For discussion **FCR(2009-10)24**
on 12 June 2009

ITEM FOR FINANCE COMMITTEE

HEAD 166 - GOVERNMENT FLYING SERVICE
Subhead 603 Plant, vehicles and equipment
New Item "Replacement of two fixed-wing aircraft and the associated mission equipment"

Members are invited to approve a new commitment of $776,000,000 for replacing two existing fixed-wing aircraft and the associated mission equipment with two new jet planes and new mission equipment for the Government Flying Service.

PROBLEM

The two existing Jetstream 41 (J-41) fixed-wing aircraft and the associated mission equipment of the Government Flying Service (GFS) have been in use since 1999 and are approaching the end of their serviceable life. GFS's operations will be jeopardised if they are not replaced in a timely manner.

PROPOSAL

2. The Controller, GFS, with the support of the Secretary for Security, proposes to create a new commitment of $776,000,000 to replace the two existing J-41 fixed-wing aircraft and the associated mission equipment[1] with two new jet planes and associated new mission equipment.

/JUSTIFICATION .....

[1] The equipment installed on the J-41 aircraft includes a 360-degree search radar, a forward looking infra-red (FLIR) detection system, FLIR/radar operator station, video data downlink, satellite communication and other secure mission radio systems, emergency beacon locating system, observation station, in-flight dropping system for dispensing flare/smoke and dropping liferafts to survivors at sea, aerial camera and other supporting equipment.

JUSTIFICATION

Need to replace the two J-41 fixed-wing aircraft and the associated mission equipment

3. Commissioned in 1999, the two J-41 fixed-wing aircraft in GFS's fleet are mainly deployed for long-range search and rescue (SAR) operations outside Hong Kong waters, providing top cover for helicopters during such offshore operations, and providing assistance to other government departments (e.g. in aerial geographical surveys and law enforcement operations). They fly a total of about 1 550 hours a year on average.

4. In 2008, GFS conducted a review on the conditions of its aircraft fleet. The review concluded that the two existing J-41 fixed-wing aircraft are approaching the end of their serviceable life, with the following problems identified –

(a) owing to the unique nature of their operations, the two J-41 aircraft are constantly subject to hostile operating environments, including extreme weather, turbulence and highly corrosive salt-laden atmosphere prevailing at low altitudes over the sea. These conditions have placed great strain on the structural integrity of the J-41 aircraft and imposed an abnormal rate of wear and tear on their components;

(b) the aircraft manufacturer has ceased production of J-41 aircraft and the model is being gradually phased out worldwide. As a result, the level of technical support available from the manufacturers and spares suppliers has been on a gradual decline. GFS has been experiencing problems of long delivery time and unavailability of some spare parts. We understand that other operators of J-41 aircraft elsewhere experience the same problems;

(c) GFS estimates that its stock of essential spare parts for the J-41 aircraft will be depleted in about four years. When the defective components/parts cannot be replaced, the two J-41 aircraft will not be able to meet the required safety standards, some of which are mandatory. As a result, the aircraft will have to be grounded and GFS's SAR capability will be seriously affected;

(d) the mission equipment installed on the two J-41 aircraft has been in use since the aircraft came into service in 1999. Most of the equipment has become obsolete and the production of some spare parts has already ceased; and

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(e) most of the mission equipment installed on the two J-41 aircraft is analogue-based[2]. This limits the sharing of data among different systems such as the global positioning system (GPS), the flight management system, the FLIR detection system and the 360-degree search radar. Currently, the crew on the J-41 aircraft has to extract data from the 360-degree search radar and the FLIR detection system, process/analyse the data manually, and input the required information into the flight management or navigation systems. Such manual mode of operation is inefficient and may affect the precision of operations.

5. Since 2007, GFS has taken the following measures to alleviate the problems of long delivery time and unavailability of certain spare parts of the J-41 aircraft –

(a) increasing the stock level of spare parts that are still available from the manufacturers and spares suppliers;

(b) liaising closely with the manufacturers for alternative solutions; and

(c) exploring the possibility of procuring spare parts from other J-41 aircraft operators.

However, the results of measures (b) and (c) above are not as satisfactory as expected. GFS has, therefore, conducted a market research on possible replacement for the J-41 aircraft and the associated mission equipment. The research indicates that it will take approximately three years to build and modify an aircraft to the standards required for the operations of GFS.

The proposed jet planes

6. GFS's research indicates that the market for fixed-wing aircraft that will be able to meet GFS's requirements in terms of capability, performance, size and cost-effectiveness is dominated by small jet planes. We, therefore, propose to replace the two existing J-41 aircraft with two small jet planes of similar size.

7. In taking forward the replacement project, GFS will adopt the following measures to address some of the problems identified in paragraph 4 above –

/(a) .....

[2] Full digitisation and integration of the avionics and navigation systems were introduced for the whole aviation industry only in the 2000s when their performance and reliability were proven.

(a) the segment of the aircraft market that meets the general requirements of GFS is dominated by commercial aircraft which does not offer more durable and robust aircraft that suits GFS's unique operational needs. GFS will specify the requirement for the manufacturer to provide technical advice and support for maritime anti-corrosion treatment in the maintenance of the new aircraft. GFS will also make reference to the practices adopted by overseas emergency response units to maintain their aircraft which are constantly subject to hostile operating environments;

(b) GFS will specify the requirement for the latest proven models capable of further upgrading for the mission equipment to be installed on the new aircraft so as to maximise the serviceable life of the equipment without compromising the safety and reliability of GFS's operations;

(c) GFS will specify the requirement for full integration capability for all the electronic equipment on board the new aircraft to optimise their performance, efficiency and reliability;

(d) in drawing up the technical specifications, GFS will consider requesting the relevant manufacturers/suppliers to provide a longer guarantee period for spares and technical support beyond the normal ten-year period; and

(e) since spares and technical support for an aircraft are driven by market demand, GFS will take into account the overall fleet size of the aircraft model worldwide as well as its sustainability in the tender evaluation process.

Benefits of jet planes

8. The proposed jet planes and the mission equipment will outperform the existing J-41 aircraft and mission equipment in the following aspects –

(a) jet planes fly significantly faster and can remain airborne longer than the J-41 aircraft. For comparison, the speed of the proposed jet planes is 70% faster than that of the J-41 aircraft and their endurance is 56% to 400% (subject to the distance of the scene) longer than that of the J-41 aircraft. This will improve GFS's performance in

SAR operations, in terms of effectiveness and efficiency, because faster speed and longer endurance allow the aircraft to reach the scene of the incident much quicker and remain on scene for longer and more thorough search. This will increase the chance of locating survivors, reducing their exposure time in a hostile environment and increasing their chance of survival;

(b) as the performance parameters of jet planes are similar to those of airliners flying in and out of the Hong Kong International Airport (HKIA), the data collected by the jet planes will be of high reference value to aircraft using HKIA. To enhance aviation safety within Hong Kong, GFS plans to liaise with the Hong Kong Observatory (HKO) for the installation of a meteorological measuring system onto the new aircraft to collect meteorological data (e.g. wind speed and direction, air temperature, relative humidity, etc.) for wind shear and turbulence analysis by HKO and subsequent dissemination to other aircraft;

(c) the mission equipment to be installed on the new aircraft adopts digital technology and can be fully integrated with the flight management and navigation systems on board. This will enable real-time data sharing among the different systems on board as well as communication between the aircraft and the ground stations, such as GFS's Air Command and Control Centre and HKO's meteorological stations. The new facilities will greatly improve GFS's operational efficiency and enhance flight safety as follows –

(i) through the real-time data up-link function, the ground station can provide up-to-date weather information and other useful information for the SAR operations to the pilot. Such information can help reduce the risks faced by the GFS crew when operating under hostile, ever-changing weather conditions and improve the operational efficiency in conducting long-range SAR operations;

(ii) by integrating the FLIR detection system with the GPS of the new aircraft, the pilot can locate the exact position of the target more speedily (e.g. a vessel in distress). This enhances the chance of success of SAR operations;

(iii) through the integration of the FLIR detection system with the satellite communication system, GFS's crew can transfer information about the operation scene to the ground mission control centre, thus facilitating more effective decision-making in the course of operations; and

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(iv) through the real-time data down-link function, meteorological data collected by the new aircraft can be transferred real-time to HKO to enable it to provide more accurate and timely turbulence and wind shear warnings to aircraft flying in and out of HKIA; and

(d) the new mission equipment is more sophisticated and offers better protection to GFS's crew working under hostile environment. For example, the new radio systems will enhance the clarity of communication and the new in-flight dropping system will improve the precision of liferaft dropping to survivors at sea and reduce exposure of the crew to the hostile environment.

FINANCIAL IMPLICATIONS

Non-recurrent Expenditure

9. Based on the latest market information, we estimate that the total non-recurrent expenditure of the two small jet planes and the associated mission equipment will be $776,000,000, with breakdown as follows –

		$'000	**$'000**
(a)	Two small multi-purpose jet planes		266,000
(b)	Mission equipment		164,000
	• 360-degree search radar	*50,000*	
	• FLIR detection system	*25,000*	
	• FLIR/radar operator station	*7,000*	
	• satellite communication system, data downlink system and secure mission radio systems	*28,000*	
	• observation station	*9,000*	
	• in-flight dropping system	*6,000*	
	• other supporting equipment	*39,000*	
(c)	Modification work with certification to accommodate the following mission equipment on board -		194,000
	• 360-degree search radar	*48,000*	
	• FLIR detection system	*22,000*	
	• FLIR/radar operator station	*5,000*	

/satellite .....

		$'000	**$'000**
	• satellite communication system, data downlink system and secure mission radio systems	*22,000*	
	• observation station	*8,000*	
	• in-flight dropping system	*15,000*	
	• aerial survey camera[3]	*20,000*	
	• other supporting equipment	*54,000*	
(d)	Spare parts and tools		43,000
(e)	Training for aircrew and engineering staff		8,000
(f)	Contingency		101,000
	Total		**776,000**

10. On paragraph 9(a) above, the estimate of $266,000,000 is for the procurement of two small jet planes.

11. On paragraph 9(b) above, the estimate of $164,000,000 is for the procurement of mission equipment required for SAR operations and support services to various government departments.

12. On paragraph 9(c) above, the estimate of $194,000,000 is for the modification and certification of the two jet planes necessitated by the installation of the mission equipment. A relatively high cost is required as most of the equipment will protrude from the aircraft and/or the installation of such equipment will require alteration of the aircraft fuselage.

13. On paragraph 9(d) above, the estimate of $43,000,000 is for the procurement of the initial batch of spare parts and tools such as spare engines, auxiliary power units, navigation and communication components and tools for removal, installation, maintenance and testing of the major components.

14. On paragraph 9(e) above, the estimate of $8,000,000 is for the training for the aircrew and engineering staff on the operation and maintenance of the two jet planes.

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[3] The aerial survey camera is used by the Lands Department which provides aerial photography service for geotechnical survey, infrastructural and planning survey and map production. Hence, the camera will be provided by the Lands Department and only modification and certification costs are required.

15. On paragraph 9(f) above, the estimate of $101,000,000 represents a 15% contingency on the items set out in paragraphs 9(a) to (e) above.

16. The estimated cash flow requirement for the proposed jet planes is as follows –

Financial Year	**$'000**
2010-11	290,000
2011-12	290,000
2012-13	196,000
Total	**776,000**

Recurrent Expenditure

17. We estimate that the recurrent expenditure for repair and maintenance and fuel consumption of the replacement jet planes is about $15 million a year, which is similar to that for the existing J-41 aircraft.

Resale of the existing J-41 aircraft

18. Subject to Members' approval of the proposal, we will sell the two existing J-41 aircraft and the associated equipment and spares through open tender after the commissioning of the new aircraft. It is not possible to estimate at this stage the resale price which will depend very much on the condition of the aircraft at the time of the sale and whether there will be competitive demand for that type of aircraft.

IMPLEMENTATION PLAN

19. We plan to procure the two jet planes according to the following schedule –

/**Activity** .....

	Activity	Target completion date
(a)	Tender preparation	June 2009
(b)	Tender invitation	December 2009
(c)	Tender evaluation	September 2010
(d)	Award of contract	December 2010
(e)	Completion of the airframe of the two jet planes	December 2011
(f)	Delivery of the modified aircraft with the mission equipment installed and the modifications certified	December 2012
(g)	Training for pilots and engineering staff	December 2012
(h)	Commissioning of new aircraft	March 2013

PUBLIC CONSULTATION

20. We consulted the Legislative Council Panel on Security on the proposal on 5 May 2009. Members had no objection to the submission of the proposal to the Finance Committee (FC) for funding approval.

21. In response to some Members' enquiries about the need for modification and certification of GFS's new aircraft, the Administration explained that the wide range of functions carried out by GFS were often undertaken by different organisations (including military establishments) elsewhere instead of a single civilian agency, and with a much larger fleet with different aircraft types specialising in different functions. GFS's two aircraft, installed with various mission equipment, were multi-purpose and were therefore not readily available off-the-shelf. Moreover, as GFS's aircraft were of civilian type, modification carried out on the aircraft necessitated by the installation of mission equipment required certification of airworthiness from the relevant aviation authority. On the fuel cost, the Administration explained that the overall fuel consumption for the new aircraft would be similar to that for the existing J-41 aircraft. The Administration assured Members that the tender exercise would be conducted in an open and fair manner, and that the warranty period of spares support would be one of the assessment criteria in tender evaluation.

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22. As requested by some Members, the Administration issued a written response to Members on 1 June 2009, setting out the breakdown of the non-recurrent expenditure of the mission equipment as well as the modification and certification work, and the revenue generated from the disposal of the old fixed-wing aircraft upon the commissioning of the existing J-41 aircraft. In gist, the cost breakdown of the mission equipment, and the modification and certification work is reflected in paragraph 9 above. The estimated cost of the new aircraft and the mission equipment is based on the findings of GFS's recent market research on replacement aircraft and mission equipment having regard to GFS's functional and operational requirements. The market research shows that the market for fixed-wing aircraft that meet GFS's needs is dominated by small jet planes. Moreover, the technology adopted by mission equipment available in the market is much more advanced than that used by the existing equipment installed on the J-41 aircraft over ten years ago. As regards the disposal of the two Super King Air and the associated spares and equipment in 1999 after the two existing J-41 fixed-wing aircraft were commissioned into service, the revenue generated was US$2,648,000 (HK$20,654,400).

BACKGROUND

23. Currently, there are two J-41 fixed-wing aircraft and seven helicopters in the GFS fleet, providing SAR and air ambulance service round the clock and support services to various government departments. In 1996, FC approved a commitment of $140,000,000 (with increases in commitment of $493,000 in 1997 and $500,000 in 1998) for the procurement of the two existing J-41fixed-wing aircraft, together with associated equipment, to replace two Super King Air aircraft in 1999.

Security Bureau
June 2009