



## **DRS Electronic Warfare Operational Awareness Simulation/Support and Diagnostics**

'Mission Scenario Generation and Simulation'

Author:

Dr. Bruce Holley BSc MSc PhD CEng CPhys MInstP MIET Eur Ing  
Head of Air Systems LOB, DRS (UK)

## DRS ELECTRONIC WARFARE OPERATIONAL AWARENESS SIMULATION/SUPPORT AND DIAGNOSTICS

### **Mission Scenario Generation and Simulation**

DRS is currently working on a new concept which will enhance the effectiveness of its successful in service Electronic Warfare (EW) Tiered Testing Capability. This new development is termed 'Operator Awareness'. In simple terms, it utilizes the test program data used to stimulate EW systems and uses it to demonstrate an operational EW scenario which can be used in a classroom environment or on a platform to enhance EW Operational Awareness. This paper outlines the details of this new concept.

The principles of Operator Awareness are to provide operators with a last minute awareness of threat signals which might be encountered during an in-flight operational mission. These Operator Awareness sessions would essentially take place during the pre-flight briefing sessions to aircrew prior to operations, and would provide them with a last minute reminder of the various threat signals that might be encountered on their mission. The benefits of this pre-flight awareness is that it would provide aircrew with a last minute EW situational awareness update, thereby reinforcing the EW training they will have received during their routine Full Mission Simulator Training sessions performed on the platform simulators.

This last minute situational awareness is considered to be extremely beneficial as routine Simulator Training sessions are normally scheduled weeks in advance and only routinely performed as part of compulsory scheduled training flight training. Therefore, the DRS Operator Awareness sessions will provide a significant enhancement to this routine simulator training. It should also prove to be extremely cost effective as additional simulator sessions are very expensive and difficult to schedule as platform simulators tend to be in high demand. The main benefits of the DRS pre-flight awareness are as follows:

- Set up a Mission Scenario by programming a selection of EW Warning Signals which may be encountered during a proposed Mission.
- Run a Mission to enable Operator Awareness of EW Warning Tones/Threat TAGS under conditions which may be encountered during the Mission.
- Increase Operational Awareness of signals outside the Missile Engagement Zone: Mobile phone signals, domestic air Traffic control RADARs, friendly RADARs etc.
- Increase Operational Awareness of the effect/impact of EW System Counter Measures on a particular "threat" scenario. Indications of when countermeasures are deployed.
- New emerging threat scenarios can be quickly programmed and demonstrated to operational crews. New threat scenarios could be demonstrated in a very short time frame prior to an operational mission.
- Operator Awareness can be of significant value if used during aircrew de-briefing sessions to re-run a mission in order to assess the functionality of a platforms EW System during a Mission.

## How Does it Work?

The DRS stimulation/test system transmits simulated signal data into an EW systems antennas via small anechoic chambers called hoods. It should be noted that these hoods can be used on Rx and Tx systems e.g. ESM, MAWs jammers etc. The Maintainer/Operator can then verify if the simulated threat is being displayed on the platforms displays by comparing the platforms displays with a hand held tablet display showing the output from the DRS stimulator and thereby determine the functionality of the EW equipment. In consequence, the DRS concept of operational awareness is to use the DRS stimulator in a classroom environment with the stimulation being displayed on a large monitor. Figure 1 shows a typical display that might be used.



Fig 1. This display indicates the type of signal that might be received by the platforms EW system. The position of the TAG represents the signal position relative to platform and its signal strength.

## Mission Scenario Generation

Having the ability to stimulate signals the platform might encounter on a mission, the next stage is to put the stimulated signals into a mission scenario that a platform might encounter. The DRS stimulator is programmed to run a sequential signal generation program consisting of different threat signals: Threatening, friendly and at varying signal levels to represent different ranges. It should be noted that it is not the intention of DRS to stimulate a multi threat environment as there are other far more capable stimulators to carry out these type of scenarios. The purpose of the DRS concept is to ensure there is a very good operator awareness of signals that are related to real threats that could seriously damage or destroy a platform. Figure 2. Shows how a typical mission scenario might be developed.

Using Figure 2, The following mission scenario can be generated:

- The mission scenario is overlaid on a map/grid system. This can be in any elevation such that terrain masking can be simulated by varying received signal power.

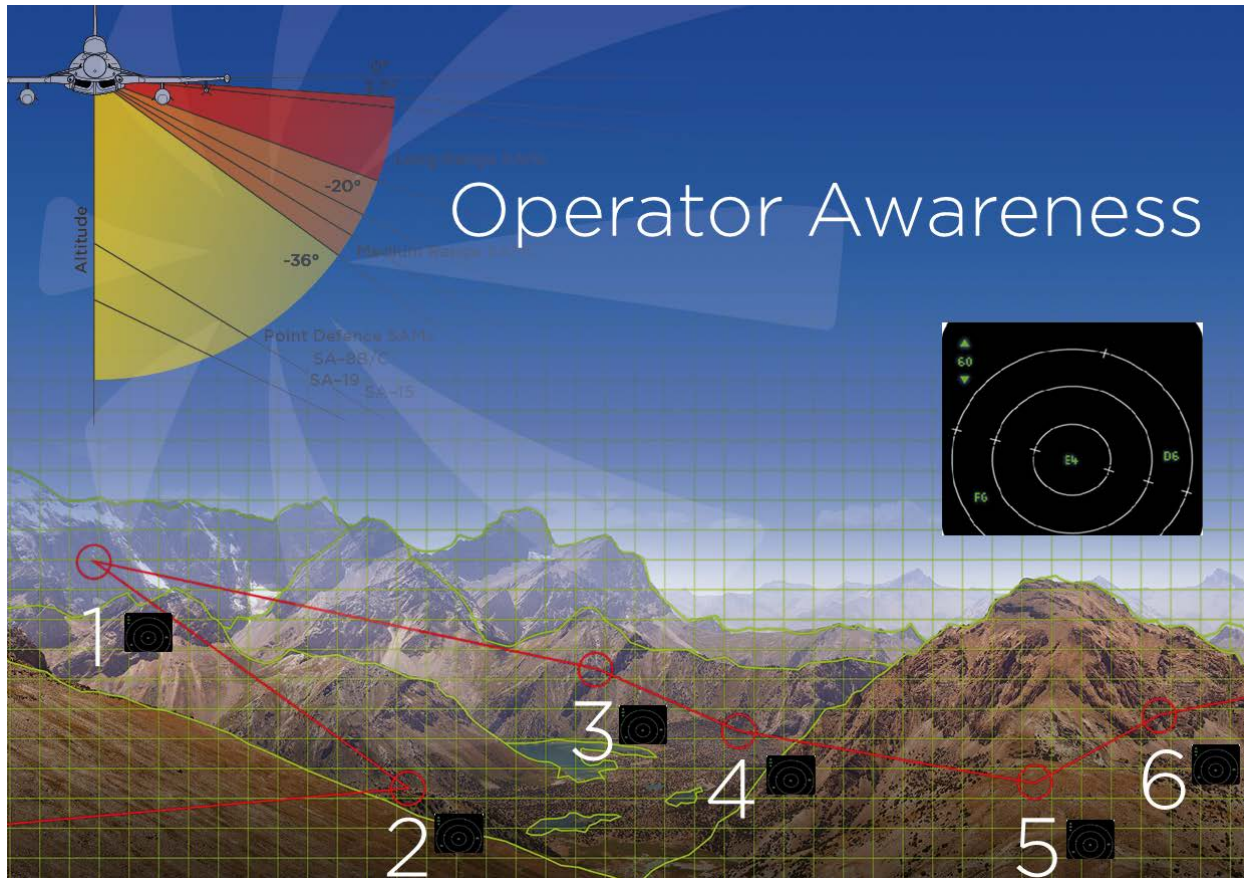


Figure 2. Mission Scenario Generation.

### Signal Generation Type

- Point 1. Start Mission: ATC RADARS, mobile phones etc.
- Point 2. Early Warning RADARS. Small amount of jamming.
- Point 3. Early Warning RADARS, Fire Control RADAR – weak signal no threat.
- Point 4. Fire Control RADAR strong signal – countermeasures activated - Alarms.
- Point 5. RPG type threat. RF MAWS activated. Fire Control RADAR – No alarm
- Point 6. Airborne missile tracking RADAR – strong signal countermeasures activated – Alarms.

The Mission Dependent Data (MDD) used to generate the previously described scenario can be either actual signal data or made up training signal data. However, as the simulation data is being generated by the DRS simulation system it can be programmed to the same sensitivity levels the actual platform will detect and display. In other words, the display simulation will replicate a received signal TAG in the same relative position in the simulation as will be seen on the actual platform display. This level of sensitivity accuracy is due to the sensitivity of each EW equipped platform being known because it is stimulated/tested using the DRS hoods and stimulator which provide accurate Rx and Tx parameters – sensitivity, TAG, Power, Modulation etc. Moreover, the mission scenario described above could replicate, a greater level of received signal authenticity by simulating signals at varying power levels, superimposing noise and spurious signals depending on the complexity of the scenario being generated.

One of the major advantages of using this concept is that the theory in the classroom can then be replicated on an operational platform to ensure the platform systems are capable of detecting and countering the mission scenario generated threats.

---

## Summary

---

DRS is currently developing a new concept using their highly regarded in service EW stimulation equipment. This new concept is called ‘Operational Awareness’ and is designed to enhance full mission simulator training. This is achieved by providing a quick and simple classroom stimulation utilizing the signal generation capability from the DRS stimulation equipment and modifying it to replicate an EW mission scenario using either real or training signal data, to demonstrate typical threats or friendly signals at different power levels. These signals therefore correlate to near or far signal sources which can also include terrain masking etc. In addition, the fidelity of the signal data can be degraded using noise or interference to replicate jamming etc.

The data being displayed in the classroom environment exactly replicates the signal data seen on the platform displays as the DRS stimulation/test equipment is designed to evaluate the signal sensitivity of an EW system. Therefore, the scenario generation is simply a replay of the platforms EW sensitivity across its complete frequency range. Moreover, the stimulation equipment can be quickly programmed to take into account any new and emerging threat generation signal systems and demonstrate how an EW system will react to them.

DRS believe this new ‘Operational Awareness’ concept using the DRS stimulator and hoods is a unique and an extremely cost effective method of demonstrating how EW systems will react in an actual operational signal environment and thereby providing operators with a better understanding of how to interpret EW displays and performance prior to an operational or EW training mission.