

An Expose' of V-22 "Facts"

A Review of Paper written by Col Schultz (USMC), Criticizing the Press.

This review by the V-22 Red Ribbon Panel was prepared with the intent to clarify and correct many of the "views", outright falsehoods and Contractor Public Relations material used by Col Schultz in his treatment of the Press. (Our Comments are in BOLD face after each statement of "facts".)

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Subject: There have been several allegations made against the V-22 in the press recently. The allegations and the facts are presented below.

Article 1: "Eased Standards Fix Osprey"

Raleigh News and Observer - Mr. Joseph Neff

A careful reading of this article clearly refers to the numerous System Requirements on the V-22 that have been deferred or deleted.

Opening Statement:

— The V-22 has met or exceeded all key performance parameters (KPPs). No KPPs have been deleted from the current ORD.

Mr. Neff did not address the 'KPP's as suggested here by Col Schultz - this Marine Corps tactic has been a stock in trade technique of changing the focus in defense of actual, real problems.

— Changes were made to the ORD to delete unnecessary requirements as well as add new, more stringent requirements. This is part of the normal requirements maturation process that takes place in every aircraft development program.

When did Col Schultz unilaterally decide that requirements associated with autorotation, combat maneuvering, protection from Nuclear, Biological, Chemical design, and others, were "unnecessary requirements" ? Exactly what were the un-stated new "more stringent requirements" added, and by what authority? His last statement is gratuitous to sidetrack the reader from the issues addressed in the article.

1. Allegation: "The Navy has lowered its performance requirements"

Fact:

— All Operational Requirements Documents (ORDs) undergo periodic review to keep pace with user requirements. The V-22 is no exception.

— The Assistant Secretary of the Navy, Research, Development and Acquisition endorsed the Panel to Review the V-22's recommendation that the requirements be validated and prioritized, and those that rank poorly in cost/benefit be deleted. The Joint Requirements Oversight Council approved these changes, and concurs with the Joint Requirements Review Working Group and the Program Managers plan to continue identifying the potential high payoff/cost benefit requirement trades throughout the ORD development process. The use of time-phased requirements in support of evolutionary acquisition will best serve joint warfighting needs.

These statements are gratuitous given that after an expenditure of some \$13+ Billion of taxpayer money, the Program Office has now reduced several safety oriented aspects and requirements, while at the same time increasing unit costs.

2. Allegation: "The Navy no longer requires that the V-22 be able to land safely in helicopter mode without power."

This refers to the requirement of autorotation when in helicopter mode - a fundamental and critical safety requirement for ALL military and civilian rotorcraft, which has now been deleted from ORD at the V-22

Program and NASA requests!

Fact:

— The V-22 spends 70 percent of its time in airplane mode where it has the capability to perform a survivable all-engine out landing.

This is an untested, invalidated effort to justify the deletion of autorotational capability with the subsequent direct risks to Pilots/Crews of the V-22. We see here the change of specific subject, a standard approach by the USMC in responding to the many questions/statements on the V-22.

The inference is that since the V-22 spends more time in the airplane mode, it is therefore not necessary to be able to autorotate in helicopter mode. What about the guys who are flying the 30 percent of the time? Tough. I Guess.

Equally IMPORTANT is the fact that an emergency “survivable” all-engine out landing is not exactly a routine operation - which all pilots must learn to do in flight training as is done in other transport aircraft. This rationale for deleting a requirement for autorotation has not been demonstrated. Perhaps someone will tell us exactly when and how this will be done. A safe landing with two engines out is totally dependant on at least two factors to preclude a catastrophe.

After dual engine failure, it is mandatory that some hydraulic/electric function is available to rotate the nacelles to about 60 degrees to make a landing in airplane mode; because the V-22 cannot land without tilting the two 38 foot diameter propellers without a disaster. Equally important is that a relatively hard surface is required to attempt a landing a safe landing. This is hardly a good reason to claim that this is justification for deleting an autorotation requirement.

If this is what we call “new technology”, the entire concept of developing safer aircraft has taken a severe backward 100 year turn!

In addition, the V-22 has demonstrated the capability to autorotate.

This is “technically” true. The V-22 has demonstrated the ability to fly in helo mode without any power applied to the rotors. The critical phases of autorotation however, entry and the flare, have **NOT** been demonstrated. No abrupt power-cut has ever been done in V-22, nor will ever be done, because it is extremely dangerous and probably not survivable.

A flare in the V-22 has in fact been attempted in flight test!

(Note that this maneuver-- in all helicopters -- can initiate a flare during autorotation and reduce the sink rate to zero and land safely before the rotor(s) stop.

In testing, the V-22 managed to reduce the autorotation sink rate from 5600 ft/min (that is correct 5600, not the 3800 as stated by the NASA panel in their report) -- to initiate a flare to a nice manageable 3200 ft/min -- before the power had to be restored to prevent a complete rotor stall -- ending in a catastrophe.

The bottom line here is that they did in fact initiate an autorotation -- they simply found that they could not initiate a flare and land safely!!

So much for the other 30 %.

— No similar sized rotorcraft has ever had to demonstrate a full autorotation landing.

This is a complete falsehood. The USMC's own CH-53, as well as all other military helicopters were tested and required to demonstrate full autorotational landings safely to the ground at maximum gross weight, as required under contract. The H-53 has essentially the same empty weight and power as the V-22, and has demonstrated SAFE autorotational capability to the ground.

— Likelihood of needing to conduct an autorotative landing in the V-22 is far less than the platforms it's replacing (i.e. CH-53E losing its tail rotor).

Here we see another change of subject. This “claim” is presumably based on engine failure probability statistics, and ignores real combat helicopter experience where battle damage and fuel starvation drive the need for a safe autorotational capability, increasing greatly the probability that an autorotation will need to be performed.

— The likelihood of surviving an autorotative landing in the V-22 is comparable to a rotorcraft of similar weight. In addition, the V-22s crashworthy design features far exceed all conventional rotorcraft.

Completely untrue. Two more “facts” that are both incorrect. That the H-53 has demonstrated safe, survivable autorotational landings is the real fact. The likelihood of a rotorcraft (V-22) with almost twice the disk loading and a rotor inertia less than 1/4 that of an H-53 makes Schultz's statement misleading and wishful thinking,

and completely contrary to even a basic engineering analysis of the autorotational problem..

3. Allegation: *"Required protection from nuclear, chemical and biological weapons has been eliminated."*

Fact:

— NBC overpressure was a very expensive option that did not make sense because:
- Once the aircraft door is opened in an NBC environment, the interior of the aircraft becomes contaminated. **Again, this WAS an ORD requirement from beginning --it has now been eliminated! The V-22 is NOT pressurized and, therefore, could not sustain any of the required capabilities without significant weight penalties. A similar/related problem involves the lack of oxygen, which is NOT available to troops, and so with troops on-board, the mission altitude envelope of the V-22 is severely curtailed.**

Without pressurization, and with Oxygen Stations for only the 4 crew members, carrying troops above about 8-10,000 feet is a severe/foolhardy problem for missions requiring long distances which in turn are normally accomplished at higher altitudes, where the V-22 is more efficient.

(A close review of the requirements which have been dropped or delayed (e.g. minigun turret), all tend to be related to the need for additional reduction of the V-22 weight problems.)

- Troops and aircrew deployed in anticipation of any potential NBC threat will already be wearing protective gear. **Note: This is very reassuring, but it does not address limits for altitudes without pressurization, nor oxygen requirements for troops; and which would have been required if the FAA/Navy MOU had not been canceled by the Navy.**

It is even more important to realized that this makes V-22 a daytime only NBC environment aircraft, -- since night vision devices - (NVD)s are incompatible with NBC protective gear! This was one of the main reasons for the requirement in the first place.

Since the typical USMC mission is at night (by definition), you can surmise the consequences, and the real reason why "this didn't make sense".

The statement "will be wearing protective gear" is a much larger problem which Col. Schultz does not appear nor desire to discuss. The "gear" mentioned is very bulky and restrictive for all the crew and troops, and requires advance preparation and practice for realistic application. The bulk alone will require reduced useful payloads of combat loaded troops, who already have no place to store their excess combat gear.

4. Allegation: *"Reliability standards have been changed and lowered."*

Fact:

— Reliability standards on the V-22 remain higher than current fleet transport helicopters today. **This is patently absurd. DOTE, GAO and maintenance data, when correctly compared, i.e. not with "goals," which are far from ever being demonstrated, are in actuality worse than those of the CH-46E, CH-53D, and even the heavy lift CH-53E.**

— See attached charts comparing Reliability and Maintainability of Block A & B MV-22s with the two aircraft it is replacing (CH-46E and CH-53D), and the heavy lift CH-53E. These Charts are attached. **(These two charts were not available, but show Objectives of differing dates in the future, compared to current data for other helicopters.)**

— The Panel to Review the V-22 recommended the standardization of Reliability, Availability, and Maintenance (RAM) parameters. Mean Flight Hours Between Failure Logistics (MFBFlog) became the primary measure of logistic reliability. MFBFlog of 0.9 hours (Threshold) and 1.2 hours (Objective) is the current standard. Mean Flight Hours Between Abort was restated as Mean Repair Time (Abort) of 4.8 hours. These standards equate to the original mission reliability rate of 85% per 3-hour mission.

Changing parametric measurements not used by other aircraft is a nice way to pick you own FUTURE capabilities. It should be asked at Pax River exactly how many total hours of maintenance work has been done by the contractor and military crews during the first 15 flights and "near 35 hours" as reported by the V-22 Program Office last month. Given that only 15 flights during some two+ months were accomplished, the total maintenance work and costs would be constructive and useful information.

— The changes reflect NAVAIR Systems Engineering study of the previous Mean Time Between Failure (MTBF) rate. The original 1.4 metric was based on a selection of various legacy fixed wing and helicopters that were

available at the time (mid-1980s). This analysis was updated and the engineering estimates and assumptions were replaced with actual fleet data and experience from identical or similar systems on comparison aircraft. The results of this audit trail were updated with present available data of usage/duty cycle, complexity factors, aircraft/system configuration and production growth slopes. The result was the more accurate measure of logistic supportability of .9 hours (threshold) and 1.2 hours at system maturity (objective).

It appears that at this late period, the V-22 Program has decided to change the goal posts to justify additional maintenance time. Why were the current maintenance hours being spent per hour of flight time during the past 3 months not reported, which we are certain will turn out to be unbelievably higher than any past goals?

5. Allegation: *"A requirement that troops be able to exit the cabin door at low altitude via a rope or ladder has been eliminated."*

Fact:

— The requirement to fast rope from the V-22 has not been eliminated.

When it was found in OT&E testing to be a safety problem, and impossible to meet the years old requirement and repetition -- it was simply changed -- decreasing the required capability by 2/3rds, while greatly slowing down the times of egress by the jumpers and making it impossible for them to land in closer team proximity.

— The requirement was restated to specify only the number of ropes/devices required. This capability was demonstrated in

earlier operational tests from the same locations used by fleet transport helicopters today.

Again we see more misleading statements. The "earlier demonstrations" clearly determined the unsafe nature of the original plan for 3 jumpers operating simultaneously. The hazards related to the extremely high downwash forced the change to number of jumpers, locations and the techniques required.

6. Allegation: *"A requirement for 'Combat maneuvering' capability has been watered down."*

Fact:

— This requirement was *not deleted*, but properly restated as Defensive Maneuvering.

An excellent display of pure gall. Redefining and deleting a known need, taught and practiced in all helicopter combat training, and used in operations for years, is purechutzpah! The fact that the V-22 is very vulnerable in combat terminal mission areas has again been redefined to cover-up its largest Safety of Flight Performance weakness.

The solution it seems, as with dozens of other problems on the V-22, is to Defer/Delete/Dilute/Rename items that otherwise would be weaknesses and could not meet the original design requirements. It does make one question the reliability and usefulness of that of the JORD group; which appears to sign off on any requirement or problem found by the Program Office to be troublesome or can't be met. This is a very strange way to write off the expense of many similar faults.

— Air Combat Maneuvering (ACM), is a term that is *only* relevant to fighter and attack aircraft.

We personally know many USMC, USAF, USA Operational Pilots who would simply laugh at this statement. Since the original definition and techniques have been around for maybe 30-40 years or more, this somewhat flippant justification, even though referred to in the V-22 NATOPS Manual (and most likely now deleted), are both humorous and distasteful.

Are we going to redefine the world to fit the V-22 faults and failures? Any helicopter pilot who has not needed to apply Combat Maneuvering techniques missed a lot of hands-on experience.

— The MV-22 is required to be capable of performing defensive maneuvers to avoid an adversaries weapons parameters and/or complicate his weapons engagement solutions. This requirement is not different from any other transport aircraft that it is designed to replace.

There ARE no other "transport" aircraft that has to go into hover mode to enter and exit the highly vulnerable Combat Terminal areas while pretending to act like a helicopter. Therefore, it seems that if Col. Schultz doesn't want to address the real fundamental failures, he simply changes the discussion!

— By design, all military troop transport aircraft are not offensive air-to-air weapons systems. Military transport aircraft only maneuver defensively to disengage from the threat weapons systems.

This suggests that the long claimed and discussed addition of a turret mounted defensive weapon may be about to be deleted by the Program Office and JORD. It would appear that the severe penalty related to this system in terms of weight and balance will force another "unnecessary requirement" because of a decrease in useful weight, along with the concurrent problem of maintaining an acceptable weight and balance equation

and center of gravity, which we know shifts about a foot whenever the nacelles are tilted.

7. Allegation: *"For the Osprey, the flight envelope is very restrictive, much more so than a helicopter."*

Fact:

— The MV-22's flight envelope is more than two times greater than a conventional helicopter. See chart below. **The chart, similar to that shown in the NATOPS Flight Manual, does not refer to the maneuvering envelope, which was alluded to in Mr. Neff's article. The chart appears much different than that in the NATOPS Flight Manual, and strangely shows the envelope for helicopter mode as below the 10,000 ft which elsewhere is later claimed to be much higher.**

More importantly, is that the 'allegation' speaks to parallel comparisons of helicopters versus the V-22 in helicopter mode. Here, again, we find an attempt to change the intent and truth being brought to light by Mr. Neff. The flight envelope of the V-22 in helicopter mode can be a very fearsome place for pilots.

With all of the restrictions and warnings related to multi-axis control inputs, a propensity for loss of control due to unstable vortex ring state behavior, the lack of good safe margins and low maneuver limit loads, the V-22 is forced to become a 2-dimensional aircraft, and essentially discards any of the 3-dimensional capabilities of helicopters.

When under attack in Combat Terminal areas, the V-22 becomes a virtual sitting duck, with the only escape route being straight ahead, avoiding any banks or multi-axis control inputs (which are prohibited). Any seasoned/experienced combat helicopter pilot will tell you that this is both completely unsafe and extremely foolhardy.

8. Allegation: *"The Osprey must descend slowly when landing, because of its tendency to enter vortex ring state. The Osprey has shown a tendency to roll over when it descends rapidly in helicopter mode at low forward speeds. This phenomenon, is known as vortex ring state or VRS."*

Fact:

— *This is incorrect.* Vortex Ring State (VRS) is not a new phenomenon. It is an aerodynamic phenomenon that affects all rotorcraft.

This is a standard set of Mantras conceived by Contractor, NASA and the V-22 program office. Probably not one in a thousand of helicopter pilots have really ever experienced true VRS because it occurs over such a small range of airspeeds and rates of descent.

When we asked a former military and current FAA flight test pilot with over 40 years of helicopter and combat experience what he thought about the so called VRS phenomenon, his answer was simple and straightforward: "What is VRS??!"

— It is an aerodynamic phenomenon that affects all rotorcraft.

True enough statement, but VRS, when encountered makes conventional helicopters shake and shudder while it makes the V-22 roll over on its back. **This is not a subtle difference.**

— NASA has stated and demonstrated in wind tunnel testing that they believe the V-22 can recover from VRS faster than any conventional helicopter.

NASA has NEVER tested V-22 recovery procedures in a wind tunnel. This is another lie. The concurrent use of "stated and demonstrated" along with "believe" is incongruous. It is either one or the other.

No-one knows where this fantasy was drummed up by the USMC. We defy ANYONE at NASA to try to provide any data or testing to verify this. It is very difficult to find this in a single or tandem rotor helicopter, both of which have a natural tendency to fly out of VRS.

— From initial flight-testing and analysis already conducted, the V-22 has demonstrated capability to descend faster than most helicopters without encountering VRS.

Without REAL data this is a very interesting claim. Presumably this is based on another, fictitious NASA test. We certainly agree, however, that because of the high disk loading and lack of ability to autorotate, the V-22 can, without question, descend faster than ANY helicopter. The difference is the helicopter can descend and maneuver simultaneously at fairly high rate of descent, and UNDER control! The ability of the helicopter pilot to manage energy in descent makes it significantly safer!

— The Navy has dedicated one aircraft for an entire year to fully explore and define VRS and the entire flight envelope.

They STILL cannot confirm or define the actual “envelope” because the number of variables involved (weight, nacelle angle, temperature, altitude, gust loadings, pilot control movements, maneuver rates) make it impossible to determine any valid single “limits”.

— The NASA independent assessment stated that, the rate of decent limit, 800 feet per minute (for horizontal speeds of less than 40 knots), provides a very large safety margin from the areas where vortex ring state-initiated control problems were encountered (descent rates greater than 2,000 feet per minute).[†] Staying above these limits the MV-22 can transition from 220 knots to a landing within 3 miles and within 90 seconds. No helicopter is capable of achieving this operational and tactical advantage.

Here we have another claim which has been “word-smithed” by the writer.

It includes, by suggestion, that a maneuvering helicopter - in or out of autorotation - cannot make a quick descent and -- with virtually no mileage involved -- either directly or while banking into a DZ, and with or without a flare, make a safe landing.

To experienced combat helicopter pilots this is truly laughable.

As related to the above, a helicopter can intentionally and safely enter autorotation while maneuvering and descend and land directly beneath its' starting point -- AND get on the ground quicker than the V-22 flying 3 miles!

9. Allegation: *"The Osprey cannot hover above 10,000 feet and has limited ability to carry passengers and fuel when landing and taking off at 8,000. The Osprey would have been of little use in Operation Anaconda."*

Fact:

— *This is incorrect.* The MV-22 can hover at greater than 10,000 feet.

Unless the Boeing managed ITT (Integrated Test Team) reports/charts and the NATOPS performance charts derived from flight tests are incorrect, the V-22 has no hover take-off capability with payload with a density altitude of 10,000ft or more. In all other known programs involving rotorcraft, flight test performance results establish limits, and are then translated into Pilots Flight Manuals.

The V-22 Flight Manual shows NO takeoff data at or above 10,000 ft.

Using cockpit simulators, no matter how developed they are, cannot be used to verify actual flight test limits.

This MUST be done by the aircraft itself, not a computer.

One should also wonder what the words “Rotor Stall” on the 10,000 MSL line for hover mode from zero to 75-80 kts airspeed, on all Boeing data charts -defining the V-22's flight envelope-- imply. (hovering at greater than 10,000 ft in a simulator doesn't count.)

NASA -Based on hover test results to date and on information provided, the V-22 will meet all mission requirements.

Note carefully : The author has neatly included “and on information provided,” which is another way to say it hasn't been demonstrated in actual flight testing.

It is essential for the reader to be told that as hover weights are increased over the “referred gross weight” of 39,500lb, the margin of lift and the attainable load factor (Nz) is gradually decreased to an unsafe level because of the need to increase tip speed.

The end result is a severe decrease in safety margin and an inability to use ANY multi-axis control inputs (prohibited by NATOPS) -- which are needed for maneuvering or agility in combat situations under fire at hover/low airspeed/low altitudes.

This is never addressed in any of the “official” discussions of the V-22 performance.

— The MV-22 can deliver nine 250 lb passengers to a hover at 11,500 feet and return to a base at a distance 50 nautical miles. This

is based on MV-22 performance data given a standard day at 11,500i pressure altitude.

The technique used here is to carefully leave out one or two essential facts! Example: How far did the aircraft fly, and what was the Take Off Original Weight?

It is this kind of incomplete “claims” which have been repeatedly been put out by the V-22 Program contractors and the USMC. It therefor makes all of their claims to be suspect and incomplete. If the initial weight was such that when the aircraft arrived to 11,500 ft hover out of ground effect with 2250 lb. of troops, it is likely that they were no where near the takeoff limits!

We don't believe that working with weights with differences of 3000-4000 lb. make this assertion a viable claim -- except for supporters, congress, media -- none of whom know or understand what is ACTUALLY being claimed.

— As a general rule, useful load decreases as density altitude increases. This applies to all rotorcraft. **Although the generalization is correct, the real truth is that the useful load of the V-22 drops off faster with increasing density altitude than that for any helicopter in the USMC inventory. At 4000 ft density altitude, the V-22's payload of 5 fully equipped troops is laughable compared to helicopter!**

— Using the V-22's STOL capability increases the troop and cargo carrying capacity, its range/radius, and 'at-altitude' performance.

This is another case of twisted logic not supported by FACTS! If either a helicopter or the V-22 is making a running takeoff (VTOL) on a hard deck or runway (if available), this is true For BOTH, not just the V-22! Because this is another fact of life, why was it brought up as if the V-22 was unique in this capability?

— For example, in Afghanistan today, a shipboard based V-22 using short take off and landing techniques, could fly to 10,000 feet and deliver 24 troops or 5,750 pounds of cargo.

Our experience in dealing with the USN/USMC Program is to stop and look out to see what was left out -- as it is done here! Note that Ranges, Temperature, Altitude and T.O Weights are NOT mentioned! All of these are required to even attempt to verify this very loose -and possibly useless-- claim. As mentioned above , flying troops around at 7000-9000 ft without oxygen is a little marginal AND harmful to the troops.

NOTE: The time practiced habit of leaving basic parameters out of statements, is a ploy proving absolutely NOTHING!

10. Allegation: *"The strong downwash concerns U.S. Rep. Jim Gibbons."*

Fact:

— Downwash is an issue for all rotorcraft. In general terms, the more heavy the aircraft the greater the downwash. V-22 downwash is no better or worse than similarly sized helicopters.

First statement is absolutely and technically correct!! The second statement is less assertive, but it is a simple overstated falsehood! The USMC H-53 with about the same "size" or gross weights of the V-22 has about ONE HALF the downwash of the V-22 when equally loaded! This is a no brainer simple calculation. Simply divide the weight by the total swept area of the rotor(s), and find the square-root.

— As with all rotorcraft, the V-22's downwash will be mitigated through tactics, techniques and procedures. **Essentially correct, however the inclusion of "mitigated" is an unusually strange term related to downwash. It might the product of ----?)**

Article 2: "Windmills Our Specialty" 2Mil Website -- Mr. Carlton Meyer

Opening Statement:

— This article is from a website -- not a magazine - It is not widely read, nor is its information picked up by reputable press

This is an unusual and unnecessary slam at a fellow USMC officer, who does in fact have a rather good reader following on the Internet -- visit www.G2Mil.com. He occasionally relies on the V-22 Red Ribbon Panel to clarify some of the Program Office "claims" - as illustrated earlier.

13. Allegation: *"The MV-22 has about the same range as modern helicopters, not twice the range."*

Fact:

— The V-22 does not claim to have twice the range of all existing helicopters.

Several dozen Government Officials, Generals and Program P/R have stated that this is a fact , and even grander claims for the V-22 over the past ten years --another standard "Mantra."

— It has five times the range of the CH-46E, the primary USMC aircraft to be replaced, and a greater range than the CH-53D, the second helicopter in the medium lift community to be replaced.

Partially correct; but a proper comparison instead of 30-40 year older design machines, would be of the USMC's own CH-53E, which has virtually the same Empty Weight and same amount of propulsion for lift. The V-22 can only lift about 1/3 of its own Empty Weight, whereas the CH-53E

can lift 100% of its Empty weight.

The Payload to Empty Weight of the V-22 is the WORST of any military rotorcraft in the world!

This one individual weakness has never been justified by cost effectiveness or any reasonable justification in comparison to either helicopters or any other transport aircraft!

— Studies and actual flight tests have proven that the V-22 has three to five times greater range over conventional medium lift helicopters.

We always find a “qualifier” that seems to make the V-22 an easy winner.

First, there is in fact NO "medium helicopter" anywhere which matches the V-22 claim of 52,800 lb Gross Wt!

Medium lift helicopters are normally in the 25-30,000 lb weight class! This is like saying that Cruisers or Battleships have much longer ranges than a Destroyer. What is the point? Why is it repeated?

In the real world of comparisons, the ONLY comparable helicopters for proper comparative analysis are the USMC H-53E, and the Army H-47.

The V-22 has NO real “greater” range than with either of these, unless you add fuel with auxiliary tanks, and reduce payloads; or focus on high altitude -low payloads - and in-flight refueling. And, don't let them forget the problems with carrying troops at high altitudes. Get ALL the parameters!

Ironically, because of the numerous V-22 deficiencies and deletion of requirements, the newer single rotor medium/heavy helicopters such as the S-92 and EH-101 can outperform and are more cost-effective, particularly in terminal mission combat scenarios. The overall safety ratings for either of these far outrange that of the V-22.

Has anyone ever asked the military, how the Contractor refunds the Government when requirements under contract are deleted because they can't be met????

The fact that both the EH-101 and the S-92 can pass the safety certification muster of the FAA - which is generally a little lower than that of military requirements, speaks loud and clearly to the V-22 operational safety deficiencies.

FIVE times WHAT?? The CH-3C medium transport helicopters flew non-stop from New York to Paris almost 40 years ago! That was may be TWENTY TIMES further than other rotorcraft, but without explanation of conditions and equipment it can be meaningless!

It is the writers' bewilderment that a Program Manager finds it necessary to stoop to the level of defending “mantras” constructed by Contractors during their sale campaigns and repeated as part of their P/R work on Congress . Is it the Navy's and USMC intent to start justifying new fighter aircraft based on the old Cougar or Panther fighters?

14. Allegation: "The MV-22 does not have twice the speed of helicopters. If it carries an external load it must keep rotors upright and cannot fly faster than helicopters."

Fact:

— The V-22 has achieved level flight speeds of 275 knots, which is twice the advertised speed of the primary aircraft it will replace, the CH-46E.

Comparing the V-22 in airplane mode with a helicopter is interesting, but proves very little if anything.

In helicopter mode the V-22 is a total loser, and uses more fuel to fly at 100kts than any “comparable” helicopter! Note the “change the subject” ploy -it has been used for years by the Bell/Boeing/USMC/Congressional sales team!

— The V-22 has, in fact, achieved air speeds of 342 knots in descent testing.

This is of course is interesting but not very useful in any realistic missions. The Col. did not mention that this was limited to 15 seconds and was descending at about 12,000 ft per minute!!

It never flies anywhere near this when carrying troops or supplies.

Note earlier comments related to lack of oxygen for troops at higher altitudes.

Further, it definitely does not fly anywhere near the normal speeds as that other turboprop transports, nor even on other missions such as “self-deployment,” which require a much better fuel efficient airspeed.

— The V-22 has flown in airplane mode with external loads at speeds up to 230 knots. The aerodynamic shape and weight of the external load determine the speed at which it can be carried.

Did Anyone catch the “omission” of weights, size and ranges? A typical Public Relations trick! Is the reader now supposed to believe that any “undefined “ weight, say the size of a small boxcar, Humvee, Howitzers, and others can be flown 200 miles on an assault mission at 230 knots? CLUE--the answer is NO!

If the “new technology” V-22 design cannot even carry ONE jeep without being hampered with the requirement for ground troops to install temporary large/heavy extruded U-shaped aluminum channels to provide ‘load spreaders’ on the cargo floor, how do you compare it with a FORTY year old CH-3C helicopter which could readily handle TWO drive-on jeeps and without ANY special equipment!

If this so-called “new technology” requires all kinds of special handling and maintenance, costs far more, and has far more restrictions than a FORTY year old helicopter, which was the first fully certified IFR rotorcraft, with NONE of the restrictions evidenced in the V-22 (de-icing, avoidance of thunderstorms and lightning, etc.) then we must ask: “What exactly do we have to sacrifice in operations so we can call something “new technology”?

15. Allegation: *"It is questionable that MV-22's higher speed makes it safer from ground fire. Survivability is an issue!"*

Fact:

— The V-22 is more survivable than the aircraft it will replace because of its inherent design in system redundancy, capability for speed, expanded range, ceiling, and maneuverability.

This and following claims tend to apply to airplane mode. It certainly does NOT pertain to “aircraft it will replace” as is shown below!!

SELF DEFENSE

The suggestion or implication that the V-22 is more survivable than a helicopter in a combat terminal area (with no ability to use multi-axis inputs for agility/maneuverability) is very short sighted and suggests very little experience in the real world.

Anyone watching the TV lately can see that ALL transport helicopters exposed to terminal combat conditions have at least 2 - and in many cases, 3 automatic weapons installed so as to provide 360 degree coverage and protection.

The experts are today (after 15 years?) still looking for a solution to finding a place to put a defensive gun capability. They cannot put them in the windows like all helicopters because the nacelles/propellers block much of the lines of fire., and they apparently cannot add windows similar to helicopters because of load limits/structural redesign problems.

They have talked for years about installing a mini-gun turret - and have already designed one -- but its installation results in additional weight and weight/balance and C.G. problems.

If they add 700-1000 lb. in the front end for this gun--they will have to add an equivalent 700-1000lb toward the tail of the aircraft. All of the possible solutions will require an equivalent reduction of payloads, troop carrying and cargo reductions and or a combination of fuel/range requirements.

AERODYNAMIC PROBLEMS

The V-22 key and FATAL Design flaw is that which occurs in the terminal mission areas --where most V-22's take off and land, requiring they be in helicopter mode, and is where the vulnerability is at its maximum!!

Its' very poor maneuvering/lift/stall margins, coupled with the side by side rotor arrangement cause a severe propensity for instabilities and to stall/settling with power/VRS at times under fire, where the pilot has absolutely minimal ability or control.

It is of GREAT significance that this is the ONE area of Flight Testing which has been avoided and never done with the V-22.

Even though brought to the attention of DOD, DOTE, GAO and DOD/IG it still is being ignored and pushed out in time in the so-called “new test” program.

Note there is no acknowledgment or mention of vulnerability in the terminal mission areas -- where some 90% of all losses actually occur!!

We find this approach of denial for perhaps the most significant weakness of the V-22 both self-serving and poor judgment on behalf of all Management concerned

— Its speed provides quick penetration of threat engagement envelopes, and its range and pilots situational awareness displays allow it to navigate *around* known threat locations, rather than taking the direct route to the objective that helicopters are forced to do.

— Ballistic tolerance, redundant systems, and system separation combine to reduce the Osprey's vulnerability.

— The MV-22 is built to be crashworthy. Engines and transmissions are located away from the cabin and cockpit area and the prop-rotors will fray or broom straw if the aircraft lands with the prop-rotors in the cruise position. It is the most crashworthy rotorcraft ever developed.

— However, its most important survivability feature is its low IR signature. No other helicopter in design or fielded today can match the IR signature of the V-22. The V-22 has taken rotorcraft IR signatures to UNPRECEDENTED levels. See chart below.

We are always amused by this current focus on airplane mode survivability while ignoring the far more important concern for survivability in Helicopter Mode, where some 85-90% losses can be expected!!

We have almost come to the unfortunate conclusion, that very few people involved DIRECTLY in the V-22 Program have been exposed to fire in a hovering situation in Combat. Perhaps we are watching an entire new generation of Computer Nerds, who because of their "skills" always win at computer games, and while flying in the new computer driven Flight Simulators, think they can handle anything thrown at them.

What they somehow refuse to understand is that in the REAL world of NON-LINEAR situations, which occur in the REAL world at very slow airspeeds/hover - in a side-by side propeller rotorcraft - ill-designed for its use in REAL combat situations - cannot be controlled by even the most advanced computers available!

Very IMPORTANT! -- Control Systems in HELICOPTER Mode

The most current computerized applications essentially attempt to resolve classical control systems like autopilots and FSM's, to deterministically FORCE everything to be LINEAR. As one very knowledgeable expert in this field says: "What we are coming to find is that there is a huge amount of information about a system in the non-linear effects that we have, until now, simply filtered out as 'undesirable effects.'"

Efforts are being made now involving attention to finding ways to overcome this VERY IMPORTANT weakness, wherein non-linear situations, which include unstable airflow, abrupt changes in emergency control situations and many others, might be resolved and applied to future systems. These involve what are now known as 'Chaotic realms' and other advanced sciences.

Another quote for Co. Schultz and others to ponder: "But the bottom line of what you are pointing out is that the problem space is not linear, 1-dimensional, single-input-single-output or anything near those levels of simplicity. You are describing a truly Chaotic realm."

We are surprised that NASA or others have not yet faced this situation AND made it known to Management!

RADAR REFLECTIVITY

Another subject the readers will also NEVER hear about is that of the radar vulnerability for the two 38 ft diameter proprotors of the V-22 in the airplane mode! Some experts have suggested that from about 150-200 miles distance, the radar reflection will appear like two Boeing 747's flying in formation -- any other guesses or thoughts as to why this subject is NEVER discussed?

This IS a subject which should be analyzed and investigated!

When the Colonel/USMC/NAVAIR and other government organizations - including Congress - claim that the vulnerability of the V-22 is the "BEST" of anything at all, perhaps they should reflect on the last two above sections of our comments before the rush to repeat the Colonels' "facts."

There are still many REAL problems with the V-22 design that we have touched on in this paper.

16. Allegation: *"The MV-22 may not be able to carry, as advertised, 24 combat-equipped Marines, and that requirement was arbitrarily established anyway!"*

Fact:

— The MV-22's capacity to carry 24 combat troops, a key performance parameter, was demonstrated during the aircraft's operational evaluation in 2000 (OPEVAL Phase I).

It was well settled in the DOTE Report to the Blue Ribbon Panel that 17-18 fully equipped combat troops may be possible, but 24 could not be carried safely because of lack of storage for 60-70 lb. of gear for each of the troops.

Not only are there no storage areas, but there are also no windows (for spatial orientation) nor hand grips available for assistance in emergencies or the need for stabilization !

(PS We missed reminding the reader of the small problem of what to do with all of the bulky equipment needed for the immediate potential use of NBC requirements - as covered earlier.)

— The 18-24 troop payload was established to maintain the tactical integrity of platoon and reinforced-platoon units.

Until the V-22 was "designed" and new redefinitions became in vogue, we were told that a normal platoon was 12 men, and a reinforced platoon was 16 or more.

— Helicopter lifts in excess of 24 combat troops poses an unacceptable risk of loss in a single aircraft of human lives and fighting capability.

Who decided this? Another example of an outright misrepresentation. This claim by Col. Schultz seems more like "sea lawyer" talk and 'appears' to state that the V-22 can carry troops more safely than the USMC H-53E, which can carry up to 40- 53 troops safely!

It would be interesting to see if the Commandant and hundreds of USMC aviators would agree!

17. Allegation: *"The MV-22 does not cost \$41 million as reported. The Marine Corps spent an average of \$90 million for each 'pre-production' MV-22."*

The Selected Acquisition Report (SAR) for December 2001 - some 6 months ago - specifically penned the Program Unit Cost of the V-22 as about \$100 Million. These numbers can be played with by saying what the last one cost - or the next ten "may" cost - but in the end the Average Program Unit Cost - the ultimate cost to the taxpayers - is exactly that which DOD is required by Law to report every quarter to the U S Congress.

Fact:

— The unit flyaway cost for an MV-22 is \$68.4 million, for the current year budget of record and based on last the definitized MV-22 production lot of aircraft-Lot IV for 11 aircraft.

Note - insertion of "for current year budget."

— The original buy of 360 for the Marines, 50 for the Air Force and 48 for the Navy for a total of 458 has not changed.

Note: left out "since when " or "how long"?)

— CV-22 Cost: While no CV aircraft have been procured, the average recurring unit flyaway cost is expected to be \$82.4 million.

No Comment.

18. Allegation: *"The Marine Corps should buy an alternative such as the MH-60S."*

Fact:

— Eighteen independent studies concluded that *the V-22 is more cost and operationally effective and more survivable* than any helicopter or any mix of conventional helicopter types.

WE absolutely love this one!! This is another CLASSICAL trade mark "Mantra" which is pure P/R. The V-22 Red Ribbon Team will personally pay \$500 to anyone who can produce these 18 somewhat mythical studies. Professor Gessow (now deceased) of University of Maryland told us that in almost every study that they had worked with under contract for the government, showed that it was pretty much the other way around!

— The V-22 generates overwhelming tempo over a greater battle space (range), enabling our forces to win more quickly and decisively (speed) while minimizing casualties (survivability).

This sounds more like a P/R pitch to Congress than the real world. The phrase "overwhelming tempo" etc., sounds like a college lecture, BUT without facts or support.

— One of the main advantages of the V-22 is that it reduces the strategic airlift required. With an H-60:
The amount of amphibious shipping and strategic airlift must be increased.

A force of H-60s would not only provide less capability; it would require significant increases in manpower and infrastructure.

Did you note that the USMC H-53E was not mentioned? Maybe that is because it carries more than TWICE++ the number of troops in a V-22?

— While capabilities comparisons between the V-22 and conventional rotorcraft strongly favor the V-22, comparing speed, range and payload capacity misses the overriding point: since helicopter technology has reached its full potential, helicopters cannot meet the Marine Corps requirement to conduct Expeditionary Maneuver Warfare (EMW).

A study recently prepared by our USMC members of the Red Ribbon Panel has showed that the H-53 in a ship to shore assault can deliver some 7000 Combat troops versus 4200 troops to the same DZ at the same time! The restriction for larger V-22 spotting areas on carriers, uses more space than the H-53 or other helicopters.

In addition to the same number of troops, the H-53 can carry heavy artillery and support cargo at the same time. This somewhat offsets the “full potential” of the implied solo V-22 EMW claims.

Furthermore, someone needs to be planning the costs/manpower/support for Radar Suppression Escort aircraft for the V-22, which cannot generate sufficient power to protect itself -- without a very serious loss of useful load because of weight increases for carrying powerful jamming equipment. This NOT a small consideration.

“BUY before FLY”

All of the above -- and most subjects in this paper -- are directly related to and a major fault of the misguided “buy before fly” activities by Contractors, Congress and “wanabe” non-technical Military - both Active and Reserve. The super capable marketing forces who created the V-22 out of paper brochures, looking for the Golden Ring -- ignored normal development processes -- and substituted dream lists in place of solid research (including the 40 year history of laterally displaced rotors, and solid and complete design and wind tunnel work.)

We are now observing the collapse of capabilities and requirements -- all because of the short-sighted greed. Proper research would have brought out the real problems, which have resulted in numerous restrictions and prohibitions required to attempt to continue a program which can now be seen to have major flaws which have reached beyond the normal LINEAR solutions for aerodynamic controls.

The contractors and supporters both in and out of government violated many basic requirements for the development requirement of new technologies, and are now learning belatedly - after sunk costs of more than \$13 Billion - that in taking short cuts, that the basic control rules cannot handle the aerodynamic solutions required for safe operations. Perhaps NOW, our acquisitions system (which unfortunately includes many ‘outsiders’) will insist upon proofs and validations before commitment (external and internal politically pressures notwithstanding) to discard the policy of “BUY before FLY”.

19. Allegation: *The MV-22's mishap rate is worse than that of other aircraft*

Fact:

— Though aviation accidents are still an unfortunate reality, we've made tremendous progress in reducing their number over the years.

— Even one accident is too many, and we will always strive for continuous improvement until reach our goal of zero accidents. This is an ambitious goal, but to endorse any other goal legitimizes the acceptance of harm. The goal is achievable.

— When judging the V-22's mishap history, it is useful to remember that in their first five years of operation, several previous aircraft programs suffered similar and at times worse problems:

This academic discourse is perhaps the most misleading and deceitful CLAIM made by the Colonel in this entire paper! There is no discussion of the fact that the loss of FOUR V-22s along with 30 innocent men has occurred during peacetime, nor any other standard differential qualifiers to sort out numbers honestly.

Type of aircraft # of Class-A mishaps during first five years

CH-53D

9

CH-46E	44
H-3	28
UH-1	43
F/A-18	4
F-14	27

This is a standard defense for 'supporters'. Note there are no identification of dates or uses. It is important that no other aircraft program has lost 4 out of the first 8 aircraft delivered, nor does it mention the difference between Combat losses and others. The dissembling of facts to prove a falsehood is a great technique -- if your audience is blind or stupid.

EXAMPLE: An honest representation should have shown that virtually ALL of the H-3 losses claimed here, occurred in Viet Nam while saving downed pilots! A similar mistake is related to the H-46 claims!

How - in the name of dead veterans - does the Colonel justify stepping this far out of line?

What about the UH-60 Blackhawk?

__ Like many other new aircraft programs, the Blackhawk experienced a rocky start. Sikorsky's only prototype crashed at the Farnborough Air Show, killing both pilots. A few years after taking delivery of the new helicopter, the Army grounded the Blackhawk for two months in 1985 after two crashes killed 15 people. It was grounded again in 1986 and twice in 1987 because of crashes that killed three soldiers. This conventional helicopter quickly established an accident rate higher than that of all other Army aircraft. Between 1985 and 1990, Blackhawk mishaps claimed 40 lives.

No data here representing those involved in combat losses! As a former officer, flight test director and combat experienced pilot, the Coordinator of the V-22 Red Ribbon Team finds it contemptible that ANY official of the government - in or out of office, would feel a need for justification of anyone's "pet project" by misrepresenting and falsifying information for his own personal edification and power.

20. Allegation: *"The MV-22 is not essential for future Marine amphibious operations."*

Fact:

__ The requirement for Over the Horizon (OTH) amphibious operations have been validated and are identified in both the Marine Corps capstone EMW concept and Operational Maneuver Warfare from the Sea (OMFTS). These concepts address changes to the world's operating environment and changing threats. OTH operations address the areas of access denial, shore-based defense, host-nation support, static logistic and assembly areas vulnerabilities. It allows us to avoid long operational pauses at the beach to build combat power, improving our opportunity to achieve surprise by generating overwhelming tempo and momentum. OTH operations also increase the enemy's vulnerability. The enemy will be less capable of predicting our objectives and will be forced to choose between being weak in many places or strong in a few.

We are not near as efficient in philosophical nonsense as we are in facts - there are several mouthfuls here, which suggest that Bell/Boeing P/R underwrote this material for a lecture or graduate thesis. If the writers would review current professional magazines such as the US Naval Institute Proceedings, he/they would find that far more knowledgeable senior officers have already downgraded the justification for much of the cost effectiveness and utility for OTH and OMFTS claims.

Additional Allegation from Mr. Joe Neff, Raleigh News & Observer reporter:

" My questions: Has the ADS-33 requirements been waived? When? Who authorized this? And on what basis?"

Fact:

__ ADS-33 is a general aviation spec developed by the Army. We believe the only helicopter that has it under contract is Comanche.

The ADS -33 requirement - now used internationally - is hardly what one could call a "general aviation" spec!

__ The Navy has its own specifications that levy flying qualities for helicopters and fixed wing aircraft and we are under contract for these.

Any review by persons familiar with the V-22 program would have to at least sense that as time goes by, the Navy/USMC, in this case only, develops its own "specs" as it goes along!

— As of today we are in compliance with our specs and have a test program to further develop our envelope. **The ADS-33 document has become a military universal for rotorcraft, and now international standard for testing, particularly for maneuver/agility for rotorcraft which will be expose to combat conditions. Combat Aircraft engineering/flight test folks have ascertained that the V-22 - again because of the poor proprotor design and the proximity of the two nacelles - cannot meet even 20-30 % of the requirements of this “general aviation spec” as claimed by the author - and incorrectly at that!. We believe the Navy - as with many other problems - has requested a waiver from using ADS-33 in the “new” test program.**

— We have looked at ADS-33 in the past -- it's a good document and we plan to use tailored parts of it in the future, where and when it will apply to the V-22. But it is NOT a requirement, nor was it ever one on the V-22 **No comment other than that it is a good indication that the DOD should consolidate - in our new “Transformation” Process - all of our Military Rotorcraft Design organizations - Army/USN/USAF/USMC- and all associated personnel assets with the most experience engineers and flight test personnel available.**

This reorganization could have a basic design function team, along with teams associated with common mission requirements such as light/utility, combat oriented support, medium transport/rescue/SOC, and heavy lift.

The cost savings for similar powered/sized rotorcraft with interchangeable dynamic components deployed as necessary, would be fairly unique and reduce replenishment of major components including transmissions, rotor heads and blades, engines and others.

Further, the excessive costs of manning duplicative and competitive DOD assets would be eliminated.

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Conclusion:

If you have managed to read this far, and are convinced that there is something seriously wrong with the V-22 Program and its' Management, we recommend that you make a copy of this document and forward it to your Senator or Congressman (or nearest Media contacts) and ask them to justify WHY the public has already spend some \$13 Billion!!

After studying this program and its REAL problems and waste illustrated here, we now call it the "V-22 Albatross!

On behalf of the V-22 Red Ribbon Panel, I would ordinarily apologize for some of my abrupt comments. However, to find a fellow officer, with far less experience than most of us have, to degrade the media in their attempt to educate the public is overdone. The waste of time in spending so much effort defending the stale and out of date “mantras,” taught to him by Contractors over a period of over 15 years, is sorry and uncommendable, and reminds many of us of the “sea lawyer” stories..

His decision to make his program look normal or even outstanding by trying to justify V-22 accidents and the 30 related unnecessary deaths in a machine with fatal design problems, and at the same time comparing them with actual combat inflicted losses and deaths is a little more than my ethics or feelings for responsibility can endure.

He was not only not correct, he was disgraceful. Col. Schultz is either the 7th or 8th Program Manager of this tragic program, and should know better than to follow the same mistakes as his predecessors.

He owes an apology to anyone and everyone who has had the opportunity to read his “analysis” of “facts”!

Harry Dunn, (Col USAF Ret:)
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Instigator and Proj. Director for Worlds First Helicopter Inflight Re-Fueling Program.
Coordinator, V-22 Red Ribbon Panel