The Grumman G-III

Grumman is sticking with its winning formula for a third-generation business aircraft by making the G-III the next logical progression from the G-II, which was a logical progression from the G-I.

By Archie Trammell

Grumman American's G-III announcement turned out to be a far bigger surprise than anyone expected. For five years hints of a three-engine Gulfstream X had been filtering up from Savannah, With the mounting cost of fuel and the ever more vociferous howls of environmentalists, a switch to a trio of newer technology, high-bypass engines seemed a certainty.

The announcement that the G-III would be a twin jet powered by the same two Rolls-Royce Speys that power the G-II thus came as a decided surprise. Many people came away from the announcement briefings in an incredulous frame of mind. Could Grumman be serious?

Yes, it was. It was obvious from the way the announcement was made, complete with a too-pat story on why two Speys instead of three high-bypass engines, that breaths were being held down in Savannah as the verdict came in from potential customers following the announcements. Now that verdict is coming in and the two-engine Gulfstream III program is fact, not fiction, it would seem. A check with Grumman right at the end of the year indicated that the marketplace is voting yes. Grumman expects to announce more than 20 firm orders for the aircraft when, and if, a go-ahead decision is reached next month following additional wind-tunnel testing. Although the Speys are old-technology engines, and there is a question of their economy on short trips at low altitudes, many operators apparently see the airplane as fulfilling their needs in the 1980s.

The official reasons for two Speys rather than a trio of higher bypass engines are performance and reliability. The G-III rationale is long range at relatively high speeds. With eight passengers onboard, it'll range 4,000 nm at Mach 0.84 or 2900 nm at 0.88. With up to 16 passengers onboard, the range curve drops off only to 3,600 and 2,500 nm respectively in no-wind conditions.

To achieve that payload/range capability, Grumman's engineers needed fuel economy, obviously, and that they could achieve either through improved engines or improved altitude performance, or both. The engineers looked hard at newer engines with improved specifics, but none of the combinations (including a four-engine version, we've learned) would do the job. Speys, however, would-at a high enough altitude. So the wing design was optimized for climb and altitude performance and a decision was made to go with Mark 511-8 Speys derated to about 9,000 pounds for takeoff to meet the noise criteria of FAR 36. Range will come from a capability to climb directly to FL430 for the first-step cruise. An attempt will be made to get certification to FL510 for final cruise, but getting that approval is not vital to the program. The range difference would be minor.

As a side benefit, Grumman points out that the Speys are proven in almost a million hours of corporate service and more than 12.6 million hours on airliners. Some 150 corporate flight departments already have in-house Spey expertise and tooling, Rolls-Royce supports the corporate operator well and worldwide there are many airline shops with emergency repair capabilities. Finally, Grumman says derating the engines will result in greatly reduced overhaul costs. To maximize this benefit, automatic engine controls may be used that would allow a derating on down to 8,900 pounds of thrust, with the good engine going to full power spontaneously in event of a failure.

Grumman management doesn't dwell on this subject long even when asked, but there's a second side benefit of staying with the Speys that undoubtedly outweighs even the primary reason. It's cost. A price of $6.4 million in 1977 dollars is being quoted for the Spey version, but we esti-

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mate a trifan model would be at least $8.2 million due to the engineering and developmental costs involved. Grumman management says we're conservative. Thus, Speys were dictated by a need to give purchasers the quality they've come to expect from Grumman in an affordable package.

The result is not the kind of compromise you might expect. Grumman's engineers are masters at reassembling the detail parts of an existing airframe and coming up with a remarkably new aircraft. In many ways, the G-II is a reassemblage of the G-I, but that hasn't prevented it from becoming the flagship of the corporate aviation fleet. The G-III will be an extension of that successful design philosophy.

In a briefing for B/CA in Savannah recently, Grumman Vice President of Engineering Charles Coppi told us that the G-III will have a detailed parts commonality with the G-II of approximately 70%. He expects that the aft fuselage, including the engine installations, will be virtually identical except for systems changes. The fuselage will be longer, but the basic structural details will be the same. The windows will not be raised, but there will be another one on either side. The landing gear will be very similar to that of the G-II and so will the basic systems components within the wing.

Although that commonality will not result in a "new" airplane, in the pure sense, it will save thousands of engineering man-hours and will decrease the magnitude of the learning curve for flight department maintenance personnel.

The G-III wing will be all new. Super-critical technology will be employed to achieve the low drag necessary and winglets are being considered to keep the area and span within manageable limits. The span will be 84.8 feet and the sweep 300.

That infamous Grumman nose is also going to be completely redesigned. The crew will enjoy two additional feet so a third man can be accommodated on the eight-hour trips contemplated for the aircraft. The windshield will be rounded off to improve the cockpit noise level and decrease drag, Grumman's engineers are looking at similar existing windshields on airline aircraft in hopes of adapting one to the G-III for additional engineering and production economy.

The resulting aircraft will be considerably different in performance from the G-II (which will stay in production). Grumman is hoping to come in with a basic operating weight of about 39,000 pounds contrasted to a BOW of 37,000 pounds and upwards for the G-II. Gross ramp weight of the G-III will be up 4900 pounds to 67,400 compared to 62,500 pounds for the G-II.

In spite of the increases in weight, the projected balanced field lengths are under 6000 feet standard day, sea level, running out to just under 7000 feet on an ISA+15 day at 5000 feet elevation. Speeds for the G-III will be considerably better than those of the G-II on long missions when swiftness is important. At Mach 0.88 the G-III will range 2,900 nm. To get that range in a G-II, the Mach must be 0.72.

All of these are very preliminary numbers, of course. Wind-tunnel data is still being collected and when the last of it is in next month, a final go or no-go decision will be made on the program.

With approximately 20 orders in hand, a go decision would seem to be highly likely. When it comes, Grumman has promised us better numbers so we can bring readers a fuller and more detailed report. B/CA

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Specifications and Performance
(Preliminary)

Manufacturer Grumman American Aviation Corporation

Model Gulfstream III

Type 12-to-16 passenger twin turbofan, long-range corporate jet

Price $6.4 million plus interior and avionics
(estimated in 1977 dollars)

Pressurization 9.45 psi; sea level cabin to 22,100 ft. msl; cabin altitude 7676 ft. at 51,000 ft. max ceiling

Powerplants Two Rolls-Royce Spey MK-511; flat-rated to 9000 pounds thrust for takeoff; max thrust available 11,400 lbs.; reduced takeoff thrust to meet FAR 36 requirements

Weights (lbs./kg.)

Max ramp	67,400/30,573
Max takeoff	66,900/30,345
Max landing	64,030/29,044
Max zero fuel	43,000/19,505
Typical basic operating	38,810/17,604
Useful	34,490/15,645
Max payload	5350/2427
Executive payload	3200/1452
Max baggage	2630/1193
Max fuel	26,990/12,343
Payload with max fuel	1600/726
Fuel with max payload	23,240/10,541
Fuel with exec. payload	25,390/11,516

Speeds

Long-range cruise	0.84 Mach
High-speed cruise	0.88 Mach

Range

16 passengers	3600 nm
Max fuel	4410 nm

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