THE GHOST PROGRAMME

A Plausible Technical Companion to *The Last Pilot*

F-35U Retrofit Doctrine, Autonomous Architecture, and the *Atonement Fleet*

M. A. Rozas Pashley / Quantum Wildchild - May 2026

Editorial note on method: This document is an open-source engineering inference. Every figure, system reference, and performance estimate derives from publicly confirmed programme data, published engineering parameters, and operational logic connecting them. Where the inference goes beyond confirmed fact it is flagged as such. This standard is applied throughout the essay as the reader is entitled to know which is which.

EXECUTIVE SUMMARY

I hereby propose to establish the engineering case for a depot-level conversion programme transforming existing F-35 airframes into agentic AI-operated combat platforms hereby designated as the F-35U *Ghost*. The conversion requires no new production line, no exotic materials programme, and no clean-sheet propulsion development. It requires a decision, adequate depot capacity, and the institutional honesty to acknowledge what the F-35 programme was always pointing toward.

The Ghost is not a replacement for the F-35. It IS the F-35, with the biological constraint removed and the performance ceiling it was always suppressing finally enabled. The $2.1 trillion already committed to the programme over its 92-year lifecycle is not wasted by this conversion. It is, finally, redeemed by it as a suitable atonement to the US taxpayer.

SECTION 1: BASELINE PLATFORM AND WHAT IS REMOVED

The F-35A and F-35C variants provide the conversion baseline. Early production airframes or those approaching scheduled major overhaul cycles are the priority candidates, depot entry coincides with existing maintenance cycles, minimising programme disruption and maximising cost efficiency.

The F-35B STOVL variant presents additional complexity due to the lift fan system and is treated as a secondary conversion candidate pending separate analysis.

***The following aircraft systems** are removed in their entirety from the conversion airframe:*

Martin-Baker US16E ejection seat and associated twin catapult rail structure, explosive cartridge assemblies, parachute deployment system, survival kit, and harness: approximately 95 kilograms. *Honeywell* Onboard Oxygen Generation System including molecular sieve concentrators, bleed air plumbing branch, anti-G pneumatic supply lines, and auxiliary emergency oxygen bottle: approximately 50 kg. Cabin pressurisation system, associated ducting, and thermal conditioning hardware for the cockpit zone: approximately 35 kg. Canopy transparency, framing structure, seal systems, and jettison mechanism: approximately 40 kg. Cockpit instrument panels, multifunction

Art Concept.- F35U *Ghost as* Alpha node of a wing formation. It leads a gaggle of eight or even sixteen attritable *Loyal Wingman* drones operating under Ghost coordination, each carries a scaled-down agentic AI node.

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displays, panoramic cockpit display, and associated wiring looms: approximately 25 kg. Sidestick controller, HOTAS assembly, rudder pedals, and mechanical control runs to theFly-By-Wire (FBW) interface nodes: approximately 15 kg. F-35 Generation III Helmet Mounted Display System and dedicated image processing hardware: approximately 5 kg. Pilot in full operational kit, flight suit, G-suit, survival vest, gloves, boots, personal equipment: approximately 95 kg.

Conservative mass removed from the forward airframe: 360 kilograms excluding structural modifications to the cockpit pressure vessel. Including selective removal of the pressure vessel reinforcement and associated structural mass where the conversion fairing allows, the total approaches 500 kg.

Including the pilot, the operational figure reaches 595 kg at the conservative estimate, approaching 700 kg at the upper bound depending on configuration depth.

This mass is concentrated at the forward Centre of Gravity. Its removal shifts the CoG aft, which is managed through the forward installation of the Ghost Core compute modules and, where mission profile permits, additional fuel capacity in the former cockpit bay. The net CoG position is optimised during conversion for the primary mission profiles assigned to each airframe batch.

Freed volume in former cockpit bay: approx. 1.5 to 2 cubic metres. This volume accommodates the Ghost Core installation, added fuel bladder capacity of approximately 300 to 500 kg depending on configuration, or mission-specific sensor & electronic warfare payload suite.

The Forward Fairing

The forward fuselage is closed with a low-observable composite fairing, a continuous smooth surface from radome to spine, radar-absorbent material matched to the existing F-35 RAM coating specification, no seams, no transparencies, no surface discontinuities. The fairing is contoured to reduce the frontal radar cross-section below the baseline F-35 figure by eliminating

the canopy transparency and its framing structure, which represent a significant RCS contributor in the frontal sector.

The fairing accommodates expanded conformal sensor apertures: additional Distributed Aperture System-type (DAS) electro-optical nodes providing enhanced 360º coverage, conformal electronic warfare array elements, and flush-mounted Starshield terminal antenna panels. The sensor apertures are integrated into the fairing surface during manufacture rather than retrofitted, maintaining the low-observable surface continuity.

Visual signature: the faired Ghost is immediately and unambiguously distinguishable from a crewed F-35 on the ramp, in flight, and on satellite imagery. The smooth continuous nose, the absence of the canopy bubble, the expanded sensor aperture pattern along the forward spine, these are not subtle modifications.

They are the visual declaration of a platform that has moved beyond its transitional configuration. This visibility is a feature, not a liability. The atonement should be legible.

SECTION 2: THE GHOST CORE AUTONOMOUS ARCHITECTURE

The Ghost Core is the autonomous mission system installed in the freed cockpit volume. It consists of two to three rugged compute modules in radiation-hardened packaging, drawing on military-grade processing hardware at the level of current Collaborative Combat Aircraft (CCA) onboard systems. Redundant power supply from existing F-35 electrical generation. Estimated added mass: 150 to 250 kg, well within the mass budget freed by cockpit deletion. Thermal management via the existing environmental control system, rebalanced following removal of the cockpit zone load.

Interface with the airframe: the Ghost Core integrates directly with the F-35's existing Integrated Core Processor and Vehicle Management System via software-defined protocol overrides. The AI issues commands at the same system interface layer as human pilot inputs, the FBW computers receive commands in the same format whether the source is a sidestick or the Ghost Core. No mechanical actuators. No robotic intermediaries. The fly-by-wire architecture is the AI's native motor system, accessed through the interfaces that already exist and have been flight-proven across thousands of sorties.

Agentic Behaviour

The Ghost Core runs a goal-directed autonomous mission stack. Mission parameters, target sets, threat constraints, coordination geometry, rules of engagement thresholds, and self-preservation priorities, are loaded pre-flight via secure ground link or transmitted during flight via Starshield datalink. The AI generates and executes multi-step mission plans, replans in real time as the threat environment develops, and manages the full formation including the Loyal Wingman AI enabled drone gaggle without human input at the tactical execution level.

The agentic architecture distinguishes between mission-level parameters set by the human commander and tactical-level decisions made by the AI in execution. The human authorises the mission, defines the constraints, and sets the engagement thresholds. The AI manages everything that happens between take-off and recovery within those constraints. This architecture is consistent with current interpretations of the meaningful human control requirement under the

laws of armed conflict, while acknowledging frankly that the human's meaningful control operates at the intent level rather than the execution level.

The Ghost Core learns from each sortie. Onboard simulation modules process engagement data during transit phases. Post-flight, the updated neural model uploads to the ground architecture and propagates across the fleet. The 100th Ghost in the atonement fleet benefits from the accumulated learning of the first 99. No pilot training pipeline operates on this principle.

Redundancy and Failure Modes

Triple-redundant compute modules with automatic failover. Loss of primary module: seamless handover to secondary within milliseconds, mission continues. Loss of primary and secondary: tertiary module executes safe recovery profile, disengage from contested airspace, proceed to designated recovery airfield or carrier, land autonomously. Loss of all three modules within a single sortie: considered a battle damage scenario equivalent to catastrophic flight control failure in a crewed aircraft. Probability assessed as lower than equivalent crewed system failure rate given absence of the human factors contribution to mishap statistics, which accounts for approximately 80 percent of military aviation accidents.

Airframe Denial System

Any autonomous platform operating in denied or contested territory without a pilot capable of initiating self-destruct must incorporate a multi-tier onboard airframe denial system as a non-negotiable design requirement. The Ghost conversion includes a classified demolition suite, the specific architecture is above the unclassified level of this essay, designed to ensure complete destruction of the Ghost Core compute modules, the sensor fusion hardware, the autonomous flight control software stack, and all mission-specific payload on loss of the airframe, whether through combat damage, mechanical failure, or controlled termination by ground command. The requirement is absolute: no recoverable component reaches adversary hands.

The precedent is established doctrine, the *Night Stalkers* destroyed their aircraft at Mahyar, Iran, 2026, on exactly this principle, and the Ghost applies it with the additional urgency appropriate to a platform whose AI architecture represents a more sensitive intelligence prize than any previous autonomous system deployed in contested airspace. The airframe can be lost. The Ghost Core cannot be recovered.

SECTION 3: FLIGHT ENVELOPE EXPANSION

The F-35 fly-by-wire governor is currently set at 9G operational limit. This figure derives directly from the biological constraint: 9G is approximately the outer edge of what a trained pilot in a full pressure suit and G-suit can sustain without G-induced loss of consciousness, a condition that develops within three to five seconds of sustained 9G loading at combat speeds. The F-35 airframe's structural design limit is 13G. The gap between these two figures, 44 % of increased available structural performance, has existed since the first F-35 flew and has never been used once, because there was always a human inside who could not survive it.

Ghost Core conversion removes the biological constraint. The flight control law update is a software modification to the FBW envelope protection parameters, not a hardware change, not a structural redesign, not a new control surface. The structural limit becomes the operational limit.

Selective reinforcement at high-stress structural joints, carbon-fibre overwrap at wing root attachments, forward fuselage frames, and main landing gear attach points, adds minimal mass while providing confidence margin for sustained high-G operations across the airframe's remaining service life.

Manoeuvre Performance

At 500 knots (930 km/h) in a sustained level turn: 9G produces a turn radius of approximately 1,400 metres. 13G produces a turn radius of approximately 960 metres. That 31% reduction in turn radius is decisive in within-visual-range combat. No current crewed adversary fighter is cleared for sustained 13G manoeuvre, because none is designed for it, all are built around the same 9G biological ceiling. A Ghost engaging a crewed adversary in a turning fight at 13G is engaging an aircraft whose pilot will lose consciousness attempting to match the geometry. The engagement is not a contest of equal platforms. It is a structural mismatch.

Instantaneous G peaks beyond 13G are achievable within materials limits for manoeuvre durations of one to two seconds. The Ghost Core's reaction speed, microseconds versus the 200 to 300 milliseconds of biological pilot response, means the aircraft can be constantly flown at the absolute edge of its structural envelope, with the AI managing load factors in real time against the structural limit model rather than a biological one. This is not aggressive flying. It is the airframe operating as designed, minus the constraint of protecting an occupant it no longer carries.

Suborbital Profile

The Ghost's reduced gross weight combined with full Pratt & Whitney F135 afterburner output, approximately 43,000 pounds of thrust, produces a thrust-to-weight ratio at conversion gross weight that supports zoom climbs to 30 to 40 kilometres altitude without auxiliary propulsion. This altitude places the Ghost above the engagement envelope of all current surface-to-air missile systems, above the operational ceiling of all current interceptors, and within line-of-sight of the Starshield LEO constellation at reduced atmospheric interference.

Lightweight ceramic composite leading edge treatment, applied to the existing titanium leading edge structure during conversion, manages thermal load on the climb and re-entry profiles for this altitude range. For operations above 40 kilometres or requiring genuine suborbital re-entry profiles, a podded hybrid rocket booster can be carried on the centreline station. The booster is recoverable and removable. It is an option, not a requirement, for the primary atonement fleet mission set.

The suborbital profile is not the Ghost's primary combat mode. It is a capability that exists as a consequence of the weight reduction and envelope expansion, available for specific mission profiles, rapid global strike, high-altitude ISR, satellite proximity operations, without additional airframe development. The Ghost does not need to be a spaceplane to benefit from operating above the threat envelope. 38 kilometres is not orbit. It is, however, unreachable by anything currently in the adversary's order of battle.

At 38 kilometres altitude, air density is less than 3% of sea level values. Aerodynamic drag collapses. The thrust available produces acceleration profiles with no low-altitude equivalent. The 13G structural ceiling remains the operational limit, but the aerodynamic loads that generate G-

force in turning flight also decrease with air density, high-altitude manoeuvres at 13G impose lower structural stress than equivalent manoeuvres at combat altitude. Mach 2 in the upper stratosphere corresponds to a significantly higher true airspeed than Mach 2 at low altitude. The Ghost at 38 km is not a high-flying F-35. It is an aerodynamically liberated platform where the performance constraints of conventional air combat have fundamentally shifted in its favour. On the upper atmospheric environment: true plasma sheath effects occur at hypersonic re-entry velocities, not during zoom climb ascent, that is the X-20 Dyna Soar's operating problem, not the Ghost's. Aurora borealis phenomena occur at 100 to 300 kilometres in the thermosphere, well above the Ghost's ceiling.

SECTION 4: THE GAGGLE, LOYAL WINGMAN INTEGRATION

The Ghost operates as the alpha node of a formation. Eight or even sixteen attritable loyal wingman drones can operate under Ghost coordination, each carrying a scaled-down agentic AI node of the same family as the Ghost Core. The formation is not a remote-controlled drone swarm with the Ghost as operator. It is a distributed autonomous system with the Ghost as the senior node, the platform with the best sensors, the deepest processing capability, and the authority to set formation-level mission goals.

Wingman Platform

Platform baseline: XQ-58A Valkyrie derivatives or future equivalent low-cost attritable airframes. The Valkyrie-class platform offers a combat radius exceeding 2,800 kilometres, internal weapons bay capacity for two GBU-39 Small Diameter Bombs or equivalent, and a unit cost in the 2 to 6 million dollar range, approximately 2 to 3% of a crewed F-35's unit procurement cost. The wingman carries its own agentic AI node, its own Starshield terminal, and its own sensor suite scaled to the platform's size and cost envelope.

Attritable by design means *recoverable where practical and expendable where necessary*. The wingman does not have a pilot to bring home. The decision to expend a wingman, to assign it a mission profile from which recovery is not the primary objective, is a logistics decision, not a casualty. This changes the tactical calculus of high-threat penetration missions in ways that no crewed formation can match.

The Ghost can send the wingmen first into the most dangerous engagement geometry, use them to saturate adversary air defences, deplete missile inventories, and map the threat picture, and fly into the resulting opening with the Ghost's superior sensor suite and weapons capacity. Expendable is not the same as wasted.

Command Architecture

The Ghost distributes high-level mission goals to the gaggle via encrypted mesh datalink on low-probability-of-intercept waveforms, building on existing Link-16 infrastructure, the current NATO-standard tactical datalink, plus dedicated autonomous coordination channels.

Goal distribution is not micromanagement. The Ghost tells the wingmen what the mission requires. The wingmen determine individually how to achieve it within their assigned roles and constraints.

Wingmen self-organise within the goal structure: automatic formation keeping, mutual sensor sharing, electronic attack coordination, kinetic decoy sequencing, and dynamic role reassignment when a wingman is lost or its payload is expended.

Each wingman maintains independent onboard mission planning and can operate autonomously through complete datalink blackout, executing its last received mission goal, adapting to local threat conditions, reconnecting to the formation mesh on signal restoration and reporting its status and remaining capability.

The Ghost's superior F-35 sensor suite, AN/APG-81 AESA radar, AN/AAQ-37 Distributed Aperture System, AN/AAQ-40 EOTS, feeds the entire formation's targeting picture in real time. The wingmen see through the Ghost's eyes. The Ghost benefits from the wingmen's distributed sensor coverage. The formation is a single intelligence distributed across multiple platforms, not a leader and followers.

Mixed Payload Configurations

Weapons wingmen: standard internal bay loadout, GBU-39 SDB or AIM-120 AMRAAM variants, for kinetic strike and air-to-air engagement. Sensor wingmen: expanded ISR payload, SIGINT collection, ground moving target indication. Electronic warfare wingmen: dedicated jamming and suppression payloads, operating as expendable SEAD assets that can operate inside threat rings the Ghost and crewed aircraft would not enter. Tanker wingmen: conformal fuel bladder configuration extending Ghost range on ultra-long-range profiles. The gaggle's composition is mission-configured before each sortie and can be dynamically reassigned in flight as the mission develops.

SECTION 5: *STARSHIELD* BATTLESPACE INTEGRATION

The Ghost and its gaggle operate as nodes in the military Starshield LEO mesh, SpaceX's militarised Starlink derivative providing assured global communications via proliferated low Earth orbit satellites with inter-satellite laser crosslinks. The Ghost's conformal terminal antennas, flush-mounted in the faired fuselage and wing leading edges, provide encrypted connectivity with 20 to 40 millisecond round-trip latency at standard combat altitude.

At suborbital zoom-climb altitude, 30 kilometres and above, line-of-sight geometry to the constellation improves dramatically. Atmospheric interference is minimal.

The Ghost is simultaneously closer to the satellites and above the atmospheric absorption layers that degrade lower-altitude terminal performance. Effective latency for priority command and control packets drops to single-digit milliseconds. For an agentic AI making tactical decisions at microsecond (ms) speed, single-digit ms connectivity to the joint force architecture is effectively instantaneous.

The formation maintains a common operational picture updated at machine speed, shared with ground commanders, other aircraft, and maritime assets via JADC2 architecture, the Joint All-Domain Command and Control architecture connecting sensors, shooters, and commanders across air, land, sea, space, and cyber, into a single integrated network so that any asset can task any other asset in real time regardless of service branch or platform type.

The Ghost is not a stand alone system. It is a node, the most capable offensive node in the joint force network, providing constant input & output on the full spectrum of the ISR and targeting architecture simultaneously.

Jamming resilience: the Starshield mesh routes automatically around degraded or jammed nodes. The Ghost's multiple conformal antenna arrays provide 360º terminal coverage with no single point of failure. In a fully contested electromagnetic environment where the Starshield link is degraded, the Ghost reverts to autonomous operation under last-received mission parameters, the same fallback available to every node in the mesh, and the same mode in which the Ghost was designed to be fully capable without external connectivity.

SECTION 6: A PLAUSIBLE RETROFIT DOCTRINE

The conversion programme does not require a new acquisition strategy, a new programme office, or a new line item in the defence budget. It requires the application of existing depot-level modification authority to a defined subset of the existing F-35 fleet, using existing industrial facilities, existing supply chains, and existing autonomy technology that is already in flight test under current CCA programme contracts.

The **Collaborative Combat Aircraft** programme is the US Air Force initiative to develop and field autonomous uncrewed aircraft designed to operate alongside crewed fighters, initially the F-35 and F-22, executing missions too dangerous, too numerous, or too tactically demanding for crewed platforms alone.

Two prototypes completed first flights in 2025: Anduril's YFQ-44A and General Atomics' YFQ-42A. Both are semi autonomous from inception, no remote pilot with stick and throttle. Each carries its own onboard autonomy stack. Anduril went from contract award to first flight in 556 days. This highlights the revolutionary AI-integrated development velocity of autonomous military systems is no longer constrained by the pace of human engineering teams working sequentially. It is constrained by compute, data, and decision authority.

The CCA is attritable by design, tactically effective and cheap enough to be expendable. Unit cost target is well below crewed fighter procurement cost, in the 20 to 30 million dollar range for production variants. Internal weapons bay, supersonic capable, stealth-shaped.

The current programme's governing concept is the crewed fighter as quarterback, the F-35 pilot directing the CCA formation via tablet interface. As discussed at length herewithin, the quarterback framing is the legally and politically necessary description of what is actually an agentic autonomous system operating at speeds beyond meaningful human tactical supervision.

The CCA programme is the public-facing, institutionally acceptable entry point for autonomous combat aircraft. **The Ghost conversion doctrine is what the same logic looks like when you remove the institutional constraints and follow the engineering to its logical conclusion.**

F-35A Ghost Phase One: Proof of Concept (Year 1-2)

Select six to eight early production F-35A airframes, low flight hours, high modification potential, not assigned to operational squadrons. Conduct full Ghost Core conversion on two airframes at a designated depot facility such as Ogden Air Logistics complex at Tinker AFB

(UT). Conduct partial conversion, cockpit deletion and fairing installation only, Ghost Core software integration without full autonomy unlock, on four airframes as sensor and datalink test platforms. Fly the two full Ghost conversions through the complete envelope expansion test programme at Edwards Air Force Base, accumulating G-envelope data to the 13G structural limit under controlled conditions. Validate Ghost Core integration with existing F-35 Vehicle Management System and Integrated Core Processor. Establish the safety case for autonomous operation in US restricted airspace.

Parallel to the airframe conversion, integrate two Ghost platforms with the Anduril YFQ-44A CCA under the existing CCA programme contract as the inaugural loyal wingman gaggle. Test *Ghost-as-alpha* architecture against *CCA-as-wingman* in controlled exercises at a test range. Accumulate formation autonomy data. Validate encrypted mesh datalink protocols between Ghost Core and CCA autonomy architecture.

Phase Two: Limited Production (Year 2-4)

Following proof of concept validation, expand conversion to 20 airframes across two depot facilities. Establish the Ghost conversion as a standard depot modification track alongside existing F-35 scheduled maintenance cycles, aircraft enter depot for programmed depot maintenance and exit as Ghost conversions, with no additional downtime beyond the conversion work itself. Field the first operational Ghost flight of four aircraft with an 8-drone gaggle at a designated test and evaluation unit. Conduct operational evaluation against representative threat systems in live-fire exercises. Validate rules of engagement constraint architecture and human authorisation protocols with JAG and operational legal review.

Phase Three: Atonement Fleet (Year 4-7)

Scale conversion to 100 airframes across four depot facilities at a rate of 15 to 20 conversions per year. Procure loyal wingman gaggles at 8 drones per Ghost for the operational fleet. Establish Ghost squadrons at two CONUS bases and one forward operating location. Develop operational doctrine for Ghost employment in the five primary mission sets: autonomous SEAD, deep strike, maritime strike, high-altitude ISR, and counter-UAS.

The 100-Ghost atonement fleet with full 8-drone gaggles represents 900 coordinated autonomous combat aircraft. The operational cost per flight hour is a fraction of the crewed F-35 equivalent, no life support certification, no pilot physiological monitoring, no ejection seat maintenance cycle, no G-suit logistics chain, no human fatigue constraint on sortie tempo. The Ghost can fly the moment the maintenance cycle is complete. It does not need crew rest. It does not have a duty day limit.

A Caveat: Its description as an *atonement fleet* is intentional and deliberate: the trillion already spent is not waste if it becomes the foundation for the platform the programme was always pointing toward. The faired nose where the canopy was, the smooth unbroken spine, you can see at a glance that something fundamental changed. That is the whole point.

Programme Economics

Per-aircraft depot conversion cost: 15 to 40 million dollars depending on configuration depth and depot learning curve. For 100 converted airframes: 1.5 to 4 billion dollars. Per-wingman

procurement cost: 2 to 6 million dollars. For 800 wingmen at 8 per Ghost: 1.6 to 4.8 billion dollars. Total atonement fleet programme cost: 3 to 9 billion dollars across a seven-year implementation timeline.

The conversion cost range reflects depot configuration variables: the lower bound assumes maximum reuse of existing airframe systems with minimal structural modification, while the upper bound covers full cockpit pressure vessel removal, structural reinforcement, and expanded sensor integration. Programme cost will converge toward the lower end as depot learning curve matures across successive conversion batches.

For context: the F-35 programme spends approximately $3 billion every 18 months on sustainment alone under current projections. At the lower end of the cost range, the atonement fleet conversion of 100 airframes costs less than two years of that sustainment figure, while delivering 900 coordinated autonomous combat aircraft and eliminating pilot casualty risk from the most dangerous mission profiles permanently. The conversion does not reduce the existing sustainment burden. It redeems part of it.

SECTION 7: THE INSTITUTIONAL OBSTACLE

The engineering case is straightforward. The institutional obstacle is not. This section addresses it honestly because any retrofit doctrine that ignores it is a document that will not survive contact with the acquisition system.

The US Air Force pilot community is an institution with its own culture, its own career structure, its own congressional constituency, and its own deeply held understanding of what air combat is and who conducts it. The Ghost conversion is not a threat to that community's competence or courage. It is a structural argument that the missions most likely to kill its members should no longer require their physical presence. That argument is correct. It will still be resisted, because institutions do not yield to correct arguments on schedule.

The congressional constituencies built around pilot training pipelines, undergraduate pilot training at Laughlin, Columbus, Vance and Sheppard; the T-38 and T-6 programmes; the F-35 conversion training enterprise, represent employment, contracts, and votes in specific districts. None of those constituencies disappear because the Ghost conversion is sound doctrine. They become opponents of the conversion unless the political architecture of the programme explicitly preserves alternative roles for their assets during the transition.

The legal framework requiring human accountability for lethal force decisions is real and is not resolved by the agentic architecture alone. The Ghost conversion requires a parallel legal and doctrinal development effort establishing clear accountability chains for autonomous lethal force, who authorises the mission, what constraints are legally binding, and who bears responsibility when the autonomous system acts outside its parameters. This work is not impossible. It requires the same institutional commitment that built the nuclear weapons employment doctrine in the 1950s. It took a decade then. It will take less now, because the engineering reality is already forcing the question.

The adversary does not share these institutional constraints. China's autonomous combat aircraft development operates without a pilot community lobby, without congressional constituencies

defending crewed aviation employment, and without a legal system that will litigate the rules of engagement for autonomous systems before the systems are operational. The Ghost conversion is not fast. It is, however, faster than the alternative, which is losing the next conflict to an adversary that made the decision Washington delayed. Visionaries such as General Henry “Hap” Arnold or his foundational AFRL would have agreed in pursuing this on this technotronic paradigm to keep pilots out of harms way and yet accomplish the mission.

The F-35 programme will spend $2.1 trillion across 94 years, carry a pilot in its cockpit for most of that period, and retire in 2088 into a world where autonomous combat aircraft have been operational for decades. That is the trajectory if nothing changes.

It will retire alongside the B-52, an unsurpassed aeronautical marvel whose airframe gave up its last original rivet decades before, and which will itself have long since shed its crew, flying its final missions as a pilotless platform in a world that no longer requires a human being inside a weapons system to justify sending it into dangers way. The ghost of every pilot who flew both aircraft will understand the logic, even if the institutions that employed them never quite did.

The Ghost conversion is the alternative trajectory. Not cheap. Not fast. Not free of institutional friction. But grounded in engineering that already exists, technology already flying, and a programme logic that the F-35's own designers understood when they built the autonomous test platform in the same facility, in the same decade, from the same technology baseline as the aircraft they put a pilot in.

The atonement is available. The challenge is clear. The decision is the only thing outstanding.

M. A. Rozas Pashley

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SOURCES:

Lockheed Martin F-35 programme documentation, public releases 2023-2026; GAO-24-106703, F-35 Sustainment Costs Continue to Rise (April 2024); GAO, F-35 Will Exceed $2 Trillion (April 2024); 19FortyFive, $2.1 Trillion for the F-35? (April 2025); Army Recognition, US Lockheed Martin Advances Optionally Piloted F-35 (2025); Martin-Baker, US16E Ejection Seat product documentation; Honeywell, F-35 OBOGS system documentation (public); Pratt & Whitney, F135 engine specifications (public); Defense News, Anduril YFQ-44A First Flight (November 2025); Defense News, General Atomics YFQ-42A programme; The War Zone, Anduril Valkyrie and CCA programme reporting 2024-2026; DARPA ACE programme public records 2022-2025; SpaceX Starshield programme documentation (public); DoD JADC2 implementation plan public summary; Simple Flying, F-35 G-force limits and pilot physiology; Federation of American Scientists, F-35 programme history; Congressional Research Service, F-35 Joint Strike Fighter programme (various years); Center for Strategic and International Studies, autonomous weapons and international humanitarian law; ICRC, Autonomy in Weapons Systems position papers 2021-2024.