BRIEF FOR LTGEN DAVID HURLEY, HEAD OF CAPABILITY EXECUTIVE
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This Brief summarises comparisons of key geometric and weight parameters in the JSF design circa 2003 (Configuration 240-2) and 2006, post the critical design reviews (Configuration 240-4). The following table is based on JSF JPO data which, surprisingly, appear to focus on minor increases in internal fuel loads; themselves raising questions as to the veracity of the definitions being used in the design.

PARAMETER	Units	CTOL			STOVL			CV		
Configuration		240-2 (2003)	Config Delta	240-4 (2006)	240-2 (2003)	Config Delta	240-4 (2006)	240-2 (2003)	Config Delta	240-4 (2006)
Span	ft	35		35	35		35	43		43
Length	ft	51.1	**+0.3**	51.4	51.1		51.1	51.4		51.4
Wing Area	ft^2	460		460	460		460	620	**+48**	668
Aspect Ratio		2.663		2.663	2.663		2.663	2.982	**-7%**	2.768
Empty Weight	lbs	27,100 [1]	**+1,936**	29,036	30,500 [1]	**+1,661**	32,161	30,700 [1]	**+1,372**	32,072
Empty Wt Wing Load	lbs/ft^2	59	**+4**	63	66	**+4**	70	50	**-2**	48
Internal Fuel (lbs)	lbs	18,073	**+375**	18,448	13,888	**+78**	13,966	19,570	**+550**	20,120

The above weight figures show that, despite the weight reduction SWAT program (STOVL Weight Attack Team activities in 2003/04), the STOVL variant is still some 1,660 lbs over its IOC target empty weight, even though "over 3,000 lbs" were claimed to have been taken out of the design. Clearly, the latter claim is not supported by the facts, unless this weight reduction was in payload, that is, the claimed reductions were off the MTOW as opposed to the aircraft's Empty Weight. In either case, this raises issues which are contrary to the accepted norms of corporate governance, let alone standard aircraft design practices, and the designing company's own manifesto for 'Setting the Standard'. More disturbing for Australia's interests in the JSF is that the CTOL weight is presently 1,936 lbs over its original design target.

Original design targets were reviewed previously, including the F-35 Actual Carpet Plots showing the 'Design Point'. Prominent in these are the requirements for a mid envelope specific excess power (P_s) of 730 ft/sec (M0.8, 15k ft) and a level flight acceleration capability of 42 seconds at the 'Hi' cruise altitude (M0.8 to M1.2, 30k ft). Since both these requirements are weight dependent, the higher design weights will be deleterious to these targets being achieved as they will to other short, medium and long term metrics such as sustained turn performance, combat radius, payload and airframe fatigue life.

However, even a cursory inspection of the original design targets raises points of some concern. The target P_s = 730 ft/sec is, in itself, an extraordinary figure. The Tier 1 F-15C fighter (Empty Weight = 28,600 lbs, AR = 3.014, and Empty Weight Wing Loading = 47 lbs/ft^2) with dash 220 engines at the same flight conditions, assuming a flight configuration of combat fuel, clean and full A/B, has a P_s of 630 ft/sec. This is achieved with an excess thrust of around 50% of the static SL thrust. Such excess thrust enables the F-15C to achieve acceleration times between the relevant speeds of better than 18 seconds at FL150. Therefore, either the JSF level flight acceleration target of 42 seconds or the target P_s of 730 ft/sec is wrong. Standard parametric analysis suggests the latter, by some degree, and puts this figure at around 300 ft/sec, clean at full A/B and at combat fuel load standard weight. This would put the aircraft's performance into the less than competitive category with current regional capabilities, let alone those presenting in 2015 and beyond.

The above summary will be easily understood by anyone with a background and training in flight test though merely numbers and 'technical jargon' to those solely attuned to politically stylised language. Therefore, put simply in such language, according to JSF JPO data, the JSF family of aircraft, in particular the CTOL variant, would appear to be based on a design that, in terms of fighter aircraft performance, is flawed and has a Diminishing Operational Gradient as one likely outcome.

[1] Stated as 'Initial Operational Capability (IOC) Target Weight' which, by design, should include a margin to accommodate weight increases in design during the development phase. This margin is usually in the order of 10% of the final weight. The IOC target weight is what aircraft performance, handling and functional capability estimates are based upon.