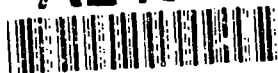


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CONSIDERATIONS FOR THE DEVELOPMENT OF
THEATER HOSTILITIES RULES OF ENGAGEMENT:
BLUE-ON-BLUE VERSUS CAPABILITY SACRIFICE

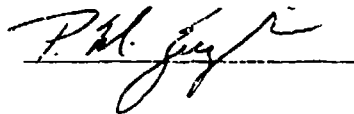
by

Paul M. Ziegler

Lieutenant Commander, U. S. Navy

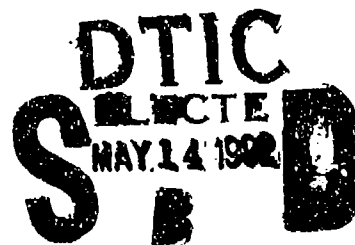
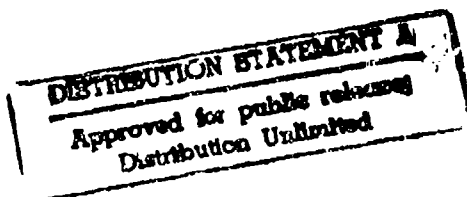
A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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The prevention of "friendly fire" casualties seems to have gained increased attention both during and since the war against Iraq. Due to this increased attention, during future hostilities the fear of possible "friendly fire" or blue-on-blue engagements may entice commanders to impose rules of engagement (ROE) which could lead to increased risk to their own forces. Commanders must weigh the risk of limitations imposed by the ROE and their affects on own force capabilities to protect themselves and successfully accomplish their missions against their affects on eliminating cases of blue on blue engagement. This paper will attempt to explore the extent to which the occurrence of blue-on-blue incidents can be reduced, the factors to be considered in future conflicts that lend themselves to higher probability of blue-on-blue incidents and increased vulnerability and possible solutions to be considered before imposing additional ROE.			
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Abstract of
CONSIDERATIONS FOR THE DEVELOPMENT OF
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BLUE-ON-BLUE VERSUS CAPABILITY SACRIFICE

The prevention of "friendly fire" casualties seems to have gained increased attention both during and since the war against Iraq. Due to this increased attention, during future hostilities the fear of possible "friendly fire" or blue-on-blue engagements may entice commanders to impose rules of engagement (ROE) which could lead to increased risk to their own forces. Commanders must weigh the risk of limitations imposed by the ROE and their affects on own force capabilities to protect themselves and successfully accomplish their missions against their affects on eliminating cases of blue-on-blue engagement. This paper will attempt to explore the extent to which the occurrence of blue-on-blue incidents can be reduced, the factors to be considered in future conflicts that lend themselves to higher probability of blue-on-blue incidents and increased vulnerability and possible solutions to be considered before imposing additional rules of engagement. Although the arguments posed tend toward an air flavor, it is believed that they are applicable across the spectrum of modern warfare.

CONSIDERATIONS FOR THE DEVELOPMENT OF
THEATER HOSTILITIES RULES OF ENGAGEMENT:
BLUE-ON-BLUE VERSUS CAPABILITY SACRIFICE

I. INTRODUCTION

Blue-on-blue, fratricide, and more recently coined terms of "friendly fire" and amicide all equate to the same ends: damage or casualties to one's own forces from one's own forces.¹

The occurrence of blue-on-blue engagement has always been a topic of concern which is often an emphasized item during post exercise debriefs. Yet, due to the nature and composition of combat exercises the number of occurrences are often discounted as unrealistic and inflated. The most obvious disclaimer which would lead one to discount these occurrences during exercise play is that the problem of identifying one's own forces from those of the enemy will not exist in real conflict, thereby eliminating the risk of blue-on-blue engagement.

Although this argument seems to have had some merit in exercises designed against Warsaw Pact aggression, the nature of future conflicts appears to minimize its validity. As a result of the end of the cold war, the breakup of both the Warsaw Pact and Soviet Union, the probability of our involvement in large scale, aligned warfare has been overridden. Future involvement in regional conflict will



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increase the risk of misidentification and blue-on-blue engagement.

II. INCREASED RISK

Several factors lend themselves to this increased risk, including modern technology, force composition, warfare techniques and time.² An examination of each of these factors and their role in increasing the risk of blue-on-blue is warranted.

Technology and arms transfers have resulted in the export and development of common weapons and systems throughout the third world, including aircraft, ships, land based vehicles and electronics. Through the attainment of advanced technology, whether overtly or covertly obtained, several look-a-likes have been produced, both in the realm of structures and shape as in the MiG-29 and from an electronic standpoint.³

The ever increasing numbers of nations involved in the purchase and transfer of arms has placed a mixed bag of U.S., NATO, former Warsaw Pact and other arms producing countries' equipment and technology in potential adversaries inventory. In confronting an enemy in possession of state-of-the art technology and similar or like weapons systems and platforms the problem of identification becomes more critical and difficult. The likelihood of U.S. forces confronted with an enemy possessing U.S. exported platforms is not altogether

inconceivable. Even through selective transfer of arms and equipment there is always the chance that U.S. systems may fall into enemy hands. Iraqi employment of U.S. Hawk Surface-to-Air Missile (SAM) systems after seizing them from Kuwait, or the toppling of a friendly government are prime examples.

In a multinational coalition the problem of identification becomes exaggerated and more evident where same, or like platforms and systems are fielded on both sides. A particularly obvious example of such a condition occurred during Operation Desert Storm where we saw French Mirage aircraft, Soviet tanks and air defense systems, and Soviet MiGs employed both within Iraq and the coalition.

Since the probability of a global or theater wide scenario for conflict has been severely reduced, it is likely that future conflicts will involve a small and limited area of confrontation with forces amassed in relatively close proximity. The desire to amass superior firepower against the enemy and the nonlinear aspect of maneuver warfare enhances the risk of blue-on-blue engagement.⁴ A fluid, three dimensional battle field increases coordination and identification difficulties.

The factor of time is one of the most critical, especially when we examine the factors of technology, force composition and warfare techniques with regard to self-defense and vulnerability.

III. VULNERABILITY

Weapons and technology transfer has not only complicated the problem of identification, it has placed high tech weaponry and platforms in potential adversaries' arsenals. The proliferation of high speed, long range and sophisticated and accurate systems has increased the potential for future aggressors to pose a formidable threat to U.S. and coalition forces. The threat posed by the employment of such systems requires that friendly forces act under conditions of compressed reaction time and in many cases must destroy the platform prior to weapon system deployment to avert being hit.

A potential aggressor, armed with over-the-horizon (OTH) or beyond visual range (BVR) capabilities, who seizes the initiative and maintains the offensive will require that friendly forces maintain an aggressive offensive and defensive posture to minimize vulnerability. Through arms and technology transfer potential adversaries have amassed a wide range of equipment for both offensive and defensive operations. Aside from weapons of mass destruction, several third world nations have played the arms market and attained the capability to pose formidable opposition across the spectrum of modern warfare areas. Potential adversaries have attained significant capabilities to threaten through the employment of mines, submarines, electronic warfare, advanced targeting systems and are able to field substantial air warning and defense systems and strong air and ground firepower.

IV. TOOLS AVAILABLE TO REDUCE RISK

During the war against Iraq, 35 of the 145 U.S. troops killed and 72 of the 467 wounded were victims of blue-on-blue engagements.⁵ This high ratio of U.S. casualties has resulted in cries for action to reduce further possible occurrences in future conflicts and poses a serious dilemma for the operational commander: how to reduce the risk of blue-on-blue engagement without seriously jeopardizing his own forces. Current and proposed methods for reducing possibilities of blue-on-blue engagements are available in system designs, doctrine, and firecontrol procedures. Most involve methods for the identification of friendly forces or methods to minimize friendly force exposure to friendly fire.

During Operation Desert Storm, the fact that all aircraft possessing Identification Friend or Foe (IFF) systems were required to operate these systems throughout all air operations and the fact that no aircraft were lost to friendly fire would lend itself to the conclusion that IFF systems will prevent blue-on-blue.⁶ Although this conclusion seems logical on the outset, there are several points to the contrary.

The lack of Iraqi air attacks into friendly territory allowed coalition forces the luxury of not having to engage enemy air over coalition territory where they would have needed to remain well aware of and sorted by coalition air defense sites.⁷ Even with the ability to interrogate IFF a defender

may be able to identify the friendly aircraft, but when a mix of both friend and enemy are within range, direction of the weapon at the non-IFF equipped target is difficult. An example of how this can have a devastating effect can be illustrated during the Israeli-Arab war in 1973. The Arabs fired 2,100 anti-aircraft missiles and shot down 85 aircraft, of which 45⁸ were Arab. Equally, the lack of a strong or aggressive air opposition to coalition force air attacks into Iraq minimized the need for long range air-to-air engagement.

Current IFF systems possess other limitations: reliability, range and susceptibility to exploitation. Even though a commander may withhold platforms that lack operational IFF systems from entering hostilities, failure of the system, due to battle damage or malfunction is not uncommon. Consequently the lack of an IFF reply to interrogation does not identify the platform in question as an enemy, only as an unknown.⁹ This unknown factor may well place one's own forces at risk. As air-to-air missile capabilities of an enemy extends to beyond visual range, the decision to engage is hampered by the lack of¹⁰ positive identification.

Current weapon ranges also exceed the range of current IFF systems. Therefore, it is possible for a platform to effectively deploy his weapon system prior to identification. Waiting to engage an inbound threat until verification of IFF can be attained could seriously jeopardize a defender.

In attempts to reduce air-to-ground blue-on-blue during the war against Iraq, coalition forces employed Anti-Fratricide Identification Device (AFID) emitters on ground vehicles. These emitters, although effective, were not foolproof. Had the coalition not had air supremacy, these same emitters could easily have been exploited by Iraqi air-to-ground aircraft for targeting of coalition ground vehicles.¹¹ In addition, during Operation Desert Storm, the debate as to whether Iraq had the capability to exploit our aircraft IFF systems was not resolved. The vulnerability of current IFF systems to exploitation may cause more losses and their ability to deter blue-on-blue engagements in a high threat environment has not been validated.

Of final concern, to date there is no common IFF system even among NATO participants. The problem of coalition warfare with mixed IFF systems including NATO and Warsaw Pact systems further complicates the identification problem.¹²

Current IFF systems only identify a friend. Other systems for target recognition are available and assist in both friendly and enemy identification. But again the factors of arms transfers, coalition warfare and system limitations all lead to degrees of uncertainty. The most reliable way to identify a target is to continuously track that target from its point of origin. This method, known as Indirect Identification (IID), is task intensive and the capability in a volume

environment is extremely limited. Noncooperative Target Recognition (NCTR) systems, which focus on characteristics such as electronic emissions, sound, shape, etc, all provide certain degrees of successful identification, but by themselves are limited, whether by environmental factors, range or location accuracy and the factors discussed in arms and technology transfer.¹³

Operational doctrine provides methods for reducing the risk of blue-on-blue without reducing defensive capability. In fact some doctrines actually enhance identification of friend or foe by combining target recognition systems in order to overcome the disadvantages of the individual systems cited above. Additionally, procedures incorporated in operational doctrine provides for identification of friend or foe by a somewhat passive means, but require coordination, situation awareness and communications.¹⁴

The establishment of certain areas and procedures provide for the safe operation of friendly forces while others limit friendly force operation for the sake of defense. The establishment of missile engagement zones, safe routes and no fire zones allow for identification by negation. The use of Forward Air Controllers (FAC) in close air support (CAS) and Fire Direction Center personnel, spotters etc. are all part of operational and tactical doctrine designed to reduce the risk of blue-on-blue. Each of these items require coordination, communication and situation awareness.¹⁵

In both unilateral and, especially, multinational operations the time available to organize and disseminate information is critical. In some areas, such as NATO and Korea, coordination of procedures and doctrine has been established through combined operational planning and training.¹⁶ In other coalitions, the luxury of time to train and coordinate operations may not be available. In these cases commanders will have to rapidly establish standardized operating procedures in order to coordinate the resources of each member of the coalition. The initial establishment of a strong defensive posture, with assigned areas of responsibility to allow time for further coordination and training prior to taking the offensive may be warranted. If an offensive is needed immediately the commander should consider phasing in coalition forces based on compatibility and time required to coordinate.

Future conflicts will undoubtedly involve a higher risk of blue-on-blue engagements. Whether U.S. forces fight unassisted or in a coalition, several of the factors cited will remain. In light of the shortcomings in technology and doctrine, commanders must consider the implementation of additional restrictions to reduce the potential for blue-on-blue engagements. The tool used by operational commanders to impose these restrictions are known as rules of engagement (ROE). These ROE although different from Peacetime Rules of Engagement will involve establishment of criteria for when one can shoot.

In peacetime, rules of engagement involve the use of weapons in roles of self-defense and conflict avoidance.¹⁷ During hostilities, ROE set forth guidelines for force employment in order to achieve stated political or military objectives.¹⁸ These basic ROE are promulgated based on National Command Authority (NCA) direction through the Chairman, Joint Chiefs of Staff (CJCS). Commanders issue ROE for their areas of responsibility based on this basic ROE and additional constraints and authorizations by activating supplemental measures, or developing specialized, tailored ROE as deemed necessary for the situation.¹⁹

When considering the imposition of additional ROE, three major areas of concern must be considered. These areas include factors having legal, political and military implications. The obvious legal constraints set forth by International Law and the Law of Armed Conflict set aside, the implications of establishing ROE to reduce the possibility of blue-on-blue lie in the concerns within the political and military arena.²⁰

The most obvious political concern for attempting to reduce the risk of blue-on-blue engagements manifests itself in coalition warfare. It's not too difficult to ascertain the political consequence of Syrian forces being subjected to U.S. fire during Operation Desert Storm. Strict control measures in such a case are required. That is not to say that no matter when we operate in a coalition, we must set strict ROE.

Commanders must consider whether a blue-on-blue engagement would seriously jeopardize the coalition. The lack of positive identification constraints may have strong political consequences even outside of coalition warfare. In an environment where neutral or non-belligerent nations may also be operating the political consequence of their being subjected to fire from U.S. forces may also be grave.

The most difficult area of concern lies in the military factors to be considered. One must consider mission objective, resources available, enemy capabilities and the effect that ROE will have. Commanders must weigh the potential risk of increased blue-on-blue engagement against the potential for mission success and own force defensive capabilities. Both doctrine and weapon system capabilities must be examined to ensure that restrictions imposed in favor of reducing blue-on-blue potential does not jeopardize the ability of the force to complete its mission.

V. IMPACT OF ROE

A large portion of the weapons systems brought to the battle today are designed for standoff, over-the-horizon (OTH) and beyond visual range (BVR) deployment. These systems are designed to minimize own force risk against the enemy and are closely tied in with established doctrine and tactics. Loss of the capability to employ these systems puts these forces at

increased risk at enemy hands and in the long term may ultimately effect their ability to perform their assigned tasks. The possible loss of the advantage of advance technology against the enemy could severely hamper success.

Granted, any decrease in ability to effectively employ one's weapons will have some adverse effect on capability, but the degree to which this effect will affect the mission and force vulnerability must be considered.²¹ This is where the enemy's capability must be taken into account. If the enemy possesses the capability to pose a threat that can not be neutralized or defeated prior to meeting the criteria set forth by ROE for positive identification then such criteria would pose unacceptable risk to one's own forces. For example, an enemy with beyond visual range (BVR) air-to-air capability would assuredly place all friendly air at unacceptable vulnerability should visual identification (VID) be required prior to engaging air targets. This may seem a crude and somewhat unthinkable analogy but when one considers the risks of blue-on-blue versus vulnerability, such restrictions do get imposed. At the tactical level for example, in planning and conducting a strike mission, the strike group may designate a point or area during the strike where the risk of blue-on-blue engagement is extremely high and outweighs the risk of vulnerability. At this point, a shift from BVR to VID criteria is mandated. During strike ingress, with the knowledge that

only enemy aircraft are in the area, BVR may be allowed against any air targets closing the strike group, but once the strike group comes off their target the shift is made to VID criteria since BVR would pose an unacceptable risk of blue-on-blue to egressing aircraft.

If VID criteria is the only method available to reduce the risk of blue-on-blue against a BVR air-to-air capable enemy then such a limitation would restrict the commander's own²² course of action. The high volume of friendly air activity over Iraq during Operation Desert Storm mandated that authority for air-to-air BVR be strictly controlled. The Joint Force Air Component Commander (JFACC) maintained the authorization based²³ on his coordination of daily air activity. Had Iraqi air opposition been more evident the JFACC would have been forced to either curtail the level of coalition air activity to allow more use of BVR capability, accept greater losses to Iraqi²⁴ aircraft or, he could have delegated BVR authority.

VI. ALTERNATIVES

In addition to the advanced technological weaponry that we bring to the battle, we also bring varying degrees of capabilities to sort out the friend or foe issue in our weapons systems and sensors. Although all systems have limitations in identification as discussed, the disadvantages²⁵ can be offset by the capabilities of others. By combining the

information provided through various sensors and matching the information against known friendly activity and additional intelligence the degree of identification certainty can be enhanced. Two shortfalls are evident in our current capability to accomplish this combination. This process of combination takes time and does not provide for absolute certainty. The flow of information from various sensors needs to be communicated and sorted against intelligence and known friendly activity. Currently no automatic system exists. Additionally, if this process is to be effective it must be accomplished soon enough to allow engagement prior to vulnerability. Thus, once identification has been determined, location must be maintained until engagement.

As discussed earlier, the problem of identification is exaggerated by arms and technology transfer. Again even though a combination of sensors can verify identification of the type, they cannot identify nationality. The degree of certainty, based on the combination of available data is limited by the ability to accurately put two and two together.

The danger involved in delegating BVR authority in Operation Desert Storm was that a breakdown in information flow or communications could increase the risk of blue-on-blue and the degree of certainty had to be absolute to preclude friction within the coalition.

Another method that could be utilized to reduce the risk of blue-on-blue without risk of vulnerability is to remove the high risk potential from the field of play if not absolutely necessary in achieving the objective. Granted, political aspects must be considered when dealing with a coalition, and service parochialism in joint operations are often an issue; but, egos aside, the focus must be maintained on the objective. If ROE limit to a point of vulnerability, the vulnerable should not be there. If some other means of meeting the objective is available that can operate within the ROE there is no need for those that cannot. The French, with their Mirage aircraft for example, were wise to exclude themselves from involvement in offensive air operations in the initial stages of Operation Desert Storm.

Another way to reduce the risk of blue-on-blue without increasing own force vulnerability can involve removal of the risk and replacement of that risk with a compatible system that will still allow for effectiveness of the weapon system. For example, when electronic similarities exist on opposing systems in close proximity it may be possible to change or augment the electronic system emitter to reduce the risk of inadvertent attack from standoff weapons. This would allow for decreased risk of blue-on-blue and also decrease vulnerability to friendly forces in their prosecution of the enemy system by allowing them to deploy standoff capabilities from outside the weapon system envelope.

VII. BLUE-ON-BLUE TRENDS

Given that the bulk of the effort in reducing the risk of blue-on-blue engagement is geared toward identification, it should be noted that past blue-on-blue incidents were not all caused by misidentification. In an in-depth study of available information concerning blue-on-blue or "friendly fire", LCOL Charles Shrader noted that human error and lack of coordination was the most significant factor in the occurrence of ground-to-ground and air-to-ground incidents prior to Desert Storm²⁷ operations.

During Operation Desert Storm, air-to-ground blue-on-blue seems to have been more a case of disorientation than misidentification. Based on the fact that the majority of the occurrences took place prior to the start of the ground war and in Saudi Arabia, it could be deduced that either the pilots were not aware of their position or they relied on faulty²⁸ navigation equipment. Also, in spite of the natural expectation of a high probability of blue-on-blue based on its method, only one case occurred during close air support²⁹ missions.

Not since World War II have we seen an enemy that was very active in the air, whether in an air-to-air mode or an air-to-ground mode. The lack of blue-on-blue incidents since weapons ranges have exceeded the realm of visual range and the seemingly reduced vulnerability of our air power even when

utilizing visual identification shoot criteria does not eliminate the risks during future conflict against an aggressive air threat. ³⁰ An enemy poised with an aggressive air threat will add to the confusion of target identification and situation awareness. Over enemy territory, an aggressive air threat could cause air crews to lose their situation awareness and wander into enemy surface-to-air envelopes. Additionally, if an enemy were to mount an air offensive into friendly territory, the combination of air and surface to air defense would most certainly increase the risk of blue-on-blue.

The same can be said for our ground and naval forces. Given an aggressive threat, vulnerability is increased and in the three dimensional arena of modern warfare the risk of blue-on-blue will increase in the confusion of the flail to defend.

VIII. CONCLUSION

Under the circumstances discussed the risk of blue-on-blue engagement during hostilities can not be totally eliminated. When the factors of adrenaline, human error and situation awareness are applied, no current system, doctrine or rule of engagement will eliminate all possibilities of blue-on-blue engagement. Coordination and training is the only answer to minimizing such factors. Realizing this, the focus for eliminating cases of blue-on-blue is on identification prior to shooting.

Current IFF systems, although useful are not adequate and utilization may actually increase vulnerability through enemy exploitation. The shortfalls of current identification systems and procedures lead to the concern that ROE requiring 100 % certainty of target identification against a formidable adversary is not possible without increasing own force vulnerability to unacceptable levels. Through the use of platforms and systems capable of collecting and assimilating information from various sensors and intelligence sources, identification certainty can be enhanced. Utilization of long range capabilities should not be restricted based solely on launch platform identification capability. Coordination between platforms and sensors can increase certainty of target identification to acceptable levels without increasing vulnerability. Since automatic systems are not available there is still the problem of human situation awareness involved, but there are those capable of maintaining the "big picture". Commanders should delegate the authority to direct weapon deployment to such battle management and command and control personnel when necessary to reduce vulnerability.

In both coalition and joint operations, the combination of various platforms, sensors and doctrine can enhance identification certainty and defensive capabilities. When ROE must limit a systems use to the point of vulnerability to that platform, other forces available can be utilized either to protect or offset the loss of capability.

The key to any solution to the problem of blue-on-blue is coordination. To achieve this commanders must emphasize joint and multinational training and exchange of doctrine, capabilities and tactics. Without prior familiarization between forces one cannot expect to fight together without incurring increased risk of blue-on-blue or vulnerability. The fostering of good military relations with potential coalition forces is a must. Both joint and multinational exercises essential to sorting out the difficulties will assist in solving the dilemma of blue-on-blue before hostilities break out.

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