Chapter 9
Current Capabilities

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INTRODUCTION

NATO's ability to attack follow-on forces is provided today almost exclusively by aircraft operating at depths of 150 kilometers or less and carrying weapons that are most effective against fixed targets (guided bombs) or soft area targets (cluster bombs). Although such attacks may play some part in impeding the forward advance of Warsaw Pact forces, they are only a subset of the operational concepts that have been proposed for attacking follow-on forces. In particular, they would not destroy armored forces.

The implementation of the other operational concepts runs up against several major limitations in current fielded systems. Perhaps the most important is that NATO's current reconnaissance and command, control, and communication systems and procedures are not designed to provide timely information on the precise location of mobile targets. Although aircraft are partially able to make up for a lack of precise target data by placing a human observer on the scene, additional time spent over enemy territory in searching for a target will increase exposure to the very heavy Warsaw Pact air defenses.

A second major limitation is that most existing air-delivered weapons cannot destroy armored vehicles in significant numbers. The best weapon for the task today may be the Tornado aircraft flown by the British and German air forces. But its anti-armor submunitions, dispensed in large numbers, are unguided. These weapons require aircraft to fly very close to—or even directly over—the target, exposing the aircraft to fire from terminal air defenses. Cluster bombs, which are effective against soft targets, have a quite low kill rate against armored vehicles, requiring multiple attacks—and thus repeated exposure to anti-aircraft fire-to achieve a given objective. The U.S. Maverick missile is effective against tanks, but requires the pilot to engage tanks individually. The Low Altitude Navigation Targeting Infra Red for Night (LANTIRN) will support launching two Mavericks per pass, but the pilot will still have to find a target for each and point the missile seeker at it.

Capability against fixed targets such as bridges and power stations is somewhat better; guided bombs can provide the high accuracy needed to destroy these targets while allowing the aircraft to remain out of range (up to 20 kilometers or so) of terminal defenses. Few NATO aircraft can reach more than 150 kilometers beyond the East German border, however, where a large number of important fixed targets are located (railroad bridges, for example).

Aircraft face several other limitations as well. Few NATO aircraft are able to operate well at night or in bad weather, and all face competing demands from other missions, including opposing enemy air forces, close air support, and nuclear standby. In the first few days of a war, NATO aircraft in the Central Region will be committed largely to fighting the air battle and to providing close air support, with little leeway to carry out attacks against follow-on forces.

Ground-launched weapons, which could complement aircraft particularly at times when few aircraft are available (night and bad weather and the first days of a war), have little to offer at present. Artillery and the Multiple Launch Rocket System (MLRS) now entering the inventory, are of short range (less than 30 kilometers), have a relatively low delivery accuracy, and carry cluster munitions that are relatively ineffective against tanks.

TARGETING INFORMATION'

Any plan to use existing NATO forces to attack Warsaw Pact follow-on forces quickly runs up against the limitation imposed by existing technology for locating mobile targets beyond the immediate battle area. Current reconnaissance systems provide data for general situation assessment, especially at short ranges, but the data are generally neither timely enough nor precise enough to guide weapons to specific targets.

The bulk of NATO's surveillance, reconnaissance, and target acquisition capability is still provided by manned aircraft carrying a variety of sensors (see table 9-l). Aircraft penetrating enemy airspace to obtain reconnaissance photographs are obviously vulnerable to enemy air defenses, and may be forced to fly restricted routes; it is difficult for reconnaissance aircraft to cover broad areas.

Unmanned drone aircraft, currently deployed by German, British, and Belgian armies, are able to perform limited reconnaissance of heavily defended areas. Their small size makes them difficult to detect and they do not place a human pilot at risk. Some fly a preprogrammed route; others can be controlled from the ground. They carry a variety of sensors, some of which transmit directly to the ground and others return film or tapes that must be processed before the information can be extracted. Compared to manned reconnaissance aircraft, ranges are limited.[2]

Radars and equipment to pickup enemy radio communications and radar emissions are carried on a number of U.S. aircraft and permit those aircraft to remain over friendly territory while looking as far as hundreds of kilometers into the enemy's rear. The systems that detect radar signals (ELINT, or electronic intelligence) and radio communications (COMINT, or communications intelligence) may be of great value for finding command posts, surface-to-air missile (SAM) sites, and surface-to-surface missile radars.

Table 9-1 .—Surveillance and Reconnaissance Aircraft

	Nation	Wartime control
Reconnaissance aircraft:		
RF-4C	United States	NATO
RF-4E	Germany	NATO
RF-104	Netherlands	NATO
Jaguar	United Kingdom	NATO
Mirage 5	Belgium	NATO
OV-1D	United States	U.S. Corps
TR-1, RC-12D, RV-1D	United States	NATO
RPVs and drones:		
CL-89	United Kingdom, Germany, Canada	Corps
Epervier	Belgium	Corps
CL-289	Germany, Canada	Corps
ARGUS	Germany	Corps

SOURCE Office of Technology Assessment, 1987

The ASARS-II radar carried on the TR-1 aircraft can provide very detailed images allowing discrimination between tanks, armored personnel carriers, and other vehicles. The ASARS-II radar is, however, designed primarily for observing fixed objects, and has only a very limited capability to spot targets that are in motion. A prototype of this system is now flying in Europe; full operational capability is to begin in 1987. Although control of these U.S. systems would be transferred to SACEUR in wartime, U.S. security restrictions on the disclosure of intelligence capabilities to foreign countries—including members of NATO—could, unless waived, impede the timely flow of information from some of these systems to NATO commanders.

DELIVERY SYSTEMS

Within NATO today, aircraft constitute the primary means of delivering munitions beyond the immediate battle area. Ground-launched artillery and the Multiple Launch Rocket System are short-range weapons (about 30 kilometers), and the munitions they carry-the Im-

'A more detailed version of this section is found in app. 9-A in Vol. 2.

'*Jane All the World's Aircraft, 1985-86* (London: Jane's Pub lishing Co. Ltd., 1985).

Photo credit *US Department of Defense*

NATO's current capabilities rely primarily on aircraft such as F-4s and F-16s (pictured).

proved Conventional Munition, essentially a cluster bomb—are effective mainly against soft targets, such as trucks, self-propelled artillery, and other lightly armored vehicles (including Soviet BMP infantry fighting vehicles and field command posts). Although nominally capable of penetrating a portion of the lighter armored top surfaces of current Soviet tanks, these munitions in practice would have a very low kill probability against tanks. Furthermore, these ground-launched systems are not very accurate.

The ground-launched Lance missile has a considerably greater range (up to 125 kilometers), but because of its relatively poor accuracy, its role is mainly carrying tactical nuclear warheads. The conventional APAM (antipersonnel, antimateriel) warhead for Lance is designed for use against soft area targets, such as SAM sites, and is ineffective against armored targets.

About 1,000 tactical aircraft that could be used to strike targets beyond the immediate battle area would be assigned to support the NATO Central Region in wartime. All have other jobs to do besides attacking follow-on forces, however, and an important issue in the implementation of FOFA is how early in a war those aircraft would become available. F-16s, for example, which can carry out both air-to-air and air-to-ground missions, would be called upon heavily in the first few days of a war to assist in the air battle and for close air support at the immediate battle area. Long-range aircraft such as the F-111 are expected to carry out attacks against airfields and interdiction targets that may or may not be related to follow-on forces. Moreover, a significant proportion of the F-1 11s as well as some other aircraft will be held for nuclear missions.

Range is another limiting factor. Only a portion of these 1,000 aircraft (140 U.S. F-1 11s, 10 British Buccaneers, and-when full deployment levels are reached-about 430 British and German Tornados) can reach targets beyond about 150 kilometers from the FLOT. None can reach beyond about 400 kilometers without refueling (see table 9-2). Furthermore, few of the escort aircraft that would be included in an attack package can operate at these longer ranges.

The F-ills are the only aircraft fully able to operate at night and in bad weather. F-16s are beginning to acquire a night/all-weather capability with the addition of the LANTIRN navigation and targeting pods. Tornados are equipped with terrain-following radar which permits operation at low altitudes even under poor visibility, and a ground-mapping radar that could allow them to navigate to and locate large area targets at night; but they lack an

Table 9-2.— Delivery Systems

Ground-launched:	Country	Range (approx.)
Artillery	all	30 kilometers
MLRS	US, GE, UK	30 kilometers
Conventional Lance	US, NL, BE	120 kilometers

Aircraft:	Country	Range	Night/weather
F-4	US,GE	short	limited
F-5	NL	short	no
F-16	US, NL, BE	short	no
CF-18	CA	short	no
F-104[a]	GE, NL, BE	short	limited
F-ill	US	medium	full
Tornado	GE,UK	medium	good
Mirage 5	BE	short	no
Jaguar	UK	short	no
Buccaneer	UK	medium	limited

Ranges Short up to roughly 150 kilometers beyond the FLOT
Medium up to roughly 350 kilometers beyond the FLOT
[a]Being replaced by F-16 and Tornado

SOURCE Office of Technology Assessment, 1987

infrared targeting system that would enable them to carry out precise attacks at night.

Some of the B-52 bombers of the Strategic Air Command could be made available for conventional missions; crews are beginning to be trained to fly such missions.[3] The range of these aircraft is sufficient to fly from bases in the United States to targets throughout Eastern Europe. Whether they can, or must, successfully penetrate Warsaw Pact air defenses and whether existing on-board targeting systems are adequate for the job are critical questions, however.[4]

[3] "NATO Deploys Boeing B-52s in Deep-Strike Attack Exercise," *Aviation Week and Space Technology*, Sept. 9, 1985.

[4] See vol. 2, app. 9-B.

MUNITIONS

Cluster munitions currently represent the primary means for attacking combat vehicles and other mobile targets (see table 9-3). Many small bomblets—packed into an air-delivered dispenser, artillery shell, or rocket–are scattered over a wide area (typically a few hundred meters). This large kill radius compensates for imprecise delivery and permits engaging multiple individual targets per pass or per round. Although these munitions are capable of doing considerable damage to soft targets such as personnel, trucks, field command posts, and lightly armored vehicles such as self-propelled artillery and BMPs, their ability to penetrate heavy armor is small.[5] Unless a bomblet happens to strike a tank at a particularly vulnerable spot on its top surface, it is unlikely to do any serious damage. Because the typical pattern on the ground of these weapons is one bomblet per 20 square meters, the probability of killing a tank with these munitions is quite low. Another drawback of these munitions is that when delivered by air, they require the aircraft to fly within a few kilometers of the target-in the case of Combined Effects Munition (CEM) and Rockeye, which, like ordinary bombs, can be dropped from a distance in a' 'lobbed' trajectory-or even directly over the target (in the case of the Tornado's MW-1 dispenser, which remains fixed to the bottom of the aircraft).

Table 9-3.— Munitions Fielded by NATO Forces

General. purpose bombs:	
Mk-82, Mk-84, others	aircraft
Cluster munitions:	
ICM	artillery, MLRS
APAM	Lance
Rockeye	aircraft
CEM	aircraft
MW-1/KB-44	aircraft (German Tornado)
BL755	aircraft (British)
Scatterable mines:	
Gator	aircraft
RAAM, ADAM	artillery
MW-1/MIFF	aircraft (German Tornado)
Guided bombs:	
Maverick	aircraft (F-16, F-4, F-1 11)
Paveway II	aircraft (F-4, F-1 11)
GBU-15	aircraft (F-4, F-1 11)
TV-guided Martel	aircraft (British Buccaneer)

SOURCE Office of Technology Assessment, 1987

A different type of air-launched weapon, the Maverick guided missile, has a high kill probability against armored vehicles, but is expensive (over $100,000 each) and is capable of hitting at most one target per round and at most a few per pass. It also requires the attacking aircraft to fly to within a few kilometers of the target.

Other guided bombs, the laser-guided Paveway and the TV-guided GBU-15, provide a significant capability for attacking fixed targets such as bridges, hardened command posts, and power stations, mainly by virtue of their high accuracy. Both also allow the aircraft to stand off a modest distance (as much as 20 kilometers) from the target.

[5] A typical penetration depth is 25 mm of ordinary steel (rolled homogeneous armor). The APAM warhead carried on the conventional Lance missile has essentially no armor-penetrating ability.

Land mines that can be delivered by artillery or aircraft also provide a current capability for attacking follow-on forces. Unlike land mines used in the past, which had to be emplaced by hand and which generally did little damage to tanks—perhaps merely blowing off a tread, causing a minor delay—these new mines can be quickly emplaced where needed and they make use of improved lethal mechanisms that may allow them to be effective in halting or even destroying armored vehicles. A major limitation of the current scatterable mines is that they are easily seen on roads and can be cleared with the forks and rollers carried by Soviet tanks or even by machine-gun fire.