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3 February 2016

Foreign Affairs, Defence and Trade Committee
Joint Strike Fighter Inquiry
Department of the Senate
PO Box 6100
Parliament House
Canberra ACT 2600

Dear Chairman and Committee Members,

THE PLANNED ACQUISITION OF THE F-35 JOINT STRIKE FIGHTER

The sine-qua-non assessment of the Joint Strike Fighter (JSF) Program is provided annually to the US Congress by the US President's appointed Director of Operational Test and Evaluation, Dr Michael Gilmore.

The 2015 Report was released publically 1 February 2015:

http://www.dote.osd.mil/index.html

http://www.dote.osd.mil/pub/reports/FY2015/pdf/dod/2015f35jsf.pdf

This Submission draws extracts from that Report in areas regarding deficiencies in the JSF Project management and aircraft performance relevant to Australia. Key areas of concern are highlighted. Comments are added in some instances.

Note that The Director's Report is framed in the context of Project compliance with the Joint Operations Requirement Document, a document which many analysts assess is cast against adversary weapons systems now considered obsolete, and which ignores the many lethal and survivable weapons systems developed in the last decade.

Neither does the report made assessment of 'combat effectiveness': whether the JSF will prevail over potential adversaries in future air combat. However, it does report deficiencies affecting combat deployment, accredited simulation of combat capabilities, pilot safety, cyber security and logistic support.

Yours sincerely,

Chris Mills, AM, MSc, BSc

Transmitted by the Committee Upload Facility

EXTRACTS FROM THE DOT&E JSF PROJECT REPORT 2015

Executive Summary

Test Planning, Activity, and Assessment

However, if used in combat, the Block 2B F-35 will need support from command and control elements to avoid threats, assist in target acquisition, and control weapons employment for the limited weapons carriage available (i.e., two bombs, two air-to-air missiles). Block 2B deficiencies in fusion, electronic warfare, and weapons employment result in ambiguous threat displays, limited ability to respond to threats, and a requirement for off-board sources to provide accurate coordinates for precision attack. Since Block 2B F-35 aircraft are limited to two air-to-air missiles, they will require other support if operations are contested by enemy fighter aircraft.

Block 3i began with re-hosting immature Block 2B software and capabilities into avionics components with new processors. Though the program originally intended that Block 3i would not introduce new capabilities and not inherit technical problems from earlier blocks, this is what occurred.

Based on these Block 3i performance issues, the Air Force briefed that Block 3i mission capability is at risk of not meeting IOC criteria to the Joint Requirements Oversight Council (JROC) in December 2015.

The current schedule to complete System Development and Demonstration (SDD) and enter IOT&E by August 2017 is unrealistic.

The program has proposed a "block buy" that commits to and combines procurement of three lots of aircraft to gain savings. Executing the "block buy" would require commitments to procuring as many as 270 U.S. aircraft, as well as commitments by foreign partners to purchasing substantial numbers of aircraft.

- Is it premature to commit to the "block buy" given that significant discoveries requiring correction before F-35's are used in combat are occurring, and will continue to occur, throughout the remaining developmental and operational testing? The program continues to struggle with Block 3F developmental testing, and in December 2015 the Air Force rated its proposed initial operational capability supported by Block 3i as "red" due to the problems ongoing testing has revealed.

- Is it prudent to further increase substantially the number of aircraft bought that may need modifications to reach full combat capability and service life? As the program manager has noted, essentially every aircraft bought to date requires modifications prior to use in combat.

- Would committing to a "block buy" prior to the completion of IOT&E provide the needed incentives to the contractor and the Program Office to correct an already substantial list of deficiencies in performance, a list that will only lengthen as Block 3F testing continues and IOT&E is conducted?

- Would entering a "block buy" contract prior to the completion of IOT&E be consistent with the "fly before you buy" approach to defense acquisition that many in the Administration have supported?

- Similarly, would such a "block buy" be consistent with the intent of Title 10 U.S. Code, which stipulates that IOT&E must be completed and a report on its results provided to Congress before committing to Full-Rate Production—a commitment that some could argue would be made by executing the "block buy?

Comment: Would it be prudent for Australia to commit to purchase ***any*** aircraft until it completes Initial Operational Test and Evaluation? A more prudent action is to choose an aircraft with *air combat capability at a level at least comparable qualitatively to any in the region, and with a sufficient margin of superiority to provide an acceptable likelihood of success in combat. (Defence 2000, Our Future Defence Force.)*

Mission Data Load Development and Testing

Significant deficiencies exist in the US Reprogramming Lab (USRL) that precludes efficient development and adequate testing of effective mission data loads for Block 3F. Despite being provided a $45 Million budget in FY13, the program has still not designed, contracted for, and ordered the required equipment—a process that will take at least two years, not counting installation and check-out. In addition, despite the conclusions of a study by the Program Office indicating that substantial upgrades are needed to the laboratory's hardware, the program is currently only pursuing a significantly lesser upgrade due to budgetary constraints. Unless remedied, these deficiencies in the USRL will translate into significant limitations for the F-35 in combat against existing threats.

Weapons Integration

The program terminated Block 2B developmental testing for weapons integration in December 2015 after completing 12 of the 15 planned

Weapons Delivery Accuracy (WDA) events. The program planned to complete all 15 WDA events by the end of October 2014, but delays in implementing software fixes for deficient performance of mission systems sensors and fusion delayed progress.

- Eleven of the 12 events required intervention by the developmental test control team to overcome system deficiencies and ensure a successful event (i.e., acquire and identify the target and engage it with a weapon).

- The program altered the event scenario for three of these events, as well as the twelfth event, specifically to work around F-35 system deficiencies (e.g., changing target spacing or restricting target manoeuvres and countermeasures).

The overall result of the WDA events must be that the testing yields sufficient data to evaluate Block 3F capabilities. Deleting numerous WDA events puts readiness for operational testing and employment in combat at significant risk.

Verification Simulation (VSim)

Due to inadequate leadership and management on the part of both the Program Office and the contractor, the program has failed to develop and deliver a Verification Simulation (VSim) for use by either the developmental test team or the JSF Operational Test Team (JOTT), as has been planned for the past eight years and is required in the approved TEMP.

Neither the Program Office nor the contractor has accorded priority to VSim development despite early identification of requirements by the JOTT, $250 Million in funding added after the Nunn-McCurdy-driven restructure of the program in 2010, warnings that development and validation planning were not proceeding in a productive and timely manner, and recent (but too late) intense senior management involvement.

The Program Office's sudden decision in August 2015 to move the VSim to a Naval Air Systems Command (NAVAIR)-proposed, government-led Joint Simulation Environment (JSE), will not result in a simulation with the required capabilities and fidelity in time for F-35 IOT&E. Without a high-fidelity simulation, the F-35 IOT&E will not be able to test the F-35's full capabilities against the full range of required threats and scenarios.

Nonetheless, because aircraft continue to be produced in substantial quantities (all of which will require some level of modifications and retrofits before being used in combat), the IOT&E must be conducted without further delay to evaluate F-35 combat effectiveness under the most realistic conditions that can be obtained.

> **Comment:** Without a functional VSim capability, the JSF will not be able to be evaluated for 'combat effectiveness' in contested environments featuring 'Anti-Access / Area Denial' systems, and highly capable and lethal purpose-built air combat fighters such as the Su-35S, the Su-50, Chengdu J-20 and the Shenyang J-31 – these weapons system are being fielded in Australia's region.

Suitability

The operational suitability of all variants continues to be less than desired by the Services and relies heavily on contractor support and workarounds that would be difficult to employ in a combat environment. Almost all measures of performance have improved over the past year, but most continue to be below their interim goals to achieve acceptable suitability by the time the fleet accrues 200,000 flight hours, the benchmark set by the program and defined in the Operational Requirements Document (ORD) for the aircraft to meet reliability and maintainability requirements.

Cybersecurity Testing

The JOTT began planning Cooperative Vulnerability and Penetration Assessments (CVPAs) and Adversarial Assessments (AAs) of all Autonomic Logistics Information System (ALIS) components in the latest configuration to be fielded—ALIS 2.0.1.1—as well as the F-35 air vehicle in the Block 2B configuration. The JOTT planned a CVPA for September 21 through October 2, 2015, and an AA from November 9 – 20, 2015. However, the test teams were not able to complete the CVPA as planned because the Program Office failed to provide an IATT due to insufficient understanding of risks posed to the operational ALIS systems by cybersecurity testing.

Pilot Escape System

The program conducted two sled tests on the pilot escape system in July and August 2015 that resulted in failures of the system to successfully eject a manikin without exceeding load/stress limits on the manikin. These sled tests were needed in order to qualify the new Gen III HMDS for flight release. In July 2015, a sled test on a 103-pound manikin with a Gen III helmet at 160 knots speed demonstrated the system failed to meet neck injury criteria. …. The program conducted another sled test in August 2015 using a 136-pound manikin with the Gen III helmet at 160 knots. The system also failed to meet neck injury criteria in this test.

The program began delivering F-35 aircraft with a water-activated parachute release system in later deliveries of Lot 6 aircraft in 2015. This system, common in current fighter aircraft for many years, automatically jettisons the parachute when the pilot enters water after ejection; in the case of pilot incapacitation, an automatic jettisoning of the 2012, while reviewing preparations to begin training pilots at Eglin AFB, Florida, the Program Office accepted the serious risk of beginning training without the water-activated release system installed in the early production lots of training aircraft.

> **Comment:** A single-engine aircraft from which the pilot may not eject without having a broken neck. If landing in water an incapacitated pilot can be drowned by a dragging parachute. There is also an issue with clearing the cockpit transparencies covered later in the Report.

EXTRACTS FROM THE MAIN REPORT WHERE NOT INCLUDED IN THE EXECUTIVE SUMMARY

Test Strategy, Planning, and Resourcing

Based on these projected completion dates for Block 3F developmental testing, IOT&E would not start earlier than August 2018.

The 48 Block 3F developmental test weapons delivery accuracy (WDA) events in the approved Test and Evaluation Master Plan (TEMP), plus two test events deferred from Block 2B, will not be accomplished by the planned date of May 2017.

The next planned software delivery will be a Block 4 build in 2020, creating a four year gap between planned software releases. Considering the large number of open deficiencies documented from Blocks 2B and 3i testing, the ongoing discovery of deficiencies during Block 3F testing, and the certainty of more discoveries from IOT&E, the program needs to plan for additional Block 3F software builds and follow-on testing prior to 2020.

F-35A Flight Sciences

Testing to characterize the thermal environment of the weapons bays demonstrated that temperatures become excessive during ground operations in high ambient temperature conditions and in-flight under conditions of high speed and at altitudes below 25,000 feet. As a result, during ground operations, fleet pilots are restricted from keeping the weapons bay doors closed for more than 10 cumulative minutes prior to take-off when internal stores are loaded and the outside air temperature is above 90 degrees Fahrenheit. In flight, the 10-minute restriction also applies when flying at airspeeds equal to or greater than 500 knots at altitudes below 5,000 feet; 550 knots at altitudes between 5,000 and 15,000 feet; and 600 knots at altitudes between 15,000 and 25,000 feet. This will require pilots to develop tactics to work around the restricted envelope; however, threat and/ or weather conditions may make completing the mission difficult or impossible using the work around.

- Testing to characterize the vibrational and acoustic environment of the weapons bays demonstrated that stresses induced by the environment were out of the flight qualification parameters for both the AIM-120 missile and the flight termination system (telemetry unit attached to the missile body required to satisfy range safety requirements for terminating a live missile in a flight test). This resulted in reduced service life of the missile.

> **Comment:** The problem is caused by the 'thermally challenged' JSF by dumping heat into the weapons bay, 'cooking' the weapons. This is a design defect that cannot be eliminated as heat disposal is a 'zero-sum' problem and if eliminated from the weapons bay, it must be disposed of elsewhere, exacerbating known heating problems. When the weapons bay doors are opened, the JSF loses its 'low observability'.

Under certain flight conditions, air enters the siphon fuel transfer line and causes the pressure in the siphon fuel tank to exceed allowable limits in all variants. As a result, the program imposed an aircraft operating limitation (AOL) on developmental test aircraft limiting manoeuvring fight for each variant (e.g. "g" load during manoeuvring). F-35A developmental test aircraft with the most recent fuel tank ullage inerting system modifications are limited to 3.8 g's when the aircraft is fully fuelled.

Fleet F-35A aircraft are limited to 3.0 g's when fully fuelled and the allowable g is increased as fuel is consumed, reaching the full Block 2B 7.0 g envelope when approximately 55 percent of full fuel capacity is reached.

Until relieved of the g restrictions, operational units will have to adhere to a reduced manoeuvring (i.e., less "g available") envelope in operational planning and tactics; for example, managing threat engagements and escape manoeuvres when in the restricted envelope where less g is available. This restriction creates an operational challenge when forward operating locations or air refuelling locations are close to the threat/target arena, resulting in high fuel weights during engagements.

Testing of operational “dog-fighting” manoeuvres showed that the F-35A lacked sufficient energy manoeuvrability to sustain an energy advantage over fourth generation fighter aircraft. Test pilots flew 17 engagements between an F-35A and an F-16D, which was configured with external fuel tanks that limited the F-16D envelope to 7.0 g’s. The F-35A remained at a distinct energy disadvantage on every engagement. Pitch rates were also problematic, where full aft stick manoeuvres would result in less than full permissible g loading (i.e., reaching 6.5 g when limit was 9.0 g), and subsequent rapid loss of energy. The slow pitch rates were observed at slower speeds—in a gun engagement, for example—that restricted the ability of an F-35A pilot to track a target for an engagement.

> **Comment:** A RAND Corp report accurately assessed the JSF as a ‘*can’t turn, can’t climb, can’t run’* aircraft. A 1970’s era F-16 is not the aircraft of concern; aircraft with substantially superior performance such as the Su-35S, the Su-50, J-20 and J-31 are.

Mission Systems Assessment

For the F-35A, the airspeed at which the weapons bay doors can be open in flight (550 knots or 1.2 Mach) is less than the maximum aircraft speed allowable (700 knots or 1.6 Mach). Such a restriction will limit tactics to employment of weapons at lower speeds and may create advantages for threat aircraft being pursued by the F-35A.

For the F-35A, the airspeed at which countermeasures can be used is also less than the maximum speed allowable, again restricting tactical options in scenarios where F-35A pilots are conducting defensive manoeuvres.

Instabilities discovered in the Block 3i configuration slowed progress in testing and forced development of additional software versions to improve performance. Two additional versions of the 3iR5 software were created in an attempt to address stability in start-up of the mission systems and inflight stability of the radar. Overall, radar performance has been less stable in the Block 3i configuration than in Block 2B. For 3iR6, the time interval between events was 4.3 hours over 215 hours of flight testing. This poor radar stability will degrade operational mission effectiveness in nearly all mission areas.

Mission Data Load Development and Testing

Significant deficiencies exist in the U.S. Reprogramming Lab (USRL) that precludes efficient development of effective mission data loads. Unless remedied, these deficiencies will cause significant limitations for the F-35 in combat against existing threats. These deficiencies apply to multiple potential theatres of operation and affect all variants and all Services.

Weapons Integration

While the program has instituted several process changes in mission systems software testing, maintaining the necessary WDA event tempo to complete the Block 3F events will be extremely challenging. The current build plans for each Block 3F software version show that the most challenging scenarios will not be possible until the final software version. This increases the likelihood of late discoveries of deficiencies, as occurred during Block 2B WDA testing.

Static Structural and Durability Testing

All variants are scheduled to complete three full lifetimes of testing before the end of SDD; however, complete teardown, analyses, and Damage Assessment and Damage Tolerance reporting is not scheduled to be completed until August 2019.

F-35A durability test article (AJ-1) completed the second lifetime of testing, or 16,000 EFH in October 2015. While nearing completion of the second lifetime, testing was halted on August 13, 2015, when strain gauges on the forward lower flange of FS518, an internal wing structure, indicated deviations from previous trends. Inspections showed cracking through the thickness of the flange, so the program designed an interim repair to allow testing to continue and finish the second lifetime.

> **Comment:** Durability testing often finds design defects; however, in this case 'concurrency' of testing and building could result in a requirement for expensive repairs to the entire fleet of defective aircraft.

Verification Simulation (VSim)

VSim is a man-in-the-loop, mission systems software in-the-loop simulation developed to meet the operational test requirements for Block 3F IOT&E. It is also planned by the Program Office to be used as a venue for contract compliance verification prior to IOT&E. It includes an operating system in which the simulation runs, a Battlespace Environment (BSE), models of the F-35 and other supporting aircraft, and models of airborne and ground-based threats.

After reviewing a plan for the government to develop VSim, the Program Office made the decision in 2011 to have the contractor develop the simulation instead.

Verification, Validation, and Accreditation (VV&A) activity completely stalled in 2015 and did not come close to making the necessary progress towards even the reduced set of Block 2B requirements.

While the JSE might eventually reach the required level of fidelity, it will not be ready in time for IOT&E since the government team must re-integrate into the JSE the highly detailed models of the F-35 aircraft and sensors, and additional threat models that the contractor has "hand-built" over several years.

The JSE proposal does not address longstanding unresolved issues with VSim, including the ability of the program to produce validation data from flight test, to analyze and report comparisons of that data with VSim performance, and to "tune" VSim to match the installed system performance demonstrated in flight-testing.

The large savings estimates claimed by NAVAIR as the basis for their JSE proposal are not credible, and, the government team's most recent estimates for completion of the JSE have grown substantially from its initial estimate. Nearly all the costs associated with completing VSim in its current form would also transfer directly to JSE, with significant additional delays and risk.

For the reasons listed above, the Program Office's decision to pursue the NAVAIR-proposed JSE, without the concurrence of the operational test agencies (OTAs) or DOT&E, will clearly not provide an accredited simulation in time for F-35 IOT&E, and the OTAs have clearly expressed their concerns regarding the risks posed to the IOT&E by the lack of VSim.

> **Comment:** The previous claims made by Lockheed Martin representatives to the Parliament of Australia, including Loss-Exchange-Rates' exceeding 6:1 in favour of the JSF, are shown by this assessment to completely lack credibility.

PAO Shut-Off Valve

The program has not provided an official decision to reinstate this vulnerability reduction feature. There has been no activity on the development of the PAO-shut-off valve technical solution to meet criteria developed from 2011 live fire test results. As stated in several previous reports, this aggregate, 2-pound vulnerability reduction feature, if installed, would reduce the probability of pilot incapacitation, decrease overall F-35 vulnerability, and prevent the program from failing one of its vulnerability requirements.

Operational Suitability

Operational suitability of all variants continues to be less than desired by the Services, and relies heavily on contractor support and workarounds that would be difficult to employ in a combat environment.

The Lockheed Martin database that stores the maintenance data, known as the Failure Reporting and Corrective Action System (FRACAS), is not in compliance with U.S. Cyber Command information assurance policies implemented in August 2015. Because of this non-compliance, government personnel have not been able to access the database via government networks, preventing the JRMET from holding the planned reviews of maintenance records. As a result, the Program Office has not been able to produce Reliability and Maintainability (R&M) metrics from JRMET-adjudicated data since the implementation of the policy.

F-35 Fleet Availability

In no month did the fleet exceed its goal of 60 percent availability.

Due to concurrency, the practice of producing operational aircraft before the program has completed development and finalized the aircraft design, the Services must send the current fleet of F-35 aircraft to depot facilities to receive modifications that have been designed since they were originally manufactured. Some of these modifications are driven by faults in the original design that were not discovered until after production had started, such as major structural components that break due to fatigue before their intended lifespan, and others are driven by the continuing improvement of the design of combat capabilities that were known to be lacking when the aircraft were first built. This "concurrency tax" causes the program to expend resources to send aircraft for major re-work, often multiple times, to keep up with the aircraft design as it progresses. Since System Development and Demonstration (SDD) will continue to 2017, and by then the program will have delivered nearly 200 aircraft to the U.S. Services in other than the 3F configuration, the depot modification program and its associated concurrency burden will be with the Services for years to come.

F-35 FLEET PLANNED VS. ACHIEVED FLIGHT HOURS AS OF NOVEMBER 23, 2015						
Variant	Original Bed-Down Plan Cumulative Flight Hours			"Modeled Achievable" Cumulative Flight Hours		
	Estimated Planned	Achieved	Percent Planned	Estimated Planned	Achieved	Percent Planned
F-35A	26,000	16,768	65%	22,000	16,768	76%
F-35B	14,000	12,156	87%	11,000	12,156	111%
F-35C	5,500	2,949	54%	6,000	2,949	49%
Total	45,500	31,873	70%	39,000	31,873	82%

F-35 Fleet Reliability

The F-35B is closest to achieving reliability goals, while the F-35A is furthest.

F-35 RELIABILITY: MFHBR (HOURS)								
Variant	ORD Threshold		Values as of May 31, 2015				Values as of August 2014	
	Flight Hours	MFHBR	Cumulative Flight Hours	Interim Goal to Meet ORD Threshold MFHBR	Observed MFHBR (3 Mos. Rolling Window)	Observed Value as Percent of Goal	Cumulative Flight Hours	Observed MFHBR (3 Mos. Rolling Window)
F-35A	75,000	6.5	15,845	5.3	4.7	89%	8,834	3.1
F-35B	75,000	6.0	11,089	4.6	3.9	85%	7,039	2.5
F-35C	50,000	6.0	3,835	4.3	3.4	79%	2,046	2.3

F-35 RELIABILITY: MFHBME Unsch (HOURS)								
Variant	ORD Threshold		Values as of May 31, 2015				Values as of August 2014	
	Flight Hours	MFHBME Unsch	Cumulative Flight Hours	Interim Goal to Meet ORD Threshold MFHBME Unsch	Observed MFHBME Unsch (3 Mos. Rolling Window)	Observed Value as Percent of Goal	Cumulative Flight Hours	Observed MFHBME Unsch (3 Mos. Rolling Window)
F-35A	75,000	2.0	15,845	1.60	1.18	74%	8,834	0.85
F-35B	75,000	1.5	11,089	1.15	1.32	115%	7,039	0.96
F-35C	50,000	1.5	3,835	1.02	1.00	98%	2,046	0.84

F-35 RELIABILITY: MFHBME Unsch (HOURS)								
Variant	ORD Threshold		Values as of May 31, 2015				Values as of August 2014	
	Flight Hours	MFHBME Unsch	Cumulative Flight Hours	Interim Goal to Meet ORD Threshold MFHBME Unsch	Observed MFHBME Unsch (3 Mos. Rolling Window)	Observed Value as Percent of Goal	Cumulative Flight Hours	Observed MFHBME Unsch (3 Mos. Rolling Window)
F-35A	75,000	2.0	15,845	1.60	1.18	74%	8,834	0.85
F-35B	75,000	1.5	11,089	1.15	1.32	115%	7,039	0.96
F-35C	50,000	1.5	3,835	1.02	1.00	98%	2,046	0.84

F-35 RELIABILITY: MFHBF_DC (HOURS)								
Variant	JCS Requirement		Values as of May 31, 2015				Values as of August 2014	
	Flight Hours	MFHBF_DC	Cumulative Flight Hours	Interim Goal to Meet JCS Requirement MFHBF_DC	Observed MFHBF_DC (3 Mos. Rolling Window)	Observed Value as Percent of Goal	Cumulative Flight Hours	Observed MFHBF_DC (3 Mos. Rolling Window)
F-35A	75,000	6.0	15,845	4.6	4.8	104%	8,834	4.0
F-35B	75,000	4.0	11,089	2.9	4.3	148%	7,039	3.5
F-35C	50,000	4.0	3,835	2.6	4.0	154%	2,046	3.6

Comment: Considerable improvement is required to meet the ORD goals.

Maintainability

The amount of time needed to repair aircraft to return them to flying status remains higher than the requirement for the system when mature, but has improved over the past year.

ALIS Software Testing and Fielding in 2015

The program developed ALIS 2.0.1 to upgrade to Windows Server 12, add new capabilities required to support the Marine Corps' IOC declaration in mid-2015, and address ALIS 2.0.0 deficiencies. The program completed the LT&E of ALIS 2.0.1 in May 2015, but results were poor, so the program did not release the software to the field. As of the writing of this report, the program had not signed out the ALIS 2.0.1 LT&E report. According to their "quick look" briefing, the test team discovered five new Category 1 deficiencies and confirmed that the contractor did not correct in ALIS 2.0.1 the two Category 1 deficiencies identified during ALIS 2.0.0

All versions of ALIS have demonstrated persistent problems with data quality and integrity, particularly in the Electronic Equipment Logbooks (EELs), which allow usage tracking of aircraft parts. Frequently, EELs are not generated correctly or do not transfer accurately, requiring manual workarounds that extend aircraft repair and maintenance times. Without accurate EELs data, ALIS can improperly ground an aircraft or permit an aircraft to fly when it should not.

Working around ALIS 2.0.0 deficiencies in this manner was possible for this demonstration of limited duration; however, it would not be acceptable for deployed combat operations.

Comment: A fully-functional logistic support system is required for deploy and weapons system. The above are a sample of the many reported 'issues' with the JSF ALIS.

Pilot Escape System

Two pilot escape system sled tests occurred in July and August 2015 that resulted in failures of the system to successfully eject a manikin without exceeding neck loads/ stresses on the manikin.

The testing showed that the ejection seat rotates backwards after ejection. This results in the pilot's neck becoming extended, as the head moves behind the shoulders in a "chin up" position. When the parachute inflates and begins to extract the pilot from the seat (with great force), a "whiplash" action occurs. The rotation of the seat and resulting extension of the neck are greater for lighter weight pilots.

Additional testing and analysis are also needed to determine the risk of pilots being harmed by the transparency removal system (which shatters the canopy before, and in order for, the seat and pilot to leave the aircraft) during ejections in other than ideal, stable conditions (such as after battle damage or during out-of-control situations).

CONCLUSION

The length of the DOT&E Annual Report on a weapons system is a de-facto measure of the deficiencies of the system and its failures to meet the prescriptions of the Operations Requirement Document. The Joint Strike Fighter infamously holds the record at 48 pages.

The next five longest Reports are: 22, 8, 6, 6 and 4 pages respectively. The average length of the Reports on 99 Programs is 3.56 pages**.**

While the Joint Strike Fighter is the most expensive of the USA's Weapons Systems Programs, it is clearly by far the most troubled.