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Coronavirus lockdown: Goods trains deliver N95 mask samples for DRDO tests

Not taking chances with quality, the defence lab has been pressed into service and it has so far received samples from manufacturers in Ludhiana, Delhi and Ambala

By Avishek Dastidar

New Delhi: The DRDO laboratory in Gwalior is testing N95 masks after receiving samples from bulk manufacturers via goods train drivers as the country prepares to mass-produce protective gear for medical staff on the frontlines of the COVID-19 outbreak.

As per government estimates, 2.4 crore N95 masks will be needed up to June amid rising infections and this vital transportation has come through a collaboration between Indian Railways and the Textiles Ministry. Not taking chances with quality, the defence lab has been pressed into service and it has so far received samples from manufacturers in Ludhiana, Delhi and Ambala.



“No one wants to take any chances with the quality. So we had been given standards, based on which we have made the prototype and now they have been sent for testing. We are awaiting results,” said Ashwani Garg of Pious Textiles in Ludhiana, which can produce around 3,000 masks per day.

Sample packs carrying a couple of masks are handed over to train drivers who pass them on to station functionaries in Gwalior who then provide them to DRDO officials.

Government officials said that stringent testing is also needed for body suits for which the government is working with a projected requirement of 1.5 crore pieces up to June and that there can be “no room for error in quality”.

“There has been feedback from medical professionals that body suit is vital even while treating non-corona patients to protect themselves against asymptomatic transmission. We are looking at huge numbers based on our projection,” said a senior government official working on the project.

The Textiles Ministry has sounded out all the major players and is pulling samples through strict testing protocol. The DRDO testing is in addition to its testing regime at the South India Textile Research Association in Coimbatore.

With a lockdown in place, sending samples to labs has been a challenge. “It was discussed that this is a vital transportation need, and taking the road was practically not possible. So the solution worked out was that since our goods trains now run as fast as mail/express trains, we could help send those packages through our drivers,” said a senior railway official.

<https://indianexpress.com/article/india/coronavirus-lockdown-goods-trains-deliver-n95-mask-samples-for-drdo-tests-6341152/>

Shared ventilators in times of coronavirus: Start-ups can help govt breathe easier

The company has also tied up with Andhra Pradesh MedTech Zone, an enterprise under the Andhra Pradesh government to create capacity for 5,000 more units

By Ishaan Gera

Given that the estimated 40,000-50,000 ventilators in India would not be enough in case the COVID-19 numbers reach levels that the worst-affected countries have witnessed, the government is working on all possible solutions, including enlisting automakers, PSUs and the Defence Research Organisation (DRDO), to ramp up their manufacturing.

Even with that, the requirement could surpass availability if the pandemic ends up affecting lakhs, as projected by some mathematical models. So, DRDO will be working with multiple private sector firms to create a splitter for ventilators so as to allow many patients to simultaneously use a single ventilator.



any start-ups, however, have been fielding such innovations for quite some time. AgVa Healthcare, founded by Dr Deepak Aggarwal of AIIMS, and Diwakar Vaish, a robotics specialist, had in 2018 announced a low-cost ventilator that could be cheaper than a flagship premium smartphone. The company used technology to compress a ventilator to small form-factor and bring down the cost to a tenth of an existing, traditional ventilator, it can also convert an Android tablet to work as a ventilator.

Maruti Suzuki India has tied up with AgVa and would be creating ventilators based on the latter's technology. MSI said it would achieve a production volume of 10,000 units per month. "We are targeting 20,000 units in production. Since our first iteration, we have added new features. The new ventilators are very rugged and have features which can match a `15-lakh ventilator," Aggarwal, co-founder, AgVa Healthcare, said. The company claims to have customised it to deal with viral shedding by COVID-19 patients. "We have also installed a medical-grade negative ion generator (not there in any ventilator). Negative ions inactivate the virus in respiratory tubing and airways, and a positively charged collection mechanism collects them," Aggarwal said.

The company has also tied up with Andhra Pradesh MedTech Zone, an enterprise under the Andhra Pradesh government to create capacity for 5,000 more units.

Indian start-ups are delivering innovations that can aid India's Covid-19 response. Pankaj Gupta, managing partner of Singapore-based EthAum Venture Partners, threw a challenge on Twitter, asking people to create a four-way splitter for ventilators, which could be used on ventilators as these machines operate only at 25-30% of their capacity. Gupta initially had thought of a ventilator 'hackathon', but soon pivoted the challenge towards creating a splitter, after coming across a 2006 report of doctors in Michigan using this technology. He took open-source designs and tested them in Jaipur.

"We are working including a flow controller. So, we will be creating both a simple splitter and a complex mechanism. We want to bring all 3D printers on board," Gupta said.

Another healthcare start-up Dozee has a contactless health monitor, which can be used to track heartbeat, respiration rate and stress. Pritish Gupta, COO and CBO, Dozee, said the company has a cost-effective solution to health tracking and creating makeshift ICUs. "The monitor uses AI to track vibrations and does it with 98% accuracy. As respiration is affected in COVID-19, we can

keep regular track of respiration, sending automatic alerts when respiration tends towards dangerous levels. Besides, the app controlling the device can generate a dashboard, so nurses can spend more time taking care of the observations rather than recording patients' vitals," he said.

Another start-up Niramai, engaged in breast cancer screening, uses thermalytix to screen women for breast cancer. It said it is developing a technology where a device can monitor the temperature of groups of people. Geetha Manjunath, CEO & CTO, Niramai, said: "Thus, we can do remote fever screening from 10-12 feet. While we cannot monitor crowds at present, groups of people can easily be screened."

<https://www.financialexpress.com/industry/sme/shared-ventilators-in-times-of-coronavirus-start-ups-can-help-govt-breathe-easier/1915267/>

BUSINESS INSIDER
INDIA

Wed, 01 April 2020

DRDO is stepping in to build ventilators and manufacture masks

New Delhi: The Defence Research Development Organisation has developed a prototype ventilator that can be used for multiple patients, its chief Satheesh Reddy said on Monday, amid a spike in the number of coronavirus cases in the country. He added the model is being improved to include changes suggested by medical researchers and doctors and the new version should be ready by next week.

"We are attempting to take the output of one ventilator. The mechanism makes it usable for multiple patients. We have developed the first model. We have seen it is working. There are some medical researchers, doctors who have advised us to incorporate features. We are working on it," he said.

Reddy said this is a "last-minute resort" if the number of coronavirus patients increases and there is shortage of ventilators.

"By next week it should be ready with the suggestions made by the doctors and medical researchers," he said.

The DRDO has prepared ventilator designs in the past and passed it on to the industry.

Separately, the Ministry of Health said the DRDO will begin manufacturing 20,000 N-95 masks per day from next week.

The ministry has also asked the Bharat Electronics Ltd, a public-sector undertaking under the Ministry of Defence, to manufacture 30,000 ventilators in next two months.

Among private players, Agva Healthcare, Noida, has been given an order to manufacture 10,000 ventilators within a month. Their supplies are expected to commence in the second week of April, the ministry said in a tweet.

<https://www.businessinsider.in/science/health/news/drdo-is-stepping-in-to-build-ventilators-and-manufacture-masks/articleshow/74905607.cms>



India: Centre brings key features for ventilators for COVID-19 patients

New Delhi: As ventilators are key life-saving equipment in the fight against coronavirus outbreak in the country, the Union Health Ministry has framed essential features for these machines to be used for the treatment of COVID-19 patients.

These vital features have been designed in collaboration with the Director-General (Life Sciences), Defence Research & Development Organisation (DRDO).

According to health ministry officials: “It has been done to ensure availability of essential and very important medical equipment in the view of COVID-19. These features of ventilators include that the machine should be turbine/compressor based because the installation sites might not have central oxygen lines.” “Second, the machine should have invasive, non-invasive and Continuous Positive Airway Pressure Therapy (CPAP) features to make them versatile. The ventilator machine should have 200-600 ml tidal volume, lung mechanics display, monitoring of plateau pressure, Positive End-Expiratory Pressure (PEEP), Pressure Support Ventilation (PSV), oxygen concentration, lung mechanics/inverse ratio (I:E),” said the official adding that the life-saving equipment should have the continuous working capability of 4-5 days.



The official informed that as of now less than 20 patients of COVID-19 are on ventilator support across the country. “We have nearly 14,000 ventilators dedicated to COVID-19 patients placed at various hospitals nationwide. We have placed more orders for 30,000 ventilators from Bharat Electronics Limited and some automobile manufacture’s like Maruti, TATA and Mahindra are in touch with us to develop ventilators. And they are capable for doing so,” said the official.

Last week, ANI had reported that Agva Healthcare in Noida is developing a prototype of ventilators for All India Institute of Medical Sciences (AIIMS). “Agva Healthcare will build up 10,000 ventilators and orders have been placed for the same,” said the official.

The Central government has also approached some international companies like Hamilton, Mindray and Draeger to supply additional machines. The government has also approached a Chinese supplier for 10,000 ventilators.

So far, India has reported over 1,200 confirmed positive cases of coronavirus and 32 deaths due to the deadly virus.

<https://telanganatoday.com/india-centre-brings-key-features-for-ventilators-for-covid-19-patients>

MEA has identified suppliers to increase availability of logistic items in battle against coronavirus: Health Ministry

The Ministry of External Affairs has identified suppliers from South Korea, Turkey and Vietnam to increase the availability of logistic items needed in the battle against coronavirus, Health Ministry said on Tuesday.

"Ministry of External Affairs has identified suppliers from South Korea, Turkey and Vietnam to increase the availability of logistic items in the country," said Lav Aggarwal, Joint Secretary, Ministry of Health and Family Welfare at a media briefing here.

He said that the Defence Research and Development Organisation (DRDO) is working with local manufacturers to increase the supply of N95 masks.

"A science and technology-empowered committee has been formed under the chairmanship of Dr Vinod Paul, member of NITI Aayog and Professor K Vijay Raghavan, principal scientific adviser to Prime Minister," Aggarwal said.

"This committee will coordinate with scientific agencies, scientists, industries and regulatory bodies," he said, adding that scientists from the Department of Science and Technology, Department of Biotechnology, Council of Scientific and Industrial Research (CSIR), DRDO and All India Institute of Science are part of the committee.

The Joint Secretary said that the scientific institutions linked to the ministries are working on multi-disciplinary projects which are primarily focused on repurposing of drugs.

He said that 1,251 coronavirus-positive cases and 32 deaths have been reported in the country. (This story has not been edited by Business Standard staff and is auto-generated from a syndicated feed.)

https://www.business-standard.com/article/news-ani/mea-has-identified-suppliers-to-increase-availability-of-logistic-items-in-battle-against-coronavirus-health-ministry-120033101277_1.html

The process of identifying a covid 'hotspot' is not uniform: Lav Agarwal

The ministry has also framed essential features for ventilators to be used for the treatment of COVID-19 patients. The features have been designed in collaboration with the Director-General (Life Sciences), Defence Research & Development Organisation (DRDO)

Describing the manner in which government identifies Covid 'hotspots', Lav Agarwal, an official from Health Ministry, said 'hotspots' are an emerging concept which changes based on inputs and data of virus spread. The government is ensuring that these spots are effectively monitored so that the virus does not spread. Even an area with a single case can become a 'hotspot', if the government feels that there is possibility of a wider spread in that area, emphasised Agarwal.

The Centre is continuously identifying emerging "hotspots" of Covid-19 infection and employing a rigorous cluster containment strategy, added Agarwal. As we are dealing with a communicable disease, the government does not want to assign a particular number by which it decides to declare an area to be a 'hotspot', reiterated Agarwal.

The ministry has also framed essential features for ventilators to be used for the treatment of COVID-19 patients. The features have been designed in collaboration with the Director-General (Life Sciences), Defence Research & Development Organisation (DRDO).

According to health ministry officials: "It has been done to ensure availability of essential and very important medical equipment in the view of COVID-19. These features of ventilators include that the machine should be turbine/compressor based because the installation sites might not have central oxygen lines."

<https://economictimes.indiatimes.com/news/politics-and-nation/the-process-of-identifying-a-covid-hotspot-is-not-uniform-lav-agarwal/articleshow/74913130.cms>



Wed, 01 April 2020

COVID-19 helpline: Here's how Indian manufacturers plan to boost production and supply of critical healthcare items

By Shereen Bhan

The number of confirmed coronavirus cases in India has risen above 1,000 and total active cases now stand at over 900. However the good news is that the number of recoveries stands at 99 and less than 20 people are on ventilator support.

With the nation-wide lockdown to contain the spread of the virus entering the sixth day, cabinet secretary Rajiv Gauba has dismissed reports that the government may be looking at extending the 21-day lockdown, which is slated to end on April 14.

Meanwhile, the Centre has released some data on how India's healthcare infrastructure is being prepared to cope with a rise in the number of COVID cases. 14,000 ventilators have been identified across the country, and orders have been placed for 40,000 more. 10,000 of these ventilators will be manufactured by Noida-based AgVa Healthcare and 30,000 units will be made by Bharat Electronics.

The government is also speeding up the procurement of personal protection equipment for healthcare workers. Orders have been placed for 21 lakh coveralls and 30 lakh kits. Production of N95 masks has also been ramped up, with the DRDO being roped in to help.

Even the industry body CII has come forward with a collective platform of India's large manufacturers to support the government in boosting the production and supply of critical healthcare items. The CII's coalition of manufacturing companies will ramp up inventory of critical healthcare products like ventilators and personal protection equipment by manufacturing in large volumes and by importing them for immediate requirement.

To discuss how this coalition will work and the challenges such an endeavour could face, CNBC-TV18 spoke to Sunil Kant Munjal Chairman of Hero Enterprise; Rajan Wadhwa President of SIAM; Naresh Trehan, Chairman, Healthcare at CII and MD of Medanta; Chandrajit Banerjee, Director General at CII and RC Bhargava, Chairman, Maruti Suzuki.

Banerjee said, "We have identified three areas of work, one is the ventilators, second are the personal protective equipment's (PPEs) and third are the masks. These are three big categories that we are really working at. We are maximising the capacity of the existing ventilator manufacturing companies whose products are already tested and certified but they need capital, they need to be attached to some bigger and qualified manufacturers."

Therefore, we have formed a consortium with CII, with other manufacturing organisations like the automobile vehicles manufacturing association the SIAM, the component manufacturers

association, the machine tool manufacturers association, the defence manufacturers association. We have connected with the DRDO. The DRDO is the main body now, which is certifying the type of ventilators and the specification of those ventilators. We have had a large broadcast with the DRDO to get many smaller medium sized companies getting involved in the manufacture of ventilators, said Banerjee.

Bhargava said, "This is design and a technology which apparently was developed by AgVa. We have joined with AgVa because it was amongst one of the companies sent to us by the ministry and they had already an order for 10000 ventilators from HLL."

"We thought that if we were looking for any new design from anybody, it would have meant defacto starting out from scratch, trying to get all the components developed, if something had to be imported, finding sources of those components and that would take a very long time. TSo, to get immediate results the best thing was to use our expertise to scale up the production volumes of AgVa. Till now AgVa was doing on about 300-400 per year and we wanted to get upto a few thousand per month," said Bhargava.

He further added, "Besides the premise, which AgVa owns, we have also got a much larger premise from one of our vendors in Noida and we are using that for purposes of manufacturing and assembling these ventilators. We have got at least three of our vendors who are large scale vendors starting to manufacture the components, they have already got the drawings, they have started the manufacture of the prototypes. By Wednesday the prototypes will be ready and then they can be tried out and seen if they are perfectly alright, so that the dimensions and all are done."

"The most difficult part is the imported components. We found AgVa had no imported components in stock and they had to get it from China, so we are looking for other sources as well. However as per what AgVa says, one lot of these imported components should be here by Wednesday or Thursday and we will start assembling," said Bhargava.

Munjal said, "We are trying to see how we can supplement the current supply and availability of all the four things - one is protective gear for healthcare workers and others, second is testing kits which is a big challenge at the moment. The third is respirators and ventilators -- you need multiple kinds of ventilators. You need the very sophisticated one for the very serious patients but you also need the other ones because you cannot get the most expensive ones for all the patients as we just won't be able to afford it. The fourth is masks and gloves etc. We also have to carefully segregate the COVID patients from others. So the efficient way would be to declare COVID-19 full hospitals, so you do not need to separate air circulation, water supply etc because if regular hospital gets COVID-19 patients, the chances of spreading this is very high."

"One has to be careful as to not kill the ability that we have to treat patients for other diseases and so we have been in touch with both the industry and the government," said Munjal.

Trehan said, "The most important thing about ventilators is that the safety standards have to be extreme because anything that we do which may actually malfunction and cost a life that would be a disaster. The fact is that we have to meet the specifications with proper testing and we have offered to do the testing for these manufacturers if they do desire because if it gets delayed then it won't serve our purpose. So we will try to help in every way. I am glad that Maruti is helping to actually get it up and running. However we have to be very careful, we must do it and test it properly before we put it out into the clinical use domain."

<https://www.cnbctv18.com/healthcare/covid-19-helpline-heres-how-indian-manufacturers-plan-to-boost-production-and-supply-of-critical-healthcare-items-5588511.htm>

After Rs 21,000-cr turnover in 2019-20, HAL eyes higher growth this year

Rs 19,000 crore remains outstanding from the three defence services

By Ajai Shukla

New Delhi: Hindustan Aeronautics Limited (HAL) on Tuesday announced a record turnover of over Rs 21,100 crore (provisional and unaudited) for 2019-20. This amounts to a growth of 7 per cent over the previous year's turnover of Rs 19,705 crore.

This achievement comes despite "difficulties in cash flows, interruptions in operations due to workmens' agitation and the interruption arising in March due to the Covid-19 lockdown. It has affected the final tests and certification of certain additional aircraft that were under final stages of production," said HAL in a press release.

During the year 2019-20, HAL said it has delivered 31 aircraft/helicopters and 117 new engines. It has also overhauled 199 aircraft/helicopters and 490 engines.

Speaking to Business Standard after the announcement, HAL's chairman R Madhavan said the company's healthy order book made it likely that the coming year would see similar growth.

Madhavan said the Tejas light combat aircraft (LCA) would now constitute HAL's big new income stream, with the company intending to deliver 12-14 Tejas Mark 1 fighters in the final operational configuration (FOC) next year. Of these, five are almost complete, but could not be delivered during the current year because of the Covid-19 lockdown. With each Tejas Mark 1, priced at about Rs 200 crore, the production line would generate Rs 2,400 crore - Rs 2,800 crore next year.

In addition, HAL is gearing up to build 83 LCAs in the more sophisticated Tejas Mark 1A configuration, an order the defence ministry has cleared and is awaiting final approval from the Cabinet. HAL will begin building those after delivering the 40 Tejas Mark 1 fighters already on order.

Next year will see HAL winding down its longstanding cash cow: the Sukhoi-30MKI production line in Nashik. In 2019-20, HAL delivered 12 Sukhoi-30MKI fighters, while the delivery of another four was held up by the Covid-19 lockdown, said Madhavan.

With those being delivered shortly, HAL will have completed delivery of all the 222 Sukhoi-30MKIs the Indian Air Force (IAF) ordered. Thereafter, the Nashik production line will close until the IAF orders another 12 Sukhoi-30MKIs, a contract it is still processing.

This year, HAL also built and delivered 21 new AL-31 engines, which power the Sukhoi-30MKI. That leaves another 27 AL-31 engines on order, which Madhavan says will be delivered in 2020-21.

HAL is using its Nashik line to progressively overhaul the IAF's Sukhoi-30MKI fleet. This year, HAL earned over Rs 1,000 crore by overhauling 13 fighters and is looking to raise that next year.

HAL is also generating a growing income from its helicopter production line in Bengaluru. In 2019-20, it delivered 13 Dhruv advanced light helicopters (ALHs) to the army against the 10 it was scheduled to deliver. In 2020-21, HAL will begin delivering the navy's and coast guard's orders of 12 Dhruvs each; and those remaining from the army's order of 40.



Negotiations are also under way for manufacturing 15 Light Combat Helicopters (LCHs) for the IAF and army. Madhavan says HAL has already started building the LCHs so that delivery could begin in the short order once the contract is signed.

During the current year, HAL generated an unprecedented income of Rs 9,000 crore on spares, overhauls and upgrades.

“The company cites cockpit upgrade of the Dornier-228, avionics upgrade of the Hawk trainer and the fitment of the BrahMos missile on the Sukhoi-30MKI as “game changers” for HAL. However, HAL continues facing cash flow problems due to payment delays by the military. The year 2019-20 saw collections of over Rs 18,000 crore from the army, navy and IAF. However, Rs 19,000 crore remains outstanding from the three services. This includes Rs 14,400 crore outstanding from the IAF, HAL’s biggest customer.

However, Madhavan is optimistic about this situation being remedied. “Two years back, the problem was worse, but collections are improving. In another year, we should be out of the woods,” said the HAL Chairman.

https://www.business-standard.com/article/companies/after-rs-21-000-cr-turnover-in-2019-20-hal-eyes-higher-growth-this-year-120040100071_1.html



Wed, 01 April 2020

India's aviation behemoth HAL expects more orders as it completes production of Su-30MKI

New Delhi: State-owned Hindustan Aeronautics Limited (HAL) has recorded a turnover of more than INR 21,100 crore (\$3 billion) for the financial year ending on 31 March 2020. The company said that the production facility of Su-30MKIs is expected to continue to be in operation as the Indian Air Force may opt for more fighter jets.

Hindustan Aeronautics Limited has completed the production of all 272 Su-30MKIs contracted to HAL by the Indian Air Force (IAF) during the current year and is expecting to get a few additional orders for the multi-role fighter jet, the company said in a statement on Tuesday.

India’s state-owned HAL was producing 272 Su-30MKI fighter jets on a license from Russia’s United Aircraft Corporation. The company, which is assembling each aircraft at \$70.3 million, also expects to continue the Nasik facility for the assembly of additional Su-30MKIs for the IAF. HAL set up a Su-30 (MKI) Refuelling and Overhaul (ROH) project stores facility in Nasik city in Maharashtra state in 2014.

Sputnik reported last year that the state-owned firm had requested that the Defence Ministry provide an additional order for the assembly of 72 Su-30MKI fighters for about \$5 billion.

IAF chief Air Chief Marshal RKS Bhadauria, in a media interaction in October 2019, confirmed that the additional Sukhoi-30MKI fighters would be built by HAL in Nasik.

“We are moving towards ordering 12 more Sukhoi-30s. Whether we need some more in lieu of aircraft that are going to get phased out from 2025 onwards... we will have to take a look later. But at the moment, 12 is what is being followed up straightaway”, Bhadauria said.

HAL on Tuesday hoped that with additional Su-30MKI orders and the expected order for 83 domestically made MK1A LCA, “the order book is likely to attain a healthy position during the next financial year 2020-21”.

For the financial year 2019-20, HAL recorded a turnover of over INR 21,100 crore (\$3 billion).

Improved Sukhoi-30MKI

The IAF chief also provided details on upgrading the Sukhoi-30MKI with modern “radar and weapons capabilities and also tackling obsolescence management and electronic warfare aspects”.

Earlier this year, the IAF commissioned its first squadron of Su-30MKI with the BrahMos-A (Air) supersonic cruise missiles in the southern part of the country to counter threats emanating from the Indian Ocean Region.

HAL has said that the avionics upgrade of the SU-30MKIs and BrahMos missile modifications would be a game-changer and is important for the future growth of the company.

Currently, the Indian Air Force has been facing a shortage of over 250 fighter jets against a required strength of 42 squadrons (18-20 fighter jets in each).

<https://sputniknews.com/india/202003311078778353-indias-aviation-behemoth-hal-expects-more-orders-as-it-completes-production-of-su-30mki/>

hindustantimes

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Navy’s ventilator to help 6 at a time

Naval Dockyard, Visakhapatnam, has manufactured this portable multi-feed oxygen manifold ventilator, the Navy said in a statement

New Delhi: As the country prepares to handle a rising number of cases and meet its need for ventilators, which about 5% of the coronavirus disease (Covid-19) patients may require, the Indian navy has pitched in with an innovative ventilator design that can cater to six patients simultaneously.

Naval Dockyard, Visakhapatnam, has manufactured this portable multi-feed oxygen manifold ventilator, the Navy said in a statement.

“To cater to the requirement of oxygen supply for multiple patients during the ongoing Covid-19 pandemic, personnel from Naval Dockyard Visakhapatnam have designed an innovative ‘Portable Multi-feed Oxygen Manifold(MOM)’ using a 6-way radial header fitted to a single cylinder. This innovation will enable one Oxygen Bottle to supply six patients concurrently thus enabling critical care management to a larger number of COVID patients with the existing limited resources,” the statement said.



A typical oxygen providing facility at hospitals comprises an oxygen cylinder feeding only one patient through a Ventimask arrangement. “A need was therefore felt to design a suitable portable arrangement that could provide oxygen through masks to a number of needy patients using a single-cylinder during emergencies which is the need of the hour,” the statement added.

The preliminary trials of the entire assembly were conducted at the naval dockyard, Visakhapatnam, followed by rapid trials at the Naval Hospital, INHS Kalyani, in which the portable MOM was successfully set up within 30 minutes.

After successful trials, Naval Dockyard, Visakhapatnam, has started manufacturing 10 portable MOM with two 6-way radial headers, which can cater to 120 patients at makeshift locations, especially during the current Covid-19 pandemic.

With close to 1200 cases having tested positive for Covid-19, India is ramping up its disease management capacity, and has already placed an order of 40,000 ventilators.

A domestic manufacturer, Agva Healthcare in Noida, has been able to develop suitable ventilators and an order of 10,000 ventilators has been placed with the company. Supplies are expected to start by April 2. In addition, an order for 30,000 ventilators has been placed on Bharat Electronics Limited, which is going to collaborate with domestic manufacturers. Indian auto manufacturers are also preparing to manufacture ventilators.

Separate orders are also being placed by states to procure more ventilators in case numbers surge.

“...the government is taking all necessary measures to ensure there is no shortfall of necessary equipment,” said Lav Aggarwal, joint secretary, Union health ministry.

<https://www.hindustantimes.com/india-news/navy-s-ventilator-to-help-6-at-a-time/story-zShfvHPGOIK2jb3kfW0GcN.html>



Wed, 01 April 2020

Navy to step in for police in Vishakhapatnam

Navy personnel will most probably be posted (for police duty) in the city from

Wednesday, though it is not known how many of them will be deputed for this purpose

Visakhapatnam: With Director General of Police Gautam Sawang deciding to keep personnel above the age of 55 years away from work as a precautionary measure, the Navy is likely to pitch in and perform police duties in Visakhapatnam.

Commissioner of Police RK Meena said the police had sought help from the Navy, forest department and teachers to step in for the elderly cops. He said they had written to naval authorities, who have agreed to the proposal.

Navy personnel will most probably be posted (for police duty) in the city from Wednesday, though it is not known how many of them will be deputed for this purpose. They are likely to be posted in Malkapuram and at the naval base.

Navy deployment to reduce burden

The Navy personnel will be posted in Malkapuram and naval base, areas with which the naval personnel are familiar. He said they have urged District Collector V Vinay Chand to allocate forest department personnel and teachers.

The Collector has given his nod for the same. He said there are only around 2,800 policemen and the strength was inadequate to man 90 check-posts and other duties. They are now forced to work for over 12 hours, he said.

“To overcome the situation, we will need at least 1,000 policemen for Visakhapatnam, which is a key city in the State,” he said. He said they proposed deployment of personnel from navy, forest department and teachers to help for effective policing. Teachers and forest personnel will be deployed at check-posts along with the policemen, he said. Additional deployment will ease the burden on the police to some extent, he said.

Referring to implementation of lockdown, Meena said 485 cases have been booked for violating Sections 188 and 217 under the Disaster Management Act, 2005.

Around 24,000 people have been booked for passive violation, he said. Around 700 vehicles, including cars and two-wheelers, were seized during lockdown period, he said, adding Rs 50 lakh was realised in the form of fines from violators.

<https://www.newindianexpress.com/states/andhra-pradesh/2020/apr/01/navy-to-step-in-for-police-in-vishakhapatnam-2124120.html>

Beyond Covid, Australia's big stake in India's military reorganisation

*It's easy to imagine a distracted United States could leave
Australia even more reliant on regional security partners*

By David Brtewster

- ***India has just started to reorganize its outdated and highly inefficient structures. There have been positive developments, but a lot of problems ahead***

Covid-19 will no doubt have many long-term consequences for our region that we can now only begin to imagine. One consequence that is easy to imagine in the face of a distracted and internally focused United States will be Australia's greater reliance on regional security partners, such as Japan and India. This includes an ever-greater stake in the effectiveness of the Indian military, and especially its Navy.

India has just started to reorganise its outdated and highly inefficient structures. There have been positive developments, but a lot of problems ahead. Rhetoric aside, Australia will need a sober understanding of India's likely future abilities to act as a regional security provider across our shared oceanic space.

First the good news. Last December, after decades of inaction, the Modi government appointed General Bipin Rawat as India's first Chief of Defence Staff, theoretically bringing India's three armed services under unified command for the first time. The CDS supposedly provides a single point of advisor to the government on military affairs. But Rawat will still only be regarded as the "first among equals" with the other service chiefs and the extent of his powers is not yet clear.

The CDS replaces an organisational model for India's armed forces that was put in place as a temporary measure by the British in 1947. Importantly, this appointment is just the first step in what may become the most significant military reorganisation ever undertaken by India.

From Independence, Nehru and the Congress Party kept the military divided, siloed and deeply subordinated to the civilian bureaucrats of the Defence Ministry. As a result, the military has often been only at the periphery of governmental decision-making about defence issues.

Tight civilian control of India's military has ensured that it stayed well clear of politics. Unlike many post-colonial states, India has not suffered from coups or the hijacking of resources or foreign policy by the military.

Even today, the idea of a single chief of armed forces remains somewhat controversial. Fears of militarism and military coups likely still exist within the opposition Congress Party.

But the system also comes with significant costs to military effectiveness. Indian armed forces are highly disjointed with each of the services doing its own strategy, war planning and capability planning. The Army would, for example, have little if any input into the Navy's strategy or doctrine and vice versa.

Operational command was also separated. The Army and Air Force each maintain their own Western, Central, and Eastern Commands, but they are all located in different places, making joint operations difficult.

One Rawat's first acts on his appointment as CDS was to propose the reorganisation of the Indian armed forces into unified theatre commands, in addition to tri-service commands for Cyber, Space and Special Forces. This has the long-term potential to transform India's armed forces into a modern joint military and considerably enhance its effectiveness.

Indeed, the Navy, the only service with a strong power projection mentality, has been among the strongest supporters of joint commands. The Navy currently runs India's only theatre command in the Andaman and Nicobar Islands, seen by some as important to India's ability to project power

into the Pacific. The Indian Navy, which inherited the British Royal Navy's global perspectives, sees its role as protecting India's interests wherever they may be, primarily between Hormuz and Singapore, but also potentially much further afield.

But the Navy might find that the proposed reorganisation will actually be restrictive. Rawat has also proposed merging the Navy's Eastern and Western Commands, headquartered on India's east and west coasts, into a single new "Peninsular Command". This smacks of continentalist thinking, positioning the Navy as principally a coastal defence force whose main job is to defend India's maritime borders.

There are also real concerns about India's defence (and, particularly, naval) spending. Growth in spending has largely stalled in the face of a weak economy, and we should assume that there will likely be major cuts in defence spending in the wake of the Covid-19 crisis.

That could hit India's military modernisation plans hard. Its bloated ground force of 1.2 million regular troops and 960,000 reserves means that the Army swallows up most of the defence budget. There may be little left to spend on modernisation.

The Indian Navy has long been the "Cinderella Service" with the smallest budget. In recent years, its share of the defence budget has fallen further, from 18% in 2012-13 to 13% in 2019-20. To put this in context, Australia probably spends considerably more overall than India on maritime security (although Australia's maritime spending is split between navy and air force).

Budget cuts have already hit the Indian Navy's plans. Its total planned ships by 2027 have now been reduced from 200 to 175. Future acquisitions of P-8I maritime surveillance aircraft may be reduced. As foreshadowed by this author in 2018, General Rawat is also questioning whether the Navy should go ahead with its planned third aircraft carrier, suggesting instead that it make greater use of airfields on India's island territories. The Navy argues that this would not be an acceptable substitute.

These developments contrast with China's military modernisation program. This included the establishment of five fully integrated theatre commands in 2016, bringing together the army, air force, navy and rocket forces. China's PLA troop numbers are also steadily being reduced, freeing up money for modernisation and naval spending.

Australia has a big stake in the ability of the Indian military, and particularly its Navy, to deliver effective outcomes right across our shared maritime domain. We need to ask some hard questions about India's capabilities as a regional security provider in the Indian Ocean in coming decades.

(This piece was produced as part of a two-year project being undertaken by the National Security College on the Indian Ocean, with the support of the Department of Defence.)

<https://www.lowyinstitute.org/the-interpreter/beyond-covid-australia-s-big-stake-india-s-military-reorganisation>



DEFENCE AVIATION POST

Your Connect To The World Of Defence And Aviation

Wed, 01 April 2020

Indo-Israeli LR-SAM will challenge Chinese Navy in the Indian Ocean: Chinese Military specialist

According to Chinese Military specialist while speaking on Indian Naval Capabilities in a Military show hosted by state broadcaster CCTV channel, identified long-range surface to air missile (LRSAM) jointly developed by Israel and India has one of the key weapon system which can neutralise firepower of the People's Liberation Army Navy while operating in the Indian ocean to a great extent.

Advanced air and missile defence system joint development by IAI and DRDO were designed specially to take down Chinese developed Sub-sonic cruise missiles in anti-ship role. Israel Navy Ship (INS) Hanit in 2006 was attacked while patrolling off the Lebanese coast with Chinese C-802 cruise missile which was supplied to Iranian forces but was smuggled to target Israeli Navy.

Israel and India joined hands to deal with emergence of Chinese Sub-sonic cruise missiles which have also been supplied to India's arch-rival Pakistan in the region .

LRSAM is an advanced, long-range missile defense and air defense system which has many features such as

- Long Range for interception
- Two way data link (GPS S band)
- Active Radar Seeker Missile
- 360 degree coverage
- Vertical Launch
- Multiple Simultaneous Engagements

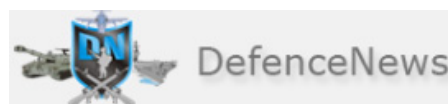
According to Defence Experts, the missile system delivers an accurate, high quality, real-time arena situation picture and extracts low Radar Cross Section (RCS) targets even in the toughest environmental conditions. It is a digital Active Electronic Steering Array (AESA) Radar System which incorporates new and advanced technologies.

The LRSAM missile system can operate by night as well as by day in addition to all weather conditions. It is capable of successfully dealing with simultaneous threats engagements, even in severe saturation scenarios.

The system has a very short reaction time and a fast missile vertical launch capability with 360 degree coverage. The system optimizes the coordination between the missile and batteries by using an advanced broadband communication network.

According to Indian Navy LRSAM is capable of dealing with short, medium, and long range threats, where its inter connectivity among the various ships in the naval task force enables it to be a multi-layered air and missile defence System

<https://www.defenceaviationpost.com/2020/03/indo-israeli-lr-sam-will-challenge-chinese-navy-in-the-indian-ocean-chinese-military-specialist/>



Wed, 01 April 2020

Navantia presents S80 Plus submarine for India's P-75I at Underwater Defence & Security 2020 Conference

Navantia is participating in the P75(I) project using as reference design our S80 plus, the only 3000 ton AIP submarine currently under construction worldwide. This baseline is very close to the requirements of the Indian Navy, possibly the closest among all shortlisted competitors, and meets the Indian ambition with minimum risk. For this reason, a technical effort at this stage is minimum and Navantia is focusing on other aspects such as the indigenization of major equipment and materials, and Transfer of Technology (ToT) opportunities.

More than 100 companies in India are already in contact with Navantia for the indigenization of equipment and materials, and around 200 are expected to participate in the event, which will be the forum for explaining areas of cooperation, and organizing one-to-one interviews. Key S80 Plus equipment suppliers shall also participate to explore indigenisation opportunities for components, or fabrication in India. All Indian suppliers are very welcome.

About India's P-75I:

The Indian government shortlisted in January 2020 two Indian shipyards and five foreign defense companies for the P-75I project which calls for the local construction of six conventional submarines. The two local shipyards that were shortlisted are the privately owned L&T group and state-owned MDL. The five foreign defense companies are Daewoo Shipbuilding and Marine Engineering DSME (South Korea), Navantia (Spain), Naval Group (France), Rubin Design Bureau (Russia) and ThyssenKrupp Marine Systems TKMS (Germany).

About S-80 Plus-class submarine:

The S-80 Plus class is a Spanish class of four submarines in production by the Spanish company Navantia in its Cartagena shipyard for the Spanish Navy. In common with other contemporary submarines, they feature air-independent propulsion.

S-80 Plus-class submarines are designed to improve threat scenario missions. Their operational mobility will allow them to operate in remote areas, travelling discreetly at high speeds. Their air-independent propulsion (AIP) system, of new technological design, will ensure their ability to remain in an area for a very long period of time without being detected and their ability to operate in possible conflict zones.

In terms of specifications, the S-80 Plus-class submarines have a full load displacement of 3,200 tons, a total length of 81.05 m (265.9 ft), a beam of 11.68 m (38.3 ft) and a draught of 6.20 m (20.3 ft). With a cruising speed of 12 knots, the S-80 Plus-class submarines offer a range of 8,000 nm. The submarine can accommodate 32 personnel (plus 8 troops).

The S-80 Plus-class submarines are equipped with 6 × 533 mm torpedo tubes with DM2A4 torpedoes and Harpoon missiles.

<https://www.defencenews.in/article/Navantia-presents-S80-Plus-Submarine-For-India%e2%80%99s-P-75I-at-Underwater-Defence-and-Security-2020-Conference-810001>

ThePrint

Wed, 01 April 2020

‘For just a bloody cannon’: How a MiG-21 nearly took down a PAF Sabre on debut for IAF in 1965

The story of the debut of IAF's MiG-21 in the 1965 India-Pakistan war and its memorable encounter with Pakistan Air Force's Sabres on 4 September

By Sameer Joshi

The iconic MiG-21 and its various variants have served the Indian Air Force (IAF) well over the years. India is the largest operator of MiG-21s outside the erstwhile Soviet Union with over 1,200 MiG-21s having served in India when the IAF opted to purchase the MiG-21 over several other Western competitors in 1962. The MiG-21 was the first successful Soviet aircraft combining fighter and interceptor characteristics in a single aircraft. It was a lightweight fighter, achieving Mach 2 with a relatively low-powered after-burning turbojet, and was comparable to the American Lockheed F-104 Starfighter, the Northrop F-5 Freedom Fighter and the French Dassault Mirage III.

Since then it has evolved in capacity and capability and has been extensively used in conflict zones across the world, with approximately 100 MiG-21 ‘Bisons’ still in service with the IAF.

While the Vietnam People's Air Force was the first Air Force outside the Soviet Union to score an operational kill on a MiG-21 against the USAF in 1966, the Indian Air Force MiG-21s had a very memorable encounter with the Pakistan Air Force during the 1965 Indo-Pak war.

Background — Operation Grand Slam, 1 September 1965

Pakistan attacked India at 0400 hours on 1 September 1965, launching Operation Grand Slam, a Divisional-level attack supported by two M48/47 Patton tank regiments on the Chamb-Akhnoor

axis in Jammu and Kashmir to capture Akhnur and the road link from Jammu to Rajouri and Poonch.

The Indian 191 brigade was taken by surprise and hit hard. The Pakistan Army (PA) offensive pushed the Indian Army (IA) units by its sheer weight to the banks of the Munnawar Tawi river, where a rearguard action by a squadron of AMX 13 tanks of 20 Lancers and elements of 3rd Mahar Regiment, supported by Indian Air Force Vampire and Mystere air strikes, slowed the advance of the famed Pattons tanks. The Commander of the PA 7 Division requested urgent support from the air force, wherein Pakistan Air Force Sabres crossed over the Cease Fire Line (CFL) and shot down three archaic IAF Vampires during this attack.

However, with the Indian counterattack having imposed considerable caution, the PA took a good 48 hours to reorganise and move forward across the Munnawar Tawi on the Palanwala-Jaurian axis. This allowed the IA to cross back over the river in good order and reorganise its defences around Palanwala/Jaurian.

In a sharp air action over this area on 3 September 1965, the IAF scored its first kill by Flight Lieutenant Trevor Keelor of No23 Squadron 'Panthers' as part of a Gnat formation led by Wing Commander Johnny Greene, ambushing the PAF and shooting down a F-86F Sabre jet. This air combat account can be read here.

The IA meanwhile evacuating from Palanwala, hastily deployed defensive positions in and around Jaurian town, awaiting to make contact with PA's 7 Infantry Division and its armour elements early on 4 September 1965. By then urgent reinforcements in infantry and armour had been rushed in from Akhnur in support of their defence. Both sides realised the importance of Jaurian, beyond which the road to Akhnur and possibly Jammu, lay open for exploitation; which would sever off the state of Jammu and Kashmir from the Indian heartland as per the laid down objectives of Operation Grand Slam.

The Indian and Pakistan Air Forces threw in their best air combat and close air support (CAS) assets to achieve local air superiority over this crucial battlefield — stakes for which were supremely high. On the Indian side, along with the Gnats and the Mysteres, a component of the newly inducted MiG-21s of the IAF's No28 Squadron 'The First Supersonics' deployed impromptu to Adampur Air Force Base (AFB) to take on the threat posed by PAF jets, in particular the supersonic F-104 Starfighter and the much regarded F-86 Sabre.

Jaurian–Akhnur axis. 1525 hours, 4 September 1965

Jaurian, the flashpoint of a fierce battle between the dug in Indian Army and the Pakistan Army's 7 Division, was under a sustained attack by the Pakistan Air Force.

The PAF had detailed 31 combat air support missions against the IA all through the day. Of these, the highest density mission operating out of Sargodha was made up of a strike by 12 Sabres of No15 Sqn 'Cobras', led by their Commanding officer, Squadron Leader Irshad.

The strike package consisted of three Sabre formations of four aircraft each, each one of them operating over the target area for a period of not more than five minutes. The first two formations had been strafing the only road link between Akhnur and Jaurian with an upbeat resolve for the past fifteen minutes and had set on fire a number of IA trucks and other soft skinned vehicles with their 2.75 inch rockets fired from the Sabre's 'Mighty Mouse' pods. As they left, the Pakistan Forward Air Controller (FAC) patiently awaited the arrival of the last formation over Jaurian.

High above them, four F-104s were providing top cover at 20,000 feet. The Starfighters, operating under Sakesar ground radar cover, were on prowl for Indian Air Force's Gnats, who had craftily ambushed the PAF Sabres over Jaurian just the day before. The PAF was looking to avenge that loss.

Squadron Leader Muniruddin Ahmed, the Wing Operations Officer at Sargodha, led the last section of Sabres armed with two napalm bombs each. Munir, a happy-go-lucky and popular aviator in the PAF, was known for his legendary stutter that became more pronounced as he got excited. Guided by the FAC's grid reference, his formation arrived over the target area at 500 feet. He scanned for worthwhile targets for their napalm canisters. Unlike the rockets, napalm was suited for widely spread targets.

“Target 2 ‘o’ clock, attack formation GO,” he chimed after making contact with a spread-out building complex which he assumed to be a military installation. His formation members tucked in tight around him in the ‘finger four’ position for napalm delivery. Munir gradually turned towards the target and rolled out while descending down to 200 feet above ground level for the attack run. “Stand by for release. Approaching target. Bomb release, bomb release now!”

The Sabres whizzed past their target, as the napalm canisters dropped lazily towards the ground, exploding in contact with the ground in massive fireballs, engulfing all inflammables in their maleficent conflagration. The attack went well, though Munir wasn’t sure if he had hit anything of value.

After the attack, Munir turned hard left, avoiding the base of the incoming hills and climbed to 1000 feet. Turning towards Pakistan, he took stock of his formation with a radio check. “Viper formation check in,” Munir queried, as the other aircraft replied in sequence, “Viper 2, Viper 3...” There was no response from Viper 4.

“Viper 4 check in,” Munir piped on the radio again. There was no response. “Where the hell is Nasir?” he scanned anxiously for Flight Lieutenant Nasir Butt, the fourth member of his formation. He weaved his aircraft around in a desperate attempt to look out for a tell-tale sign of an attack on his formation. He nearly did not notice the streak of fire leaving a smoke trail crossing his Sabre on the right. A shocked Munir instinctively tightened his turn away from the fireball on the ground, as the smoke trail hit the ground.

“They were under attack. But by whom? And what was that streak, a rocket or a missile? It couldn’t be! Gnats don’t carry missiles. Damn, where were the Starfighters?” Munir peered hard on either side of the aircraft and then shifted his gaze above.

His heart skipped a beat upon seeing atop the Sabre, not more than 15 meters and getting larger, the sleek underbelly of a silver coloured delta wing aircraft. As panic hit him, he recognised the IAF MiG-21 in earnest and desperately bunted his aircraft down and away from his tormentor, nearly crashing into the ground.

Then, the famous Muniruddin stutter overpowered and jammed all radio traffic on the Sakesar radar ops frequency, as he excitedly transmitted on the RT about the discovery of the MiG. He stammered convulsively, “Contact with a M-M-MiG-21. B-B-B-B-By G-G-G-G-God, he nearly had me.”

On that fateful day, Munir’s much vaunted radio call pronounced the arrival of the legendary MiG-21 in combat for the first time in the skies of the Indian subcontinent.

MiG-21 induction in IAF

The story of the MiG-21 in Indian Air Force service began in August 1962, when it was chosen over the French Mirage III and the US F-104 Starfighter to fulfill the Indian Air Force requirement for a supersonic fighter to counter the Pakistan Air Force’s Starfighter fleet.

The key aspect of this deal was the Indian insistence on licence production of the chosen type in India. Only the Soviet Union agreed to this part of the contract without strings attached, which made it possible for the Hindustan Aeronautics Limited to start producing the next generation of combat aircraft in India.

The first batch of seven IAF pilots and engineers, led by Wing Commander Dilbagh Singh, trained hard at Lugovaya AFB near Tashkent in Kazakhstan. On return to India in 1963, these personnel formed the nucleus of No28 Squadron ‘The First Supersonic’ based at Chandigarh. However, like any initial induction of a high-performance aircraft, the squadron faced teething problems, especially as pilots struggled to carry out meaningful training on the six MiG-21F13s (T-74) available in the build-up year before the 1965 war.

The MiG-21 T-74 was a Mach 2 capable aircraft armed with two Vympel K-13 AAMs (NATO code name AA-2 ‘Atol’) and a single 30mm cannon in the fuselage. The K-13 was the Russian copy of the famed Sidewinder missile, albeit not as sophisticated as the AIM-9B version of the Sidewinder being used by the PAF.

In March 1965, 28 Squadron was bolstered with the delivery of six MiG-21PFs (T-76) variants. The T-76 was equipped with the R1L airborne interception radar, which could locate and intercept targets out to a distance of 20 km. The Russians designed the T-76 in line with the worldwide tactical philosophy of deploying missile armed aircraft only — the T-76 crucially lacking any gun armament like the T-74 it was supposed to replace. Modern missiles were considered sufficient to engage and destroy enemy fighter at combat ranges, with the guns being bespoke as weapons of a bygone era. This led to the production of the McDonnell Douglas F4 Phantom, the English Electric Lightning and the Mikoyan Gurevich MiG-21PF (T-76), armed with only air-to-air missiles. Only the French with the Dassault Mirage III insisted on guns as an integral design as part of this generation.

How wrong it proved for the operators of these aircraft, especially the USAF in the Vietnam war, whose F-4 Phantom crews found themselves helpless without guns against the Vietnamese MiG-17 and 19s, more so because of unreliability of the first generation of AAMs in close combat situations. It would be some time before necessary modifications were undertaken to carry a gun pack on these aircraft.

The IAF was destined to learn its own hard fought lessons over the adoption of this philosophy soon.

Initially not scheduled to take part in the 1965 war due to insufficient crew training, especially on the T-76, a decision was nevertheless taken to ship a major component of this fleet to Pathankot after the loss of IAF Vampires over Chamb on 1 September.

Under the command of Wing Commander M.S.D. 'Mally' Wollen, the 28 Squadron MiGs deployed to Pathankot on 2 September 1965. The pilots quickly oriented themselves and got down to the task of coordinating combat air patrol (CAP) sorties in conjunction with the IAF's Amritsar radar unit, whose pick up on the enemy and close controlling would be the key for optimum utilisation of the IAF MiGs.

After flying some familiarisation missions on 3 September 1965, the day Trevor Keelor shot the first Sabre for the IAF, the MiGs were prepared for an offensive CAP mission under Amritsar GCI control for the next day. Mally Wollen would lead the mission along with his Flight Commander, Squadron Leader A.K. Mukherjee as his No2.

The MiG-21 would be making its combat debut with the IAF, a first outside the Soviet Union by any air force.

Jaurian–Akhnur axis. 1515 hours, 4 September 1965

The Indian Air Force had changed its plan to keep the Pakistan Air Force guessing! Unlike the day before, the Mysteres and the escorting Gnats would approach Akhnur from Pathankot on two different directions and rendezvous over Akhnur. The MiGs would sanitise the area under friendly radar control operating at medium levels, aiming to draw the expected PAF CAP component towards them, away from the Gnats.

Four No31 Squadron Mysteres headed towards the Chamb–Jaurian sector at 2000 feet to carry out rocket strikes against Pakistan Army Pattons of 13 Lancers threatening the Indian Army defenders at Jaurian. Rendezvous (RV), with the four Gnats of No23 Squadron, was planned over the Akhnur bridge. Wing Commanders Johnny Greene led the 23 Squadron Gnats, along with Squadron Leader A.S. Sandhu and Flight Lieutenants Pathania and Murdeshwar. Maintaining 1000 feet, the Gnats dashed towards the RV point, with each pilot itching for a Sabre scalp in the coming minutes. Reaching the RV point, the Gnats found that the Mysteres were running late and Greene set the formation into a loose defensive orbit over the Akhnur bridge.

Flying above the Gnats at 16,000 feet under a strict Ground Controlled Interception (GCI) CAP profile was the intrepid MiG-21 pair of Wollen and Mukho, who were monitoring the radio frequency of the Gnats and the Mysteres with keen interest. They were on the hunt for PAF Starfighters, who the IAF intelligence assumed would jump in to support the Sabres from their observed hold area across the CFL.

While at 16,000 feet the air conditioning had cut in for the MiG-21 pair. Though the impending excitement of the mission was working overtime on Wollen and he was still sweating profusely in

the pressure suit, a must wear for all early model MiG-21 pilots. It pretty much was the same outfit worn by Soviet cosmonaut Yuri Gagarin on his space mission, used for high altitude supersonic interception profiles on the MiGs. For these, one climbed to 16 km in a quick action trajectory, accelerating to Mach 2.1, and then zoomed to 21 km, flying an interception profile with the radar pointed as per the ground control bearing, while accelerating from Mach 1.8 to 2.1. The IAF practiced this profile right until the early 1980s before it was discontinued.

For this mission, Wollen and Mukho were piloting the latest T-76 version of the MiG-21 and were armed with two K-13 AAMs each.

Wollen was getting restless as the time passed without an update, "Confirm joy on any bogey," Wollen quizzed 230 SU at Amritsar. "Negative contact with any hostiles," replied the radar controller. "Boy, we will be sitting ducks if our radar doesn't warn us of the Pak CAP," Wollen contemplated and asked Mukho to increase the visual scan.

Close GCI control was the key towards successful utilisation of the MiG-21 aircraft during that era and it was not happening at the moment. Wollen throttled back to endurance settings while the MiGs setup a standard race course orbit, clearing each other's tails. He switched his R1L radar to transmit as he peered into the small scope of the radar in an attempt to pick up any PAF intruders. The scope only showed widespread clutter, primarily due of the presence of hills abound. As Wollen was switching the radar off, a strident RT call from Greene, the Gnat formation leader, announced contact with enemy Sabres, "Contact with bogeys left 10 'o' clock, four miles, same level. They are Sabres finishing their bombing run."

Wollen carried out a slow roll inverting the aircraft, peering hard to pick up the Gnats below bouncing the Sabres. "Mukho, accelerate tactical speed and roll out course two niner zero," Wollen instructed Mukherjee, as both MiGs accelerated to 750 kmph. Wollen intended to catch up with any of the enemy escaping towards Pakistan.

Meanwhile Greene had ordered the Mystere formation to abort their mission and exit from the combat area as the combat was evolving in the same corridor. As his MiG-21 rapidly accelerated to tactical speeds, Wollen got a tail clear message from Amritsar radar, who did not have contact with any aircraft above the height of the MiG-21s. Soon a charged up 'Pat' Pathania, the Gnat member from Greene's formation announced, "Murder, Murder, Murder," the ritual call of shooting down an aircraft. Flight Lieutenant 'Pat' Pathania had shot down Flt Lt N.H. Butt of the PAF, the fourth member of Munir's formation carrying out napalm runs over Jaurian.

"Great, one down," Wollen bellowed a hoorah inside the face piece of his pressure helmet. The MiGs made contact with the returning Mystere formation zipping below them. "Not far now," Wollen thought to himself as he animatedly listened to Greene's calls that the enemy Sabres had rolled homebound on course two seven zero and the Gnats were breaking off.

Incidentally, while Pathania shot down one, two other Sabres escaped due to gun stoppage issue on the Gnats, which prevented both Murdeshwar and Sandhu from getting a kill each in Greene's formation. The Gnat was notorious for its 30mm gun stoppage in air problem.

The PAF formation had no clue that it had been intercepted and one of its members had been shot down. The Sabres accelerated homebound, oblivious to the IAF fighters lurking in the area.

Jaurian–Chamb axis. 1529 hours

As the Gnats broke contact with the escaping Sabres, Mally Wollen decided to enter the arena. Both the MiGs went into a shallow dive in an effort to spot the intruders. Passing 10,000 feet, Wollen picked up two Sabres flying abreast, crossing left to right, from below towards their frontal quarters.

"Contact two bogeys left 10 'o' clock two kilometers, Mukho I am going for the right chap," Wollen informed his No2 and carried out a hard turn to the right to create some much needed space and reversed back, scanning in the rear for any other enemy.

The Sabre was descending to low levels and Wollen engaged reheat to close in rapidly. In Wollen's turn and reversal, Mukherjee fell back and lost contact with his leader due to the pressure helmet face piece obstructing his vision under 'Gs'.

Wollen targeted the Sabre with his K-13 missiles. At 1.5 km, he got a steady 'lock on' tone on his left missile. Taking inputs from the fixed ring and bead gunsight about his range from the target with the radar useless at low levels, Wollen depressed the missile firing button on his joystick at 1.2 km. The K-13 missile separated from the left rail with a flash and ran towards the Sabre, suddenly changing its course and hitting the ground well short of the target. "Damn," Wollen muttered as he saw the missile hitting the ground.

"It's the bloody ground heat return," he said, as he continued to close into the low flying Sabre, getting a bellowing 'lock on' tone on his second missile. He positioned himself precariously at the Sabre's level and launched the missile at 1000 metres from the Sabre, flying a shade over 300 feet from the ground at over 850 kmph. The missile left the right rail and after flying a flattish trajectory for about a second, crossed the Sabre on the right and hit the ground. "What the hell?" Wollen was livid with wanton wrath as he saw the hopeless fate of both his missiles, while his prey was still flying safe and sound oblivious to the narrow escape on both counts.

Wollen's anger took over his senses as he engaged reheat and rapidly closed into the Sabre. Furious at his predicament, realising that because he was flying the newer T-76 version, there were no guns to shoot down the Sabre.

"Well," he told himself, "I'll ram the bugger!" With that Wollen bore sighted his quarry and closed in rapidly with the intent to cause a physical impact. Wollen aimed for the Sabre's rear fin. Less than 10 meters from the target, on course to ram the Sabre, Wollen let his reasoning take control of his emotions as he sharply pitched up and away from the Sabre, narrowly avoiding the looming collision by not more than five odd meters. He turned to the right and reversed, seeing the now panicky and much aware Sabre pilot making a dash for low levels to escape the "mad" MiG pilot.

For Wollen, who had been involved in an aircraft collision in the past and had survived, it was probably a case of 'once bitten, twice shy!' With the combat effectively over, Wollen turned back for base. He and Mukho joined together over Jammu and carried out an uneventful landing back at Pathankot.

For the second consecutive day, the IAF had ruled supreme and shot down a Sabre over Chamb-Jaurian sector without any loss. It was also a noteworthy day in the history of MiG-21 operations, with the IAF MiGs carrying out their first operational mission. They very nearly claimed their first victory on this debut, which, but for the disappointing performance of both the K-13 missiles, would have been indisputably possible — given the fact that the PAF Sabre pilot had no clue that he had a MiG on his tail.

Ironically, had Wollen been flying the older T-74 version of the MiG, he could easily have bagged Munir's Sabre with the integral 23mm gun.

Muniruddin Ahmed was saved by sheer providence that day, having escaped from the MiG-21's clutches by the skin of his teeth. He was not so lucky the next time. He was shot down over the Amritsar radar on 11 September 1965, with his fortunes taking a turn for the worse. He was much missed in the PAF.

Wollen on the other hand never reconciled to the fact that he missed shooting down Munir that day and remained acrimonious about it all his life. As a seething Wollen put across to his peers in the dispersal after landing back from that prodigious sortie, "For a cannon, just for a bloody cannon!"

Aftermath

Jaurian fell to the Pakistanis in the early hours of 5 September. However, the Pakistan Army 7 Division had used up all its reserves to achieve this feat. Operation Grand Slam had come to a standstill.

On 6 September, the Indian Army launched Operation Riddle, a Corps level attack on the Lahore front, widening the scope of the war all across the International Border with Pakistan, thus effectively sealing the fate of the Pak Army offensive in Chamb-Jaurian, as well as PA's effort to restrict and confine the war within Jammu and Kashmir.

The Pakistan Air Force became aware of the operational status of the MiG-21s with the Indian Air Force only after Muniruddin Ahmed's visual confirmation that day. Sakesar radar did not have radar pick up on the fight which took place below 15,000 feet, thus could not vector the Starfighters on CAP near the CFL to join the fight.

After that day, the PAF tied down a number of their air combat assets in exclusive sorties to track and bait IAF MiGs. This was to no avail as the MiGs did not fall for their methods. Significantly, the first engagement in history between Mach 2 fighters took place on 11 September 1965. A single PAF F-104 had a brief encounter with two IAF MiG-21s west of Halwara. The PAF's No9 Squadron F-104 on being warned of approaching MiGs, pitched his nose down and accelerated to Mach 1.1 at tree top levels, making good his escape. The pugnacious MiGs chased the Starfighter at Mach 1 plus, but could never catch up, turning back for base at the international border.

The small force of the MiGs at Pathankot was also the primary reason why the PAF targeted this base with the largest number of bombing runs in the days to come, which did incidentally knock out two IAF MiG-21s (T-76s) being readied for a sortie on 6 September in a daring strike by PAF's No19 Squadron.

A crucial advantage the PAF had against the IAF in 1965 war was due to the FPS-20 and FPS-6 radar systems available to them through the US arms aid. This allowed extensive ground controlled interception vectors to the PAF pilots allowing them to achieve advantageous positions in a battle — the key to winning a dogfight.

India only had ground observers with radios supported by one major early warning radar system based at Amritsar. The PAF Starfighter and the Sabre were also equipped with the AIM-9B Sidewinder, an IR guided missile having a much better performance than the early model K-13s employed by IAF MiGs on 4 September. The PAF scored at least 3 AAM kills against the IAF in 1965 using these missiles. In the coming years, the IAF worked hard to acquire elaborate Soviet & French Air Defence radars and thus achieved a much better situational awareness to vector fighters like the MiG-21, which were designed to work best using GCI control for initial positioning.

Even though their contribution was limited to CAP duties in 1965, the MiG-21 pilots of No28 Squadron set the ball rolling for the widespread acceptance of the MiG in the post war years, having gained, and putting to effective use their 1965 wartime experiences. The effort bore effectual dividend for the IAF in the 1971 war.

Post 1965 war MiG-21 utilisation by IAF

After the war, the Indian Air Force started receiving the MiG-21FL version in 1966. The 1971 war witnessed the first supersonic air combat in the subcontinent when an IAF MiG-21FL shot down a Pakistan Air Force F-104 Starfighter with its GSh-23 twin-barrelled 23 mm cannon. By the time the hostilities came to an end, the IAF MiG-21FLs had claimed four PAF F-104, two Shenyang F-6, one F-86 Sabre and one C-130 Hercules.

According to Western military analysts, the MiG-21FLs had clearly "won" the much anticipated air combat match between the MiG-21FL and the F-104A Starfighter.

Updated MiG-21 variants continued their services as the backbone of the IAF's fleet in the 1980s and the 1990s. The MiG-21BIS T-75 and the MiG-21 T-96 were utilised extensively during the 1999 Indo-Pak Kargil conflict for high altitude rocket and bomb attacks against Pakistan Army intruders. Escort to strike and CAP missions were also flown over the battlefield.

On 10 August, 1999, an IAF No45 Squadron MiG-21BIS shot down a Pakistan Navy Atlantique MR aircraft over the Rann of Kutch, after the PN aircraft had intruded inside Indian territory.

In the IAF-PAF engagement in Jammu and Kashmir on 27 February 2019, an IAF MiG-21 Bison flown by Wing Commander Abhinandan Varthaman of No51 Squadron 'Swordarms', shot down a PAF jet in Pakistan Occupied Kashmir (PoK), which as per electronic signatures available with IAF was decreed to be a F-16 of the PAF. This account can be read here.

The last of the MiG-21 Bison Squadrons may well end up serving the IAF for a number of more years — a legacy few aircraft will be able to match across their lifetime.

Postscript

Guns on modern combat aircraft — Yes or a No?

The short and sweet answer — guided missiles are yet to demonstrate a Probability of Kill (Pk) or effective operating/engagement envelopes for all combat scenarios which can be envisaged in modern air combat. A gun fills many gaps well. Gunfighting has certainly been viewed with disdain by some operational practitioners, who have been repeatedly trying to do away with them in fighters despite the not-so-savvy record of missiles in combat. Well, even though improvements are constantly made to guided missile designs, the gun appears to be on course towards being an integral component of air combat well into the future.

Also, the days of dogfighting are not over. Air Combat Manoeuvring is and always will be a fundamental need and desired aspect of air combat. The beginning and the end of the process. History is on the side of the dogfight. Ignore that at your own peril.

(Acknowledgement: Society for Aerospace Studies (SAS). Discussion with Air Marshal B.D. Jayal (Retd). Inputs from the books Indo Pak Air War of 1965 by Jagan Pillariseti & Samir Chopra; Battle for Pakistan by John Fricker; and multiple online references.) (Sameer Joshi is a retired Indian Air Force fighter pilot with experience on the MiG-21 and Mirage-2000 jets. Besides being a start-up entrepreneur, he has serious interests in aerospace & defence and military history.)

<https://theprint.in/defence/for-just-a-bloody-cannon-how-a-mig-21-nearly-took-down-a-paf-sabre-on-debut-for-iaf-in-1965/391168/>



Wed, 01 April 2020

ISRO's GISAT-1 is a first for India

The Indian Space Research Organisation (ISRO) announced that it would be indefinitely postponing the launch of its GISAT-1 Earth Observation (EO) weather satellite. The launch, which was originally scheduled for 5 March 2020 has now been indefinitely postponed by the ISRO.

Although the ISRO did state the precise technical reasons behind the postponement, in addition, one possible development preventing the scheduled launch was due to the outbreak and spread of the Covid19 pandemic. Regardless, the spread of the disease has potentially and conceivably induced a precautionary delay.

Beyond the uncertain reschedule, we need to survey why ISRO has decided to launch a Meteorological Satellite (METSAT) or Earth Observation into Geostationary Orbit (GEO). Compared to other countries, where does India stand in the launch of this category of satellites? If the launch is successful, India will join an exclusive club.

The first country to launch a MET EO satellite into GEO was the United States (US). The latter launched the world's first METSAT in 1974, dubbed the Synchronous Meteorological Satellite 1, followed by Japan's Himawari satellite and Europe's Meteosat in 1977. Russia followed seventeen years later in 1994 with the launch of its METSAT or EO satellite Elektro. China became the sixth country to launch this type of satellite in 2004 called the Feng Yun 2 (FY-2) in 2004.

In the event ISRO is successful, India will thus become only the seventh country to launch and operate a satellite of this kind. The ISRO otherwise has generally operated weather satellites in polar orbits. Nevertheless, among all these states, let us compare where India stands vis-à-vis China.

Beijing's geostationary meteorological satellite programme started in the 1980s. Before the launch of dedicated operational METSATS as part of the Feng Yun ("winds and clouds" in Chinese Mandarin) series.

<https://www.defenceaviationpost.com/2020/03/isros-gisat-1-is-a-first-for-india/>

Coronavirus vaccine: when will it be ready?

Human trials will begin imminently – but even if they go well and a cure is found, there are many barriers before global immunisation is feasible

Even at their most effective – and draconian – containment strategies have only slowed the spread of the respiratory disease Covid-19. With the World Health Organization finally declaring a pandemic, all eyes have turned to the prospect of a vaccine, because only a vaccine can prevent people from getting sick.

About 35 companies and academic institutions are racing to create such a vaccine, at least four of which already have candidates they have been testing in animals. The first of these – produced by Boston-based biotech firm Moderna – will enter human trials imminently.

This unprecedented speed is thanks in large part to early Chinese efforts to sequence the genetic material of Sars-CoV-2, the virus that causes Covid-19. China shared that sequence in early January, allowing research groups around the world to grow the live virus and study how it invades human cells and makes people sick.

But there is another reason for the head start. Though nobody could have predicted that the next infectious disease to threaten the globe would be caused by a coronavirus – flu is generally considered to pose the greatest pandemic risk – vaccinologists had hedged their bets by working on “prototype” pathogens. “The speed with which we have [produced these candidates] builds very much on the investment in understanding how to develop vaccines for other coronaviruses,” says Richard Hatchett, CEO of the Oslo-based nonprofit the Coalition for Epidemic Preparedness Innovations (Cepi), which is leading efforts to finance and coordinate Covid-19 vaccine development.

Coronaviruses have caused two other recent epidemics – severe acute respiratory syndrome (Sars) in China in 2002-04, and Middle East respiratory syndrome (Mers), which started in Saudi Arabia in 2012. In both cases, work began on vaccines that were later shelved when the outbreaks were contained. One company, Maryland-based Novavax, has now repurposed those vaccines for Sars-CoV-2, and says it has several candidates ready to enter human trials this spring. Moderna, meanwhile, built on earlier work on the Mers virus conducted at the US National Institute of Allergy and Infectious Diseases in Bethesda, Maryland.

Sars-CoV-2 shares between 80% and 90% of its genetic material with the virus that caused Sars – hence its name. Both consist of a strip of ribonucleic acid (RNA) inside a spherical protein capsule that is covered in spikes. The spikes lock on to receptors on the surface of cells lining the human lung – the same type of receptor in both cases – allowing the virus to break into the cell. Once inside, it hijacks the cell’s reproductive machinery to produce more copies of itself, before breaking out of the cell again and killing it in the process.

All vaccines work according to the same basic principle. They present part or all of the pathogen to the human immune system, usually in the form of an injection and at a low dose, to prompt the system to produce antibodies to the pathogen. Antibodies are a kind of immune memory which, having been elicited once, can be quickly mobilised again if the person is exposed to the virus in its natural form.

Traditionally, immunisation has been achieved using live, weakened forms of the virus, or part or whole of the virus once it has been inactivated by heat or chemicals. These methods have drawbacks. The live form can continue to evolve in the host, for example, potentially recapturing some of its virulence and making the recipient sick, while higher or repeat doses of the inactivated virus are required to achieve the necessary degree of protection. Some of the Covid-19 vaccine projects are using these tried-and-tested approaches, but others are using newer technology. One more recent strategy – the one that Novavax is using, for example – constructs a “recombinant”

vaccine. This involves extracting the genetic code for the protein spike on the surface of Sars-CoV-2, which is the part of the virus most likely to provoke an immune reaction in humans, and pasting it into the genome of a bacterium or yeast – forcing these microorganisms to churn out large quantities of the protein. Other approaches, even newer, bypass the protein and build vaccines from the genetic instruction itself. This is the case for Moderna and another company, CureVac, both of which are building Covid-19 vaccines out of messenger RNA.

Cepi's original portfolio of four funded Covid-19 vaccine projects was heavily skewed towards these more innovative technologies, and last week it announced \$4.4m (£3.4m) of partnership funding with Novavax and with a University of Oxford vectored vaccine project. "Our experience with vaccine development is that you can't anticipate where you're going to stumble," says Hatchett, meaning that diversity is key. And the stage where any approach is most likely to stumble is clinical or human trials, which, for some of the candidates, are about to get under way.

Clinical trials, an essential precursor to regulatory approval, usually take place in three phases. The first, involving a few dozen healthy volunteers, tests the vaccine for safety, monitoring for adverse effects. The second, involving several hundred people, usually in a part of the world affected by the disease, looks at how effective the vaccine is, and the third does the same in several thousand people. But there's a high level of attrition as experimental vaccines pass through these phases. "Not all horses that leave the starting gate will finish the race," says Bruce Gellin, who runs the global immunisation programme for the Washington DC-based nonprofit, the Sabin Vaccine Institute.

There are good reasons for that. Either the candidates are unsafe, or they're ineffective, or both. Screening out duds is essential, which is why clinical trials can't be skipped or hurried. Approval can be accelerated if regulators have approved similar products before. The annual flu vaccine, for example, is the product of a well-honed assembly line in which only one or a few modules have to be updated each year. In contrast, Sars-CoV-2 is a novel pathogen in humans, and many of the technologies being used to build vaccines are relatively untested too. No vaccine made from genetic material – RNA or DNA – has been approved to date, for example. So the Covid-19 vaccine candidates have to be treated as brand new vaccines, and as Gellin says: "While there is a push to do things as fast as possible, it's really important not to take shortcuts."

An illustration of that is a vaccine that was produced in the 1960s against respiratory syncytial virus, a common virus that causes cold-like symptoms in children. In clinical trials, this vaccine was found to aggravate those symptoms in infants who went on to catch the virus. A similar effect was observed in animals given an early experimental Sars vaccine. It was later modified to eliminate that problem but, now that it has been repurposed for Sars-CoV-2, it will need to be put through especially stringent safety testing to rule out the risk of enhanced disease.

It's for these reasons that taking a vaccine candidate all the way to regulatory approval typically takes a decade or more, and why President Trump sowed confusion when, at a meeting at the White House on 2 March, he pressed for a vaccine to be ready by the US elections in November – an impossible deadline. "Like most vaccinologists, I don't think this vaccine will be ready before 18 months," says Annelies Wilder-Smith, professor of emerging infectious diseases at the London School of Hygiene and Tropical Medicine. That's already extremely fast, and it assumes there will be no hitches.

In the meantime, there is another potential problem. As soon as a vaccine is approved, it's going to be needed in vast quantities – and many of the organisations in the Covid-19 vaccine race simply don't have the necessary production capacity. Vaccine development is already a risky affair, in business terms, because so few candidates get anywhere near the clinic. Production facilities tend to be tailored to specific vaccines, and scaling these up when you don't yet know if your product will succeed is not commercially feasible. Cepi and similar organisations exist to shoulder some of the risk, keeping companies incentivised to develop much-needed vaccines. Cepi plans to invest in developing a Covid-19 vaccine and boosting manufacturing capacity in parallel, and earlier this month it put out a call for \$2bn to allow it to do so.

Once a Covid-19 vaccine has been approved, a further set of challenges will present itself. “Getting a vaccine that’s proven to be safe and effective in humans takes one at best about a third of the way to what’s needed for a global immunisation programme,” says global health expert Jonathan Quick of Duke University in North Carolina, author of *The End of Epidemics* (2018). “Virus biology and vaccines technology could be the limiting factors, but politics and economics are far more likely to be the barrier to immunisation.”

The problem is making sure the vaccine gets to all those who need it. This is a challenge even within countries, and some have worked out guidelines. In the scenario of a flu pandemic, for example, the UK would prioritise vaccinating healthcare and social care workers, along with those considered at highest medical risk – including children and pregnant women – with the overall goal of keeping sickness and death rates as low as possible. But in a pandemic, countries also have to compete with each other for medicines.

Because pandemics tend to hit hardest those countries that have the most fragile and underfunded healthcare systems, there is an inherent imbalance between need and purchasing power when it comes to vaccines. During the 2009 H1N1 flu pandemic, for example, vaccine supplies were snapped up by nations that could afford them, leaving poorer ones short. But you could also imagine a scenario where, say, India – a major supplier of vaccines to the developing world – not unreasonably decides to use its vaccine production to protect its own 1.3 billion-strong population first, before exporting any.

Outside of pandemics, the WHO brings governments, charitable foundations and vaccine-makers together to agree an equitable global distribution strategy, and organisations like Gavi, the vaccine alliance, have come up with innovative funding mechanisms to raise money on the markets for ensuring supply to poorer countries. But each pandemic is different, and no country is bound by any arrangement the WHO proposes – leaving many unknowns. As Seth Berkley, CEO of Gavi, points out: “The question is, what will happen in a situation where you’ve got national emergencies going on?”

This is being debated, but it will be a while before we see how it plays out. The pandemic, says Wilder-Smith, “will probably have peaked and declined before a vaccine is available”. A vaccine could still save many lives, especially if the virus becomes endemic or perennially circulating – like flu – and there are further, possibly seasonal, outbreaks. But until then, our best hope is to contain the disease as far as possible. To repeat the sage advice: wash your hands.

• This article was amended on 19 March 2020. An earlier version incorrectly stated that the Sabin Vaccine Institute was collaborating with the Coalition for Epidemic Preparedness Innovations (Cepi) on a Covid-19 vaccine. It was further amended on 30 March to remove an incorrect reference to CureVac being a “Boston company”; its world headquarters are in Tübingen, Germany.

<https://www.theguardian.com/world/2020/mar/31/coronavirus-vaccine-when-will-it-be-ready>