

Air Mobility Command has arguably the newest and most modernized elements of the Air Force. It recently took delivery of its last factory-fresh C-17 Globemaster III and declared initial operational capability with the re-engined and refurbished C-5M Super Galaxy. New C-130J Super Hercules tactical transports continue to join the fleet. And although AMC's KC-135 Stratotanker aerial refuelers are ancient, the KC-46A program to replace them is well underway, with flight tests about to start. Collectively, the future air mobility force—the one AMC will work with for the next 20 years or so—is well-established.

All that said, however, AMC is looking beyond the current fleet and trying to decide how it must shape itself for the future, as severe financial pressures shrink the Air Force overall and change the operating concepts for the Army and Marine Corps that AMC must move to battle. It may be that, on the cusp of obtaining the future

force it has long labored to achieve, AMC must reinvent itself yet again.

The Mobility Capabilities and Requirements Study (MCRS) 2016, “the one against which we measure our lift capacity,” is now almost three years old, said Gen. Paul J. Selva, AMC commander. It “envisioned a force and a set of [operational] plans that are now necessarily overcome” by the budget squeeze facing the US military “and the available force structure to execute those plans,” he said. A follow-on Mobility Capabilities Assessment that simply “inventories all the available lift and compares it to anticipated war plans,” likewise, was done before the sequester crisis drove the services to propose even steeper cuts to force structure. As a result, events have overtaken it, too.

“What we will have to do now is look at what we believe force structure is going to look like in [Fiscal 2018], compare that ... to war plans” developed by combatant commanders, and decide what airlift

forces are needed “to make the COCOMs successful,” said Selva.

AMC is proposing the new study, dubbed MCRS 2018, in the Fiscal 2015 budget the Defense Department is now presenting to Congress. “The realities of what’s going to be available in terms of the combat force structure are changing,” said Selva. “It’s going to put a differing demand signal on the whole strategic lift inventory and how we use it.”

In budget negotiations last fall, Eric Fanning, then acting Secretary of the Air Force, said it was the Army that argued for a greater strategic airlift fleet in the Air Force. Fanning said Army Chief of Staff Gen. Raymond T. Odierno insisted a smaller Army would require greater mobility, not less, to be flexible enough to get where it’s needed quickly.

C-17s Bearing Up Well

The strategic airlift fleet is in good shape, said Selva. Although some C-17s

The Once and Future Mobility Force

By John A. Tirpak, Executive Editor



USAF photo by A1C Trevor Rhynes

The mobility rules may change just as AMC fields the force it needs.



Left: Army paratroopers climb into the belly of a C-130J at Ramstein AB, Germany. New C-130J tactical transports continue to join the fleet even as AMC reshapes itself for the future. Here: A C-17 lands while a C-130J taxis at Nellis AFB, Nev. USAF recently took delivery of the fleet's last C-17.

USAF photo by A1C Stephanie Rubi

are 20 years old, many are “pretty much brand-spanking new,” he said. Boeing delivered the Air Force’s last C-17 in September 2013, and C-17s are expected to serve into the 2040s.

Although some individual C-17s saw exceptionally hard use in Iraq and Afghanistan, AMC tries to swap aircraft in and out of demanding missions so that the hours accrued per aircraft stay relatively balanced across the C-17 fleet, said Lt. Col. Mike Stohler, Aircraft Maintenance Branch chief at AMC headquarters at Scott AFB, Ill.

AMC officials “rotate those tails in and out of bases between our [Air National] Guard and [Air Force] Reserve and Active Duty components,” he said. “Some aircraft do ... incur some extra work, but we do our best to manage that fleet.”

Stohler said AMC typically uses a C-17 about 68 hours a month across some 19 sorties, based on numbers from the end of Fiscal 2013. Each C-17 typically goes in for programmed depot maintenance every five years. PDM involves a significant teardown and inspection entailing refurbishment or replacement of worn-out parts.

The big push for AMC now is to get the C-17 fleet to a single configuration and a “common avionics block so that all the airplanes are identical to the operators,” said Selva. More recent C-17s came with additional fuel tanks to extend their range; older airplanes will get these as a retrofit. Two further upgrades will be a common configuration fuel system and a new version of the Onboard Inert Gas Generation System, or OBIGGS, that makes fuel tanks safer; the two systems

USAF photo by SrA. Stephen J. Otero



are “high maintenance drivers” on the airplane, he said.

Stohler said AMC is now driving the C-17s toward two configurations—and eventually to one. That’s a big step down from the four or five versions of just a few years ago. He said AMC expects to get the bulk of the C-17s to the Block 17 configuration by the end of Fiscal 2016 or early in Fiscal 2017. “Block 18 will come shortly after that,” he said.

Boeing built the last of the Air Force’s C-17s off the production line to the Block

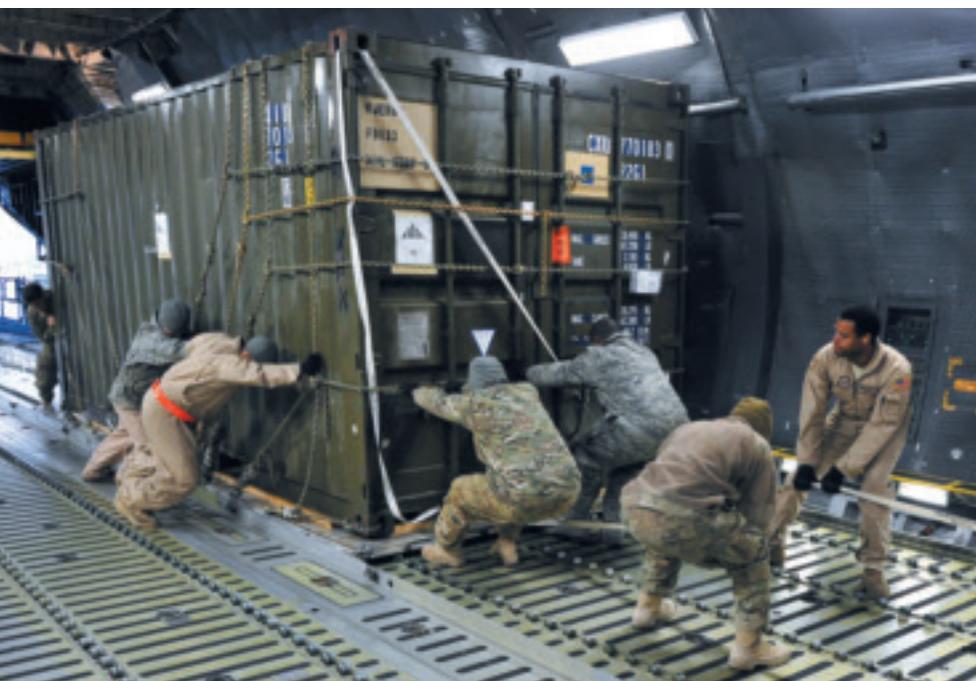
18 standard. Right now, there are typically about 38 C-17s in depot at any given time, a number somewhat inflated by the configuration changes.

“Once we come over that hump, by ’17, we should be down to a forecasted average of 22 to 25,” said Stohler. The Warner Robins Air Logistics Complex at Robins AFB, Ga., is the main depot for C-17s, but Boeing also does some of the work in San Antonio.

For now, Selva doesn’t think the C-17 will need to undergo a service life extension program, or SLEP, despite the heavy use some have seen in the last 12 years of war. “The question of SLEP versus selective upgrades of aircraft systems, I think, is a viable conversation,” he said. Eventually, he expects the C-17 may need replacement of load-bearing skins and the landing gear. Those are two elements “we’ll watch really closely” to ensure the fleet makes it to its planned retirement date, he said.

However, “we have no indication from our engineering work or the fleet viability board that any other parts of the airplane are going to require life extension over the next 20 to 25 years,” he said.

There may be some other improvements, such as enhanced self-protection systems “that we might want to think about adding



USAF photo by TSgt. Parker Gyokereis

Airmen and soldiers load a cargo pallet onto a C-5 Super Galaxy on Jan. 28 at Camp Marmal in Afghanistan. The aircraft assisted with the rotation of US Army aviation task forces.



Gen. Paul Selva (c), AMC commander, talks with Joint Chiefs of Staff Chairman Army Gen. Martin Dempsey (l) and Gen. William Fraser III (r), commander of USTRANSCOM, at Scott AFB, Ill., last summer. AMC will have to adapt to the new operational concept for the Army—whatever that may be.

... over time,” said Selva, but these don’t amount to a major change to the airplane, counting instead as maintenance and a response to operating conditions. “The advancement of the defensive systems,” so the C-17 can operate in “an increasingly contested environment, I think, is a set of capabilities we’re going to have to think our way through carefully,” he said.

AMC is also engaging industry to find ways to make the C-17 more efficient. In an experiment, pilots flew two C-17s in tight formation nearly wingtip-to-wingtip on a long flight over the Pacific, with one aircraft slightly ahead of the other. The second airplane was essentially “stealing the lift off the lead airplane,” said Selva. “Riding on top of that vortex” generated by the first airplane resulted in eight to 10 percent fuel savings.

Although AMC doesn’t usually fly two airplanes together in such a way, “tweaking the software” for the experiment revealed changes that AMC can apply across the fleet’s flight-control systems and give each airplane about a four percent boost in fuel economy, he said.

“What I’ve challenged industry to do is to start peeling apart the conventional wisdom of how we use the airplanes that we already own and come up with more efficient ways to do it,” said Selva.

The experience of more than 12 years of combat usage highlighted a few things about the C-17. It demonstrated the performance of the airplane, including assault landing capability, short-field operations

with a heavy load, and the ability to use unprepared fields—three capabilities naysayers had claimed, “‘You’ll never use,’” Selva said. However, “we’ve used them all.”

The Galaxy Is Super

The C-5M is, likewise, a star performer, and AMC has opted to keep the omnibus Reliability Enhancement and Re-engining Program modification plan in its budget partly because of the experience so far, said Selva.

The airplane is “delivering magnificent capability,” he said. “It can take off at max gross weight from Dover [AFB, Del.], and fly essentially unrefueled all the way to destinations in Eastern Europe or Central Asia.” It is demonstrating a “much higher reliability rate” than the C-5A or C-5B, with departure reliability in the percentage range of “high 80s, low 90s,” he said. “It’s a phenomenal capability.” By comparison, C-5As typically turn in departure reliability in the 50 percent range.

The C-5M program comprises the modification of 52 airplanes—one C-5A, 49 C-5Bs, and two C-5Cs—with new engines and some 70 other improvements, all building on the previous C-5 Avionics Modernization Program that concluded in April 2012. The AMP gave the C-5 a

glass cockpit and a digital backbone, but the RERP adds structural improvements and the GE F138 engine.

One of the key performance parameters of the C-5M was to achieve a 75 percent mission capable rate under wartime conditions, according to Greg Ulmer. He is Lockheed Martin’s modification, maintenance, repair, and overhaul programs and operations vice president. “That metric was to be measured at [initial operational capability] plus two years,” he said, but the C-5M’s performance so far seems to have hit the mark early. “When we operate the airplanes in a surge type of environment—say, they deploy three or four overseas and they do a mission surge—what we’re seeing is a mission capable rate between 80 and 90 percent,” he said. “We feel that the surge condition is reflective of a wartime operation.”

The company delivered the 16th C-5M in late December. Ulmer called this significant because the conditions necessary for declaring the aircraft operational hinged on the delivery of 16 airplanes.

That, in itself, wasn’t enough for Selva to declare IOC, though. Spare parts at home base and overseas had to be in place, trained pilots and maintenance crews had to be ready to operate the system, and other required assets available had to be ready.



However, Selva said in December that he expected to declare IOC shortly after the 16th airplane arrived at Dover. Of the 52 aircraft, 18 are destined for the Delaware base, with 18 slated for Travis AFB, Calif., and 16 for Westover ARB, Mass.

There is no relationship between the rate that the C-5Ms enter the inventory and the rate that the Air Force retires its C-5As, said Selva. The Air Force wants to retire the A-model aircraft, which date back to the 1960s, and neck down to a fleet of only C-5Ms.

Ulmer said the A model could be refurbished with the C-5M modification; one of the C-5M demonstration aircraft was an A model to show it could be done. The aircraft performs as well as those C-5Ms converted from C-5Bs, he said. Some members of Congress, hoping to preserve a Guard or Reserve capability for constituent bases that have operated C-5As, have advocated that the Air Force modify the C-5As, too.

There's no business case to perform the C-5M modification on the remaining C-5As, said Selva. "We don't need that additional capacity because the 52 Ms fill that niche pretty well."

The Air Force is still waiting for Congress to give permission to retire all the A models. Those getting the green light for retirement are going into Type 1000 or "inviolat" storage at the Air Force's "Boneyard" at Davis-Monthan AFB, Ariz., meaning they could return to flight status.

It costs money to keep C-5As in Type 1000 status, however, and the Air Force is hoping Congress will relent in letting

the C-5As go away permanently. "We're optimistic" it will grant permission, said Selva.

The Labors of Hercules

The C-130 fleet will also have to adapt to the new operational concept for the Army, whatever that may turn out to be. AMC is now developing a C-130 roadmap to plan how the service will continue to operate and buy the venerable tactical airlifter—and whether the Air Force should turn to something new.

"I think we are about at the right inventory, just north of 300" aircraft, said Selva. Last summer's DOD-wide Strategic Choices Management Review determined that the Air Force could "cut the size of the C-130 fleet with minimal risk," according to Defense Secretary Chuck Hagel in outlining the SCMR's interim findings. But Selva said, "We've advocated holding onto those for the time being."

The C-130 carries out two missions, he said: "tactical and operational movement of forces on the battlespace, engaged in a fight, [and] to cover ... a variety of emerging requirements in the homeland defense space." There are four variants of the C-130 in Air Force service today: C-130H1, H2, H3, and J models, the newest variant. Delivered since the 1990s, the C-130J features improved engines and performance.

In determining whether to keep some C-130Hs or buy new C-130Js, Selva said the key factor is "the quality of the wing box on the airplane." About a third of

the H models have had new wing boxes installed, at some expense, "to keep them viable," he said. "That investment is sunk cost."

The Air Force drew heated criticism from Congress for deciding it could not afford to buy and support the C-27J Spartan fleet and for opting to divest these airplanes and carry out its missions with C-130s instead. Of the 21 C-27s built for the Air Force by Alenia Aermacchi, the Army Special Operations Command is taking on seven, while the Coast Guard will operate the remaining 14.

AMC should have 104 C-130Js in its fleet by the end of Fiscal 2014, said maintenance officer Stohler. Of those, only 10 are what he called "shorties"—the same size as the C-130Hs. The rest are C-130J-30s, a "stretched" version 15 feet longer that can carry up to 128 passengers or 92 paratroopers.

The Air Force has only been buying the stretched version for the past decade or so. Other USAF organizations, such as Air Force Special Operations Command, also buy C-130s in specialized configurations for their unique noncargo missions.

Jack Crisler, Lockheed Martin's vice president for new business in mobility, special operations, and maritime systems, said his company has been told the Air Force's eventual requirement is for 265 C-130Js. However, the program of record—the number of airplanes the Air Force is authorized to put on contract—is 134 airplanes. The Air Force has already ordered 99 of those and Lockheed Martin has supplied 91.



Far left: SSgt. Jason Siverling adjusts a strap on a C-17 before a drop in South-west Asia. Left: A C-5 is transformed through re-engining and refurbishing into a C-5M Super Galaxy at a Lockheed Martin facility. Selva says the C-5M has "magnificent capability."

Lockheed Martin photo

The Air Force is not buying the C-130J under a multiyear contract but, rather, on a year-to-year basis, said Crisler. The company will deliver those airframes now on order by the end of 2015, he said.

Like the C-17 and C-5, AMC wants to get to a common configuration on its C-130s, said Crisler. The various blocks "come about every three years" and are driven by a C-130 user group including all the US services operating the aircraft, plus a number of international customers.

To keep older C-130s in the fleet beyond 2020, they would likely need an upgrade to their communications and navigation systems, said Selva. "Those investments would be made in the context of a roadmap look at the airplanes that are most viable," he said. The roadmap will decide if it makes financial sense to refurbish the older airplanes or just buy new ones.

"We're doing that business case right now. It's very preliminary," said Selva. It's a tricky calculation, though, because the longer some aircraft are retained, the more work they need. The Air Force had an avionics modernization program for the C-130 fleet planned, but curtailed it due to budget cuts, opting for more selective improvements instead.

The roadmap will look beyond the Air Force's broader servicewide, 10-year forecast because of uncertainties about the C-130 beyond that point, said Selva. "If we keep looking at what makes them viable between now and 2020, we continue to sink investment into the older airplanes that may or may not make them viable

beyond 2020. So we're trying to ask that question from a long-term perspective."

Crisler said Lockheed Martin is building 24 C-130s a year, the most efficient rate. It's about a 50-50 share between the Air Force and all other customers. While C-130Hs go into programmed depot maintenance every five years, the C-130J fleet is young enough that that hasn't happened yet. "When the aircraft reaches its 12-year birthday ... we have a 12-year inspection," said Stohler. "Then, five years after that, it will get its first PDM."

In terms of mission capable rates, the J-model airplanes perform somewhat better than the C-130Hs, said Stohler. The MC rate "for the Hs right now is sitting just at about 75 percent, as of the end of November," he said. The J models are "just a touch above 80" percent, although the AMC standard for them is about 85 percent.

Crisler said Lockheed Martin is working on a number of modifications that could make the C-130 fleet more efficient, such as the use of "microvanes," or strakes along the rear of the airplane to improve airflow and reduce fuel consumption. Another possible upgrade would be the addition of winglets on the tips of the wings, but such developments so far are not Air Force requirements, and Lockheed Martin is investigating them at its own expense.

The C-130 roadmap will work hand-in-hand with AMC's look at how it will perform the combat airlift mission, longer term. The command is beginning to study

requirements "that define what the airlift fleet looks like ... into the early '30s and on into the '40s," when the C-17, C-5M, and many C-130s will reach the limits of their life expectancy, Selva said. It's necessary to think that far ahead so AMC isn't caught having to recapitalize two or more fleets at once.

Enter the C-X

Selva said he doesn't want to presume the requirements for the next generation of airlifter will look just as they do now; in fact, they likely won't.

"What are the attributes we want that lifter to have, and does it make sense to start cutting that into our thinking in the late teens, so we're not buying ourselves into a legacy airplane?" he asked. It may not make sense to keep buying new C-130s toward the end of this decade if their service lives will carry them into an era when they are no longer relevant.

These ideas and roadmaps represent "the conceptual work for C-X," an airplane that may replace both the C-17 and C-130 alike, said Selva. The capabilities of the C-X will largely depend on what direction the Army's going on tactical and operational maneuver and what contribution that lifter will make to that maneuver, he said. It may be that the aircraft needed has to be able to operate within contested or denied airspace. If it must, that would almost certainly demand an aircraft very different from either the C-17 or C-130—one designed with low observability in mind and potentially with far greater speed and agility.

"We're working with ... the Air Force Materiel Command team on the broad requirements" for C-X, said Selva, as well as with the Air Force Research Laboratory to get "a head start on what this airplane might look like or what that set of capabilities might define in terms of an airplane or multiple airplanes."

Although the thinking seems to be that AMC could narrow the possibilities to a single airlifter, probably sized somewhere between a C-130 and C-17, that may not be the case. "It might be that we still have to have a division between the strategic and tactical lift environment in terms of the tools we use to get that work done," said Selva. ■