

# Identification Friend Or Foe: A Necessity On The Battlefield

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## Abstract:

“Fratricide is the employment of friendly weapons and munitions with the intent to kill the enemy or destroy his equipment or facilities, which results in unforeseen and unintentional death or injury to friendly personnel.” On the modern battlefield, technological advances have seen the influx of weapons of higher precision over longer distances as well as the reduction of the fog of war through better sensors, sensemaking and information systems. However, Identification of Friend or Foe (IFF) remains as an operational challenge and mistakes could lead to fratricide or “amicicide.”

*Keywords: Fratricide; Identification Friend or Foe; Modern Battlefield; Operational Challenges and Technology*

## INTRODUCTION

*“Fratricide is the employment of friendly weapons and munitions with the intent to kill the enemy or destroy his equipment or facilities, which results in unforeseen and unintentional death or injury to friendly personnel.”*

*– US Department of the Army<sup>1</sup>*

On the modern battlefield, technological advances have seen the influx of weapons of higher precision over longer distances as well as the reduction of the fog of war through better sensors, sensemaking and information systems. However, Identification of Friend or Foe (IFF) remains an operational challenge and mistakes can lead to fratricide or “amicicide.” Singapore has, as a responsible member of the world community, been constantly partaking in peacekeeping missions in coalition with multi-national forces. Even today, the Singapore Armed Forces (SAF) continues to take part in such missions. Indeed, CPT Stanley Chua writes in an earlier *POINTER* article that:<sup>2</sup>

“The nature of peacekeeping deployments has transformed significantly over the last decade. Whereas earlier operations entailed overseeing the implementation of peace agreements between formerly warring nations, many recent missions have taken the form of humanitarian intervention, often in circumstances where peace is yet to be established. Consequently, the

situations that confront deployed peacekeepers are increasingly volatile, often permeated by a climate of violence and intimidation.”

Such situations require multi-national forces to work together to mitigate any attacks faced. At that same time, there is also a need to ensure the forces are equipped to prevent any occurrences of fratricide. With our increasing role in peacekeeping missions, our current technological developments need to be supplemented with techniques to prevent fratricide.

## FRATRICIDE: CONCERNS, CAUSES AND EFFECTS

### Fratricide Concerns

The modern battlefield is now more urbanised and complex. With the interspersions of civilians, enemies and one's own forces, decisions to fire take on greater complexity as these could lead to fratricide or civilian deaths. IFF is a grave concern even for the US military, as seen in the Iraq war in which about a quarter of US military casualties was due to friendly fire incidents. A compilation of fratricide occurrences in 20<sup>th</sup> century conflicts is shown in Figure 1. A large portion of fratricide occurrences (46%) were due to encounters involving land units only.<sup>3</sup> According to LCDR William Ayers III, “in any conflict, there are losses imposed by the enemy and this is an accepted part of the process. What is difficult to accept are those losses that are inflicted by own or allied forces.”<sup>4</sup> In

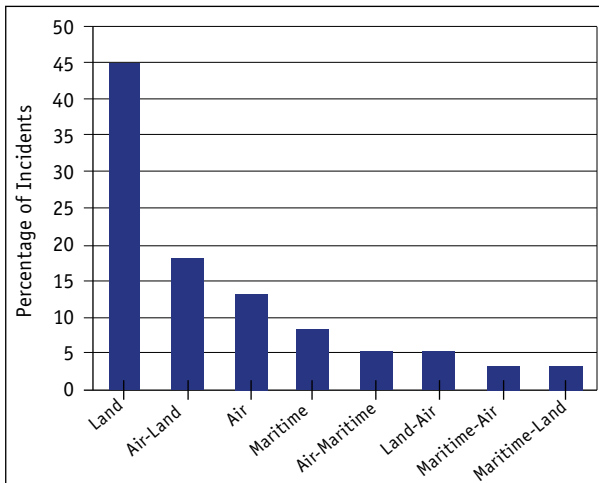


Figure 1: Fratricide Occurrences in 20<sup>th</sup> Century Conflicts

most cases, not only does fratricide affect the morale of the forces affected, it also affects the country. For every life lost in a conflict there is a family who must deal with that loss. Learning that their loved ones were killed by fratricide makes the loss even harder.<sup>4</sup> This could lead to people losing confidence in their armed forces. In 2003, Royal Marine Christopher Maddison was killed when his river patrol boat was mistakenly

fired upon by a Royal Engineers checkpoint in Iraq.<sup>6</sup> The coroner hearing his case mentioned that Maddison was let down by those in command and doubts were cast on the competence of the military leadership.

*“Human factor is probably the biggest reason for fratricide and it can be attributed to reasons such as combat stress, inadequate training, lack of experience or even negligence.”*

Fratricide is not a new problem and friendly fire occurs in all conflicts. US government reports show that friendly fire casualties as a percentage of total losses have increased from 15-20% in both World War Two and the Vietnam War to 24% in the First Gulf War, with little improvement since then in both Iraq and Afghanistan.<sup>7</sup> While precision weapons improve accuracy and somewhat mitigate the risk



Wreckage of Black Hawk helicopter shot down by friendly fire in the Northern Iraq No Fly Zone during Operation Provide Comfort, 1994.



*LAV-AT Destroyed by Friendly Anti-Tank Guided Missile*

of collateral damage, this advantage is of little use in cases of mistaken identity. Many fratricide cases remain unreported due to fear of the consequences.

In late 2011, Associated Press reported a recent engagement in Afghanistan where NATO helicopters responding to a joint US-Afghan special operations team under militant attack erroneously struck two Pakistani military posts, resulting in 24 deaths.<sup>8</sup> The report quoted US officials suggesting that “the Taliban may have deliberately tried to provoke a cross-border fire fight that would set back fragile partnerships between the US and NATO forces and Pakistani soldiers at the ill-defined border.”<sup>9</sup> This example clearly illustrates the far reaching consequences of fratricide from IFF mistakes.<sup>10</sup>

### Causes Of Fratricide

Fratricide is largely attributed to factors such as human error, environment and technology. “Human factor is probably the biggest reason for fratricide and it can be attributed to reasons such as combat stress, inadequate training, lack of experience or even negligence.”<sup>11</sup> During conflicts, one of the most uncontrollable factors is the environment. There are many aspects of the environment that can increase incidents of fratricide such as limited visibility due to nightfall or a heavy downpour, or even disorientation caused by featureless terrain. Advances in technology have led to the increase in the speed at which weapons operate, reducing the reaction time: “in some cases the effective range of the weapons is better than

the ability to identify friend or foe.”<sup>12</sup> The increased technology available in the battlefield also leads to an increase in potential for equipment malfunction. With the increased lethality of armament used, equipment malfunction can be deadly.

The “Fratricide Avoidance” handbook from the United States Army has also cited the following as primary causes of fratricide:<sup>13</sup>

**Inadequate Fire and Manoeuvre Control.** This is due to units that “fail to disseminate the minimum necessary manoeuvre and fire control measures to coordinate activities on the ground and in the air (air-ground integration).”<sup>14</sup> Inconsistent understanding of control measures also contributes to friendly fire: “situation clarity decreases as the density of forces increases, especially when units operate without proper dispersion and spatial separation.”<sup>15</sup>

**Direct-Fire Control Failures.** This is where “defensive and particularly offensive fire control plans are not developed or fail in execution. Some units do not designate target reference points, engagement areas, and priorities—or fail to adhere to them. Units fail to tie control measures to recognizable features. Weapons positioning can be poor and fire discipline can break down in contact.”<sup>16</sup>

**Land Navigation Failures.** In certain cases, land navigation failures can happen: “difficult terrain or weather and visibility can hamper navigation, which

may cause units to move out of sector, report wrong locations, become disoriented, or employ fire support weapons from wrong locations. As a result, friendly units may collide unexpectedly or be erroneously engaged."<sup>17</sup>

#### Reporting, Crosstalk and Battle-Tracking Failures.

Erroneous reporting, crosstalk and battle-tracking failures are other significant causes: "commanders, leaders, and their command posts at all levels often do not generate timely, accurate, and complete reports or track subordinate locations as the tactical situation changes. Commanders and staff are unable to maintain situational awareness, which distorts the picture at each level and can increase the risk of danger close."<sup>18</sup>

**Known Battlefield Hazards.** Ideally, battlefield hazards should be visibly marked. Unexploded ordnance, unmarked and unrecorded minefields, debris from rounds, improvised explosive devices, and "booby traps" will be on the battlefield. Failure to mark, record, remove, or otherwise anticipate these threats leads to casualties.

**Positive Identification.** In reality, positive identification is rarely obtained. Vehicle commanders, gunners and close air support pilots have difficulty distinguishing between friendly and enemy thermal and optical signatures at long range.<sup>19</sup> Also, "during limited visibility, or in restricted terrain, units in close proximity can mistake each other for the enemy when faced with short engagement windows and decision times."<sup>20</sup> This problem is compounded when the enemy and allies are similarly equipped. Visual recognition is often the only way to determine friend or foe.

**Other Causes.** "Lapses in unit and individual troop discipline or violations of Rules Of Engagement (ROE) procedures contribute to out of sector engagements, unauthorized discharges, mistakes with explosives and hand grenades, charge errors, incorrect gun data, and similar incidents."<sup>21</sup>

## EFFECTS OF FRATRICIDE

Fratricide has significant effects on the combat readiness and effectiveness of the personnel and units involved. It can also have a psychological impact

on the soldiers and stir public dissent. The public does not expect friendly fire casualties to occur and finds them hard to accept or understand.<sup>22</sup> With the increase in social media usage such unfortunate incidents can be speedily reported and even blown out of proportion. In the midst of a conflict, public demands for investigations and explanations could lead to unintended complications.<sup>23</sup>

There is little doubt about the psychological impact of friendly fire casualties. Some possible effects in soldiers are the loss of aggressiveness during fire and manoeuvre, loss of initiative, possible hesitation to use supporting combat systems, hesitation to conduct operations in limited visibility and self-doubt among the leadership.

In addition to the effects felt at the tactical level, effects felt at the strategic level may include disrupted operations, over-supervision of units as well as a general degradation of cohesion and morale.<sup>24</sup>

## ESTABLISHING IFF AND COMBAT IDENTIFICATION INITIATIVES

From the aforementioned, the detrimental effects of fratricide cannot be over-emphasised. Analysing the considerations, objectives and various IFF technologies are vital to overcoming fratricide. They are discussed in the following section.

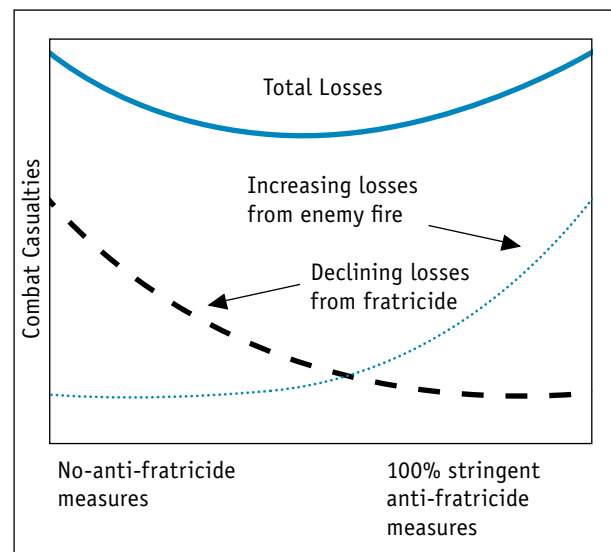


Figure 2: Combat Casualties vs. Anti-Fratricide Measures

## Considerations

To totally eliminate fratricide is unrealistic and counter-productive. There is a need to balance combat effectiveness versus anti-fratricide measures. Putting too much emphasis on anti-fratricide measures may reduce combat effectiveness to the point where casualties inflicted by the enemy become greater than reducing friendly fire losses, as shown in Figure 2. Therefore the objective should be on reducing fratricide through effective IFF capabilities, rather than total elimination of fratricide.

There are three main components as part of a system-of-systems approach that are pertinent to establishing IFF and combat identification issues which are further explained below:<sup>25</sup>

**Tactics, Techniques and Procedures (TTPs).** We can improve upon existing Tactics, Techniques and Procedures (TTPs). Doctrines and Standard Operating Procedures (SOPs) are part and parcel of IFF measures. These measures will have to evolve with new technical solutions. In addition, adherence to TTPs is critical for effective IFF. In fact, it has been described that fratricide prevention is like a three legged stool with TTPs forming the three supporting legs.<sup>26</sup> One such documented change in the procedures of the US Army includes After Action Reports (AARs) that address fratricide.<sup>27</sup>

**Target Identifications (TIDs).** Target Identification (TID) is another area which can be re-examined. This is a technical solution that aims to positively identify, with a high degree of confidence, any potential target in the battlefield. The primary objective for TID is to correlate and assign a foe, friend or neutral identification label to a “target.”<sup>28</sup>

**Situational Awareness.** Timely and better Situational Awareness in addition to “seeing” red, blue and grey icons will allow better understanding of the battlefield situation and hence make better decisions on actions and movement in the battlefield. This would reduce scenarios of being caught in a fratricidal situation. A study conducted by the RAND Corporation involving 83 direct fire battles and 15 task forces demonstrated that good situational awareness at the lowest level is the key to preventing the majority of fratricide.<sup>29</sup>

## Objectives

With the aforementioned considerations in mind, the objectives in establishing IFF/combat identification initiatives can be further elaborated. One of the main objectives would be situational awareness from the strategic level down to the tactical level to ensure positive identification among one's own forces. It is also important to secure the operational security of IFF technologies and SOPs as it would be extremely detrimental if such information were to fall into the hands of an adversary, enabling positive identification of all the blue forces.

Another important consideration is cost effective solutions. A pitfall in establishing IFF solutions is that they are being promulgated to only a section of the armed forces. Moreover, teams implementing various IFF solutions do not communicate with each other. Thus, cost is critical as you would need to promulgate it force-wide. Finally, another effect is the intangible effects of hesitation during operations that may be exhibited by blue forces.

Choosing an IFF solution is a complex problem involving trade-offs in performance, covertness, cost and many factors. Finding a single solution seems to be an insurmountable task.<sup>30</sup> IFF solutions should also be solutions for the long haul and quick fixes should be avoided. That being said, there is a need to consider the following in choosing an IFF solution:

- a. Simplicity (Size, Weight, Mountable, Hand-Held).
- b. Vulnerability (Exploitation, Countermeasures).
- c. Cost Effectiveness.
- d. Day/Night and All Weather capability.
- e. Identification level (Friend, Foe, Neutral).
- f. Interoperability (Joint level, Platform to Soldier).
- g. Extent of changes (TTPs, Training, Doctrine).
- h. Coverage (Maximum Distance Covered, Orientation).

## IFF TECHNOLOGY COMPARISON

There are several IFF technologies used by different armed forces in the world and for a range of one to ten kilometres. The common ones are listed below:

The interrogation/response system utilizes either Radio Frequency (RF), radar or laser signals to identify friend or foe over a long range of distance (five to ten kilometres) through the “process of query and response.” This can be classified as cooperative target identification technology. The technology requires special apparatus to send, respond to, and receive secured signals. The cost needed to deploy universal protection on each soldier using such an IFF system is high and the additional load on the soldier carrying the system may result in constraints during war fighting.

The passive signalling device is a non-cooperative identification technique where no action or response by the target is needed. This method utilizes materials that absorb or reflect Infrared Radiation (IR) that can be observed by optical devices such as night vision goggles, binoculars and thermal images as dark or bright spots respectively. Commercially available products include IR paints, tapes, and identification panels with unique signatures to ensure that the shooter can discriminate between friend and foe at a distance. This technique is an inexpensive enabler for target identification that does not require additional power to operate and can be easily implemented as no additional apparatus is needed other than the existing optical and thermal devices. However, this implies that it can also be viewed by enemy forces if they possess comparable sensing devices.

Otherwise, there is the active signalling device. This is also a non-cooperative identification technique. However, the device transmits electromagnetic signals (from the visible to IR range) that are usually coded to reduce the risk of compromise. Commercial products include IR beacons based on microelectromechanical (MEMS) technology which sends pulsed signals up to ten kilometres away. Another proposed technique uses chemicals to generate a variety of lights from the visual spectrum to IR wavelengths for visual identification when stimulated by ultraviolet lasers. The operational range of Visual-IR-based IFF is influenced by the atmosphere. The presence of moisture, fog or haze will affect the effective range of propagation of IR; visible signals and visual wavelengths are more affected by such factors than IR radiation. However, an advantage of the device which generates chemical lights is that it does not require power for operation, whereas

the IR beacon is battery operated. However, this group of IFF technique can be viewed by night vision equipment and is ineffective if the enemy carries night vision equipment.

## CONCLUSION

Fratricide continues to plague battlefields. The argument that modern warfare has increased the occurrences of fratricide is justified by the fact that significant number of incidents have occurred in the modern era. There is thus a need to pay attention to it and many militaries in the world are pressured to produce solutions.

Ultimately, friendly fire will probably never be eliminated. New technologies in situational awareness and combat identification play a part in a collective consensus to reduce the odds. However, more importantly, the interoperability between multi-nations has to be improved through better training, techniques and intelligence.

However, as shown, there are many trade-offs in establishing possible IFF and combat identification solutions which must be carefully balanced. There is no “silver bullet” solution to end all fratricide incidents and emphasis must be placed in marrying all the earlier mentioned areas to enable a holistic solution.<sup>30</sup> As aptly summed up, IFF and combat identification solutions should have the following in common: “... be simple, not easily exploited by enemy forces, cost effective, have a day or night all-weather capability and be deployable to coalition forces.”<sup>31</sup> This is a tall order but a necessary one.

In the SAF we need to ensure that IFF is taken seriously. Apart from SAF's increased participation in peacekeeping operations, the advancement in weaponry has made modern warfare more dangerous and has raised the requirement for integrated fighting strategies involving the Land, Sea and Air forces. Integrated fighting strategies could possibly increase the probability of friendly fires. As such, it may be necessary for the SAF to ensure non-fratricide through learning from past lessons experienced by other armies as well as harness IFF initiatives that may be relevant for use. 🌐

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