mr. George Carver, SAVA/DCI

SUBJECT : Current and Near Future Technologies and Systems as might be Appropriate to the Problem

REFERENCE : Memorandum entitled "Collection of Intelligence on Communist Logistic and Personnel Movements through Laos and through Cambodia" dated 7 February 1970

1. We, collectively or individually, have reviewed the referenced document and have attended several meetings on the subject. In response to a request for technological support levied on the DD/S&T, two functions are responding: OEL with a suggestion for increased COMINT coverage (under separate cover) and ORD with a rather generalized overview of current and near future technology as might apply to the problem (see attached).

2. We make no <u>specific</u> detailed suggestions of systems or gadgets; rather we present a survey of ORD and other projects and technologies of which we are aware, in no particular order other than generic. All items mentioned have progressed to the point of proof of concept, either by prototype demonstration or test or through design studies. Hence, accurate performance, cost and development cycle times are available. Some sample systems of possible assemblies of available components and technologies are proposed in general form by way of example.

3. We emphasize that we advocate no specific system or device because we claim no knowledge as to the relative value of various kinds of data to intelligence in this application. We do, in passing, stress the mandatory requirements for a centralized, coordinated, efficient processing means for handling the hugh quantity of data which is readily obtainable by the means available.

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4. We have assumed the following ground rules:

a. Strike capability is not required; hence, on-line or real time processing is not mandatory.

b. Fairly peaceful ambient but with potential danger from ground fire, AA or SAM and/or high performance aircraft attack. Some electromagnetic intercept capability on the part of the enemy is also assumed.

c. All enemy transmissions are of sufficient strength to permit line of sight intercept.

d. COMINT is the best indication of personnel movement; visual or parameter detection are best for logistics movement.

5. In summary, we present many possibilities, all realizable with predictable funding and time requirements. We submit examples; all intend to provide data to suggest schemes. We stand ready to respond to specific inquiries. 25X1

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AP/ORD/DD/S&T

Attachments
1. Paper on Platforms
2. Paper on Sensors
3. Paper on Components

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example. Propelled by electric motors, the balloon is powered by prime batteries, recharged by solar cells. Tests to date show that station keeping is realizable under most conditions. The somewhat lower altitude is permissable by the very low optical and radar visibility of the balloon. The 5 to 10 lb. payload of the smaller version is adequate for the micropower, microelectronics, automated receiving, transmitting or recording equipment which are realizable with today's technology. Let this suffice for a generalized solution to the COMINT problem.

The logistics problem is somewhat more complex; not technically, but by virtue of the many sensors which seem to be required to satisfy intelligence demands. For these, the choice is probably a combination of extreme altitude platforms and very low altitude ones. The choice depends of course on the type sensors chosen. Photographic and IR techniques certainly benefit from proximity. While new developments in optical techniques permit greater resolution and sensitivity from high altitudes, the SE Asia weather is not always compliant, especially for daytime operations where great detail is desired. [redacted] 25X1

25X1 [redacted] Nonetheless, it would seem that lower altitudes are the best all around. In addition, lower altitude operations permit accurate air drop of in-place sensors. One possible application of high altitude photo and IR is, of course, the detection of changes on a gross basis.

A distinction should be made as to what is meant by low altitude. It is suggested that tree top level flights are the better, particularly for continuous surveillance; the median altitudes (10,000 to 60,000 feet) appear quite vulnerable to SAM and other aircraft attack. For daytime, therefore, low and fast; while at night, low slow and quiet. Examples of the former are the F-4; of the latter, FAC, the quiet-powered Sweitzer sailplane or drone aircraft, free flight and tethered balloon or VTOL devices or drone helicopters. One point seems to emerge; that a cheap drone will prove to be the ultimate solution when compared to the cost of manned systems, particularly those that are lost. Drones, which are realizable today, offer great advantage.

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PLATFORMS

Type	Drone Airplane	
Operational Alt.	500 - 2,000 ft.	65 mph
Payload Capacity	50 lbs.	
Size	15 ft. wing span	
Propulsion System	Gas Engine	
Power Source	24 Hours	Reasonable - 1500 miles
Status	Available with three months lead time. To replace FAC as cheap drone - estimated $25 K in production.	

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PLATFORMS

Type	100,000 to 110,000 ft. Altitude Drone
Operational Alt.	
Payload Capacity	100 lbs. 22 Hours on Station
Size	50 ft. Wing Spread
Propulsion System	Jet Engine (Williams Research) Needs Development
Power Source	
Status	Contemplated - Initial Study Under Way

PLATFORMS

Type	Drone Helicopter (Flea Vehicle
Operational Alt.	To 40,000 ft.
Payload Capacity	20 lbs.
Size	12 ft. Rotor Diameter 110 lbs. total
Propulsion System	Gas Engine with Alternator to Power Payload and Controls
Power Source	40 Mile Range. 4 Hours Loiter
Status	Design Study Complete. Also completed for a 1 lb. payload, 25 lb. total weight version. Has autopilot, some navigation.

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PLATFORMS

Type	Drone Boat, Remote (Over-the-Horizon) Navigation & Control Package
Operational Alt.	N/A
Payload Capacity	Depends Upon Boat Used
Size	
Propulsion System	Limited to Internal Combustion Engines
Power Source	Standard
Status	Breadboard Ready for Test and Evaluation

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SENSORS

It is clear that a multitude of sensor types can be brought to bear the problems of COMINT and logistics movement in SEA. The type selected is in some cases dependent upon the deployment mechanism and/or operational platform. For example, a presently existing laser illumination/scanner requires a moving platform in order to generate area coverage. This platform must exhibit the requisite stability and navigational capability; but given that such platforms are available, the question as to the useful target coverage that can be obtained must be answered. Monitoring logistics movement through dense jungle is clearly impossible due to the opaque nature of foliage to visible wavelengths. The laser device, however, has been flown and is an existing piece of hardware demonstrating an excellent resolution capability for areas not completely covered with vegetation. Other photographic techniques such as a multiple wavelength camera and IR scanner are also operational and provide ideal matches for a variety of drone vehicles.

Electronic sensors are also present in great numbers. Perhaps the most significant point in this area is the availability of a class of electronic devices that improve power effeciency by orders of magnitude. This technology makes possible the consideration of battery operated systems for monitoring purposes heretofore unrealistic due to limited useful life-time. A multi-function relay system has been built and demonstrated that consumes less than 750 microwatts per repeator. The repeators in addition to accepting a variety of commands and being uniquely addressable has carried information varying from audio to T.V. video. Translating these techniques to monitoring systems directed at these particular problem areas can yield solutions previously technologically impossible.

A specific area of technological development that can change the whole pattern of area monitoring is the field of primary energy. Where the new electronics improve efficiency, they still require a long lived source of energy. A source is at hand that promises substantial amounts of power for time periods measured in years. This source is the radio-isotope battery, a device producing on the order of 25 milliwatts of power. Understandably the projected life of 85 years has not yet been verified experimentally.

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It seems clear that the capability exists in the sensor area as represented by DCPG, TSD, and others' efforts and what is required is for them to be mated with a matching system, platform, or intelligence gathering effort. The inter relation between the sensor and deployment mechanism suggests many possible configurations.

SENSORS

Type lowlight level TV

Targets moonlight scenes

Output real-time video

Size, Weight 100 $in.^3$, 4-1/4 lb.

Power Reqd. 9 watts

Status In final test phase

SENSORS

Type Slow Scan TV

Targets Visible daylight scenes

Output 24Kbits/sec PCM video

Size, Weight 2-1/2 lbs. 5" x5" x 5"

Power Reqd. 7 watts

Status 6 prototypes built

SENSORS

Type IR Scanners - D3 - D4 - D5

Targets at low altitude: people, cattle, trucks, campfires

Output video image recorded on film (looks like photograph); can also be used in near-real-time by means of a CRT viewer or by rapid processing of film.

Size, Weight 150-200 lbs. per system. Size on order of 30" x 12" x 18", plus several smaller units plus cabling.

Power Reqd. normal aircraft 28vdc and 115 vac 3Φ

Status In existence

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SENSORS

Type Active "non-linear" radar operating at 150 MHz, 100 Kw peak power

Targets rifles, trucks, & other manufactured objects

Output indication of targets out to a range of 3,000 ft.

Size, Weight suitable for installation in a helicopter or airplane

Power Reqd. kilowatts

Status ORD has tested truckmounted system

MERDC is testing helicopter mounted system

SENSORS

Type lazer illum/scanner

Targets 1/3 milliradii

Output

Size, Weight 100-200#

Power Reqd.

Status Perkin-Elmer and Hughes each make a system

SENSORS

Type multi-spectral camera system

Targets visual

Output film

Size, Weight (4) P-220 camera strapped together

70 mm format camera w/filters Est. 50# w/stabilized mount

Power Reqd.

Status in operation

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SENSORS

Type stabilized viewing, communication & photo devices

Targets

Output

Size, Weight binoculars with camera or laser commo

Power Reqd.

Status available

SENSORS

Type Facsimile Video Sensor (Minifax) - produces a 90° by 360° panoramic video image in 30 seconds frame rate

Targets Any target within about a mile; resolution is 0.1° by 0.1° (1.7 feet in 1000); daylight or twilight operation

Output Video modulated voltage (0 to 16 volts); 1000:1 dynamic range; line synchronization and frame synchronization

Size, Weight One inch diameter by six inches length; weight less than 0.5 pounds; will withstand impact shock of 1000 g.

Power Reqd. 1.2 watts for full operation

Status First prototype scheduled for completion in March 1970. Additional units would require an estimated four to five months for small quantities (cost of early units will be high - in the $20,000 to $30,000 range).

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BASIC COMPONENTS

For lack of better definition, we discuss here basic technologies, components, and devices which form the inter-connecting parts of sensor/platform systems. Some have been referred to elsewhere and are repeated here for convenience.

The problems attacked here are those of data handling, power supply, and the possibilities of rebuilding existing devices to reduce size and/or power consumption. These latter two considerations would seem to be prime for any prolonged surveillance situation and probably need no further amplification.

In the area of data handling, eg., from sensor ouput to processing center, there are simply a multitude of possibilities. Some basic problems need consideration:

a. Operation in a cluttered electromagnetic environment such as exists in SEA.

b. Enemy intercept and nullification

c. System efficiency

The last item refers to the problem of efficiently using data links and processing facilities. It would seem that sensor data would be available on a temporarily sporadic basis unless, of course, sensors are placed along a crowded highway, for instance, such as the San Diego Freeway. This then suggests a store and dump-when-full or dump-when-interrogated capability.

BASIC COMPONENTS

Item - Micro Power - Micro Electronics

The ability to constrict literally any electronic function in small size and requiring only fractions of original power.

Status

Technology developed. Examples of application are:

a. Communications quality superhetrodyne receiver in the volume of a matchbook
b. 1 mw UHF FM Transmitter in a pencil
c. Misc. radio control systems
d. Bi-divertional, multifunctional radio relay system using less than 700 microwatts per repeat.

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BASIC COMPONENTS

Item - Solar Rechargeable Power Sources

For long lifetime system, ORD has found that solar rechargeable secondary power sources are extremely efficient, from a weight/energy standpoint.

If any solar exposure is possible, the tradeoffs of array size, weight, detectability, and power cell size should be made against use of life-limited primary cells.

Six- to twelve-month operating periods are possible.

Status

Solar array studies for various applications have been completed in RP and PC. Terrestrial uses are feasible.

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BASIC COMPONENTS

Item - Nuclear Battery

Life measurable in years
Tens of milliwatts available
Small size (1-1/2" dia. X 1-1/2" long)
Radiation not detectable at 1 meter with laboratory equipment

Status

Available but presently expensive ($5,000 ea)

BASIC COMPONENTS

Item - Miniature General Purpose Computer (CDC 470)

Logic

MOS/LSI circuits (4 MHz)
Four phase logic
43 instructions
Add - 3 sec
Multiply - 9 sec
16 bit words

Memory

4,000 x 16 bit words
Plated wire NDRO
No standby power required

System Characteristics (including memory)

~~Status~~

10 cubic inches
0.8 pounds
5 watts

Status

First prototype is deliverable in the fall of 1970.

Additional units will be available at the rate of two to three per month.

Cost is estimated at $25,000 to $30,000 (almost entirely memory).

BASIC COMPONENTS

Item

Covert and/or interference resistant transmitter modulation techniques.

Status

One system, for example, spread spectrum over 5 MH_z packaged complete in matchbox size.

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BASIC COMPONENTS

Item - Miniature Emplacement Package

Functions: Performs deceleration, impact shock protection (to 1000 g), leveling and stabilization for systems in the 5- to 15-pound total weight class.

Payloads would typically be miniature intelligence collection, storage and communications equipment (video, audio, seismic, IR, etc.).

Status

Two prototype engineering models were completed in January 1969.

Model No. 1 (Flat Lander) is being tested extensively in February 1970.

Camouflage and scaling (weight and volume) analyses have been completed.

Estimated six months to develop 10 to 20 units (cost per unit is approximately $5,000 to $10,000).

GROUP 1
Excluded from automatic
downgrading and
declassification

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BASIC COMPONENTS

Item - Position/Navigation - Omega Receiver

Weight 1-1/2 lb. 8 watts
Absolute Accuracy 1 to 2 miles
Repeat accuracy 1000 feet (differential mode)
Readout digital or on link

Status

6 deliverable in March
$10K est.

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BASIC COMPONENTS

Item - Position/Navigation - Loran C-D Receiver

4-1/2 lbs. battery powered - 30 w
Absolute accuracy 400'
Repeatable 200'
Readout digital or on link
S/N - 17 db.

Status

(2) Prototypes and world wide evaluation underway
Follow-on being developed by USA
Eventually to MOS-FET at 3w
$35K in prototype quantity.

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BASIC COMPONENTS

Item - Quick - Turn-On Vidicon Tubes

250 millisecond turn-on time
20 milliwatt filament power
600 TV Line Resolution

Status

Two experimental one inch-tubes have been successfully developed

one - all electrostatic one inch tube
one - all electromagnetic one inch tube

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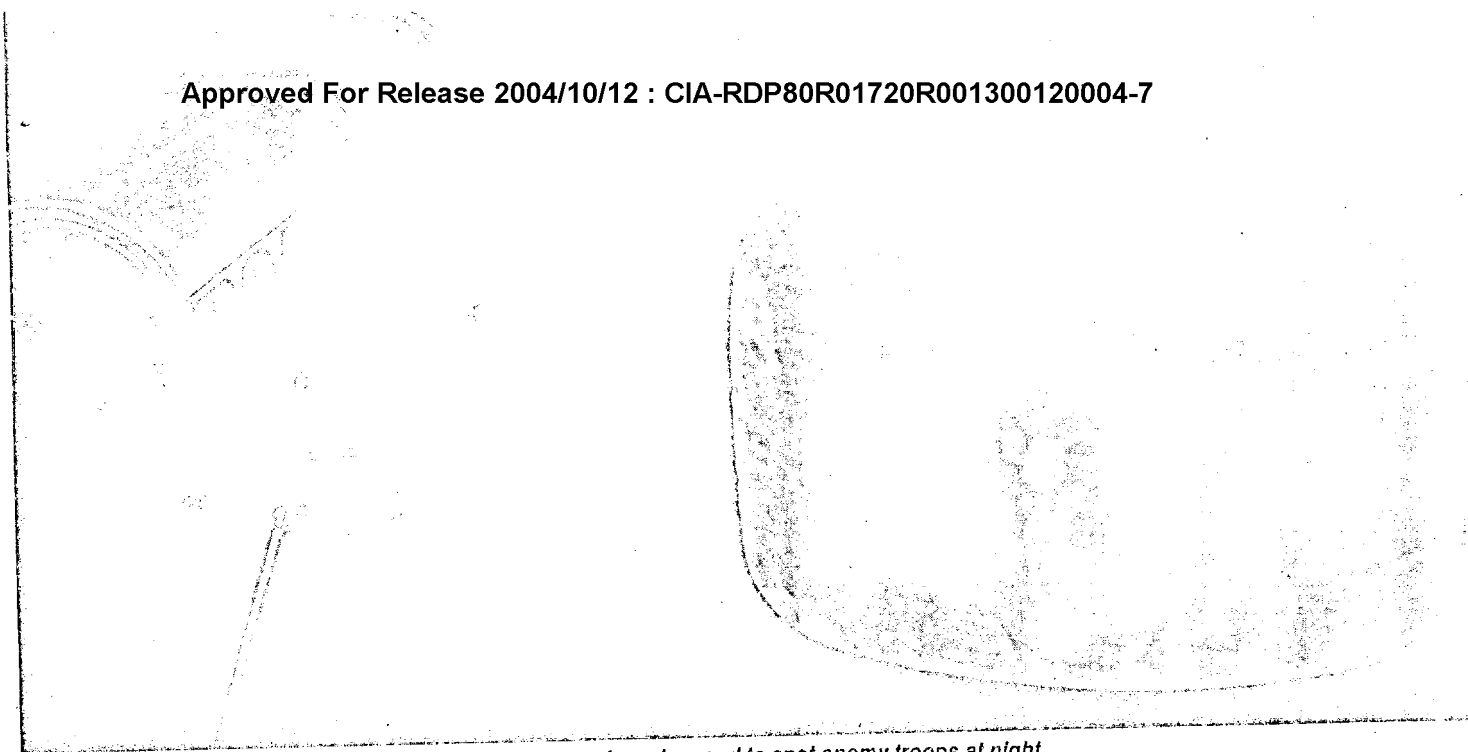


New TV camera magnifies light by thousands of times and can be used to spot enemy troops at night.

DEFENSE

The Pentagon plays electronic war games

Defense Dept. develops in secret a new concept of warfare

In the jungles of Vietnam, at Fort Hood, Tex., in military and industrial laboratories in the U. S. and West Germany, and at dozens of other locations here and abroad, the Pentagon has been secretly experimenting with a new concept of warfare.

General William C. Westmoreland, Army chief of staff, calls the concept the "automated battlefield." More commonly, it is known as the "electronic battlefield." By any name, it is nothing less than an effort to develop a totally new method of waging war at the footslogger's level. To date, the effort has been hidden within myriad programs of the three services. Thus far, $2-billion has been spent, and costs may soar to $20-billion in the next decade.

Out of the spending will come exotic new sensors--seismic, acoustic, infrared, radar, and others--to detect enemy movements over huge areas. Strikes will be made through use of data links, computer-assisted intelligence evaluation, and automated fire controls. And GIs will get costly electronic gear to help them find and fight the foe.

Soldiers on the front lines are already applying electronic battlefield techniques. General Westmoreland touched on this in a speech before the Assn. of the U. S. Army last Oct. 14: "The Army has undergone in Vietnam a quiet revolution in ground warfare—tactics, techniques, and technology. This revolution is not fully understood by many."

Consolidation. Now the diffuse concept is emerging more clearly as the Pentagon attempts to whip it into an understandable whole. Today, hundreds of systems for surveillance, target acquisition, night observation, and data processing are being used by or developed for all the services. And scores of contractors are working on them.

Covering a wide spectrum of projects are such companies as RCA, Westinghouse, Hughes Aircraft, Honeywell, General Electric, and ITT. Some, like Barnes Engineering, Sandia, and Texas Instruments, are working on such specialized devices as "intrusion alarms." Others, such as Varo, Inc., of Garland, Tex., and Aerojet-General, are developing night vision optical equipment.

Out of all the technological effort, two big problems have emerged:

- Projects are becoming too many and too big to be buried within the three services' separate budgets as attempts to improve battlefield reconnaissance. Congressmen are probing for wasteful duplication and demanding that the program be brought into focus.
- Technology, especially of systems to collect battlefield data, is now so advanced that [illegible] to make use of it. Almost certainly, entirely new tactics and troop organizations will have to be developed, and elaborate computerized command and control centers will direct them.

The Pentagon has set up the mechanism to coordinate projects and eliminate duplication under its electronic battlefield program. Lieutenant General John D. Lavelle of the Air Force is in over-all charge of the work. He heads a task force called the Defense Communications Planning Group. Secrecy cloaking most electronic battlefield projects, however, still makes it hard to follow their costs and judge how effectively they fit together.

Growth. Even the titles of many projects are classified. However, McGraw-Hill's DMS Industrial News Service has figures on how some of them have grown. In fiscal 1967, the Defense Dept's Advanced Research Projects Agency (ARPA) budgeted $3.5-million for sensor studies, and two years later the annual appropriations for electronic battlefield research topped $80-million. Then, as the armed forces placed orders for equipment developed and tested in the preceding two years, appropriations for procurement rose to $524-million.

For fiscal 1970, DMS estimates, $78.5-million has been approved in this area for R&D and $214.1-million for procurement. But either figure may increase through reshuffling of Pentagon funds before the fiscal year ends.

On the battlefield, sensors developed for the electronic battlefield program are already changing how Army units fight. Says Dr. John S. Foster, Jr., the Pentagon's director of defense research and engineering: "We may well be on the verge of providing complete, realtime battlefield surveillance around the clock." But putting such information to full use will require command and control centers able to keep track of friendly, as well as enemy, forces. Companies such as Litton, Motorola, Otis Elevator, and HRB-Singer are deeply involved in developing the centers. But, in addition, special new troop formations may be needed just to handle complex electronic field equipment.

Field tests. The Army is tackling this problem on several fronts. This year, infantry and tank units will take part in full-scale battlefield experiments at Fort Hood, Tex., called Project Master. The aim is to develop an Integrated Battlefield Control System (IBCS), where computerized control systems could make use of data from the new sensors.

Going into IBCS will be Army experience in earlier and much more limited projects: Tacfire, a computerized tactical fire control system developed in the last three years, and TOS, a tactical operations system that was tested in Germany and demonstrated in December. Computerized equipment used in TOS will be shipped from Germany to Fort Hood this spring.

Sensors that can see in the dark are changing the way armies fight

The Army's Combat Developments Command also has run small-scale tests of the new tactics, weapons, and troop organization at the Hunter-Liggett Military Reservation in California. Now the Army is trying to decide who will get its expensive night-fighting devices—all fighting men or only certain units. To help get an answer, it is testing "limited action forces"—small units heavily equipped with sensors and special communications gear—in Hawaii and other training grounds.

A prototype picture of the electronic battlefield already exists in a limited way. In Vietnam, the Army is using more than a dozen new night vision devices as well as other types of sensors. These include infrared sensors, light-amplifying telescopes, and seismic detectors to monitor enemy movements for more than a mile around allied bases.

Some of this equipment, largely untested, was rushed into use two years ago during the siege of Khesanh, and hundreds of air strikes were directed against targets identified by sensing devices. Since then, U.S. troops in Vietnam have used so-called "leave-behind" equipment in territory abandoned after a battle. If enemy forces return, these sensors target their movements and relay data to the nearest Army headquarters.

In the not too distant future, says the Army, airmen and infantry will work closely together, their tasks coordinated by control centers like those the Army and Air Force are trying to develop. For low-level strafing, the Air Force this year will try to build up to a total of 100 heavily armed, slow-flying "gunships" with amplified television, radar that penetrates jungles, and screens that display both radar and infrared images of what lies ahead of the plane. Bendix, Emerson, Itek, and Admiral are among companies working on these systems.

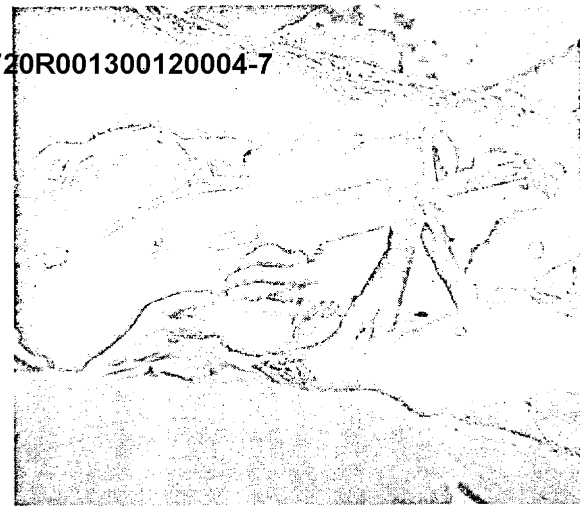
The Army also wants to put less weighty detection equipment aboard its Huey combat helicopters, built by Textron's Bell Helicopter Co. At least 16 companies are engaged in building or developing multisensored aircraft and helicopter systems, including Grumman, Fairchild Hiller, IBM, LTV, Martin Marietta, and Northrop.

To achieve surprise in reconnaissance, the Army and Marines, who fly at rooftop level, want more than a dozen Lockheed YO-3 "quiet" airplanes with several new sensing systems aboard. The YO-3s will whisper over the enemy and detect his presence before the planes are spotted. And the Air Force wants to quiet the turbojet Beech King executive aircraft, fit it with larger, more elaborate sensors and viewing equipment, and use it at about 17,000 ft. altitude.

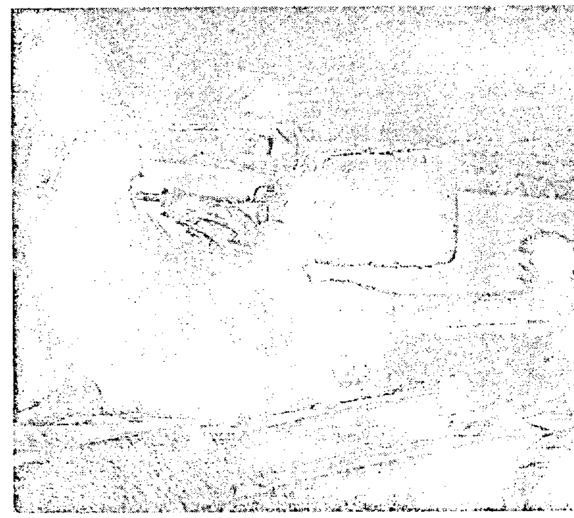
In their efforts to get even quieter and more stable observation platforms for surveillance, military men are even looking into balloons. And Dr. Eberhardt Rechtin, director of ARPA, believes that an unmanned, armored and sensor-equipped helicopter can be used to spot targets for the artillery. He expects to have such a helicopter operating within two years.

Ordnance. Many of the munitions that tie in with the concept of remote-controlled warfare will be in Vietnam by the end of the year. Among companies involved in their development are General Dynamics, Raytheon, and Sylvania. Already in use are shells, rockets, and bombs packed with hundreds of deadly, nail-like steel darts. And the Army is stocking up on a new type of tracer bullet that shows up only on night-vision equipment and thus avoids disclosure of a gunner's position.

Electro-Optical Systems is delivering to the Air Force kits that will convert conventional bombs to laser-guided weapons. Other companies at work on laser applications include Philco-Ford



Rifle scope amplifies light and spots targets after dark.



Tank with infrared equipment keeps a 24-hour vigil on the enemy.

and Perkin-Elmer. This year the Air Force will begin to air-drop vast numbers of land and water mines that will detonate when anyone comes close to their sensors.

In a project related to air-dropped mines, the Air Force already has equipment to sow tiny, rugged "intrusion detectors" across vast stretches of land. Under a program called "College Eye," these high-flying U.S. aircraft are able to pick up concentrations of enemy activity. To aid in the subsequent attack, bombers carry TV cameras that can amplify light from the moon and the stars tens of thousands of times, thus allowing around-the-clock visual bombing.

The huge mass of information that such developments will make available may be the biggest problem in the electronic battlefield. As Lieutenant General George S. Boylan, Jr., deputy chief of staff for Air Force programs, says: "Our capacity to obtain information is continuing to increase more rapidly than our ability to reduce it to usable intelligence." ■

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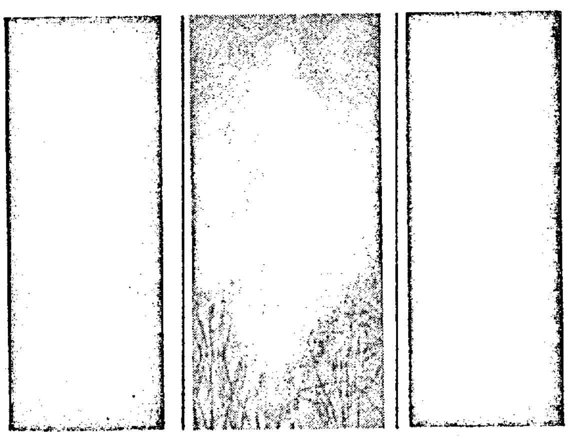
by Leonard Sullivan, Jr.

In Vietnam, the targets are small, cheap, cleverly hidden and mobile. It is not the kind of war we were prepared for, but then that is the reason we have military R&D

IN BRIEF: *The author heads the office in the Pentagon whose specific purpose is to expedite those R&D activities which hold some promise of increasing the effectiveness of our forces in Southeast Asia. From that special position, he tells of the important role of R&D in the war. Currently, the Department of Defense is investing some $800 million per year in this effort. Given the long time required to bring ideas through the R&D process and convert them to hardware, is it reasonable to expect that today's ideas can be developed in time to have an effect on the battlefield? The Pentagon clearly believes so, citing the more than one hundred new types of equipment that are added to our operational inventory each year. Currently, more than one thousand specific R&D projects are going on in support of the war.—D.A.*



■ Some people wonder whether research and development have a place in a war while that war is going on. I believe strongly that there is a place for such endeavors—just as there was in previous wars. Indeed, my office exists under the Director of Defense Research and Engineering for the specific purpose of expediting those research and development activities which hold some promise of increasing the effectiveness of our military forces in Southeast Asia.

Most wars we fight will be different from the ones we were anticipating. Every war will have its own peculiarities and innovations. Every war will introduce new tactics, new equipment, and new objectives. So there will always be a problem of remaking our military forces, or reoptimizing them for the particular type of war that comes along.

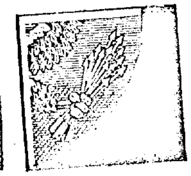
We know now that the war in Vietnam is considerably different from any war we have ever fought before. We entered this war fully and beautifully equipped to fight either an all-out nuclear conflict or World War II over again. But then we found that Vietnam is a new war—for many reasons. As I describe these reasons, I believe you will see the importance of a strong R&D activity linked to our engagement in Southeast Asia.

More than one war

At the time we undertook to help the South Vietnamese, I do not think we fully realized how difficult it would be to fight an enemy so closely interwoven with our allies. It is a war without front lines, a war where you can seldom distinguish friend from foe—except by the actions of the foe. Thus, we have had to learn a great deal about how to find small bands of enemy guerrillas dispersed over the countryside. In addition to the insurgency, however, several other wars have been superimposed, each with its own characteristics. I will discuss each briefly.

The most advanced war, technologically, is the bombing of the North; it uses many of our latest tactical aircraft in a strategic role; we are up against enemy surface-to-air missiles for the first time; we are in combat against supersonic Soviet-designed aircraft, firing air-to-air missiles—and we are doing the same. The electronic warfare is quite sophisticated on both sides. Less sophisticated, but more important, we have had to learn how to survive intense antiaircraft fire.

One frustrating aspect of this war is the difficulty we find in really discouraging the enemy, or killing his interest in fighting, by bombing alone. We are also learning—or relearning—that when you run an air campaign without ground follow-up, you frequently cannot keep the targets destroyed. It is one thing to bomb a bridge to slow someone's retreat on the ground, or to bomb a convoy that is resupplying front line troops. But it is quite another thing to try to stop a country from going about its essential business—like driving trucks, burying supplies in the ground, or unloading ships—when one has an intention of



R&D FOR VIETNAM

following up on the ground. These are things which make it a very expensive kind of war—and in many respects, the results are difficult to quantify.

The second war is in trying to stop infiltration into South Vietnam. This is a relatively new problem; we had some experience along the Korean demilitarized zone, but not during a hot war.

Vietnam has about one thousand miles of land boundary, and another thousand miles of water boundary. We are trying to stop the North Vietnamese from crossing these 2000 miles of boundary and resupplying the guerrillas in the South. Actually, relative to the length of the border, the supplies and reinforcements coming into the South are very small. So the "flow rate" across any unit length of the total boundary is low. But the boundaries are difficult to patrol; most of the natural assets are on the side of the guerrilla. For example, two-thirds of the land boundary is covered by heavy jungle. Across these boundaries, the North Vietnamese either walk, carrying supplies on their backs, or push bicycles. They do not *ride* the bicycles; they use them as oriental wheelbarrows, carrying up to 500 pounds of supplies in "saddlebags." Lately, they have begun using trucks to cross. They have found that we cannot destroy their roads as fast as they can build them. They have had a very active road-building campaign and are now building roads right into South Vietnam.

Within South Vietnam, a third war involves the dissipation of the main enemy units—now mostly North Vietnamese manned. These are the "search and destroy" actions in which the U.S. forces have been mainly employed in South Vietnam. In these actions, we go out into the countryside to try to find the enemy mainforce battalions and regiments that move as units. We attempt to locate and destroy them before they can reach friendly targets. This is where our firepower has come into play, along with the extreme mobility to fly our forces anywhere in the country. Without that firepower and mobility, we would need many more troops to do the job from relatively static defensive positions.

The fourth war is one we have paid less attention to than we might have. This is the war to control guerrillas. As a civilian, I am in no position to determine where military priority should be—and hence I shall not try to put myself in a role of military strategist. But the facts in the guerrilla war are these: If all the smoke were cleared away, if we stopped the bombing of the North, if the North Vietnamese stopped infiltrating into the South, if we stopped fighting main unit actions in the jungles, we would *still* have the problem of controlling the guerrilla.

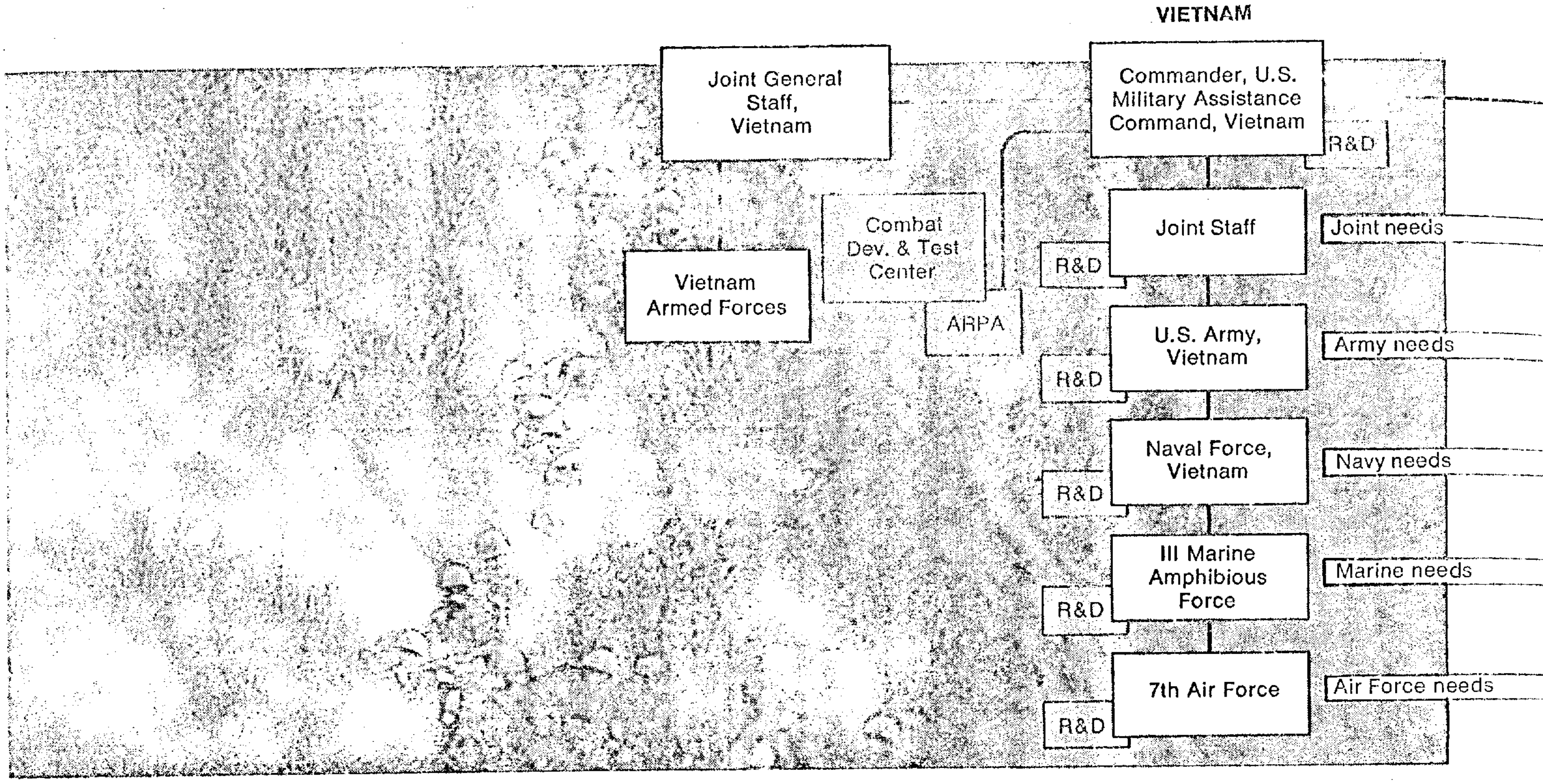
Adjusting a threshold

Who is the guerrilla? He is simply the local dissident or the local zealot. He is willing to commit acts of violence in order to make himself heard and in order to change his lot and that of future generations. The threshold of his violence is a fine balance between the strength of his discontent and his view of the consequences of his violence. We should be able to change an insurgent's threshold of violence by adjusting both sides of the balance. We can lower his level of discontent by peaceful action, and we can raise the apparent deterrent by suitable military or police presence—and technology can probably help on both sides. By "we" I mean the U.S. as well as the South Vietnamese government.

It is mainly in this "fourth war" that social science research has been used to advantage. Before we can undertake to advise another country—much less help and train it—we must have a full understanding of the differences in its culture, background, aims, and motivations from those of our own society. We cannot realistically hope to assist in solving the problems of South Vietnam which have caused the dissatisfaction and lawlessness until we understand in considerable detail how and why those problems arose.

The fifth and newest war with which we have been confronted is the war of the cities—a form of "escalation" or modernization of the Maoist insurgency doctrine. The enemy knows that by rocketing and shelling from without and by sniping and arson from within, it is possible to cause considerable local and international consternation. Damage to property is extensive, the innocent population is caught in a cross fire they cannot easily avoid, and the credibility of the government is put to a severe test.

Although not solely a Vietnamese problem, there is much to be learned in minimizing



FROM VIETNAM TO WASHINGTON: THE CHAIN OF COMMAND

the trauma of "urban insurgency." The preparation of a city, its people, its government, its civic agencies, and its public utilities is not a simple matter. The conduct of the urban counterinsurgency, once engaged, demands special troops, special training, special weapons, special vehicles, and special tactics. And the reconstitution of the city in the aftermath also requires special planning and special techniques to minimize the duration and extent of the dislocation. All of these problems are on the front burner in South Vietnam today—and should be at least on the back burner in many other parts of the world.

What value R&D?

With this background we begin to see a dynamic range of things in this war for which our R&D activities are applicable. Indeed, the range is enormous compared to that of any war we have ever fought. It ranges all the way from police techniques to electronic warfare—and we are trying to modernize our forces throughout the whole spectrum.

There are many people both in Defense (including military and civilian) and in the U.S. at large (including Congress and private citizens) who believe that our efforts to make this a war of technology are wasted. There are others who would claim that we have already forced the escalation of this war to one that we could conveniently fight with our already highly sophisticated war machinery. I would dispute these points. Although I would agree that we will find no single device that will have the climactic importance that the tank had in World War I or the atom bomb had in World War II, there are many, many opportunities to develop better weapons and devices, skills and understanding by which to lower our losses, shorten the duration of the conflict, and enhance both our own and our allied military posture. In several discrete battles of this war, brand-new technology has had a very significant, if not decisive, effect on the outcome. In other instances, technology *could* have had a decisive effect if our experimental equipment had been available in production quantities, and if our military forces could have been trained *overnight* to embrace new equipment (and adjust their tactics accordingly).

Moreover, some of our more important contributions are only now reaching the theater in operational quantities. As individual "gadgets," they cannot win the war by themselves, but taken in the aggregate, the effort may become significant. We will "break even" financially if our total effort shortens the war by only one month—without assigning any value to the lives saved thereby. And if the sum total of these new capabilities can assist in *deterring* future conflicts of this type (by raising

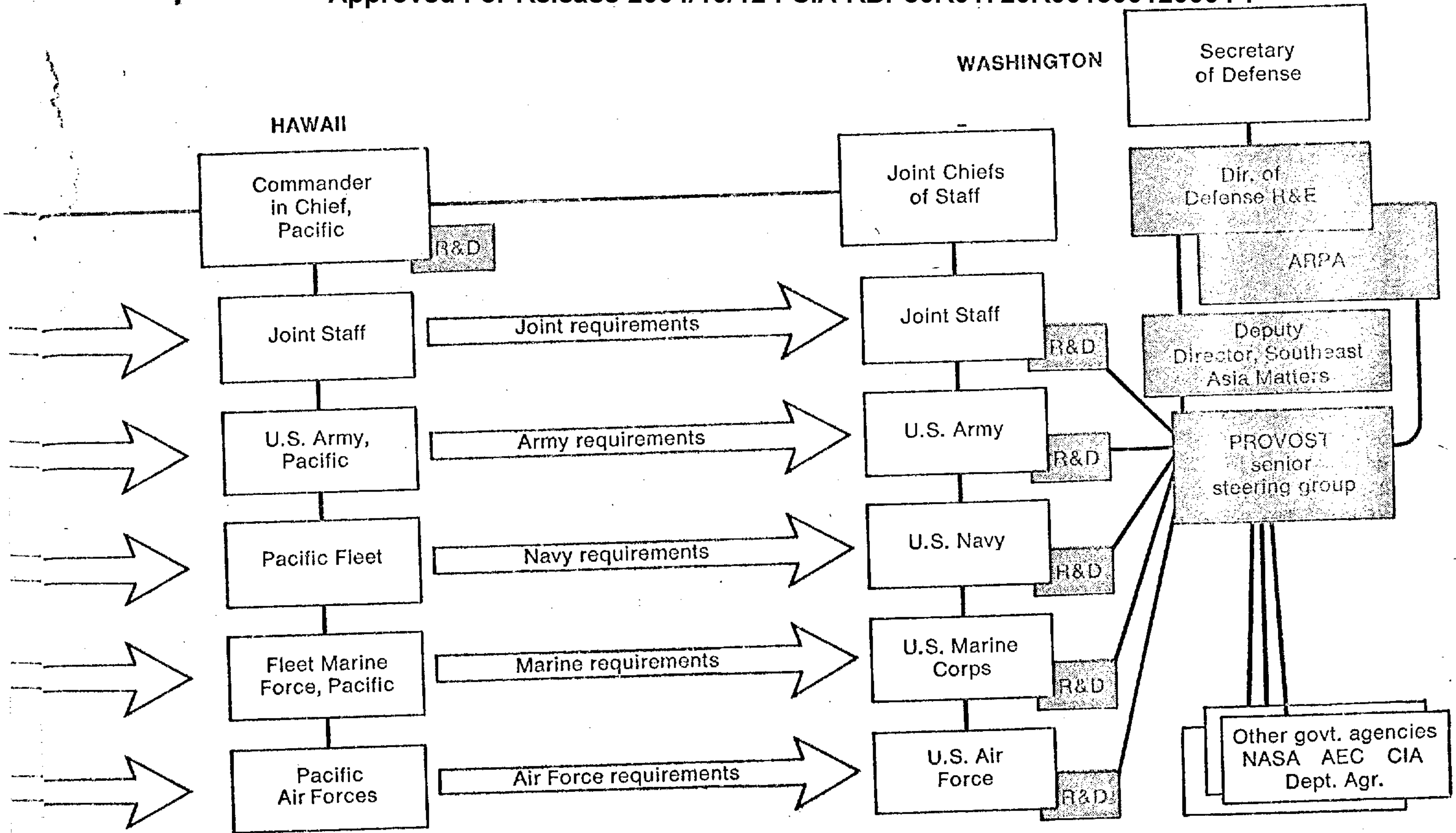


Chart is a schematic representation of the echelons of command involved in the war in Southeast Asia. Color signifies centers of R&D activity.

the threshold for violence elsewhere in the world) then I can only conclude that our efforts have been worthwhile.

In the main, the inventory of our general-purpose forces was outstanding when we went into Vietnam. The U.S. general-purpose forces are designed to fight any sort of limited nonnuclear war that might arise, anywhere in the world—whether on an ice cap, in a desert, in a jungle, in a marsh, anywhere. Because of the broad range of conflicts in which we might possibly become involved, a single general-purpose force cannot be really optimum for any specific war except possibly in Europe. Therefore, there is a very necessary tailoring job that must be done, having nothing to do with whether or not we spent enough money for defense during peacetime. We will always have to tailor our forces to a specific nonnuclear war once it comes along.

Organization for optimization

One of the lessons I hope we will learn from the war in Vietnam is that we must always be prepared to optimize our forces *after* we get involved. This is why we have generated a special, highly responsive R&D team within the Department of Defense. How did we organize in the Department of Defense to do this? I should remind you that this war grew in an insidious fashion, from a very small war which had few people's attention, to a rather large war with ordnance delivery that matches Korea. The Pentagon chose to manage the various aspects of the war, as much as possible, within existing organizational management and budgeting procedures. R&D for the war is performed in accordance with this same principle: It is managed, essentially, by the same people who are also controlling the R&D that is done for other military devices which are *not* involved in this war. However, to add emphasis to the work that was specifically needed for Southeast Asia, Dr. John Foster, Jr., established my office about two and a half years ago as an expediting office within Defense Research and Engineering. It was charged only with creating and expediting R&D pertinent to the war; and it will disappear when the war is over.

Because we chose to manage the war through the normal organizations, the problems associated with streamlining our procedures have been really those of personal contact—of individuals within the organization getting together and agreeing to do things; we work either face to face or we hand-carry papers, rather than letting them go through the standard procedures. We have formed a series of ad hoc steering groups and committees; in essence, these groups tie together all the various agencies [illegible] pursuit of the war.

We use one code name for this whole operation; PROVOST, for Priority Research Objectives Vietnam Operational Support.

It is at this level where you find the people who are full time on R&D for Vietnam. Here we have a regular Senior PROVOST Steering Group; this is the mechanism I use within the Pentagon to get practically everything done. It is comprised of a senior military man (a general or flag officer) who reports to his military chief for R&D in each of the Services.

We also have part-time representation in the group from other government agencies that have technical skills applicable to our specific problems. For instance, NASA has people who are available to us for solving problems for which they have unique talents. The Atomic Energy Commission is also represented—they have some of the finest engineers and "gadgeteers" in the business. Finally, of course, we work closely with the Advanced Research Projects Agency, a separate part of Dr. Foster's office.

We have over one thousand specific R&D projects going on now in support of the war; as a rough average, we send about 100 new types of equipment to the theater every year for operational tests and evaluation, to find out whether they will in fact contribute to our fighting capabilities. Another 100-150 are also added to our operational inventory. These run the gamut, from a basically new type of helicopter, a new variety of jet aircraft, or a contraband detector, all the way down to a new type of tropical combat boot which will make it easier for a soldier to walk around, a modern transportable hospital, or better medicines against the types of disease that are prevalent in Southeast Asia.

The actual research and development programs have been carried out in all the usual R&D centers of competence—the military laboratories, private industry, and university research centers. I am frequently asked whether the widely divergent views within the U.S. about the merits of war have had a deleterious effect on our efforts. Naturally, any member of the U.S. Government is disappointed when he asks for help from a laboratory, a company, or a university and is told that they do not feel it appropriate for them to participate, that they have other more pressing work to do, or that there is insufficient profit in it for them. I also find it personally embarrassing to find this nonconstructive attitude within the engineering and scientific community of which I consider myself a part. Nonetheless, for every temporary setback I receive, I can provide at least ten examples of service and dedication "beyond the call of duty": Laboratory scientists who work on their own, virtually without funding support, huge U.S. corporations who essentially "donate" the services of some of their best talent without hope of large profit return; tiny companies that work around the clock on an almost impossible schedule; graduate students and professors who offer themselves without demanding recognition; people from all these groups who risk their lives in Vietnam to help. I do not believe that any important development has been delayed by the vocal nonparticipation of a few—though I personally believe that their method of self-expression is insulting and demoralizing to our men in Vietnam.

Weapons, modified and new

Let me mention a few examples of the kinds of developments I have been talking about. We recently developed a new gunship-aircraft configuration that happens to be very good at killing trucks along the resupply routes and in providing close support to our ground troops. This plane was developed for the Air Force in a military laboratory at Wright Field within a period of about nine months. It involved new equipment in an existing airframe. Wherever possible, we borrowed and adapted existing components. The plane was tested in the U.S. and it worked adequately; then it was sent to Vietnam with its operational crew plus a number of test people who observed it over a period of time. The plane operated in combat and was judged to be sufficiently successful that the 7th Air Force submitted a formal request for a production quantity. Production is under way now.

The HUEY Cobra program is another example. Here the Army took the original Bell HU-1 helicopter and redid virtually the entire aircraft to make it a better weapon platform. It was introduced in the early part of this year and we believe it may make a significant difference in the war. It has proven particularly useful in the urban insurgency context.

We have introduced several weapons which are brand new. Some were already in development before we became engaged in this conflict, and hence it was simply a question each time of expediting or changing the weapon in some modest way to improve its effectiveness for this war. There are new artillery rounds, for instance, and new kinds of bombs, including new kinds of delay bombs of various sorts—some to go after the flak sites in the North, some to go after the truck traffic, some to go after enemy soldiers hidden under jungle canopy. Most of our proudest accomplishments, however, will remain classified until the war is over, although some of our night-vision equipment and motion detection radars have now been declassified since they have either been lost to the enemy or have no reasonable countermeasure.

In addition to our test agencies in Vietnam and our organization here in the Pentagon, we have scientific advisors with the major field commanders.

Only the military men themselves can establish what we call a "firm requirement" for a piece of equipment. But our people in the field are free to tell us of needs. When we are informed of these, we ask the scientific community to work on possible solutions. When solutions appear practical we present them to the people in the field. Often they then turn around and give us a "firm requirement." This may seem a somewhat unwieldly operational chain, but we are primarily research and development people trying to provide equipment for a military organization; ultimately, the operators must make the decision as to whether or not the solution is realistic.

In addition, each of the Services has set up a quick reaction capability whereby the Service can respond rapidly to special demands for improved equipments. Each Service maintains its own laboratory people in the field. In many instances, these experienced engineers have found relatively simple, inexpensive things that have made tremendous differences. A typical example: Down in the Mekong Delta region, where the fighting takes place on the rivers and canals, we have been using small landing craft of World War II vintage as patrol boats. Because they have flat bottoms, they are well suited for the shallow waters of the rivers and canals. The Navy wanted to be able to land helicpoters aboard these boats, which are only 40 or 50 feet long, either for medical evacuation, resupply of equipment, or various command and control functions. One of the Navy's laboratory personnel who was in the theater at the time designed a suitable landing deck. Within a few weeks, a prototype was built in Vietnam according to his design—with some help from his people back in the U.S. Today, many of these "minicarriers" operate successfully in the Delta. This development has measurably increased the flexibility and effectiveness of those forces, and for a very small sum of money. The Army maintains their Limited War Laboratory which does many of the same kinds of things, small jobs that are badly needed in a hurry. These labs are allowed to bypass some of the normal chains of approvals, when the money is small and quick reaction is urgently needed.

	Total Defense RDT&E (millions)	Southeast Asia RDT&E (millions)
1964	7635	100
1965	6997	200
1966	7553	370
1967	7954	680
1968	8002	780
1969	8000?	800

I cite these examples to show that the Services have the technological capabilities and procedures available to respond to the demands for R&D in this war. My office in ODDR&E has not taken over this role; the military Services do it themselves; our job is to help them, to encourage them, and to assist in finding the funds needed for these requirements.

Good guys and bad guys

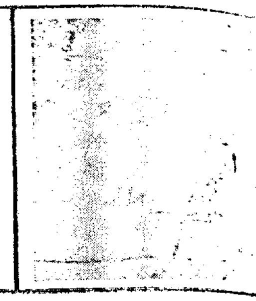
The most difficult job in this war has been to find the enemy. This may sound platitudinous. After all, we have had to find the enemy in every war we've ever been in. But there are no front lines in this war. The enemy operates primarily in small units. You cannot tell the "good guys" from the "bad guys"—many aren't even wearing uniforms. The big problem is to find out where the enemy is at a particular time—and, in fact, to determine whether or not he *is* the enemy—and then to determine his intentions. He is very good at camouflaging himself, his installations, and his equipment; and he moves primarily at night. Over North Vietnam, the problem is of a similar kind: We try to knock out the bridges, vehicles, and supply dumps, but these too are hard to find, as are his radar installations and antiaircraft defenses. The North Vietnamese do not have a very advanced civilization, they don't have large target complexes, and they have learned that we have difficulty knocking out their targets if they keep them small enough, or if they hide them away during the day. For every visible bridge, there may be three or four alternate ways of crossing the same stream.

In guerrilla and urban warfare, we must find the man who is planting the mine along the road, find the Vietcong who may come into a village to cut the chief's throat during the night, and find the teenage sapper team bent on destroying a Saigon police station. In all these cases, our biggest inadequacy is being able to single out the target, or the individual that represents the enemy. Perhaps a fourth of our total RDT&E expenditures has been solely for the purpose of trying to detect indications of enemy presence.

We are using virtually every type of indication that a human or vehicular target provides in our attempts to develop better means to find the real targets. These detection systems must work in real time—it does no good to find that 100 men walked or drove down Trail *X* from Point *A* to Point *B* a week ago. So realtime, nighttime intelligence gathering has been one of our major problems. We are beginning to make significant inroads in this area. Starlight scopes, for instance, permit a soldier to see targets with nothing more than starlight as illumination. They are now widely used in the Southeast Asian conflict with very impressive results.

Approved For Release 2004/10/12 : CIA-RDP80R01720R001300120004-7 the enemy has

About ten percent of DOD's annual R&D budget is currently going toward improving our equipment in Vietnam. From this investment, which represents some $800 million per year, come such developments as those shown on the opposite page. Clockwise from immediate right: Lightweight, inflatable hospitals that can be transported by helicopter; Navy contraband detector used to probe cargoes for metallic objects; AH-1G "Huey Cobra," developed in less than two years, which the Army credits with significant contribution in blunting the Tet offensive; helicopter-borne water buckets, an idea borrowed from the U.S. Forestry Service to improve firefighting in urban warfare; Starlight Scope, which greatly enhances the capability to see and fight at night; and a motion-detection radar that is now in wide use with the Marines in northern provinces of Vietnam.



shown extraordinary cleverness in countering some new things we have introduced. It is seldom more than a few months after we introduce something new before we capture some document that tells the enemy, in essence, how to counter the new device. This is one reason we have tried to be so very security conscious during this war.

Where is the enemy's brainpower? Clearly, some of it is in the field, and it is evident that the enemy's allies have a certain amount of scientific advisory talent working for them too. I suspect there is an office like my own somewhere in the enemy structure, and that my counterpart works with a smaller budget and different emphasis. It is not the American way to use a lot of manpower and just a few devices that add to their capability; to save lives, we tend to want to minimize the number of men we use and to replace their skills with more sophisticated technology.

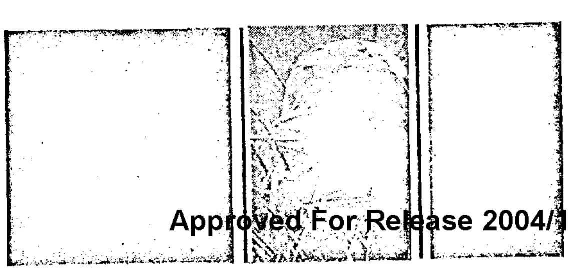
Eye for eye, tank for mortar

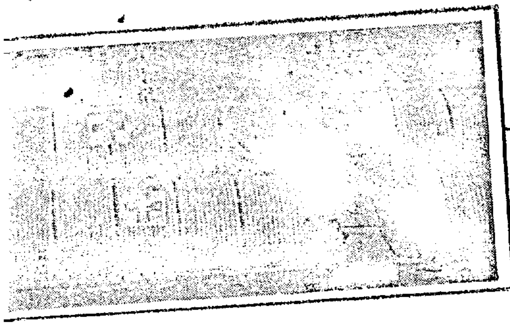
There are those who have a deep concern that we may be compromising much of our latest technology for tactical warfare without benefiting from a similar disclosure of Soviet and Chicom capability. To a certain extent, this is true; the Communists have committed North Vietnamese lives rather than Soviet technology wherever possible. The real questions, of course, are whether it is serious to have exposed our own capabilities as a means of reducing our own dead and crippled, and whether it will be difficult to establish a new level of capability in those areas where surprise is advantageous. I have no doubts in either area; we have done the right thing. After all, new technology becomes available faster than we convert it into military hardware. And in many areas, we have had the priceless advantage of finding out just how well our newer equipment works. We are thus in a position to make the type of real-world improvements in our forces that can only be derived from practical experience. There is very little good that comes from any war—and we would be negligent, indeed, if we did not profit from the only real R&D "benefit" possible; a better understanding of our own capabilities and needs.

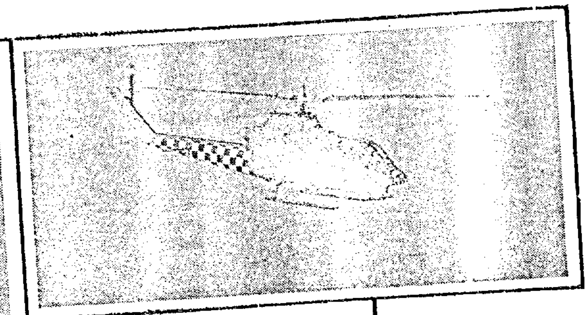
There is another thing that is coming out of this war loud and clear: There are dramatic asymmetries between what we do and what the enemy can do to counter us. In some wars, the participants reason: If the other fellow has a tank, we must have a tank with an extra inch of steel; if he has a Mach 2 airplane, we must have a Mach 2.1 airplane; if he has a 150-mm artillery piece, we must have a 175. But because occupation and seizure of territory are not elements of this war, such reasoning does not hold in Vietnam. The enemy can destroy a $6 million airplane with a $100 mortar shell. He can shoot down a half-million-dollar helicopter with a 25¢ bullet from a hand-held gun. He can stop a tank with a hand-held antitank weapon, because he just plain sneaks up to it, stays under a bush for two or three days, or submerges himself in a rice paddy and waits for the tank to come along.

Such asymmetries are hard to live with. Time and again, we are asked: Why do we need a $2 million, two-seat twin-engine, afterburning jet to destroy little bamboo bridges? You could argue that we might be able to get along with a somewhat cheaper airplane, but the enemy has an air defense system *above* that bamboo bridge, which employs MIG 21's. Thus, we must have a weapon that can take on both the bridge and the MIG 21. The whole war has an enormous "dynamic" range, from one extreme to the other. But if we give up—if we say we cannot stop such resupply movements, by which the local insurgents are supported and bolstered—then we are saying that we cannot stop this conflict. If we cannot do this, we cannot stop wars of national liberation. If this is true, the whole world may become "liberated" piece by piece.

The mortar problem in Vietnam is another example of asymmetry. We have never before been in a war where our cities, bases, and depots have been exposed to mortar and rocket fire—often from 360° around the perimeter. A








mortar shell can be carried in a man's pocket; it can be hidden in a crate of lettuce. The enemy is willing to take two weeks, or two months, to set up a 50-round attack. On the average, 50 rounds can destroy $20 million worth of airplanes. A simple weapon such as a mortar or rocket can raise hell, and the counter system is quite complex.

The enemy's allies are doing a good job of providing the North Vietnamese and the South Vietnamese guerrillas with these weapons—and they are not simply old pieces of pipe with home-made explosives in them; they are all made somewhere in the Communist nations; they come in little canvas carrying bags; they break down into pieces that can easily be handled by a small man. This is not accidental. This weaponry is carefully tailored for their side of the job, just as we try to tailor ours to counter it. It is a fascinating game of technology against technology, but in one case with a minimum use of manpower, and, in the other, a rather extravagant use of manpower.

Between 1964 and today, much of the equipment used by our forces has changed at least once. This covers the gamut from [illegible] aircraft and the weapons they drop; for instance, the helicopters we use for pilot rescue: We used one helicopter when the war began, then another helicopter for the next two years, and now we have begun to replace the second helicopter with an even more capable machine.

Strategy for a "porous" war

In the field of detection, I think the changes are occurring even more rapidly. You have probably read about the chemical sniffers, that smell the presence of human beings. This sounds rather sophisticated, but is little more than normal laboratory instrumentation packaged in an olive drab box. We put these boxes into helicopters and fly them over the jungle. Four or five years ago, I doubt that anybody would have given us a plug nickel for this idea, and yet, they are now being used in substantial quantity by regular operational forces. Similarly, we are learning to detect footsteps many yards away—with another spin-off from laboratory instrumentation equipment.

These developments open up some very exciting horizons as to what we can do five or ten years from now: When one realizes that we can detect anything that perspires, moves, carries metal, makes a noise, or is hotter or colder than its surroundings, one begins to see the potential. This is the beginning of instrumentation of the entire battlefield. Eventually, we will be able to tell when anybody shoots, what he is shooting at, and where he was shooting from. You begin to get a "Year 2000" vision of an electronic map with little lights that flash for different kinds of activity. This is what we require for this "porous" war, where the friendly and the enemy are all mixed together.

Much of the new sensor technology has application at the other end of the battle spectrum, in the security business. For example, we must learn how to protect the road from Saigon to the Mekong Delta, for this is the economic lifeline for the country. Some 40% of the people live in the Delta; these people are 95% agrarian, and their products must get to Saigon. Keeping this road free from ambush is a very serious problem.

One other problem in the Delta is that most of the people are not for either side; they want both sides to go away so they can grow some rice and sell it to somebody for a reasonable price. They give their allegiance to no one. And this is the frustration: They will tell you a week later that the Viet Cong came in and took 20% of their rice. But they will not tell you at the time it happens. They know we cannot protect them adequately against others who may sneak into the village again next week. So our progress is inhibited by not being able to provide an adequate level of security. Consequently, a small group of Viet Cong can keep the population silent and uncooperative.

Indeed, throughout the country one of the biggest problems stems from the fact that nobody has a telephone. There is often no way for a victimized community, or family, to call for help. We sorely need a simple, primitive substitute for our own phone system. I think it would help to raise the people's confidence if they could report to their officials in time for law enforcement to respond.

New concepts of war

What are the lessons to be learned from this war? I believe the first is the fact that we *cannot* separate the insurgent from his background. Next, when we do find a target—be it a Viet Cong, a truck, or a bridge—*often* we cannot kill it, and *always* the enemy can replace it. All the important enemy targets are small, fleeting, hidden, moving, cheap, smart, and reproducible. He knows how to use his environment to advantage. The jungle, the rice paddies, the shallow streams and canals, the firm clay earth itself, the long-suffering people and their generations of discontent—these are the environmental factors we must contend with. And let me add one more: We must learn to fight [illegible] at night. We must work with the environment to find the enemy and to either catch him in the act of being an enemy or somehow to deter him from being an enemy again.

Over the past four years, the United States has spent over \$2 billion in R&D on these other problems of the war. We are on the verge of some very important new military capabilities. We may not perfect them all in time for this war. Indeed, some may never even reach the field in test quantities. But these are the things that will keep this kind of war from breaking out again, and we *must* continue to develop them into weapons and equipment that can be readily adopted by the military, even after we reach a ceasefire in Vietnam.

From the work we have sponsored during this war, I can see three revolutionary concepts coming into focus—and our research and development programs have already begun to demonstrate that these concepts can be made practical:

- One: We are getting closer to being able to provide complete realtime battlefield surveillance around the clock, through suitable instrumentation.
- Two: Technology will soon permit the development of practical weapons that will discretely destroy the types of small, fleeting targets characteristic of this type of war.
- Three: It now appears that we *may* reach the stage where there will be little difference between fighting at night or during the day. Clearly, this will be the toughest challenge; fighting at night will require a new systems approach, new training, new doctrine, and new ways of committing one's manpower.

In all three of these revolutionary concepts, we are hindered by two real-world problems. First, the technology is so new that it has not yet become an inherent part of our weapons system designs. Second, and equally important, the introduction of new concepts is extremely difficult during the conduct of the war. These are the problems that must be solved if we are to compress the learning and experience process so that the greatest benefits of new technology can be felt in South Vietnam.

Finally, we must learn to share this new technology with our allies. It is not enough to equip only the U.S. forces with new capabilities that make our men more effective. We must become more aggressive in training and organizing the South Vietnamese to take on the "residual war" themselves. It is my own opinion, after nine visits throughout South Vietnam, that the South Vietnamese can handle more sophisticated equipment—even if we have to maintain it for some time into the future. It is only by transferring our new capabilities to our allies that we can hope to turn the counterinsurgency problem back where it belongs, with a concurrent reduction in U.S. costs and losses. When that happens, then my office can probably go out of operation. □