Lies, damn lies – and force estimates, part 1

F-111: Throw weight vs precision

By Dr Carlo Kopp

MELBOURNE – In recent evidence to the Joint Foreign Affairs, Defence and Trade committee of Federal Parliament, Defence asserted that "throw weight" as a measure of combat strength was irrelevant because of the use of precision munitions. This was a remarkably courageous statement.

The term "throw weight" has a long history as it was used throughout the Cold War as a Measure Of Effectiveness (MOE) for comparing the relative strengths of Soviet vs Western strike forces, comprising the respective triads of long range bombers, submarine and silo launched missile forces; later the model was used to compare road mobile ballistic and cruise missile force strengths. Its ubiquity was a result of its simplicity and robustness as a MOE – once weapon effects are normalised or scaled, "throw weight" provides a direct measure of the "weight of fire" a force can deliver to a given distance. Another way of describing it is as "aggregated normalised weapons payload to striking distance".

Calculating throw weights is not complex. The starting point is to determine the combat effect of the respective weapons and derive a relative scaling factor. Where the weapons are identical, such as in the debate over the F-111 vs F/A-18A vs JSF, the scaling factor is unity – the combat effect of identical weapons is the same. Whether a GBU-10/24/31 or SDB smart bomb is dropped by an F-111, F/A-18A or JSF is immaterial – each weapon achieves the same combat effect.

Once we have determined the relative combat effect of the weapons, calculating the resulting throw weight is a simple matter of multiplying the number of each aircraft type by the number of bombs each can carry by the distance they can carry them. As an MOE, throw weight thus provides a direct measure of force "productivity" – how much bombing work could be done with the number of assets available.

Throw weight assessments can be further refined by applying qualifiers as scaling factors. Aircraft availability or mission completion rates (MCR) can be used, as these account for what fraction of the strike force is airborne vs what is sitting on the ground or divert ing due failures. Availability/MCR must however be used carefully, since peacetime rates do not reflect the increased maintenance tempo seen before and during conflicts. Statistics from the 1991 Gulf War are most revealing, as a very large jump in availability was observed compared with peacetime availability rates in earlier years. The recent and excellent Red Flag deployment performance of the F-111 is indicative – it did better than the newer teen series types on site. Unless the availability/MCR of the aircraft types differs dramatically, it will produce little impact on a throw weight estimate as similar figures essentially can cel each other out. The JSF is to be more reliable than either current type, but the additional few per cent will produce little impact given the good rates on both of the existing types.

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Qantas smartens landing approach

MAASTRICHT – Boeing, the Air Traffic Alliance, Airservices Australia and Qantas have agreed to flight demonstrations of a concept to improve aircraft arrival efficiency.

ATC will send the approaching aircraft electronic arrival clearance – eliminating the need for the usual multiple voice communications.

Electronically linked data then guides the aircraft on a steady descent along the most efficient flight path. The aircraft, on scheduled Qantas flights, will start descent, about 225km from the airport.

Embraer moves into 100 seats

SAO JOSE DOS CAMPOS – Embraer inaugurated its new mid-sized Embraer 190, a 100-seat plane aimed at a market share now served by bigger planes. Embraer is the world's fourth-largest civil planemaker. The prototype was doused with champagne by President Luiz Inacio Lula da Silva. The first delivery of the $30 million aircraft will go to JetBlue Airways, which has ordered 100.

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The use of aircrew availability as a qualifier is problematic, because of annually fluctuating numbers and reserve capacity. In time of crisis reservists are called up, and staff postings stripped of experienced aircrew to top up numbers. Therefore it is not common practice to use aircrew availability in force structure analysis.

An important further qualifier is given by tasking. This is especially important when comparing the F/A-18A and JSF against the F-111. Both of these are to perform air combat roles and strike roles. Because Wedgetails, tankers, airfields and other assets must be protected until all opposing fighters have been killed off, a good fraction of the F/A-18A and JSF fleets would be unavailable for strike operations as they would be orbiting in CAPs covering high-value assets. Therefore throw weight estimates which count the whole F/A-18A or JSF fleets overstate the capability of the F/A-18A or JSF vs the F-111. The reality is that a large fraction of the F/A-18A or JSF fleet might be committed to air combat tasks, effectively driving down their throw weight contributions.

Conversely, while the RF-111C and F-111G currently cannot target laser guided bombs, there is nothing to prevent the RAAF from emulating US Air Force and RAF tactics in previous conflicts – a `master bomber' F-111C would use its Pave Tack to lase targets for F-111Gs or RF-111Cs not so equipped.

The value of throw weight centred measures has vastly increased since the recent development of persistent strike techniques against mobile targets – bombers orbiting the battlefield and plinking ground targets with smart bombs within minutes of target detection.

This was the key to the success of last year's Iraq ground campaign. Persistence demands large fuel and smart weapon payloads – the F-111 with about twice the weapon payload and twice the fuel of an F/A-18A or JSF is superior in this role.

It is curious that Defence effectively dismissed throw weight, despite published figures not including the effect of air combat operations and thus effectively presenting the Defence case to be stronger than it really is.

The mystery of how Defence concluded that no strike capability gap exists thus remains unsolved.

ADF photograph

RAN and RNZN ships depart Jervis Bay for Operation Protector exerecise off the NSW coast

A modified KC-135 sprays water on an F-22 during icing testss at Edwards AFB

USAF image