

Steps taken to prevent the unauthorized use of nuclear weapons — mechanical impediments, electronic locks, restrictive operational procedures — are, collectively, referred to as ‘negative control’. An analogy for a system under strict negative control might be a police officer who keeps his gun, unloaded with the safety catch on, securely snapped into his leather holster. Under these circumstances, there is little chance that the officer will discharge the firearm by accident. Similarly, during times of relative calm, there are multiple safeguards in place inhibiting the unauthorized or accidental use of nuclear weapons.

On the other hand, positive control means making sure the weapons actually go when the decision to launch has been taken. Because of the speed of modern ballistic missiles, military planners want to be sure that their own missiles can be launched rapidly. From this it becomes obvious that enhancing positive control means reducing negative control. In addition, the need for speed in the transition from one set of controls to the other causes problems.

An analogy would be a police officer entering a very dangerous and tense situation knowing that an armed adversary is waiting. The officer proceeds with the gun in his hand, loaded and ready to fire. Under the circumstances of intense pressure and apprehension, it is easy to imagine an accidental shooting.

Similarly, some researchers are concerned about the danger of accidental nuclear war during a time of international crisis. They fear that decision-makers may find themselves under intense pressure to ease the inhibitory controls and increase the overall ‘readiness’ of the system.

CONTROLLING STRATEGIC NUCLEAR FORCES

There are several components in the strategic nuclear arsenal of the superpowers: long-range bombers, submarine-launched ballistic missiles, sea-launched cruise missiles, and intercontinental land-based missiles. In addition to the weapons themselves, there is the network of command and control systems which are designed to detect the first sign of enemy attack and to coordinate a response. Each of these components has unique problems of positive and negative control.

Bombers

To ensure their survival and their ability to reach assigned targets, the strategic bomber force is ordered airborne, or ‘scrambled’, during a crisis. This is positive control. The aircraft go into a holding pattern; they do not head toward their targets until ordered to do so. Bombers can be recalled when the crisis has subsided, or in the event of a false alarm.

Submarine-launched ballistic missiles

Submarines equipped with nuclear missiles do pose some problems of command and control. These weapons are not equipped with the electronic locks called ‘permissive actions links’ or PALs. It is theoretically possible for a weapon launch to be initiated by the commanding officer, the weapons officer, and two other officers who have been entrusted with combinations to a safe containing launch codes. There are some inhibitions on an unauthorized launch. The entire ship must be prepared for launch. Preparation includes slowing the ship and taking it down to the appropriate depth for firing. An alarm sounds throughout the ship when a launch is imminent. Still, some analysts have suggested that the missiles on board submarines need to be made even more secure.

Sea-launched cruise missiles

Surface ships carry cruise missiles which can carry nuclear warheads. Some analysts argue that the sea-launched nuclear weapons are the most likely to be used first in a confrontation between the superpowers.³ Like submarine-launched ballistic missiles, these cruise missiles are not equipped with electronic locks and the autonomy of the naval command and control of these nuclear forces is of concern to many analysts. Again, it has been argued that these weapons need to be made more secure.

Land-based missiles

The strategic land-based intercontinental ballistic missiles (ICBMs) cannot be recalled once they have been launched. However, they are, by virtue of being based on land in fixed silos, more vulnerable to a first strike than are sea-launched systems. It is here where the conflict between positive and negative control is most acute.

These missiles cannot be launched without an electronic code which is entrusted only to the president of the United States. Each cluster of ten ICBMs is controlled by two launch control officers who must turn their keys at the same time to execute their orders; neither acting alone could launch the missiles.

Five of these two-man crews make up a squadron. If one crew attempts to launch their missiles, the four other launch control centres are alerted. The missiles will not be launched unless another team turns their keys within a very short time. Furthermore, any one of the officers in the squadron can inhibit the launch orders given by any single two-man crew.

Command and Control

The early warning system is crucial to US strategic planning. Personnel of the US command and control network constantly monitor information sent back