

JUMPING

Rockwell Collins' RealFires JTAC simulator has been sold to the ADF. The system is available in a number of versions from full dome to desktop. (Photo: Rockwell Collins)



Recent conflicts have highlighted how air power has made a major impact on the battlefield, with improved training for those that direct air-launched weapons, the JTACs, being emphasised.

By Beth Maundrill

As lessons learned from recent operations are implemented and technologies are further evolved, militaries are looking at how to enhance the use of simulation to train and maintain the capabilities of their joint terminal attack controllers (JTACs), also referred to as forward air controllers (FACs).

When training JTACs, most NATO and Western coalition partners adhere to the Joint Close Air Support (JCAS) Action Plan Memorandum of Agreement (MoA) that establishes minimum standards for operations. These must be taken into consideration by both military organisations and industry when delivering training and associated equipment.

Long process

While learning some roles within the military can take just a few months, or even weeks, a JTAC has to go through an extensive training regime that in the UK can take over a year before he or she is allowed to conduct unsupervised controls.

The UK JTAC training centre, known as the Joint Forward Air Controller Training and Standardisation Unit (JFACTSU), is based at

RAF Leeming in North Yorkshire. Policy direction comes from the Joint Air Land Organisation (JALO).

JFACTSU is a dual-accredited school and is the only NATO and US joint services-accredited training centre in the UK MoD that is able to train JTACs. This accreditation is significant for the military, which must adhere to the minimum requirements set out in NATO STANAG 3797.

'We seek to adopt the most stringent guidance and policy that sits in those documents and from that we craft our own UK JTAC policy – contained in Joint Service Publication 918,' explained Lt Col Tony Goodman, the SO1 training plans at JALO.

'Because we have a common standard when we operate with our NATO partners, especially the US, we have the ability to have cross-fertilisation of capability.'

The advantages of simulation are apparent when needing to train on equipment that is not readily available. At the UK training centre, JTACs have access to live training with Hawk aircraft as well as access to a number of flying hours from frontline aircraft types, including Tornado and Typhoon fast jets.

JFACTSU also has access to a DA42 aircraft that is provided under an Air Command-sponsored contract with Cobham. While this platform does not act like a fast jet, it can generate other functions, such as the provision of data links and communications that can be used during training. However, working with coalition partners JTACs may be expected to integrate with other aircraft, including F-16s and F/A-18s.

Risk benefits

‘On the simulation side, the software offers the ability to develop a variety of narratives and scenarios from simple to complex,’ explained Goodman. ‘That talks to one of the strengths of simulation in that you can often replicate situations, narratives, environments and platforms that you may not routinely have access to in the live environment. The simulator can also conduct those higher-risk activities which wouldn’t be possible in the live environment, therefore you can push the envelope in the simulated environment with no risk at all.’

From initial to recurrent training, the UK utilises simulation for its JTACs. To maintain currency, they are allowed to use simulation to complete four of the 12 controls required over a period of 12 months.

‘The UK takes an end-to-end approach to generate and sustain the UK JTAC capability,’ Goodman highlighted. ‘At the schoolhouse in the last 18 months we have procured and introduced some enhanced simulation capability based on the immersive Close Air Support Simulator (iCASS). This has significantly improved on our legacy simulation capability. Additionally, the iCASS has now been accredited by NATO and the US and as such can be used for recordable currency training.’

The iCASS is a solution developed by Close Air Solutions (CAS) and Selex ES (now Leonardo Electronics) to provide JTACs with a high-fidelity immersive training environment. CAS is a company founded by former RAF personnel who have experience in the world of JTAC training.

‘We realised there was a gap in good training and simulation in the JTAC community,’ explained Mike Squires, founder and business director at CAS. ‘We left the RAF to specifically set up a company to do training for JTAC and close air support and joint fires type soldiers.’

iCASS is modular, which means CAS can incrementally upgrade different elements of a customer’s system. It can also be implemented in a desktop configuration or used in a full immersive dome.

The JFACTSU immersive training environment provides a 240x120° FoV dome system that has been supplied by Immersive Display Group.

The company also offers a mobile accredited simulator to support training

Exercise Black Dagger is the final exercise for JTAC students from the ADF held at RAAF Base Townsville and surrounding airspace. (Photo: ADF)



in-theatre. MetaVR provides its Virtual Reality Scene Generator (VRSG) to create the immersive visual environment within the iCASS system. CAS is now looking to the future, incorporating augmented reality for JTAC training.

Augmented approach

The US has already begun exploring the incorporation of augmented reality for JTAC development. The USMC and Office of Naval Research have been working on Augmented Immersive Team Training (AITT), an augmented reality system that integrates with the USMC ground combat team training instrumentation system. An AITT demonstration was conducted in 2015.

AITT will display virtual indirect fire effects, aircraft, vehicles and role players onto actual terrain. Augmented reality technology could be implemented to enhance JTAC training according to Squires, but it is work in progress.

The UK’s Defence Growth Partnership (DGP) has launched an innovation challenge under the Centre for Defence

Enterprise (CDE) for agile, immersive mission training. In 2015, CAS won phase one of the challenge, which allowed it access to funding for a six-month proof of concept study. The product, Synthetic Wrap Augmented Reality Virtual Environment Synchronised (SWAVES), seeks to explore training for JTACs beyond the standard use of domes and desktop training.

‘Augmented reality could replace the traditional scenario of projector training in a dome with the real world,’ said Squires. ‘We are looking at agile and immersive training that will allow us to take the benefits of simulation into the live world and inset synthetic entities into a soldier’s field of view.’

The company, in partnership with Cursive Simulation, has gone on to submit a bid for phase two which involves a 12-month funded programme which would bring CAS up to pre-production of the concept. The company is currently awaiting a response from the UK DGP.



'It is going to blur live and virtual – the soldier is not going to know if he is talking to an aircraft that is actually in the sky or if it is a synthetic entity,' Squires said. 'He will be operating through a network with real pilots.'

By being able to input augmented objects, such as aircraft, into a soldier's FoV, the expense in flying fast jets can be removed. It also allows personnel to wear and use the same equipment that they

would in the field, which takes away the risk of negative training.

In the US, Rockwell Collins' RealFires transportable targeting solution is able to allow the trainee to use equipment he or she would use in the field as well as dress with the load that would be needed to be carried in-theatre.

'Currently, you still have to do live training before you can act as a JTAC, you need a

live aircraft overhead for you to train with,' said Andrew White, marketing manager simulation and training at Rockwell Collins.

'Bearing in mind a fast jet is expensive to operate, you need to make sure you get those live exercises right. What you don't want is to have an aircraft flying and an individual not knowing how to use the targeting devices. What this gives you the opportunity to do is to undertake that

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training session hundreds of times at a much lower cost,' he added.

Getting real

Rockwell Collins was selected in 2015 to provide RealFires to the Australian Army as part of the its Land 17 programme. The company will provide a classroom-based system to the Australian Land Forces for its artillery school and a deployable system to the Royal Australian Air Force (RAAF). The latter service's transportable solution comes in two ruggedised cases complete with an Oculus Rift HMD.

The JTAC simulator delivered to the Australian School of Artillery includes training room facilities, a 270° dome, high-fidelity graphics and full simulation of FireStorm sensors.

'FireStorm is a digitally aided system,' said White. 'If a customer wants to do voice communications then you do not need FireStorm. In that case we can train the JTAC for doing the task on a generic basis.'

The latest version of the FireStorm joint fires targeting system includes the integration of the StrikeHawk digital tactical video downlink receiver, a High Accuracy Lightweight Targeter (HALT) and an accuracy augmentation system that eradicates interference from ferrous objects such as armoured vehicles.

'General requirements for JTAC training include the MoA accreditation and using equipment that is replicating what they are going to be using in the field,' added White.

While high-fidelity visuals are often at the top of the list of priorities for customers investing in training. White pointed out that this is not necessarily the case when it comes to JTACs.

'It doesn't seem that visual acuity is necessarily the biggest driver in these things,' he said. 'Our core products are visual systems, but we struggle with JTAC-type quality because it is low in comparison to what you would get on a flight simulator. We don't supply the domes for the JTAC systems; we work with companies like Immersive Displays because it is a much lower-cost and lower-fidelity system.'

White makes an interesting point in comparing flight simulator visual systems with those used for JTAC training however; image generators such as VRSG, VBS3 and TitanIM would not be described by many as a 'lower-fidelity' option.

White said that he found reluctance to go to higher-fidelity systems was down to it not being absolutely necessary for JTACs and a factor for those who write standards not wishing to preclude nations with smaller budgets from being able to do comprehensive JTAC training.

The RealFires system being delivered to Australia for Land 17 utilises Titan Integrated Military (Titan IM) visual systems, enabling JTACs to view aircraft and other objects accurately in the simulated world. The company can also provide the system using other simulation solutions, including Bohemia Interactive Simulations'

(BISim) Virtual Battlespace (VBS) 2 and 3, depending on customer requirements.

Call for fire

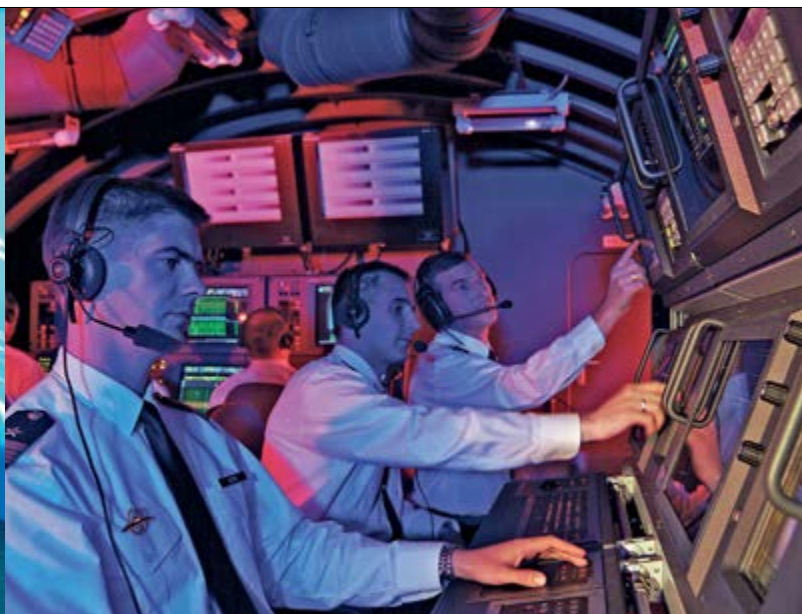
Partnership with other companies has allowed MetaVR to provide its IG to various customers worldwide. The company's VRSG, 3D terrain and 3D content are in the new desktop JTAC simulators that are replacing the Call for Fire Trainer (CFFT) simulators on the Special Operations Terminal Attack Controller Course (SOTACC) facility at the US Army's Yuma Proving Ground, Arizona.

'CFFT used to be a huge programme of record with the US Army and it still is, but what is happening there is that rather than using a government-based solution they are opting to go with a pure COTS solution,' said Garth Smith, president and co-owner of MetaVR.

This came as part of an award made by US Special Operations Command to Battlespace Simulations, MetaVR's partner.

'We are seeing that the partnership between ourselves, Immersive Displays and Battlespace Simulations is very effective and when you mix those capabilities together you are creating a range of options for the customer,' said Smith.

The three companies have also worked together on a project to provide close air support training in the UAE, as that country looks to improve its JTAC capabilities and provide training for coalition partners. A contract was awarded by the Middle-Eastern nation in July 2015. ►



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'This was a really big sale for us where the presidential guard has a schoolhouse that they are using to train coalition partners. They are setting up a joint fires training facility. It is not just for close air support but also an artillery training facility as well,' explained Smith.

The systems will be used to train and maintain readiness for the UAE's joint fires observers (JFO) within the Presidential Guard, and JTAC students formerly operating under the Air Warfare Centre (AWC) of the UAE Air Force. Equipment provided by MetaVR will be used on multiple desktop and projected display devices in the new multiple classroom simulation systems.

Smith noted that the company does not receive development contracts from any of the services and all of the R&D has been internally funded.

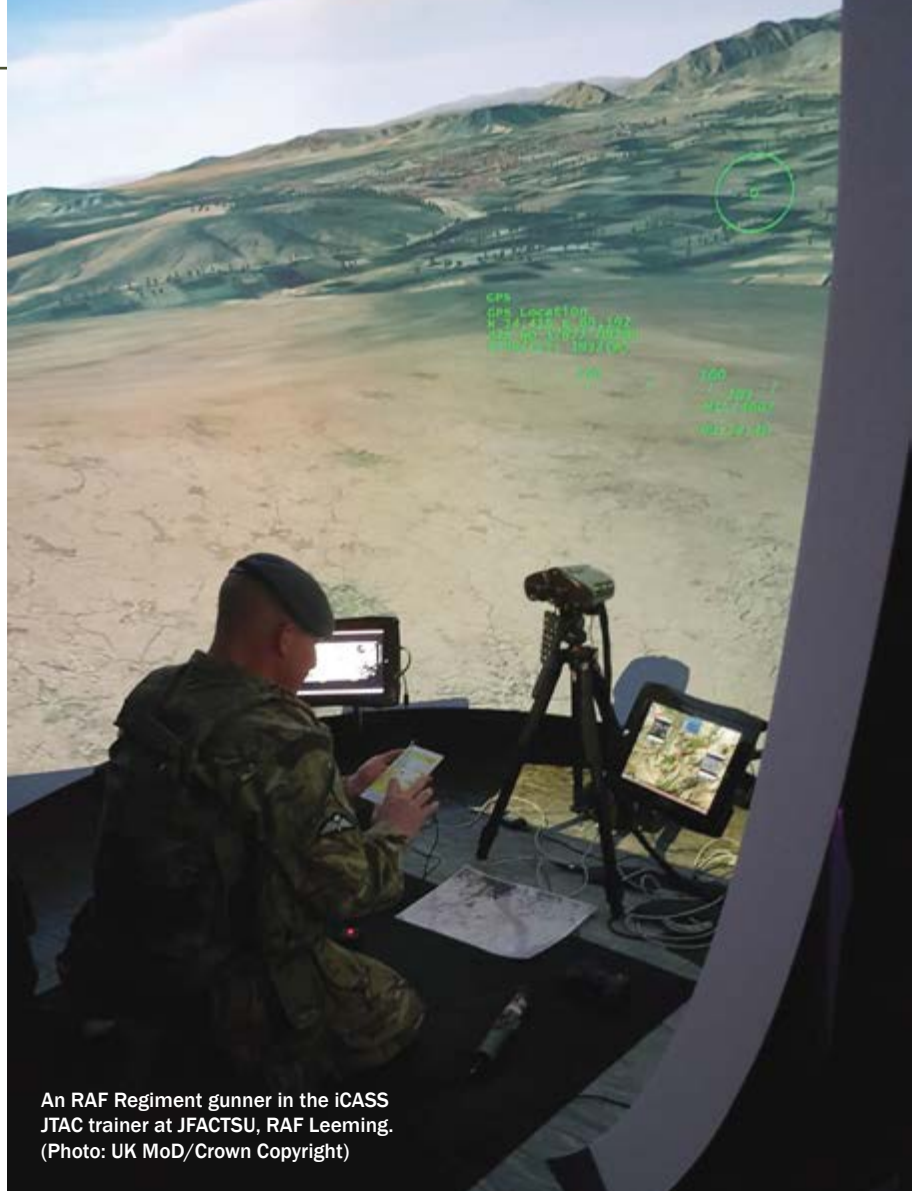
As the USAF continues to evolve its training, the company has also provided its software in multiple training domes and desktop configurations at Nellis AFB in Nevada.

The system at Nellis includes two QuantaDyn Advanced Joint Terminal Attack Controller Training Systems (AJTS) which were installed in July 2014. The AJTS consists of a domed visual display system from Immersive Display Solutions with high-resolution projectors, a computer generated force/semi-autonomous force application, MetaVR's VRSG, a dynamic aural cueing system and a suite of emulated equipment.

Full network

Moving forward, the key challenge for those supplying JTAC training equipment is how to network training systems with other entities in order to conduct full-scale training scenarios. This is something that is already being done, but there is still room for improvement.

'A lot of the challenges come from information assurance, and what customers are worried about is compromise – networking things and then having them compromised,' said Smith. 'The potential for compromise comes from a foreign country observing us doing training, especially when we are doing a geo-specific mission and using terrain from a real area. They have to be sure that the communications are not being intercepted. So the biggest stumbling block for that is information assurance,' he added.



An RAF Regiment gunner in the iCASS JTAC trainer at JFACTSU, RAF Leeming. (Photo: UK MoD/Crown Copyright)

Meanwhile, White noted that another challenge that needed to be addressed is the visual systems themselves, as everyone participating must be able to see the same thing.

'It is no good if the correlation of the visuals is incorrect, as the positioning of objects must always be the same,' he said. 'If you have an inaccuracy in the positioning of the building and the ground plane, you might find that a building is 2ft in the air. Different IGs rendering different pictures are always going to give you that kind of correlation issue.'

Although this is a challenge, the reality of packaging pieces of data together and passing them between equipment is not an issue, according to White. Rockwell Collins has experimented linking its JTAC training system with live aircraft, utilising an Aero L-29 jet trainer from the University of Idaho.

Networking event

In the UK, the company used its JTAC simulator, a helicopter simulator and a flight simulator and then the L-29 aircraft in the US. It was able to network these different entities together to conduct a successful training demonstration.

Meanwhile, MetaVR is hoping that with its stronghold across JTAC training in the USAF it will be able to network its A-10 full mission trainers (FMTs) together in the future to further enhance JTAC training.

According to Smith, in his experience with the USAF: 'The long-term goal is for them to network the JTAC and flight training devices so they can conduct joint exercises from different bases. The A-10 aircraft FMT uses MetaVR software. Their goal is ultimately to network the A-10 with the JTAC software. Gray Eagle and Shadow UAV trainers also use MetaVR, so you can then link in UAVs to the training network.' ■