



National
Defence

Défense
nationale



PREPARED BY THE DIRECTOR GENERAL COSTING, INVESTMENT
PLANNING, & APPROVALS

Cost Factors Manual

Air Chapter

2018-2019



Canada

PREFACE

This is the Fiscal Year (FY) 2018-2019 Air Chapter of the Cost Factors Manual (CFM). Previously the CFM was published in two volumes. Volume I was the Personnel Costs Chapter and Volume II was the Equipment and Facilities Costs comprised of five Chapters. Beginning in FY 2018-2019 each Chapter is being published independently.

The CFM is a costing exercise and as such has to meet the 'best practice' characteristics of a high quality estimate as outlined in the updated TBS costing guidelines. As such, over the past 15 months the Director Cost Analytics (D Cost A) staff reviewed and revised the cost estimating methodology in the CFM and worked with L1 organizations to find data sources and confirm results. D Cost A staff are particularly appreciative of the support offered by other L1 organizations, especially in data source identification, since due to information system changes, migration of historical data, organization restructuring, and other issues, finding proper data to support the cost estimating process has been particularly challenging.

The Cost Factors Manual remains an unofficial publication prepared by the Director General Costing, Investment Planning and Approvals (DGCIPA). The Aircraft Chapter is designed to provide a common basis for the estimation of the Department of National Defence (DND) aircraft assets. The CFM uses readily available Departmental data in order to develop standard costs as outputs contained in the Table 1-1 within this Chapter.

Standard costs are an estimate or predetermined cost of performing an operation or producing a good or service under normal conditions. Standard costs are used as target costs or as a basis for comparison with the actual costs and are developed using historical data. Standard costs almost always vary from actual costs due to unpredictable factors.¹ The standard costs within this Chapter are national average costs of operating the various fleets and do not account for variations due to location, mission, age, or configuration of the aircraft.

As a result, the rates should not be used for specific budgetary purposes. The standard costs as presented provide a reliable estimation for managers and analysts when evaluating operation and maintenance costs, such as the cost of equipment operations, cost recoveries, and the comparison of types of service in conjunction with the Provision of Services Manual (B-GS-055-000/AG-001). However, these standard costs are not designed to provide a reliable estimation when evaluating future budgets or considering alternate service delivery programs

These standard costs may assist with analogous or parametric analysis. If this Chapter is used for such purposes it is paramount that a variance analysis be conducted whereby the actual costs are compared to the standard costs in order to justify the differences in values. Whenever possible local data should be used. It has been identified that Wings and units have more accurate and complete information as compared to the information available for the generation of the standard costs as developed within this Chapter.

¹Business Dictionary.com

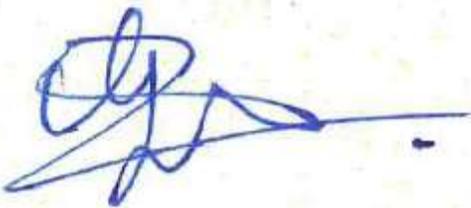
The standard costs within this Chapter are expressed in FY 2018-2019 dollars and are effective 1 April 2018. To convert standard costs to other fiscal years, please use the proper inflation or deflation factors from the most current edition of the DND Economic Model (EM).

Present and previous CFM editions, dating back to FY 2011-2012, are available on the Intranet at the ADM (Fin) site <http://cfo.mil.ca/en/systems-tools/cost-factors-manual.page>

The use of the CFM is neither directed nor mandatory, except in relation to recoveries as specified in the [Provision of Services](#) Manual (B-GS-055-000/AG-001).

Your comments on either the form or content of this manual are appreciated. Comments can be directed to the various OPIs mentioned throughout the Manual or addressed directly to:

Centre for Costing in Defence
National Defence Headquarters
MGen George R. Pearkes Building
101 Colonel By Drive
Ottawa, ON K1A 0K2
CANADA

A handwritten signature in blue ink, appearing to be 'Vrenti Ghergari', with a long horizontal stroke extending to the right.

Vrenti Ghergari
Director Cost Analytics

AIRCRAFT COSTS

AIM

1. This chapter provides standard costs for the Royal Canadian Air Force's (RCAF) aircraft fleets. Standard costs are an estimate or predetermined cost of performing an operation under normal conditions. These standard costs provide a reliable estimation for managers and analysts when evaluating operation and sustainment (O&S) costs, such as the cost of RCAF operations, cost recoveries, and the comparison of types of service in conjunction with the Provision of Services Manual (B-GS-055-000/AG-001).

2. However, these standard costs may assist with analogous or parametric analysis but are not designed to provide a reliable estimation when evaluating future budgets and alternate service delivery programs. The standard costs are national average costs of operating a fleet and do not account for variations due to location, mission, age, or configuration of the vessel. As a result, the rates should not be used for specific budgetary purposes.

HOW TO USE THIS CHAPTER

3. As mandated in the Provision of Services Manual (B-GS-055-000/AG-001), the following two bullets detail how to use the costing elements of this chapter for cost recovery purposes:

- **Total Incremental Operating Costs:** Used when calculating recoveries from Other Government Departments (OGDs) and interdepartmental costs transfers; and,
- **Total Full Costs:** Is the summation of the subtotals of Incremental Operating Costs, Personnel Costs, and Other Costs. It should be used when calculating recoveries from non-governmental agencies and for comparing competing options. Caution must be applied when using this value as it includes amortization costs that are derived based on a usage metric rather than time, thus the more an asset is used the lower the per unit cost of amortization.

4. For pure operating costs only consider the "Total Operating Costs" column + Aircrew and ISM values. However, if looking at the "Full Cost" of operation, the addition of Wing Support Personnel, Wing Support O&M, and Amortization columns must be included resulting in the use of the Full Cost calculation.

CHANGES TO THIS YEAR'S CFM INFORMATION:

5. The following changes were made to this year's Air Chapter of the CFM:
- Flying Hours: There was a change to the methodology in calculating the rates as depicted in Table 1-1 vice that from prior publications of the Cost Factors Manual (CFM). As a result the costs have changed notably since the last publication. This change is a direct result of using Yearly Flying Rates (YFR) vice 95% of Total Aerospace Resource Management (TARM) planned value as the denominator. This change was implemented as the CFM's mandatory requirement is in relation to cost recoveries which are based on actual expenditures. The cost driver of actual expenditures are actual hours flown and not planned values;
 - POL: POL has been renamed "Energy" to align with costing nomenclature;
 - O&M: Previous versions only used one year of data. This version uses a three year average in order to remove large fluctuations due to large one-time expenditures;
 - National Procurement (NP): In previous versions National Procurement (NP) was divided into operational dependent and operational readiness based on a National Procurement Assessment Study conducted by Chief Review Services in 2003. A more recent RAND study concluded NP has a variable and step-variable component and thus are combined into one value for this edition.
 - Base Support Costs: DRMIS costs recorded against UICs in direct support of fleets as confirmed by DGAEPM and RCAF staff.

SOURCES AND DESCRIPTION OF INFORMATION

6. Table 1-1 displays the estimated standard costs per flying hour for the various fleets operated by the Royal Canadian Air Force (RCAF). Data sources include:

- Defence Resource Management Information System (DRMIS);
- Central Computation Pay System (CCPS);
- Revised Pay System for the Reserve (RPSR);
- Fuel consumption data by fleet for FY 2016-2017, as provided by 1 Canadian Air Division (CAD);
- Yearly Flying Rate (YFR) actuals by fleet; and
- Amortization information as provided by Director Financial Account (DFA)

7. Listed below are the headings for the columns within Table 1-1. For each column the methodology and a brief description of the impact on the output, as well as that as compared to previous publications is depicted.

YEARLY FLYING RATE (YFR):

8. Previously the YFR was an estimate based on a budget reduced authorized TARM value. For this version the Actual YFR flown in FY 2016-2017 by fleet was used. As a result the total YFR for all fleets increased from 75,795 hours to 97,126 hours, or 28%. Given YFR is the denominator for most calculations, the cost per flying hours has decreased when compared to prior publications.

OPERATING COSTS

ENERGY: AVIATION PETROLEUM, OIL AND LUBRICANTS (AvPOL)

9. AvPOL refers to aviation fuel, which is a specialized type of petroleum-based fuel used in powering aircraft. The general ledger (GL) numbers applicable to AvPOL are: GL 07214 - Aviation Fuel and GL 73214 - Inventory. The methodology has not changed between publications. POL is calculated based on total dollars spent on AvPOL divided by actual YFR as provided by 1 CAD. The result is normalized to the year of publication using the Economic Model or Historical Economic Model values.

OPERATIONS AND MAINTENANCE (O&M)

10. O&M: All Vote 1 expenditures as recorded in DRMIS, net of Standard Object 1 (all personnel pay related costs), aircraft fuel, and any facility related costs from the Flying Squadrons, as these are captured elsewhere in the Table. The expenditures are divided by actual YFR flown by fleet. The methodological change is that previous publications used one year of data whereas for FY 2018-2019 a three year average was used to smooth out large one time procurement purchases. All costs were normalized to the year of the publication.

NATIONAL PROCUREMENT (NP)

11. The NP costs are the recurring historical aircraft NP expenditures, less any cost outliers such as onetime procurements. Included are the contracted costs of In Service Support Contracts (ISSC). Aircraft NP expenditures are recorded using Fund C113 and C523 as provided by ADM (Mat). In order to remain consistent the calculation methodology was changed from a five year average to a three year average divided by the actual YFR. The three year average was used for consistency purposes as it aligns with the O&M data as listed above. All costs were normalized to the year of the publication.

PERSONNEL AND INDIRECT COSTS

AIRCREW

12. Aircrew costs include the full cost of personnel directly involved in the operation or safety of the aircraft. This includes pilots, navigators, flight engineers, airborne electronic sensor operators and loadmasters. Flight based on Military Pay system position count (filled positions), multiplied by CFM FY 2017-2018 Volume 1 pay rates. The total aircrew cost per fleet is then divided by actual YFR flown to derive the cost per flying hour. This methodology differs from the previous publication in that actual flying hours are used rather than 95% of the TARM YFR. Furthermore, the number of personnel was based on establishment filled position and did not include those posted for training purposes. All costs were normalized to the year of the publication.

IN-SERVICE MAINTENANCE (ISM) PERSONNEL

13. In-Service Maintenance Personnel include the cost of military and DND civilian personnel performing maintenance and repair of aircraft identified within Unit Flying Squadrons and Air Maintenance Squadrons. For civilians, DRMIS Fund L111 actual expenditures of the RCAF confirmed cost centres were used. For military personnel the Military Pay system position count (filled positions) was used to identify the number and rank of personnel which was multiplied by CFM FY 2017-2018 Volume 1 pay rates and normalized to the year of publication. As per aircrew, the total cost per fleet was divided by the actual YFR flown which differs from the previous publication which used TARM YFR. All costs were normalized to the year of the publication.

WING SUPPORT - PERSONNEL

14. Wing Support Personnel represent indirect labour costs associated with a wing or squadron that support direct operations. These persons perform overhead tasks such as administrative duties including, but not limited to: operating mess facilities, maintaining building and grounds, administering training, processing payments, and ordering parts.

15. The Wing Support Personnel costs is calculated as the standard cost per person multiplied by personnel counts within the squadrons. Standard costs are derived from the CFM FY 2017-2018 Personnel Chapter pay rates for military position and from actual expenditures recorded for Fund L111 on a three year rolling average of DRMIS trial balance information for civilians. The total cost is then allocated to fleets based on cost centres mapped to individual aircraft fleets and on a percentage basis. The allocated cost is then divided by actual YFR flown for the specified fleet. All costs were normalized to the year of the publication.

WING SUPPORT - O&M

16. All squadrons require support from the support wings and squadrons to perform their primary duties. Wing Support O&M costs represent the O&M costs incurred by the support wing and support squadrons allocated on a per person basis.

17. Wing Support O&M costs are all Vote 1 expenditures, net of Standard Object 1 (all personnel pay related costs), aircraft fuel, and any facility related costs, for the Wing support units. Cost centres were mapped to individual aircraft fleets and the costs are allocated on a percentage basis. A three year average of DRMIS trial balance data was used to develop the total costs which are divided by actual YFR flown for each fleet. All costs were normalized to the year of the publication.

AMORTIZATION

18. Amortization costs are calculated to provide a systematic basis for allocating the capital cost (fixed value) of an aircraft over its estimated useful life. This does not entail an expenditure of funds but must be considered when determining the full cost of the aircraft. The Director of Financial Accounting (DFA) provided the amortization tables as extracted from DRMIS. The total amortization value for the fleet is divided by the actual YFR flown (variable value) resulting in an amount that would be recovered by unit of usage vice time.

19. This methodology is not intuitive, as it implies that the more an asset is used the less the cost per metric will be. However, the total yearly amortized rate, which remains constant based on a straight-line depreciation method, is being recovered through a secondary measure i.e. flying hours. Thus the amortization value is depicted in the model based on usage (YFR) rather than over a period of time in order to have all values shown based on a cost per flying hour rate.

OFFICE OF PRIMARY INTEREST (OPI)

20. For additional information regarding Regular Force personnel costs, please contact the staff within the Director of Cost Analytics (DCA) at (613) 947-1691.

Table 1-1 Aircraft Estimated Full Costs - Rates Per Flying Hour (FH) - FY 2018-2019 \$

§ CAD FY 2018-2019		Fleet Size	Fuel Consumption (Litres/Flying Hour)	Average Flying Hours Per Aircraft Per Year	Flying Hours (Whole Fleet)	Full Costs											Total Full Costs
						Operating Costs				Personnel Full Costs				Other Costs			
Aircraft Type		Energy	O&M	NP	Total Operating Costs	Aircrew	In-Service Maintenance Personnel	Wing Support - Personnel	Total Personnel Costs	Wing Support - O&M	Amort	Total Other Costs					
Transport																	
	CC115 Buffalo	6	846	224	1,344	996	290	10,483	11,769	3,057	4,979	14,371	22,407	2,108	-	2,108	36,285
	CC130 Hercules	13	2,678	476	6,193	2,517	797	10,414	13,728	2,928	3,922	6,263	13,113	1,368	2,477	3,846	30,686
	CC130J - Hercules	17	2,577	477	8,105	2,369	540	15,308	18,217	1,493	4,625	5,304	11,421	1,717	8,066	9,783	39,421
	CC138 Twin Otter	4	318	485	1,939	483	389	2,224	3,096	1,592	1,255	5,195	8,042	1,124	166	1,290	12,428
	CC144 Challenger	4	1,261	527	2,106	1,171	3,964	409	5,543	968	1,462	5,231	7,661	1,555	2,259	3,814	17,019
	CC150 Polaris	5	5,701	858	4,290	5,708	966	11,878	18,552	1,141	1,056	3,533	5,730	954	4,116	5,070	29,351
	CC177 Globemaster	5	10,413	761	3,805	9,637	1,358	14,311	25,306	1,784	4,072	3,483	9,339	1,076	9,704	10,780	45,425
Fighters																	
	CF188 Hornet	80	4,842	167	13,365	4,122	347	11,522	15,990	766	5,656	10,750	17,173	2,991	15,619	18,610	51,773
Trainers																	
	CT114 Tutor	25	975	141	3,531	889	328	5,741	6,958	595	3,660	13,085	17,340	3,916	292	4,208	28,506
	CT142 Dash 8	4	622	459	1,836	677	3,317	716	4,710	4,667	4,407	9,756	18,829	1,187	-	1,187	24,726
	King Air B200	2	468	507	1,013	456	245	2,460	3,161	432	1,520	4,826	6,778	1,594	-	1,594	11,533
Helicopters																	
	CH124 Sea King	28	552	402	6,031	512	184	10,115	10,811	2,756	6,978	11,249	20,982	1,506	52	1,558	33,352
	CH148 Cyclone	3	1,006	166	498	881	239	23,525	24,645	3,576	9,036	14,345	26,958	1,951	14,584	16,535	68,137
	CH146 Griffon	84	370	296	24,902	329	286	3,120	3,735	2,416	2,550	8,901	13,867	1,709	1,574	3,283	20,885
	CH147F Chinook	15	1,384	238	3,576	1,107	937	24,254	26,297	3,052	5,010	8,181	16,243	1,517	14,794	16,311	58,852
	CH149 Cormorant	15	905	366	5,495	918	225	19,636	20,779	1,929	2,752	8,527	13,208	1,242	4,357	5,599	39,586
Maritime Patrol																	
	CP140 Aurora	19	2,643	317	6,019	2,598	488	18,772	21,858	3,631	7,647	11,232	22,510	1,727	11,936	13,663	58,031

NOTE: The CH 148 Cyclone is still being introduced. As a result caution must be applied with respect to the use of the values. Variations in cost per flying hour are expected during implementation.