AMC PAMPHLET 11-3

BIRDS FLY FREE, AMC DOESN'T

An Aircrew Guide for Efficient Fuel Use

AIR MOBILITY COMMAND

OCTOBER 2015

THIS PAGE INTENTIONALLY BLANK

BY ORDER OF THE COMMANDER AMC PAMPHLET 11-3
AIR MOBILITY COMMAND 1 OCTOBER 2015
Certified Current 21 July 20

Flying Operations

AVIATION FUEL EFFICIENCY

This pamphlet outlines the ways to maximize fuel efficiency and improve operational capabilities. It should be used as a guide when operating AMC aircraft. When used properly, these proven techniques can result in significant fuel savings. This guide is not directive and does not supersede flight manual procedures and/or AMC directives. Used as a reference, this pamphlet will serve as a guide to bolster AMC capabilities while improving the efficiency of the fleet as a whole. This pamphlet is written for aircrews flying AMC aircraft including all Active and Air Reserve Components.

Contents

OPR: HQ AMC/A3F
Certified by: HQ AMC/A3 (Maj Gen JERRY P. MARTINEZ)
Pages: 16

Chapter 1

INTRODUCTION

Mobility Air Force (MAF) aircrews operate daily in all types of environments supporting the war fighter around the globe. Fuel costs are a significant factor in MAF operations and we must recognize the importance of efficiency in mission success. The Secretary of the Air Force has set a goal of 10% improvement in aviation fuel efficiency by 2020. That efficiency yields two benefits: monetary savings and enhanced operational capability.

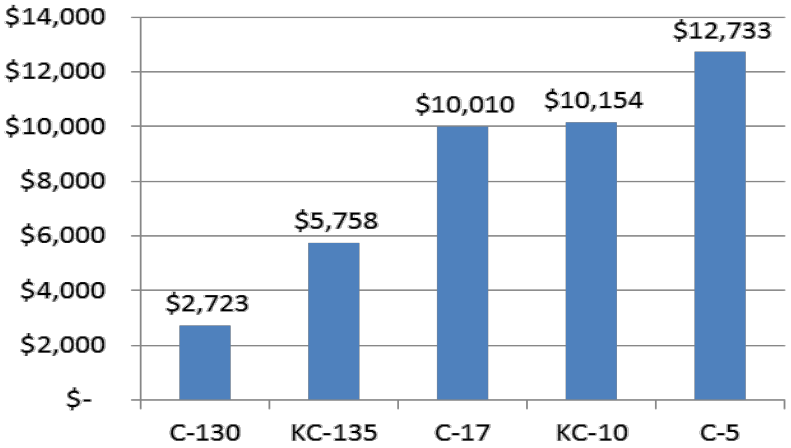
First, monetary savings contribute to AF recapitalization, modernization, and quality of life programs, providing better tools and resources for Airmen and their families. Also, there are substantial benefits to operating more efficiently. Efficient mission execution allows the Air Force to meet more real-world mission objectives by maximizing resources. Lower fuel loads can increase safety margins during critical phases of flight. Being more efficient makes it possible to carry a greater payload. Instead of two aircraft, maybe one aircraft can do the job. Tankers can orbit longer and/or offload more fuel. In addition, range can be extended for all assets. Improved efficiency means not just reduced fuel cost but also reduced overall operating costs and improved readiness. It is a force multiplier that enhances capabilities and readiness across the MAF.

Fuel is one of the highest cost resources for the Air Force and it is vital we look at how we operate and seek ways to minimize waste. This pamphlet is AMC's guide to aircrews to increase fuel efficiency across all airframes. This requires us to assess how we operate and find ways to do it better. Safety is of vital importance and fuel efficiency does not trump safe operations. This means we manage our resources efficiently and without impacting safety nor degrading mission effectiveness.

Chapter 2

GENERAL FUEL PLANNING CONSIDERATIONS

1. **It is Air Force policy to conserve aviation fuel when it does not adversely affect training, flight safety, or operational readiness.** In order to increase fuel efficiency, each Mission Design Series (MDS) aircraft can apply the principles in this pamphlet to execute this policy. Fuel efficiency does not authorize deviations from published tech order guidance. AMC aircraft burn an extraordinary amount of fuel; therefore, we must ensure it is used wisely. The chart below illustrates the average hourly fuel cost for each MDS in AMC.



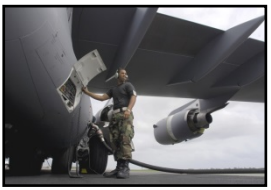
FY 2014 MDS Fuel Cost per Hour

2. **Fuel Requirements:** Before takeoff or immediately after in-flight refueling, there must be enough usable fuel aboard to complete the flight IAW AFI 11-202 Vol 3 and the applicable AFI 11-2 MDS Vol 3, to include:

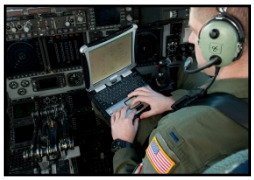
- ♦ To a final landing, either at the destination or alternate airport (if one is required), plus fuel reserve.

- ♦ To or between air refueling control points (ARCP) and then to land at the destination (or a recovery base, if refueling is not successful), plus fuel reserve.

3. **Tankering fuel** (i.e. carrying more fuel than required for a flight plan segment) for convenience is a wasteful practice and must be authorized by the controlling agency. This will only occur when justified by mission requirements, such as an operational benefit or significant fuel cost difference. An example is Mobility Air Forces Cost Avoidance Tankering (MAFCAT), due to fuel price considerations…it burns more fuel but saves taxpayer $.

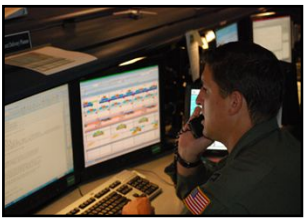


4. **Mission Index Flying (MIF)** is similar to Cost Index Flying utilized by the airlines. MIF algorithms take into account flight routings, winds, temperatures, weight, and maintenance costs to provide the optimal altitude and speed for mission requirements. Instead of fixed speeds and step-climbs, Mission Indexed flight plans, used in conjunction with the airborne Pilot's Performance Advisory System (PPAS), adjust altitudes **and** speeds along an optimal route of flight. MIF across the entire enterprise helps save a considerable amount of fuel. This allows for reduced fuel loads, increasing operational capacity.



5. **Advanced Computerized Flight Plan (ACFP) with MIF overlay**. AMC's updated flight planning software was released February 2014, incorporating MIF algorithms. Flight plan fuel loads are calculated via optimized plans, based on specified inputs including weather, route restrictions and cargo (including AR fuel).

The ACFP system develops flight plans for wind contours at optimum flight levels resulting in fuel savings. ACFP provides the optimum route and profile combination based on atmospheric conditions, aircraft performance, airspace structure, and user inputs (e.g., cargo loads, special routings, unique mission requirements, etc.). By flying the ACFP routing and profile as presented, AMC crews have shown that the ACFP, in comparison to a less-dynamic, fixed route plan, can save time and fuel.

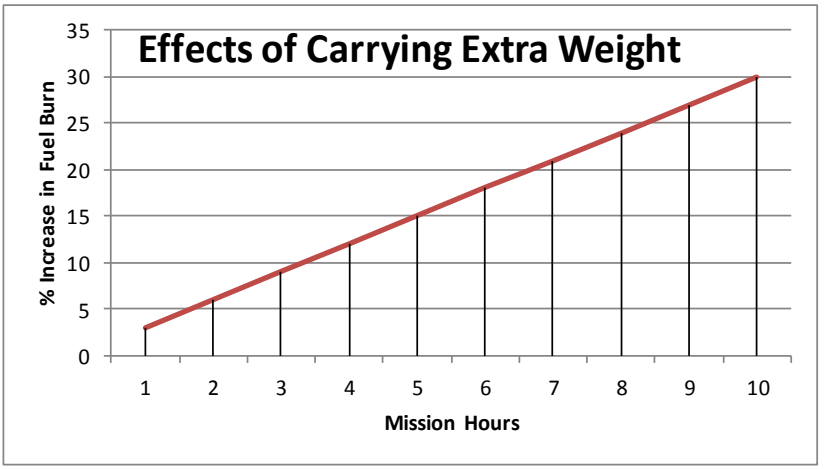


Aircrews should verify all relevant planning data. During execution, "requesting direct" may result in a less efficient routing, and should be requested only if determined to be more advantageous. If the data is in error, request a new product from 618th AOC. **Do not accept substandard information.** An ACFP with a cargo load of 20,000 pounds is of limited value to you when in fact you have 80,000 pounds on board. With the extra weight you may not be able to climb to the planned altitudes. All flight plan winds, times, temperatures, and fuel consumption rates are based on altitudes that you may not be able to reach.

- ♦ Understand your flight plan, especially fuel burn parameters
- ♦ If the ACFP is in error, contact TACC and get an accurate one.
- ♦ Payload (i.e. cargo/Pax/AR Fuel) weight is a critical element in an accurate flight plan. If actual payload is significantly different from planned, request an updated ACFP.
- ♦ Compare the ACFP overhead temp deviation with that on the weather product and use the most restrictive. Don't just use +15 or +20. An incorrect temp deviation may result in a lower initial level-off altitude, causing an increase in fuel required to fly the lower altitude.
- ♦ Plan for extended taxiing. Regulations dictate a fixed amount of fuel for start, taxi, and takeoff, normally sufficient for a 15-minute taxi.
- ♦ If you don't need a scheduled AR for either operational or training purposes, attempt to get it cancelled through the proper channels. Descending, slowing, increasing gross weight, climbing and cruising at a new lower post-AR altitude are all fuel inefficient. Canceling an unneeded air refueling also saves the fuel requirements of a tanker sortie.
- ♦ Plan appropriately for alternates. Using the most distant alternate is sometimes acceptable when the weather is bad in the entire terminal area. However, if your destination is Moron, Spain on a completely clear day, using Rota as the alternate is an efficient choice.

6. Reduce excessive takeoff fuel loads. ***For every pound of excess fuel carried, up to 3% more will be burned each hour.*** A 5-hr flight with an extra 10,000 pounds of fuel can cost an additional 1,500 pounds in fuel consumption. Carrying extra fuel can result in the following:

- ♦ Negatively affects aircraft performance (takeoff distance, climb, stall speeds, etc).
- ♦ Reduces payload and/or Air Refueling offload capability.
- ♦ Decreases range and/or orbit time per pound of fuel burned.
- ♦ Increases takeoff and climb fuel.
- ♦ Lowers cruise ceiling.
- ♦ Delays step climbs.
- ♦ Increases alternate fuel required.
- ♦ Increases holding fuel required



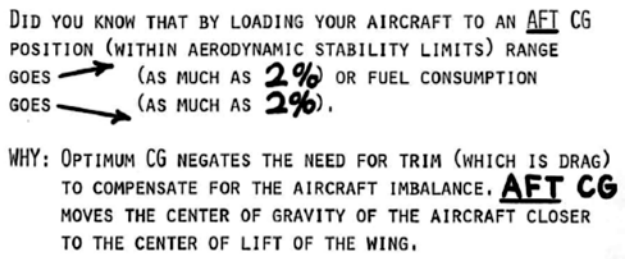
AS AIRCREW MEMBERS, YOU ARE MANAGERS OF A PROFIT CENTER--YOUR AIRCRAFT. AS SUCH, WHAT YOU PLAN AND WHAT YOU DO GREATLY IMPACTS COST.

7. **Prioritizing Fuel Savings Techniques.** There are a lot of techniques to save fuel, and AMC wants each crew to implement them all. However, some techniques are more critical because they have the potential to save the most fuel. The following proven techniques provide the most fuel savings on most missions:

- ♦ Flying at Optimum Cruise Altitude.
- ♦ Flying at Optimum Speeds.
- ♦ Eliminating Excess Weight.

Paying close attention to planned fuel loads and conditions allows the aircrew to optimize the altitude and airspeeds being flown, in accordance with the plan, or adjusting when conditions differ from planned.

Loading the aircraft to an aft CG and flying an optimum descent profile are also important to consider:



8. **Fuel Efficiency Briefing.** During the aircraft commander's mission briefing, discuss fuel efficiency options to include configuration management, taxiing with fewer engines running, limiting fuel tankering, and descent profile. A conscious effort planning to be efficient makes it more likely you will do it in-flight.

9. Paying attention to the available fuel efficiency techniques and applying them as often as conditions permit will result in optimal efficiency, effectiveness, and safety. If all AMC aircrews make reasonable efforts to operate more efficiently, the savings are dramatic. But remember, it is not just about savings. **It is also about improving operational capabilities**. These reductions are practical only when they can be accomplished with no mission degradation.

Chapter 3

GROUND OPERATIONS

1. For all AR missions (including local training), aircraft commanders, in coordination with the controlling C2 agency, may **adjust scheduled engine start and block-out times** to make the scheduled air refueling control time.

2. **Use the APUs only when absolutely necessary and for as short a period as possible.**

- ♦ **Use Ground Power Units (GPUs)** — they are more efficient than APUs which can burn up to 6 times more than a GPU.
- ♦ Delay the APU start when the aircraft is powered by external power until necessary for the preflight.

3. **Pre-Mission Briefing.** The aircraft commander should use the pre-mission briefing to emphasize safety, effectiveness and fuel efficiency during all phases of flight as well as ground operations whenever possible.

4. **Aft CG loading** reduces the force on the horizontal stabilizer which reduces the longitudinal trim required. This, in turn, reduces drag and fuel consumption. When loaded to an aft CG, consumption decreases up to 2%.

5. **Select the shortest taxi route possible** and ask for opposite direction takeoffs if it's shorter and/or prudent. When arriving at the aircraft, make note of the winds and direction of traffic to pick a departure runway early. Remember to include obstacle information. Consider this option early and recompute TOLD if required, preferably before engine start.

6. **Avoid double blocking** whenever possible. If capable tow equipment exists, it should be used to the maximum extent possible.

7. **Reduced-engine taxi** if possible. Delay starting one or more engines and use reduced-engine taxi prior to takeoff if conditions and aircraft tech order permit.

8. A **rolling takeoff** is preferred when conditions permit. Less power is required to move a rolling object versus a stationary object.

9. **Reduced power takeoffs** save fuel and increase engine life substantially, thereby reducing maintenance costs.

Chapter 4

IN-FLIGHT OPERATIONS

1. **Departure & Climb.**

- ♦ **Clean-up and accelerate** on schedule for your aircraft to get out of the high drag (high fuel flow) takeoff configuration as soon as possible.

- ♦ **Avoid intermediate level-offs when possible**. Query ATC controllers for higher altitudes prior to reaching assigned altitudes. Flying lower altitudes burns more fuel.

2. **Altitude.**

- ♦ Altitude is one of the most important factors affecting fuel economy, especially on long missions.
- ♦ Coordinate altitude changes early; early requests are more likely to be granted by ATC.
- ♦ The probability of being cleared a requested altitude will increase as RNP is implemented in more worldwide airspace and the required navigation performance tolerances become more stringent.
- ♦ If flying with MIF, ensure you update PPAS conditions regularly. Climb, descend, or maintain altitudes as dictated.
- ♦ If not flying MIF, step climb when able and appropriate after considering winds at the higher altitude.
- ♦ Remaining at a lower altitude for crew convenience instead of climbing to optimum altitude is unacceptable.

♦ The ACFP is based on optimum flight profiles. For instance, an ACFP may place the aircraft at FL 310 as the final altitude when performance may show that a climb to FL 350 is possible. FL 350 and above may possess a strong, opposite direction jet stream and climbing would degrade enroute flight performance.

∗ Prior to climbing, attempt to gather weather data at the higher flight levels from either a weather station or from another aircraft at that altitude.

∗ If flying MIF, input the weather data and fly the directed altitude.

∗ If not flying MIF, use the following guidelines:

– Cruise at an altitude that gives the most NM/lb of fuel.

– Climb if the GS is reduced less than 7 knots per 1K feet.

– Descend if GS will increase more than 8 knots per 1K feet.

– Do not fly above cruise ceiling.

3. **Cruise.** Since MIF has been applied to ACFP, adhere to the planned altitudes and airspeeds for optimization. ACFP may require an altitude and/or speed change to take advantage of winds or other environmental factors. Fuel burn as well as flight duration are predicated on the aircrew following the ACFP altitudes and airspeeds. Use PPAS to update ACFP altitudes/speeds.

♦ Fly MIF when available to maximize efficiency.

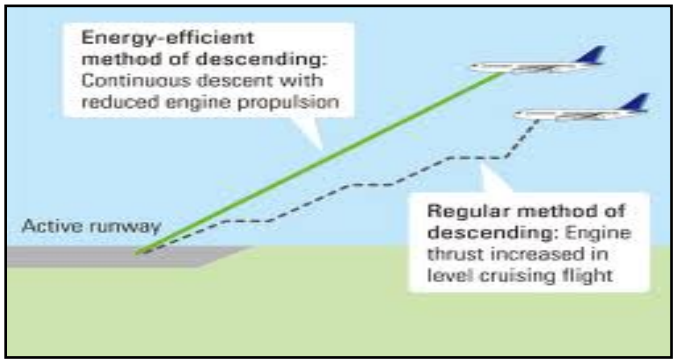
♦ Thunderstorm avoidance is paramount, but added fuel consumption can be mitigated. If thunderstorms are present on your route of flight, fuel for thunderstorms should be included by the Flight Manager planning your sortie.

♦ Fuel planning for thunderstorm avoidance is minimized if early action is taken. Ask for an off-course deviation well ahead of the system so gross maneuvering is not required (i.e., at least 100 NM prior).

♦ A mis-trimmed jet is not fuel efficient. Attention to lateral and fore-and-aft fuel balance can reduce aileron and stabilizer trim, respectively. Matching up throttles can also reduce rudder inputs by the autopilot or yaw stabilization systems, resulting in fuel savings.

♦ Speed management is equally as important as speed selection. Once you've picked a speed (tech order or wind-adjusted), fly precisely. Cruising at .01 Mach (or 5 KTAS) faster increases fuel consumption by as much as 2%. This cuts into reserves and is wasteful. Monitor your speed carefully and don't allow it to inadvertently increase.

4. **Descent.** Minimize power required during descents. An enroute descent with minimum power saves fuel. Plan the descent point well in advance, coordinate with ATC, and fly the most direct routing to the



runway when able.

5. **Holding.** Hold at endurance or performance manual recommended holding speeds if conditions permit. Attempt/request to hold at higher altitudes.

6. **Approach.**

♦ A safe, stabilized approach is of primary importance.

♦ Delay configuration until as close to final approach if possible. Fuel flow can increase up to 50% when configured for landing, and an early flap/gear extension can cost up to 100 pounds per minute.

7. **Taxi to Parking.**

- ♦ If conditions permit, **exit the runway at the point that provides the minimal taxi routing** to parking.
- ♦ **Shutdown any engines not needed to taxi** after landing (in accordance with applicable TTPs).

8. **APU/GPU.** Upon parking, make every effort to minimize APU usage.

Coordinate with ground personnel, in advance if necessary, to **have a GPU ready to connect** in order to **reduce the use of the APU**. An APU burns up to 6 times more fuel than a GPU so it makes sense to minimize APU use and have GPU connected as soon as practical. This also saves on APU wear & tear thereby contributing to longevity and service life.

9. **Post-Mission Briefing.** The aircraft commander should dedicate a portion of the post-mission debriefing to debrief the entire aircrew on their fuel efficiency effectiveness and on areas where they could have improved.

10. **Fuel Tracker.** After the flight, it is important to capture some critical information. Fuel Tracker is a web-based tool that enables aircrews to record specific fuel-related parameters after sortie completion. The data aircrews provide ultimately allow AMC to determine progress of various fuel efficiency initiatives. Fuel Tracker is continuously being refined, with a long term goal of automating the process and bringing the tracker into an existing system of record. It is important to record the data required by Fuel Tracker after the flight in order to continue conservation efforts and identify what is most effective.

Chapter 5

TRAINING

We've all heard the adage, "Train like you fight." In the MAF, a successful mission is safe, effective, and efficient. It is vital that instructors incorporate fuel saving techniques into training in order to

make fuel efficiency part of the equation. For example, the simulator is a great tool to show when to start a descent or how to safely configure properly with the least amount of fuel used. Use of simulator training for demonstrations of climb, cruise, and descent techniques that promote safe and efficient operations will translate into operational effectiveness. Leveraging networked simulator training through Distributed Mission Operations (DMO) allows the force to plan and execute efficient formation/team-based profiles in a realistic synthetic environment offering an additional training tool for practicing conservation techniques.

During aircraft sorties (operational or training), instructors can also demonstrate how to use the techniques and guidance of this pamphlet to instill the right culture of proper energy management.

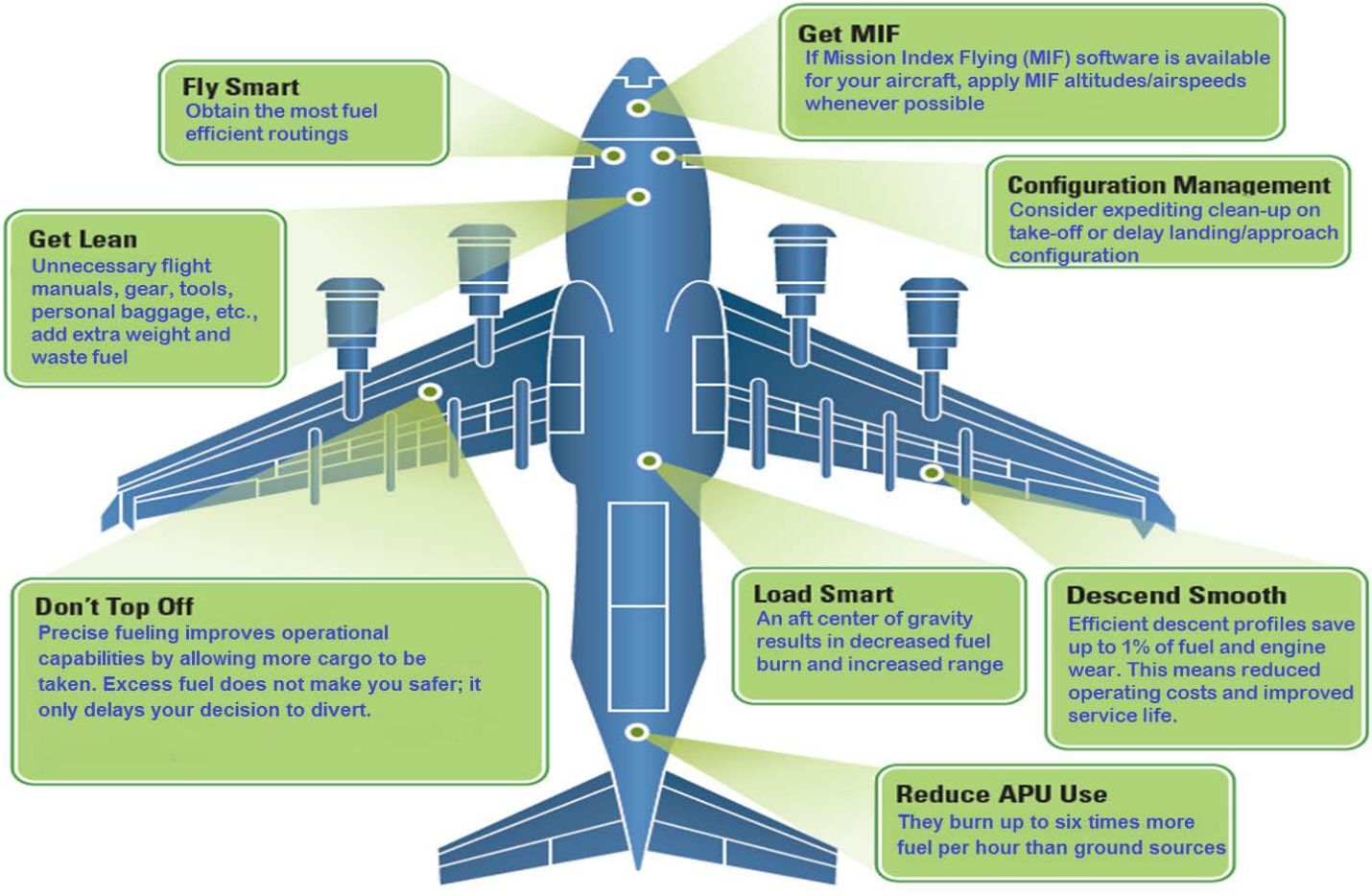
Finally, use of sortie-specific fuel loads, rather than standard ramp loads, are important to reducing the cost of readiness of the MAF. Assess the fuel required for the sortie, and defuel if necessary when time permits. Accomplish all the training required and land when the training is complete, rather than burning excess fuel to achieve a scheduled sortie duration.

Chapter 6

SUMMARY

AMC's culture of energy efficiency requires awareness and action. Everyone must understand why it is important to operate efficiently. It is not just about cost savings. It is also about managing resources to enhance our operational capabilities. Being efficient bolsters mission readiness so that we can continue to support the warfighter when and where needed.

Fuel Efficiency is a collaborative effort between Total Force Aircrews, Maintainers, and Support Airmen. Everyone must work together to better manage resources in order to expand MAF capabilities. The result is increased operational capability and decreased cost of mission execution and MAF readiness. Safety, Effectiveness, and Efficiency equals mission success.


Get MIF
If Mission Index Flying (MIF) software is available for your aircraft, apply MIF altitudes/airspeeds whenever possible
Fly Smart
Obtain the most fuel efficient routings
Configuration Management
Consider expediting clean-up on take-off or delay landing/approach configuration
Get Lean
Unnecessary flight manuals, gear, tools, personal baggage, etc., add extra weight and waste fuel
Don't Top Off
Precise fueling improves operational capabilities by allowing more cargo to be taken. Excess fuel does not make you safer; it only delays your decision to divert.
Load Smart
An aft center of gravity results in decreased fuel burn and increased range
Descend Smooth
Efficient descent profiles save up to 1% of fuel and engine wear. This means reduced operating costs and improved service life.
Reduce APU Use
They burn up to six times more fuel per hour than ground sources