ATTRACTING FOREIGN INVESTMENT IN DEFENCE

Vol XI, Issue I, JUNE 2020 ■ ₹100

geopolitics

DEFENCE ■ DIPLOMACY ■ SECURITY

www.geopolitics.in

BATTLE CRIES?

There is everything in favour of India and China to de-escalate their military standoff in Ladakh and for this both have to give up the usual bogey of "perceptual differences" on the Line of Actual Control

COVER STORY

NUCLEAR 'CHINDIA' RISING OR UNBOUND? 18

Indian armed forces' warfighting support system and infrastructure must be ready for the worst. Agreeing to "adjustment" of current Chinese positions "as is where is" will hand over critical strategic space to China.

COVER STORY

India's weak border defence provokes China 24

China is systematically grabbing land in Ladakh by exploiting its topographical features. New Delhi leaving the region under the administrative control of J&K have weakened border defences.

Dealing with China 32

Consistency has never been a virtue for the communist rulers of China in settling their border disputes with neighbours. Using different principles for different countries have led to the bottleneck.

COVER STORY

New Delhi is doing little 40

What India will actually do, owing to a long habit of slavish thinking and a self-abnegatory mindset, is that it will continue doing what it is doing- trying to please Beijing and Washington.

SPOTLIGHT

A likely gamble 10

The latest decision to raise the FDI cap in defence is fine but unaccompanied by land and labour reforms, the environment will not be attractive enough to entice foreign and Indian investors.

SPECIAL FEATURE

UNIFORMED SAVIOURS OF HUMANITY (14)

The large-scale mobilisation of Indian troops and their exemplary contribution towards handling COVID-19 have made the country proud. The men and women in uniform have proved their mettle.

SPECIAL REPORT

TRACKED METAL BEASTS OF THE INDIAN ARMY (46)

With more than 4500 Main Battle Tanks divided into 67 armoured regiments, the Indian Army has one of the largest tank fleets in the world. But modernisation is still a work in progress.

GLOBAL WATCH

A POST COVID-19 WORLD ORDER (58)

Globally we are going to see a push towards greater investment in healthcare and a reduction in defence spending. The virtual world will also grow exponentially with rigorous digitalisation.

EDITOR-IN-CHIEF
K SRINIVASAN

EDITOR
PRAKASH NANDA

MANAGING EDITOR
TIRTHANKAR GHOSH

CONSULTING EDITOR
M MURLIDHARAN
S. VASANTHAKRISHNAN

SUB-EDITOR-CUM-REPORTER
AMARTYA SINHA

SENIOR PROOF READER
RAJESH VAID

DESIGNER
MOHIT KANSAL

PHOTO EDITOR
H C TIWARI

STAFF PHOTOGRAPHER
HEMANT RAWAT

geopolitics
VOL XI, ISSUE I, June 2020

DIRECTOR
RAJIV SINGH

PUBLISHING DIRECTOR
RAKESH GERA

LEGAL ADVISOR
VASU SHARMA

SUBSCRIPTION
ALKA SHARMA

DISTRIBUTION
BHUSHAN KOLI

For advertising and sales enquiries, please contact : 9810159332, 9810030533

For editorial inputs: geopolitics@newsline.in

Editorial and Marketing Office
Newseye Media Pvt. Ltd.,
D-11 Basement, Nizamuddin East,
New Delhi -110 013, Tel: +91-11-41033382 / 84

Owned and published by K Srinivasan, 4C Pocket-IV, Mayur Vihar, Phase-I, Delhi-91 and printed by him at Archna Printers D-127, Okhla Indl Area Ph-1, New Delhi -110020, Readers are welcome to send their feedback at geopolitics@newsline.in

Cover Design:
Mohit Kansal

The total number of pages in this issue is 64

DEFBIZ

EJECTION SEAT SAGA

REDEFINING THE NEW NORMAL OF COMBAT AVIATION

The Collins ACES II®'s stable, 9-13 G catapult at ambient temperatures is also important when the pilot is operating aircraft in hot environments. High temperatures affect the acceleration during the catapult phase and when the risks of spinal injuries tremendously increase around 20 G's, having some buffer will ensure pilot safety, writes **DON BORCHELT**

The Evolution Of The Ejection Seat

In barely more than a century, the world of aviation safety has progressed incredibly. In the book "Flying", written by Gustav Hamel and Charles Cyril Turner in 1914, the authors present several treatises on early aircraft safety wherein they debate crash-resistant wicker cockpits and the merits of whether it's better to use a seat belt, or if it's better to be thrown free of the cockpit when crash-landing. Later in the book, another aviation pioneer, Henry Farman said about flying "it will be so safe that we shall hear no more of the need to carry parachutes or other safety devices, for the contingency of having to abandon the machine in the air will seem an absurdity to contemplate."

The world of combat aviation has made tremendous gains in safety and mishap prevention. Accordingly, the ejection seat has continued to evolve as a critical component of modern combat and trainer aircraft. Previously, aircraft manufacturers were responsible to design and installation of ejection seats into their aircraft. However, after some introspection and incident analysis, authorities came to realise that ejection seats had wildly different performance characteristics. Further, while ejection seats were saving lives, their instability and other basic design characteristics resulted in frequent injuries to the pilot. Survival may seem by some the sole raison d'être of an ejection seat, but for combat aircraft potentially operating in contested areas, hostile environments or remote mountainous locations, the ability to deliver the pilot safely uninjured to the ground is critical. The aircrew must be able to immediately seek shelter, use the radio to call for rescue, and if required by the situation, to be able to escape and evade capture while doing so.

A pilot suffering an ejection-induced back injury will be tremendously disadvantaged and his or her chance for survival immediately jeopardised. Aviation authorities realised this stark reality in the late 1960s and early 1970s where many pilots survived their initial ejection, but were unable to evade subsequent capture due to back or neck injury.

ACES II®

Fast forward to 1978 when Collins Aerospace introduced the ACES II ejection seat. The US Air Force (USAF), together with industry partners endeavored to develop a lightweight, high performing ejection seat that could fit into to a wide variety of aircraft. Since that day, The ACES II has saved 670 fighter pilots and aircrew worldwide flying a range of aircraft including all variants of the F-15, F-16, B-1, B-2, A-10 and most recently the F-22. As important as saving lives, the ACES II proved itself tops in the industry with verifiable data showing less than a 1 per cent chance of a spinal injury during ejection. These exceptionally low spinal-injury rates are between 5 and 40 times lower than other ejection seats currently fielded. This compelling injury data is clear and irrefutable, appearing in scientific and academic papers such as Survivability and Injuries from Use of Rocket-Assisted Ejection Seats: Analysis of 232 Cases by Matthew Lewis.

While developing the ACES II, USAF authorities were careful to establish a robust supply chain. This supply chain ensures competitive sourcing for the hidden expenses of maintaining ejection seats; consumables and spare parts. United Propulsion Company (UPCO), a Collins subsidiary, was set up to make cartridge- and propellant-actuated devices (CAD/PAD). The ability to competitively source for CAD/PAD is key to keeping sustainment costs affordable over the long-term and UPCO facilitated sourcing of the replacement parts. Whereas some ejection seats use proprietary, sole-source CAD/PAD, ACES II allows customers the flexibility to source for the best deals to maintain their seats.

> The world of combat aviation has made tremendous gains in safety and mishap prevention. Accordingly, the ejection seat has continued to evolve as a critical component of modern combat and trainer aircraft

Further, ACES II CAD/PAD has, on average, over 10-years of service life on the seat. Put together, the ACES II CAD/PAD lasts longer and is less expensive. That means that the ACES II is about 50 per cent less expensive per year to maintain than other seats. In fact, a recent USAF Justification and Authorisation, which announced the service's intent to award a sole-source procurement contract for the ACES 5® (which will replace the ACES II), highlighted $1.5 billion worth of sustainment savings by selecting the ACES family of systems.

Aside from affordability, some of the most high-profile ejection events of recent combat attest to the essential ability to "hit the ground running" - escape, evade capture and talk on the radio to summon rescue forces. The current USAF Chief of Staff, General David Goldfein, who ejected using ACES II during a combat mission in

B-2 bomber ejection seat upgrade

BOEING

Collins Aerospace to provide ACES 5® ejection seat and landing gear system for Boeing T-7A Red Hawk trainer

the Balkans in 1999, was back home in time for breakfast with his family after his rescue and was again flying combat missions in short order.

Also, in possibly one of the most widely circulated and amazingly photographed events in aviation history, Capt. Chris "Elroy" Stricklin ejected from his F-16 "Thunderbird" at a Mountain Home Air Force Base airshow. This ejection was well outside the technical performance specification of the ACES II, but the proven and reliable features of the seat including the CKU-5 load-compensating catapult and the Stability Package (STAPAC) pitch stabilisation rocket motor worked flawlessly in tandem, and demonstrated that industry leading terrain clearance performance can be accomplished without harming the aircrew.

Although other seats can perform with 18-20 G's or higher accelerations during the catapult phase, they are not effective when the thrust vector is pointed in the wrong direction because the seat pitches forward or rearward where there is no active pitch control.

The ACES II's stable, 9-13 G catapult at ambient temperatures is also important when the pilot is operating aircraft in hot environments. High temperatures affect the acceleration during the catapult phase and when the risks of spinal injuries tremendously increase around 20 G's, having some buffer will ensure pilot safety. In all scenarios tested to date, whether on the bench or a real-world ejection, the CKU-5 delivers a stable, reliable, consistent, load-compensating push. The load compensation is achieved through a complex mix of physics and chemistry. The shape of the burn chamber is specifically optimised to allow different rates of burn, and the propellant will burn faster when subject to increased pressure. Therefore, when ejecting heavyweight aircrew, the propellant will burn faster (and push harder) as the pressure builds in the burn chamber. Conversely, when ejecting a light-weight aircrew, less "push" is needed to achieve the desired performance, and less pressure is encountered while moving a lighter mass and therefore the burn rate slows. Compared to other ejection seats that are black powder based "mortar" style catapults, no switches are required to be set (and potentially forgotten) by the pilot to optimise the seat performance. Finally, the ACES II has never activated on its own and when not commanded to eject. Thus, whether in combat or in peacetime, the ability to walk away from an ejection and fly another day is essential. Nations invest a lot of money to train their aircrew so returning the pilots to active flying status preserves a valuable military resource.

ACES 5® Next Generation Ejection Seats

Collins Aerospace is dedicated to continuously improving and tackling its customer's most critical needs. After listening closely to pilots, aircrew, maintainers, and acquisition officials in the early 2000's, the ejection seat design engineers moved to further improve the ACES II ejection seat that was introduced in 1978.

When developing the F-22, the USAF required a seat that provided pilots with passive arm and leg restraint and a seat structure strengthened to withstand wind forces up to 700 knots. Once added, the F-22 evolution became internally known as the ACES 3. Later, the USAF required a modular seat that could be disassembled in the cockpit and this modularity concept evolved into the ACES 4. Finally, the passive arm and leg restraints, modularity, and Passive Head and Neck Protection were combined into a single ejection seat called ACES 5, the most advanced ejection seat in the industry.

Through a series of internally funded technical demonstrations, ACES 5 demonstrated an impressive pedigree of USAF-sanctioned test data. In addition to the internally-funded testing and development, the ACES 5 family has also qualified and been delivered to upgrade the B-2A Spirit. Over the years, this repeatable data has completely fleshed out the pedigree of the ACES 5 and shows reliable performance that meets and exceeds the modern standards of injury criteria that any nation should expect from now on: MIL-HDBK-516C and its most recent 2016 update.

The ACES 5 is even simpler to maintain than the ACES II. The modular design means that the canopy doesn't need to be removed in order to remove the ejection seat. ACES 5 has been demonstrated to be disassembled and removed from the back seat of an F-16 cockpit in 15-20 minutes, with reinstallation only taking about 20-30 minutes. This means that aircraft will be mission capable more often and more effectively.

In addition, the patented Passive Head and Neck Protection (PHNP) is a simple, robust mechanical system compared to a complex, high-maintenance, airbag-style system. All that is required is a simple visual inspection by maintenance technicians.

ACES 5 is made of robust, machined aluminum and designed to withstand shocks and loads induced at very high-speed ejections. Together with the Passive Arm- and Leg-Restraint System, the seat secures the limbs of the aircrew and transfers the loads into the seat structure itself. This prevents windblast induced flailing injuries of the limbs, another key feature to being able to evade capture or crawl into a survival raft.

Pitch and yaw stability of the ACES 5, particularly critical at high speeds, are the core requirements of injury prevention. ACES 5's active pitch stability provided by the STAPAC is retained from the ACES II while adding a new fast-acting drogue parachute that deploys milliseconds sooner to stabilise the seat in the yaw axis.

Finally, aircrew land under the canopy of the newest, best-performing ejection seat parachute available today, the GR-7000. The GR-7000 slows the decent of even the heaviest aircrew, up to 245 pounds with a full survival kit (a total of 337 pounds suspended weight), to a very slow speed of less than 21 feet-per-second. The parachute is more steerable, and the built-in forward drive prevents random oscillations common in older parachutes. Together with the slow descent rate, the GR-7000 stability decreases the probability of a lower-leg injury very low levels that exceed modern injury criteria.

To help update those modern injury criteria, Collins Aerospace worked closely with the airworthiness authorities and help set a new standard of injury performance – the MIL-HDBK-516C airworthiness certification criteria which is a total overhaul from the original version. ACES 5 is the only ejection seat certified to this standard. The result is that ACES 5 retains the low-potential for spinal injury and protects pilot in ejections up to 600 knots. In fact, with ACES 5, spinal injuries are reduced to less than 1 per cent and major injuries to less than 5 per cent. To date, close to 670 lives have been saved with ACES technology.

DON BORCHELT
Business Development Director
ACES II/5, Mission Systems, Collins Aerospace

One of the lesser known, but equally critical features of the ejection seat is the volume of the survival kit. Collins Aerospace's 1500 cubic inch survival kit can be tailored with maximum flexibility to the specific survival needs of any theater of operations. Further, it is a single, contiguous volume as opposed to being partitioned into multiple, separate, smaller spaces. In fact, USAF pilots are now flying with converted M4 assault rifles in their ACES II survival kits, giving aircrew a real fighting chance to enhance their likelihood of survival.

Finally, as announced in October 2019, the USAF intends to sole source the ACES 5 to upgrade all existing ACES II seats. In addition, the ACES 5 is also the seat of choice for the new USAF trainer aircraft, the T-7A Red Hawk, which will begin fielding in the coming years.

What will the future bring to the ACES family of systems? Engineers are constantly hard at work developing technology that will make ejections even safer and create game-changing ejection seat technology and performance.

One can all dream like aviation pioneer Henry Farman did more than 100 years ago, and while modern aircraft are safer than ever before, the ACES 5 ejection seat stands ready to ensure those born to fly, live to walk away.

ACES 5®
Next Generation
Ejection Seat

Don Borchelt retired from the US Air Force in 2018 where he was assigned as the 1st FW Vice Commander. It was in his Flight Safety roles where Don became even more passionate about the imperative to provide aircrew with the safest, best performing ejection seat possible. He has 2000 flight hours and over 100 combat hours. In his role, Don leads and implements business capture strategies to develop, test, and field the ACES 5 ejection seat to reduce ejection risks for fighter, bomber, and trainer aircrew in the US and internationally

ALL PHOTOS: COLLINS AEROSPACE