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The May 1998 Pokhran tests in India and Pakistan's following it up with its series of nuclear test has transferred the Indo-Pak nuclear posture of ambiguity into a more transparent deterrence. Western governments and media often express fears on the threat of hair trigger nuclear conflict in the subcontinent and the nature of unarticulated command and control systems. The Kargil conflict in the summer month of 1999 has only added to the international apprehension of a nuclear holocaust in south Asia. As a scholar like Gurmeet Kanwal observes:

"There is no reason to believe that either India or Pakistan will act less responsibly than the other nuclear weapon states despite the October 1999 military coup in Pakistan. However, the present ambiguity regarding the command and control structure, the alert status and the institution of fool proof arrangements to prevent both accidental and unauthorized use of nuclear weapons, is bound to undermine international confidence in the ability of the two countries to prevent the use of Nuclear weapons. When the stakes are high the lack of transparency always leads to the lack of credibility." 1

Unlike Pakistan, India has clearly enunciated its nuclear doctrine. Prime Minister Atal Bihari Vajpayee has declared in a policy statement in Parliament on August 4, 1998 that India's nuclear doctrine will be based on morally justifiable concept of "no first use" and

that India will maintain "a minimum but credible nuclear deterrent".  

While the proposed nuclear doctrine is yet to be debated in Parliament and formally accepted officially, it would be stated that a broad national consensus had emerged on 'a no first use' policy and the need to develop a credible minimum deterrent. However in the realm of command and control of nuclear weapons, there appears to be a great deal of ambiguity. Several strategists of repute have stated that with a 'no first use policy' and a doctrine of minimum deterrence confining the size of India's nuclear forces to easily manageable levels an elaborate command and control apparatus is not necessary. Another analyst echoes the same view saying "Doctrinally, India should seek a modest but credible retaliatory capability that can inflict an unacceptable cost to adversary were it tempted to employ the horrendous nuclear weapon in the first instance. Integration of nuclear doctrine, war head management, delivery systems and C\(^4\)I\(^2\) [Command, control, communication computers, intelligence and information] would present India's security planners with a range of options. But economic considerations and criteria of affordability should remain the single most important driving force behind policy choices. However another analyst differs from such a view which offers a low cost solution to an obviously complex challenge.\(^5\)

4. Kapil Kak *in Command and control of small nuclear arsenals in Jasjit Singh's Nuclear India*, p-267
The aim of this chapter is to analyze the factors impinging on the establishment of a viable and fail-safe command and control apparatus and to recommend a viable option for India in the light of arrangements existing in the other Nuclear Weapon States (NWS). As Bruce Blair has written "If command and control fails nothing else matters." 6

Before going into details, it has to be understood that there are essentially two distinct levels of command and control of nuclear forces. At the strategic level the control of nuclear forces lies firmly in the hands of the civilian authority which would use its nuclear might through diplomatic and declaratory means to achieve its political objectives, including deterring an adversary from taking recourse to military confrontation and conflict. The second is at the military level where the military requirement for the actuation of the employment policy and for the subsequent control of nuclear conflict is called for, if such a possibility exists. 7 But here also there need not always be watertight compartments as the two levels may merge as in case of military dictatorships or where the chief of Army takes over as the head of the government as in Pakistan.

Nuclear strategy is the function of the civil authority governing the state. The ability to contain confrontation short of a nuclear exchange is the essence of this strategy. Therefore the need for a comprehensive command and control infrastructure to support decision making, communicate the essence of decisions to the adversary and where necessary to the nuclear forces; pre nuclear exchange intelligence acquisition, synthesis of new information into suggestive intelligence; prices management; and post conflict administration of both domestic and international operations. 8

Command and control of various Nuclear Weapon States (NWS):

In all NWS except Pakistan, command over the Nuclear forces is finally under the political leaders who have the sole authority to order the use of nuclear weapons.

**United States**

In the US this authority is vested in the National Command Authority (NCA) comprising the President and the Secretary of Defense and their duly deputized alternatives and successors. ⁹ The NCA could also be widened to include Chairman of the Joint Chiefs of Staff (CJCS) and possibly the other Joint Chiefs. Clearly spelt out "chains of succession" exist for the President, members of NCA and for CJCS. The President exercises his authority over nuclear weapons by issuing electronic codes Emergency Action Message (EAM) or 'go codes' – to subordinate officials and commanders for further transmission to the nuclear forces.

**Launch on Warnings**

Fears of a pre-emptive first strike generated the need to deploy launch on warning systems. In such a system, the early warning satellites of one side would if they detected the launching of enemy ballistic missiles send signals, directly to the computers controlling that sides ballistic missiles so that they would have taken off, by the time the enemy missiles arrive. Launch on warning is the ultimate in the delegation of control of nuclear weapons. So," To leave the decision to launch the nuclear holocaust to a computer is the ultimate in human madness." ¹⁰

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The NCA relies on the National Military Command Center (NMCC) situated under the Pentagon building in Washington. The NMCC provides a full range of command and control guidelines capabilities and is linked to nuclear forces and senior US military commanders around the world.

The Alternative NMCC (ANMCC) located beneath Raven Rock mountain in Pennsylvania (close to the US president's retreat at Camp David, Maryland) is hardened against nuclear, attack and supports and duplicates the function of the NMCC. The National Emergency Air force Command Post (NEACP) based at Garrison Air force Base in Indiana is designed to provide safety to the President and connectivity with all nuclear forces. At least one Air force command center of the Strategic Air force command (SAC) is always in the air. Collectively the NMCC, ANMCC, NEACP and other principal command centres including the SAC HQ are known as the National Military Command System (NMCS). The US World Wide Military Command and Control System (WWMCCS) provides communication and data processing capabilities to the NCA and subordinates commands.

Each of the primary and alternate Command centers are located in deep underground concrete bunkers and are designed to withstand nuclear detonation and the effect of Electromagnetic Pulse (EMP). Numerous procedural checks and balances need to be satisfied before release is authorised. However, despite all these precautions, it is doubtful whether the system is 100 percent foolproof.11

11. Gurmeet Kanwal, "Command and control of Nuclear Weapon in India".
Russia

Since the breakup of the USSR in 1991 the Russian nuclear command and control system is still in the process of evolution. In theory ultimate control over Russian Nuclear weapons lies with the President who is also the supreme commander. A defence committee advises him. Nuclear release orders would be routed through the Supreme High Command (VGK or Stanka) and passed by the general staff to the nuclear commands: Strategic Rocket Forces (SRF), Air force and Navy and the five Theatres of Military Operations (TVD).

A new round of restructuring is underway to merge together the SRF with the nuclear components of the Navy and Air Force. As per unconfirmed reports, the new force is called the Strategic Missile Forces (SMF).

Ground based command centers are hardened to withstand overpressures of up to 1,000 Psi (Pounds per Square inch). Operational control of nuclear warheads is known to be shared between the military and KGB. As a result, in theory the control of nuclear weapons is of higher order than in the US and correspondingly, the Russian Strategic nuclear forces are generally at a lower state of readiness than their US counter parts. However in practice due to sharp cuts in defence expenditure, Russia's nuclear weapons and command and control structure are known to be in a poor state of maintenance. Also the break up of USSR has lead to a dilution in control from which the Russian force never recovered and as alleged repeatedly by General Alexander Lubed, a large number of nuclear warheads are still missing.

In our immediate neighborhood, we have two hostile nuclear weapons countries Viz. China and Pakistan whose command and control infrastructure is relevant for India as it has a direct bearing on India's nuclear strategy and has to keep itself ready to meet the threat arising from the nuclear proliferation in this region of the subcontinent.

**China**

In China, the Chairman of the Central Military Commission (CMC) of the Communist Party would decide whether the use of nuclear weapons is necessary.

At present President Jiang Zemin is the Chairman of the CMC. Formerly the strategic missile force (now the second artillery) controlled China's land based ballistic missiles, the People's Liberation Army (PLA) Air force controlled the air delivered nuclear weapons and the PLA Navy controlled China's SLBMs. The Chinese nuclear forces have now consolidated operations and training under strategic Rocket Wing, a newly established Special Command. As China continues to be an authoritarian state, not much is known about the detailed linkages of the country's nuclear command and control structure.

**Pakistan**

Nearer home all things considered, the prospects of Pakistan having evolved a dedicated command and control system for its nuclear weapons would appear remote. Benazir Bhutto, former Pakistani prime minister has gone on record to state that Pakistan's nuclear weapons are firmly in the hands of the Pakistani army.

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14. The Hindu, 'China's Deadly Missile Arsenal', November 18, 1999
16. In an interview with Teheran Radio in October 1999, Benazir Bhutto stated that "Pakistan's nuclear programme had never been under the control of the political leadership."
That makes Pakistan the only state in which the civilian Leadership has no control over weapons of mass destruction. In the past, Pakistan has claimed that it has a basic command and control system in place since, the early nineties.17

The existing control by the Army in Pakistan on nuclear weapons is unlikely to pass into civil hands in near future. This will preclude the necessity of establishing an elaborate and costly command and control system reaching up to the Head of the State. This is likely to complicate analysis and crisis management norms so far as the Indian Government is concerned.

Even during the brief interlude when Pakistan was not under direct military rule, the military leadership has continued to enjoy power without responsibility. With General Pervez Musharraf's military coup d'état of October 12, 1999, it appears certain that Pakistan is unlikely to have a civilian government for some time to come. Though there is no reason to believe that the Generals in charge in Pakistan will behave irrationally in unleashing the dogs of nuclear war, there are bound to be misgivings in many world capitals about the concentration of decision making power for nuclear operations in military hands.

The main reason for such discomfort is that the threshold for graduating from a conventional to a nuclear war would be considerably lower if there is no political leadership in the decision making loop to act as a cautionary trip wire.18

18. Gurmeet Kanwal, 'Command and control of Nuclear Weapons in India' Strategic Analysis.
Existing command and control of structure in India

In India's cabinet system of government, based on the West minister model, the PM is the Head of the Government, even though the President is the supreme commander of the armed forces. The apex body responsible for all matters impinging on India's security is the Cabinet Committee on Security (CCS) headed by the PM. The CCS constituted by PM. Inder Gujral in 1997 is the modern version of the erstwhile Defence Committee of the Cabinet (DCC) that failed to survive the 1962 Himalayan debacle. Members of CCS headed by PM include the Defence ministers, the Home Minister, the Finance Minister and the Minister for external affairs. Other members of the council of ministers may be invited to attend the deliberations whenever their advice is considered necessary. This is a departure from the erstwhile DCC in which the service chiefs of staff were always in attendance. It is incongruous that major decisions having a bearing on national security can be made without the presence of the Chiefs of staff.

Parallel to the CCS and almost of the same membership is the National Security Council NSC headed by the PM. The only real difference is that the National Security Advisor (NSA) and the Deputy Chairman of the Planning Commission are also in attendance when the NSC meets. The NSC is assisted by Strategic Policy Group (SPG) and the National Security Advisory Board. During the May, August 1999 Kargil Conflict the CCS was reported to have met quite often. It is not known how often the NSC was convened. It could justifiably be deduced that in practice, the CCS is now discharging the functions of political guidance and oversight in the higher direction of war.

The Chief of Staff Committee (COSC) is the highest professional advisory body on military matters. The chairman COSC (the longest serving chief of staff is appointed chairman) does not exercise command over any of the services other than his own.
three chiefs of staff continue to be individually responsible to the Defence Minister and the cabinet and exercise full command and control over their own services. The Directorate General of Defence Planning Staff (DG DPS), an inter services body was established under the defence secretary in 1986 to assist the COSC in its policy formulation and planning function. The military wing that was part of the Cabinet Secretariat till 1991 and in now under, the Ministry of Defence (MOD) provides secretariat support to the COSC. At present neither the DG DPS nor the military wing has the capability to coordinate and execute peacetime or wartime joint operational planning, nor to assist the COSC in the execution of agreed joint operation.\textsuperscript{19}

**Recommended command and control system for India**

The Draft “Indian Nuclear Doctrine” prepared by NSAB states the following on command and control.\textsuperscript{20}

Nuclear weapons shall be tightly controlled and released for use at the highest political level. The authority to release nuclear weapons for use resides in the person of the Prime Minister of India or the designated successors.

An effective and survivable command and control system with requisite flexibility and responsiveness shall be in place. An integrated operational plan, or a service of sequential plans, predicated on strategic objectives and a targeting Policy shall form part of the system.

For effective employment, the unity of command and control of nuclear forces, including dual capable delivery systems shall be ensured.

\textsuperscript{19} Gurmeet Kanwal, *Command and control of Nuclear weapons in India Strategic Analysis.*

\textsuperscript{20} N.3, Para-5 of “India Nuclear Doctrine” a Draft paper proposed by the NSAB (publicly released by the Ministry of External Affairs in New Delhi on August 17, 1999)
The survivability of the nuclear arsenal and effective command, control, communication computing, intelligence and information (C4I2) shall be insured.

The Indian defence forces shall be in a position to, execute operation on an NBC environment with minimal degradation.

Space based and other assets shall be created to provide early warning, communications, and damage/detonation assessment.

In our parliamentary form of government like Great Britain the prime minister, as the head of the Cabinet, must exercise ultimate control over the nuclear weapons. In the Indian context, the PM and CCS (Cabinet Committee on Security) could be designated as the National command authority (NCA). The NCA would be advised by the National Security Council (NSC). It is important that in nuclear decision making the cabinet must, get 'single point military advice'. At present, all three chiefs of staff render military advice to the CCS. The confusion in decision making can be imagined if two chiefs of staff were to advise the CCS to desist from using nuclear weapons to retaliate against an enemy nuclear strike during or on going conventional military operations and the tactical chief, particularly the Army Chief was to insist that the retaliatory use of nuclear weapons was an inescapable operational requirement in the prevailing circumstances. Due to the interdependence of each service on the other in modern warfare and because of the repercussions of the operational activities of each on the other, it is imperative that differing viewpoints among the services are resolved by military professionals themselves and that the political masters get professional military advice from only one service. Such a source can only be the chief of Defence staff or Chairman Joint Chiefs of
Staff and not the Chairman of the COSC as it is presently constituted. This view is of course not shared by other analysts who feel that the existing system of COSC with improved staff support structures for joint planning, joint operations, joint training and joint communication should be able to fulfill the military role in nuclear decision making. A CDS (Chief of Defence Staff) is not considered necessary at this moment. If anything, multiple and some times competitive inputs provided by the three chiefs may make for a wider and comprehensive data base for a crucial decision on the use of nuclear weapons.

Jasjit Singh the then Director of IDSA also reflects similar views. According to him there must be minimum disruption of existing well tested organizations and procedures. Our goal, he says, should be to see where they need to take on additional responsibilities, with minimum modification. It would be gross mistake of truly monumental dimension to attempt an organizational revolution to manage a multiple set of things of fundamentally new type of weapons, new set of command and control systems and a new set of procedures to handle these... Therefore, we must build on existing systems and procedures wherever they exist and do so in an incremental form, review these constantly as we go along, and then at a future stage, if we need to introduce significant changes, we should do so in an incremental planned manner ...... Therefore it is essential that we move into the nuclear weapons command and control through an incremental evolutionary process built on existing capabilities procedures and past experiences.

21. Gurmeet Kanwal, Command and control of nuclear weapons in India Strategic Analysis.
22. Kapil Kak, ‘Command and control of small nuclear arsenals’ op. cit. in Jasjit Singh’s Nuclear India, p-278.
He further opines that costs must be minimized otherwise we are likely to land up with an expensive system, which may or may not work. Experimenting or rushing into something here is the last thing we should be thinking of ....... I would like to draw the attention to the command and control of Chiefs of Staff Committee (COSC) Targets which have been effectively managed for more than four decades in peace and war. The three services under the sanction and direction of their chiefs, have evolved the framework and procedures which authorize their staff to work out the targeting policy for a set of targets considered of central and strategic value, as the strategic targets to be released under the command authority of the three chiefs of staff. Targeting and planning for this purpose has been maintained by the Indian Air force (IAF) in all its details. The planned air effort takes into account the commitment for the COSC targets. The concept, in principle at least is no different from targeting with nuclear weapons. Targeting with nuclear weapons needs additional factors to be considered but lesser involvement of all three services will be necessary if the delivery systems belong to one service only. But the basic requirements and parameters of management are not very different either in terms of organizational needs or management techniques. Secondly, the IAF has been undertaking, like air forces in other countries, strategic reconnaissance missions over the decades. The way command and control as been managed and the lessons delivered from decades of highly successful operations would be extremely relevant to the issues related to command and control of strategic strike with nuclear arsenals.24

National Command Post (NCP)

There is a need for a hardened underground National Command Post from which the National Command Authority NCA can direct future wars. The NCA consisting of the PM, the Defence Minister and Chairman COSC must commence functioning from the NCP during the warning period prior to the outbreak of hostilities. The NCP should be an underground facility at a distance of 40 to 50Km. from New Delhi. It should be capable of withstanding up to a 20kiloton blast from ground burst or from a deep penetration nuclear weapon like the US B 61 –11 earth penetrating nuclear warhead. An alternative NCP is also necessary, located away from the NCP.

Survivability of NCA and Chain of Succession

The threat of decapitation of the nuclear decision makers make it necessary to formulate a list of alternate and successors . The continuity of government at the highest level must be ensured. Alternates and successors need to be nominated for the political leaders as well as the military commanders. The alternates and successors must also be enabled to act when necessary by providing them with the codes for launching nuclear weapons, the communications necessary and regular information updates so that they can keep abreast of the situation.

The following chain of succession / command is recommended:

Civilian decision makers - Military Leadership.

PM- CDS
| Deputy PM – Vice CDS
| Defence Minister – Longest serving chief of Army, Air force, or Navy
| Members of Cabinet Committee on Security – Vice Chief of Army, Air force or Navy and like wise.
The chain of succession / command need not necessarily be publicly disclosed in order to ensure that those on the list do not become obvious targets.

**Conclusion:**

The core of India's nuclear doctrine is deterrence rather than fighting a nuclear war. The nuclear arsenal has to be designed for that purpose and the command and control has to correspond to that goal. Considering that the nuclear threats to India are likely to emerge essentially from the immediate neighborhood across the countries territorial boundaries, the short time of flight due to proximity factor will need to be catered for in the strategy. It is also clear that there is no conceivable political purpose which would require India to initiate a nuclear threat first, leave alone use of nuclear weapons. The first objective of our doctrine should be to deter nuclear threat and possible use by another state against us. Second if deterrence fails (an aggressor launches a nuclear strike against India or its forces) our nuclear forces should be able to immediately retaliate with adequate power to inflict an "unacceptable" level of punishment and destruction on the aggressor. India's long term threat-challenge matrix may well warrant development of intercontinental ballistic missiles (ICBMS) and a few nuclear powered submarines for submarines launched ballistic missiles (SLBMS). A clutch of relatively invulnerable submarines would provide the so called "finite deterrence"; especially as the land based force itself could be vulnerable. Submarines also lessen the pressure on the policy makers to attack first and are hence compatible with our doctrine of 'no first use'. Since the acquisition of nuclear submarines through indigenous efforts may take both more time and money, alternative choices until then would be necessary.
For the present it would be prudent to rely on a diad of nuclear weapons carrying strike Aircraft and land based ballistic missiles. The command and control requirements for such weapons delivery profiles should be inherently be less complex than those of the older Nuclear powers (whose chief goal is winning a nuclear war) whereas India's arsenal is unlikely to exceed 100-150 war heads and whose sole purpose would be retaliatory action in case deterrence fails. Furthermore, these projects as pointed by Jasjit Singh should be carried out on a phased and incremental manner, consistent with the changes in security regimes and threat perception.

The Airborne Platforms to deliver nuclear weapons can be done by Su-30, Mirage, 2000, Jaguar and probably Mig.27. Theoretically each of these fighter aircraft can be configured to be a delivery platform against our western neighbor. But range/radius of action limitations preclude employment of airborne platforms against worthwhile counter targets of our northern neighbor.

India's self-imposed restraint on use of nuclear weapons in tactical battlefield forecloses the use of short range Prithvi 150Km missiles. India's strategic imperatives require the equipment of Prithvi (range 250 kms) and Agni (range 2500kms) with nuclear tips. Prithvi-250 kms a mobile and credible deterrent against our western neighbor would have limited use against our northern neighbor. Agni both long and short-range variants have to be tested and have to be kept weapons ready for deployment in short notice. There should be an operational and "Command and control" driven compulsion to integrate all the strategic assets of the nation. Surveillance and reconnaissance assets (Air craft and satellite based), strategic conventional strike and nuclear configured
Aircrafts, Prithivi-250 and Agni (when inducted) are to be centralised under a strategic command force under the overall control of the PM.

The effectiveness of retaliatory power of deterrence would be ascribed to the efficiency of command and control and the willful determination with which the nuclear diad can be controlled. India's command and control mechanism has to be based on the following elements.

(1) A highly survivable political national command (NCA) during crisis and conflict situations.

(2) Robust, fail safe and survivable communication between the command and strategic nuclear forces.

(3) Strategic intelligence, surveillance, reconnaissance, warning and damage assessment that allow situational evaluation during and after adversary's first strike.

(4) A high degree of mobility of nuclear arsenals is required to ensure its survivability.

(5) Extensive dispersal including frequent moves and relocation of these assets along with the ability to operate from different locations.

(6) Extensive deceptions including decoys and dummies.

(7) It is also important to have the capability to launch a nuclear retaliatory strike within a very short time say 30 minutes, if the forces are already on a degree of alert. The time for fusing/putting it together, putting on the warhead, aligning it,
the process of loading and launching the weapons system should not exceed 1
to 2 hours in order to be credible.

The most basic principles on which the command and control system should operate
is firm political control over the nuclear arsenals. This means that decision making
should remain at the highest political level with the advice of the military and other
experts. The operational command and control would remain with the military forces.

While working on the C4I2 paradigm of the older nuclear powers India need not
replicate some of their elaborate (C4I2) structures like missile attack warnings, Air-borne
command posts. However, underground command Posts and robust and highly
survivable multiple range communications systems will be an imperative need for
nuclear deterrence. The mobility of both Prithivi250 and Agni 2500 would greatly
enhance the credibility of India's retaliatory options.

Lastly there is the overriding need to integrate strategic reconnaissance,
surveillance and target information systems with air craft and missile based strike force.
The best way to achieve this operational necessity would be to organize the strategic
assets of IAF and Agni and Prithvi 250 under a separate IAF strategic command. In
order to optimise the command and control capabilities it would be useful to create a
strategic Air command which would have operational control over all nuclear delivery
assets. Such an organisation would be capable of absorbing surface to surface ballistic
missiles while retaining the combat air crafts under them. This will provide the unity of
command of strategic strike capabilities.
In a recent article titled 'All set for N-Forces Command' written by Rajat Pandit it has been disclosed that the country's first ever Strategic Forces Command (SFC) tasked with managing its nuclear arsenal is finally to come into existence.  

The SFC will be headed by SFC commander who will report to the Chiefs of Staff Committee (COSC) till the Chief of Defence Staff can be appointed by the government... The nuclear warheads and delivery systems in India, as it is are kept separate for safety. The custody of the radioactive core, firing assemblies and delivery systems for instance are in the hands of DAE, the DRDO and the armed forces respectively. The tri-services SFC will be handling the nuclear assets and the existing delivery systems and control structure to tackle emergencies and avoid confusion. 

25. Rajat Pandit, 'All set for Nuclear Forces Command', The Times of India, December 31st, 2002
26. ibid