

TEAM CASTRUM

Generic Base Architecture
Forward Operating Base Exercise





INTRODUCTION

Generic Base Architecture (GBA) and Forward Operating Base Exercise (FOBEX) is a timely opportunity to evolve a solid design foundation for a vital requirement. As Team CASTRUM, it is our pleasure to participate in GBA and FOBEX @ Caerwent, February 2011, an important endeavour which begins to address the ambition to develop a Generic Base Architecture, and within this to demonstrate – at various levels of maturity - what is possible in terms of tactical systems integration.

The Team's work builds on significant internal investments, the fruits of which were successfully demonstrated in the form of a Level 0 Tactical Base during FOBEX @ Salisbury Plain, November 2010. This was conceived as being set within a multilevel enterprise architecture spanning the Tactical Base network, and incorporating a range of internal and remote ISTAR assets. Together these provided protection through shared situational awareness derived through the fusion of multiple inputs into a configurable command display.

In Caerwent we are demonstrating the development of our tactical systems integration work as well as our work on the GBA. The former includes the deployment of a Level 0 Tactical Base and its enhancement through Level 1 and beyond; and its subsequent reconfiguration and recovery.

Our approach is based on the following:

- a pan-DLoD vision of a 30-man Tactical Base as a modularised, integrated, reconfigurable, redeployable, and supportable system
- four design drivers: Safety & Security, Environment, Support & Training, Physical Interfaces
- the integration of sub-systems across these drivers, and the optimisation of effect and ease of management that flows from this
- our work on the General Vehicle Architecture
- comprehensive internal investment programmes into Tactical Base capability, a close involvement with the Land Warfare Centre, and learning from 4th Armoured, 16 Air Assault and 3 Commando Brigades
- our ability to partner quickly and effectively to bring collective and individual innovation across the Defence Lines of Development to this important capability area.



We have invested heavily to bring you this demonstration. We ask for two things in return. First, that you remain open to what you see, hear and experience. Parts of our demonstration seek to excite discussion around concepts, and parts seek to showcase mature products and systems. Please understand and appreciate the difference. And second, we ask that you are curious and engage closely with our people so that together we can develop a common understanding of the capability required and what is possible. This is important for the current fight, and also for investing in and developing solutions to support contingent operations.

We look forward to your engaging curiosity and openness,
Team CASTRUM

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SETTING THE SCENE

GBA and FOBEX is Defence's future deployable Tactical Base (TB) capability in the land environment. It is highlighted by the findings of SDSR and the evolving Defence Strategic Direction. The requirement for this development work is partly based upon emerging experience and operational requirements from Op HERRICK. It draws upon relevant lessons from the past, such as Op BANNER. Lastly, it derives conceptual provenance from the Defence Concepts and Doctrine Centre's Future Character of Conflict (FCOC) work and its derivative, Army Doctrine Publication (ADP) Operations. It should also reflect work being conducted now by Commander FDT's Ex AGILE WARRIOR forum, which seeks to inform transformational changes to doctrine. These will lead the Army towards a Future Force 2020 that must be agile enough to operate across a 'mosaic of operations' in the Project OUTPOST era.

TB is a fundamental part of the Forces' ability to project power forward and then to ensure that elements in the deployed area of operations enjoy adequate and cost-effective force protection. During Military Aid to Stabilization and Development (MASD) there is likely to be a need for a secure and flexible 'foot on the ground'. Out of this firm base, security forces can patrol to clear, then to dominate and hold ground, thus protecting the population and sustaining freedom of movement. In more exacting operational conditions the need may be for defended localities to serve as nodes within a networked matrix of wide-area ISTAR and communications assets.



They may be required to deliver life, command, logistic and fire support. Well-managed facilities will provide shelter, rest, security, ballistic protection and unified C2 for other security force elements, such as local police. They will act as a centre for the reconstruction efforts that are so crucial to modern Influence Activity. They may provide the 'core' around which security forces in the local area can safely satellite; or the fulcrum for air or ground manoeuvre, during more kinetic mounted or dismounted close combat. Even during major force-on-force combat operations, bases may be required to secure the sea and air ports of disembarkation, the lines of communications, logistical infrastructure; and even to ensure resilience against cyber attack.

Effective joint TB should be modular and simply deployable. In their design they will conform where feasible to open standards, thus allowing greater flexibility of configuration, interoperability and portability of component parts. This will also reduce logistic footprint whilst maximising their utility. A systems approach will ensure their individual integrity and architectural commonality across the generic 'family'. They should offer climatic protection in extreme conditions, 24 hour and all-weather performance, and be deployable in complex terrain. The future design for operations will be heavily reliant upon networked information and intelligence (I2) to support command. Bases should be protected by layered local surveillance, operating across the electromagnetic spectrum. This will also facilitate wide area coverage. To sustain this role, careful and elegant power and resource management will be required. All these considerations are very explicit in the Team CASTRUM approach.



THE OPERATIONAL SCENARIO



It is February on the edge of a village just outside the Green Zone. A project to rebuild and enhance a village primary school and replace the local electricity grid is about to get underway. As part of this a field troop of Royal Engineers will deploy to supervise and help local labour. While the locality is becoming more peaceful and signs of recovery are clear, the risk of insurgent sniper attack or intimidation cannot be discounted. The IED risk is medium. There is a high incidence of low-metal content IED, hampering normal methods of detection and potentially reducing tempo on the ground. Supported by a fire support team, a rifle company will deploy to provide assistance as well as local security and coordination. In the wider Area of Operations (AO), manoeuvre operations continue to bring peace, law and freedom of movement to the population. Without effective wide area surveillance, the risk remains that insurgents will try to infiltrate back into the AO to destroy the fragile signs of recovery.

Given the need for a swift but secure 'foot on the ground' an austere Level 0 Tactical Base (TB) will be established initially. It is centred on the school yard and based on a Mastiff command vehicle. A Joint Tactical Air Control party and the Royal Engineers field troop will co-locate with it. Local protection will be provided by one of the rifle platoons, and wider area security will be provided by joint patrols with Afghan National Security Forces (ANSF). Surveillance will be provided by a trailer-borne mast-mounted EO and radar suite and a matrix of UGS. Sniper shot detection capability is also available as is intermittent aerial surveillance by UAV. A crucial force protection asset is the ability to collate these ISTAR feeds in the command vehicle, and to integrate this local shared situational awareness with the wider common operating picture. This is based upon a secure link to Battlegroup HQ some 7.5km away from where any Quick Reaction Force, medical evacuation or reinforcements will come, either by air or road.

This new TB is potentially a key element in a matrix of ground-holding assets. If it proves defensible and communications-friendly, it may be further developed as part of an effective, force-protected and mutually supporting chain of C4ISTAR nodes, designed to facilitate even better domination of the AO.



A number of days elapse with little incident and the project makes good progress. The battle-group commander now recommends to CF(H) it is time to adjust his deployment. As part of this he intends to establish a longer term TB in the village in order to provide the desired enhanced security and freedom of movement for the local population. This is not least to protect the newly built school/community centre until ANSF authority is established. It will also act, as has already been demonstrated, as a crucial part of a wider communications and ISTAR matrix, serving as a secure 'foot on the ground' for manoeuvre and patrolling. A more permanent Helicopter Landing Site, covered by view and fire, is to be built on the open ground on the village perimeter. Regular standing patrols will also be needed to assure its wider security, until automated surveillance assets can be deployed to strengthen local FP.

The TB will provide a secure base for a rifle company in a ground holding role comprised of two UK and one Afghan National Army (ANA) platoons, with Afghan National Police support. It will support and be supported by two Check Points just outside and along the main route through the village. Each of the three platoons will rotate through the following tasks: (1) Check Point operation and security (2) TB security and quick reaction force and (3) local area patrolling. The site of the TB has room for expansion should this be required.

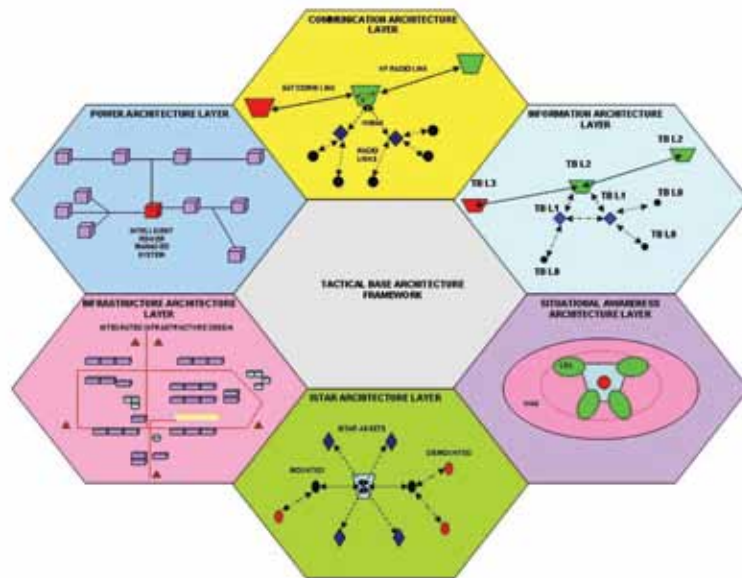
The battlegroup plan envisages the Level 0 TB remaining in place until the new base and Check Points, the sites of which are within its local ISTAR footprint, have been built to Level 1. This will provide a minimum of support to maintain basic health and tactical C2. At this point, the Level 0 TB will close down and occupy the Level 1 site. The Level 1 TB, then in operation, will be further developed up to Level 2 to enable safe and secure operation all year round. In time, it is seen as a potential police station and barracks for ANSF, providing a logical alternative to breakdown and disposal.

ARCHITECTURE

Team CASTRUM is pleased to be supporting the MoDs GBA and FOBEX initiative, aimed at providing Defence Standards covering Forward Operating and Tactical Bases to provide cost effective scalable solutions with an open architectural approach at the core. This builds on the work done within the Force Protection Mission System Working Group on Generic Vehicle Architecture (GVA)

For a Tactical Base to be considered as a system, a system architecture is required. This is key to ensuring that the Tactical Base Enterprise Architecture is realised to meet all of the enterprise requirements or needs. Team CASTRUM has outlined a system architecture concept which encompasses the need to improve operational efficiency and drives towards a reduction in the cost of ownership.

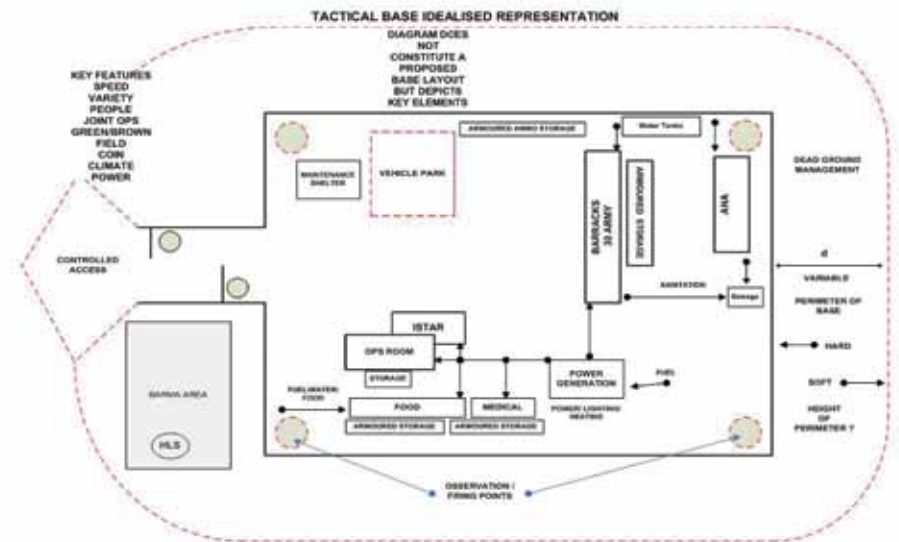
The conceptual diagrammatic view below illustrates some of the key architectural facets that comprise the overall complex System Architecture of a Tactical Base. Each individual facet is a self contained architecture in its own right but when all of these architectural facets are combined the resulting System of Systems provides and underpins the totality of a GBA.



The above representation aligns with and supports the Land Open System Architecture concept used by the UK MoD and provides an integrated framework on which to develop the architecture to satisfy both the current and future operational requirements for Tactical Base deployment.

The term “Generic Base Architecture” refers to the open, modular and scalable architectural approach adopted by Team CASTRUM for the design of Tactical Bases. Scalability of approach will cover the Tactical Base Level designation of 0 to 3. In effecting migration from one level to another in either direction, scalability will be both horizontal and vertical. To permit this, cross-DLOD considerations will be fully addressed .

To illustrate this the diagram below represents an idealised view of some of the key features which comprise a Tactical Base. The capability and service provision level depends entirely upon the designated level of the Base.



Team CASTRUM's key considerations in developing the Generic Base Architecture Framework encompass all of the following aspects:

- Safety and Security
- Environment
- Physical Interfaces
- Support Requirements
- Training.

Team CASTRUM Generic Base Architecture will be developed within the context of the enhancement and combination of GVA and Generic Soldier Architecture (GSA), in order to provide an overarching and coherent Systems of Systems approach.

ARCHITECTURAL LAYERS: SOLUTION VIEWS OF GBA

Each member of Team CASTRUM provides a key element of the architectural framework forming GBA. Each layer of the framework can be considered in service terms as “Core” or “ Platform” and these are dealt in detail by each of the team members in the subsequent pages.

Core Services:

Power: BAE SYSTEMS & ROLLS ROYCE

In this era of austerity and the desire for a greener footprint the power architecture is becoming increasingly important to ensure that the demands of fuel efficiency and cost reductions are realised. Paradoxically, the power demands of hungry comms-electronic devices are becoming ever-heavier. There is a pressing need to decrease the demand on the logistic burden of re-supply and the associated effort of Force Protection to service that re-supply. Power generation and distribution needs to be managed intelligently and efficiently at any level of Tactical Base and this aspect is fundamental to GBA and its subsequent development.

Data: FINMECCANICA BATTLESPACE SOLUTIONS

Information is key and Information Superiority is King if we are to dominate the networked battlespace of the future. Tactical Bases operate in the information space and as such are considered to be acting as nodes in an information networked architecture. Tactical bases collect, process and disseminate information from around the battlefield and beyond. Information dissemination must make efficient use of the available bandwidth provided by the communications architecture. The efficient flow of information around the battlefield depends upon each of the architectural layers working as a whole within the framework of GBA.

At the centre of each node is the Integrated Operations Room from which Command and Battlespace Management is conducted. The importance of an integrated operations room cannot be understated and is essential to meet the ever increasing demands of:

- Command and Control
- Force Protection
- ISTAR
- Lethality
- Logistics.

And to support ground and air manoeuvre elements in the surrounding AO and the wider area of influence beyond.

Shared Situational Awareness (SSA)/ISTAR: SELEX GALILEO

A robust scalable, modular electronic infrastructure providing a resilient LOP is a vital component of the SSA and ISTAR architectural layers.

An array of networked sensors provides data which is fused together with available ISTAR data feeds to deliver both Base Protection and Force Protection capability. Most importantly this feeds the overall force COP which is the basis of shared situational understanding (SSU) across the AO. The FOB is a vital node in the C4ISTAR network that MAY assure the persistent wide area surveillance upon which Information Dominance will depend.

System Information Exploitation (SIE): IBM & PARADIGM

Considering a Tactical Base as a system it becomes important to monitor the status and health of the system. SIE (not to be confused with the shared intelligence environment) is now a major aspect of the Information Architecture layer within GBA. SIE will benefit the Commander and also the logisticians, to ensure improved operational effectiveness and cost of ownership.

Communications: SELEX COMMUNICATIONS & PARADIGM

To enable a Tactical Base to operate in a hostile deployment it is vitally important to have a robust communications architecture. Enabling information to be passed up and down the chain of command and also provided to force elements on the ground. Without a robust communications network architectural layer the information layer of the GBA framework cannot function effectively. Communications Architecture is the basic framework component for NEC. Communications Architecture Layer also provides internal communications capability that is vital to fighting the Tactical Base effectively. SSA is crucial to developing Understanding – both local and wider. Robust, resilient and wideband multi-mode, multi-band communications are the key to this capability.

Physical Protection: MARSHALL SV

The provision of Tactical Base security for protected work space in a rapidly deployable format is a developing theme in the Infrastructure layer for GBA. Conventional static physical protection is time consuming and labour intensive and in a dynamic tactical environment may not be the best solution albeit provides the maximum protection. Rapidly deployable structures providing adequate physical protection with the added value of being able to deploy kinetic force are now part of an integrated infrastructure design providing protection, modularity, scalability and agility requirements of GBA.

Platform Services:

Base Protection: SELEX GALILEO & MIRA

Base protection is served in part by an all-seeing information and intelligence (I2) architecture that directly contributes to local shared situational awareness (SSA) and to Understanding. This provides the capability to minimise areas of dead ground and to enrich the base STAP. This architectural layer also provide an element of force protection, supports combat logistic patrols in the AO and offers mutual support of other Tactical Bases within the Tactical Base area of responsibility. Dead Ground management is undertaken by the use of an Unmanned Ground Vehicle deployed to area where the use of Unattended Ground Sensors is not suitable. This can also act as a comms relay or carrier without placing troops at risk.

Physical Infrastructure: MARSHALL SV & HERTEL

Underpinning the entire physical framework is the infrastructure layer which provide the life support fabric for man and machine alike. No matter what level of Tactical Base infrastructure, composition and layout are vitally important to ensure operational effectiveness. All services and capability provisions are founded on a, robust, ergonomically sound and well deployed infrastructure.

Accommodation: HERTEL

At the Tactical level any accommodation for Level 0 or 1 bases must be rapidly deployable and provide a protective environment for its occupants and their equipment. In this case the Integrated Operations Room will be deployed in such an enclosure which will be erected and then equipped for operation as the base main command post (CP).

Command support: NSC

As part of command support effective training for the commander to be able to operate effectively is essential. Skill sets need to be developed to be able to make effective use of the capabilities GBA will deliver. These must be backed up by development of appropriate TTPs and C2 doctrine – and this must in turn be reflected in adequate training and educational provision. This is part of the holistic cross-DLoD approach that Team CASTRUM has embraced.

WHAT YOU WILL SEE AND EXPERIENCE

You are now in a representative Level 2 Tactical Base. The following scenario describes the journey from what was a “green field” site.

A 2-stage operation was mounted to secure and hold the local Area of Operations. In the first stage, a joint UK / ANSF platoon occupied and established a platoon sized Level 0 patrol base. The platoon cleared the local area around the selected site and posted perimeter security at planned cordon positions. The platoon headquarters vehicle along with the company tactical headquarters and the Observer Force Protection/ISTAR asset then occupied the central position and deployed the mast-mounted area surveillance systems. Concurrently, the perimeter local surveillance systems were deployed out to the corner sentry positions, creating a “soft” perimeter. Once the Level 0 patrol base was established, operations to secure and protect the population commenced.



In the second stage, the remainder of the company group joined the vanguard platoon to reinforce the patrol base. The integrated operations room, once established inside a protected shelter close to the platoon headquarters vehicle, assumed control of the operation. Concurrently the perimeter of the patrol base was extended with the redeployment of the cordon, perimeter surveillance systems and the establishment of perimeter force protection sentry positions and walls. The platoon headquarters vehicle – now closed down - moved out with the GVA Panther to occupy Check Point BLACK to the east. The second joint UK / ANSF platoon deployed to occupy Check Point BLUE to the west.

Once the command, control, communications, computers, intelligence, surveillance, target acquisition and reconnaissance (C4ISTAR) and force protection (FP) assets had been established and the perimeter made secure, the combat service support (CSS) infrastructure was deployed into the tactical base (TB). This included power infrastructure, an ablutions unit, a laundry unit, an incinerator, a Field Sanitary Support Unit, an antenna farm, a Company Aid Post (CAP), a water bowser and a Petrol Oil and Lubricants (POL) point. This completed the establishment of FOB CASTRUM, a company group Level 2 TB.

As part of the company surveillance and target acquisition plan (STAP), framework patrols are now being conducted, unmanned ground vehicle (UGV) and unmanned aerial vehicle (UAV) missions are being tasked, dead ground surveillance has been deployed to cover the south and a light electronic warfare team (LEWT) is in operation.



In terms of how the TB was brought together, the infrastructure was delivered in a planned and logical sequence of pre-prepared load packages (each capable of being delivered by in-service vehicles, support helicopters (SH) and other potential delivery systems, including ultimately of being manhandled into its final position.) This approach ensures that individual elements arrive with sufficient preparation to enable them to be swiftly connected (if necessary) and efficiently integrated within the TB. Careful planning also ensures that the correct delivery sequence and modular equipment packages deliver the optimum maturity solution from Level 0 to Level 2. The process has sufficient flexibility for it to be adapted for a wide range of different operational scenarios. The process also is also reversible so that the TB can readily be dismantled/redeployed, partially or fully. We will also demonstrate through our system architecture how the TB can be efficiently upgraded through life.



FINMECCANICA BATTLESPACE SOLUTIONS

Integrated Operations Room



The relative complexity and tempo of current operations place increasing demands upon the key functions of Command and Control (C2), and Information and Intelligence (I2). It imposes a heavy cognitive load on the personnel who support these, within the modern Tactical Base (TB).

A fully integrated base operations room command post (CP), acting as the core for future C2, is vital to ensure that these demands are met. To achieve the required levels of mission effectiveness, sustainability and efficiency, future CP will need to be better connected, automated; and far more interoperable than before. New levels of integration, flexibility and scalability are required to conduct complex battlespace management (BM).

Scalable and Flexible – Transition from Level 0 to Level 1

During the demonstration exercise, the CP will be housed in a rapidly-deployable hardened shelter employed at the Level 1 Tactical Base. This will have taken control from the command vehicle (CV), following initial set-up and installation. This action completes the initial transition from Level 0 to a Level 1 Tactical Base status, thus allowing the CV to be re-deployed for other duties. These might include deploying in support of ground patrols, or acting as an alternate CP.

Open Architectures and the Evolution of the Generic Base Architecture

The integration demonstrated within the CP illustrates the benefits to be derived from an open architectural approach, thus providing increased functionality and compatibility.

This demonstrator is a significant step in the development and definition of the future generic base architecture (GBA) protocols and GBA compliant solutions.

Features of the Integrated Operations Room CP

A significant feature of the Integrated Operations Room is that it is a node within a scalable and flexible network of FOB CPs. It incorporates increasingly automated C2 information systems, as part of a unified, interoperable, end to end digitized network.

The core solution consists of:

- A commander's or watchkeeper's station, fusing a rich local operating picture (LOP) and creating the basis of shared situational awareness (SSA)
- A G2 ISTAR Station bringing in feeds from intel applications and assets such as TIGR, IPA and CIDNE within the shared intelligence environment (SIE); thus enhancing understanding
- A Communications Station, allowing the CIS staff to engineer network access as required
- A Logistics/Facilities management Station.

The open architecture also enables the ready integration of other C4ISTAR and strike assets as required, controlling:

- Fires – JTAC/FST, SA and RWS
- UGV and UAS remote viewing terminals
- Electronic warfare and ECM(FP).

Improved tactical C2, based on superior SSA and FOB management services.

Our concept is to provide timely, accurate, yet easily-presented and understood local area information to the watchkeepers and other operators, linked to the wider common operating picture (COP) and ISTAR feeds, in order to enhance force protection and to support networked C2 across the force.

The core of the operations room CP is the Gigabit Ethernet backbone which provides the main data highway for service distribution. In addition, there is a Sentinel 100Mbit network for linking communications into the CP from dismounted and mounted units on patrol in the local area; and a Paradigm secure network providing satellite communications (SATCOM). Other feeds are also available including deployable tactical SATCOM (TacSAT); thus enabling various information exchange requirements (IER) to be satisfied, both locally and across the wider coalition, 5 EYES and UK network.

VANTAGE is the SSA backbone that is resident at all the operator stations within the CP, providing a real-time visualisation of multiple sensors, in conjunction with a georeferenced local operating picture (LOP). The basic components of this picture are shared but the 'view' can be configured to the role and requirements of each operator. We use standard interfacing that allows the rapid visualisation of sensors (ours and third parties in this instance) as well as implementing interfaces to higher level C4ISTAR assets. This allows the various elements of information to be easily captured and depicted, according to the precise information needs of the watchkeeping staff and the specialists within the CP (LEWT, COIST etc).

Included in the functionality provided by VANTAGE, are aids for information management and exploitation (IM/IX). These contribute to overall Knowledge Management (KM), on-site analysis and reach; and support appropriate, timely decision-making. Specifically for this demonstration these include:

- Blue force tracker (BFT) based on EZ-PRR as a data bearer
- Hydra UGS (seismic, optical, acoustic etc)
- Fused automated position location (APL) of ground and air platforms, derived from other inputs such as BFT, GrATS etc
- Boomerang hostile firing point (FP) detection
- "Honesty Trace" information from patrols based on TIGR
- New comms status reports
- Automatic threat detection.

The flexibility of our concept has enabled the integration of an RWS operator station within the CP. Although recognised as not current practice, this demonstrates the possibility of providing centralised monitoring and control of direct fires allowing better courageous restraint in the defence of the FOB. This illustrates how an integrated approach could subsequently lead to a reduction in required manning levels within a FOB.

Access to FOB systems within the Ops Rooms:

- Boomerang
- Camera feeds from the Cougar
- Remote queuing of the RWS
- View and control the Observer
- View PINZ Camera
- Blighter feeds
- UAV Camera Feed
- UGV Camera Feed
- I2D (for reports)
- Comms monitoring
- GVA compliant inputs – vehicle status etc.

Screen Shots from VANTAGE management system



FINMECCANICA BATTLESPACE SOLUTIONS

Common Operating Picture



With the diverse array of sensors providing output having a Common Operating Picture is essential for effective and timely decision making.

By leveraging from our wide ranging expertise in sensor types we are able to integrate from a large supplier base a large number of existing and new sensor feeds to provide the user with a single view of the Battlespace that provides enhanced situational awareness and makes a complex environment readily understood.



FBS Sensor Integration capabilities:-

Visualisation

- VANTAGE Situational Awareness Tool (also delivers sensor control and C2).

Sensor Integration

- Unattended Ground Vehicles
- Unmanned Aerial Systems
- Manned ground and air systems
- Highly mobile (trailer based) systems
- Static.

Visualisation

VANTAGE has been built from the ground up to integrate a broad range of sensor inputs and display these to the user in a readily understandable format. Able to manage inputs from a vast range of inputs including:

- RADAR
- Daylight and IR cameras
- Unattended Ground Systems
- Passive InfaRed (trip wires)
- Seismic
- Acoustic
- Sniper detection systems
- UAV and UGV
- Personal Role Radio
- Soldier System Radio.

Sensor Integration

UGVs

Increasing use is being made of previously manned vehicles being used as UGVs to provide Situational Awareness of difficult and dangerous terrain. By leveraging from assets already in service these capabilities can be achieved faster and at lower risk than ever before

UAV

UAVs provide a valuable source of information for enhancing Situational Awareness. With increasing levels of deployment of UAVs VANTAGE is able to integrate from a wide range whether mini and micro through to strategic, high level long endurance.

Manned Ground and air systems

As a major provider of the sensing systems deployed in the manned ground and air domain we have a deep and broad understanding of the complexities associated with image transfer including advanced data compression and management techniques that enable this capability even in environments where bandwidth is restricted

Highly Mobile (trailer based) systems

The use of trailer and containerised systems is increasing as FOBs become more mobile, and often operate in Urban terrain where space is a premium. These systems can provide a low cost, rapidly deployable surveillance asset that doesn't require a dedicated and expensive vehicle.



The number of sensor systems in operation are rapidly increasing, and thus the importance of being able to provide a Common Operating Picture that is able to integrate a large number of sensors and provide the user with an easy to use interface is critical:

- Maximise all sensor types
- Leverage from legacy and in-service sensors
- Ability to integrate new and emerging products
- Able to operate across land, maritime and air domain
- Able to interact with manned and unmanned systems.

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MARSHALL SPECIALIST VEHICLES

SafeBase® Armoured Sentry Position



Marshall Specialist Vehicles (MSV) will demonstrate the ability to rapidly deploy an armoured sentry position to provide enhanced force protection.

SafeBase® builds on proven shelter technology to deliver a rapidly deployable sanger solution based on industry standards that will fit well with the GBA principles of generic, modular and scalable solutions.

SafeBase offers the user a scalable armoured solution built around and MSV ISO container design which has been proven through 30 years of in service and operational use. The display unit demonstrates STANAG 4569 Level 2 protection but this can be tailored using alternative armour solutions including appliqué, ceramics and gabions.

There is also the option to have armoured walls deploy from the container to immediately provide cover from view, force protection and security.

MSV through its joint venture Lorica Systems UK can tailor an armour solution to a user's requirements of mass and cost.

The SafeBase being demonstrated at GBA and FOBEX incorporates the SELEX Enforcer Remote Weapon System (RWS) which itself encompasses a 12.7mm Heavy Machine Gun with a box magazine with capacity of 200 rounds. The system can also be converted to house the 7.62mm GPMG with a 500 round magazine or a 40mm Grenade Machine Gun.

The sangar has removable armour panels enabling a sentry to engage from within the position should the need arise.

Key Capabilities

- Rapidly deployable
- Minimal logistics footprint
- Scalable armour solution
- 12.7mm Remote Weapon System
- Cover from view.



Expanded Capability Description



The upper sentry box is self contained within the ISO envelope for shipping. For operation, the upper sentry box elevates fully within a few minutes at the touch of a button.

Once deployed the protection offered by the SafeBase® system can be further enhanced using sandbags or gabions to build the position. The armour panels are appliqué and so should gabions be available, the base armour can be reduced and thus the mass of the system.

SafeBase® utilises Marshall's proven experience with container solutions enabling it to be transported by Land, Sea, Rail and Air using international ISO interfaces. The integrated forklift pockets enable the system to be manoeuvred and positioned.



The corner mounted container lifting system also enables SafeBase to be unloaded without the need for handling equipment.



Marshall Specialist Vehicles (MSV) excels in rapidly designing, manufacturing and supporting complex shelter based deployable systems for military and non military users worldwide.

MSV offers a range of protection (and blast, fragmentation and ballistic levels) including CBRN, EMC, EMI and EMP for rigid shelter based solutions on vehicles and transportable ground operated systems.

Lorica Systems UK

MLS and Plasan have recently embarked on a joint venture agreement. Incorporated within a sovereign UK registered company, Lorica Systems UK Ltd unites Plasan's armouring and protection skills with MLS's project management and platform integration capabilities. Lorica Systems UK Ltd will provide solutions incorporating the skills of its two parents and other capabilities as required.



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MARSHALL SPECIALIST VEHICLES

Expeditionary Campaign Infrastructure; Laundry, Ablutions and Incinerator



Marshall Specialist Vehicles (MSV) will demonstrate rapidly deployable Expeditionary Campaign Infrastructure in the form of Ablutions, Laundry and Incinerator.

Each unit is designed with commonality and scalability in mind thus forming part of an overall Generic Base Architecture (GBA). All units are currently in operational service with other armed forces.

Incinerator

The MSV incinerator uses diesel or gas to burn 20 kg of waste per hour at a temperature of 850 degrees Celsius. The incinerator has a capacity of 0.13 m3 equating to about 50kg of waste.

The unit has a secondary combustion chamber which ensures all gases are re burnt.

A bolt-on heat recovery system for hot water can be attached to the unit to further reduce energy costs.

This model of incinerator is used by the US Army in Afghanistan as well as the US Navy, United Nations, Medecins Sans Frontiers and the Norwegian Red Cross.

The model demonstrated is mounted in a 10ft ISO standard container for ease of transport but could easily be dismantled for more permanent operations.

Key Capabilities

Incinerator

- Efficient waste reduction
- In service solution
- Heat recovery system

Ablutions & Laundry

- 5 weeks use from one bowser fill
- 80% reduction in water use
- 10 days continuous operation before refill
- In service solution
- 10 days continuous operation before salt refill.

Expanded Capability Description



Ablutions

This ablutions unit consists of three toilets, three showers, two wash basins and 1 urinal. The system is fully air conditioned and can be set up including integral levelling by two persons in two hours.

The built in water treatment appliance has been fully tested by the Norwegian Army in Kosovo. This gave them an 80% reduction in water use from 25,000 litres per week to 5,000 litres per week.

Using salt tablets to purify and recycle the water, a single fill of 150kg of salt lasts for 10 days.

Laundry

The laundry unit incorporates six washing machines capable of cleaning 6.5kg of clothing per wash cycle. It also houses six dryers and as the ablutions can be set up by two persons in two hours. The laundry uses the same water treatment appliance as the ablutions to give an 80% reduction in water use.



Marshall Specialist Vehicles (MSV) excels in rapidly designing, manufacturing and supporting complex shelter based deployable systems for military and non military users worldwide.

MSV offers a wide range of infrastructure solutions which are currently in service with NATO member states.

MSV solutions are scalable, easily deployable and require minimal logistics footprint.

MSV can also offer;

- Field Kitchens
- POL Storage
- Waste Treatment
- Demolition
- Deployable Armoury
- Forensic Laboratories
- Mobile Field Hospitals
- Command and Control Centres
- Deployable Machine Shop
- Ground Control Stations
- UAV Transport Containers
- Deployable Staff Working Environment.

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FORTIS™ is an innovative and pioneering modular shelter which offers extensive blast and ballistic protection for its inhabitants.

A modular and flat-pack protective shelter that is rapidly deployable (and re-deployable) via a helicopter USL, DROPS or air drop platform.

Rapidly assembled by a team of four with just one tool, FORTIS can be configured to meet the requirements of field accommodation, medical facilities and command and control centres whilst providing a protective environment for expeditionary or deployed forces.

Recent testing at Faldingworth & Otterburn has proven FORTIS to offer substantial protection against 7.62mm, 50 calibre, RPG-7, & commonly used mortars.



Key Attributes

- Modular and Lightweight construction
- Proven high level of blast and ballistic protection
- No requirement for mechanical plant equipment
- Adjustable protection levels
- Rapid construction with just one tool
- Minimal training requirement
- Multiple configurations.



Providing protective shelters for hostile environments

The FORTIS shelter is a versatile and adaptable modular shelter consisting of panels easily assembled by four persons as a small accommodation block, or as a large complex to suit your requirements.

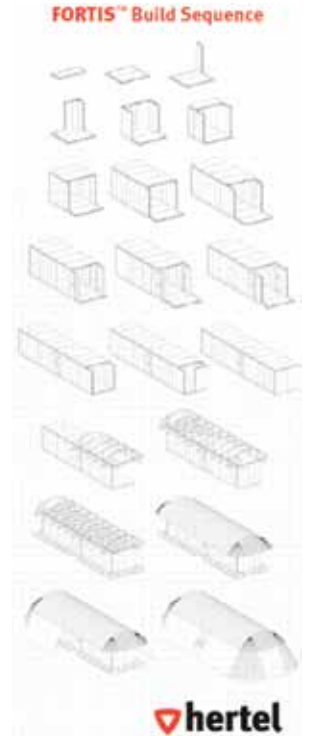
The FORTIS shelter can be adapted for any purpose you require, including medical, first aid, logistic and command centres and single and multiple accommodation units.

The FORTIS shelter is lightweight and efficiently packed on a pallet which is easily transported via helicopter, ISO container, cargo aircraft or road freight.

To minimise assembly time the FORTIS components are packed in construction order meaning that the immediately required sections are the first to be unloaded.

FORTIS can be assembled by four persons and minimal ground preparation is required to ensure the structure is level. This can be accomplished manually by simply levelling soil/gravel.

Each of the panels is simply offered up and locked together using an 8mm Allen key (the only tool required in the build process). A typical 36 m2 unit can be assembled in less than two hours. The dismantling procedure is simply the reverse of the assembly procedure.



Contact;

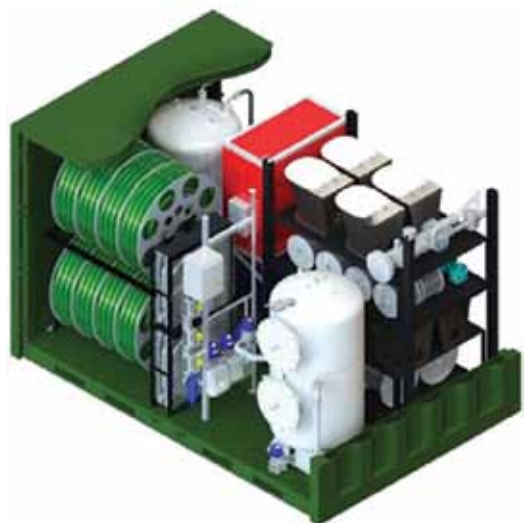
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HERTEL IN PARTNERSHIP WITH TRANSVAC

AddVac™ Field Sanitary Support Unit



The Standard AddVac™ (FSSU)
Field Sanitary Support Unit

AddVac™ Concept:

The AddVac™ (FSSU) Field Sanitary Support Unit is a fully containerised unit which has been specifically designed to provide flexible, effective and hygienic toilet facilities to support the demands of both rapid reaction – “first in field” and semi-permanent camp facilities.

The AddVac™ concept forms part of a group of innovative waste management solutions and offers total flexibility to suit all applications.

AddVac™ System Description:

The Standard AddVac™ Field Sanitary Support Unit (FSSU) on exhibit at GBA and FOBEX 2011 is a Black Water transportation system which collects, holds and transfers sewage via pressure differential. The system has been designed to operate either independently or in conjunction with other camp facilities

Key Attributes

AddVac™ allows the operator to employ systems with the following options:

- Standard Unit- Collect and hold basis (for small camps) for up to 80 personnel
- Standard Unit - Collect and batch transfer to Advanced MBR Works (for larger camps)
- FSTU Treatment Unit - Collect, hold and incinerate all waste for up to 30 personnel
- Self-Contained Ablution Units – Includes washing and toilet facilities for up to 30 personnel.

A typical system includes a purpose-made half sized 1D, 1DX Type ISO Containing

- **Collection Plant:** - Skid mounted comprising a stainless steel (AISI 316) two chamber pressure vessel, control panel, level switches, pressure switches, piston pump and motor operated valves
- **Power Pack:** - comprising a 24 volt battery pack, an inverter drive (24 volt dc to 240 volt ac) complete with battery health monitoring software and 4 Kva diesel generator (automatic start)
- **Water Pressure Set:** - Skid mounted comprising a stainless steel (AISI 316) pressure vessel complete with piston pressure pump, level switches, pressure gauges and isolation valves
- **Vacuum Discharge Pipework and Manifolds:** Eight in number 30 metre coils of 2” reinforced discharge hose complete with camlock connections. Three in number distribution manifolds c/w isolation valves
- **Vacuum Toilets & Interface Valves:** Eight in number floor mounted stainless steel (AISI 316) vacuum toilets (shock compliant to MILSPEC 901D & NES 814) and one in number Vacuum Interface Valve for bedpan disposal.

AddVac™ Advantages:

- The AddVac™ FSSU is totally self supporting & does not require additional power or water
- The stainless steel toilets use leading vacuum technology. The toilets consume 75% less fresh water than conventional units without smells
- The AddVac™ system uses small bore flexible pipework to interface each toilet. Vacuum sanitary systems do not require a gravitational fall and can offer up to 4 metres lift capability. As a result, the collection plant can be located on the same level as the toilets
- The vacuum toilets can be located up to 40 metres from the collection container. The blackwater is contained within the collection tank, thereby isolating contamination and allowing the toilets to be located within living areas and medical reception centres
- Additional AddVac™ units can be included in a sanitary arrangement to cater for increased hydraulic loadings as camps grow in size
- The AddVac™ unit is primarily a collect/hold system. However, the fully automated level control and discharge arrangement enables the system to be interfaced with further treatment processes such as Biological or AWTP MBR systems.



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Solutions for Defence &
Humanitarian Societies

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SELEX GALILEO

Situational Awareness and Force Protection



Within Finmeccanica SELEX Galileo are a major provider of sensors, integrated sensor systems, Force Protection and C2.

Committed to improving Situational Awareness to enhance troop safety in the demanding conditions of current deployments SELEX Galileo are delighted to be able to exhibit a range of products at this event.



SELEX Galileo products being displayed:-

Command and Control

- VANTAGE Situational Awareness Tool.

Sensor Systems

- Mobile Surveillance Vehicles
- Observer 100 mobile surveillance System
- COBRA integrated Electro optic sensor unit
- Hydra Unattended Ground System.

Vehicle Situational Awareness

- Drivers night vision system
- Vehicle 360° situational Awareness.

Protection

- Enforcer Remote Weapon Station.

Command and Control

Providing immediate Situational Awareness through the integration of remote sensors, VANTAGE users are able to manage assets, track events and prioritise potential threats whilst reducing operator workload.

- Provides the user with a common operational picture
- Integrates sensor outputs into a single display providing:
 - digital mapping
 - video display
 - sensor control panel.

Sensor Systems

Mobile Surveillance Vehicles

Providing Cougar and Pinzgauer with the Remote Weapon Station (Enforcer) coupled with the STAWS system to provide enhanced Force Protection and the COBRA Electro Optic, Blighter RADAR and DNVS for Situational Awareness.



Observer 100 – trailer mounted surveillance

Observer 100, is a trailer mounted mobile surveillance system providing:

- Electro optic and radar target detection, other head units such as EW or comms can be fitted
- Mobility – Towable by Land Rover sized vehicle, can be helicopter lifted and suitable for air transport
- Self sustained operation for approx 30 days, rapid deployment in under 5 minutes from parking to operation
- Data link to remote operator terminal
- Interfaced to VANTAGE Situational Awareness tool.

COBRA Integrated Electro Optic head

- Modular Optical fit
- HAWK 3rd Gen TI
- Stabilised
- Able to operate in harsh environments.

Hydra Unattended Ground Sensors

Hydra provides a self forming wireless communications mesh which can be a data carrier and manage a range of sensors:

- Electro optic
- PIR, Acoustic, Magnetic, Seismic, ChemBi.



As a major provider of Sensor solutions, Force Protection and C2 systems to the UK MOD and Armed Forces around the world SELEX Galileo are able to deliver solutions that meet the demanding needs of the user; help them see, keep them safe:

- Improved Situational Awareness
- Improved Force Protection
- Effective C2.

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SELEX GALILEO/SCIMITAR

Air Land Integration and Contract Air



Air Land Integration and Contract Air.

It has been recognised by the Ministry of Defence for some years that there is a requirement for a co-ordinated approach to the execution and training associated with the Air / Land interface. The operations in both Iraq and Afghanistan have accentuated these issues. Air power has been used in very close proximity to ground troops yet there has been little specific training undertaken during the work up phase prior to deployment. This has been due to the non availability of dedicated training assets and operators that understand the operational environment can interact with the airspace managers and deliver full motion video to ground commanders and forward air controllers that meet their individual needs.

For the last 18 months SELEX Galileo and Scimitar have been working with the Land Warfare Centre, OPTAG and JFACTSU to provide this type of training to the Brigades during their pre-deployment training in the Salisbury and STANTA training areas. The Surrogate UAV aircraft equipped with an EO camera has been meeting the requirement for imagery into the Brigade HQ in support of the company commanders, and at the same time conducted close air support profiles in support of the exercises controlled by the company forward air controllers using the equipment they will deploy on operations.

This initiative has ensured that the Brigade personnel involved in air / land integration arrive in theatre better prepared for their tasks ahead.

Key Capabilities of Contract Air

Highly-experienced ex-military fast jet pilots

Maintaining relevant currency through constant engagement with the front line

Responsive approach to training requirement

Rapid insertion and integration of capability

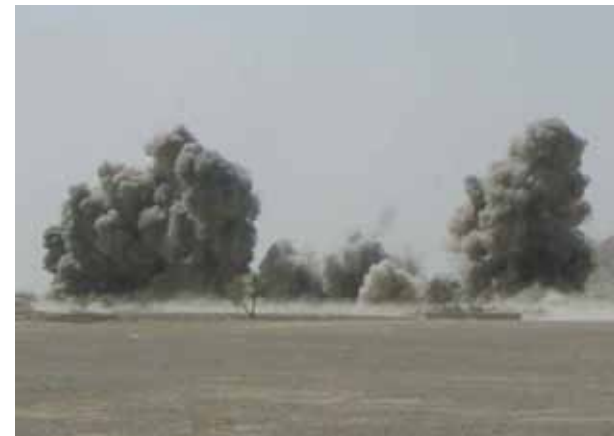
Developmental approach to training with an operational focus



Provided 150hrs of surrogate UAV, ISR and CAS provision for pre-deployment CFX, FTX and CALFEX over past 18 months

Received regular front line briefings from AIR and LAND environments pre, during and post each Ex

Engaged with WHITE forces, FLCs and in particular, the end users, in order to refine service provision to maintain relevance and currency



SELEX Galileo specialises in battlespace, airborne and naval electronics, delivering to our customers total awareness, total protection. Help them see, keep them safe.



Scimitar specialise in the cost effective delivery of relevant training using representative technology and current SOPs, to the LAND and AIR environments, who can use their in-service equipment, at their required battle rhythm to learn, train, maintain currency and develop.

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IBM in UK Defence today: Trusted to deliver. UK Air Defence Ground Environment: Implemented the air surveillance and interceptor command and control systems, integrating multi-radar tracking and voice systems and collating the vast quantity of real-time information which fighter controllers use to manage the battle and presenting this information in a modern, easy to assimilate graphical user interface.



Data Link Processor System: Implemented on board ships of the Royal Navy, Federal German Navy and the Canadian Navy as well as autonomously for the Royal Marines providing Link 11, Link 16 and Link 22 Tactical Datalinks.



International Technology Alliance: Research programme jointly funded by the MoD and the US Army Research Laboratory into:

- Network Theory
- Security across a System of Systems
- Sensor Information Processing & Delivery
- Distributed Coalition Planning & Decision Making.

Generic Vehicle Architecture: We are working with D Land and a number of Industry partners developing a Defence Standard for a Generic Vehicle Architecture and System Information Exploitation capability that will shape future joint operations providing Comprehensive Situational Awareness to commanders and logisticians. DEFSTAN 23-09 has now been produced and is published by MOD.

GBA and FOBEX 2011

Building on the work with the Generic Vehicle Architecture (GVA), IBM is working to extend its software solution for an electronic architecture into fixed locations. This capability allows information to seamlessly share a single infrastructure in the FOB environment by making use of the principles of an open architecture over available communications media. Deploying a common intelligent infrastructure throughout the network allows decoupling of local systems and applications thus eradicating 'stovepipes'. Effectively the FOB becomes a platform which comprises many sub systems (situational awareness, water, fuel, power, etc.). By utilising an open architecture, information from these sub systems can be integrated and shared to inform Logisticians and Operational commanders on the status of the FOB leading to greater agility and cost savings.

IBM is committed to the adoption and use of open standards so that solutions from different suppliers can inter-operate. This, in turn, enables customers to adopt solutions from any supplier willing to work to the standards, encouraging both innovation and competition. IBM's demonstration at GBA and FOBEX 11 is designed to meet this objective and to make use of COTS products providing developers with a platform on which they can build their own applications. Critically it also shares the same technology that MOD has down selected for CBM and ISTAR programmes.



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BAE SYSTEMS

Integrated Energy Manager



Introduction

The BAE Systems IEM has been designed as an efficient alternative to diesel generators. A robust and transportable device, the IEM is capable of delivering significant fuel savings for FOBs by generating, storing and managing electrical power more efficiently.

Improving fuel efficiency

IEM maximises fuel efficiency by using permanent magnet generators, which generate power more efficiently, and an integrated Energy Storage System, which optimises duty cycle and allows for integration with existing generators. Intelligent switching and load shedding further add to fuel efficiency.

Exceeding the power requirement

Capable of 120kW, the IEM exceeds the requirement to deliver 50kW. Furthermore, the modular distribution facility monitors and switches loads (subject to the upgrade of legacy systems).

Employing proven systems

The IEM uses proven components from our successful HybriDrive™ bus programmes. With 10 years experience in designing, developing and integrating hybrid bus systems, we have nearly 3000 systems in service globally.

Deploying Easily

Deployed in a steel container for protection, the IEM fits onto a 20ft trailer. There is also the potential to develop smaller units at lower power ratings.

Key Capabilities

Better fuel efficiency

- Reduces pressure on logistics
- Lowers the cost of operations.

Power capability

- 120kW power output.

Integrated Energy Storage System

- Maximum fuel efficiency due to optimisation of the generator duty cycle.

Technical Information

Intelligent Power Management (IPM) software

The IEM works in parallel with IPM software, which monitors the use of power and can optimise its use against different loads throughout the day, thereby saving diesel fuel required by generators. Such IPM software can be integrated with legacy and new equipment, requires minimal training and can automatically control generators without operator intervention (once generators' control units are modified).

IEM components:

Modified Propulsion Control System (PCS), derived from the HybriDrive™ this unit customises the performance of the system to provide optimum fuel efficiency.

Energy Storage System (ESS) uses lithium-ion, nano-phosphate technology to provide a light and efficient energy storage solution that offers longer life.

Health and Usage Monitoring System (HUMS) consists of software that increases operational availability by identifying systems that are operating below optimum efficiency.

Generator (including the starter) is a permanent magnet machine.

Engine is a Cummins six cylinder diesel that produces 350 horsepower (261kW, 355 PS).



Figure 1 - Mature components. The IEM, illustrated above, uses proven components (such as the ESS) that have been used on BAE Systems' successful hybrid bus programmes.

IEM Component Details and Specifications

PCS

- Power: +/- 320kW continuous
- Weight: 75kg.

ESS

- Power: +/- 200kW peak
- Weight: 340kg
- Nano-phosphate, lithium-ion technology.

Generator (Incl, starter)

- Power: +/- 145kW peak
- Weight: 135kg.

Engine

- Power: Cummins QSB6.7
- Capacity: 6.7ltr
- 350hp.

BAE SYSTEMS

Mastiff Common Modular Power System



Introduction

CMPS was originally intended to increase the electrical output of military vehicles to meet the need generated by newer, more power-hungry devices (i.e. communications systems, situational awareness systems, etc). However, CMPS can also provide a solution to the growing need for electrical power at FOBs.

Mastiff CMPS Demonstration Vehicle Overview

The Mastiff CMPS upgrade involved replacing the standard alternator with a permanent magnet Integrated Starter Generator (ISG). Then a Power Management Control Unit (PMCU) was added to allow the efficient distribution of power for use both on and off the vehicle. The result was an increase in on-vehicle power from 7.5kW to 20kW at idle (750 rpm) and 30kW at 1000rpm.

Export power

Due to its ability to export up to 30kW of electrical power as soon as it is stationary, a CMPS-equipped Mastiff vehicle could support the rapid deployment of a FOB. Flexible and easy to deploy and operate, the Mastiff CMPS vehicle requires relatively little training and could augment or replace a towed generator. Although the current demonstration vehicle can export 30kW, different CMPS configurations have the potential to increase this to 90kW.

More power for on-vehicle applications

More efficient generation of electrical power means better fuel efficiency, while the potential to run belt-driven loads electrically could result in improved torque.

Key Capabilities

Export power

- Greater flexibility
- Easier to deploy
- 30kW demonstrated
- Potential for 90kW.

More on-vehicle power

- Better fuel efficiency
- Reduces pressure on logistics
- Lowers the cost of operations.

Improved EMC performance

- Less interference with communications systems (compared to standard vehicle generator).

Technical Information

Justification

The existing Mastiff alternator is capable of producing up to 11.2kW (equates to 400A@28V DC), which may struggle to meet the requirements of vehicle-based systems that are expected to come on-stream.

Upgrade Components:

Integrated Starter Generator (ISG) replaces the standard vehicle alternator in the engine compartment. On the Mastiff CMPS Demonstration Vehicle, this is a belt-driven system, which could potentially be provided as a field upgrade. However, power take-off or in-line configurations – providing greater efficiency – are also possible.

Power Management Control Unit (PMCU) combines a Generator Inverter (GInV), Bi-Directional Converter (Bi-Di) and Export Power Interface (EPI) in one, easily-replaceable, unit. Although located in the crew compartment on the Mastiff CMPS Demonstration Vehicle, the PMCU could be located elsewhere.

Cooling System on the Mastiff Demonstration Vehicle is an off-the-shelf heat exchanger and pump assembly located in the engine compartment. Alternative locations on the vehicle or integration with the main vehicle cooling system are also potentially viable.

Export Power Unit (EPU) on the rear of the vehicle provides an easy to use interface to power off-vehicle applications (such as FOBs). The device includes an emergency stop switch and control of the engine speed.

The configuration of the Mastiff CMPS Demonstration Vehicle, known as a 'federated' architecture, is capable of producing up to 30kW for export. Alternative configurations (otherwise known as 'distributed' architecture, where the GInV, Bi-Di, etc are not contained within a PMCU) are potentially capable of producing up to 90kW.

Demonstrable Capabilities

The Mastiff CMPS Demonstration Vehicle produces 20kW at 750rpm (engine idle), 30kW at 1000rpm and is equipped with an Export Power Unit (EPU), allowing it to provide up to 30kW for off-vehicle applications.

ISG



- Capable of up to 90kW (equates to 2,500A@28V DC)
- Replaces existing alternator in engine compartment
- COTS item
- Proven in demonstrations on FMTV, Paladin, Bradley, Stryker and MRAP
- Dimensions: 360mm (Length), 210mm (Diameter)
- Weight: 55kg.

PMCU



- Includes GInV, Bi-Di and EPI
- Dimensions: 260mm x 815mm x 450mm
- Weight: 115kg (Dry).

EPU



- Includes 'Emergency Stop' button, export power enable, Power monitor / readout and engine idle control
- Dimensions: 400mm x 300mm x 200mm.

ROLLS - ROYCE

FEPS mobile electric power



Rolls-Royce is a world-leading provider of power systems and services for use on land, at sea and in the air.

The Distributed Generation Systems business provides a range of equipment for the military power systems network, including generating sets, power management and distribution, vehicle electric drive systems, vehicle export power, and auxiliary power units.

Products benefit from efficient fuel consumption, intelligent features, power-dense electrical machines for lightweight and compact vehicle packages, high power quality and reduced signatures. Supportability engineering services include fleet management and availability contracting.

Field Electrical Power Source

The ultimate in battlefield power.

A range of highly mobile, diesel-powered generators that can be used for many battlefield applications, from C4I systems to hospitals.

'Stealth' technology to achieve low acoustic, thermal and radar signatures.

Selected by the UK Ministry of Defence as the generator to support the UK armed forces.

Compatible with other NATO and US Army generation and field electrical distribution equipment.

Global environmental operating options include wading, cold start and high ambient capabilities, and high capacity cyclonic dust filtration system.

Operational Capability

- Very low visual, acoustic, thermal and radar signatures
- Ultra low noise: 55dBA @ 7m
- EMC, HAEMP and NBC certified
- Plug and Play' features enable complete safety.

Control System

- Health and usage monitoring
- On-board user operation assistance, diagnostic routines and maintenance and repair schedules.

Electrical Output

- Power output range: 12kWe to 40kWe
- Single/ three phase, 50/60Hz
- Output configured to meet customer demand
- Brushless design, single bearing Newage alternator
- Nuclear hardened with automatic voltage regulator.

Engine

- Deutz FL912 diesel engine
- Modular design for high degree of part commonality
- Proven reliability and ease of maintenance
- Low fuel consumption.

NEWMAN & SPURR CONSULTANCY LTD



NSC provides a wide range of simulation, training and consultancy services to MoD organisations and agencies in the UK, NATO and overseas.

NSC's principal activity is the provision of innovative simulation and training solutions alongside consultancy support. The Company is an established supplier of:

- a. Virtual Training Systems
- b. Training Development
- c. Training Delivery
- d. Exercise Support
- e. Scenario Generation

Skills and services provided by NSC encompass system design and development, integration, training design and support, user support, and analysis. The mix of these skills will vary from customer to customer with some customers requiring a complete training solution encompassing training design, delivery and evaluation whilst others may have a specific need for NSC's exercise delivery skills in support of their own exercising capability.

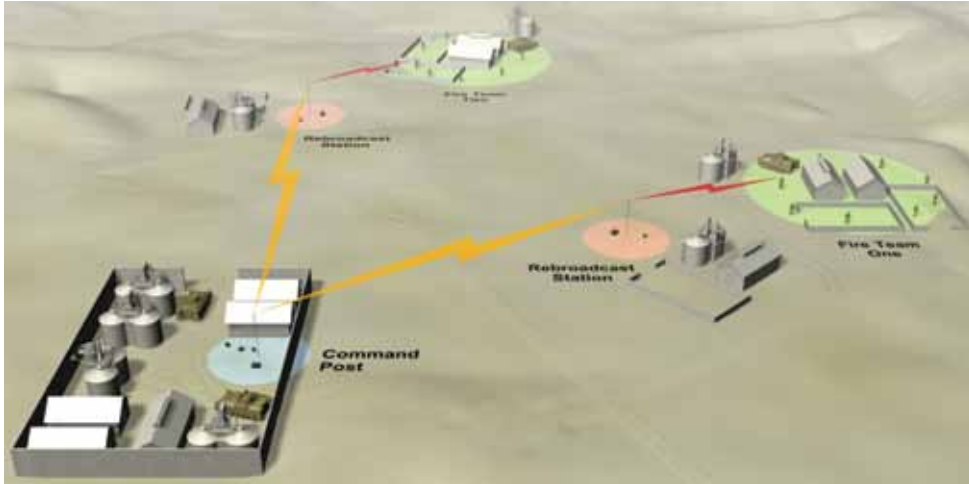
For GBA and FOBEX 11, NSC are providing a 3d visualisation and virtual representation of the FOB capability, including the integration of the simulated virtual world with the live VANTAGE software. This demonstrates how simulation can be used to provide a planning, visualisation and training environment.



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SELEX COMMUNICATIONS

Providing The Integrated Communications Solutions for the Generic Base Architecture



The ability to “better link platforms, sensors, decision-makers, weapons systems and support capability” will increase operational capability in any environment. In addition to the Operational Advantages and Freedom of Action delivered by the other integrated capabilities offered in the GBA, the incorporation of this range of SELEX Communications “integrated communications solutions” underpins the overall C4ISTAR integrated capabilities architecture that has been developed for the FOB. As such, this solution complies entirely with the aspirations set out in the UK NEC Vision.

Sentinel – local area sub-system and VoIP technologies

Sentinel employs Internet Protocol (IP) technology, a fundamental building block of the World Wide Web. It supports the delivery of Network Enabled Capability in the defence domain whilst ensuring that existing investment in defence communications can be taken into the future by introducing commercially funded developments into the military domain.

Sentinel uses an advanced architecture to support interoperability across levels of command. It features a wide range of commercial and military interfaces, and can be used to support the progressive migration of legacy systems into new technology environments.

Talon Lite – backhaul capability

A cutting edge satellite terminal based on commercial products, Talon Lite offers a 1-metre multi-band VSAT which is transportable, lightweight and robust. The system is housed in two transit cases, making it very portable and meeting the IATA checked baggage weight. The terminal is aimed at the professional and military operator working at X-Band, Ku-Band or Ka-Band.

Key Capabilities

- Local Area Sub-systems
- Satcoms
- Base Communications
- Situational Awareness
- Information Management.



Expanded Capability Description

Enhanced, Encrypted Personal Role Radio

The Enhanced, Encrypted Personal Role Radio (EZPRR) has all the features and form of the PRR but has the added features of encrypted voice and data plus greater range. It is in operational use by the British military. It operates in unison with the existing PRR. Maintaining the simplicity of the PRR, the EZPRR has introduced a secure platoon level solution where more important information can now be transmitted amongst the sections by the commanders.

Infantry Soldier Situational Awareness Tool

ISSAT provides the members of an infantry section or platoon with a low-level positional information and SA system. The system uses mature off-the-shelf components that are suitable for the dismounted close combat environment and that have minimal impact on the host soldier. Key attributes are secure voice communications, secure high-speed, low latency Blue Force Tracking, detailed mapping information, simple text messaging and navigational functions.

Each network member is provided with a common set of equipment that comprises an encrypted voice and data-capable radio, headset and a GPS receiver. Commanders are supplied with a hand-held display device with a situational awareness application that provides common operating picture display and command functions.

Base protection communications

The Fixed Base Force Protection (FBFP) System has been built on the key design features of the EZPRR to provide enhanced Force Protection in and around Base Camps and Command Posts. FBFP achieves this by extending the range of EZPRR by a potential 2.5 kilometres through the deployment of a Command Post System (CPS) and a Re-broadcast Station System.

Intelligent Information Dissemination

SELEX Communications' Intelligent Information Dissemination (I2D) product intelligently manages the information flows around a communications network to maximise efficiency. I2D has been designed to solve the common issues of limited bandwidth, inefficient bandwidth usage, multiple information requests being made by the same location, and stove piped systems or communication paths.

Connecting & Protecting



PARADIGM

Secure Milsatcom Services



Paradigm will demonstrate the recovery of performance and status data from various deployed platforms.

This trial will show the recovery of status information from various vehicle platforms operating at the GBA and FOBEX site, as well as the collation and secure transport of that information from GBA and FOBEX to HQ in the UK using the Skynet 5 constellation.

Why do this? Getting an accurate picture of the current health and status of a deployed asset can be invaluable in patrol and mission planning. Automating data recovery brings benefits such as:-

- Reduced man time required to recover status and usage data – it's done automatically on return to base.
- Improved situational awareness – as the recovery of data is an automated process, richer data sets can be recovered for off-line processing.
- Recovered information can be collated and “mined” away from the FOB to create a detailed picture of the performance of deployed assets, leading to more pro-active maintenance and sparing regimes.

This System Information Exploitation (SIE) will allow the authority to have better visibility of its deployed assets in terms of reliability and serviceability, ultimately leading to more available, more cost effective platforms in theatre.

Key Capabilities

Automatic Data Recovery

- More data! Improved visibility
- Greater accuracy, no human error
- Frees up personnel from tedious manual data recovery.

Data capture within FOB

- Recovery of data in slow-time
- Secure data recovery.

Supports a range of Generic Vehicle Architecture platforms

- Common SIE equipment and software
- Can recover different information sets from different platforms.

Secure backhaul (reach) from theatre

- Uses existing in-theatre systems & capacity to recover asset data.

The Environment

Assets operating in theatre do so in a hostile environment, where they are subject to extremes of use - which will inevitably take their toll on the platform.

Having visibility of usage and status of a single asset can potentially reduce chances of failure on that individual asset. Analysing the same data across a fleet of assets will give a much richer understanding of the fleet's serviceability, engineering and logistics support requirements.

Capturing information from current deployed assets is time consuming, arguably low priority and uninteresting work. By automating the capture of information, richer data sets can be produced, while removing the need for manual input.

Better still, data can be “mined” [aka the “Exploitation” part of SIE] by different authorities in the UK for their own purposes. For example a vehicle manufacturer might want to understand how their asset is coping with usage in theatre, particularly if they are delivering against an availability-based service contract. Alternatively, the Authority might want to understand how variances in individual driver / operator skills and techniques might impact on a platform's performance.

The Trial

There will be up to five vehicles “operating” in support of the FOB at Caerwent. Each of these platforms will capture and store usage data while “deployed” outside of the FOB. On return to the FOB, the vehicles will upload their usage data to a server held at the FOB over a secure wireless connection.

The data will be processed, compressed and onward transmitted via Skynet 5 to the secure Data Silo in the UK. From the Data Silo, information will be distributed to stakeholders as required to allow them to better understand the usage of the assets and its impact on asset availability and ongoing operational costs.

While the trial is showing recovery of information from vehicles, the system is able to recover information from almost any platform which supports a Control Area Network bus (CANbus), or other proprietary information capture capability. Examples include generators, medical equipment, specialist plant – if you work with an asset that you think could benefit from , please come and talk to us.



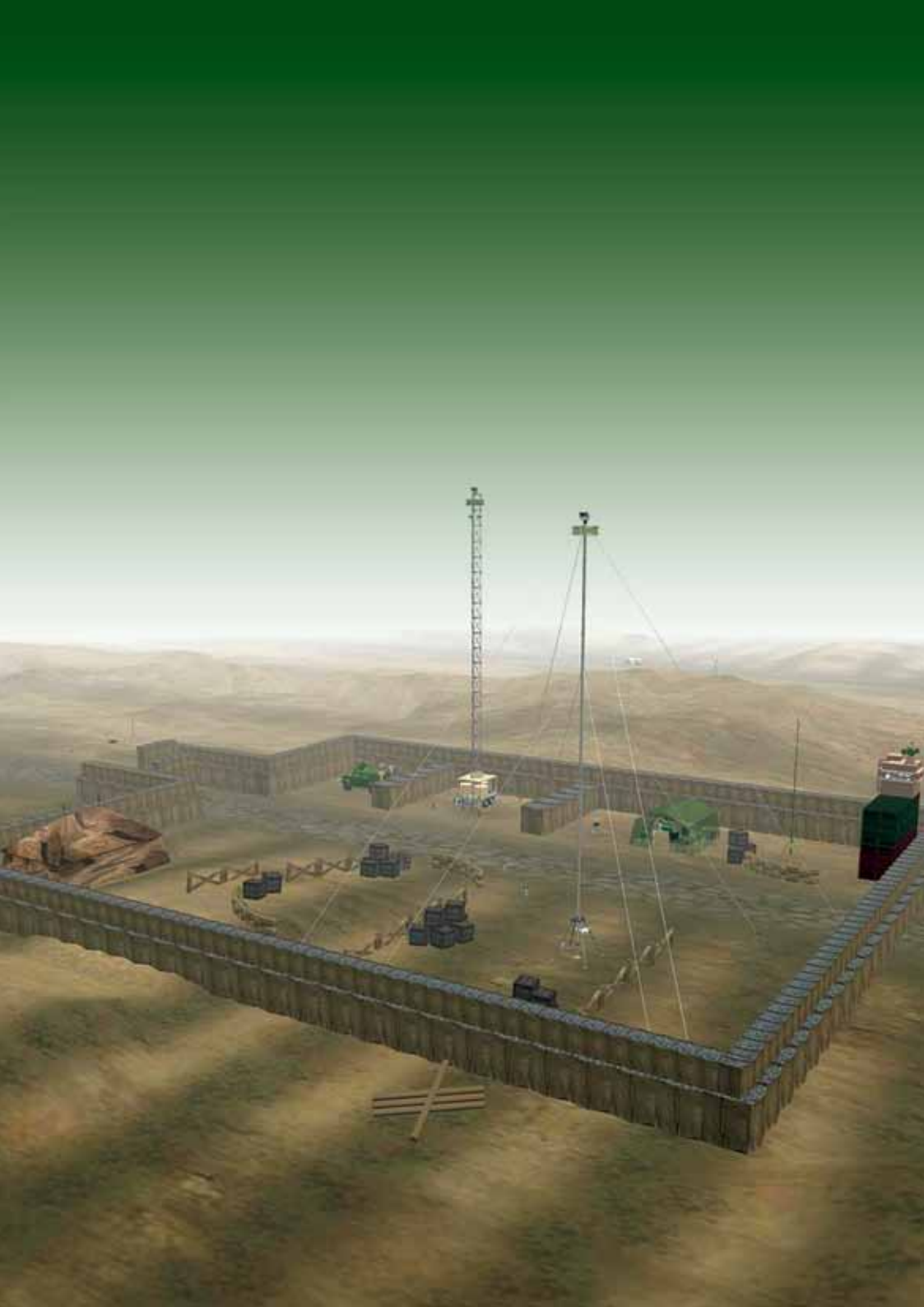
Paradigm is the service provider for the Skynet 5 PFI contract with the UK MOD, signed in October 2003, valued at over £4.0 Billion. Paradigm is responsible for the provision of end-to-end, hardened and protected satellite services, using X-band and UHF frequencies, for the UK Armed Forces up to 2022.

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Agility in solutions which can be reconfigured in response to changing user needs meeting the shift to Operational Information Superiority.

Finmeccanica UK Battlespace Solutions have adopted a complete solutions view with an emphasis on tactical systems integration, architectures, partnering, modularity and close engagement with the User covering the complete Tactical Base problem space.

Responsiveness in the way we work with customers and partners.

Bringing together a range of partners with innovative offerings - a partnership which we are keen to expand in order to ensure a best in class team can be formed around FoB as a system and the Generic Base Architecture.

Technology expertise and how our continuing commitment to invest can be brought to bear on capability programmes.

We are pulling together the ideas, products and systems developed in our internal investment programmes and those of our partners within a coherent architectural construct.

Understanding of, relevance to and commitment to invest in meeting the demands of the user, the MOD and wider Govt capability programme.

Our offering is informed by an understanding of the DLoDs, a close engagement with the User and performance on operations
Our investment programmes will continue to be closely aligned to the User's needs.

Value to the UK, including through export, of the capabilities and skills developed in the UK by Finmeccanica investment.

Although driven by the needs of the UK MoD the architectural approach and some of the products are applicable within NATO and the wider export market.

