# STAVATTI™

STAVATTI MILITARY AEROSPACE
TACTICAL AIR WARFARE SYSTEMS DIVISION

# NATO CONFIGURATION STATEMENT

SPECIFYING THE GENERIC NATO/ALLIED EXPORT CONFIGURATION
&
STANDARD SYSTEMS LISTING FOR THE

# SM-26S/T MACHETE™

## COIN/CAS/FAC/AT



PREPARED AND RELEASED BY:

STAVATTI MILITARY AEROSPACE
TACTICAL AIR WARFARE SYSTEMS
520 Airport Road
South St. Paul, MN 55075 USA
TEL: 208-263-6081
FAX: 208-263-8059
http://www.stavatti.com
email: stavatti@stavatti.com

| Report Documentation Page | *Form Approved*<br>*OMB No. 0704-0188* |
|---|---|



| 1. REPORT DATE | 2. REPORT TYPE | 3. DATES COVERED |
|---|---|---|
| **27 JUN 2005** | **N/A** | **-** |

| 4. TITLE AND SUBTITLE | 5a. CONTRACT NUMBER |
|---|---|
| **NATO Configuration Statement Specifying the Generic NATO/Allied Export Configuration & Standard Systems Listing for the SM-26S/T Machete** | 5b. GRANT NUMBER |
| | 5c. PROGRAM ELEMENT NUMBER |
| 6. AUTHOR(S) | 5d. PROJECT NUMBER |
| | 5e. TASK NUMBER |
| | 5f. WORK UNIT NUMBER |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br>**STAVATTI Military Aerospace Tactical Air Warfare Systems Division 520 Airport Road South St Paul, MN 55075** | 8. PERFORMING ORGANIZATION REPORT NUMBER |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | 10. SPONSOR/MONITOR'S ACRONYM(S) |
| | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) |

12. DISTRIBUTION/AVAILABILITY STATEMENT

**Approved for public release, distribution unlimited**

13. SUPPLEMENTARY NOTES

**The original document contains color images.**

14. ABSTRACT

15. SUBJECT TERMS

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
|---|---|---|---|---|---|
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | |
| **unclassified** | **unclassified** | **unclassified** | **UU** | **16** | |

**Standard Form 298 (Rev. 8-98)**
Prescribed by ANSI Std Z39-18

**DISCLAIMER:** All technical and performance specifications presented within this document are forward-looking estimations which are subject to change and modification without prior notification of recipient. SM-27S/T MACHETE™ and Nose-To-Nozzle™ are Trademarks of STAVATTI.

**U.S. GOVERNMENT DISCLAIMER:** This document does not reflect the official policy or intentions of the U.S. Government. The SM-27 MACHETE™ is the result of an IR&D/contractor initiative; does not reflect USAF/USN/USMC/DoD concurrence. The designation SM-27 MACHETE™ is an internal, corporate assigned air weapon system designation and does not reflect USAF/USN/USMC/DoD nomenclature concurrence. The views expressed within this document are those of STAVATTI and do not reflect the official policy or position of the United States Department of Defense or the U.S. Government.

**FOR TRANSMISSION OF TECHNICAL DATA**: Technical Data as defined in 22 CFR 120.10 or 15 CFR 779.1 is not included. The transmission/export of this document is not subject to U.S. control. All technical data contained within this document is considered unrestricted/unclassified and has been available to the public domain for a period of no less than 6 months, as most readily available at http://www.stavatti.com. Unit flyaway cost data included within this document is for marketing research purposes only and do not constitute, nor are to be misconstrued as, a proposal for the sale of SME. Flyaway cost data is for budgetary and market study purposes only and is not contractually binding.

**TRANSLATED EDITIONS**: Translations of this, and other relevant Stavatti documents, are presently underway in a variety of languages and will be made available upon request. Please accept the apologies of Stavatti if this document is not yet available in your native language. “ENGLISH” is the standard STAVATTI language.

**CORRESPONDENCE & INQUIRIES:** Correspondence and inquiries relating to, or resulting from this document, should be forwarded immediately to STAVATTI per the cover sheet address.

This Generic Configuration Statement Corresponds to the SM-27S/T MACHETE™ COIN/CAS/FAC/AT, Fixed Wing Aircraft of BLOCK 10 Configuration For Direct Commercial Sales (DCS) to Qualified U.S. and NATO/Allied Air Arms.

**DOCUMENT TYPE:** Aircraft Configuration Specification

**DOCUMENT NUMBER:** SD-65339-WS

**DOCUMENT DATE OF ISSUE:** 27 JUNE 2005

**MODEL SPECIFIED:** SM-27S/T MACHETE™

**AIRCRAFT TYPE:** Fixed Wing; Counter-Insurgency

**AIRCRAFT CONFIGURATION BLOCK:** BLOCK 10

**CONFIGURATION CONTROL NUMBER:** SM-27/10/NATO/02

**UNIT FLYAWAY COST:** $6,000,000 to $10,000,000

**SPECIFIC CUSTOMER(s):** NATO Member Nations/U.S. Allies

**CUSTOMER REQUIREMENT:** Counter-Insurgency/Trainer

**CONTRACT TYPE:** Fixed Firm Cost (FFC)

**SALE TYPE:** Direct Commercial Sale (DCS) with Potential FMS Components as Necessary (for COMSEC/TRANSEC/TEMPEST/GPS PPS/IFF and Intelligence Suport export via the DCA as FMS government to government transactions).

**CONTRACT TIME-FRAME:** 2008-2028

**PURPOSE & SCOPE:** This document serves as a Generic Configuration Specification and Standard Systems Listing for the STAVATTI SM-27 MACHETE COIN/CAS/FAC/AT aircraft as configured specifically for marketing and sale to the Air Defense Arms of all NATO member nations and consistent U.S. allied nations including, but not limited to, Australia, New Zealand and Japan. This document describes/details a general configuration, often regarded as the STAVATTI STANDARD WEAPON SYSTEM CONFIGURATION for the SM-27 MACHETE of BLOCK 10 production configuration. This document is not to be misconstrued as a proposal, or information submitted in response to a Request For Proposal (RFP). This document is for general, Rough Order Magnitude (ROM) information transfer purposes only in anticipation of market studies/information requests by relevant NATO/Allied air arms. The information contained within this document is held to the unclassified/unrestricted level and is not subject to export control for the purpose of maximizing ease of transfer to relevant NATO/Allied individuals. Information relating to specific weapon system configurations to address individual NATO/Allied customer requirements is beyond the scope of this document. Requests for said information, including greater technical detail regarding the SM-27 MACHETE platform is subject to export control/ITAR and may require notification of and/or approval from DDTC prior to the release of said information dependent upon specific end user nation. Furthermore, the transmission of technical data, including detailed performance envelopes may require the receipt of a DSP-5 export license prior to release. STAVATTI is eager to prepare said additional information upon request as well as obtain the necessary DDTC approvals to facilitate further information release. All information within this document is considered “forward looking” and relates to an aircraft anticipated to enter Low Rate Initial Production (LRIP) between 2008 and 2010. STAVATTI is the prime contractor responsible for the design, development, manufacture and total systems integration/support for the SM-27 MACHETE.

**OVERVIEW:** The SM-27 MACHETE is a fixed wing military aircraft developed to satisfy COunter INsurgency (COIN), Close Air Support (CAS), Light Attack (LA), Forward Air Control (FAC) and Advanced Trainer (AT) missions. The SM-27 is a product of STAVATTI MILITARY AEROSPACE, a division of STAVATTI HEAVY INDUSTRIES, LTD. (STAVATTI).

There is a distinct need for a capable replacement for OV-10 BRONCOs and A-37 DRAGONFLYs operated by U.S. allies worldwide. With over 230 such aircraft still in service today, STAVATTI identifies the SM-27 MACHETE as the only new platform which will effectively address this type requirement. Furthermore, the USAF/AFRES/USANG has been operating 116 OA-10As in satisfaction of the FAC role. The average age of the OA-10A has exceeded 22 years and this type will require replacement within the next 10 to 20 years. The SM-27 is an appropriate successor to this type in the FAC/anti-terrorism role.

STAVATTI recognizes a potential requirement for over 900 turboprop MACHETE aircraft worldwide. Satisfying the defense needs of more than 30 customer nations over the next three decades, STAVATTI will produce two turboprop MACHETE models: The SM-26S (Strike) and SM-27T (COIN/Trainer). A direct competitor to the EMBRAER EMB-314/ALX, RAYTHEON T-6A/AT-6B, PILATUS PC-21 and KAI KO-1A, the SM-27S/T series is a suitable replacement for Cessna A-37B, Cessna T-37B, Rockwell OV-10A and FMA AI. 58A aircraft.

Presently under development as a corporate initiated, privately financed, commercial program, the SM-27S/T MACHETE series is intended to enter Low Rate Initial Production (LRIP) in 2007-2009, followed by Full Rate Production (FRP) in 2009-2011. FRP is projected to resulted in the manufacture of 50 aircraft annually and the direct employment of over 300 aerospace professionals. Marketed and sold primarily through Direct Commercial Sales (DCS), the SM-27S/T series may be distributed and supported via FMS in association with an appropriate service branch.

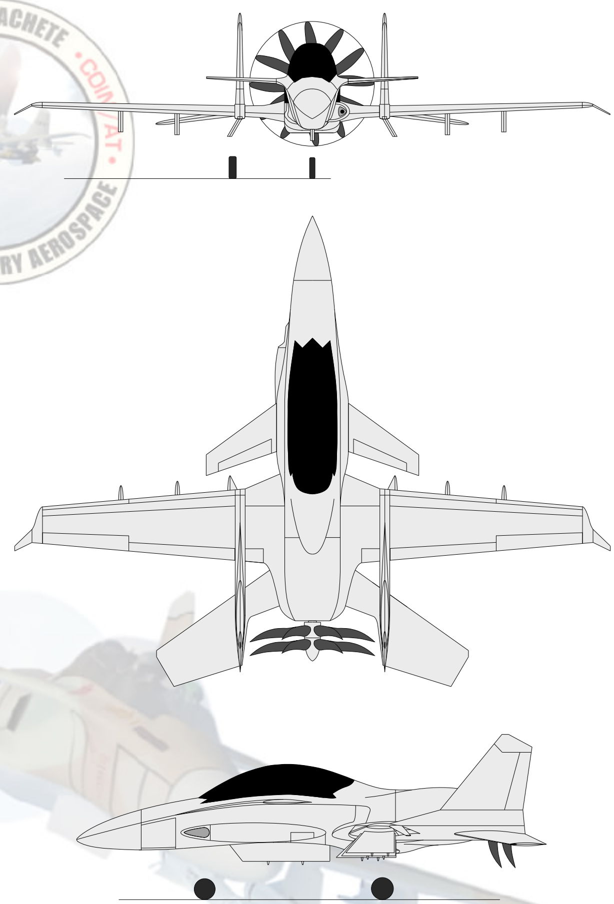
**CUSTOMER FOCUS:** This Configuration Control Statement (CCS) provides a succinct model/type description of the generic SM-27S/T Turboprop MACHETE as configured for marketing and sale to duly qualified NATO member Air Defense Forces and Defense Ministries of the nations of Australia, New Zealand and Japan.

**COSTS:** SM-27S MACHETE Per Unit Flyaway Cost as described is approximately $6.1 million to $9.5 million dependent upon avionics, ECM and armament configuration. Mean Flyaway Cost of the SM-27S configuration described herein is approximately $7.6 million.

SM-27T MACHETE Per Unit Flyaway Cost as described is approximately $6.6 million to $10.3 million dependent upon avionics, ECM and armament configuration. Mean Flyaway Cost of the SM-27T configuration described herein is approximately $8.2 million.

All costs are projections, estimated in 2005 USD FeRNs.

**GENERAL ARRANGEMENT:**



**DESIGN FEATURES:** The SM-27S/T MACHETE is a single engine, turboprop aircraft developed for production by a joint venture enterprise of STAVATTI MILITARY AEROSPACE. The SM-27S/T will be produced in two variants: The SM-27S and SM-27T. The SM-27S is a single seat, high performance light attack and COunter INsurgency (COIN) platform. The SM-27S is designed specifically for Close Air Support (CAS), and in addition to COIN, can satisfy a host of air missions including Light Attack (LA), Forward Air Control (FAC) and Armed Reconnaissance (AR). The SM-27T is a two place tandem weapon system which can not only satisfy the COIN, CAS, FAC and AR role, but also serve as an Advanced Trainer (AT).

Power for the SM-27S/T is provided by a 3,000 SHP class free turbine engine powerplant driving a contra-rotating propeller. Powerplant airflow is supplied by laterally mounted, bifurcated fuselage flush inlets. A three surface arrangement consisting of a high aspect ratio wing, low aspect ratio canard foreplanes and an all-moving horizontal tail is provided. Twin vertical stabilizers provide directional stability and yaw control. The wing is equipped with double slotted Fowler flaps for exceptional short field performance with load.

A one piece bubble canopy and pressurized cockpit with zero-zero crew-member escape capability is provided. Flight controls are of manually actuated, aerodynamic force-feedback type with yaw dampening. Tricycle landing gear consisting of a forward retracting oleopneumatic nose strut and inboard wing/fuselage retracting oleopneumatic main gear is employed. A comprehensive integrated avionics suite, including Electronic Warfare/Electronic Counter Measures (EW/ECM) is featured. Stores and ordinance is carried on one fuselage and six wing hardpoints. Typical fixed internal armament includes a single port mounted 30mm cannon.

**ACCOMMODATION:** The SM-27S/T cockpit is designed to accommodate a wide spectrum of male and female crewmembers encompassing the 1st percentile female through the 99th percentile male (NATO) population range. This population range corresponds to crewmembers ranging from 5 ft 4in/100 lbs through 6 ft 4 in/250 lbs. For planning and engineering development purposes, assumed standard crew-member weight is 260 lbs, including survival equipment.

The SM-27S flight crew consists of a single pilot seated on a Martin Baker MKUS.16L zero/zero ejection seat. The SM-27T flight crew consists of a pilot and Weapon Systems Officer (WSO)/Observer seated in tandem (fore and aft crewstations respectively) on Martin Baker MKUS.16L zero/zero ejection seats in satisfaction of the COIN/CAS/FAC role. In satifaction of the Advanced Trainer role, the SM-27T flight crew consists of a student and instructor seated in tandem (fore and aft crewstations respectively) in on Martin Baker MKUS.16L zero/zero ejection seats. Total standard SM-27T crewmember weight, including survival equipment, is 520 lbs.

**STRUCTURE:** The SM-27S/T primary structure is an amalgamation of composite and advanced alloy materials. By weight, 33% of the aircraft structure is composite material, 57% is advanced alloy and 10% is polycarbonate and other non-metallic materials.

Approximately 10% of the aircraft structure is comprised of Hexcel IM9 graphite fiber suspended in a matrix of hi-temperature, RP46[1] polyimide resin. These graphite composite components guarantee tensile strengths in excess of 467 Ksi and flexural strengths of over 265 Ksi while exhibiting a 550º F use temperature.

**SM-27S/T MACHETE™ PRIMARY STRUCTURAL COMPOSITION**

| AIRFRAME COMPONENT | Scandium Aluminum (lbs) | Ti-6Al-4V/Other Titanium (lbs) | IM9 Graphite/ Polyimide (lbs) | SPECTRA® Polyimide (lbs) | Polycarbonate/ LEXAN®(lbs) | Other Alloys & Composites (lbs) | STRUCTURAL TOTALS (lbs) |
|---|---|---|---|---|---|---|---|
| WING | 345 | 284 | 0 | 63 | 0 | 40 | 732 |
| CANARD | 61 | 41 | 0 | 30 | 0 | 5 | 137 |
| H. STABILIZER | 0 | 40 | 60 | 0 | 0 | 9 | 109 |
| V. STABILIZER | 38 | 29 | 0 | 85 | 0 | 15 | 167 |
| FUSELAGE | 109 | 360 | 277 | 225 | 0 | 120 | 1091 |
| STABILIZER BOOM | 0 | 91 | 0 | 0 | 0 | 20 | 111 |
| CANOPY | 0 | 20 | 0 | 0 | 353 | 6 | 379 |
| MAIN GEAR STRUTS | 88 | 111 | 0 | 0 | 0 | 12 | 211 |
| NOSE GEAR STRUT | 7 | 14 | 0 | 0 | 0 | 3 | 24 |
| FIREWALL/NACELLE | 0 | 32 | 0 | 0 | 0 | 2 | 34 |
| DISCRETE ARMOR | 0 | 100 | 0 | 200 | 0 | 200 | 500 |
| **TOTALS (lbs)** | **648** | **1,122** | **337** | **603** | **353** | **432** | **3,495** |
| **TOTALS (%)** | **18.5** | **32.1** | **9.6** | **17.3** | **10.1** | **12.4** | **100.0** |

Principal graphite composite components include primary structural members such as horizontal stabilizer skins, and the fuselage inner laminate skin.

17% of the aircraft structure consists of Hexcel woven Honeywell SPECTRA® 2000 fiber of 650 and 1,200 denier suspended in a matrix of high-temperature polyimide resin (RP-46). The SPECTRA components offer 40% greater specific strength than typical Aramid fiber with such a low dielectric constant that they are virtually transparent to radio and radar. Superior to KEVLAR®, tightly woven SPECTRA/polyimide composite compose the fuselage external skins, wing ailerons and leading/trailing edge flaps, vertical stabilizer skins, rudders, canard trailing edge flaps, radome, antenna fairings and in discrete armor throughout the aircraft.

The majority of SM-27S/T composite components are formed about a mandrel utilizing Cincinnati Viper fiber placement systems and autoclave cured. The composite cure cycle specific to RP46 resin requires ten hours at a peak temperature and pressure of 617º F and 175 psi respectively. Some components, such as horizontal stabilizer skins, are formed by automated pre-peg fabric lay-up into Invar molds. Composite component fabrication is performed in-house using STAVATTI owned autoclaves, mandrels, molds and fiber placement.

SM-27S/T alloy components include principal load-bearing elements and aero-structures such as wing and canard skins, spars, ribs, fuselage geodetic subframe, engine firewall and mounts, landing gear, electronic/ subsystems mounting chassis, electronics Faraday cage and as a component of all discrete armor.

Over 18% of the aircraft structure consists of Scandium Aluminum[2]. Produced under contract by STAVATTI, the Scandium Aluminum featured in the SM-27S/T is a proprietary formulation developed and produced under license from Ashurst Technology Corporation, Ltd. This alloy contains up to 0.25% Scandium and a yield strength exceeding 100 Ksi, while offering improved weldability and corrosion resistance over 2XXX and 7XXX series aircraft aluminum. STAVATTI will be responsible for the Mil-Qualification and FAA certification of this proprietary alloy for aircraft application as a component of the MACHETE certification/qualification program. Scandium Aluminum is used in the aircraft wing skins, canard skins, vertical stabilizer skins, fuselage geodetic substructure and landing gear structure.

Over 32% of the SM-27S/T structure is composed of Titanium alloys including the general purpose Ti-6Al-4V Titanium and Ti-4.5Al-3V-2Mo-2Fe (SP 700) Titanium, higher strength Ti-15V-3Cr-3Sn-3Al, Beta forged Ti-10V-2Fe-3Al for landing gear struts and Ti-6Al-2Zr-2Sn-2Mo-2Cr-0.25Si (Ti-6222) Titanium for airframe structural elements. Titanium primary structures include wing spars, ribs and fuel tanks, canard spars and ribs, empennage spars and ribs, fuselage geodetic subframe, empennage stabilizer booms, canopy frame, landing gear struts and hardware, aircraft firewall and engine bay and in discrete armor. Titanium components are produced using laser forming[3], laser machining and traditional aerospace Titanium part production methodologies. Titanium components are fastened to the aircraft structure via laser welding, Titanium Bolts and Huck Ti-Matic rivets as appropriate.

Additional alloys used throughout the SM-27S/T include molecularly pure Chromium, 7055-T7751 Aluminum, 7150-T7751 Aluminum, 7075-T651 Aluminum, 2090-T83 Aluminum Lithium, and PH 15-7 Stainless Steel. Additional composite materials used throughout the aircraft include Hexcel IM7/polyimide, KEVLAR-49/polyimide, KEVLAR-29/polyimide, KEVLAR-129/polyimide and SPECTRA 1000/polyimide. These and other alloys and composite materials constitute over 12% of the SM-27S/T structural weight.

More than 10% of the remaining SM-27S/T structural composition consists of a transparent polycarbonate material used in the MACHETE clamshell bubble canopy. This polycarbonate is a proprietary material licensed by STAVATTI for external production by TEXSTARS. The polycarbonate material exceeds the requirements of MIL-P-5425/5425E.

The SM-27S/T is designed for an operational service life of 15,000 hours, accumulating an average of 750 hours per annum. Aircraft fatigue life will be based upon 30,000 takeoffs and landings (cycles) and simulated fatigue testing to 45,000 hours, to be conducted by STAVATTI. The aircraft maximum design load factor limit is +7.5g and -3.5g at Maximum Gross Takeoff Weight (MTOW) with maximum external stores. The Aircraft has been designed for an Ultimate Load Factor of 1.5 times the design load factor (resulting in an Ultimate Load Factor of +11.25g).

**ARMOR & SURVIVAL FEATURES:** STAVATTI has placed substantial emphasis upon ensuring SM-27S/T survivability in the low-level, hostile environment. In so doing, significant quantities of both integral and discrete armor are incorporated throughout the airframe.

Integral Armor consists of primary aircraft structural elements which not only serve as load-bearing members, but also provide an element of armor protection by inherent design. Featuring fail-safe construction throughout, the MACHETE wings and canards feature two sine-wave Titanium spars and numerous titanium sine-wave ribs. These spars and ribs in-turn assist in shielding discrete, self-sealing wing fuel tanks. MACHETE horizontal and vertical stabilizers feature three sine-wave spars and multiple sine-wave ribs. This use of Titanium spars and ribs significantly improves aircraft survivability. Employing significant quantities of geodetically arranged Titanium mated to SPECTRA skins, the MACHETE fuselage is of inherently survivable and crash-worthy design.

All MACHETE fuel is contained within discrete tanks located in the wings and fuselage. Each rigid tank consists of a Titanium fuel cell that provides both structural form and function as well as a degree of armor protection. Within each cell is a tear-resistant, self-sealing bladder. Whenever possible, fuel lines are contained within fuel tanks. All fuel lines, hydraulic lines and flight control lines are contained within Titanium or SPECTRA filament jackets to ensure survivability. The aircraft flight control, electrical and hydraulic systems are duplicated and physically separated by more than 24 in to ensure redundancy.

Presenting a compact, close coupled arrangement, the MACHETE configuration is directed toward survivability. The empennage, for instance, is configured such that the SPECTRA skinned vertical stabilizers provide the aircraft propulsion system with a degree of profile shielding. Learning from the A-10, the MACHETE empennage is slightly oversized to ensure continued control in the event of significant loss of stabilizer area during combat. Additional reductions in overall aircraft vulnerable area are derived from the use of a low-wing situated directly beneath the aircraft fuselage fuel tanks, ammo drum and to a degree, propulsion system, as shielding. The use of vertically sloped forward fuselage cross sections further improves survivability by ensuring that the majority of incoming ballistic projectiles will be received as deflection impacts met by SPECTRA skins.

MACHETE Discrete Armor consists of materials which function wholly as armor, serving no secondary structural purpose. The SM-27S/T employs no less than 500 lbs of Discrete Armor, strategically placed within critical vulnerable areas including around/about the aircraft powerplant (engine cowling case armor), electrical generation, environmental, hydraulic and control systems, as well around the internal ammunition drum. To ensure crew survivability, the MACHETE cockpit is a integral unit contained within a unitized Cockpit Armor Module (CAM). The CAM is a laser welded, armored structure, conceptually identical to the A-10 crew protection structure. The Discrete Armor used throughout the MACHETE, including the CAM, is a STAVATTI proprietary laminate of alloy and composite materials including a molecularly pure Chromium face sheet backed by multiple layers of SPECTRA 2000[4]. Thickness of the Discrete Armor laminate varies based upon specific application, ranging from 0.25 in to more than 1.25 in.

Composed of advanced bullet-resistant polycarbonate, the SM-27S/T transparent bubble canopy is no less than 0.95 in thick throughout and provides impact protection against a 4 lb bird up to airspeeds in excess of 450 kts. Ensuring crew protection through 0.44 Magnum /7.62mm caliber small arms and limited resistance to 23 mm cannon fire, the canopy benefits from technologies developed at I.P.M.S[2].

Ensuring crew survivability, the SM-27S/T is equipped with the highly reliable and proven Martin Baker MKUS.16L zero-zero ejection seat. The ejection seat is provided with both sequential and auto-eject features. Incorporating a comprehensive internal electronic countermeasures suite, proven Radar Warning Receivers, Laser Warning Receivers, Missile Approach Warning Systems and Self Protection Jammers produced by Elisra, Elta and/or Raytheon are carried as customer selected, standard equipment. The BAE Systems AN/ALE-47 electronic countermeasures system with 8 to 16 dispensers is standard equipment.

**FUSELAGE:** The MACHETE fuselage is a compact unit consisting of the fuselage core, radome and engine cowling. The fuselage core is a unitized structure consisting of a Titanium and Scandium Aluminum geodetic sub-frame. This geodetic subframe employs the geodetic structural principals pioneered by Sir Wallis and Goldworthy. The geodetic subframe is a laser welded, built-up structure and serves as a rigid chassis for the integration of all alloy frames, primary bulkheads, mounts and the firewall. All fuselage contained systems, including avionics, electrical, armament hydraulic and the CAM, are secured to subframe integrated alloy mounts. The subframe is skinned in a light alloy film to ensure all TEMPEST sensitive avionic and electrical systems are contained within a Faraday cage.

The fuselage core is skinned with a unitized sandwich structure consisting of a Hexcel IM9 graphite/polyimide internal skin and a Hexcel produced, finely woven 1,200 denier SPECTRA/polyimide external skin, separated by a proprietary thin core optimized for improved ballistic projectile threat protection.

The MACHETE fuselage features the Cockpit Armor Module (CAM) for integrated cockpit protection. The MACHETE fuselage features an integrated armored ammunition cell and internal self-sealing fuel tanks. The fuselage incorporates discrete armor throughout. The fuselage features a starboard located downward hinged door with integral steps for crew ingress/egress[5].

The radome is composed of bandpass SPECTRA /polyimide. The radome is 56 in long and accommodates an antenna of 21 in to 28 in diameter. The radome hinges to the port for radar/avionics access. The engine cowling is of three-part clamshell type and is composed of a SPECTRA/polyimide composite sandwich with Chromium armor plate. Cowl length is 72 in.

**WINGS:** SM-27 MACHETE wings are of high aspect ratio, low-wing, cantilever type. Wing leading edge sweep is 5° and trailing edge sweep is -5°. Wing span is 43 ft 0 in. Reference wing area is 171 sq ft. Wing aspect ratio is 8.9. The wing airfoil is a NACA 65(2)-415 throughout the span. To alleviate the negative affects of tip stall, the MACHETE wing employs approximately 2° washout. Wing incidence is 0°. Wing dihedral, from root, is 2°. Wing Drag Divergent MACH Number is slightly above 0.73 MACH (483 Kts at sea level).

The MACHETE wing is a modular, three-piece, fail-safe structure consisting of an integrated center section spanning 132 in and port and starboard outer sections spanning 192 in each. The center section is consists of two sine wave Ti-6222 spars which form the basis of a rigid, laser welded, Titanium carry-through box. This carry-through box serves as mount and armored housing for the main landing gear. The carry-through box is also the principal mount and interface for port and starboard Titanium monocoque empennage support booms which serve as the structural interface for the vertical and horizontal stabilizers. The center section has Titanium ribs and stringers and Scandium Aluminum skins. All alloy components are fastened via laser welding.

The carry-through box is bolted to the fuselage geodetic alloy subframe, serving as the wing/fuselage mounting interface. No fuel is contained within the center section, although internal volume is available for avionics and electronic countermeasures, including additional dispensers. The center section contains the inboard component of the aircraft double slotted Fowler flaps and serves as the mounting and actuation point for the MACHETE hydraulically actuated ventral airbrake.

The port and starboard wing sections feature two Titanium sine-wave spars and one Titanium false spar for aileron/flap attachment. Each wing section incorporates eighteen Titanium ribs and twelve Titanium stringers. Wing sections benefit from Scandium Aluminum skins, with all alloy components fastened by computer directed laser welding. Each wing contains a rigid Titanium, self-sealing fuel tank located between the two spars. Each wing section is equipped with 0.301c ailerons for roll control and 46% span 0.301c double slotted, trailing edge Fowler flaps with deflection settings of 10, 20, 30, 40 and 60 degrees. Each wing section is also equipped with an automatic, AoA actuated leading edge slat. Trailing and leading edge flaps/slats are hydraulically actuated while the ailerons are mechanically controlled with electric trim tabs. Ailerons, flaps, slats and airbrakes are of SPECTRA/polyimide construction. Each wing section is equipped with a streamlined tip fairing and inverted low aspect ratio winglet for induced drag reduction. Both the tip fairings and winglets are constructed from SPECTRA/polyimide and house navigation antennas.

Wings are equipped with an Electro-Expulsive Separation System (EESS)[6] for in-flight deicing. Wings are equipped with a total of six external stores hardpoints, with two hardpoints located on each outer wing section and two canted hardpoints located on the wing center section tips fitted directly to the empennage support boom. The two center and two outer section hardpoints are rated to 2,500 lbs capacity at +7.5g. The two remaining outer wing hardpoints are rated to 1,000 lbs capacity at +7.5g. Two hardpoints per wing are plumbed for external fuel carriage. Standard external tanks include 100 through 230 USG types. Each wing may be fitted with an additional, wing tip mounted hardpoint for the carriage of up to 250 lbs at +7.5g pending the removal of tip farings and winglets. Wing tip harpoints may be equipped with launch rails suitable for the carriage of AIM-9 AAMs.

**CANARDS:** The aircraft canard foreplanes are fixed, close-coupled cantilever type. Canards enhance aircraft low speed handling, maneuvering and short field performance through the generation of high energy vortexes. The canards are of lifting type, adding to aircraft gross wing area. Leading edge canard sweep is 36° and trailing edge sweep is 19°. Canard dihedral is 3°. Canard unit span is 5 ft 1 in. Total canard area and aspect ratio is 25.42 sq ft and 4.07 respectively. Canard mean airfoil is a NACA 65-209 section.

Canard construction consists of two Ti-6222 spars, seven Titanium ribs and Scanium Aluminum skins. Canards benefit from laser formed components which are laser welded to form a smooth, high tolerance finish.

Canards incorporate flaperons of SPECTRA/polyimide construction which operate collectively with the all moving horizontal stabilizer to enhance pitch rate.

**EMPENNAGE:** The MACHETE empennage consists of an all-moving, mass balanced horizontal stabilizer for longitudinal stability and pitch control and twin vertical stabilizers. The empennage is close-coupled to the aircraft wing to improve instantaneous maneuverability and reduce aircraft physical dimensions. The empennage is mated to MACHETE via the wing mounted integrated empennage support boom structure and aerodynamically contoured fuselage braces which blend directly into the horizontal stabilizer. Both the horizontal and vertical stabilizers are equipped with EESS deicing.

The MACHETE horizontal stabilizer has a leading edge sweep of 35° and trailing edge sweep of 17°. Horizontal tail unit span is 8 ft 2 in. Total horizontal tail area and aspect ratio is 57.3 sq ft and 1.16 respectively. Horizontal tail mean airfoil is a NACA 0009 section and anhedral is 8°. The horizontal stabilizer is composed of three Ti-6A1-4V Titanium sine-wave spars and ten IM9/polyimide ribs. Horizontal stabilizer skins are flush riveted IM9/polyimide. Maximum horizontal stabilizer deflection angle is +/- 40°.

MACHETE vertical stabilizer consists of two independent units of trapezoidal configuration with dorsal fairings. Vertical stabilizer leading edge sweep is 40° and trailing edge sweep is 8°. Vertical stabilizer span is 80 in. Total vertical tail area and aspect ratio is 62.45 sq ft and 1.42 respectively. Vertical stabilizer mean airfoil is a NACA 0009 section with dihedral of 90°. The vertical stabilizer is composed of three Ti-6A1-4V Titanium sine-wave spars, five 2090-T83 Aluminum Lithium false spars, six Scandium Aluminum ribs and flush riveted SPECTRA/polyimide skins. Each vertical stabilizer features a SPECTRA/polyimide skinned/Scandium Aluminum ribbed rudder. Rudders incorporate trim tabs and are capable of deflection angles of +/- 35°. Each vertical tail incorporates a SPECTRA/polyimide tip antenna fairing for vertical tail mounted antennas, EW and RWR.

**POWERPLANT:** The SM-27 is powered by one Pratt & Whitney Canada PW127G free turbine propulsion engine developing 2,920 SHP at maximum take-off with a shaft output of 1,200 RPM. Basic engine TBO is 6,000 hours. Self-start capability and electric power control with mechanical back-up is provided. PW127G mass flow is provided via two semi-flush mounted, bifurcated fuselage air inlets equipped with EESS deicing. Engine exhaust is ducted afterward and out through a 173 sq in annular exhaust pipe blended into the aircraft cowling to permit a net thrust increase. Basic powerplant SHP and SFC ratings at sea level, static, ISA conditions are:

**PW127G SL, ISA PERFORMANCE**

| RATING | SHP | SFC (lb/shp/hr) | Fuel Burn (lbs/hr) |
|---|---|---|---|
| Maximum Take-Off: | 2,920 | 0.453 | 1,323 |
| Maximum Continuous: | 2,920 | 0.453 | 1,323 |
| Maximum Climb: | 2,240 | 0.483 | 1,082 |
| Maximum Cruise: | 2,132 | 0.491 | 1,047 |

The PW127G is orientated in a pusher configuration, mounted to the aircraft via Titanium engine mounts with the engine bay segregated from the fuselage by a Titanium firewall. The engine itself is enclosed in a clamshell armored cowling consisting of SPECTRA /polyimide and molecularly pure Chromium. Engine bay fire suppression is provided by an integrated KIDDIE detection and suppression system.

The PW127G drives two contra-rotating, six blade, 108 in diameter reversible-pitch, constant speed propfan blades of Scimitar form. Totalling twelve pusher blades, each blade is fitted with EESS for deicing[7].

**FUEL SYSTEM:** The aircraft fuel system is of OBIGGS pressurized type, composed of five rigid self-sealing fuel tanks and one feeder tank. Four of the fuel tanks are located within the fuselage, while the remaining two tanks are located within the port and starboard wing respectively. The maximum useful internal fuel load for the SM-27S/T is 2,600 lbs, equivalent to approximately 388 gallons of JP-8 (at 6.7 lbs/gal) or 400 gallons of JP-4 (at 6.5 lbs/gal). SM-27S/T fuel tanks are sized for 400 usable gallons of JP-4, resulting in a total capacity of 426.7 gallons, including the volume necessary to accommodate self-sealing cells. Unusable internal fuel equates to approximately 40 lbs. Total SM-27S/T internal fuel capacity adheres to the following distribution:

**SM-27S/T MACHETE™ INTERNAL FUEL DISTRIBUTION**

| FUEL TANK LOCATION | TOTAL CAPACITY (USG) | USABLE CAPACITY (USG) |
|---|---|---|
| Port Wing: | 112.0 | 103.0 |
| Starboard Wing: | 112.0 | 103.0 |
| Fuselage #1: | 124.2 | 118.7 |
| Fuselage #2: | 58.0 | 55.4 |
| Fuselage #3: | 20.5 | 19.9 |
| **TOTALS:** | 426.7 | 400.0 |

| FUEL TANK LOCATION | FUEL CAPACITY JP-8 (USG/LBS) | FUEL CAPACITY JP-4 (USG/LBS) |
|---|---|---|
| Port Wing: | 100.0/669.5 | 103.0/669.5 |
| Starboard Wing: | 100.0/669.5 | 103.0/669.5 |
| Fuselage #1: | 115.2/771.6 | 118.7/771.6 |
| Fuselage #2: | 53.7/360.1 | 55.4/360.1 |
| Fuselage #3: | 19.3/129.3 | 19.9/129.3 |
| **TOTALS:** | 388.2/2,600.0 | 400.0/2,600.0 |

***Note:*** *Usable Capacity assumes volume losses due to installation of self-sealing fuel bladders incorporating fire retardant, reticulated foam.*

Fuel tanks are fitted with tear-resistant, self-sealing bladders lined with open cell reticulated foam. A single point refueling interface is located on the starboard fuselage, while gravity refueling may be accomplished through three filler locations including one on each wing and a single fuselage point. A probe-and drogue in-flight refueling system may be installed on the right forward fuselage as a customer, cost added option. All fuel lines are of Titanium construction, are of absolute minimum length and routed within fuel tanks to improve survivability whenever possible. Fuel tanks feature internal cross-feed capability with redundant feed flow. Fuel is initially consumed from the wing tanks to enhance survivability, with all fuel delivered to a self-sealing fuselage feeder tank prior to powerplant receipt. Closed cell foam is incorporated throughout all dry bays neighboring tanks.

**SYSTEMS:** MACHETE systems include flight controls, hydraulics and electrical units. The MACHETE employs a mechanical, direct force-feedback flight control system. The physics and mechanical balance algorithms of the flight controls are designed with a high degree of sophistication to result in a simple, jam resistant system. The aircraft flight control column is linked by stainless steel cables to the all moving empennage (stabilator), canard flaperons and ailerons. The rudder pedals are linked by stainless steel cables to aircraft rudders and steerable nose wheel. All control cables are ducted through SPECTRA filament wrapped titanium conduits for survivability. Control cables are duplicated such that two independent, purely mechanical systems exist for redundancy. Working in unison, the dual, undamaged flight control system provides a high degree of mechanical advantage for significant ease of aircraft handling throughout the flight envelope, which is slightly reduced in the event of control system damage.

Ailerons, flaperons, rudders and stabilators are internally mass balanced. Ailerons and rudders feature electric trim tabs controllable through a control column rheostat. Stabilators feature electric trim, actuators for which are located in the support boom. All MACHETEs feature positive static and dynamic stability. MACHETES are fully aerobatic and will perform standard maneuvers including the stall, slip and spin, without departure.

The MACHETE features two, independent, 4,000 psi hydraulic systems. Hydraulic functions include landing gear extension and retraction, trailing and leading edge flap extension and retraction, canopy extension and retraction, crew boarding ladder retraction, clamshell cowling actuation and ventral airbrake actuation. Hydraulic pressure is maintained automatically. The hydraulic power package supplies hydraulic pressure and incorporates an electrically-powered variable displacement motor/pump, a reservoir and low pressure filter. A nitrogen-charged accumulator is used to minimize pressure loss while allowing for thermal expansion. The aircraft hydraulic system employs SPECTRA filament wrapped titanium lines and non-flammable hydraulic fluid for enhanced survivability.

The SM-27S/T electrical system supplies 115 volt, three-phase, 400 cycle AC power and 28 VDC per MIL-STD-704D. Three independent sources are used for power generation consisting of a primary starter /generator, a secondary generator and two batteries. AC power is supplied by two engine driven static invertors rated at 125 volt amps, providing outputs of 26 VAC at 400 Hz and 115 VAC at 400 Hz. Power is normally supplied by one invertor with the second serving as a backup. DC power is supplied through two 24 VDC, 40 amp-hour, nickel-cadmium batteries. The starter/generator is a combination engine starter and 28 VDC, 300 amp generator. The secondary generator is a 28 VDC, 130 amp generator. An external 28 VDC power connector is provided within the engine bay.

**LANDING GEAR:** The MACHETE features hydraulically actuated, retractable tricycle landing gear. The main landing gear consists of wing mounted, single-strut, oelo-pneumatic, single wheel units featuring carbon disk brakes. Main wheels use 19.5 x 6.75-8 size tires including Goodyear, 10 ply rib tread with a maximum inflation pressure of 110 psi. The main gear retracts 90° outward, with wheels stowed in the wing center section carry-through box upon retraction. Landing lights are incorporated into the main gear struts. A handcrank system is provided for emergency main gear extension.

Nose landing gear retracts forward and is an oelo-pneumatic, fork-braced single wheeled unit. The nose wheel uses 18 x 4.25-10 size tires including 6 ply, Goodyear Flight Eagle DT tread with a maximum inflation pressure of 100 psi. Nose wheel steering, and main gear braking, is provided via rudder pedal inputs. Nose gear may be gravity extended in the event of hydraulic failure. The landing gear is capable of unprepared, forward operations and sink rates of 15 ft/s enabling a high tolerance to hard landings. Maximum landing gear deployment airspeed is 200 Kts. MACHETE wheelbase is 12 ft 11 in. MACHETE wheel track is 11 ft 4 in. Nose gear/main gear weight distribution is 21/79 at MTOW.

**COCKPIT & INSTRUMENTATION:** The cockpit is available in two configurations: the single seat SM-27S and the two seat tandem SM-27T. Each configuration is designed for reduced workload operations with crewmembers seated on unreclined Martin Baker MKUS.16L ejection seats. Both MACHETE models incorporate auto-eject and auto-eject sequencing. SM-27Ts include a Command Select Valve located in the forward instrument panel of the aft crew station to select ejection sequencing. The cockpit is pressurized to 8,000 ft[8] and air-conditioned via a powerplant driven, Freon-free compressor. Standby crew oxygen provided by a Litton Molecular Sieve Oxygen Generating System (MSOGS). To decrease vulnerability, a LOX system is not incorporated, the aircraft relying instead upon MSOGS and cockpit pressurization.

The aircraft benefits from a large area, frame-less, single-piece clamshell bubble canopy. The canopy is of advanced bullet resistant polycarbonate composition and can safely sustain the impact of a 4 lb bird at airspeeds exceeding 450 kts from any attitude. Visibility is 350° azimuthal with 13° over-the-nose and 25° over-the-side. The canopy is hydraulically lifted upward for cockpit access. The canopy is defrosted and purged of precipitation using a perimeter high pressure, powerplant bled, hot air system. A manual unlatch and hand-crank is provided. In the event of ejection, a fail-safe system of redundant rockets is provided to ensure canopy jettison beyond the ejection zone at most attitudes and airspeeds encountered throughout the flight envelope[9].

Both MACHETE models benefit from spacious interiors which offer maximum cabin widths of 32 in and heights of 64 in. The overall cabin length for the SM-27T is 116 in. The SM-27S cabin is 64 in long. Lacking the aft crewstation, the SM-27S offers over 32.7 cu ft of available volume for growth/expansion located immediately aft of the ejection seat/cockpit armor. This expansion area measures approximately 52 in x 35 in x 32 in and may accommodate additional avionics, countermeasures, ammunition and/or fuel, totalling a maximum of 750 lbs, corresponding to a maximum increase of SM-27S MTOW to 16,250 lbs, resulting in flight performance generally similar to the SM-27T.

The cockpit for SM-27S/T is a completely modular unit, produced as a unitized, self contained system external to the fuselage. Incorporating distinct, armored and EM hardened quick interconects for flight controls, electrical junctions, avionics buses and environmental control, the MACHETE cockpit is installed and extracted vertically in the absence of the bubble canopy. Cockpits for either model attache to the CAM bath-tub structure through bolts in vibration damping fittings. The CAM, featuring Chromium armor plate and SPECTRA fiber significantly mitigates the penetrative effects of projectiles and spall. Cockpits and CAMs for either the SM-27S/T are interchangeable, allowing a specific aircraft to be converted in less than 12 hours to either a single seat or two place tandem variant, increasing aircraft flexibility and value.

All MACHETE variants benefit from a HOTAS flight controls arrangement consisting of a centrally mounted flight control column, full deflection rudder pedals, power control lever (throttle), prop control level and flap lever. Stick and throttle flight control grips are provided by Mason Electric. Rudder pedals are fully adjustable.

The forward panel of the SM-27S/T smoothly integrates the MACHETE HUD, MFDs and traditional analog flight reference instruments through a format of distinct style and arrangement:

**SM-27S/T**
**FORWARD PANEL**
**2 x L3 MFDs**

**SM-27S/T**
**FORWARD PANEL**
**3 x CMC MFDs**

The aft panel of the SM-27T is identical to that of the forward panel, with exception of the HUD being replaced by a HUD repeater. IFR certified, the cockpit is designed for Generation III night vision compliance and Helmet Mounted Cuing Systems/Integrated Helmet and Display Sighting Systems (HMCS/IHDSS).

The primary visual flight reference display is the CMC Sparrow Hawk 25° wide field-of-view HUD and HUD repeater system. Secondary flight reference instruments include the customers choice of LCD MFD configurations including either two L3 Communications Actiview 104P 6 x 8 in LCDs or three CMC 5 x 7 in AMLCD. Displays provided by alternate manufacturers, including Honeywell and Elbit may also be integrated.

Aft and rear panels are complemented by a comprehensive warning annunciator panel, two 3-axis air conditioning/heater vents and thirteen analog instruments. A table presenting STAVATTI recommended SM-27S/T panel displays and instrumentation is provided:

**SM-27S/T MACHETE™**
**STANDARD DISPLAYS & INSTRUMENTATION**

| | |
|---|---|
| **HEAD UP DISPLAYS (HUDs)** | **CREWSTATION** |
| **OPT 1:** 1 x CMC Sparrow Hawk | Forward |
| **OPT 1:** 1 x CMC Sparrow Hawk Repeater | Aft |
| **MULTI-FUNCTIONAL DISPLAYS (MFDs)** | **CREWSTATION** |
| **OPT 1:** 2 x L3 Actiview 104P 6 x 8 in LCDs | Forward & Aft |
| **OPT 2:** 3 x CMC 5 x 7 in AMLCDs | Forward & Aft |
| **INSTRUMENTS (INSTs)** | **CREWSTATION** |
| **OPT 1:** 1 x Airspeed Indicator/Mach Meter, 3-in | Forward & Aft |
| **OPT 1:** 1 x Attitude Indicator, 3-in | Forward & Aft |
| **OPT 1:** 1 x Altimeter, 3-in | Forward & Aft |
| **OPT 1:** 1 x Vertical Speed Indicator, 3-in | Forward & Aft |
| **OPT 1:** 1 x HSI/DME with ILS, 3-in | Forward & Aft |
| **OPT 1:** 1 x Turbine Tachometer, 3-in | Forward & Aft |
| **OPT 1:** 1 x Exhaust Gas Temperature, 2-in | Forward & Aft |
| **OPT 1:** 1 x Fuel Quantity, 2-in | Forward & Aft |
| **OPT 1:** 1 x Cabin Pressure, 2-in | Forward & Aft |
| **OPT 1:** 1 x Accelerometer, 2-in | Forward & Aft |
| **OPT 1:** 1 x Compass, 2-in | Forward & Aft |
| **OPT 1:** 1 x Chronograph, 2-in | Forward & Aft |
| **OPT 1:** 1 x Flap Position Indicator, 2-in | Forward & Aft |

**AVIONICS & SENSORS:** SM-27S/T avionics are integrated about a MIL-STD-1553B Interface/Data Bus with Data Bus wiring used throughout the system architecture to reduce wiring bundles. The SM-27S/T features a comprehensive navigation/communications suite. The philosophy driving the SM-27S/T avionic configuration emphasizes mission completion, reliability, flexibility and ease of serviceability. Avionics may be of a variety of types including either COTS or MOTS. Wherever possible, avionics are of modular LRU type with BIT. Principal avionics and sensors are contained in two to three bays including the nose radome/sensor bay (14.5 cu ft), forward fuselage avionics bay (27.4 cu ft) and aft cockpit avionics bay as available in the SM-27S (33.7 cu ft).

The avionics/sensor suite is designed and integrated by STAVATTI based upon customer specifications. STAVATTI has developed a STANDARD (NATO EXPORT) AVIONICS/SENSOR CONFIGURATION which includes a variety of proven, reliable systems from which NATO end-users may select a specific MACHETE configuration. This STANDARD configuration is optimized to permit unrestricted export of the MACHETE via Direct Commercial Sales (DCS) to the majority of NATO members, although specific avionics, including GPS with PPS, as well as particular COMSEC/TEMPEST equipment, must be procured via FMS or on a government-government basis.

**SM-27S/T MACHETE™**
**STANDARD AVIONICS & SENSORS**
**• NATO EXPORT•**

**MISSION COMPUTERS (MMDP)**
**OPT 1:** CMC FV4000 Open Architecture Mission Computer
**OPT 2:** GD AN/AYQ-25(V) Advanced Mission Computer
**OPT 3:** Elbit MDP/MMRC Multi-Role Computer

**STORES MANAGEMENT & WEAPONS DELIVERY (WDNS)**
**OPT 1:** GD SMS 2100 Stores Management System
**OPT 2:** Elbit SMS-86 Stores Management System

**NAVIGATION SYSTEMS**
**GPS/INS OPT 1:** Raytheon DAR GPS Digital Anti-Jam Receiver
**GPS/INS OPT 2:** Northrop Grumman AN/ASN-166 GPS/INS
**GPS/INS OPT 3:** Northrop Grumman LN-93 INS
**GPS/INS OPT 4:** Honeywell H-764G Embedded GPS/INS
**GPS/INS OPT 5:** Thales Top Flight EGI 3000
**TACAN OPT 1:** DRS/Sierra Research AN/ARN-136A
**TACAN OPT 2:** L3 Communications AN/ARN-154(V) DME/TACAN
**ADF OPT 1:** Honeywell KR 87
**ADF OPT 2:** Rockwell Collins ADF-462/4000
**VOR/ILS OPT 1:** Honeywell AN/ARN-127
**RADAR ALTIMETER OPT 1:** Honeywell APN-194

**COMMUNICATION SYSTEMS**
**VHF/UHF COMM OPT 1:** Rockwell Collins AN/ARC-210(V)
**VHF/UHF COMM OPT 2:** IAI Elta ARC 740
**VHF/UHF COMM OPT 3:** Raytheon AN/ARC-232(V) STARBLAZER
**IFF TRANSPONDER OPT 1:** Raytheon AN/APX-100(V)
**IFF TRANSPONDER OPT 2:** BAE Systems AN/APX-117(V)
**IFF TRANSPONDER OPT 3:** BAE Systems AN/APX-113
**IFF TRANSPONDER OPT 4:** BAE Systems AN/APX-118(V)
**SECURE VOICE OPT 1:** Raytheon KY-58 Secure Voice/Data System
**INTERCOM OPT 1:** Andrea Electronics AN/AIC-25 Intercom
**DATA LINK OPT 1:** MIS/LVT Low-Volume LINK 16

**AUTOPILOT SYSTEMS**
**AUTOPILOT OPT 1:** (Formerly) Lear Astronics Autopilot

**EMERGENCY POWER SUPPLY (EPS)**
**EPS OPT 1:** PS-855/B Emergency Power Supply

**COCKPIT VOICE DATA RECORDER**
**VADR OPT 1:** FA2100 Cockpit Voice/Data Recorder

**COST PLUS OPTIONAL RADAR SYSTEMS**
**RADAR OPT 1:** FINMECCANICA GRIFO F/L/M3/M+ Multi-Mode
**RADAR OPT 2:** Northrop Grumman AN/APG-66H Multi-Mode
**RADAR OPT 3:** Lockheed Martin AN/APG-67(F) Multi-Mode
**RADAR OPT 4:** IAI Elta EL/M-2001B ATA/ATG
**RADAR OPT 5:** RDR 2000 Vertical Profile Color Weather Radar

**NOTE:** OPT=Equipment Option (#) TBD by the customer

The cockpit is equipped with a Cockpit Video Recording (CVR) system capable for recording at least 120 minutes of HUD symbology, the external HUD field of view, cockpit LCD MFD symbology and all aircraft communication system audio. The aircraft is also equipped with a crash survivable Flight Data Recorder (FDR) capable of storing the last 90 minutes of flight data for post-crash flight reconstruction. The aircraft is fitted with a Crash Position Indicator (CPI) and a survivable Underwater Locator Beacon (ULB). Halon 1301 is employed for avionic system fire suppression within sealed avionic bays.

**ELECTRONIC WARFARE:** The SM-27S/T employs an internal Electronic Counter Measures (ECM) suite. The SM-27S/T EW system accommodates a wide variety of external jamming pods and countermeasures dispensers and includes Radar Warning Receivers, Laser Warning Systems, Self Protection Jammers and Advanced Missile Warning Sensors. The ECM suite is designed and integrated by STAVATTI based upon customer specifications. STAVATTI has developed a STANDARD (NATO EXPORT) ECM/EW CONFIGURATION which includes demonstrated as well as next generation electronic warfare systems which may equip MACHETE. This STANDARD CONFIGURATION is designed to satisfy the needs of the majority of potential NATO customers without export restriction, however, particular ECM systems must be procured on an FMS or government-government basis.

**SM-27S/T MACHETE™**
**STANDARD INTERNAL ECM/EW SYSTEMS**
**• NATO EXPORT•**

**MISSILE APPROACH WARNING RECEIVERS**
**OPT 1:** Raytheon AN/AAR-58 MAWS

**RADAR WARNING RECEIVERS**
**OPT 1:** Elisra SPS-65(V) RWR/RWS/SPS
**OPT 2:** IAI Elta EL/L-8233 ISDS

**SELF PROTECTION JAMMERS**
**OPT 1:** IAI Elta EL/L-8230 Internal Self Protection Jammer

**LASER WARNING RECEIVERS**
**OPT 1:** Elisra LWS-20V-2 Laser Warning System

**CHAFF/FLARE DISPENSERS**
**OPT 1:** BAE Systems AN/ALE-47 with 8 to 16 USAF Style Dispensers

**NOTE:** OPT=Equipment Option (#) TBD by the customer

**ARMAMENT:** SM-27S/T armament includes fixed internal and expendable, external carried weapons.

SM-27S/T fixed internal armament includes the carriage of one 30mm cannon within an streamlined, port fuselage fairing. 30mm cannon ammunition is fed through a link-less feed system supplied by and contained within an aft fuselage located armored ammunition drum. Amunition is loaded/serviced through a ventral fuselage loading hatch. The cannon provides the aircraft with anti-armor/anti-aircraft capability.

The standard SM-27S/T cannon is the single barrel Oerlikon-Burle KCA 30mm. The cannon is provided with 250 rounds and offers a rate of fire of 1,350 rounds per minute at a muzzle velocity of 3,379 ft/sec. Ammunition types include AP, HEI, SAPHEI and TP and the KCA can deliver a total of 22.5 strikes/sec resulting in an impact mass of 0.6 slugs/sec. In the SM-27S, the cannon may be provided with over 625 rounds of additional ammunition contained within an expanded ammunition drum located aft of the forward cockpit.

A variety of alternate 30mm cannons may be fitted within the port fuselage cannon fairing. These cannons include the General Dynamics GAU-13/A 30mm. Furthermore, a variety of cannons and machine guns may be carried within the nose/radome of the MACHETE provided the aircraft is not fitted with optional radar/sensor systems. Carriage of machine guns and cannons within the MACHETE nose may significantly alter the standard avionics configuration due to volume constraints associated with weapon and ammunition drum packaging. Overall, the MACHETE offers a flexible weapons platform providing a variety of options:

**SM-27S/T MACHETE™**
**STANDARD FIXED INTERNAL ARMAMENT**
**• NATO EXPORT•**

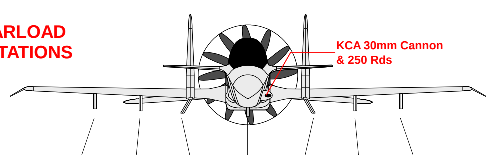
**PORT FUSELAGE CANNON FAIRING**
**30mm CANNON OPT 1:** 1 x Oerlikon 30mm KCA with 250+ Rds
**30mm CANNON OPT 2:** 1 x GD 30mm GAU-13/A with 250+ Rds
**30mm CANNON OPT 3:** 1 x ATK 30mm M230LF with 250+ Rds
**25mm CANNON OPT 4:** 1 x ATK 25mm Bushmaster III with 250+ Rds
**50mm CANNON OPT 5:** 1 x ATK 50mm Bushmaster III with 250+ Rds

**FUSELAGE NOSE MOUNTED MACHINE GUNS**
**MACHINE GUN OPT 1:** (2 to 4) x ATK 0.50 Caliber Bushmaster MG
**MACHINE GUN OPT 2:** (2 to 4) x FN Herstal 0.50 Caliber M3M
**MACHINE GUN OPT 3:** (1 to 2) x Dillion Aero 7.62mm M134

Up to 5,250 lbs of expendable, external stores and ordinance are carried on a total of seven external hardpoints consisting of six wing mounted and one fuselage centerline mounted pylons equipped with NATO standard 14-inch and 28-inch lug suspension systems. Of the seven hardpoints, three are rated to 1,000 lbs and four are rated to 2,500 lbs maximum external carriage capacity at a +7.5 g load factor. Four of the external wing hardpoints are plumbed for external fuel tanks.

The MACHETE is designed for air-to-ground missions, employing ordinance including the AGM-65, GBU-32, CBU-97, CBU-59, BLU-107 and additional stores. Air-to-Air capability is provided through the carriage of AIM-9 and similar passive homing/IR AAMs. The MACHETE is capable of LANTIRN, LITENING and ECM pod carriage and employs a MIL-STD-1760 Weapon Interface Data Bus. Weapons release is conducted through a control column gun trigger switch and weapon release button for air-to-air/air-to-ground. An abridged SM-27S/T stores loading chart is provided:

**SM-27S/T WARLOAD & STORES STATIONS**




| STATION NUMBER | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| AIM-9 Sidewinder | ● | ● | | | | ● | ● |
| AGM-65 Maverick | ● | ● | ● | | ● | ● | ● |
| GBU-22/Mk.82 | ●● | ●● | ● | ●● | ● | ●● | ●● |
| GBU-32 JDAM/MK. 83 | ● | ●● | ● | ● | ● | ●● | ● |
| CBU-97/B SFW | ● | ●● | ● | ● | ● | ●● | ● |
| BLU-107 Durandal | ● | ● | ● | ● | ● | ● | ● |
| LAU-3 Rocket Pod | ●● | ●● | ● | | ● | ●● | ●● |
| CBU-59/Rockeye II | ● | ●● | ● | ● | ● | ●● | ● |
| SUU-11(GAU-2) Gun Pod | ● | ● | ● | ● | ● | ● | ● |
| MK77 Napalm Bomb | ● | ● | ● | ● | ● | ● | ● |
| ALQ-184(V) ECM Pod | ● | ● | ● | ● | ● | ● | ● |
| 100 U.S. Gallon Tank | | ● | ● | | ● | ● | |
| 150 U.S. Gallon Tank | | ● | ● | | ● | ● | |
| 230 U.S. Gallon Tank | | ● | ● | | ● | ● | |
| Hardpoint Rating @ 7.5g | 1000 lbs | 2500 lbs | 2500 lbs | 1000 lbs | 2500 lbs | 2500 lbs | 1000 lbs |

**SERVICEABILITY:** MACHETE maintenance serviceability estimates predict a Mean Time Between Failures (MTBF) of 13.07 hours with 3.84 Maintenance Man Hours per Flight Hour (MMH/FH). The aircraft is expected to display a 98% sortie availability rate. As an airframe, the aircraft has been designed to minimize support equipment and MMH/FH. Customer selected avionics and systems, however, determines actual maintenance requirements.

## END NOTES…

1. STAVATTI has selected NASA LaRC RP46 polyimide resin as a non MDA/non-carcinogenic successor to PMR-15 and a cost competitive, high performance alternative to AFR-700B. STAVATTI will produce this resin, as well as prepreg composite components, under non-exclusive license from NASA LaRC for direct application in the SM-27S/T. Although a high temperature/high performance resin, STAVATTI realized that greater cost savings will result from the internal production of RP46 for a variety of aircraft applications, rather than procure higher-cost, externally produced resins which would offer lower performance. Internal production of RP46 resin results in a usable resin product at a cost of approximately $35/lb, as opposed to the estimated $325/lb (or greater) cost associated with AFR-700B. Note that normal operational skin temperatures of the SM-27S/T are not expected to exceed 150º F at any point in the flight envelope, outside of exhaust gas/weapon exhaust plume exposure. Alternative resins may also be employed as a substitute to RP46, albeit at additional airframe raw materials and production cost including, but not limited to: CYCOM 5250-4 modified bismaleimide, CYCOM 5260-2 modified bismaleimide, AVIMID N condensation polyimide, AVIMID R condensation polyimide, Hexply F655-2 bismaleimide resin system, BIM-AC non-mutagenic/non-carcinogenic polyimide, AMB-21 polyimide or DMBZ-15 polyimide.

2. STAVATTI is a unique organization with significant capabilities and some stunning personnel. A chief STAVATTI scientist and technical guru served as the Director of Research Development for Ashurst Technology from 1991-1993 wherein he was responsible for introducing a variety of new technologies to the U.S. Military Industrial Complex as developed by the world renowned I.M. Frantzhevik Institute for Problems in Materials Science (I.P.M.S.) in the former Soviet UKRAINE. Through coordinated efforts, STAVATTI has incorporated a variety of these stunning technologies (some of which were patented by Ashurst from which STAVATTI will serve as licensee) into the MACHETE airframe. Scandium Aluminum and molecularly pure Chromium are two such I.P.M.S. derivative technologies, as are next generation graphite fiber, basalt fiber and high strength-to-weight ratio, molecularly unique transparent materials suitable to serve as an alternative to polycarbonate. STAVATTI ties via qualified personnel with the UKRAINIAN aerospace defense industry has ultimately resulted in the development of unique and proprietary alloys, composites, fluidic controls and propellers featured in the MACHETE weapon system.

3. Titanium components, such as sine-wave spars, will be created using a laser forming machining process as pioneered by the AeroMet Corporation of Eden Prairie, MN whereby aircraft structural elements are laser formed into complex, 3-D near-net shape machining-pre forms directly from CATIA/CAD files without need for molds, dies or significant non-recurring engineering costs. Known as the Lasform™ process, STAVATTI will subcontract AeroMet and/or procure Lasform™ or similar laser forming systems for use in the non-traditional machining of Ti-6Al-4V and additional Titanium alloy components.

4. Molecularly pure Chromium is one of the hardest alloy substances known to man. Combined in a laminate configuration with Honeywell SPECTRA, this unique armor will significantly exceed the damage tolerance and resilience of both Titanium armor plate and the aluminum alloy armor featured in most historical COIN aircraft.

5. The SM-27S/T vertical door ladder system is conceptually similar to the crew ingress/egress system employed by the Grumman A-6 Intruder/EA-6B Prowler.

6. The Electro-Expulsive Separation System (EESS) featured on MACHETE lifting surfaces, air inlet and propeller blades is a product of ICE MANAGEMENT SYSTEMS, INC. (ICE MANAGEMENT) of Temecula, CA. ICE MANAGEMENT licensed the EESS or *Ice Zapper* technology from NASA AMES Research Center in 1995 for development and marketing as a commercial aerospace product.

7. The sophisticated MACHETE propeller system is a product of STAVATTI developed under the benefit and assistance of personnel presently and formerly associated with the Stupino Design Bureau of Machine Building/ZMBD Progress, UKRAINE.

8. The cockpit may be pressurized to below sea-level cabin pressures at low altitudes to 5,000 ft and slightly greater than sea level standard pressure from 5,000 to 35,000 ft to ensure a positive pressure differential thereby significantly reducing the threat posed by combat within forward areas subjected to chemical and biological warfare agents. This positive pressurization will slightly inhibit overall aircraft performance and is the result of simultaneous operation of the aircraft redundant cockpit environmental compressor.

9. The SM-27S/T employs the redundant rocket assisted canopy jettison system as a fail safe mechanism. This redundant system serves as an alternative to the use of Linear Shaped Charge Detonating Cord (LSCDC) within the canopy structure. STAVATTI recognizes significant shortcomings in the use of LSCDC within aircraft canopies including increase serviceability requirements and costs, increased potential for crew hazard and the probable significant reduction in the overall structural integrity of the MACHETE aircraft canopy, particularly in reference to the impact resistant design focus of the canopy structure.

## EXTERNAL DIMENSIONS & AREAS (Provisional)

### Overall Dimensions (All Models)

| | |
|---|---|
| Span | 43 ft 0 in |
| Length | 34 ft 0 in |
| Height | 12 ft 0 in |
| Gross Wing Area | 196.4 sq ft |

### Wing (All Models)

| | |
|---|---|
| LE Sweep | 5º |
| Span | 43 ft 0 in |
| Area | 171 sq ft |
| Dihedral | 2º |
| Incidence | 0º |
| Aspect Ratio | 8.91 |
| Taper Ratio | 0.44 |
| MAC | 4 ft 7 in |
| Mean Airfoil | NACA 65(2)-415 |
| Aileron Area | 12 sq ft |
| TE Flap Area | 27.3 sq ft |
| LE Slat Area | 9.0 sq ft |
| Ventral Airbrake Area | 6.75 sq ft |

### Canard (All Models)

| | |
|---|---|
| LE Sweep | 36º |
| Span (Unit) | 5 ft 1 in |
| Area | 25.4 sq ft |
| Dihedral | 3º |
| Incidence | 0º |
| Aspect Ratio | 4.07 |
| MAC | 2 ft 7.6 in |
| Mean Airfoil | NACA 65-209 |
| TE Flap Area | 6.7 sq ft |

### Horizontal Tail (All Models)

| | |
|---|---|
| LE Sweep | 35º |
| Span (Unit) | 8 ft 2.25 in |
| Area | 57.32 sq ft |
| Dihedral | -8º |
| Incidence | 0º |
| Aspect Ratio | 4.68 |
| MAC | 4 ft 6 in |
| Mean Airfoil | NACA 0009 |
| Elevator Area | 48.0 sq ft |

### Vertical Tail (All Models)

| | |
|---|---|
| LE Sweep | 40º |
| Span (Unit) | 6 ft 6 in |
| Area | 62.45 sq ft |
| Dihedral | 90º |
| Incidence | 0º |
| Aspect Ratio | 1.42 |
| MAC | 5 ft 1.43 in |
| Mean Airfoil | NACA 0009 |
| Rudder Area | 18.2 sq ft |

### Landing Gear (All Models)

| | |
|---|---|
| Wheel Base | 12 ft 11 in |
| Wheel Track | 11 ft 4 in |
| Nose/Main Weight Dist. | 21%/79% |
| Nose Tire | (1) 18 x 4.25-10 |
| Main Tires | (2) 19.5 x 6.75-8 |
| Nose Tire Pressure | 100 psi |
| Main Tire Pressure | 110 psi |

## INTERNAL DIMENSIONS (Provisional)

### SM-27S MACHETE (Single Seat)

| | |
|---|---|
| Cabin Length | 64 in |
| Cabin Height-Maximum | 64 in |
| Cabin Width-Maximum | 32 in |

### SM-27T MACHETE (Two Place Tandem)

| | |
|---|---|
| Cabin Length | 116 in |
| Cabin Height-Maximum | 64 in |
| Cabin Width-Maximum | 32 in |

## WEIGHTS & CAPACITIES (Provisional)

### SM-27S MACHETE (Single Seat)

| | |
|---|---|
| Dry Empty Weight | 7,120 lbs |
| Aircraft Operating Weight | 7,650 lbs |
| Maximum Useful Internal Fuel | 2,600 lbs (JP-8) |
| Clean Take-Off Weight (CTOW) | 10,250 lbs |
| Maximum External Load/ | 5,250 lbs |
| MTOW | 15,500 lbs |
| Design Load Factor @ MTOW | +7.5/-3.0 |

### SM-27T MACHETE (Two Place Tandem)

| | |
|---|---|
| Dry Empty Weight | 7,610 lbs |
| Aircraft Operating Weight | 8,400 lbs |
| Maximum Useful Internal Fuel | 2,600 lbs (JP-8) |
| Clean Take-Off Weight (CTOW) | 11,000 lbs |
| Maximum External Load/ | 5,250 lbs |
| MTOW | 16,250 lbs |
| Design Load Factor @ MTOW | +7.15/-2.86 |

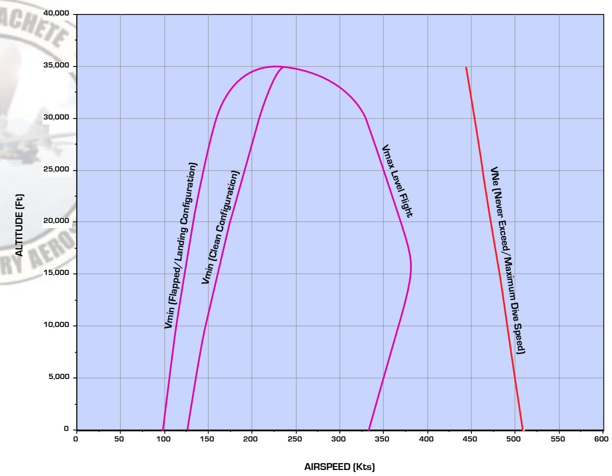
## PERFORMANCE & LOADINGS (Provisional)

*Performance estimates are based upon a standard SM-27S aircraftvat CTOW or MTOW. MTOW configuration representative of a load including 2 x GBU-31 and 2 x GBU-38 under ISA, standard day conditions. Takeoff and landing field lengths are based on level, hard surface runways with zero wind. Ferry range is unarmed with external tanks..*

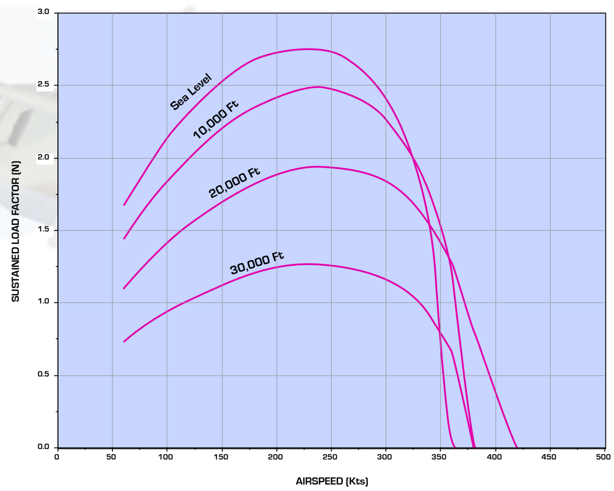
| | |
|---|---|
| Max Level Speed @ SL-CTOW | 350 Kts |
| Max Level Speed @ 15,000 ft-CTOW | 403 Kts |
| Max Cruise Speed @ 15,000 ft -CTOW | 360 Kts |
| Maximum Dive Speed-CTOW | 504 Kts |
| Max Level Speed @ SL-MTOW | 332 Kts |
| Max Level Speed @ 15,000 ft-MTOW | 379 Kts |
| Max Cruise Speed @ 15,000 ft-MTOW | 334 Kts |
| Maximum Dive Speed-CTOW | 474 Kts |
| Stall Speed Flapped @ SL-CTOW | 79 Kts |
| Approach Speed Flapped @ SL-CTOW | 87 Kts |
| Stall Speed Clean @ SL-CTOW | 103 Kts |
| Stall Speed Flapped @ SL-MTOW | 97 Kts |
| Approach Speed Flapped @ SL-MTOW | 107 Kts |
| Stall Speed Clean @ SL-MTOW | 127 Kt |
| Best Climb Speed @ SL | 120-130 Kts |
| Max Climb Rate @ SL-CTOW | 7,050 ft/min |
| Max Climb Rate @ SL-MTOW | 4,100 ft/min |

| | |
|---|---|
| Service Ceiling Exceeds | 44,000 ft |
| Tactical Radius; 20 min at Target-CTOW | 705 nm |
| Tactical Radius; 20 min at Target-MTOW | 575 nm |
| Range, Internal Fuel-CTOW | 1,530 nm |
| Range, Internal Fuel-MTOW | 1,250 nm |
| Ferry Range, External Fuel-MTOW | 3,600 nm |
| Takeoff Distance-SL-CTOW | 676 ft |
| Landing Distance-SL-CTOW | 1,369 ft |
| Takeoff Distance-SL-MTOW | 1,678 ft |
| Landing Distance-SL-MTOW | 2,081 ft |
| L/D Max Clean-CTOW | 15.12 |
| Vmax L/D Max Clean-CTOW | 147 Kts |
| L/D Max Loaded-MTOW | 11.76 |
| Vmax L/D Max Loaded-MTOW | 160 Kts |
| Max Wing Loading (lbs/sq ft) | 83.0 |
| Max Power Loading (lbs/shp) | 5.6 |
| Design Load Factor-CTOW | +11.3/-5.7 |
| Design Load Factor-MTOW | +7.5/-3.75 |

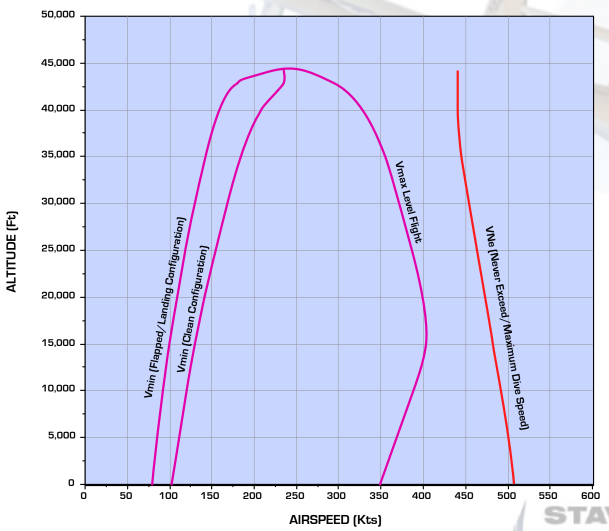
**LEVEL FLIGHT ENVELOPE**
SM-27S/T MACHETE™
LOAD CONFIGURATION: 2 x GBU-31 & 2 x GBU-38;
MTOW: 15,500 lbs; N=1



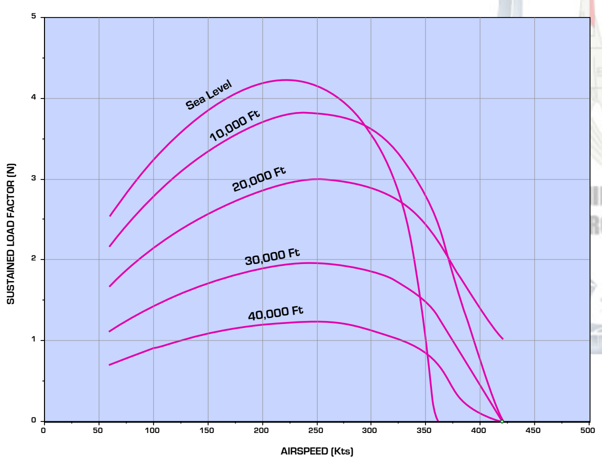

**SUSTAINED LOAD FACTOR**
SM-27S/T MACHETE™
LOAD CONFIGURATION: 2 x GBU-31 & 2 x GBU-38;
MTOW



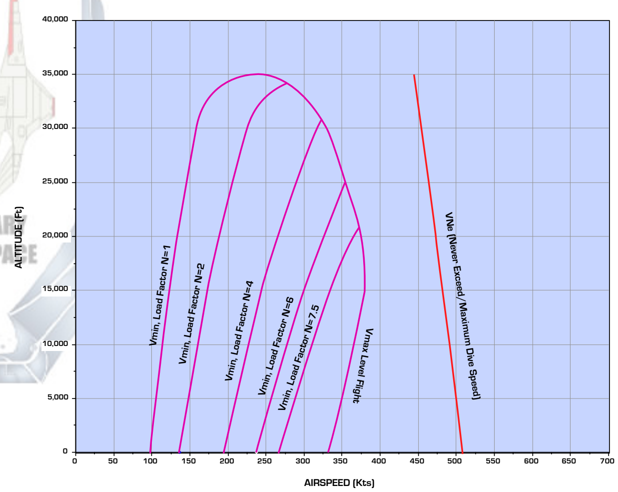

**LEVEL FLIGHT ENVELOPE**
SM-27S/T MACHETE™
CLEAN CONFIGURATION; CTOW, N=1



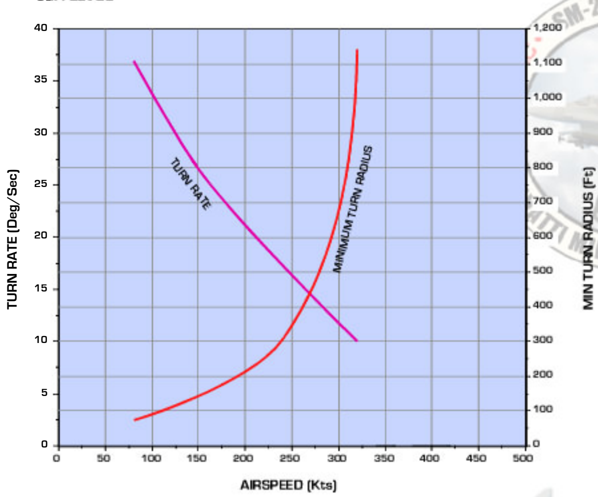

**SUSTAINED LOAD FACTOR**
SM-27S/T MACHETE™
CLEAN CONFIGURATION; CTOW



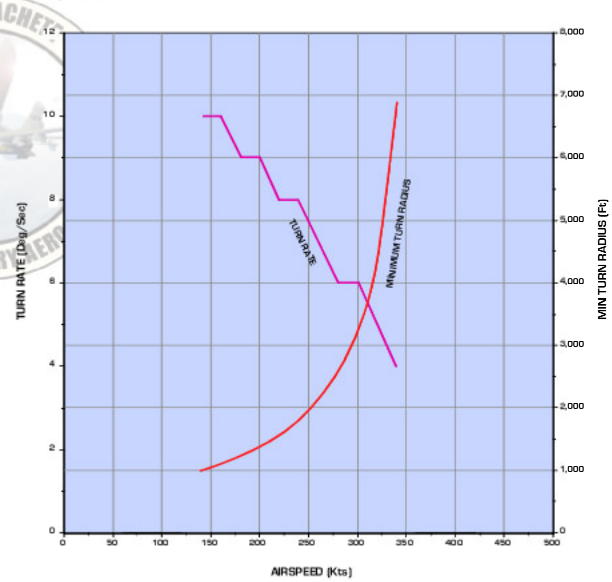

**LEVEL FLIGHT ENVELOPE/LOAD FACTOR**
SM-27S/T MACHETE™
LOAD CONFIGURATION: 2 x GBU-31 & 2 x GBU-38;
MTOW: 15,500 lbs; N=As Indicated



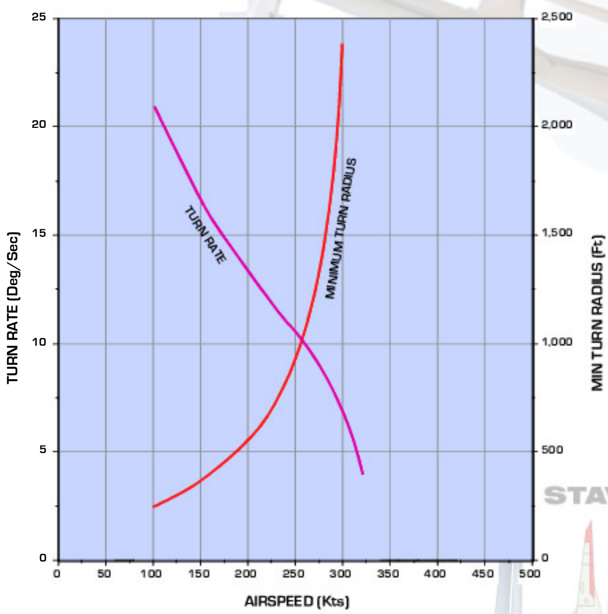
**RADIUS/RATE OF TURN**
SM-27S/T MACHETE™
CLEAN CONFIGURATION; CTOW
SEA LEVEL



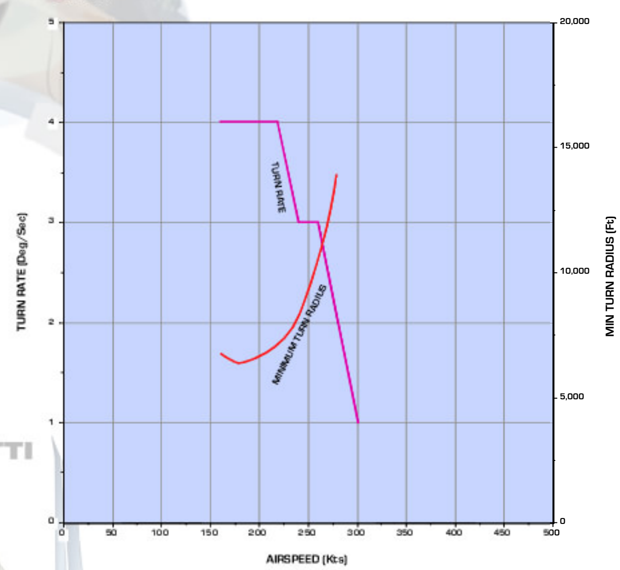

**RADIUS/RATE OF TURN**
SM-27S/T MACHETE™
CLEAN CONFIGURATION; CTOW
30,000 Ft



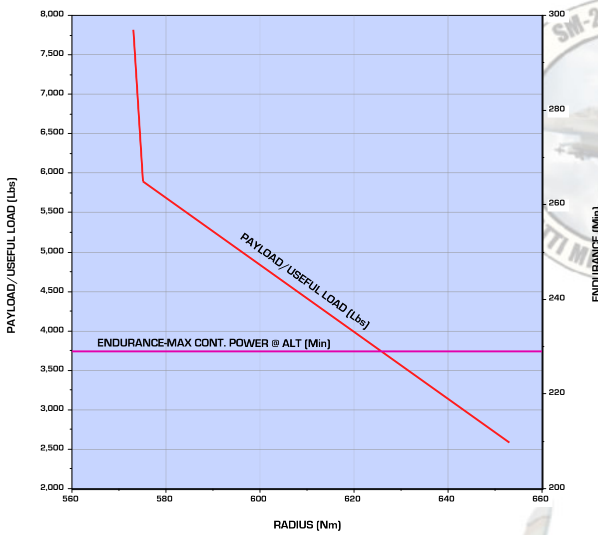

**RADIUS/RATE OF TURN**
SM-27S/T MACHETE™
LOAD CONFIGURATION: 2 x GBU-31 & 2 x GBU-38; MTOW;
SEA LEVEL



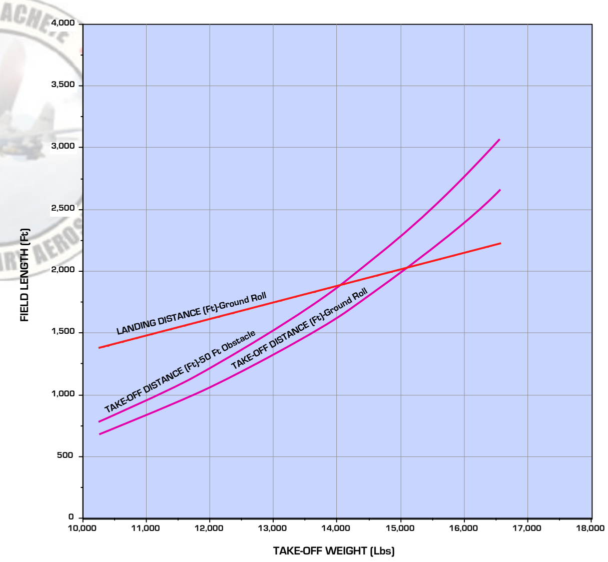

**RADIUS/RATE OF TURN**
SM-27S/T MACHETE™
LOAD CONFIGURATION: 2 x GBU-31 & 2 x GBU-38; MTOW;
30,000 Ft



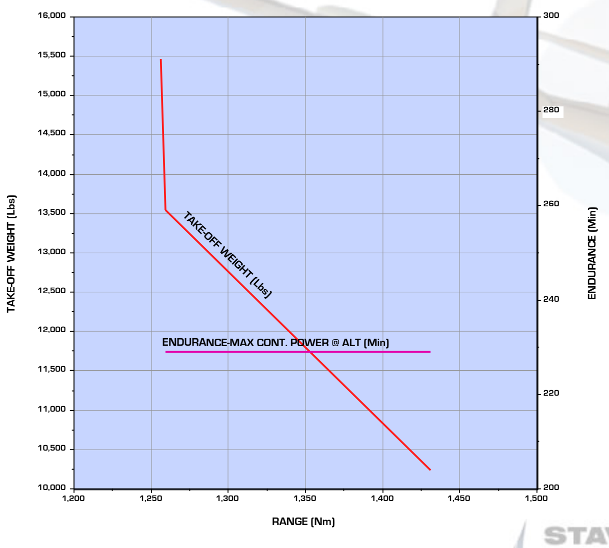

### PAYLOAD/COMBAT RADIUS
SM-27S/T MACHETE™
Including 20 Minute On-Station/Combat Allocation



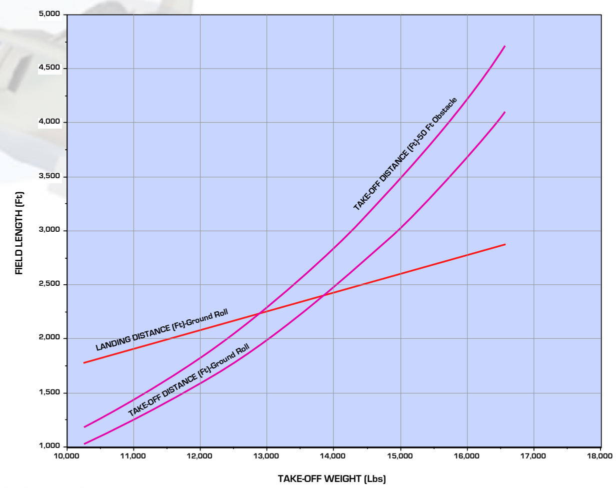

### TAKE-OFF & LANDING PERFORMANCE
SM-27S/T MACHETE™
Maximum Performance Take-Off/Landing
Sea Level



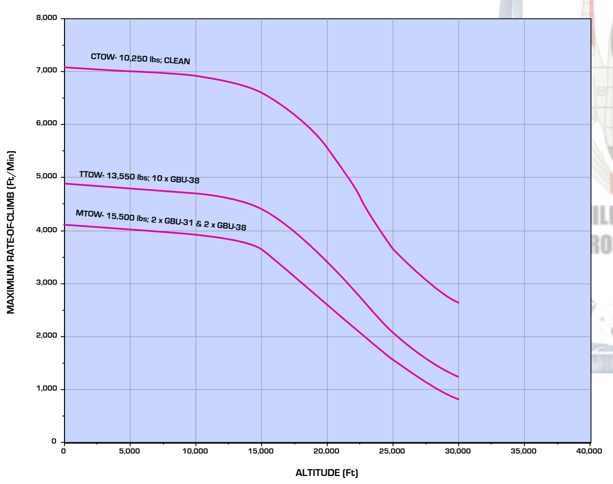

### TAKE-OFF WEIGHT (TOW)/RANGE
SM-27S/T MACHETE™
Maximum Internal Fuel/Max Continuous Power



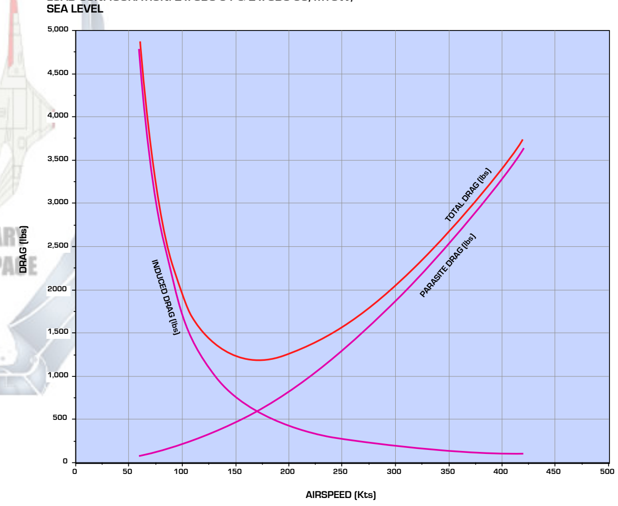

### TAKE-OFF & LANDING PERFORMANCE
SM-27S/T MACHETE™
Maximum Performance Take-Off/Landing
8,500 Ft FIELD ELEVATION



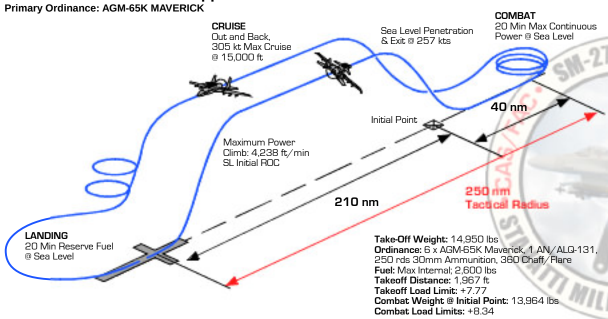

### RATE OF CLIMB
SM-27S/T MACHETE™
VARIOUS LOAD CONFIGURATIONS



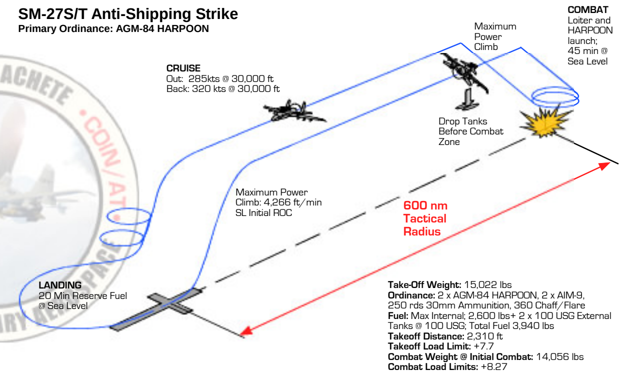

### DRAG CURVE
SM-27S/T MACHETE™
LOAD CONFIGURATION: 2 x GBU-31 & 2 x GBU-38; MTOW;
SEA LEVEL



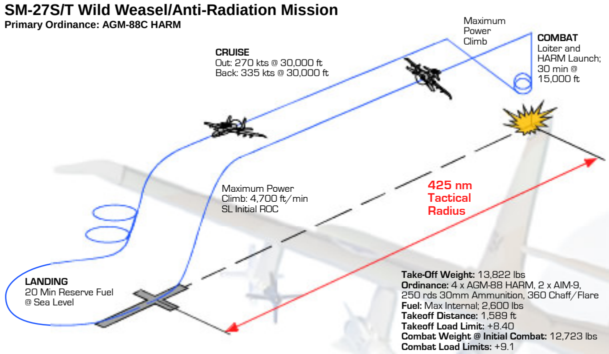
**SM-27S/T Battlefield Air Support Mission**
**Primary Ordinance: AGM-65K MAVERICK**



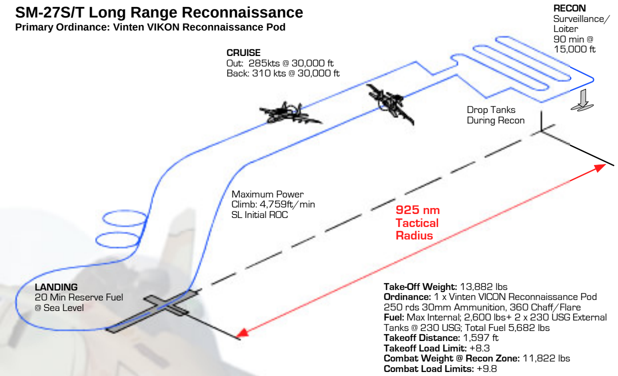

**SM-27S/T Anti-Shipping Strike**
**Primary Ordinance: AGM-84 HARPOON**



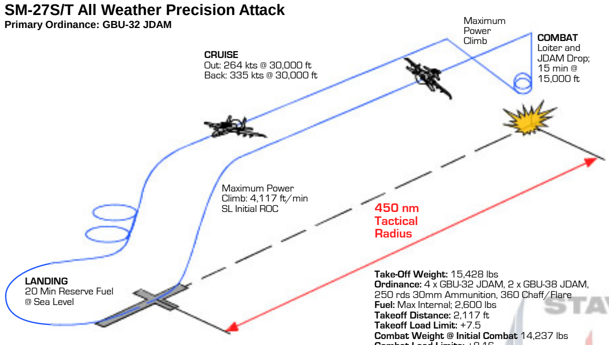

**SM-27S/T Wild Weasel/Anti-Radiation Mission**
**Primary Ordinance: AGM-88C HARM**



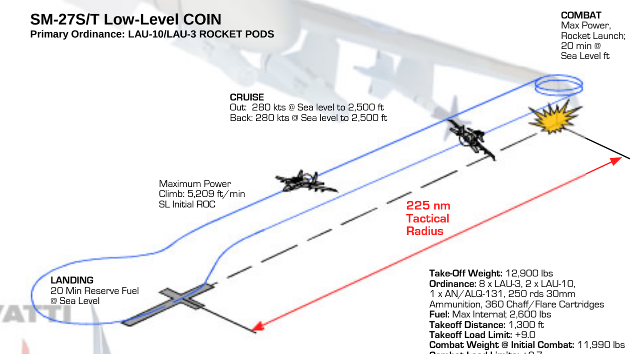

**SM-27S/T Long Range Reconnaissance**
**Primary Ordinance: Vinten VIKON Reconnaissance Pod**



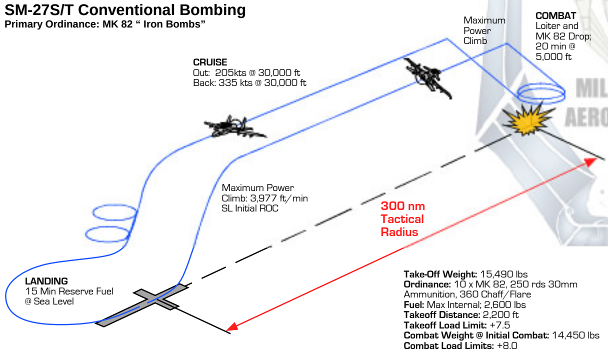

**SM-27S/T All Weather Precision Attack**
**Primary Ordinance: GBU-32 JDAM**




**SM-27S/T Low-Level COIN**
**Primary Ordinance: LAU-10/LAU-3 ROCKET PODS**




**SM-27S/T Conventional Bombing**
**Primary Ordinance: MK 82 " Iron Bombs"**




**SM-27S/T Anti-Armor Mission**
**Primary Ordinance: CBU-105 WCMD**