

## **Fighting with Firepower: The Future of Fire Support in the 3<sup>rd</sup> Brigade**

*We are moving from an era marked by the massive application of indiscriminate firepower – characteristic of the wars of the Industrial Revolution – to an age where firepower can be projected from afar with great selectivity.*

Francois Heisbourg

*To win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the supreme excellence.*

Sun Tzu

### **INTRODUCTION**

A review of the Australia's strategic posture has been a repercussion of the impact of the major trends of international relations in the post-Cold War era. These forces include globalisation, an increasing regionalism and the primacy of American power.<sup>1</sup> These forces coupled with the Revolution in Military Affairs (RMA) and the desire to develop a credible yet flexible force despite financial constraints have pre-empted a review of the application of force by Australia in the new millennium.

The 2000 Defence White Paper asserts that Australia is required to maintain a capability across the threat spectrum from warfighting to military support operations.<sup>2</sup> The Australian Defence Force (ADF) is compelled by a range of issues including economic restrictions, recruiting and retention difficulties and the predominance of manoeuvre doctrine to maintain a force flexible enough to switch smoothly between these diametrical strategic imperatives. This force will be predominantly based around a maritime strategy that includes a "vital and central role for land forces."<sup>3</sup>

The Army or land force contribution to this strategy centres on Manoeuvre Operations in a Littoral Environment (MOLE). MOLE encompasses an integration of the sea-land-air environment and involves forced entry from air and sea (FEAS). MOLE extends beyond the range of amphibious operations.<sup>4</sup> These operations are likely to be conducted as units as part of a Brigade in a coalition setting. Certainly, the "continuous and coordinated employment of tri-service assets in a common battlespace" is the accepted modus operandi.<sup>5</sup>

The centrepiece of Army support to this strategy is likely to remain the maintenance of high readiness, light, flexible forces capable of rapid deployment to execute a range of contingencies across the threat spectrum.<sup>6</sup> The 3<sup>rd</sup> Brigade is tasked with the responsibility of providing that capability. Currently, the Brigade is significantly hampered in its ability to provide a comprehensive commitment to this capability. Combat power weaknesses include a lack of tactical mobility, inadequate integral surveillance and reconnaissance options and a lack of force protection against armoured or mechanised forces.<sup>7</sup> The Brigade essentially remains an infantry orientated force more atypical of the platform based organisations of the last century.

Organisations that are able to effectively support the Army strategy and conduct a successful transition to a land force more attuned to the requirements of the future will

mass effects not resources. “Fighting Smart”, the utilisation and application of manoeuvre theory, where strength is pitted against weakness within the battlespace, will be fundamental to success.<sup>8</sup> Preferably, the enemy can be defeated without recourse to arms. However, the Army, as outlined by “fighting smart” must be prepared to win the land battle. This approach requires the maintenance of forces capable of winning the land battle through the conduct of close combat.<sup>9</sup> Close combat is the *raison d’être* for the 3<sup>rd</sup> Brigade and the maintenance of the combat arms teams organic to the Brigade.<sup>10</sup>

One of the components of the combined arms team within the Brigade is the Fire Support Battlefields Operating System (FS BOS). The FS BOS has an indispensable role in the transformation of the Brigade into an effects based organisation capable of providing a relevant and credible force within the battlespace of the future.<sup>11</sup> Fire support responsibilities within the Brigade will remain linked to support to the close battle and the provision of reinforcing and shaping effects. Fire support and the effects provided must be more precise, lethal, guaranteed and discriminate.<sup>12</sup> Fire support must remain highly mobile and able to generate combat power that matches the commanders’ intent and main effort. Fire support must be flexible, capable of timely task organisation and employ an economy of munitions to deliver the necessary effect.<sup>13</sup>

## **AIM**

The 2000 White Paper has indicated that sustained investment will be made to enhance land force capabilities such as fire support.<sup>14</sup> The aim of this paper is to determine how the FS BOS within the 3<sup>rd</sup> Brigade can re-orient, re-organise and re-equip to best provide effects based support to the Brigade in the context of the current Australian strategic outlook.

## **CAPABILITIES FOR MOLE**

Future adversaries within MOLE scenarios will vary immensely in capability. The Combined Arms Training and Development Centre (CATDC) utilised a 500-800 man size force with conventional niche high tech weapons and the ability to brigade as required as a generic construct for the Win Now series of papers. ADF land forces must be prepared to face adversaries ranging from those with low tech weapons to those equipped with advanced systems.<sup>15</sup> The ADF response must be tailored to counter the threat and be ready to undertake a range of responses or tasks.

These tasks will differ across the threat spectrum. Tasks may include the seizure, protection and operation of a forward operating base, destruction of force projection assets, services protected evacuation (SPE) and services assisted evacuation (SAE).<sup>16</sup> The ability to counter the symmetric or asymmetric threats encountered within such tasks highlights the need for flexibility within tasked force elements. In operational terms, this flexibility is generally associated with light, highly mobile forces with a low detection signature. These forces are capable of producing an effect beyond their combat weight.

The effect required to counter such threats is likely to be best provided by forces task organised as a combined arms team. Combat teams within MOLE are likely to operate

independently and at greater range from either command or logistic nodes than within the linear nature of the current battlefield. Combat teams and organisations will need greater organic capability and require less reliance on parent units in the non-linearity of the battlespace.<sup>17</sup>

The adoption of manoeuvre theory as the basis for land warfare doctrine also stresses this approach. In manoeuvre theory, forces produce effects in order to dislocate the enemy and render his forces irrelevant. This is achieved when friendly strengths are pitted against weakness. Such weaknesses may include logistic elements or command and communications nodes. Manoeuvre theory or “fighting smart” in Australian doctrine also accentuates the need to coordinate effects within the battlespace. This coordination function is achieved by exploiting a knowledge edge relative to the enemy and synthesising information, decision superiority and decisive action via the effective employment of sensor to shooter links.<sup>18</sup>

The combat teams must remain prepared to win the close battle and survive any encounter battle. The ability of these teams to survive and preferably shape the enemy response requires a reliance on organic, responsive and guaranteed weapons. Effects must be precise and lethal in order to minimise friendly casualties and disrupt enemy action and activity.

The major components of future force capability matched to these scenarios and underlying doctrine are an organisation that is highly mobile, possesses a low detection signature, is sensor to shooter heavy and retains the capacity to coordinate both lethal and non lethal effects across the battlespace.<sup>19</sup> The cornerstone that underpins this capability is the light force and within the ADF that is the 3<sup>rd</sup> Brigade.

### **THE CAPABILITY OF 3<sup>RD</sup> BRIGADE**

The 3<sup>rd</sup> Brigade is capable of a diverse range of tasks within the MOLE setting. The Brigade may be required to undertake FEAS. Means of entry may include parachute, air land, air mobile or amphibious vehicles or craft. Actions at the objective may need the destruction or seizure of a forward operating base. During OP WARDEN, the Brigade conducted EAS into East Timor and then rapidly secured Komoro Airfield as an Air Point of Entry (APOE) and Dili Port as a Sea Point of Entry (SPOE). This operation was executed within extant Notice to Move (NTM) timeframes. The rapid deployment of the Brigade underlines the vital nature of light forces in the conduct of MOLE.

The organisation of the 3<sup>rd</sup> Brigade has not essentially altered since OP WARDEN. The PBG, including A Fd Bty, was allotted OPCOMD to the Brigade in 2000. Nonetheless, the Brigade retains the same infantry dominated and platform centric organisation characteristic of Australian formations and task forces. Deficiencies in critical areas of the Brigade such as communications experts, specialist logistic trades and artillery gun numbers only serve to further undermine existing capability.<sup>20</sup> These shortfalls will only exacerbate the transition of the Brigade to an effects based organisation.

The tactical manoeuvre the Brigade is expected to employ as part of fighting smart is underpinned by five tactical functions. These five functions are detect, respond,

protect, sustain and inform.<sup>21</sup> The respond function requires a high level of tactical mobility. Moreover, a high level of tactical mobility is a corollary to the establishment of an effects based organisation. Tactical mobility enables effective action via the integration of manoeuvre and fire. The Brigade has a considerable lack of organic tactical mobility.

Limited tactical mobility organic to the Brigade is provided by B Sqn  $\frac{3}{4}$  Cav Regt. The lift capacity of the 55 available vehicles is limited to approximately half an infantry battalion less specialist support agencies such as Joint Offensive Support Teams (JOST). Other options are either non-organic such as 5 AAvt Regt or are incapable of providing tactical mobility such as the 3 CSSB transport section. There are no planned or current projects scheduled to address this issue.<sup>22</sup> This leaves the Brigade with a considerable deficiency in both current capability and future requirements.

Tactical mobility is also a fundamental tenet of the protect function. The freedom of action provided by mobility allows the denial of friendly critical vulnerabilities. Fire support also enables protection through the generation of combat power during close combat to enable mobility and manoeuvre. This combat power may be through obscuration, suppression or in counter battery fire (CBF). Limited organic direct and indirect fire support options impair force protection and expose friendly critical vulnerabilities. This deficiency was illustrated on EX TANDEM THRUST.

The lack of adequate organic fire support prevented 3 RAR from effectively countering enemy manoeuvre.<sup>23</sup> Inadequacies in strategic lift restricted integral fire support to two guns from A Fd Bty with 44 rounds each and the battalion mortars. War gaming prior to the exercise established a series of pre conditions for success that underscore current capability shortfalls within the Brigade. These conditions included limiting the enemy elements and fire support within range of the respective drop zones. Fire support lacked sufficient equipment mobility to protect itself from enemy artillery and provide 3 RAR the suppressive fire required to afford protection during close combat.<sup>24</sup> EX TANDEM THRUST also proved the deficiencies the Brigade has within the detect function.

The Brigade has a limited organic surveillance capability. Generally, the Brigade relies heavily on external assets such as Recce Sqns, 7 Sig Regt (EW), 131 Loc Bty and 2 Cav Regt. EX VITAL PROSPECT 2000 indicated that these external sources are not always attuned to fulfil the Brigade information requirements (IR). Force assets are not immediately responsive to Brigade due to their C2 status. This exercise experience is compounded by the paucity of complementary training undertaken by external units with the Brigade. Even habitually attached or allotted elements such as 131 Loc Bty RD F troop is not always available for combat team training due to force level tasking.

Organic surveillance options include a re-roled Brigade Recon Platoon and the 11 JOSTs of 4 Fd Regt. Mobile Fire Controllers (MFC) are organic to respective battalions and unavailable for tasking at Brigade level. The Brigade Recon Platoon is currently hampered by limited communications options that restrict its range of action. Reassignment of JOSTs to Brigade level tasks may adversely impede on unit level operations and requires careful management. Future projects have recognised the

surveillance gap within the Brigade. Under PROJECT NINOX, three Australian Manportable Surveillance and Target Acquisition Radar (AMSTAR or GSR) have been identified for allocation to 4 Fd Regt and 16 Thermal Surveillance Sights Type Three (TSS T3) will supplement the surveillance function within the Brigade.<sup>25</sup> These weaknesses are offset to some degree by the strengths of the Brigade.

The Brigade should possess a low detection signature. The Brigade as a light, airmobile and essentially 'manpack' formation generates a considerably smaller footprint or signature than formations of greater combat weight. Improvements in the electronic signature and increased mobility should also aim to decrease the Brigade signature. The introduction of NFE into the Brigade has also reduced detection signature. Historical studies prove the value of night fighting with attacking casualties reduced by approximately 40% in a variety of terrains and scenarios.<sup>26</sup> A low detection signature is critical in a formation without mechanised or armoured protection as vulnerability to detection and targeting is reduced and, therefore, protection is increased.

The Brigade also possesses the basic structure and personnel to coordinate effects. Joint Offensive Support Coordination Centres (JOSCC) from 4 Fd Regt are organic to the Brigade and are roled and manned to undertake this function at either formation or unit level. Increasingly, RAA JOSCC are displaying their versatility through the coordination of lethal and non lethal effects from joint and combined assets in a coalition setting.<sup>27</sup> EX TANDEM THRUST captured the capability of JOSCCs within the Brigade to manage this vital requirement of an effects based organisation.

The Brigade also contains the sensor to shooter links of the modern battlefield and the stepping stones to the future battlespace. The 11 JOSTs of 4 Fd Regt represent this capability. These modular flexible teams are capable of surveillance, target acquisition and the production of effects from joint and combined forces in a coalition setting. EX TANDEM THRUST operations required JOSTs to deploy with 31<sup>st</sup> MEU recce, independent operations as part of the Brigade surveillance and target acquisition plan (STAP) and support the close battle with 2 RAR and 3 RAR operations. The effects produced were as precise and lethal as required by the supported force on the exercise but limited by the nature of in-service munitions and equipment.

Weaknesses and hollowness in extant structures will ensure the road to an effects based organisation will be long and arduous. The apparent lack of defence projects to rectify the major limitations of the Brigade creates further unnecessary diversions and obstacles on the road to the future. However, these defects do not belie either the success the Brigade has already had in MOLE and the strengths the formation has in a low detection signature, coordinated effects and sensor to shooter links.

### **THE FIRE SUPPORT BOS IN THE 3<sup>RD</sup> BRIGADE**

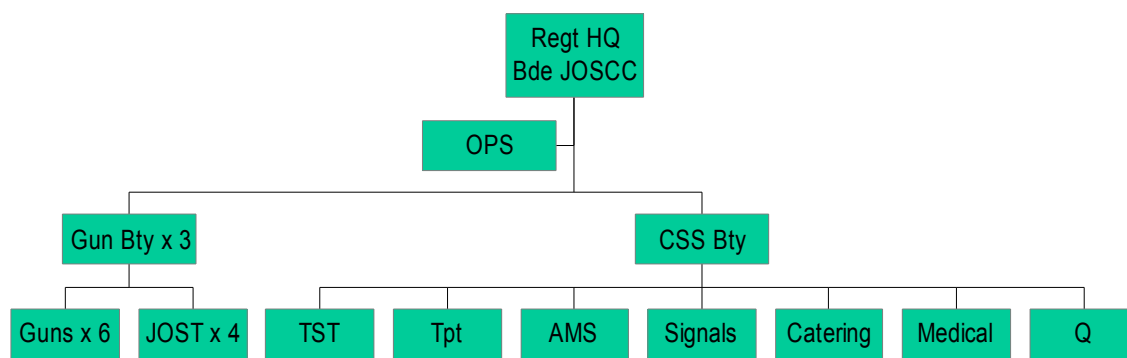
*Battles are won by fire and movement. The purpose of movement is to get the fire to a more advantageous position to play upon the enemy.*

General George S. Patton Jr

Fire support is a system of systems that provides for the coordination of effects from lethal and non-lethal joint and combined assets in support of manoeuvre force operations. Fire support is generally assumed to relate to indirect weapons. The future of the BOS is likely to be associated with effects regardless of how the effect is generated. The system comprises target acquisition, effects, delivery and C2. Each element of the fire support system is contained within the Brigade. Fire support in the Brigade continues to focus on the provision of close support fire, force protection and the production of effects to win the land battle.

The fire support system is constrained by an organisation derived almost without change from the horse drawn artillery regiments of the Napoleonic age.<sup>28</sup> See Figure 1 for current unit organisation. A more modular approach is needed to maximise force packaging options, engender appropriate effects and maintain residual capability within the parent unit. The seeds of success for the effects based organisation of the future can be found in the conventional structure of today. One of these seeds is the inherent sensor to shooter link that offers a variety of surveillance, target acquisition and engagement mission profiles.

Figure 1. Current Unit Organisation



Note: One Gun Bty has three JOST on SED.

### Target Acquisition – The Sensor to Shooter Link

The sensor to shooter link enables information and decision superiority to be converted into decisive action or effects.<sup>29</sup> The major sensor within the fire support arsenal is the Joint Offensive Support Team (JOST). The JOST is a self contained modular five man team offering; the provision of effects from all lethal weapons including Offensive Air Support (OAS), Naval Gunfire Support (NGS), artillery and mortars; a light, highly mobile surveillance and target acquisition asset; support to the close battle; reinforcement of the close battle, and assistance with formation shaping operations. These roles can be undertaken either independently or under the supervision of a battalion JOSCC.

A JOST fights well beyond its combat weight, offers mission versatility and flexibility to the formation and is a combat multiplier if employed effectively. The JOST is also a system of systems comprising personnel, surveillance and target acquisition equipment and a communications suite. The JOST has conventionally been allotted on a one per company basis.

This pro rata organisation stems from Allied experiences during World War One. British Forward Observation Officers (FOO) accompanied advancing troops in a vain attempt to adjust barrages in support of the assault. The advent of radio communications during World War Two enabled the FOO to make rapid adjustments of fire upto corps level.<sup>30</sup> Fire mobility had accomplished what previously had required either mass based assets on the Soviet model or equipment mobility to achieve the concentration of effects. Simultaneously, the forerunner of artillery tactical tasking terminology was developed to ensure commanders could rely on “the concentration of artillery and mortars as a battle-winning factor of the first importance”.<sup>31</sup>

The gradual extension of the tasking terminology to include JOST and JOSCC has led to a dilution of conventional support to the manoeuvre unit. This massing of observers on the main effort via the C2 terminology usually supports the highest commander sometimes to the disadvantage of subordinate units. An increase in the amount of available JOSTs would have the following impacts; provide the formation with a significant combat multiplier, provide continued effects coverage throughout the formation, overcome the resource limitations of the C2 terminology and give impetus to the establishment of separate surveillance capability within 4 Fd Regt and organic to the 3<sup>rd</sup> Brigade.

The Brigade level JOSTs would be the OP element of the Surveillance and Target Acquisition Troop. Tasks for JOSTs in this section would include conducting surveillance in the gap between unit and divisional surveillance. JOSTs may also be positioned to conduct a key targeting function in accordance with the commanders effects priorities. In either the detect or respond role redundancy will be vital to ensure the main effort is supported. Long term manning cover for these positions will be required. In the short term, the unit is capable of providing these JOSTs at the expense of other positions.

The training bill for this type of capability is considerable. JOST personnel will require to master a range of insertion techniques including airborne rappelling, airmobile, vehicle and dismounted deployment. The need for these skills was confirmed by experiences on EX TANDEM THRUST. Enemy locations and unforgiving terrain requires a variety of insert options to provide mission flexibility. JOSTs must be capable of accurate and responsive target engagement from a wide range of assets. JOSTs must fully understand the Brigade plan and have the necessary skills and knowledge to execute effects supporting that plan. The JOST commander is an indispensable element of this capability.

The JOST commander requires to be a CAPT FAC C current, ISC and ROGS course qualified. The job entry training amounts to 15 weeks. Moreover, JOST personnel must be familiar with a range of new technology including BCSS, the TSS T3 and GLTD or equivalent items. Clearly, fire support is a specialist skill that requires an investment in time and experience to ensure the capability is sufficiently developed and maintained. For the JOST commander, who is a coordinator or supervisor of the effects, time in this appointment is critical to his success. An amendment to RAA policy is required to ensure all JOST commanders undertake the appointment for two years. This alteration will ensure that people remain our key to capability.

There is some scope for the identification of junior Lieutenants to fulfil the role of Assistant JOST Commander. This increases the exposure of future JOST commanders to the gunner skills needed for success in senior appointments. It also ensures that less time is spent training the CAPT at job entry level and more time is invested in the employment of the capability. An additional benefit to the increased capability is the marketing of the profile of Lieutenants within the RAA. The addition to the JOST organisation would require manpower cover.

Further capability enhancements could be made through the creation of a dedicated Forward Observer Assistant trade. The 1997 DFRT review of the RAA trade structure broadened employment of RAA soldiers through the elimination of ECN 361 Artillery Communicators. This ECN was incorporated into the gun number and operator command post trades as a skill. The DFRT determination has arguably enhanced employment flexibility for RAA soldiers and units. However, this flexibility has come at the cost of frequent appointment changes as personnel are posted to maintain competitiveness against their peers. Such frequent changes are not conducive to the maintenance of the skills necessary as a Forward Observer Assistant. A comprehensive analysis of the FS capability requirements for both AIB 2003 and the ECF should be underscored by an RAA trade structure review that seeks to maintain rather than dilute this capability.<sup>32</sup>

JOST equipment must also be improved to magnify the options open to the JOST commander for his stated mission and improve current sensor capabilities. Current equipment is bulky and not conducive to light manportable style operations. The GLTD is a heavy and bulky equipment and is best deployed in a large packing case that requires a two man lift. Current equipment is unwieldy and does not offer mission versatility. Laser designation and range finding require the carriage of separate items. The equipment does not offer next generation capabilities such as real time imagery and data links and effective night designation.

More modern equipment would provide a target designator, LRF, a variety of surveillance options, in built GPS, real time image and data link and support the delivery of a range of munitions by day and night in all weather. The equipment would be modular and enable mission specific selectivity, integrated within the overall C2 architecture and be considerably lighter. Such integration is not yet available, however, there are a range of systems capable of reducing weight and bulk whilst enhancing capability.

The LRF L1A1 LOT was 1995, the LRF LP7 LOT is 2005 and the GLTD LOT is 2010. The acquisition of a Lightweight Laser Designator Rangefinder (LLDR) would replace all the equipment previously listed. The LLDR is lightweight (<5kg), provides day target designation for all in-service RAAF and US LGB and caters for the next generation of US munitions such as SADARM, range finding to 20 km, image and data transfer and an internal GPS. Initial issue should be on a per JOST basis.

The in-service GLTD does not provide compatibility with RAAF NVE. There are no indications that RAAF are attempting to rectify this deficiency. The night target indication requirement could be fulfilled by the IZLID-1000. The IZLID weighs 0.5

kg and is a hand held infra red pointer that can be viewed by in-service RAAF NVE. This equipment has been used successfully by the US on operations and should be purchased on a one per JOST basis.<sup>33</sup>

The Leica Vector IV Hand Held LRF (Leica HHLRF) is an eyesafe LRF providing target identification to 5000m. The Leica HHLRF replaces the LP7 and the conventional binoculars. Current issue is on a one per JOST basis. The provision of two per JOST would provide the JOST a lightweight, effective redundancy to the LLDR (less the designation capability).<sup>34</sup> The STA options provided by PROJECT NINOX also magnifies the training and capability of JOSTs.

One of the major acquisitions of PROJECT NINOX is the purchase of 58 AMSTAR GSR. The AMSTAR is specifically designed for ground surveillance and artillery observation and target engagement. UK FOO employ the equipment mounted on the Warrior OPV. The majority of MSTAR users mount the equipment onto vehicles due to its weight of approximately 50 kg. Initial BOP will allocate GSR to more mobile units. However, the initial BOP for the Brigade has been amended from three to two.

The basis for this amendment is a recognition that the GSR represents an integral plank of the Force RS&I plan. This plan has GSR deployed in pairs in order to guarantee answering one IR. This limited distribution undermines the development of an organic RS&I capability within the Brigade. The notion that STA and the GSR represent a niche capability is countered by the widespread operational employment of the MSTAR.<sup>35</sup> This proposal envisages central control of the GSR although the capability remains out posted to the Brigade. Clarification of the C2 status of the capability is required. Therefore, the proposed centralisation of the asset does not support either the unit in Brigade setting or the organic needs of the Brigade as identified within MOLE.

The ISD for the equipment is May 2002. The capability would be well suited to providing STA section within 4 Fd Regt. The equipment has been successfully employed in a manpack role on OP TANAGER. Initial operational analysis indicates a range of issues need to be addressed for the manpack role to be effectively employed.<sup>36</sup> However, terrain and ELOS limitations within MOLE will require the capability to be manportable to overcome these challenges. Nonetheless, GSR offers a potent capability well suited to provide the impetus for the development of the STA troop of 4 Fd Regt.

The TSS T3 is another equipment from the PROJECT NINOX stable. The TSS is a lighter (17 kg) more manportable equipment. TSS is designed specifically for target engagement for dismounted operations prevalent to light forces. The system provides a long range Thermal Imager, remote viewing screen, enabling day and night target engagement out to 8 km. Initial BOP is 16 within the Brigade based on one per JOST and MFC. The actual breakdown of this BOP does not appear to justify this figure. For example, 1 RAR and 2 RAR receive 2 each and 3 RAR are allocated one. Equipment cover for the JOSTs within the OP section of STA Troop is also required.

The acquisition and employment of this equipment will greatly enhance the STA capability organic to the Brigade. Consequently, plans to conduct the training and introduction of the capability should be undertaken to bring the capability onto line as

quickly as possible. Equipment beyond current organic capability includes Tactical Unmanned Aerial Vehicles (TUAV).

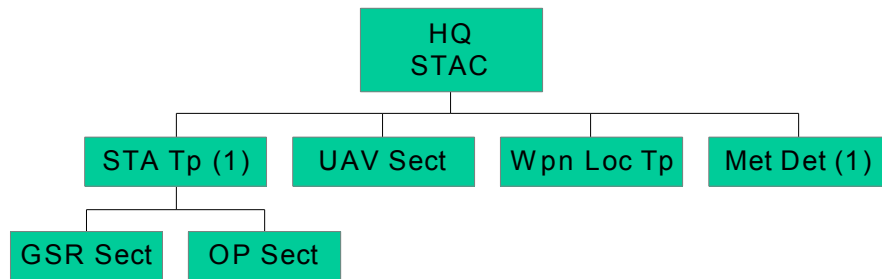
A variety of TUAV have been trialed within the ADF recently. These include the well publicised Global Hawk missions prior to EX TANDEM THRUST. This capability offers more strategic or operational surveillance. 131 Loc Bty are due to receive the CODARRA TUAV. This equipment is intended to enhance the AUSBATT rotations to East Timor. The CODARRA is more a short range capability and is unlikely to reside within 131 Loc Bty post AUSBATT. The UAV capability identified within JP 129 is more suited to force level surveillance support. This capability will include a range of more than 100 km and a medley of payloads such as FLIR, SAR and SIGINT. The CODARRA is better suited to unit or formation level STA. As a formation level asset the STA element within the Bde JOSCC is ideally situated to coordinate this capability. Moreover, the Brigade should consider the acquisition of CODARRA or similar TUAV as a concept demonstrator for EX SHOT START 02 20-31 May 2002.

A final brick that merits consideration for inclusion into the developing organic STA within the Brigade is the BAIO and Weapon Loc Troop of 131 Loc Bty. This RDF troop is theoretically part of Brigade assets already. In practice, force level tasking means that training opportunities with this troop have been scarce over the last three years. The 131 STAB CONOPS recreates this troop as a more modular STA cell (STAC) that is capable of managing AMS, UAV, WLT, UGS and other STA assets.<sup>37</sup>

An AMS element already resides within 4 Fd Regt. The Regimental Survey section is manned with trained meteorological (met) operators. The function of regimental survey has dissipated with the introduction of the Automatic Gun Laying System (AGLS). This GPS based system has considerably reduced into action times for both individual equipment and the unit. The Regimental Survey section is maintained as a redundancy until the introduction of the Artillery Orientating System (AOS) with an ISD of 2003/4. In reality, the lack of survey equipment and accuracy of AGLS has encouraged the development of AMS within the unit. This development is hampered by the paucity of MARWIN met systems available to the Army. The combination of AGLS and met within the unit would substantially enhance first round effectiveness of the unit. Consequently, the commander would have a greater range of options available from the FS BOS due to the purchase of this system.

The current proposal maintains the STAC and subordinate capability bricks reside at 131 STAB with capabilities dispensed to formations as required.<sup>38</sup> However, this proposal runs contrary to the intent to maintain capability organic at the correct tactical level. A more organic, and therefore, guaranteed and responsive option is the positioning of these elements within the Brigade where training opportunities can be maximised. See Figure 2 for STA organisation for AIB 2003. This model reflects the organic to unit concept found in the ECF proposals drafted by the CATDC.<sup>39</sup>

Figure 2. STA Organisation for AIB 2003



## Notes:

1. These elements are currently available within unit resources with some equipment supplementation as outlined within the paper.
2. This organisation would be part of the Offensive Spt Regiment within respective Brigades.
3. This organisation would reside in the Lethal Effects of the Future JOSCC. See figure 4.

The proliferation and effective employment of the advanced STA capability relies on the still vital ability to communicate in a timely and accurate fashion. The MOLE scenario of EX TANDEM THRUST highlighted the need for an effective suite of communications options to provide secure and real time links between sensors, shooters and coordinators. The offshore nature of the operation and extended communications distances encountered during the exercise underlined the deficiencies 4 Fd Regt has in this arena.

Current equipment provides both VHF and HF links. The PRC 113 UHF system provides links to OAS from FAC and ACO. The unit has received and started trials on the facility provided by the BCSS interface. The unit has also conducted extensive testing of the MBITR, which is a lightweight combined VHF/UHF system. The versatility and lightness of the MBITR makes it ideally suited to JOSTs. The rapid and permanent acquisition of these radios is fundamental to improving the JOST. The concomitant reduction in load bearing and improved mobility increase JOST capability. These radios should be a priority for equipment acquisition within the Brigade.

An image/data interface is provided by the LLDR. Situational awareness and the delivery of real time imagery within the Brigade would magnify current capability almost exponentially. Further situational awareness is likely to be provided to JOST via the BCSS hand held trial yet to be scheduled. EX SHOT START 20-31 May 2002 would be an ideal time for this trial.

### Effects and Delivery Options

*Every attack undertaken without the greatest preparation by artillery is frivolity.*

F. Hoenig,  
Tactics of the Future, 1899

*The artillery must be prepared to concentrate a great volume of fire wherever it is needed, at any moment, so as to dominate rapidly any part of the battlefield which might be threatened.*

General Charles De Gaulle  
The Army of the Future, 1941

Detection, sensing, surveillance and target acquisition enables engagement and the conduct of decisive action. The production of the right effect or ‘fire’ is inextricably linked to the delivery means. Past equipment acquisitions have often centred on acquiring a platform at the expense of effect. Such misinterpretation has created a platform rather than an effects centric approach.

Fire support within the 3<sup>rd</sup> Brigade will be required to support the close battle, win encounter battles and contribute to key elements of MOLE. This latter support may include supporting early entry operations, providing depth to operations and contributing to tempo. How does this translate into an effect? A range requirement analysis posits that early entry forces require indirect fire support from 1000 – 15000m. The provision of depth is calculated as needing support in the 20000-40000m range.<sup>40</sup> Close combat studies stress the need for suppressive fires, battlefield obscuration and the neutralisation of enemy indirect assets particularly artillery.<sup>41</sup> Close combat experiences in both world wars emphasised the importance of close co-operation between artillery and the supported arm. The maxim behind successful assaults was outlined by General Chuikov who urged troops to “try and keep as close as possible behind the explosions of your own shells.”<sup>42</sup> Safety constraints in peacetime allow close combat effects to within 350m.<sup>43</sup>

Organic fire support within the 3<sup>rd</sup> Brigade provides some of the effects required to support close combat operations. However, organic fire support lacks the range to support early entry forces, the range to provide depth and the integral equipment mobility to overcome these limitations. Fire support also offers extremely limited effects that are not tailored to modern requirements.

The suppression effect is ineffective against armoured or mechanised forces. The in service HE shell offers the same effect now that it did when it was designed in 1935. The obscuration effect is one dimensional and easily defeated by adversaries with a thermal imaging capability. Efforts to practice the real time production of battlefield obscuration have been thwarted by its suspension of the BE smoke round for over two years by ADF authorities. The suspension has been due to concerns over the carcinogenic effect produced although the UK/US continue to use the projectile. The suspension should be lifted to enable diminished skills in obscuration to be regained. Moreover, investment in bi-spectral smoke munitions would also increase the available effect. Similar exploitation of technology through the incorporation of improved conventional rounds, smart and intelligent munitions will enhance available effects.<sup>44</sup>

Most research and development is focussed on the NATO and US standard 155mm calibre. Consequently, there is a wide range of effects available from DPICM, APICM, FASCAM (ADAM and RAAMS), CLCG, ER DPICM, and SADARM. See Table 1 Munitions Effects Summary.

Table 1. Munitions Effects Summary.<sup>45</sup>

Ser	Munition	Remarks
1	Dual Purpose Improved Conventional Munition (DPICM)	Contains antipers and anti-material grenades. Number of sub munition varies according to calibre of weapon. Designed for use against pers and lightly armd veh. Aval for 155mm howitzer.
2	Antipers Improved Conventional Munition (APICM)	Contains antipers grenades. Number of sub munition varies according to calibre of weapon. Designed for use against pers. Aval for 105mm and 155mm.
3	Family of Scatterable Mines (FASCAM)	ADAM – used against pers, deny terrain, block avenues of approach. RAAMS – used against armd targets. Both systems have self destruct times from 4-48 hrs. Aval for 155mm only.
4	Cannon Launched Guided Projectile	Also known as the Copperhead. Designed for HPT of a point nature. Laser guided and aval for 155mm only
5	Extended Range DPICM	An example is the M 864 Base burn projectile that extends the range to 28.4 km.
6	Sense and Destroy Armour (SADARM)	A top attack system against armd veh using millimetre wave or infra red sensors for guidance.

The US is also experimenting with 105mm projectiles to provide greater support to its light force fleet. The XM916 is a DPICM projectile containing 42 dual-purpose XM80 sub munitions. This projectile has a range of 11000m and is compatible with the AS L119. The XM915 is also a DPICM with a range of 14000m. The M913 is an AS L119 compatible RAP with a maximum range of 19000m. The reintroduction of the L118 barrel is not considered feasible as the Abbot ammunition is no longer in production within Western nations. Other developments include the possible purchase of an ER mortar from Denel and the proposed introduction of a 120mm Automated Mortar System (AMS).

The 120mm AMS has a proposed ISD of 2006.<sup>46</sup> The purchase of this system would provide an almost quantum technological leap forward through the integration of an array of surveillance, position finding and fixing, orientating and engagement equipment. The one off twenty equipment purchase is viewed as an improvement to mobile firepower. Effect options with this calibre are similar to the 155mm system with the additional mobility compensating for the shorter range of the AMS in comparison to the 155mm.

All effect options highlight the availability of more precise, lethal and longer ranging munitions capable of matching the requirement identified within the 3<sup>rd</sup> Brigade. For example the XM916 is assessed as eight times more effective than the in-service HE projectile. All DPICMs are assessed as between eight and sixteen times more effective than HE Point detonating. The effects needed by the Brigade are best obtained by use of the 105mm, 120mm or 155mm systems.

The disadvantage of these systems is their relative lack of tactical mobility during early entry force operations. The current 105mm system can be air dropped or air landed from C130H Hercules. Both methods were used on EX TANDEM THRUST.

Three C130H heavy drop loads can provide a three gun battery, 132 HE rounds and requisite stores and equipment to support 3 RAR operations. This load optimises equipment configurations but reduces the available number of infantry due to the limitations in the Hercules fleet. Importantly, this configuration provides FS the necessary tactical mobility to support early entry operations through the airdrop of three LR on 16 ft platforms.<sup>47</sup>

Alternative tactical mobility options for this equipment include the GATOR All Terrain Vehicle (ATV) and SUPACAT Mk III. The latter is a robust ATV purpose designed for light force operations. The SUPACAT has a towing capacity of upto 1600kg and is capable of providing mobility for both the in service 105mm and to be procured 120mm systems.<sup>48</sup>

The mobile firepower of the 120mm system was originally viewed as either supplementary or complementary to 1<sup>st</sup> Bde or 7<sup>th</sup> Bde fire support options.<sup>49</sup> Subsequent analysis proposes the 120mm system replace the 105mm. Certainly, the ground mobility of the 120mm AMS provides the Brigade with an attractive option. The ISD of 2006 does not provide an immediate solution within AIB 2003 timeframes. However, towed variants of the 120mm are in service with other countries. These variants must be compatible with airmobile operations in accordance with the Brigade concept for operations. Further investigation of the 120mm capability to support these types of forces and operations is required.

LOT for the 155mm, 105mm M2A2 maintained by some part time units and the 105mm L118/9 is 2010. A rationalisation of calibres is likely in the future to maximise maintenance, ammunition, training and sustainment issues.<sup>50</sup> A future standardisation of calibres may centre on the 155mm calibre. The range of effects, potential range, and complementary research into light force support through the Light Field Howitzer and other trials supports this thesis. This is unlikely before 2010 due to LOT of current equipment. Therefore, the 105mm calibre is likely to be maintained to provide close support to the Brigade until that time.<sup>51</sup> Investment in modern munitions and SUPACAT will provide the necessary effect and desired ground mobility to support early entry forces.

The 81mm calibre is an anomalous delivery system within this context. Even the addition of an ER capability the system does not provide adequate effect or range to match requirements. This was highlighted on both EX TANDEM THRUST and EX VITAL PROSPECT 2000 where enemy capability was an overmatch for the system. Advantages of the system are its lightness and ability to provide a guaranteed response to the main effort of the battalion ensure this calibre remains attractive at unit level. However, it is the guarantee and not the calibre that units require. Consequently, the 81mm mortar may be replaced by an alternative calibre with a better range and wider effect within the future such as a manportable variant of the 120mm system.<sup>52</sup>

ECF options include the provision of a battery organic to but not embedded within the unit for fire support. The Brigade retains an organic battery and other assets to reinforce the close battle.<sup>53</sup> The recognition that fire support is a specialist skill requires the maintenance of these batteries within a unit setting to maximise training and CSS issues. Indeed, a graduated transformation of the management of fire support

is necessary to ensure the effective future coordination and employment of effects in this setting.

This transformation has already started with the School of Artillery (SOA) established as the subject matter expert for the training of all indirect fire support. For instance, Fire Support Wing at the SOA is responsible for the conduct of both mortar and gun courses. Future technological advances such as the introduction of AOS, TSS T3 and C2 upgrades serve to reinforce both the specialist nature of the BOS and the requirement to centralise the training. Post job entry standard training should also be conducted by specialists. That is, the training of Mortar Platoons and MFC would be more effective if coordinated by fire support specialists. Fire support specialists have the knowledge and skills to ensure these organic assets are managed, trained and integrated into the overall fire support BOS more effectively than under training within the manoeuvre BOS. The 3<sup>rd</sup> Brigade fire support specialists are in 4 Fd Regt.

The centralisation of the FS BOS in this fashion would capitalise on the specialist skills of the fire support BOS whilst maintaining organic discrete capabilities within units. Such an incorporation of mortar platoons into the FS system would bequeath training and equipment benefits and paves the way to the future.

### **C3 – The Art of Coordination**

*The art of C2 was seen to lie in the way a commander applied firepower, rather than in the way he deployed foot soldiers.*

J.B.A. Bailey  
Field Artillery and Firepower

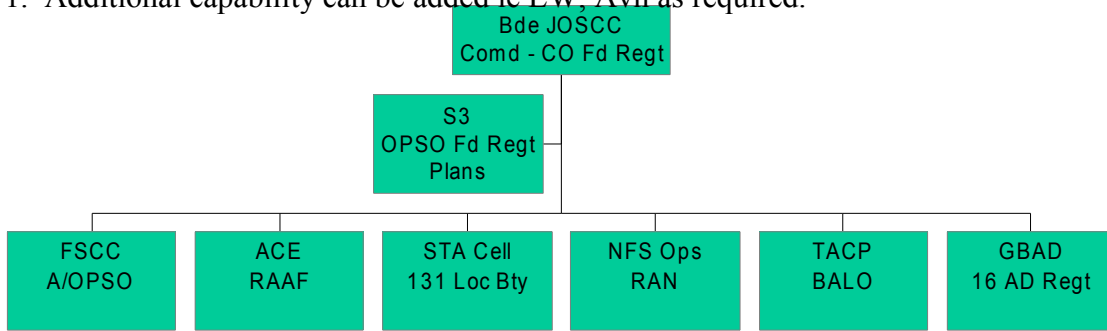
C3 provides the crucial link in the chain between sensor and shooter. The production of effects is meaningless unless conducted in a coordinated fashion in accordance with the commanders intent of shattering the will of the enemy. Fire support staff at the formation and unit level are fundamental to the successful supervision, management and coordination of these effects.

Future capabilities may be network enabled and provide a suite of real time tools or functions with which effects can be planned and executed within the battlespace. Some of these functions may include automated monitoring of target, unit and platform status, tactical and technical fire direction, target handover and situational awareness. The full suite of lethal and non-lethal effects from a range of joint and combined platforms will require management. Training of these staff will require a through understanding of effects based networked enabled warfare. Current JOSCC structures at formation and unit level provide the nucleus of future capability in effects based operations. See Figure 3 for Current JOSCC Organisation.

Notes

Figure 3. Current JOSCC Organisation

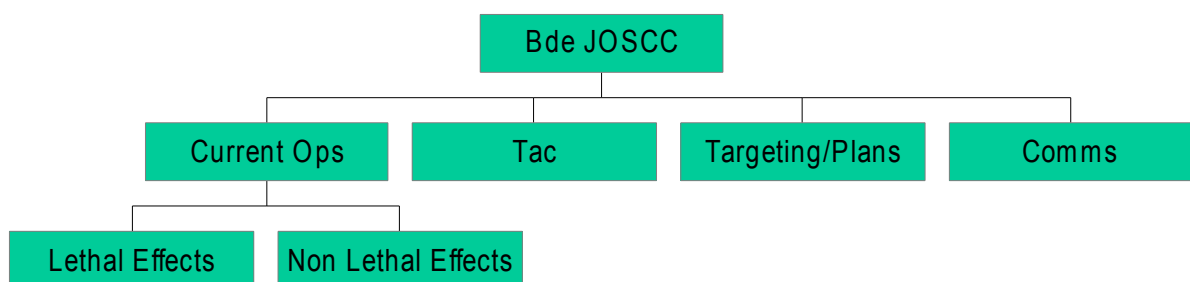
1. Additional capability can be added ie EW, Avn as required.



Fire support personnel have already demonstrated the capability to handle the engagement of targets with a variety of lethal and non-lethal means. Divisional JOSCC personnel coordinated the surveillance, reconnaissance and IO plans during OP STABILISE.<sup>54</sup> During rotation three the AUSBATT JOSCC coordinated CMA and psychological operations on behalf of the unit. Coordination implies fire support planners understand, employ and coordinate the effects of the asset. Coordination does not impute the need to pilot the plane! After all, fire support planners are not pilots but regularly coordinate the use of the effect the platform provides. A similar argument supports the coordination of non-lethal assets from EA to IO. US and UK operations in Bosnia have highlighted the way forward in this respect. The divisional fire support element coordinates non lethal responses “because the IO’s targeting methodology mirrors the lethal fires targeting methodology used by the Field Artillery.”<sup>55</sup>

The Brigade requirements for highly mobile and readily deployable forces provides the need for force tailoring and modularity to overcome strategic and tactical lift dilemmas. Efficient force packaging allows discrete elements or slices of organisations to be cut from the parent unit to provide sufficient effect without detracting from parent unit capability. Such modularity is particularly invaluable at command nodes where personnel and equipment numbers often create force imbalance.<sup>56</sup> The application of this concept applied to formation and unit level JOSCC allows the ready addition of a variety of capability bricks. See Figure 4 Future JOSCC organisation.<sup>57</sup>

Figure 4. Future JOSCC Organisation



Future structure and current coordination rely on robust communications. The communications during EX TANDEM THRUST were conducted offshore and over large distances not normally associated with unit capability. MOLE identifies the need to operate at these distances. Links between the Brigade JOSCC and unit JOSCC must replicate the command links including e-mail, fax and voice services in order to provide the fire support required in these operations. Tactical level VHF/HF were insufficient to cope with this requirement. Digitisation through BCSS and/or IDFNS may provide a long-term solution. Interim measures such as the UHF TACSAT or JP2008 MDMCN project may prove as effective.

TACSAT UHF was a one-time purchase to satisfy a capability shortfall. There is only ten in the ADF. A LOS satellite radio the TACSAT provided effective communications to the Brigade during EX TANDEM THRUST. The MDMCN project has already provided one equipment to the Brigade JOSCC. MDMCN is a secure sat phone that does not provide an all informed net. However, MDMCN does not provide equipment for a link between Brigade and unit JOSCC. The development of BCSS within the unit is continuing and also provides an additional capability. BCSS relies on conventional radio links and therefore is as limited as the communications device it accesses. The acquisition of a further three MDMCN equipment will provide secure links between unit and formation JOSCC. The development of a SATCOM capability within the unit is fundamental to ensuring communications are robust enough for fire support requirements in MOLE.

These ever spiralling technological enhancements are adding increasing complexity to the provision of situational awareness, command and control on behalf of commanders. The personnel within artillery regiments required to shoulder this burden, master a panoply of new technology and deliver the product are the communicators. The 1997 DFRT determination on RAA trade structure dissolved the trade. Instead, ECN 361 was reduced to a skill within the ECN 162 Gun Number and ECN 254 Operator Command Post trades. Technology has not replaced the need for skilled artillery communicators but rather exponentially underlined the vital nature of the communications capability. Constant postings and the need to maintain personnel within their trade (guns or operator command post) has further reduced the communications capability within artillery regiments. The re-instatement of the Offensive Support Communicator would go some way to reversing the decline in core communications skills within artillery regiments and provide a potent capability for FS contributions to MOLE.

## **CONCLUSION**

The 3<sup>rd</sup> Brigade offers the ADF a light flexible series of combat teams capable of operating across the threat spectrum and conducting MOLE. At the lower end of the threat spectrum, the Brigade has confirmed this capability through the successful deployment and conduct on OP WARDEN. Operational success does not mitigate the shortfalls inherent in personnel and equipment within the Brigade. Such deficiencies detract from the current capability and undermine the baseline needed for the development of future capability. The critical vulnerabilities in organic surveillance, tactical mobility and force protection must be countered or offset to win the land battle and maximise capability.

There appears to be no scheduled or in service ADF projects to assess and surmount these limitations within the Brigade. Internal re-structure and review may provide the initiative and external impetus to address these issues. The FS BOS has a key role to perform to counter the current critical shortfalls and position the Brigade for a transition to an effects based organisation.

“Fighting smart” acknowledges the importance of obtaining a knowledge edge in conducting successful combat operations. This edge is obtained through the acquisition and utilisation of technology and information. The acquisition of GSR, TSS and other advanced technology combined with the proposed restructure of the FS BOS represents this edge. Napoleon said “he that has the skill to bring a sudden unexpected concentration of artillery to bear on a selected point is sure to capture it.” In other words the transformation of the FS BOS and its continued integration within the Brigade will ensure that the Brigade is well positioned to win the land battle through effective close combat. Specific conclusions to support the reorganisation, re-orientation and re-equipment of the FS BOS within the Brigade are as follows:

- The FS BOS within the Brigade in both AIB 2003 and ECF timeframes will mass effects in order to support close combat within MOLE. The current artillery organisation is unsuited to requirements anticipated during these timeframes.
- The Brigade has a limited organic surveillance capability.
- Either a lack of tactical mobility within FS options or inadequate effects hamper early entry operations within MOLE.
- Core RAA skills of communication and operator command post have declined as a result of personnel policies and the dissolution of ECN 361 in 1997.
- The JOST represents a critical skill within the Brigade. Personnel policy and current equipment shortfalls undermine the JOST capability.
- The 105mm is likely to be retained until LOT in 2010 but is unsuited to support the ECF.
- The 120mm calibre has potential to support the ECF but will not be fielded by AIB 2003.

## **RECOMMENDATIONS**

The following recommendations are made:

- Review 4 Fd Regt SED to provide MLOC cover for an STA Troop comprising a GSR section of 13 pers and an OP Section of 10 pers.
- Approve the 4 Fd Regt SED request to have the OPSO at MLOC.

- Review 4 Fd Regt SED to consider addition of full STA organisation including Met det, Weapon Locating Troop and UAV section.
- Allot the RDF Weapon Locating Troop to 4 Fd Regt.
- 3 Brigade consider the appointment of an IO BOS specialist within Brigade HQ.
- All FS elements within the Brigade be trained under the aegis of 4 Fd Regt as the FS SME.
- LCOMD review the NINOX BOP to increase GSR and TSS T3 within the Brigade. This requires a minimum of two further TSS T3 to cover the OP section within STA Troop.
- A user trial of TUAV be initiated within the Brigade with 4 Fd Regt and the S2 as lead agencies.
- Investigate the acquisition of an appropriate ATV to improve tactical mobility for FS early entry forces.
- LCOMD Artillery investigate the procurement of bi-spectral as a concept demonstrator.
- The ban on Smoke BE be lifted.
- Raise an EEV for MARWIN met equipment.
- Raise an EEV for MBITR.
- FDG undertake a study into the suitability of the 120mm system to support early entry forces and the 3<sup>rd</sup> Brigade within MOLE.
- LCOMD Artillery investigate the procurement of improved munitions for 105mm as a concept demonstrator.
- Brigade approve JOSTs to undertake airborne rappelling.
- Raise a MINC(L) for the LLDR.
- Raise a TYCCEP bid for the IZLID.
- Issue the Leica laser binoculars on a scale of two per JOST.
- CATC undertake a review of the RAA trade structure for soldiers with an emphasis on the skills required by Forward Observer Assistants and Offensive Support Communicators.

- Review RAA officer personnel policy to incorporate mandatory two years as a JOST commander for all junior CAPT.
- Review RAA officer personnel policy to consider future role of Lieutenant within the Joint Offensive Support BOS.

The following recommendations are made for EX HEADLINE EXPERIMENT 2001:

- Incorporate within Fd Regt an organic STA organisation comprising STA Troop (2 GSR sections and 2 JOST equipped with TSS T3, IZLID and LLDR), Weapon Locating Troop, Met Det and UAV section.
- Employ L119 with improved munitions including RAP (19km) and DPICM (14km)
- Engage targets at FFE due to greater accuracy through precision equipment.
- Investigate 120mm as alternative to both 105mm and 81mm. The 120mm has towed, manportable and AMS variants.
- Conduct more operations at night utilising NFE, TSS, GSR and IZLID

## ENDNOTES

1. **2000 White Paper, *Our Future Defence Force*, p.15.**
2. **ibid., chapter 2**, outlines Australia's military strategy.
3. **ibid., p.47.**
4. ***Manoeuvre Operations in a Littoral Environment (MOLE) Draft Concept*, p.2.** Amphibious operations are short-term events that conclude with the break out of land forces from the beachhead. The development of Ship to Objective Manoeuvre (STOM) may further compromise this definition. The term forced means a non-permissive entry with the potential for an uncoordinated response by an ill-prepared enemy.
5. **ibid., p.2 and *Combined Arms Training and Development Centre (CATDC) WinNow papers*, p.28.**
6. A light force in an Australian context as a force that has a high degree of readiness, is rapidly deployable both strategically and tactically, and offers mission versatility.
7. **HQ 3 Brigade 909-10-20/5 *Post Activity Report – Exercise Broilga Country 01*, p.3.**
8. **LWD 1 *The Fundamentals of Land Warfare***, defines “Fighting Smart” the synthesis of tactical manoeuvre and battle-cunning. The key components and functions of fighting smart are outlined in chapter 6. **Leonhard, Robert H. *The Art of Manoeuvre Manoeuvre-Warfare Theory and AirLand Battle*, Presidio, California, 1991** highlights the history and development of the manoeuvre theory from an American perspective. However, these developments have informed the subsequent re-orientation of Australian warfighting doctrine to incorporate or adopt a more manoeuvre-based approach.
9. Interestingly, Australian warfighting doctrine concentrates on the winning of the battle. Such a focus unduly centres on tactics at the expense of the conduct of campaigns and operations. Moreover, the dominance of the battle within Australian tactical thinking within a Training Command environment is often to the detriment of the consideration of the heart of manoeuvre warfare – the defeat of the enemy. Within this framework, pursuit and exploitation are little explored concepts much to the disadvantage of the effective development of tacticians within the Australian Army.
10. ***The Fundamentals of Land Warfare*, pp.4-9, *WinNow*, p.26**, defines close combat as “actions that place friendly force elements in varying terrain and in immediate contact with the threat; where direct fires, supported by indirect fires, are applied to strike, shape or shield in order to defeat or destroy enemy forces, or seize or retain decisive points. **3<sup>rd</sup> Brigade Standing Orders Chapter 20, *Concept for Operations***, highlights that 3<sup>rd</sup> Brigade operations will involve considerable contact with the threat.
11. **Bollard, A. *RAA FS BOS Discussion Paper*, p.1.** The FS or Offensive Support (OS) BOS is linked, although separate, to firepower. The term signifies the collective and coordinated use of Surveillance and Target Acquisition (STA), lethal and non-lethal means against targets in support of manoeuvre operations in order to produce the effect required by the commander. Increasingly, all “effects” will be coordinated by a central agency. This is similar to American practice with the use of the Deep

- Operations Centre to coordinate an array of effects from attack helicopters to missiles.
12. **ibid.**, p.6. **Gates, P.** *BOS Concept for OS in the Enhanced Combat Force (ECF)*, pp.6-7.
  13. **Gates, op.cit.**, pp.7-8. **Bollard, op.cit.**, p.6. **WinNow, op.cit.**, pp.42-3.
  14. **White Paper, op.cit.**, p.83.
  15. **WinNow, op.cit.**, p.25.
  16. **MOLE Draft Concept, op.cit.**, p.6. **3<sup>rd</sup> Brigade Standing Orders Chapter 20, Concept for Operations** indicates these are all tasks that the Brigade may be required to undertake.
  17. **Leonhard, op.cit.**, pp. 42-3 underlines the requirement in modern warfare for tactical units to fight independently from effective reinforcement. In an Australian context the **White paper, op.cit.**, p.80 outlines that the size of these tactical units will be units in a Brigade setting. Currently, training for conflict and operations is inhibited by the continuing prevalence of the peacetime practice of organising for specialisations. The practice of maintaining so called niche capabilities such as GBAD and STA in homogenous units rather than in the combined arms settings they will deploy on operations with continues to hamstring effective training at the level identified by the White paper. **WinNow, op.cit.**, pp.50-51 asserts that in the timeframe of the ECF the combat company may replace the combat unit as the lowest level tactical unit that is capable of fighting independently from effective reinforcement.
  18. **The Fundamentals of Land Warfare, op.cit.**, chapter 6 provides a clear analysis of current Australian doctrine.
  19. A low detection signature refers to the ability to maintain both physical footprints and electronic emissions to a level that inhibits or at least reduces the likelihood of detection from threat force assets.
  20. Figures supplied by S11 3 Bde as at 22 Jun 01. This analysis also indicated Army is deficient 14% manning, the Brigade is 11% deficient with a further 5% of personnel either BMS or discharging within the next 3 months. This assessment precludes AIRN issues. See also **Exercise Brolga Country 01, op.cit.**, p.3.
  21. **The Fundamentals of Land Warfare, op.cit.**, pp.6-8. Knowledge Edge and command and training are also seen as support to these functions.
  22. The M113AS3 upgrade is a one for one replacement project offering nil increased lift capability. The project will not deliver vehicles before 2005 and does not include any equipment to mount JOSCC/JOSTs. The M113 fleet will be reduced to 350 vehicles overall due to commonality and training implications. The ASLAV and Bushranger projects do not account for 3 Brigade mobility issues.
  23. Mobility options for FS either mortars or guns was limited to manpack or land rover. The guns remained in the vicinity of the DZ until transport assets were air landed. The key issue is mobility of the indirect FS available to early entry FE such as 3 RAR. Any solution must address this rather than focus on calibre. **Gates, P., McNicholas, D., and Saddington, S., Firepower in the ECF – Draft 2, pp.7-12** highlight the indirect FS options for the ECF based on current and future developments within FS. The 81mm is recommended to be maintained for use in infantry battalions and, therefore, early entry forces.

24. **Close Combat Study – Interim Report 1 Mar 01, Summary, p.1.** These studies were modelled in both open and restrictive terrain and considered a variety of situations. The use of indirect FS to suppress enemy defences during an assault and break up enemy assaults on defensive positions significantly improved success in close combat.
25. Project NINOX BOP for Brigade units was constructed by the LC Surveillance Workshop in May 00. **Attachment 1 to 1<sup>st</sup> Division Surveillance Issues undated** highlights the reduction to two GSRs for 3 Bde reside within 4 Fd Regt. It is understood this reduction has been subsequently ratified.
26. **Close Combat Study – Interim Report 1 Mar 01, p.9.**
27. The immediate coordination of effects by the JOSCC was highlighted on EX TANDEM THRUST. IO coordination was conducted by Divisional JOSSC personnel on OP STABILISE see **Beasley, K. *The RAA in Peace Support Ops. 3 Bde Capability Development Plan 2001 dated 30 April 2001, p.14*** highlights that the extant IO capability within the Brigade is poor.
28. The introduction of indirect fire in time for WWI allowed the withdrawal of guns from the front line. The essential horse drawn structure of artillery remains to the present day with the exception that vehicles have replaced horses.
29. ***The Fundamentals of Land Warfare, op.cit,*** Figure 6-3 The Knowledge Edge.
30. **Bailey, J.B.A. *Field Artillery and Firepower, The Military Press, Oxford, 1989, pp. 152 and 185*** illustrates the development of the FOO within World War Two.
31. **ibid., p.185.**
32. The proposed review must consider the full spectrum of POSTED. Particular emphasis must be given to matching personnel policy to operational capability.
33. **4 Fd Regt 2685/01 Ground Laser Target Designation Capability within 4 Fd Regt dated 10 Apr 01** informed a TYCCEP bid for FY 2001/02. This paper contains the technical data for both the IZLID and the LLDR. Initial outcomes from the Land Command CEC indicate that the LLDR was unsuccessful but the IZLID has been slated as a backup project and allocated \$17, 000 for 11 systems for the unit. A MINCS (L) for the LLDR is to be raised.
34. <http://defnet.cbr.defence.gov.au/disg/james/janes/jrew2001/jrew0237.htm>
35. **Williams, S.C. and Monks, P.D. D Bty 3 RHA Employment of FOO on OP AGRICOLA 4/5, pp.4-5.**
36. **Email from 1 RAR OP TANAGER Rotation Surveillance Tp Comd AMSTAR issues – various dated 13 March 2001.**
37. **Attachment 1 to 1<sup>st</sup> Division Surveillance Issues undated, 131<sup>st</sup> Locating Battery Surveillance and Target Acquisition Battery (STAB) Concept of Operations.**
38. The construction of a house requires each brick to be laid from the bottom up. This layered approach produces a solid foundation for the house. The house of capability is built from the top down. This approach prevents the erection of a solid foundation by withholding bricks from the lower levels. Such an approach endangers the house of capability producing instead a house of cards.
39. **Gates, op.cit., p.16.**
40. **Bollard, op.cit., p.6. Gates, op.cit., p.17.**

41. **Close Combat Study – Interim Report 1 Mar 01.** This study focused on company versus platoons in a variety of scenarios and terrains. The study did not undertake specific FS modelling although it was considered in various roles during the study. For example, the provision of obscuration and CB during an assault in urban terrain was essential with an LER of 16.06. This was sixteen times more effective than the baseline scenario of no obscuration and no CB. Other studies that have employed artillery include CAEN modelling of the Tennant Creek scenario, Justin Millikin and Taryn Castles, LOD-98-16-CR and CASTFOREN modelling of the RTA motorised company, Steven Lovaszy, Duncan Tailby, Colin Stanford and Steve Brewer draft DSTO technical report
42. **Bailey, op.cit., p.225.** This echoed WWI experiences: Brigadier Jardine, commander of the 97<sup>th</sup> Brigade of 32<sup>nd</sup> Division, ordered his men to within 30-40 metres of enemy trenches before zero hour. See **Edmonds, J.E. *History of the Great War: Military Operations 1914-Vol 1*, Macmillan, 1922, p.400.** The 5th division ordered its infantry to keep 25m behind the barrage.
43. This effect is regularly practised within 3 Brigade. The distance reflect the applicable safe distance IAW CTN 3-2 Orders for Practice and due allowance for range errors within the equipment.
44. Smart projectiles are delivered to the target area and then guided onto the target. Intelligent projectiles contain their own guidance mechanism.
45. **Bollard, op.cit., pp.13-14.**
46. **White Paper, op.cit., p.83.**
47. **Summersby, S. *Artillery Support to the Parachute Battalion Group***
48. <http://defnet.cbr.defence.gov.au/disg/james/janes/jmvl2001/jmvl0540.htm>
49. Winter, P.D. **Brief for LCAUST RAA issues arising from the White Paper Feb 2001.**
50. **loc.cit.** This brief notes that the likely introduction of the 120 AMS generates four calibres within the Army. Sustainability concerns are similarly echoed by **Email from Gates, P. 211515Feb2001.** Nor are these concerns new. WWI highlighted that standard equipment was essential for battlefield efficiency. This lesson was ignored and consequently re-learned by British forces during WWII. Equipment in 1939 included TA Regiments with the 18 pounder and 4.5 inch Howitzer. Regular units were equipped with the 25 pounder, 6 inch Howitzer, 3 inch Mortar and 2 pounder anti tank gun. Only after the BEF lost 60% of the Royal Artillery world wide ordnance in 1940, including the obsolete equipment, was a more modern re-equipment program commenced. **See Bailey, op.cit., p.169.**
51. Land Command Artillery reached a similar conclusion. See **Brief for LCAUST RAA issues arising from the White Paper Feb 2001, p.1. Gates, P., McNicholas, D., and Saddington, S., op.cit.,** conclude that the 105mm be withdrawn from service. The light armoured vehicle mounted 120mm mortar system is considered the best option to replace the 105mm. Land 17/18 are the projects for the identification of the 105/155mm replacement. Land 135 is the introduction of the 120 AMS.
52. **Gates, P., McNicholas, D., and Saddington, S., op.cit., pp.10-11.**
53. **Gates, op.cit., pp13-15.**
54. **Beasley, op.cit., p.1.**
55. **ibid., p.7.**

56. The concept of capability bricks or modularity is discussed in **Bollard, op.cit., pp.22-30.**
57. **Gates, op.cit., p.13.**

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