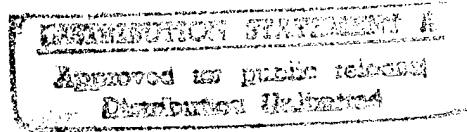


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Turning Light Forces into Heavy Hitters

New Technologies for U.S. Rapid Reaction Missions

In recent years, light, rapid-reaction forces have become a staple of U.S. military strategy and planning. Rather than defending predetermined territories with large, prepositioned forces, current U.S. plans call for quick and decisive deployments of lightly armed forces into locations of potential or actual hostilities.

Recent research performed by RAND's National Defense Research Institute and its Arroyo Center suggests that emerging technologies will eliminate or substantially reduce a major drawback of this developing role for light forces: their vulnerability to attacks from heavily armored enemies.

Equipping these forces with new or expected-to-be-developed hunter-killer capabilities—a combination of standoff weapons, sophisticated reconnaissance and targeting systems, and efficient counterbattery weapons—greatly increases their lethality and survivability. Such an arsenal would be more effective than these forces' current firepower, which relies heavily on direct-fire, line-of-sight technologies, and would allow light forces to carry out the wider range of missions that military strategists have envisioned for them.

Specifically, RAND's studies suggest that light forces equipped with enhanced fiber optic guided (EFOG) missiles, which can be fired with high accuracy at the enemy from distances as great as 15 kilometers, would destroy more targets than they can with their current weapon of choice—tube-launched, optically-tracked, wire-guided missiles (TOW). EFOG missiles emerged as by far the most formidable addition to light forces' firepower from among new and emerging weapons systems that RAND analysts assessed, which included precision-guided mortars, lightweight cannons with smart rounds, multiple-launch rocket systems, and direct-fire weapons. Combined with reconnaissance and sensing systems, EFOG missiles would allow light forces to engage enemy

forces from greater distances, maneuver more quickly, cover more territory, and follow more flexible tactics than with weapon systems they currently employ.

RAND conducted the research as part of the Rapid-Force Projection Initiative, one of the Pentagon's new advanced-concept technology demonstrations. Using computer simulations, RAND analysts examined, compared, and contrasted new technologies and systems that would allow light forces to better withstand and overcome attacks from larger, more heavily armed forces in varying terrain. The study also developed computer software to simulate related emerging technologies, such as acoustic sensors and command and control system architectures.

REVOLUTION IN MILITARY AFFAIRS: LIGHT FORCES, HEAVY RESPONSIBILITIES

The Pentagon's interest in light forces is the result of an ongoing revolution in military affairs that has influenced military thinking profoundly over the past decade. Incorporating new tactics and technologies, this revolution substitutes agility and lethality for mass in battlefield situations. Strategists are attracted to light forces because they can detect and attack threats with fewer personnel, be deployed faster and at less cost, and be sustained more economically than the heavy armored forces of the past.

However, whereas deployments of light forces carry advantages over earlier strategies in terms of responsiveness, flexibility, and cost, they also involve risks. Particularly in the early phases of a conflict, these forces are vulnerable to attack from heavily armored enemies. In the first stages of the Desert Shield buildup, for example, U.S. forces are widely acknowledged to have been unable to withstand attacks under certain conditions.

This vulnerability limits the types of roles and missions that light forces can perform. Planners, who would

like to employ them in a growing variety of situations, have had to restrict where and when to call for their use.

SIMULATING THE ALTERNATIVES

RAND researchers developed and combined an extensive array of sophisticated computer simulations to address three questions:

- How does a current light airborne force perform against existing heavy forces?
- Can a light airborne force be enhanced or reconfigured to repel existing heavy forces?
- What are the vulnerabilities of a light airborne force to a future heavy force?

Researchers examined these questions using simulated conflicts in two regions with quite different terrain, Southwest Asia and East Europe. These models allowed the researchers to frame a variety of attacks by massed enemy troops supported by tanks and other heavy armor against U.S. light forces equipped with current and alternative mixes of weapons.

CURRENT LIGHT FORCES CAN BE OVERRUN

Our analysis showed that a U.S. light airborne force, similar in size and composition to the current 82nd Division Ready Brigade, could blunt an initial onslaught from a heavy enemy force employing Russian-made equipment and Russian-style battle tactics. However, that U.S. light force, if equipped with its current array of direct-fire and indirect-fire weapons—such as Apache attack helicopters, Sheridan light tanks, TOW missiles, and towed artillery tubes—eventually would be unable to sustain its defense and would be overrun. While able to inflict significant losses, U.S. troops would be unable to destroy enough enemy equipment at long range to undermine the attacker's overwhelming numerical superiority,

thereby allowing more enemy troops and armor to come into close range than U.S. forces could handle.

How long light forces survived depended on the terrain. In simulated engagements in flat deserts of Southwest Asia, U.S. light forces could fend off initial enemy attacks. Long lines of sight in the desert allowed light forces to engage the enemy with TOW missiles and other direct-fire weapons before the enemy could engage them. In the hilly and more heavily vegetated East Europe scenario, U.S. light forces were less successful fending off initial attacks. The close terrain afforded fewer opportunities to see, attack, and engage approaching forces at range. In both types of locale, however, enemy forces approaching en masse, with a considerable force-size advantage, eventually closed in on and overwhelmed the U.S. light force.

NEW TECHNOLOGIES CAN ENHANCE LIGHT FORCES

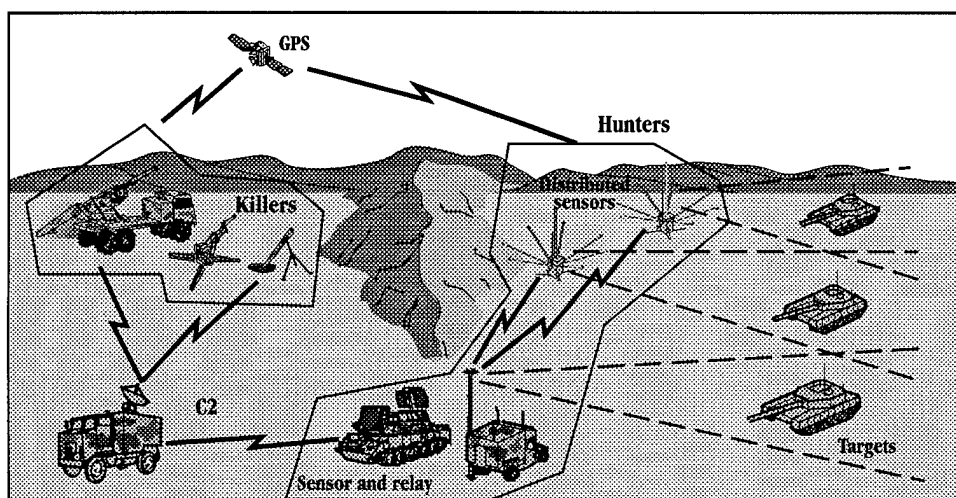
New technologies could improve the chances of U.S. light forces overcoming attacks from existing heavy forces. In simulated battles, U.S. forces using enhanced direct-fire weapons, such as the recently cancelled Armored Gun System light tank that the Army has had under development, would fare modestly better than forces equipped with current firepower. Nonetheless, making improvements to U.S. forces' direct-fire weapons alone would not prevent their eventual demise at the hands of heavy enemy assaults in either Southwest Asia or East European terrain.

Adding new standoff weapons such as the EFOG missile to U.S. light-force arsenals would be a more successful tactic. Coupled with mobile reconnaissance vehicles that could pinpoint enemy targets, EFOG missiles would be a highly effective addition to light forces. Particularly in Southwest Asia, where open terrain allows for long-range detection by reconnaissance vehicles, these standoff mis-

siles would be able to destroy sufficient numbers of enemy armor at long range, so that U.S. direct-fire weapons would be able to handle remaining enemy weapons in close, line-of-sight engagements. Moreover, light forces could become even more lethal if the United States were to improve the speed with which reconnaissance hunter vehicles communicated with standoff killer missiles.

FUTURE HEAVY FORCES POSE NEW PROBLEMS

Even with these enhancements, U.S. light forces would not be as



Hunter-Killer Is a Key Light-Force Enhancement

successful against future enemy forces equipped with longer-range weapons, more accurate targeting systems, and upgraded forward-looking infrared sensors. Further improvements would be needed to maintain a battlefield edge for U.S. light forces. In particular, light forces' arsenals would need to be augmented by precision-guided counterbattery weapons as a means to target and destroy at long range as much of an improved enemy force as possible. In both Southwest Asia and East Europe, the high-mobility artillery rocket system, which contains smart munitions such as Damocles along with target recognition capabilities, would provide the most effective counterbattery addition.

IMPROVING THE ODDS

Our analysis suggests that light airborne forces can be improved in defensive operations against a larger heavy

force. New technology concepts, such as standoff weapons, unattended sensors, intelligent minefields, and hunter vehicles, can extend the battle space, allowing the fight to begin sooner and at greater range. By so shaping the battlefield, these improvements would help minimize the consequences of light forces engaging attacking forces at close ranges.

RAND research also suggests that force enhancements can be tailored to improve light forces' chances of surviving heavy-force attacks. Enhancements would depend on the type of terrain in which light forces would operate—open versus close territory—and on the type of threat they would encounter—existing or future. In open terrain, our simulations showed that large benefits might be obtained from relatively few enhancements. Operations in close terrain would require more-extensive improvements.

RAND research briefs summarize research that has been more fully documented elsewhere. This research brief describes work done for the National Defense Research Institute and for the Arroyo Center and is documented in Rapid Force Projection: Exploring New Technology Concepts for Light Airborne Forces, by Randall Steeb, John Matsumura, Terry Covington, Thomas Herbert, and Scot Eisenhard, DB-169-A/OSD, 1996, 80 pp., \$6.00, ISBN: 0-8330-2428-0, and Rapid Force Projection Technologies: A Quick-Look Analysis of Advanced Light Indirect Fire Systems, by Randall Steeb, John Matsumura, Terry Covington, Thomas Herbert, Scot Eisenhard, and Laura Melody, DB-168-A/OSD, 1996, 84 pp., \$6.00, ISBN: 0-8330-2427-2, available from RAND Distribution Services (Telephone: 310-451-7002; FAX: 310-451-6915; or Internet: order@rand.org). Abstracts of all RAND documents may be viewed on the World Wide Web (<http://www.rand.org>). Publications are distributed to the trade by National Book Network. RAND is a nonprofit institution that helps improve public policy through research and analysis; its publications do not necessarily reflect the opinions or policies of its research sponsors.

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