Quick Reference Guide (QRG) Taiwan AH-64E Integrated Performance and Aircraft Configuration (IPAC-AH64) Version 1.0

- IPAC-AH64
- PPC-AH64
- AFF-AH64

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1. Introduction

The AH-64 Integrated Performance and Aircraft Configuration (IPAC-AH64) program is a suite of software products that allows the aviator/mission planner to view/edit electronic aircraft performance and configuration data.

The IPAC-AH64 program consists of three applications that are described briefly below, and in more detail in sections 2 through 4.

PPC-AH64 (Section 2) is a standalone application that provides the ability to generate and print an AH-64 Performance Planning Card (PPC). Inputs are provided for aircraft configuration, weight, drag and environmental conditions. In addition, a single point gauge view for what-if performance calculations is provided via the Performance Awarness Tool (PAT). All information from the PPC-AH64 application can be saved in a file with a .ipac extension.

The **IPAC-AH64 (Section 3)** application integrates with Portable Flight Planning Software (PFPS) applications, such as Combat Flight Planning Software (CFPS) and FalconView. IPAC-AH64 provides a top level editable view of a PFPS route, the ability to edit aircraft configuration, weight, drag and environmental conditions at each PFPS route point, ability to insert/edit hover points, and ability to set onboard fuel (topoff/add/remove) by receiving the PFPS calculated leg fuel at each route point. It also provides the computation and display of performance outputs for each point along the PFPS route, and allows printing of a PPC from data in the planned PFPS route. A single point gauge view for what-if performance calculations is provided via the Performance Awareness Tool (PAT), and route performance settings and capabilities are provided by the Power Management Tool (PMT). All information from the IPAC-AH64 application can be saved in a PFPS Plan File with a .rte extension.

NOTE

Technical Manual, Operator's Manual for Taiwan Army, AH-64D (TW) Longbow Helicopter, TM (TW) 1-1520-251-10, 12 December 2012 is the basis for performance calculations in IPAC.

PPC-AH64 and **IPAC-AH64** have the ability to communicate via Aircraft Configuration (.acfg) files that contain the aircraft configuration of the first point / departure point as entered in the Operating Aircraft Configuration dialog. Creation of an .acfg file for each aircraft by corresponding serial

number allows for the efficient use of the IPAC program to avoid repetitive inputs each time an automated PPC is desired. Aircraft configuration files can be imported or exported by either of these applications to help save time setting up as well as saving the specific aircraft configurations.

NOTE

As PPC-AH64 and IPAC-AH64 do not contain complete weight and balance data, .acfg files created in PPC-AH64 or IPAC-AH64 have only the MDS, serial number, and basic weight information imported into the AFF-AH64 application.

AFF-AH64 (Section 4) is a standalone application that provides the ability to generate and print a Tactical Form F. AFF-AH64 provides complete definition of the aircraft configuration (weight/drag/center of gravity [CG]), to include graphical representation of the aircraft at the Takeoff/Expend/Landing points of the Form F, as well as the ability to configure fuel management (onload/topoff/transfer/leg fuel) at each of those points. It also provides the computation and display of CG and gross weight at each of the Form F points. All aircraft configuration information from the AFF-AH64 departure point can be exported/imported via an aircraft configuration file with a .acfg extension . All information from the AFF-AH64 application can be saved in a file with a .tw64af extension.

NOTE

The screen captures of the IPAC AH-64 applications in this manual are taken during development of the software. The fielded IPAC AH-64 applications may have features and outputs that differ from the examples that follow, however the basic process for using the IPAC AH-64 applications remains the same.

2. PPC-AH64 Scenario

This scenario guides you through the use of **PPC-AH64** in preparation of a PPC for an AH-64E equipped with Longbow Hellfire launchers, rocket launchers, and Air-to-Air missiles.

The following information provides the steps for completing this scenario and the location of the required input data.

To open the PPC-AH64 application, select the PPC-AH64 desktop shortcut.

Figure 2-1 PPC-AH64 Desktop Shortcut

2.1. Manage Aircraft Configuration Dialog

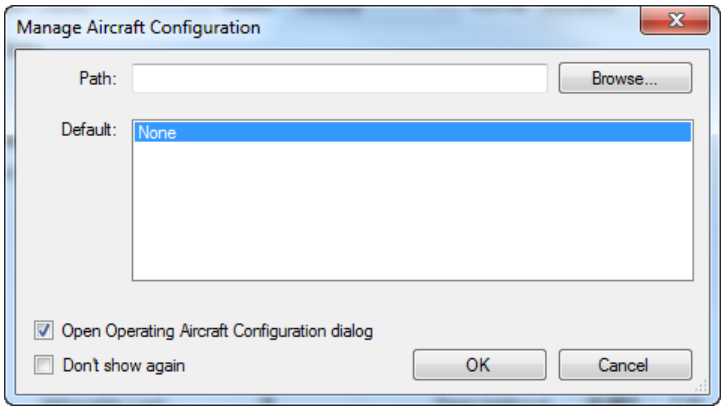


Figure 2-2 Manage Aircraft Configuration Dialog

The Manage Aircraft Configuration dialog appears on program startup of the PPC-AH64 application to facilitate the user in efficiently choosing a saved aircraft configuration (.acfg) file that corresponds to the aircraft configuration for the mission being planned. Creation of an .acfg file (or files for multiple configurations) for each aircraft in the unit is paramount for the efficient use of the PPC-AH64 application to avoid repetitive inputs each time a PPC is required.

When the "**Don't show again**" checkbox is unchecked, the Manage Aircraft Configuration dialog will automatically open when PPC-AH64 is initially launched.

When the "**Don't show again**" checkbox is checked, the Manage Aircraft Configuration dialog will not automatically open when PPC-AH64 is initially launched.
When the "**Open Operating Aircraft Configuration dialog**" checkbox is selected, the Operating Aircraft Configuration dialog automatically opens when the Manage Aircraft Configuration dialog closes.

To access the Manage Aircraft Configuration dialog at any time, from the File menu select **Aircraft Configuration (AFCG)**>**Manage Default…**.

Select the **Browse…** button to locate the folder location of the saved .acfg files. Upon selection of an .acfg file, all .acfg files in the folder will populate the Manage Aircraft Configuration dialog. Selecting an .acfg file from the available files in the Manage Aircraft Configuration dialog will import the saved aircraft configuration data into PPC-AH64.

For this scenario, there is no need to import a file.

2.2. Operating Aircraft Configuration Dialog

If not displayed, select the **Operating Aircraft Configuration** Toolbar button to open the **Operating Aircraft Configuration** dialog.

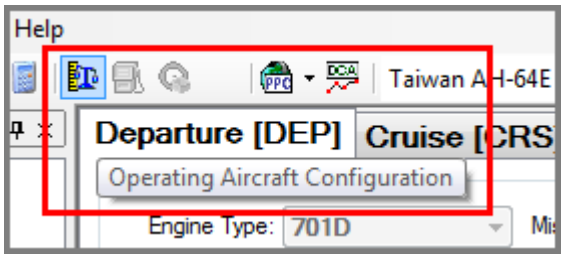


Figure 2-3 Toolbar Operating Aircraft Configuration Button

Enter or verify the following data in the **General** tab of the Operating Aircraft Configuration dialog:

(1) Int/Aux/Main capacity: 3168 lbs
(2) Aircraft serial number: 1209487
(3) Basic weight: 12456 lbs
(4) Fixed operating items weight: 350 lbs (this includes crew & crew baggage weight)
(5) Jettisonable operating items weight: 584 lbs (weight of two M-299 4 Rail Longbow Hellfire launchers, two empty M-261 rocket launchers, and two Air-to-Air missile launchers)

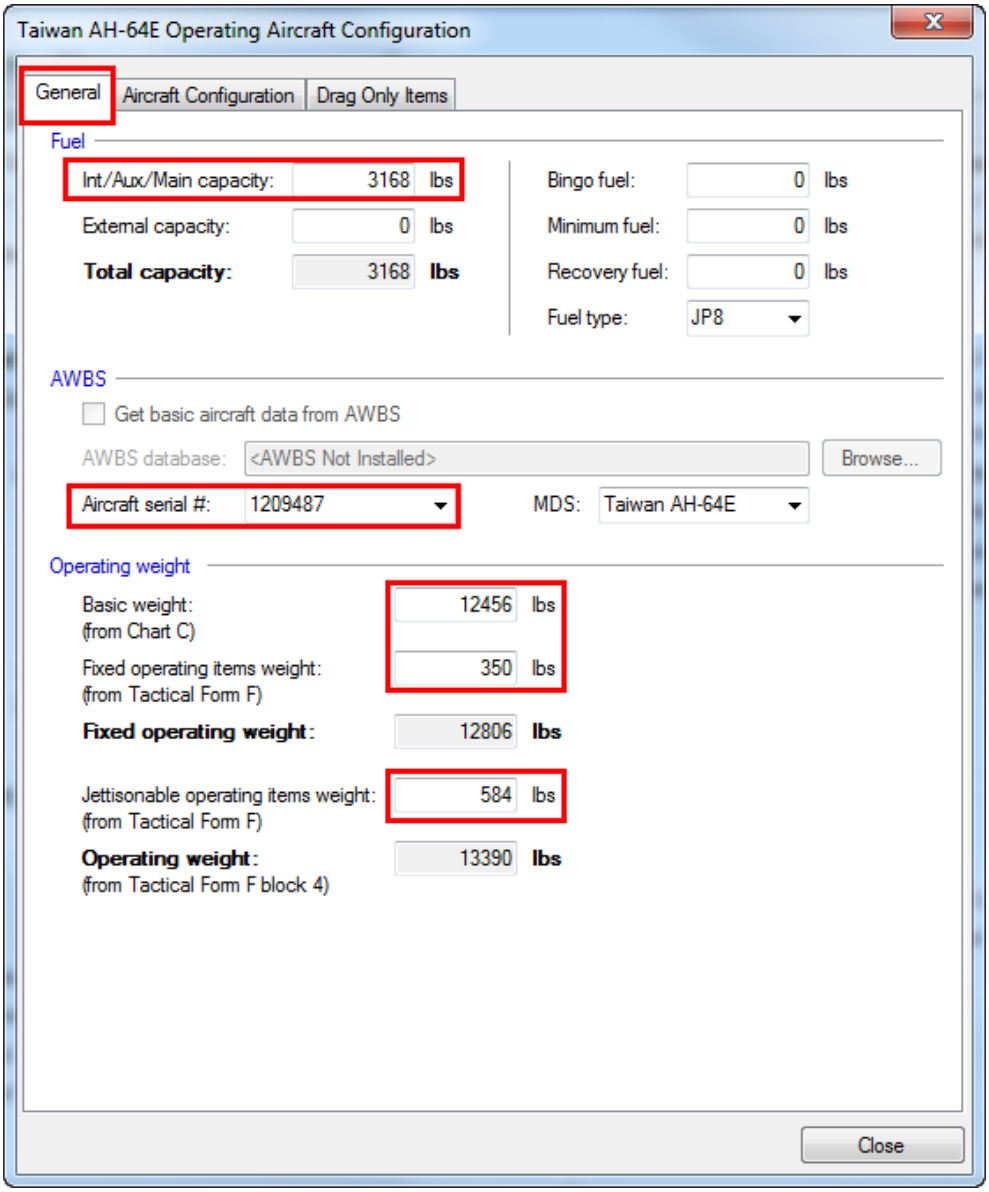


Figure 2-4 General Tab Inputs

Select the **Aircraft Configuration** tab of the Operating Aircraft Configuration dialog and enter or verify the following data:

(1) Mission: Tactical
(2) Max GWT Limit: 20260 lbs
(3) Engine #1 torque factor: 1.000
(4) Engine #2 torque factor: .95

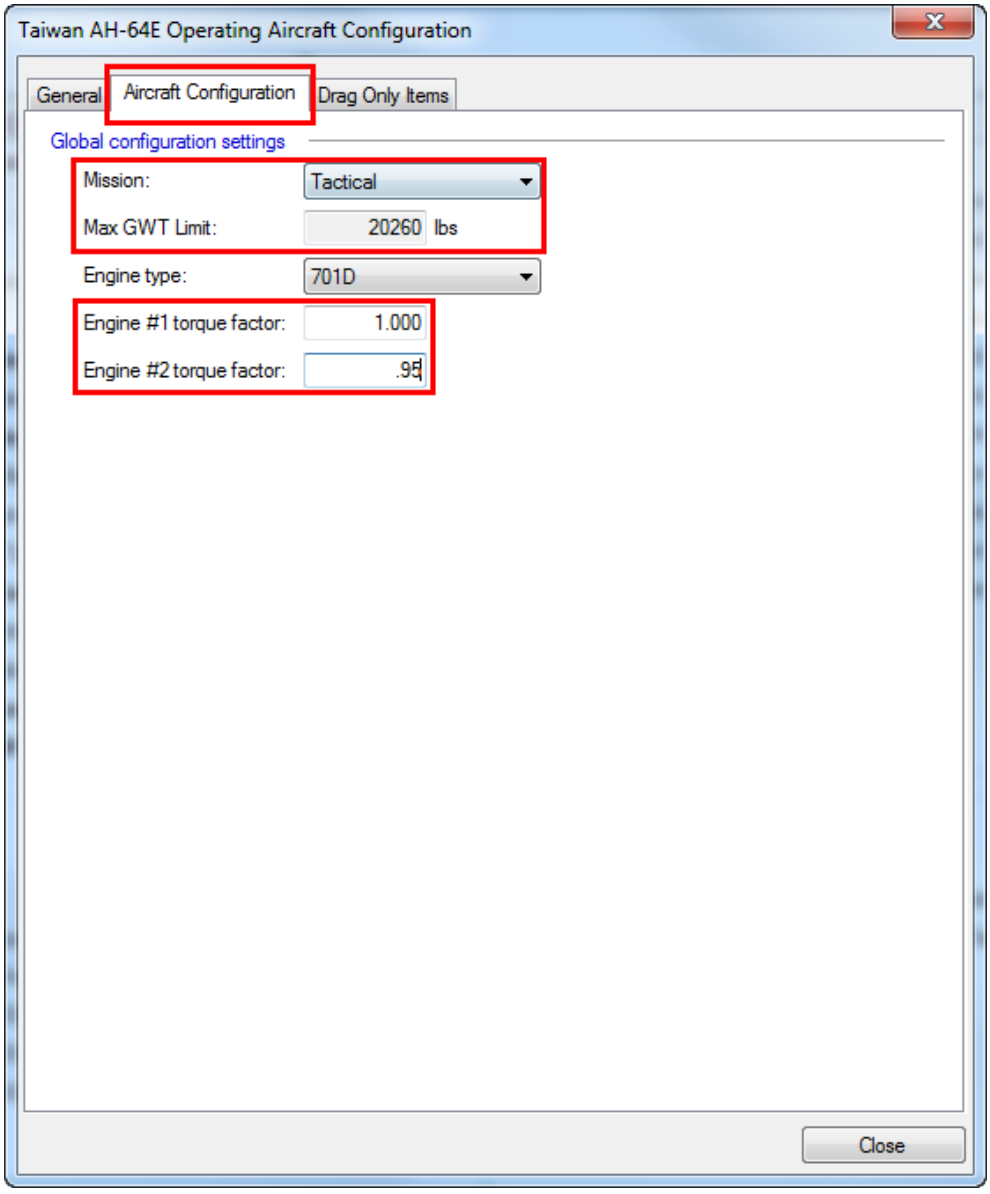


Figure 2-5 Aircraft Configuration Tab Inputs

Select the **Drag Only Items** tab of the Operating Aircraft Configuration dialog and enter or verify the following data:

(1) Wing Stores Configuration: Hellfire Launcher LWIB/RWIB, Rocket Launcher LWOB/RWOB and Air-to-Air Missile Launcher LWT/RWT
(2) HF debris deflectors per launcher: Not Installed
(3) FCR Kit: Installed
(4) Wing pylons: Four Pylons Installed
(5) Wing tip pylons: Two Pylons Installed
(6) CMWS forward LH/RH EOMS: Installed
(7) CMWS aft LH/RH EOMS: Installed
(8) CMWS fifth sensor: Installed
(9) CMWS forward flare dispensers: Installed
(10) CMWS aft chaff dispenser: Installed
(11) **Custom configuration item(s)** (select the "**Fixed/Addl Items...**" button):

	Name	Drag(sq ft)
Custom Item #1:	Test ASE Antenna	0.44

(12) Select "**OK**" to close the Custom Items dialog.

Select "**Close**" to close the Operating Aircraft Configuration dialog.

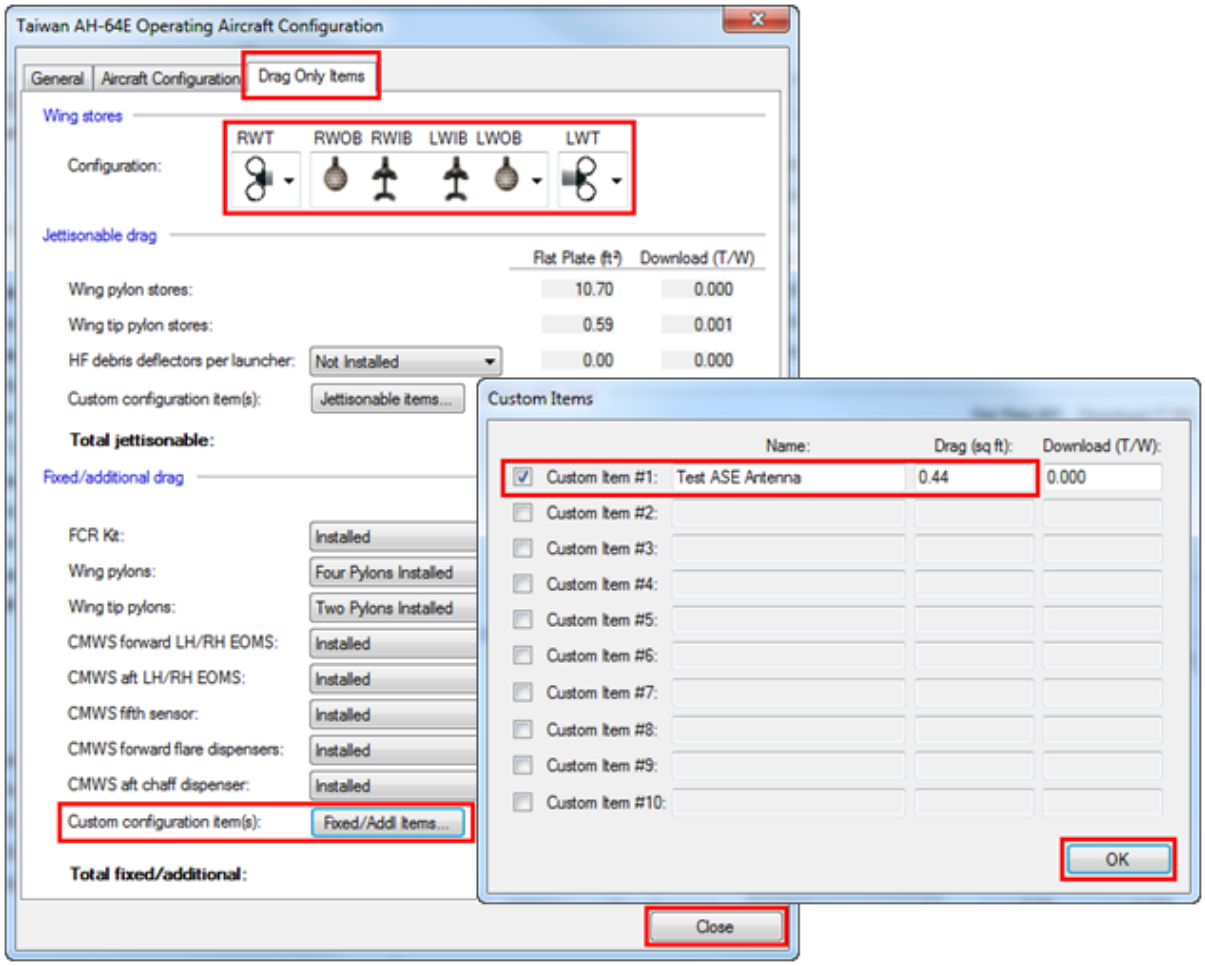


Figure 2-6 Drag Only Items Tab and Custom Items Dialog Inputs

NOTE

The Wing stores Configuration and pylons pull-down menus apply the associated flat plate drag and download drag values for the selected configuration to all applicable performance calculations.

The Total jettisonable Flat Plate (ft^2) and Download (T/W) represent the component of jettisonable load drag based on configuration selection. The Wing pylons and Wing tip pylons Flat Plate (ft^2) and Download (T/W) represent the component of non-jettisonable load drag based on configuration selection.

The weight of the selected configuration weapons load (missiles and/or rockets) must be manually entered in the appropriate PPC tab Jettisonable Load input field to allow for accurate performance calculations.

2.3. Export Aircraft Configuration

At this point in the planning process the aircraft configuration is completely set in the PPC-AH64 application. To use the data input in the Operating Aircraft Configuration dialog for future performance planning sessions, this configuration can be saved in an .acfg file. To export the .acfg file, select **File** from the Toolbar, select **Aircraft Configuration (ACFG)**, then select **Export Aircraft Configuration…** as shown below. Name the file as **1209487Config1**, select a location to save the file in (the Desktop in this example), and select "**Save"**. Select "**OK**" on the Aircraft Configuration Export message.

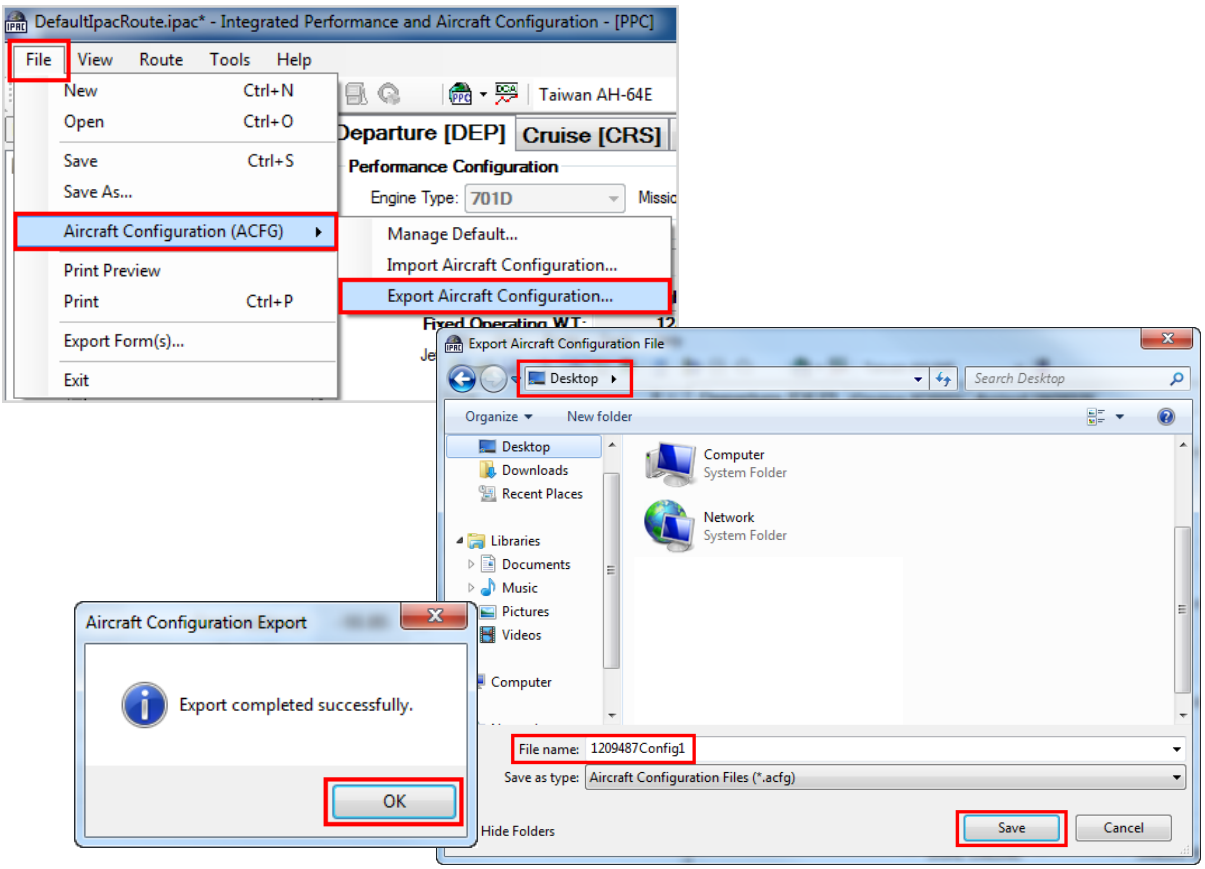


Figure 2-7 Exporting .acfg files from PPC-AH64

2.4. PPC Inputs

From the individual PPC tabs (or the PPC folder in the Route tree), select in order the **Departure**, **Cruise**, and **Arrival** PPC tabs and enter or verify the following data:

(1) **Departure (DEP)**

(a) Jett Operating Items WT: 584 lbs (Hellfire launchers, rocket launchers, & Air-to-Air missile launchers)

(b) Int/Aux/Main Fuel: 2724 lbs (Main and IAFS fuel)

(c) Int/Add Load: 267 lbs (ammunition, chaff & flares)

(d) Jettisonable Load: 1966 lbs (missiles & rockets)

Note

Jettisonable Load does not include the weight of the empty Hellfire launchers, rocket launchers, or Air-to-Air missile launchers. The Hellfire launchers, rocket launchers, and Air-to-Air missile launchers are accounted for as Jettisonable operating items weight in the AH-64E Operating Aircraft Configuration dialog.

(e) PA: 300 ft

(f) FAT: +18 ^{o}C

(g) FCR State: On

(h) Hover Height: 5 ft

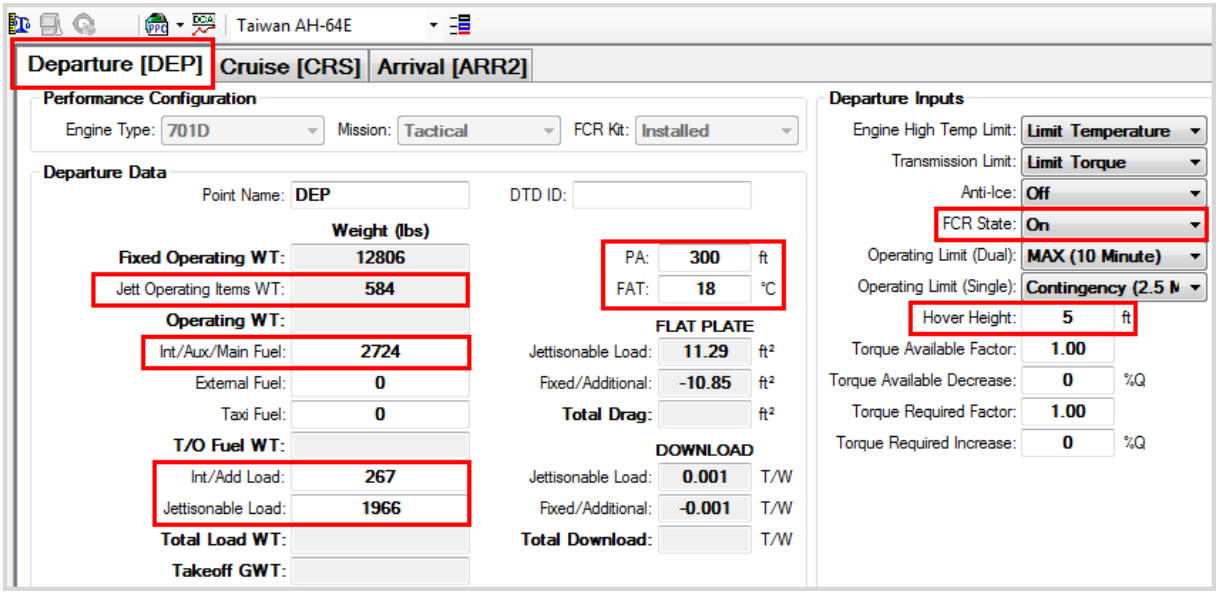


Figure 2-8 PPC Departure Tab Inputs

(2) **Cruise (CRS)**

(a) Int/Aux/Main Fuel: 2724 lbs (Main and IAFS fuel)
(b) Int/Add Load: 267 lbs (chaff, flares, & ammunition)
(c) Jettisonable Load: 1966 lbs (rockets & missiles)
(d) PA: 1000 ft
(e) FAT: +18 ^{o}C
(f) Cruise Speed TAS: 110 ktas

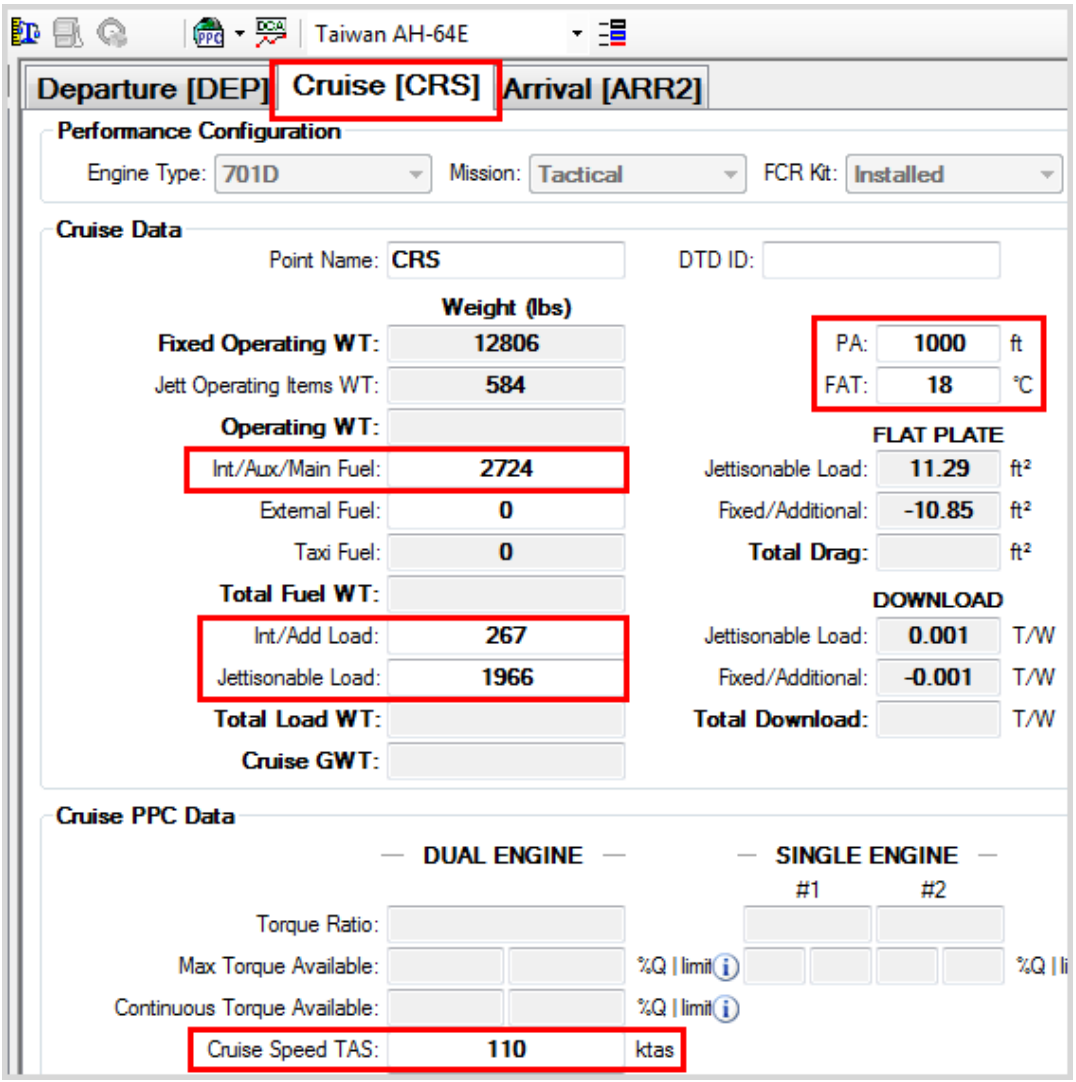


Figure 2-9 PPC Cruise Tab Inputs

(3) **Arrival (ARR2)**

(a) Int/Aux/Main Fuel: 1924 lbs (Main and IAFS fuel)

(b) Int/Add Load: 190 lbs (100 rounds of 30MM ammunition expended)

(c) Jettisonable Load: 0 lbs (all rockets & missiles expended)

(d) PA: 500 ft

(e) FAT: +22 ^{o}C

(f) Hover Height: 10 ft

Press "**Calculate"** on the Toolbar to update the data.

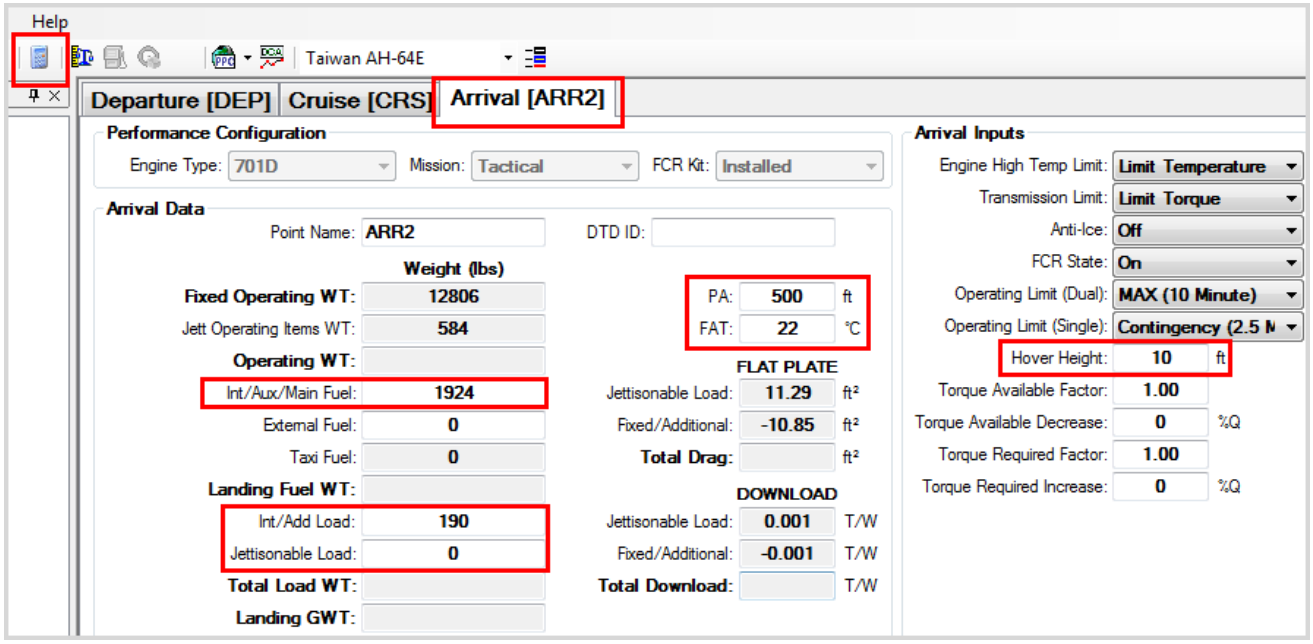


Figure 2-10 PPC Arrival Tab Inputs

2.4.1. Power Limiting Tool Tips %Q | limit

The PPC Departure, Cruise, and Arrival tabs, DUAL ENGINE and SINGLE ENGINE Torque Available output fields provide an indication of the limitation of the calculated Torque Available. The indication will be TGT (or the selected Operating Limit), NG, or FF (Fuel Flow). The Torque Available output fields have an adjacent Tool Tip feature that provides the limiting data for the applicable output field when the cursor is placed over the icon as shown below.

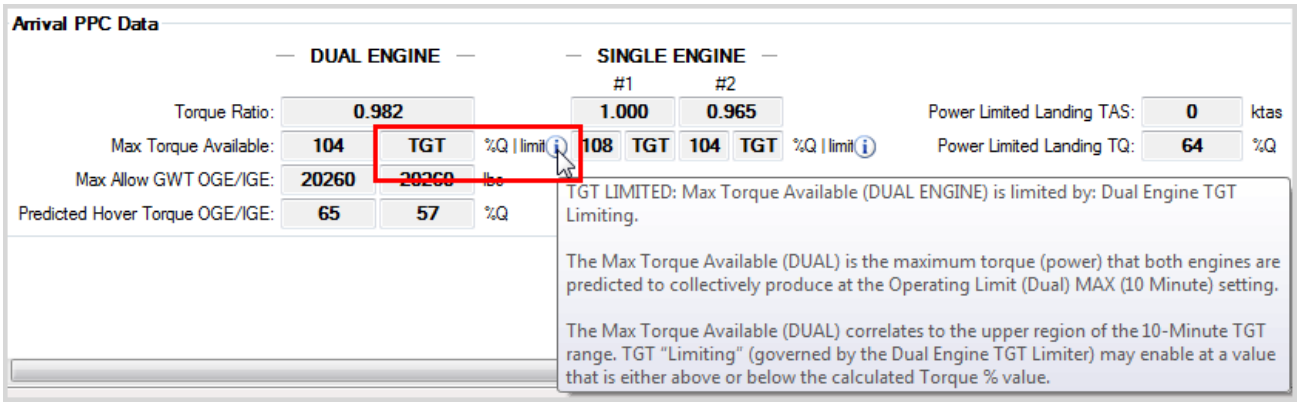


Figure 2-11 Limiting Indication and Tool Tip

The following Tool Tips are available.

Dual Engine Tool Tips:

MCP LIMIT: Max Torque Available (DUAL ENGINE) is limited by: TGT for Maximum Continuous Power.

The Max Torque Available (DUAL) is the maximum torque (power) that both engines are predicted to collectively produce at the Operating Limit (Dual) MCP setting.

IRP LIMIT: Max Torque Available (DUAL ENGINE) is limited by: TGT for Intermediate Rated Power, 30 Minute.

The Max Torque Available (DUAL) is the maximum torque (power) that both engines are predicted to collectively produce at the Operating Limit (Dual) IRP (30 Minute) setting.

TGT LIMITED: Max Torque Available (DUAL ENGINE) is limited by: Dual Engine TGT Limiting.

The Max Torque Available (DUAL) is the maximum torque (power) that both engines are predicted to collectively produce at the Operating Limit (Dual) MAX (10 Minute) setting.

The Max Torque Available (DUAL) correlates to the upper region of the 10-Minute TGT range. TGT “Limiting” (governed by the Dual Engine TGT Limiter) may enable at a value that is either above or below the calculated Torque % value.

NG LIMITED: Max Torque Available (DUAL ENGINE) is limited by: NG Limiting.

Max Torque Available (DUAL ENGINE) correlates to the maximum torque output of the engines at gas producer turbine speed (NG) limiting conditions as set inside the HMU. Fuel Flow or NG limiting can be recognized by power limiting (NP/NR droop) with no further torque increase possible, and TGT at or below limiting values.

FF LIMITED: Max Torque Available (DUAL ENGINE) is limited by: Fuel Flow Limiting.

Max Torque Available (DUAL ENGINE) correlates to the maximum torque output of the engines at fuel flow limiting conditions as set inside the HMU. Fuel Flow or NG limiting can be recognized by power limiting (NP/NR) droop) with no further torque increase possible, and TGT at or below limiting values.

Single Engine Tool Tips:

TGT LIMITED: Max Torque Available (SINGLE ENGINE) is limited by: Single Engine TGT Limiting.

The Max Torque Available (SINGLE) is the maximum torque (power) that engine #1 and #2 are predicted to individually produce at the Operating Limit (Single) Contingency (2.5 Minute) setting.

The Max Torque Available (SINGLE) correlates to the upper region of the 2.5-minute TGT range. TGT “Limiting” (governed by the respective Single Engine TGT Limiter) may enable at a value that is either above or below the calculated Torque % value.

NG LIMITED: Max Torque Available (SINGLE ENGINE) is limited by: NG Limiting.

Max Torque Available (SINGLE ENGINE) correlates to the maximum torque output of the engine at gas producer turbine speed (NG) limiting

conditions as set inside the HMU. Fuel Flow or NG limiting can be recognized by power limiting (NP/NR droop) with no further torque increase possible, and TGT at or below limiting values.

FF LIMITED: Max Torque Available (SINGLE ENGINE) is limited by: Fuel Flow Limiting.

Max Torque Available (SINGLE ENGINE) correlates to the maximum torque output of the engine at fuel flow limiting conditions as set inside the HMU. Fuel Flow or NG limiting can be recognized by power limiting (NP/NR droop) with no further torque increase possible, and TGT at or below limiting values.

NOTE

The Dual Engine Torque Available values computed by PPC-AH64 and IPAC-AH64 are the average Torque that the two engines will collectively produce.

To account for the effect each engine's ETF will have on the Torque Available, PPC-AH64 and IPAC-AH64 perform the following:

In all calculations utilizing MCP or IRP (30 Minute), the ETF of the low ETF engine is referenced instead of the ATF for Dual Engine Torque Available calculations.

For calculations utilizing MAX (10 Minute), the ATF is referenced, and one engine may reach its dual engine TGT limiting setting prior to the other engine due to varying ETF values (resulting in a torque split).

2.5. Performance Awareness Tool (PAT)

From the Route tree, Right-click **DEP (Departure)** Route Point and select "**Send to All PAT Tabs**".

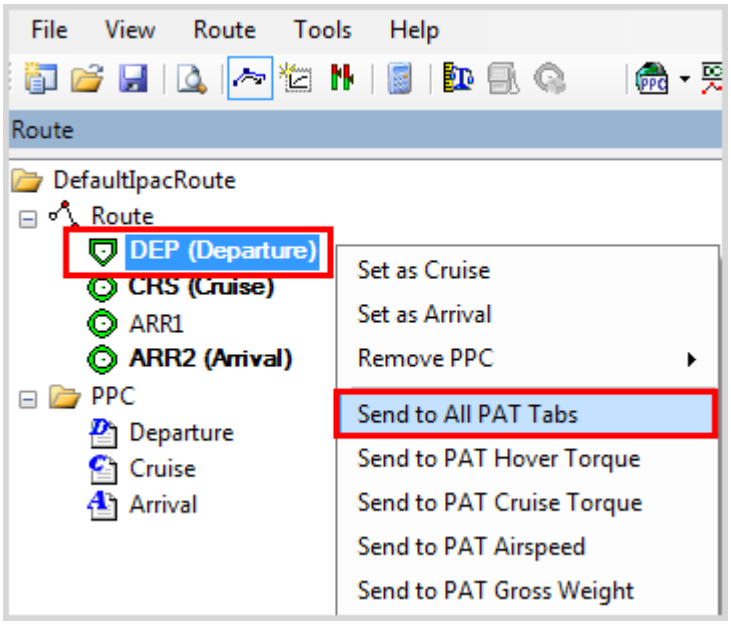


Figure 2-12 PAT Designation

Explore planning values with the **Performance Awareness Tool** for Hover Torque, Cruise Torque, Airspeed, and Gross Weight. Input fields can be changed to explore different values, or the Slider Bars can be moved to change input values.

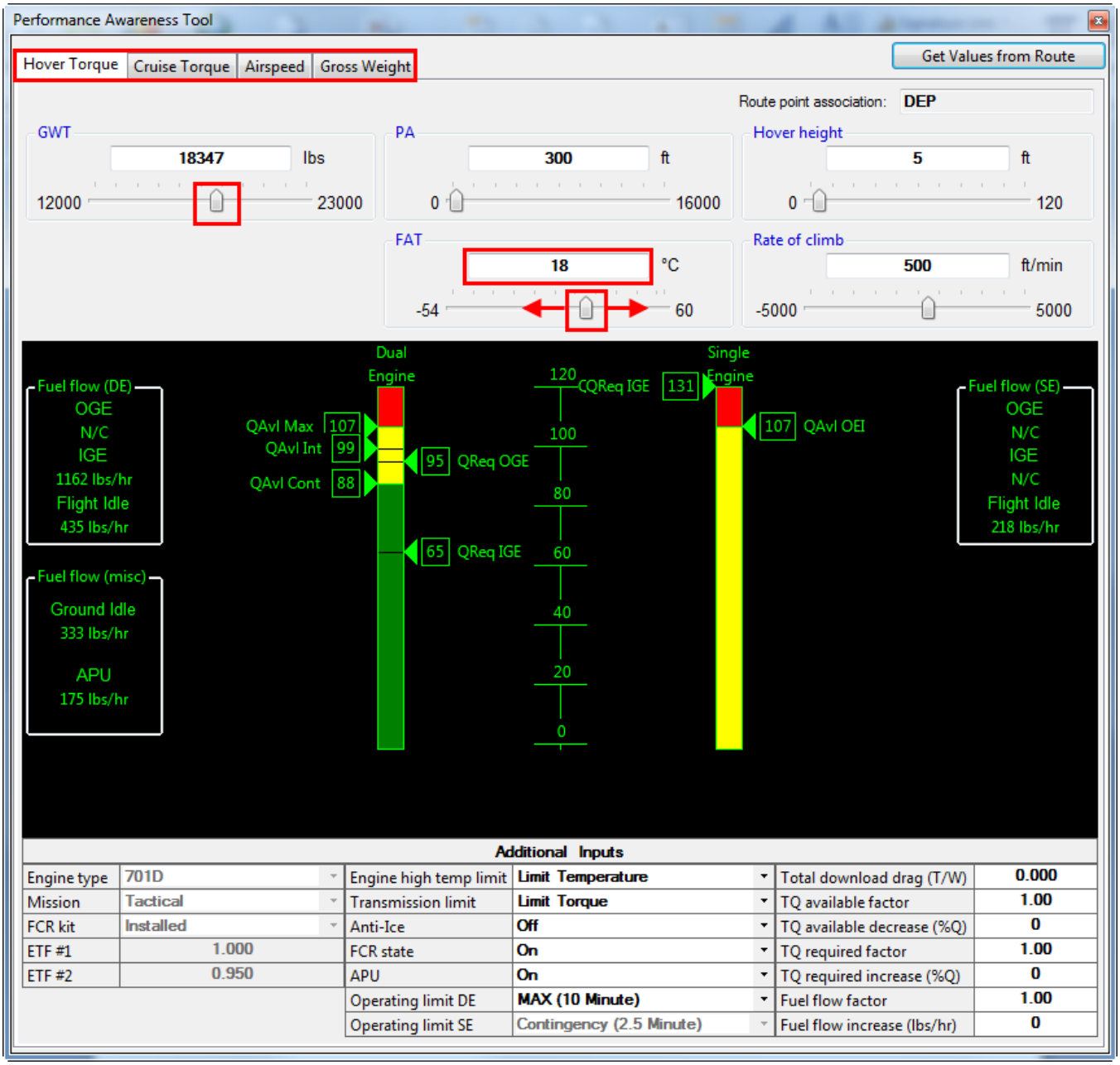


Figure 2-13 PAT

Select **Get Values from Route Point…** and select each route point as needed when preparing a PPC to explore planning values. Close the **PAT** when exploration is complete.

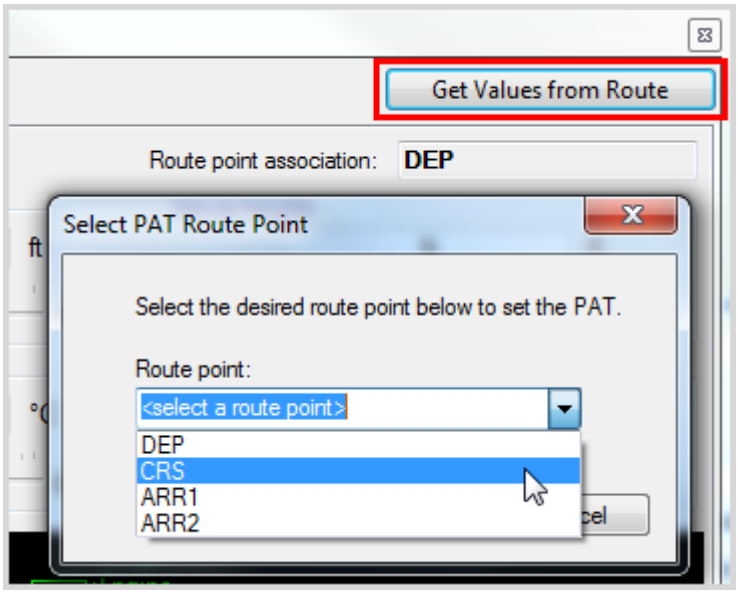


Figure 2-14 Select PAT Route Point Dialog

2.6. PPC Print Preview

From the Toolbar select the "**Print Preview**" button and review the PPC. The PPC for this scenario is shown below. Click the "**Print**" icon on the Print Preview Toolbar to print the completed PPC. Close the Print Preview dialog. Close PPC-AH64. When you close the application, a dialog displays asking if you want to save this file. For this training, click "**No**" as this file will not be used later.

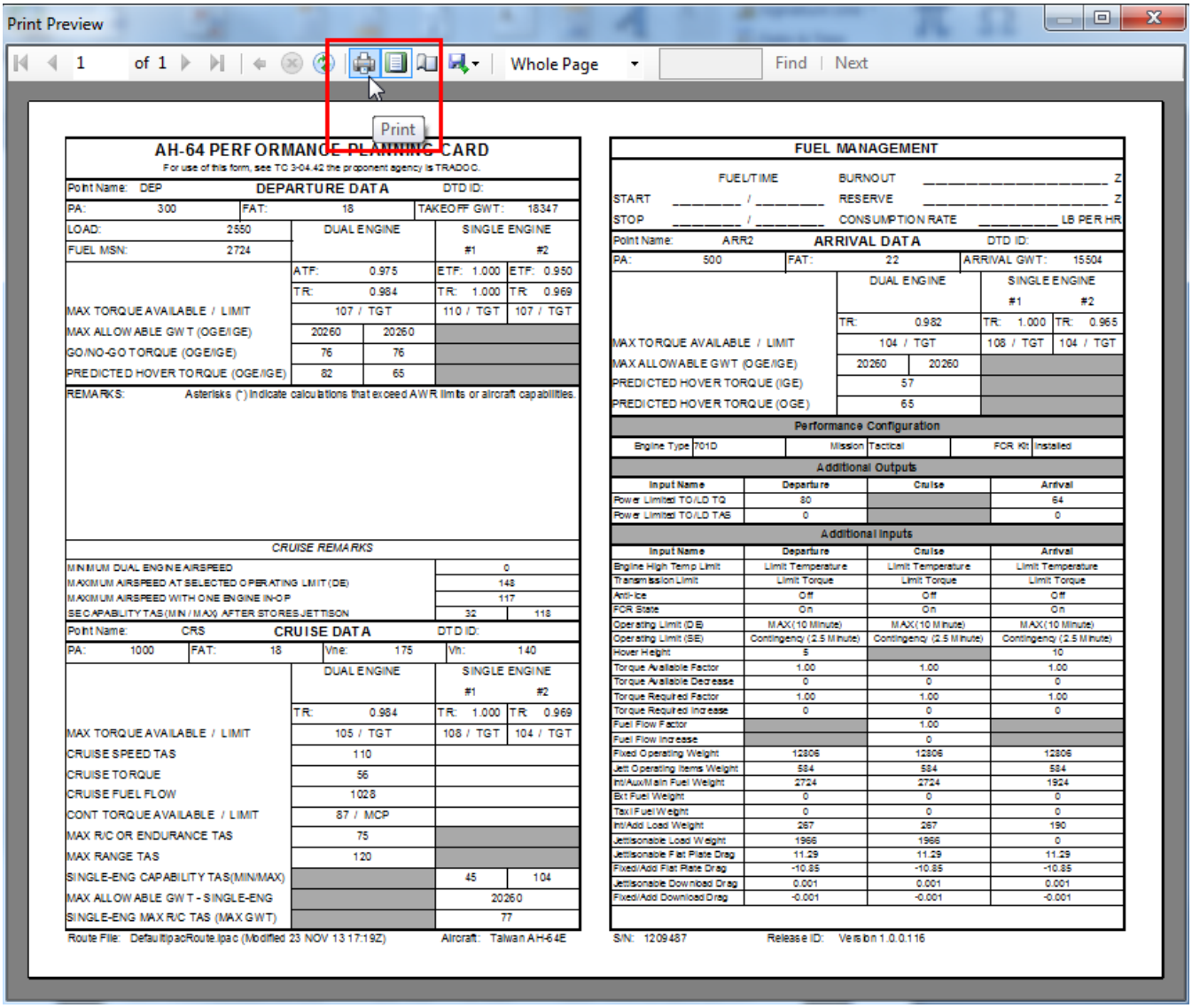


Figure 2-15 Print Preview Dialog

2.7. Saving .ipac Files

Though there is no need to save a .ipac file for this scenario, instructions are given below for future reference. All information from the current PPC-AH64 planning session can be saved by use of the following methods:

- Using the Toolbar **File** menu "**Save As…**" function.
- Upon closing PPC-AH64**,** selecting "**Yes**" on the IPAC message asking "Do you want to save changes to route 'DefaultIPACRoute'?".

In the example below, the PPC-AH64 file will be saved as 1209487 Gunnery Mission 1. All data entered during the current planning session, to include aircraft configuration data, and PPC tab inputs, will be saved in the IPAC Standalone Route Files format with a .ipac extension and can be used in subsequent PPC-AH64 planning sessions for similar missions.

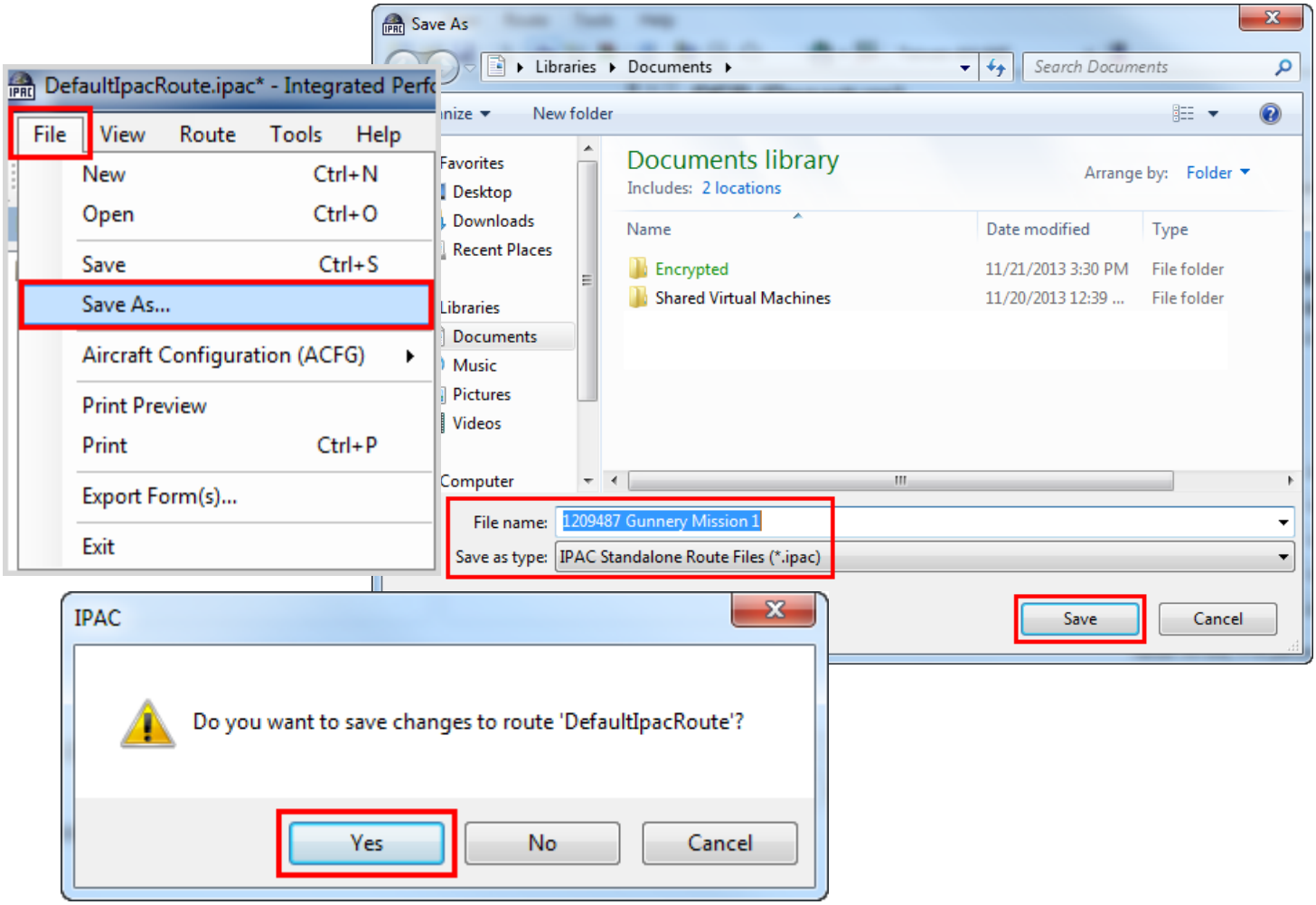


Figure 2-16 Saving .ipac Files

3. IPAC-AH64 Scenario

This scenario guides you through the use of **IPAC-AH64,** in conjunction with PFPS, and the preparation of a PPC for an AH-64E equipped with Longbow Hellfire launchers, rocket launchers, and Air-to-Air missiles.

The following information provides the steps for completing this scenario, and the location of the required input data.

To open the IPAC-AH64 application, select the IPAC-AH64 desktop shortcut.

Figure 3-1 IPAC-AH64 Desktop Shortcut

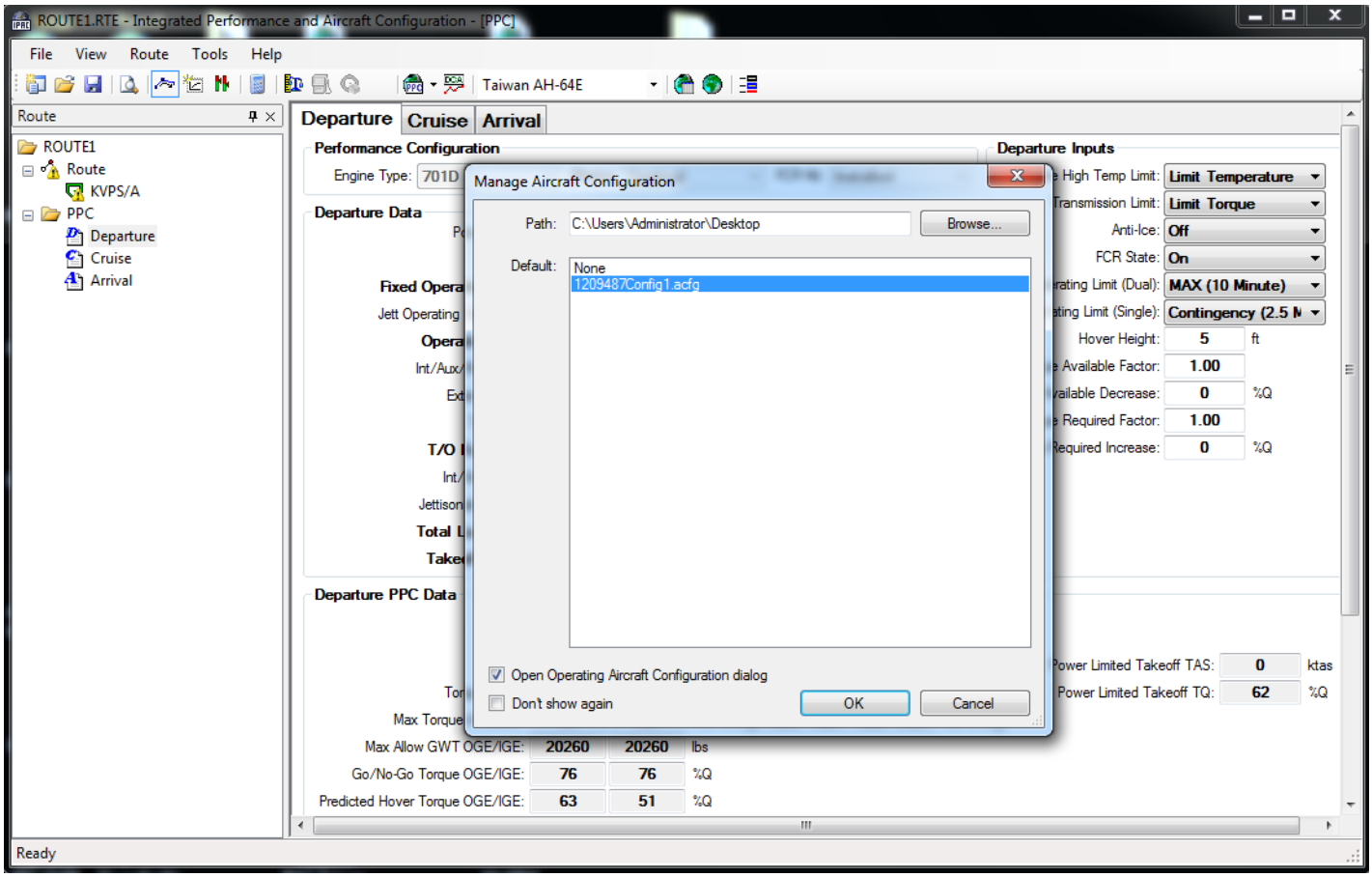


Figure 3-2 IPAC-AH64 Opening Screen

3.1. Importing an Aircraft Configuration File

This scenario will utilize the 1209487Config1.acfg file created in section 2 (PPC-AH64). From the Manage Aircraft Configuration dialog, browse to the folder location (the Desktop in this example), select the 1209487Config1.acfg file, and either double-click the file, or select the "**Open**" button. The file will display in the Manage Aircraft Configuration dialog Default field. Select "**OK**" to import the configuration data from the 1209487Config1.acfg file. Click **OK** to close any confirmation messages.

When the "**Open Operating Aircraft Configuration dialog**" checkbox is selected as shown below, the Operating Aircraft Configuration dialog automatically opens when the Manage Aircraft Configuration dialog closes.

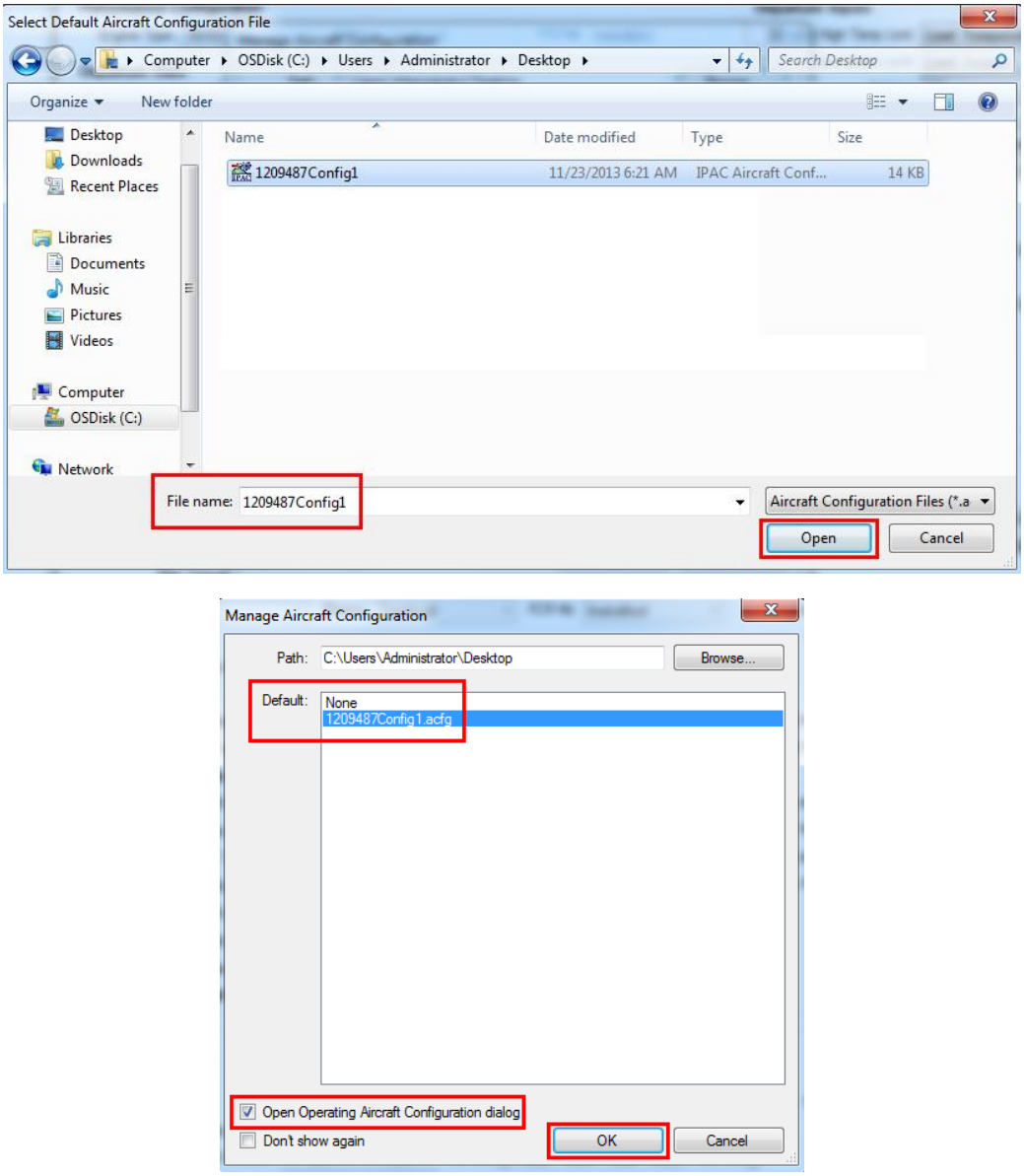


Figure 3-3 Importing .acfg Files

3.2. Operating Aircraft Configuration Data

Verify the following data in the **General** tab of the Operating Aircraft Configuration dialog:

(1) Int/Aux/Main capacity: 3168 lbs
(2) Aircraft serial number: 1209487
(3) Basic weight: 12456 lbs
(4) Fixed operating items weight: 350 lbs (this includes crew & crew baggage weight)
(5) Jettisonable operating items weight: 584 lbs (weight of two M-299 4 Rail Longbow Hellfire launchers, two empty M-261 rocket launchers, and two Air-to-Air missile launchers)

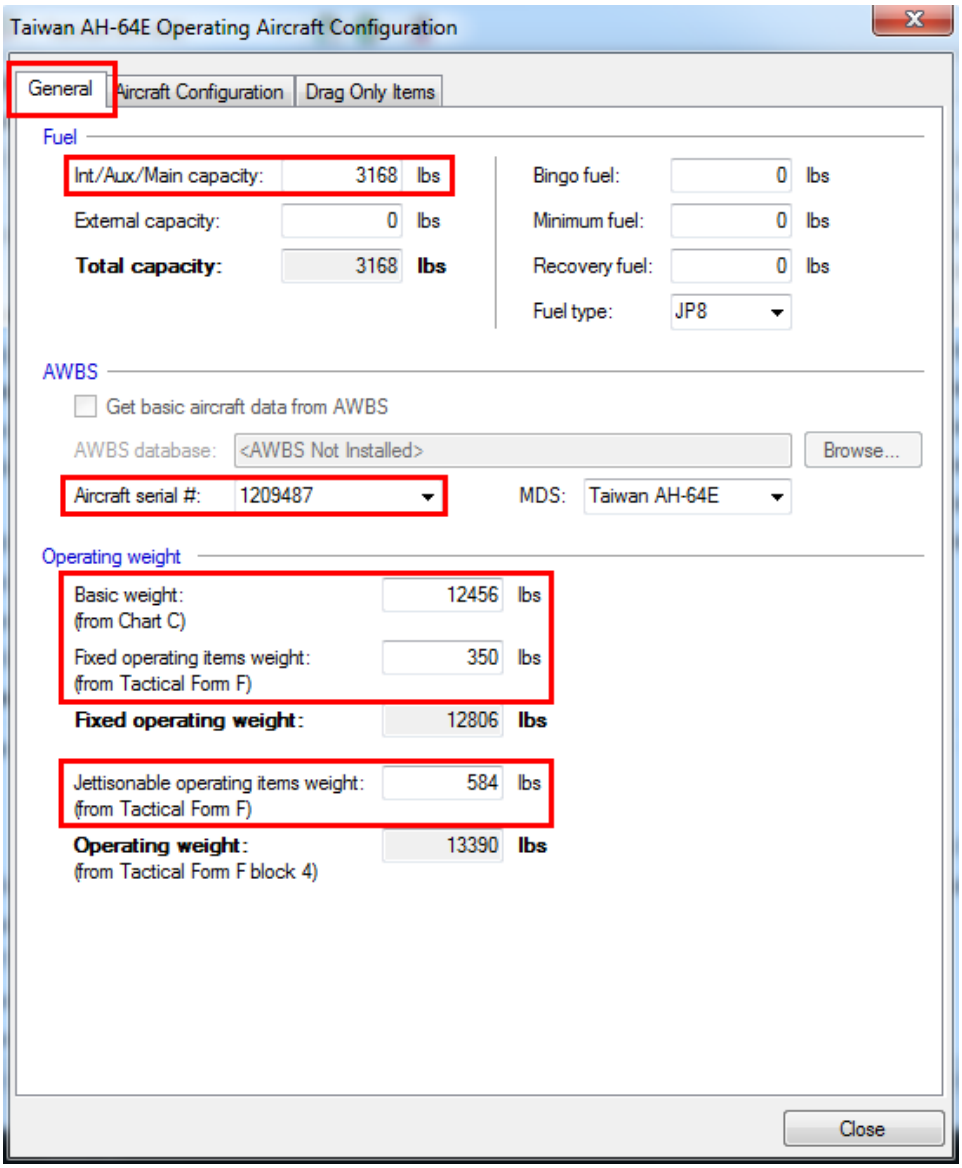


Figure 3-4 General Tab Data

Select the **Aircraft Configuration** tab of the Operating Aircraft Configuration dialog and verify the following data:

(1) Mission: Tactical
(2) Max GWT Limit: 20260 lbs
(3) Engine #1 torque factor: 1.000
(4) Engine #2 torque factor: 0.950

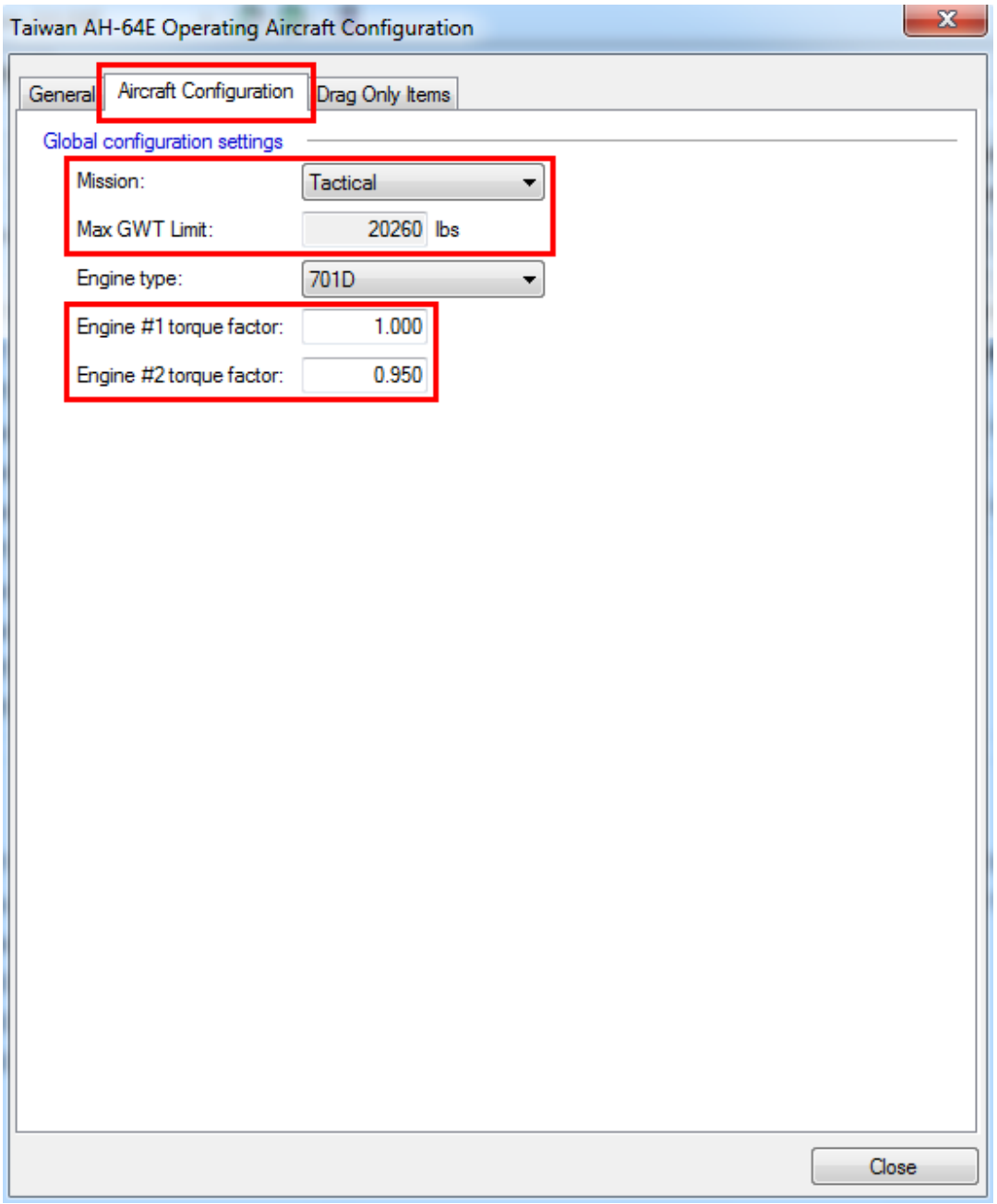


Figure 3-5 Aircraft Configuration Tab Data

Select the **Drag Only Items** tab of the Operating Aircraft Configuration dialog and verify the following data:

(1) Wing Stores Configuration: Hellfire Launcher LWIB/RWIB, Rocket Launcher LWOB/RWOB and Air-to-Air Missile Launcher LWT/RWT
(2) HF debris deflectors per launcher: Not Installed
(3) FCR Kit: Installed
(4) Wing pylons: Four Pylons Installed
(5) Wing tip pylons: Two Pylons Installed
(6) CMWS forward LH/RH EOMS: Installed
(7) CMWS aft LH/RH EOMS: Installed
(8) CMWS fifth sensor: Installed
(9) CMWS forward flare dispensers: Installed
(10) CMWS aft chaff dispenser: Installed
(11) **Custom configuration item(s)** (select the "**Fixed/Addl Items...**" button):

	Name	Drag(sq ft)
Custom Item #1:	Test ASE Antenna	0.44

(12) Select "**OK**" to close the Custom Items dialog.

Select "**Close**" to close the Operating Aircraft Configuration dialog.

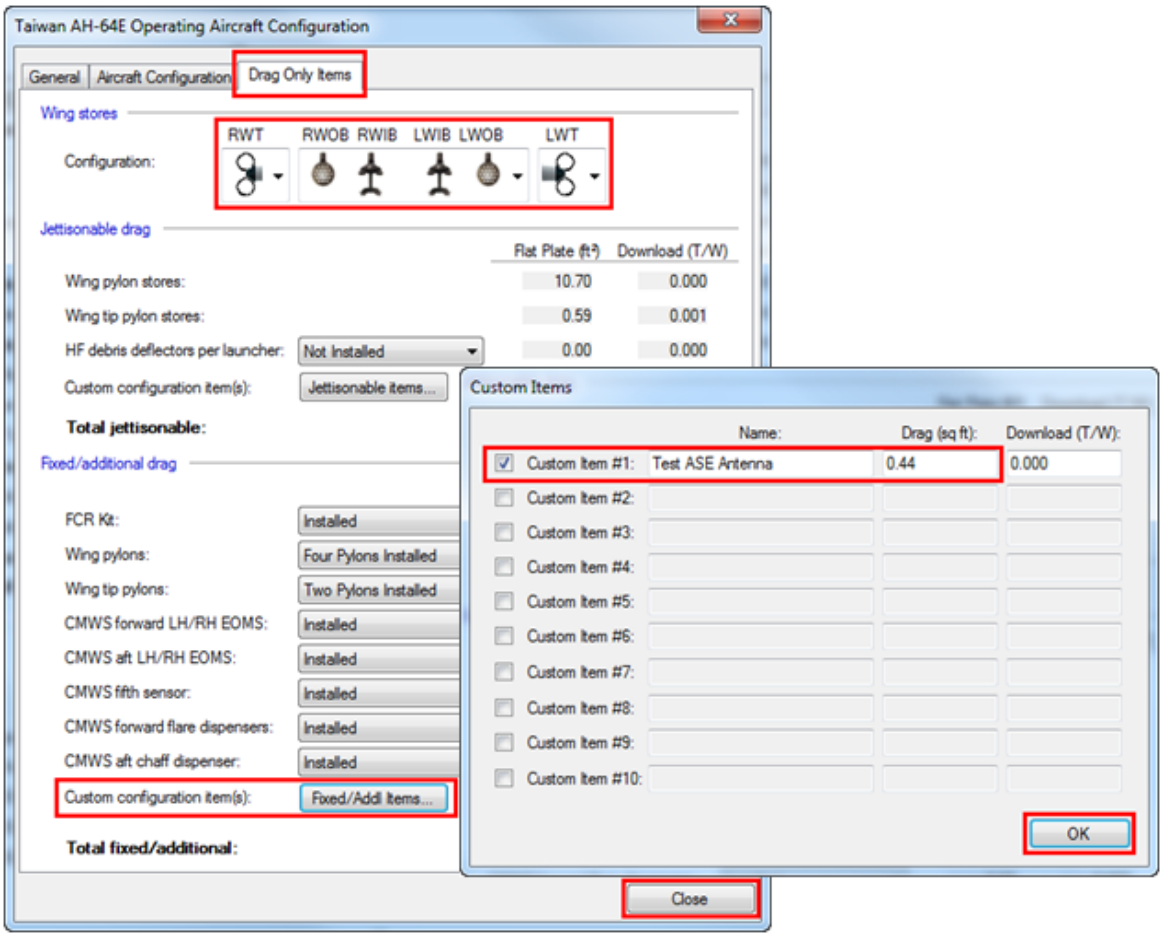


Figure 3-6 Drag Only Items Tab and Custom Items Dialog Data

NOTE

The Wing stores Configuration and pylons pull-down menus apply the associated flat plate drag and download drag values for the selected configuration to all applicable performance calculations.

The Total jettisonable Flat Plate (ft^2) and Download (T/W) represent the component of jettisonable load drag based on configuration selection. The Wing pylons and Wing tip pylons Flat Plate (ft^2) and Download (T/W) represent the component of non-jettisonable load drag based on configuration selection.

The weight of the selected configuration weapons load (missiles and/or rockets) must be manually entered in the appropriate Route Point View Jettisonable Load input field to allow for accurate performance calculations.

3.3. CFPS Route Creation

From the IPAC Toolbar, select the "**Launch CFPS**" button to launch the Combat Flight Planning Software (CFPS) and set the mission route points. For this scenario, generate a three-point route as follows:

(1) Enter the first route point **RCYU/A,** select/verify **Airport Center of Mass,** and select "**OK**"

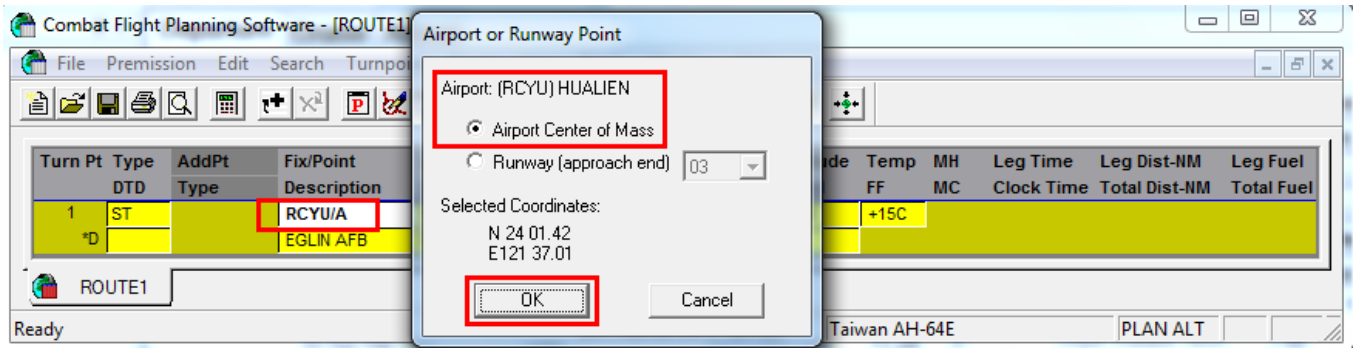


Figure 3-7 CFPS First Route Point - RCYU/A

(2) Enter **RCQC/A** as the second route point, select/verify **Airport Center of Mass,** and select "**OK**"

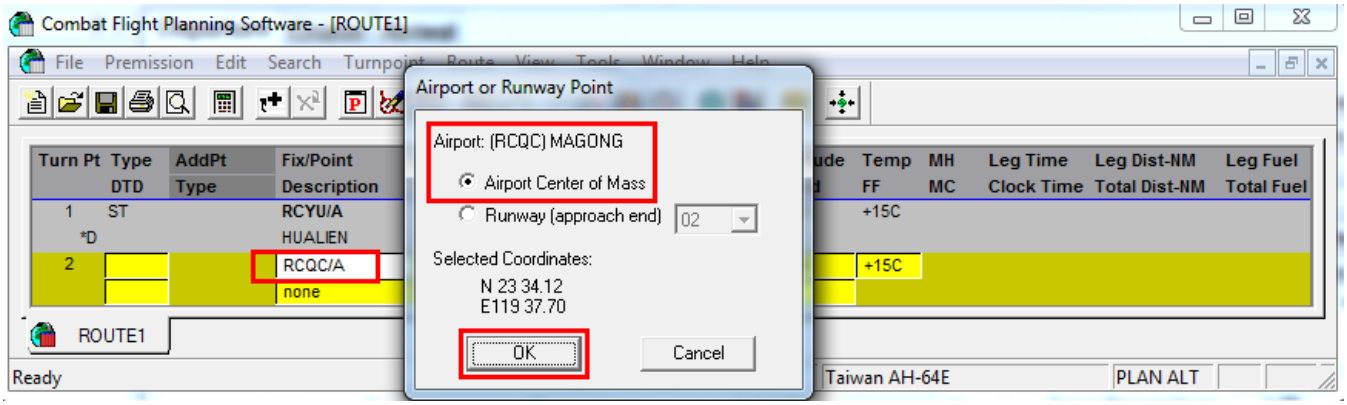


Figure 3-8 CFPS Second Route Point - RCQC/A

(3) Enter **RCDC/A** as the third route point, select/verify **Airport Center of Mass,** and select "**OK**"

(4) Select the CFPS **Calculate** button to update the data

(5) Minimize **CFPS** and return to **IPAC**

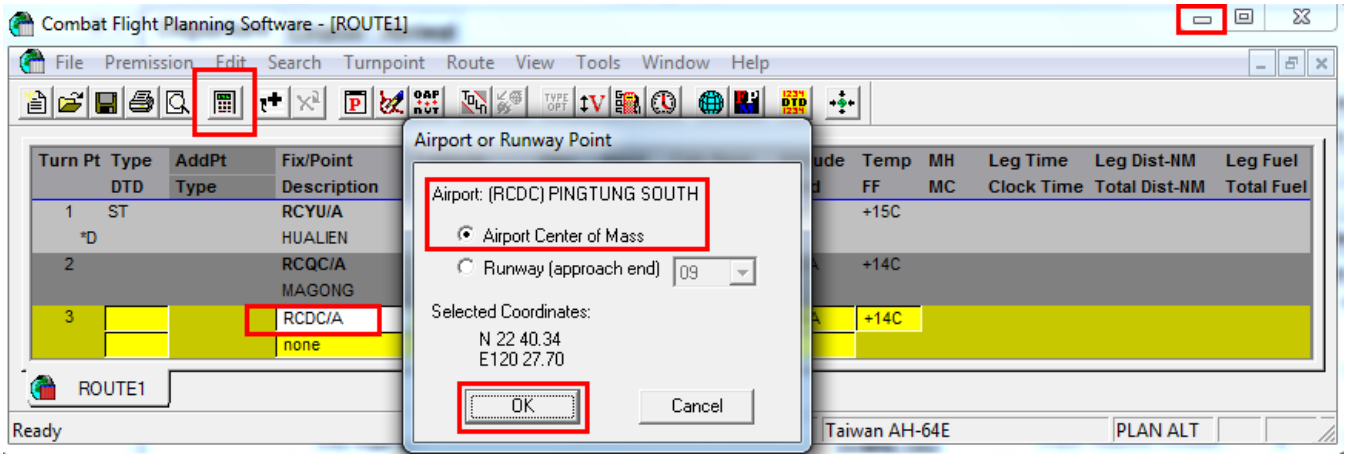


Figure 3-9 CFPS Third Route Point - RCDC/A

NOTE

The route created for this scenario is a simplified route to illustrate the use of IPAC-AH64 integrated with PFPS, and is not intended to replicate a complex tactical mission. It is understood that flight of an armed AH-64E over a populated area may be an unlikely event.

3.4. IPAC Route Point Data Inputs

In the IPAC Route Tree, right-click route point **RCQC/A**, and select **Insert Hover** four times to enter four hover events,***.hover1***, ***.hover2**, ***.hover3**, and ***.hover4** for **RCQC/A**. From the IPAC toolbar, select "**Calculate**".

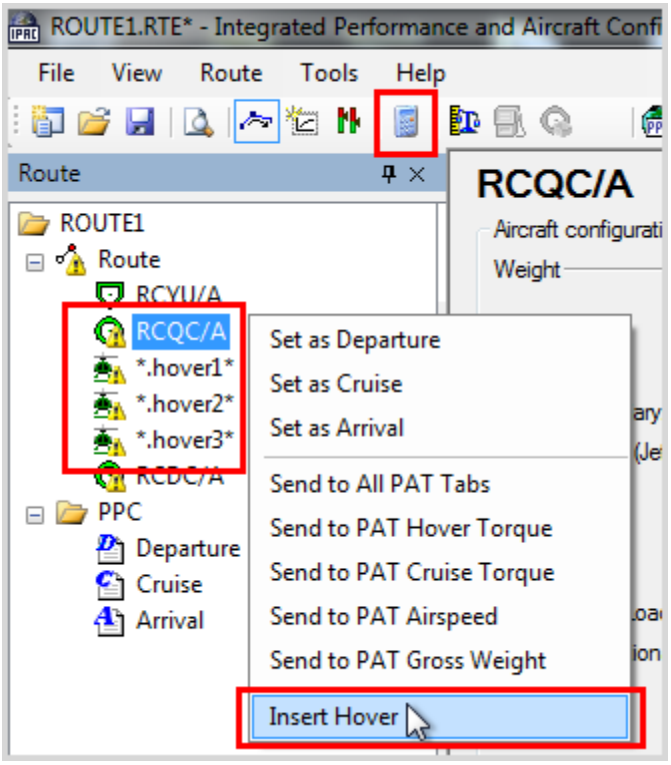


Figure 3-10 Inserting Hovers Route Point – RCQC/A

For each Route Point in the Route Tree, enter or verify the following information:

(1) **Route Point 1: RCYU/A**

(a) Internal/Auxiliary/Main Fuel: 3000 lbs (Main and IAFS fuel)

(b) Taxi Fuel: 50 lbs

(c) Jettisonable Load: 1966 lbs (rockets & missiles)

Note

Jettisonable Load does not include the weight of the empty rocket launchers or missile launchers. The rocket launchers, Hellfire launchers, and Air-to-Air missile launchers are accounted for as Jettisonable operating items weight in the AH-64 Operating Aircraft Configuration dialog.

(d) Internal/Additional Load: 267 lbs (chaff, flares, & ammunition)

(e) Pressure Altitude: 51 feet

(f) Free Air Temperature: 20 °C

(g) Airspeed: 100 KTAS

(h) Wind: 300/010

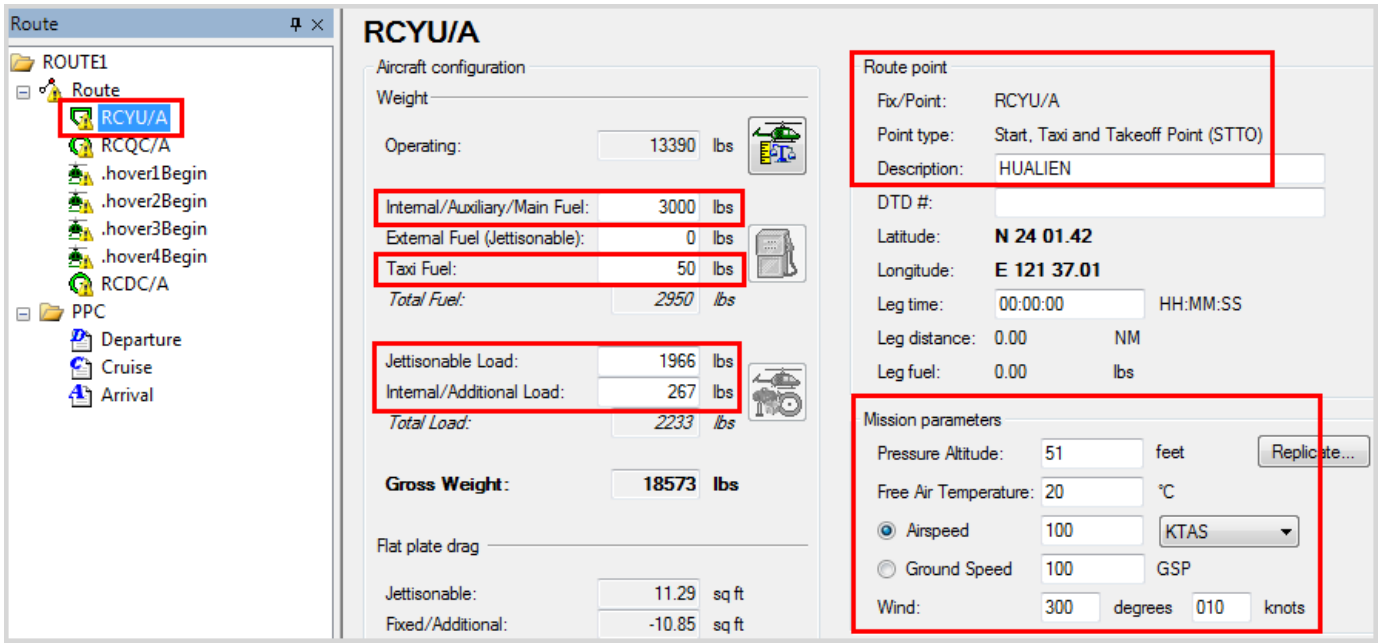


Figure 3-11 Route Point Data - RCYU/A

(2) **Route Point 2: RCQC/A**

(a) Pressure Altitude: 603 feet

(b) Free Air Temperature: 20 C

(c) Airspeed: 100 KTAS

(d) Wind: 270/005

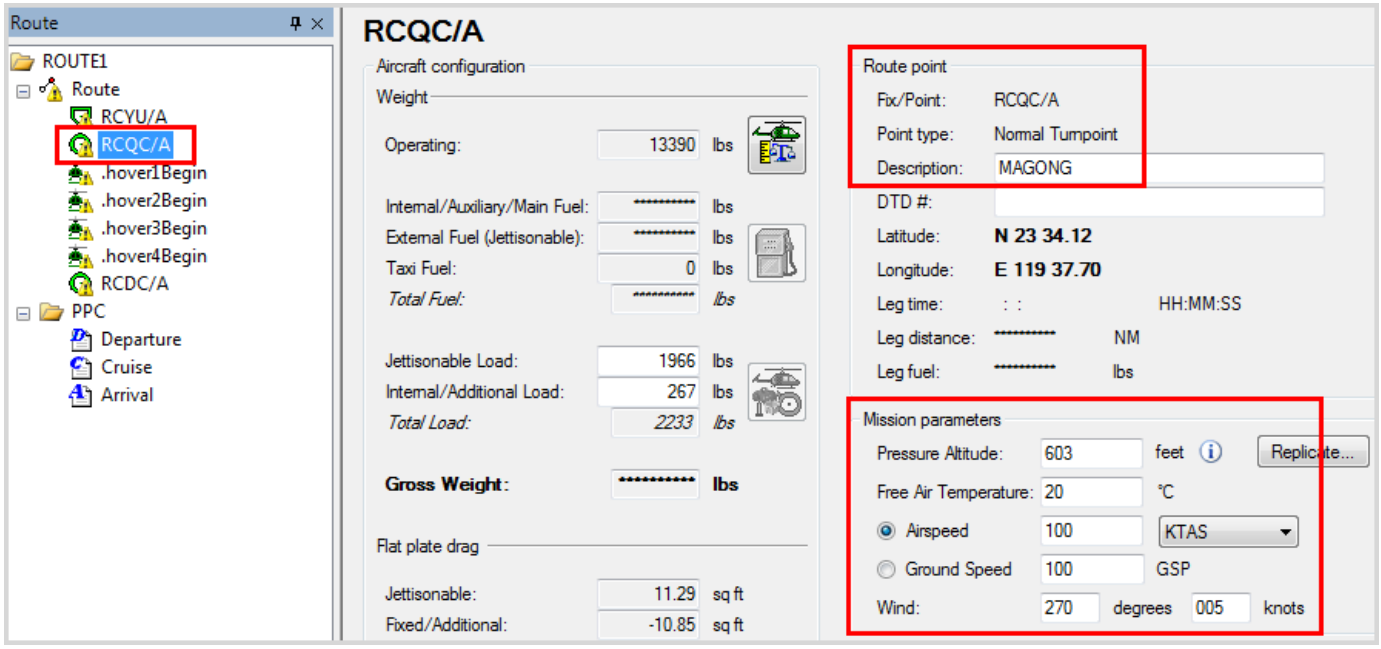


Figure 3-12 Route Point Data – RCQC/A

(e) **RCQC/A .hover1**

(1) Leg time: 00:01:00

(2) Pressure Altitude: 103 feet

(3) Free Air Temperature: 20 °C

(4) Hover mode: Hover

(5) Hover Height: 40 ft

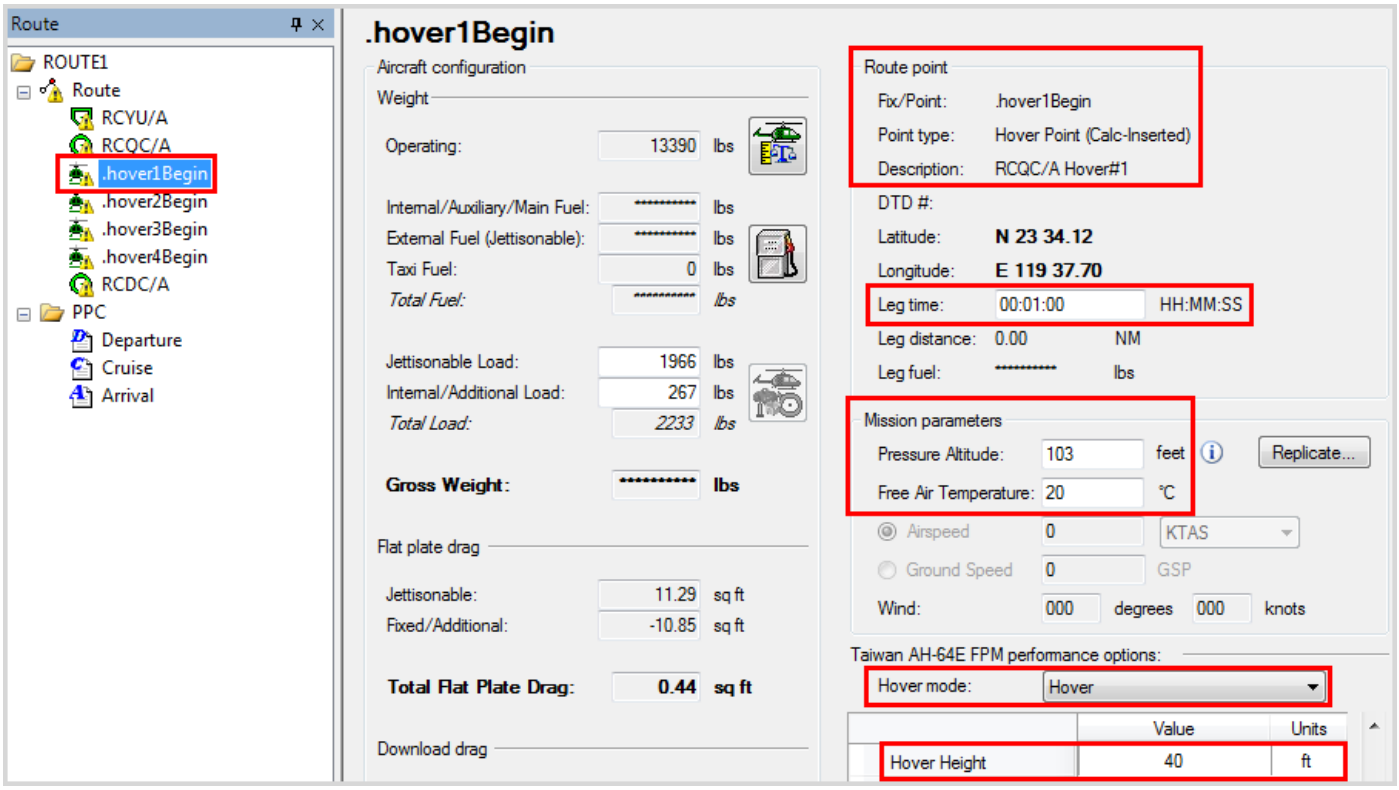


Figure 3-13 Route Point Data – RCQC/A .hover1

(f) **RCQC/A .hover2**

(1) Jettisonable Load: 0 lbs (rockets & missiles expended)

(2) Internal/Additional Load: 190 lbs (100 rounds of 30MM ammunition expended)

(3) Leg time: 00:10:00

(4) Pressure Altitude: 103 feet

(5) Free Air Temperature: 20 °C

(6) Hover mode: Hover

(7) Hover Height: 40 ft

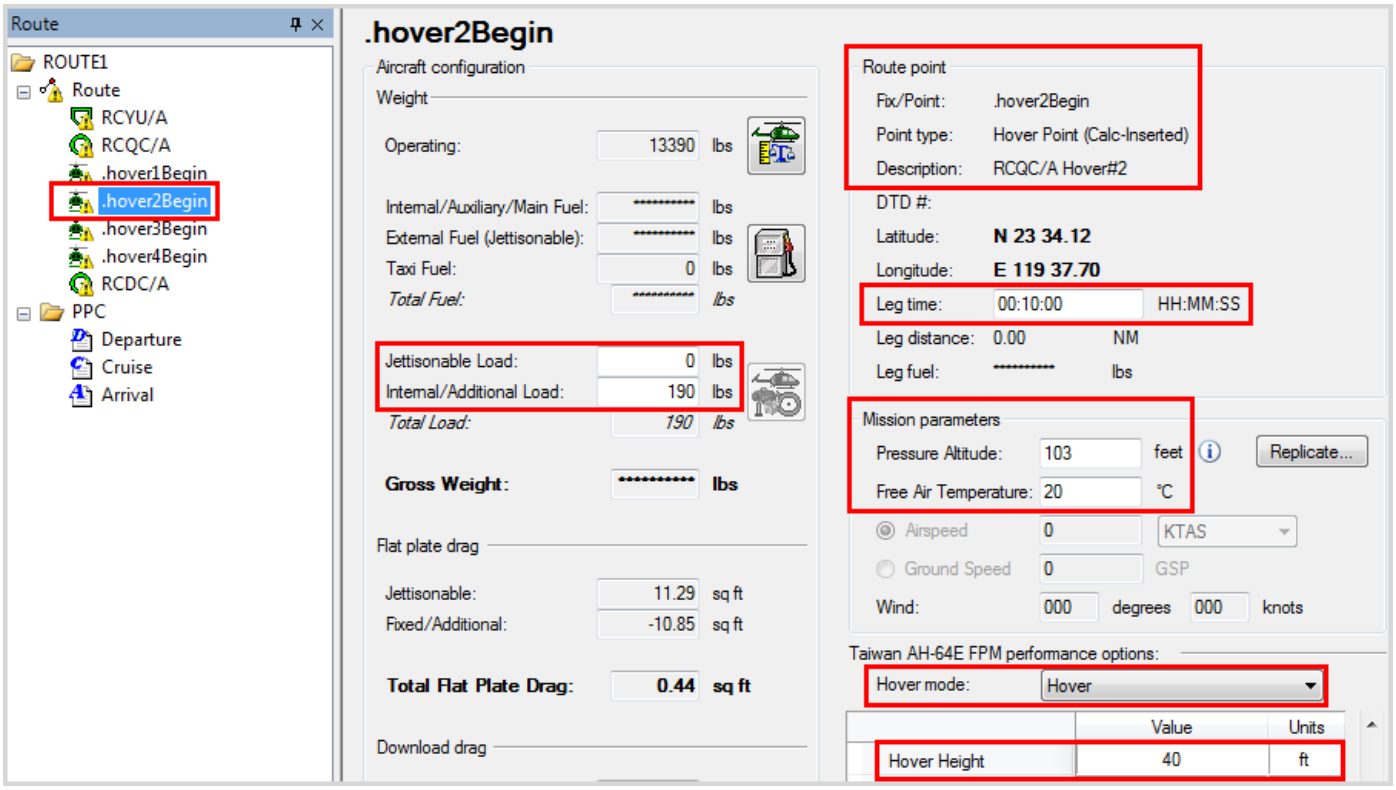


Figure 3-14 Route Point Data - RCQC/A .hover2

(g) **RCQC/A .hover3**

(1) Leg time: 00:15:00

(2) Pressure Altitude: 103 feet

(3) Free Air Temperature: 20 °C

(4) Hover mode: Flight Idle

(5) Operating Engines: Single

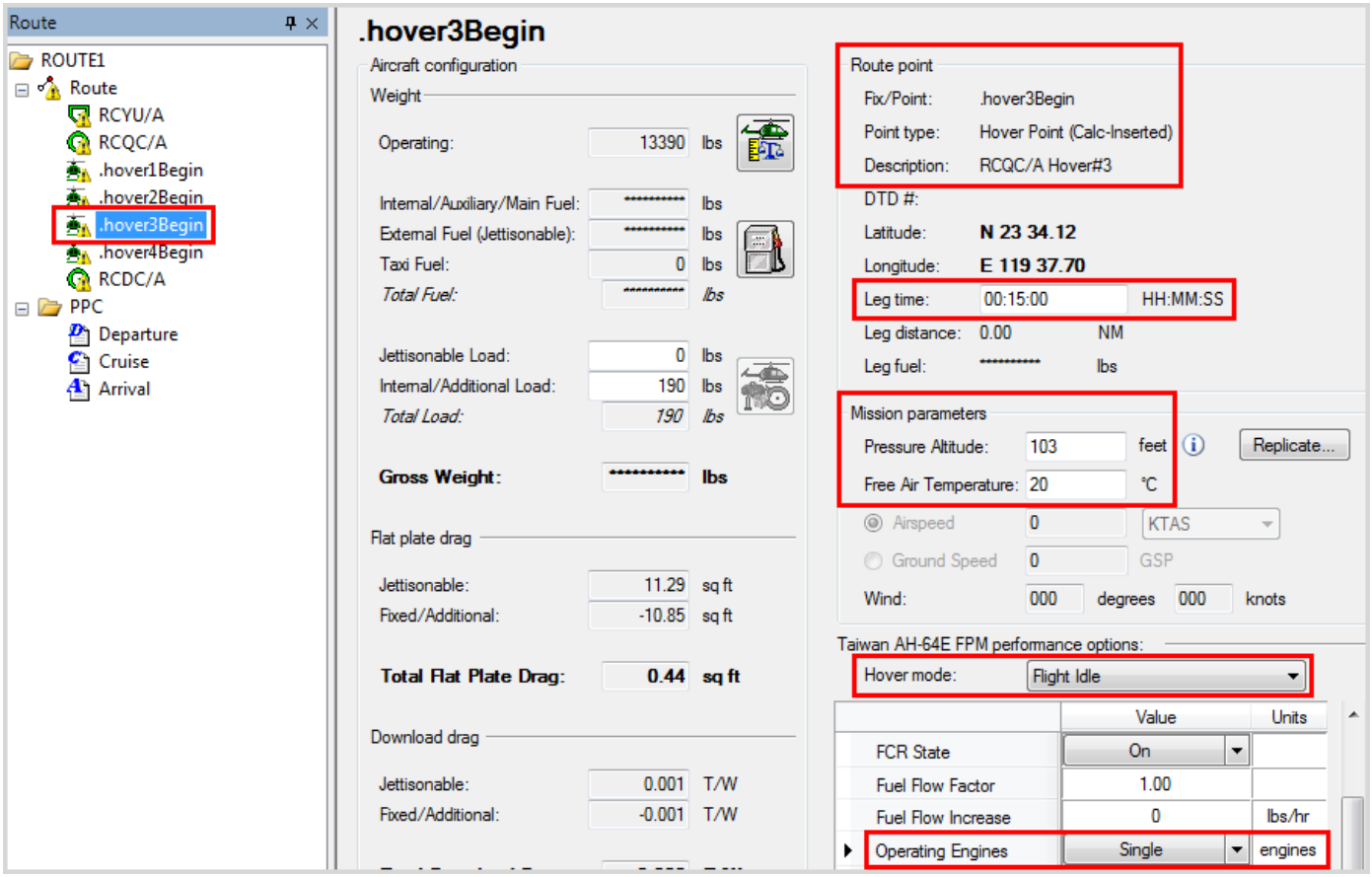


Figure 3-15 Route Point Data - RCQC/A .hover3

(h) **RCQC/A .hover4**

(1) Leg time: 00:10:00

(2) Pressure Altitude: 103 feet

(3) Free Air Temperature: 20 °C

(4) Hover mode: Hover

(5) Hover Height: 5 ft

(6) Operating Engines: Dual

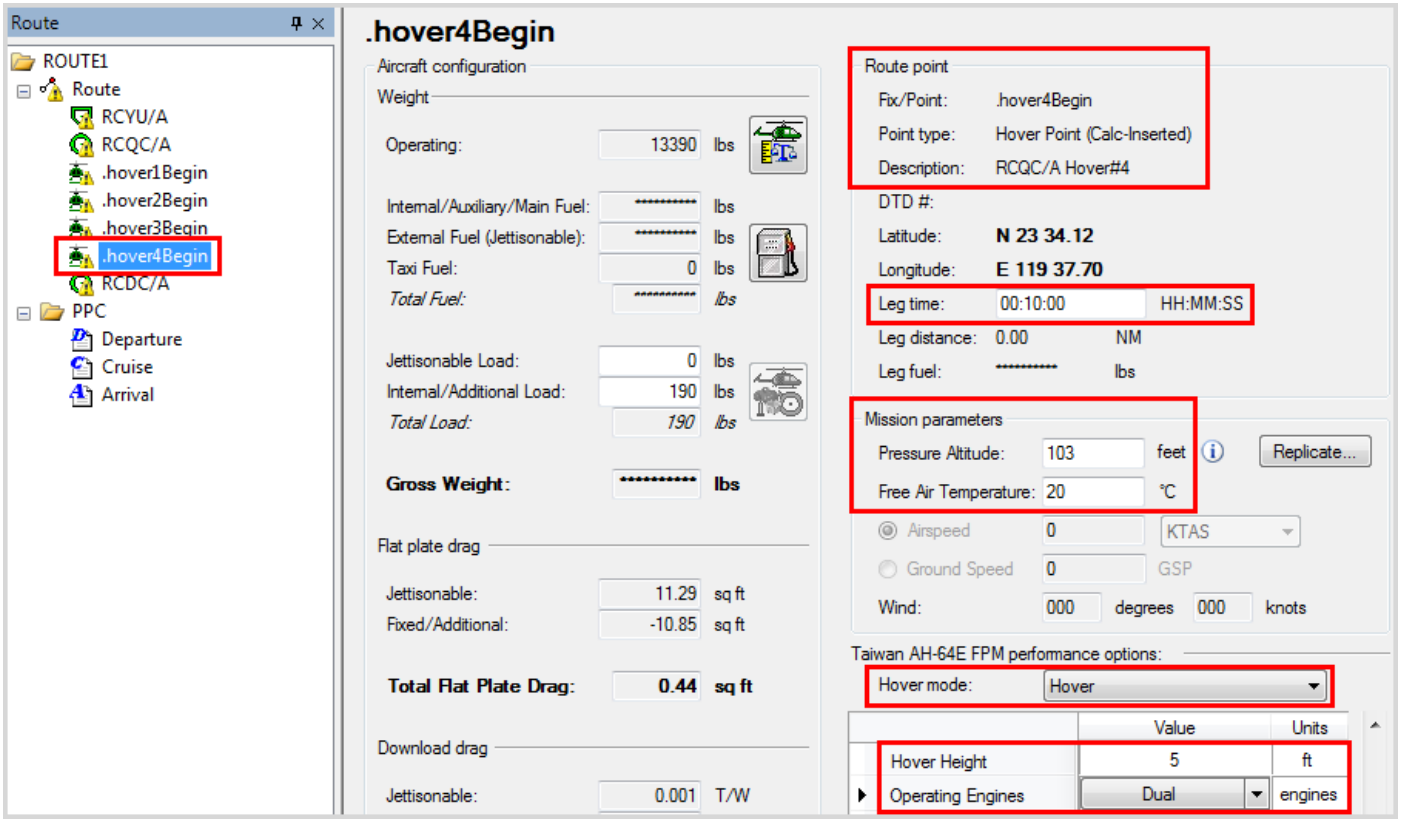


Figure 3-16 Route Point Data - RCQC/A .hover4

(3) **Route Point 3: RCDC/A**

(a) Pressure Altitude: 578 feet

(b) Free Air Temperature: 22 °C

(c) Ground Speed: 120 GSP

(d) Wind: 300/005

(e) Select the "**Calculate**" button

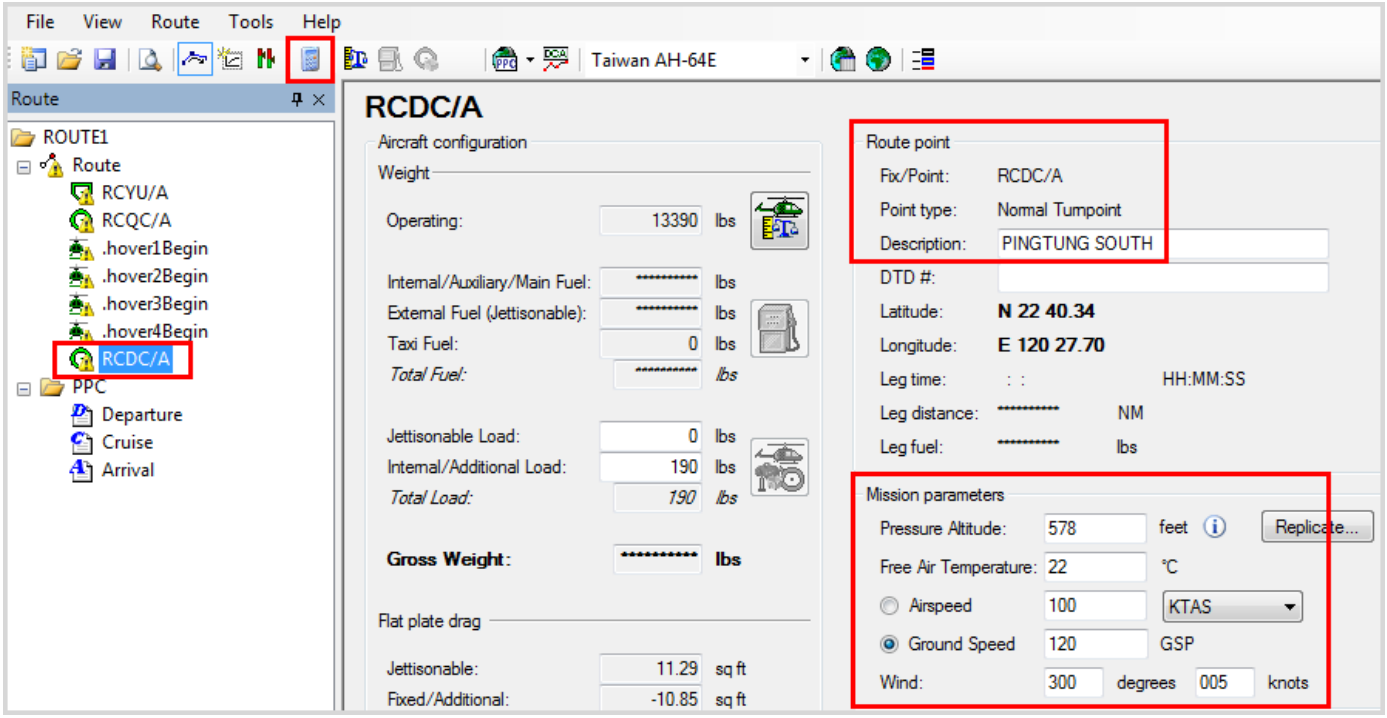


Figure 3-17 Route Point Data - RCDC/A

3.5. Fuel Configuration Inputs

Select Route Point RCQC/A, .hover3, and perform the following steps:

(1) Select the "**Open Route Point Fuel Configuration**" button
(2) Select "**Add**"
(3) Amount (lbs): 1400
(4) Select "**Apply**" and "**OK**"
(5) Select the "**Calculate**" button

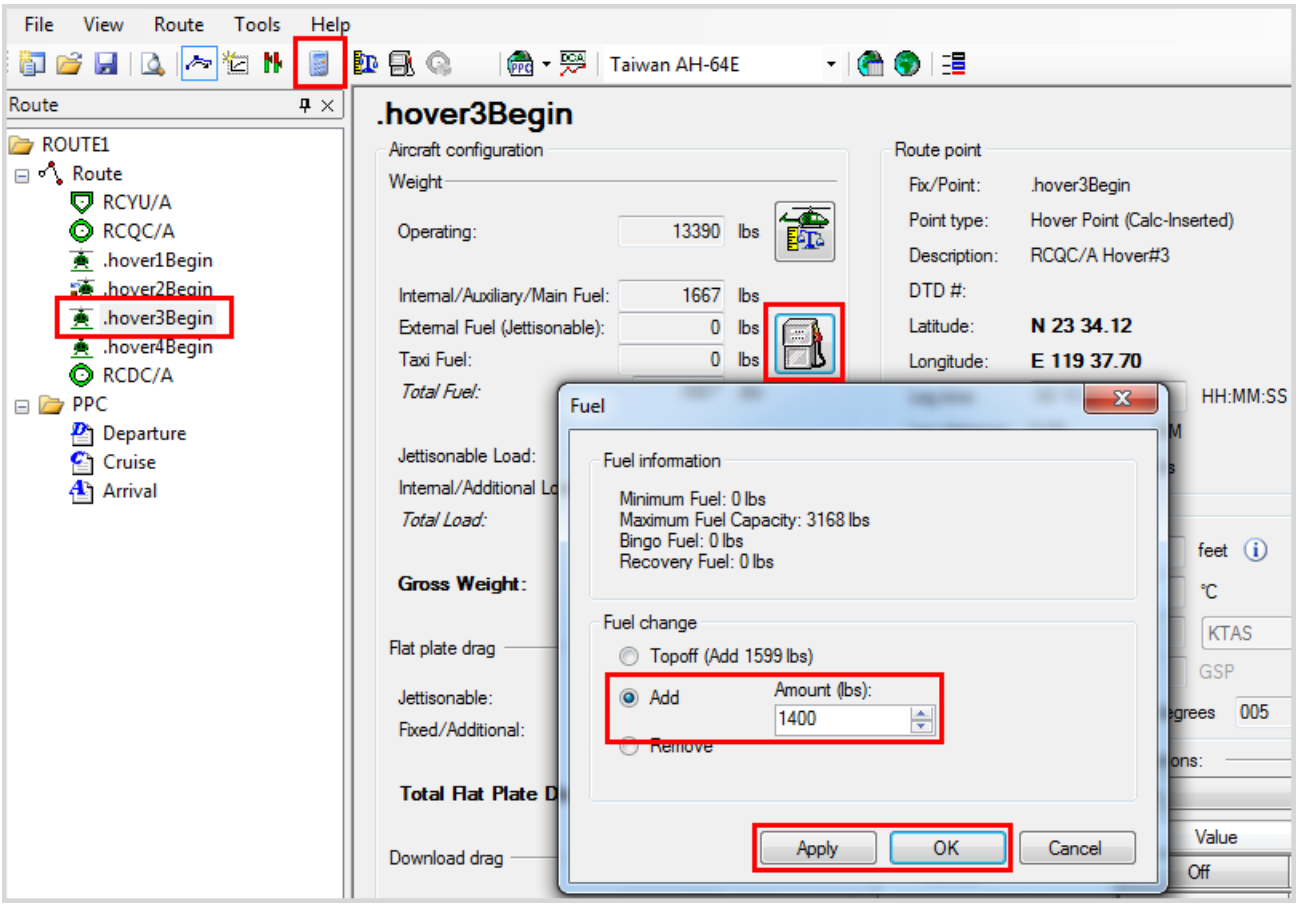


Figure 3-18 Fuel Configuration Inputs

3.6. PPC Inputs

From the Route Tree, perform the following steps for PPC tab designation:

(1) Right-click on Route Point 1, RCYU/A, and "**Set as Departure**"
(2) Right-click on Route Point 2, RCQC/A, and "**Set as Cruise**"
(3) Right-click on Route Point 2, RCQC/A, .hover1, and "**Set as Arrival**"
(4) From the IPAC Toolbar select the "**Calculate**" button

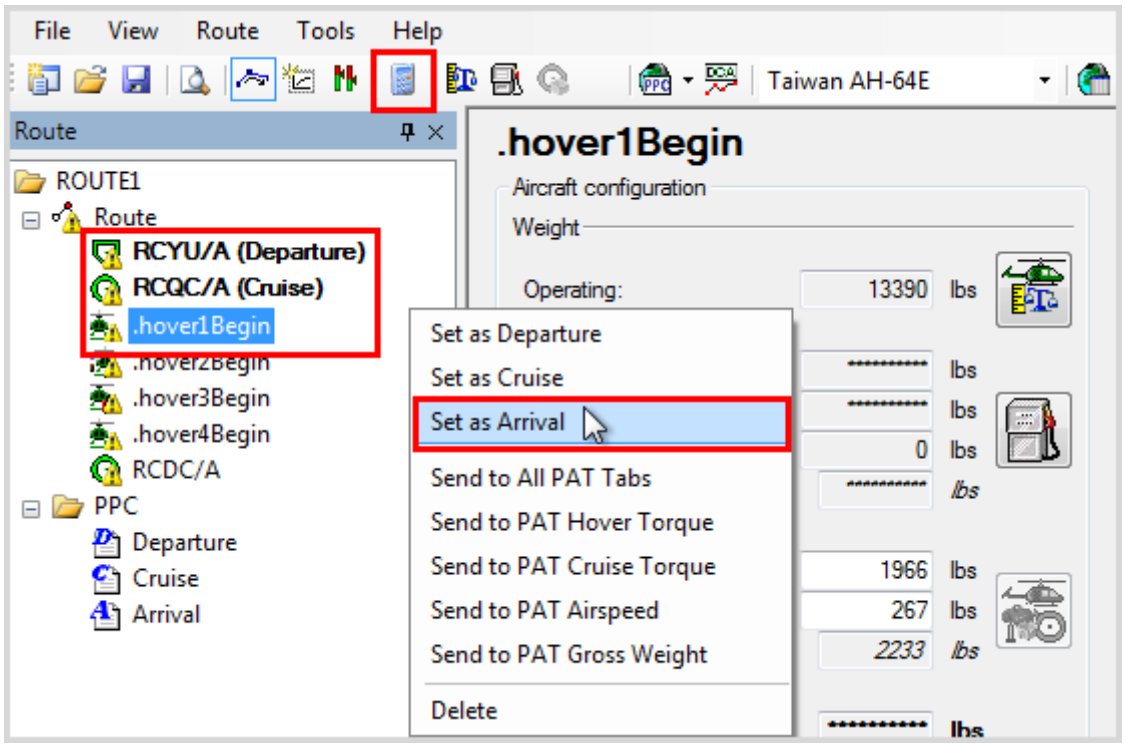


Figure 3-19 Route Point PPC Tab Designations

(5) From the PPC folder in the Route Tree (or the individual PPC tabs), select in order the **Departure**, **Cruise**, and **Arrival** PPC tabs and review the performance data

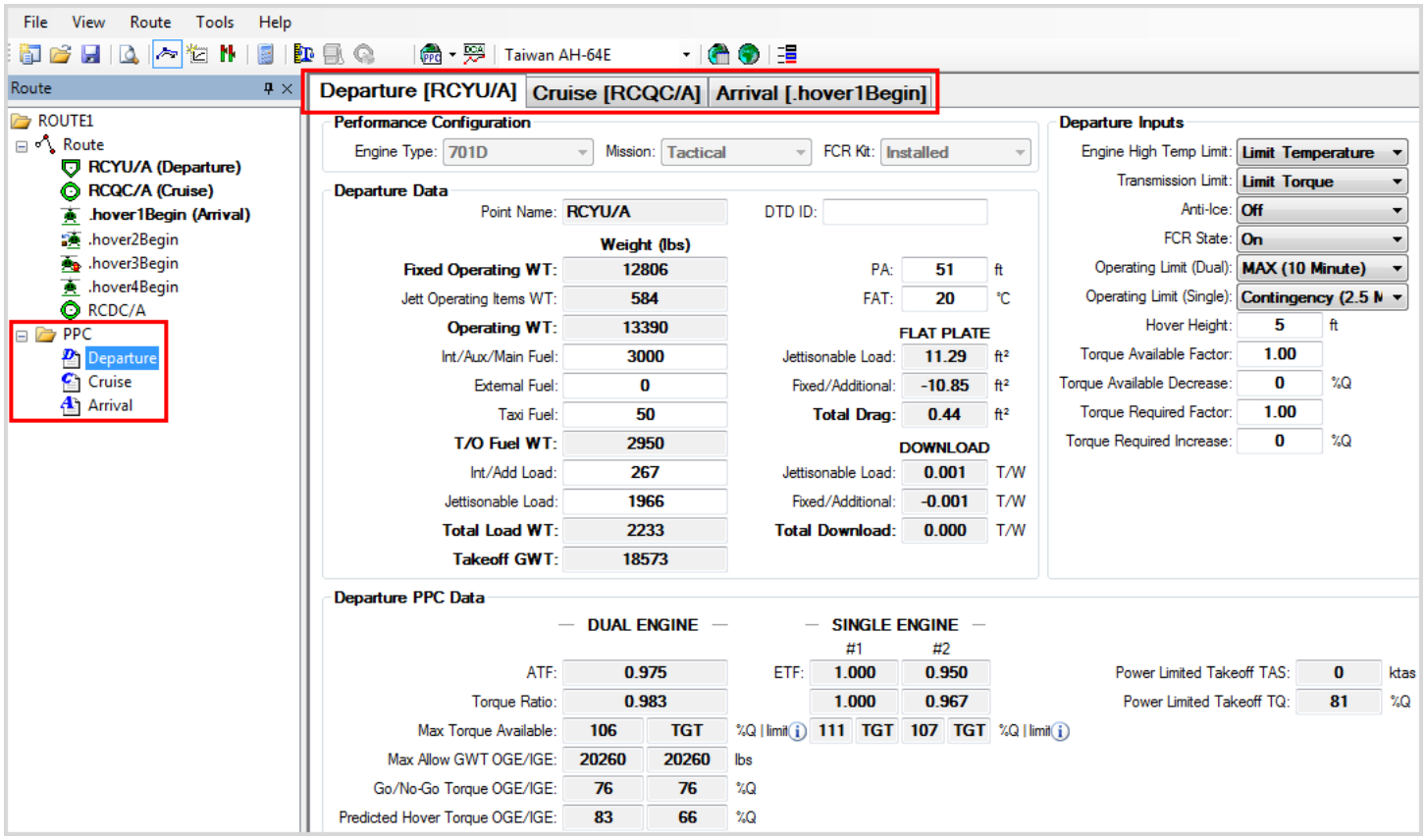


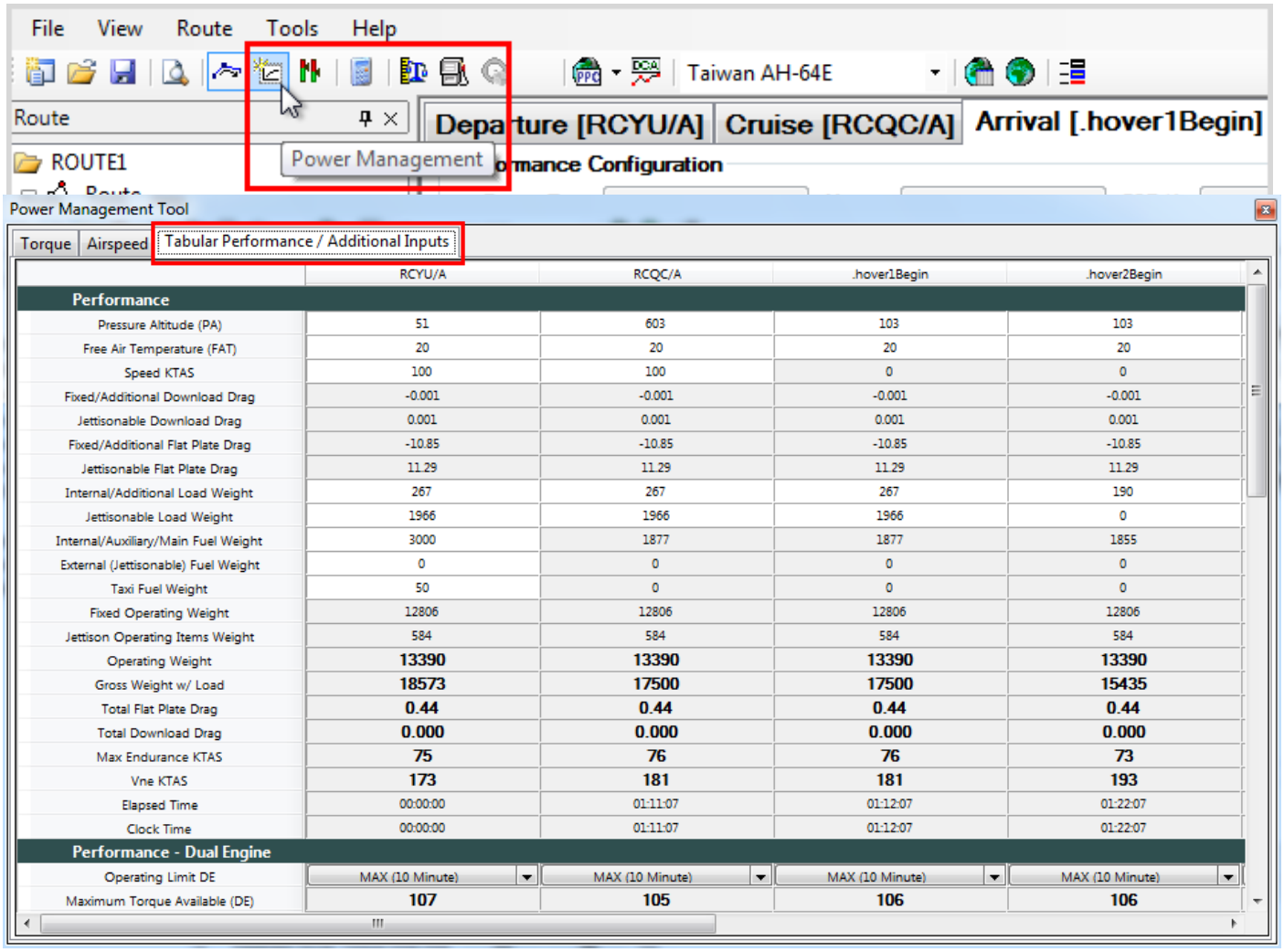
Figure 3-20 PPC Tab Performance Data

3.7. Power Management Tool (PMT)

From the IPAC Toolbar, select the "**Power Management**" button.

The Power Management Tool, or PMT, utilizes three tabs to display performance data in a graphic format, and flight performance model input data in a tabular format.

The Power Management Tool **Tabular Performance / Additional Inputs** tab displays route performance data and additional inputs in a tabular format for the entire route of flight. The tabular data columns allow review of aircraft performance margins and additional inputs to ensure adequate performance capabilities and correct aircraft configuration for each point on the route.



	RCYU/A	RCQC/A	.hover1Begin	.hover2Begin
Performance				
Pressure Altitude (PA)	51	603	103	103
Free Air Temperature (FAT)	20	20	20	20
Speed KTAS	100	100	0	0
Fixed/Additional Download Drag	-0.001	-0.001	-0.001	-0.001
Jettisonable Download Drag	0.001	0.001	0.001	0.001
Fixed/Additional Flat Plate Drag	-10.85	-10.85	-10.85	-10.85
Jettisonable Flat Plate Drag	11.29	11.29	11.29	11.29
Internal/Additional Load Weight	267	267	267	190
Jettisonable Load Weight	1966	1966	1966	0
Internal/Auxiliary/Main Fuel Weight	3000	1877	1877	1855
External (Jettisonable) Fuel Weight	0	0	0	0
Taxi Fuel Weight	50	0	0	0
Fixed Operating Weight	12806	12806	12806	12806
Jettison Operating Items Weight	584	584	584	584
Operating Weight	**13390**	**13390**	**13390**	**13390**
Gross Weight w/ Load	**18573**	**17500**	**17500**	**15435**
Total Flat Plate Drag	**0.44**	**0.44**	**0.44**	**0.44**
Total Download Drag	**0.000**	**0.000**	**0.000**	**0.000**
Max Endurance KTAS	**75**	**76**	**76**	**73**
Vne KTAS	**173**	**181**	**181**	**193**
Elapsed Time	00:00:00	01:11:07	01:12:07	01:22:07
Clock Time	00:00:00	01:11:07	01:12:07	01:22:07
Performance - Dual Engine				
Operating Limit DE	MAX (10 Minute)	MAX (10 Minute)	MAX (10 Minute)	MAX (10 Minute)
Maximum Torque Available (DE)	**107**	**105**	**106**	**106**

Figure 3-21 PMT Tabular Performance / Additional Inputs Tab

The Power Management Tool **Airspeed** tab provides an indication of cruise speed, maximum endurance, and minimum/maximum single engine airspeeds for the current route. The top of the display contains an airspeed symbol legend. Airspeed values for each point on the route are identified with the appropriate airspeed symbol and color. The left side of the display contains an Airspeed KTAS scale, and the bottom of the display contains an Elapsed Time (min) scale. Each segment of the route is identified by the title of the route point or event.

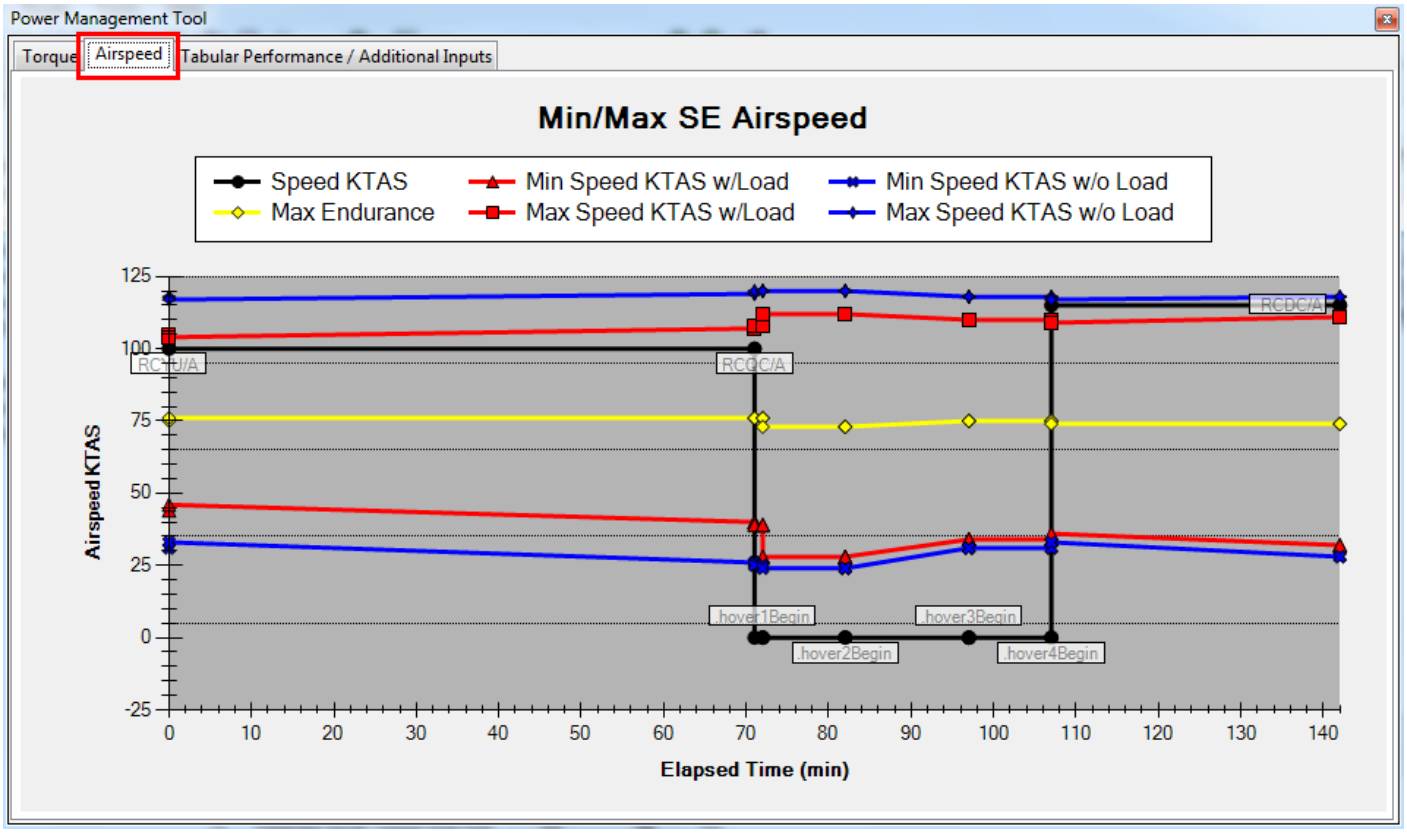


Figure 3-22 PMT Airspeed Tab

The Power Management Tool **Torque** tab provides an indication of dual engine torque required and torque available data for the current route. The top of the display contains a Torque symbol legend. Torque values for each point on the route are identified with the appropriate Torque legend symbol and color. The left side of the display contains a % Q scale, and the bottom of the display contains an Elapsed Time (min) scale. Each segment of the route is identified by the title of the route point or event.

Close the Power Management Tool when exploration is complete.

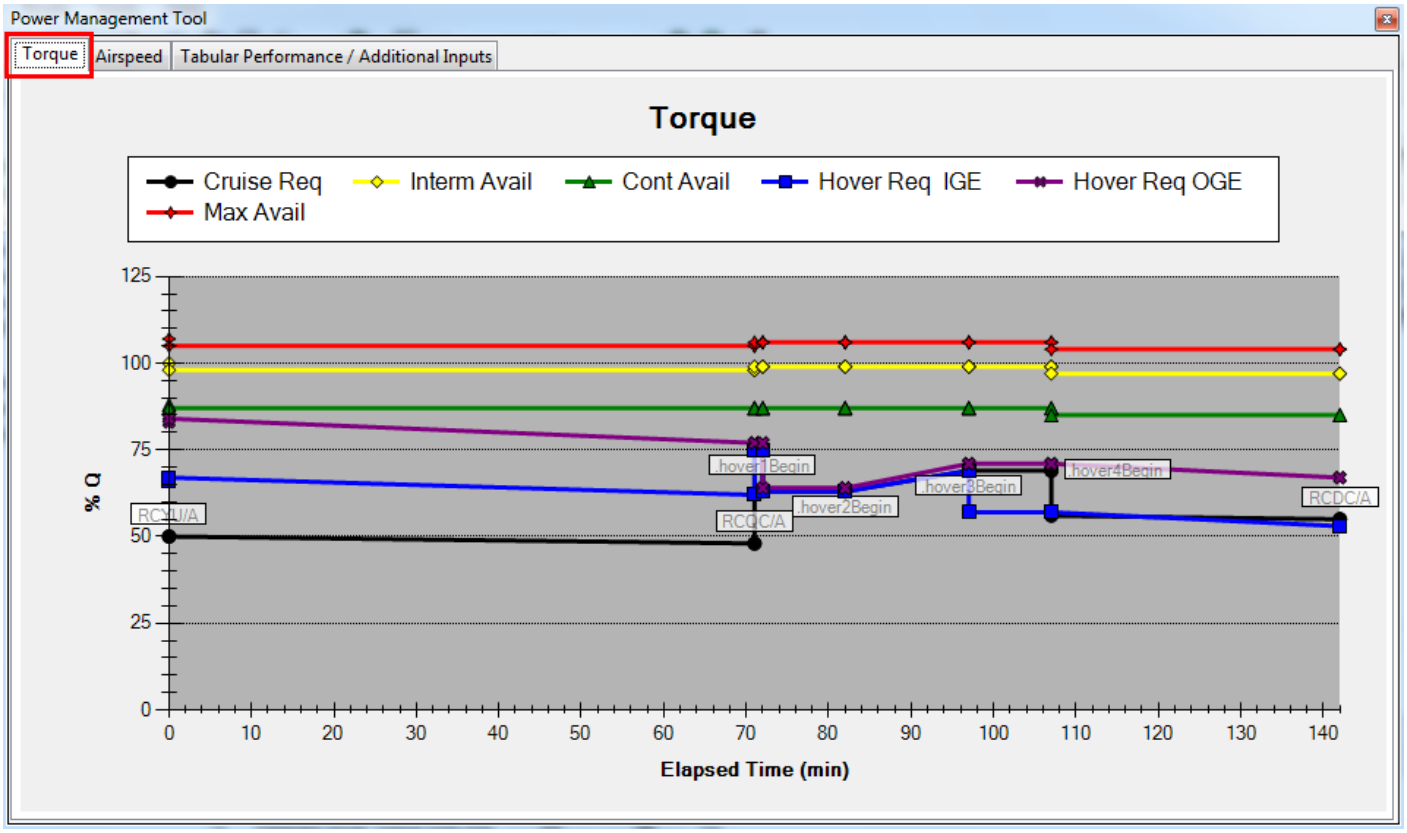


Figure 3-23 PMT Torque Tab

3.8. PPC Print Preview

From the IPAC Toolbar select the "**Print Preview**" button and review the PPC. The PPC for this scenario is shown below. Click the "**Print**" icon on the Print Preview Toolbar to print the completed PPC. Close the Print Preview dialog. Close IPAC-AH64. When you close the application, a dialog displays asking if you want to save this file. For this training, click "**No**" as this file will not be used later.

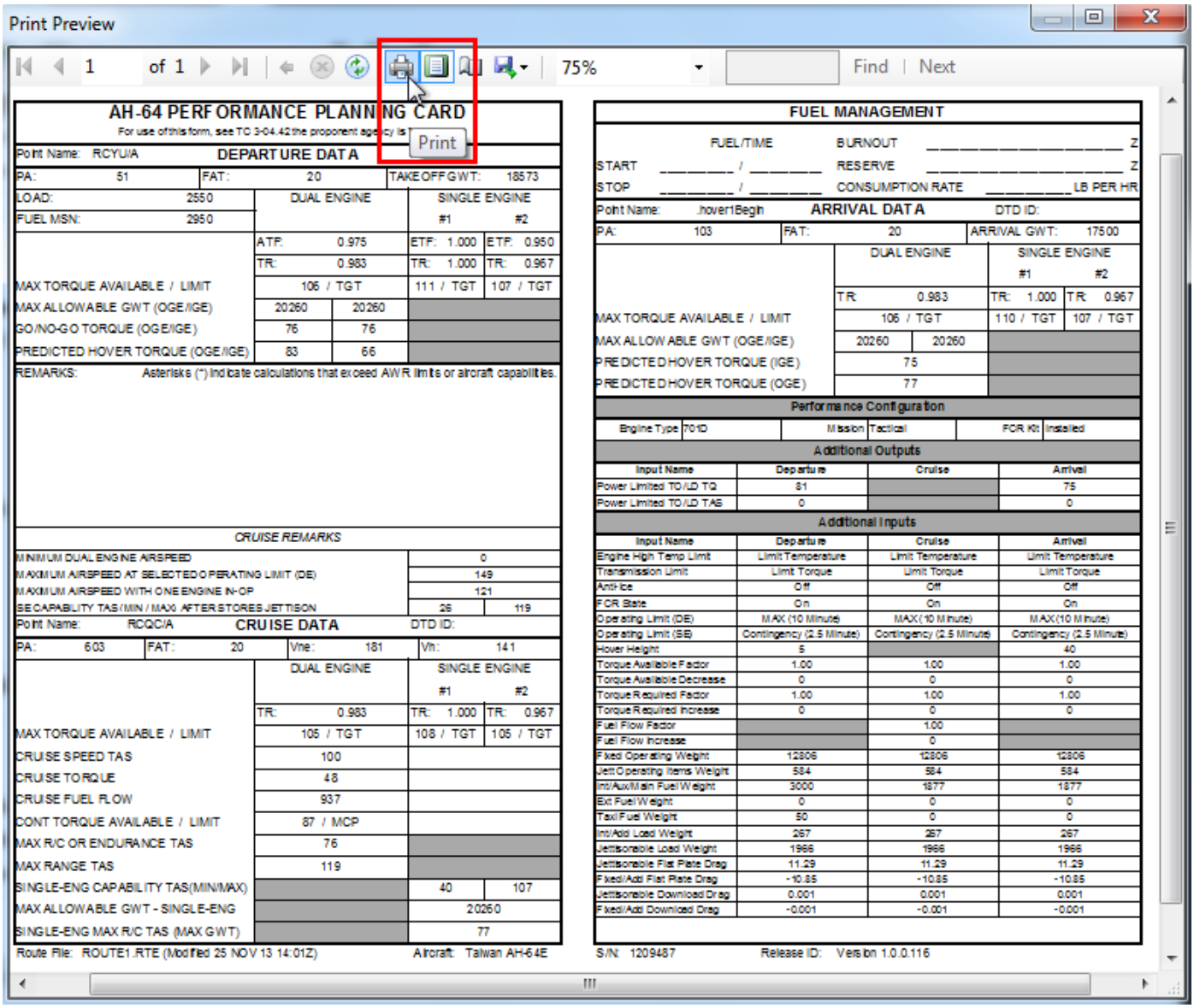


Figure 3-24 Print Preview Dialog

3.9. Saving .rte Files

Though there is no need to save a .rte file for this scenario, instructions are given below for future reference. All information from the current IPAC-AH64 planning session can be saved by use of the following methods:

- Using the Toolbar **File** menu "**Save As…**" function.
- Upon closing IPAC-AH64, selecting "**Yes**" on the IPAC message asking "Do you want to save changes to route 'ROUTE1'?".

In the example below, the IPAC-AH64 file will be saved as 1209487 Gunnery Mission 1. All data entered during the current planning session, to include IPAC aircraft configuration and performance data, and PFPS/CFPS inputs, will be saved in the PFPS Plan Files format with a .rte extension and can be used in subsequent IPAC-AH64 planning sessions for similar missions.

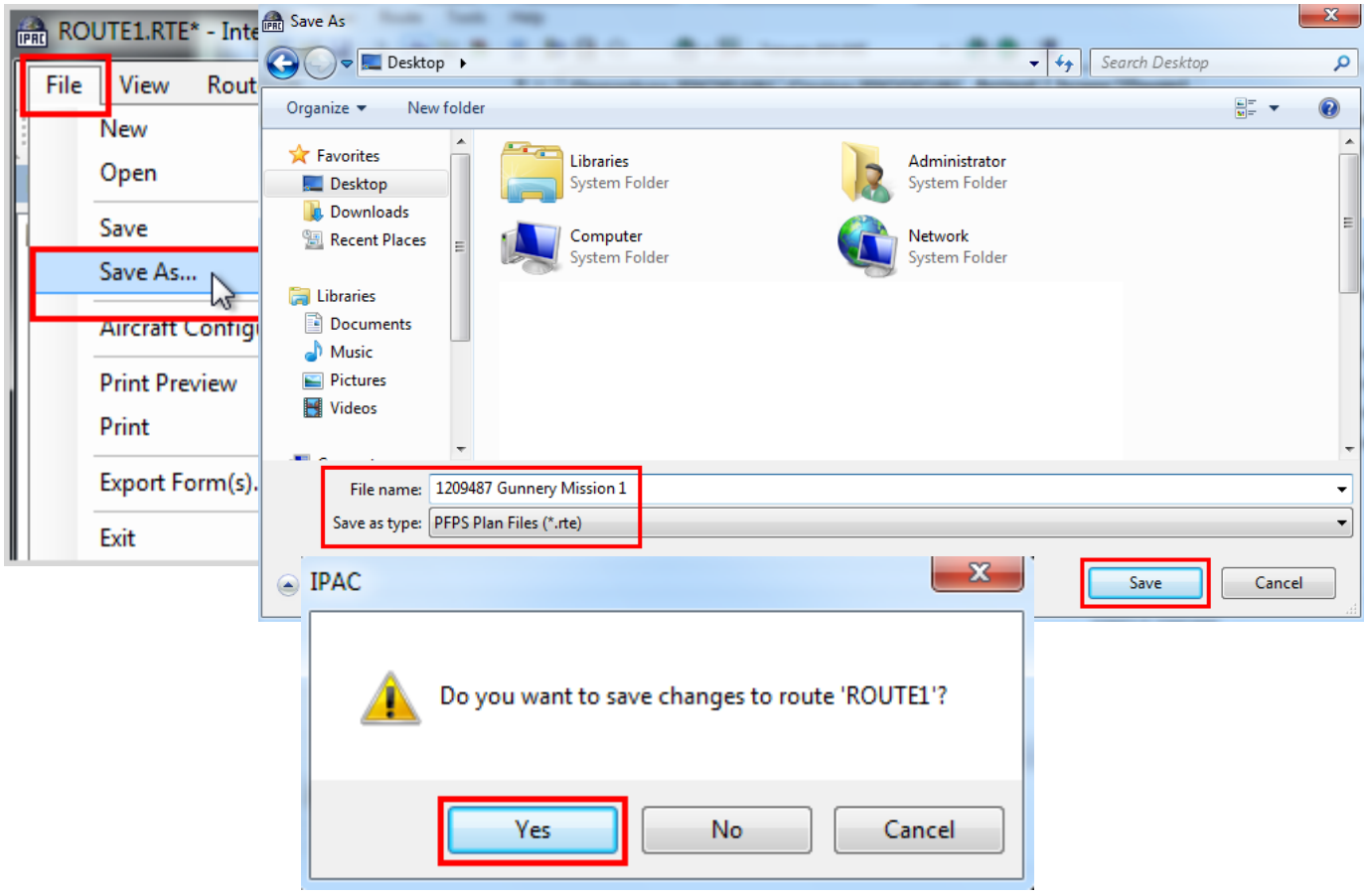


Figure 3-25 Saving .rte Files

4. AFF-AH64 Scenario

This scenario guides you through the use of **AFF-AH64** in preparation of a Tactical Form F for an AH-64E equipped with a 100 gallon Internal Auxiliary Fuel System (IAFS) tank, Longbow Hellfire launchers, rocket launchers, and Air-to-Air missiles.

The following information provides the steps for completing this scenario, and the location of the required input data.

To open the AFF-AH64 application, click the AFF-AH64 desktop shortcut, and AFF-AH64 opens to with the Operating Weight tab displayed.

Figure 4-1 AFF-AH64 Desktop Shortcut

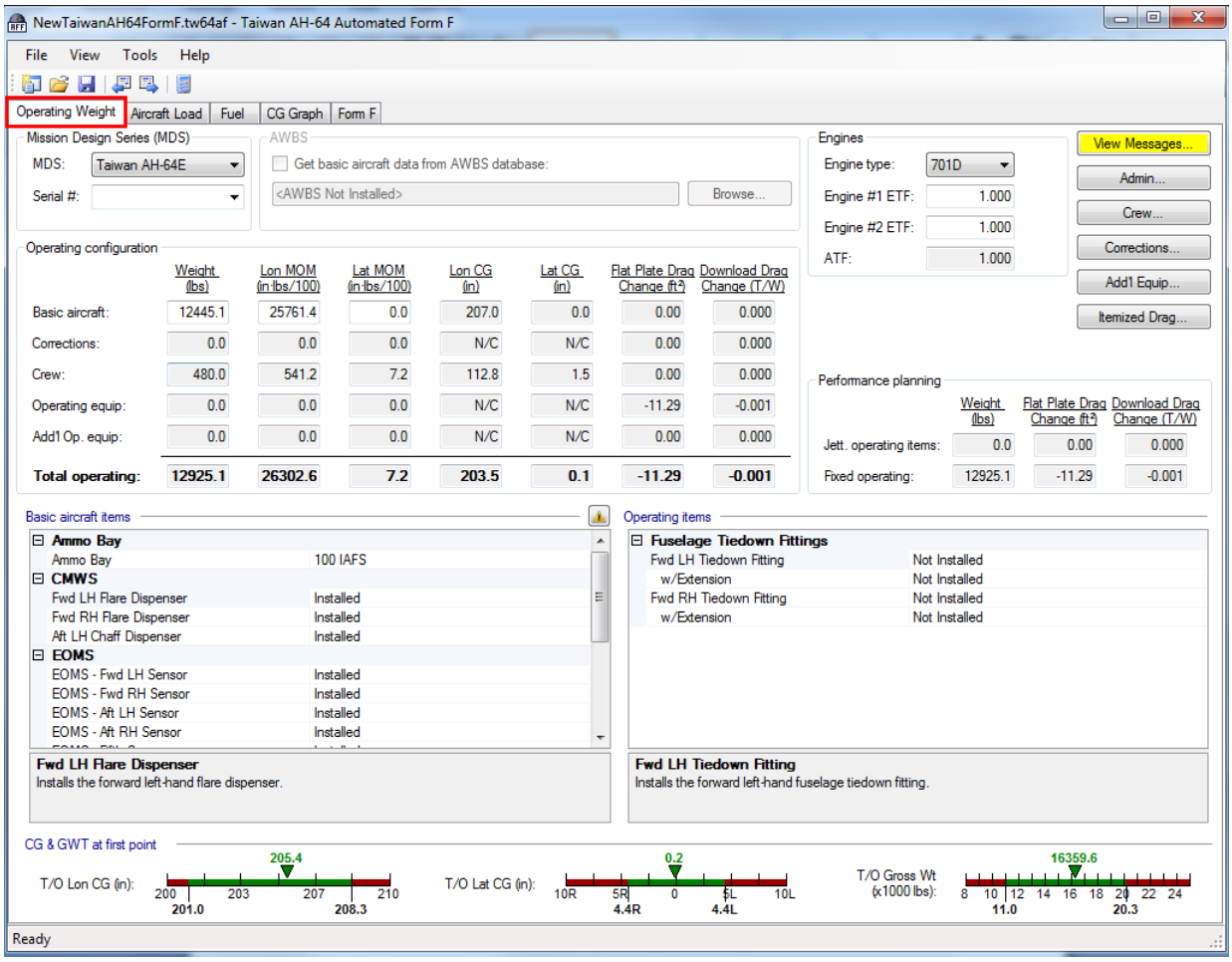


Figure 4-2 AFF-AH64 Operating Weight Tab

4.1. Importing an Aircraft Configuration File

For this scenario, there is no need to import a file. However, if a previously saved aircraft configuration (.acfg) file that corresponds to the aircraft configuration for the mission being planned is required for use, select **File** from the Toolbar, then select **Import Aircraft Configuration…** as shown below.

Select the required .acfg file from its folder location, and either double-click the .acfg file, or select "**Open**". The saved configuration data in the .acfg file will be imported into the current AFF-AH64 session. Select "**OK**" on the AH-64 Automated Form F message to acknowledge import of the data, and close the message.

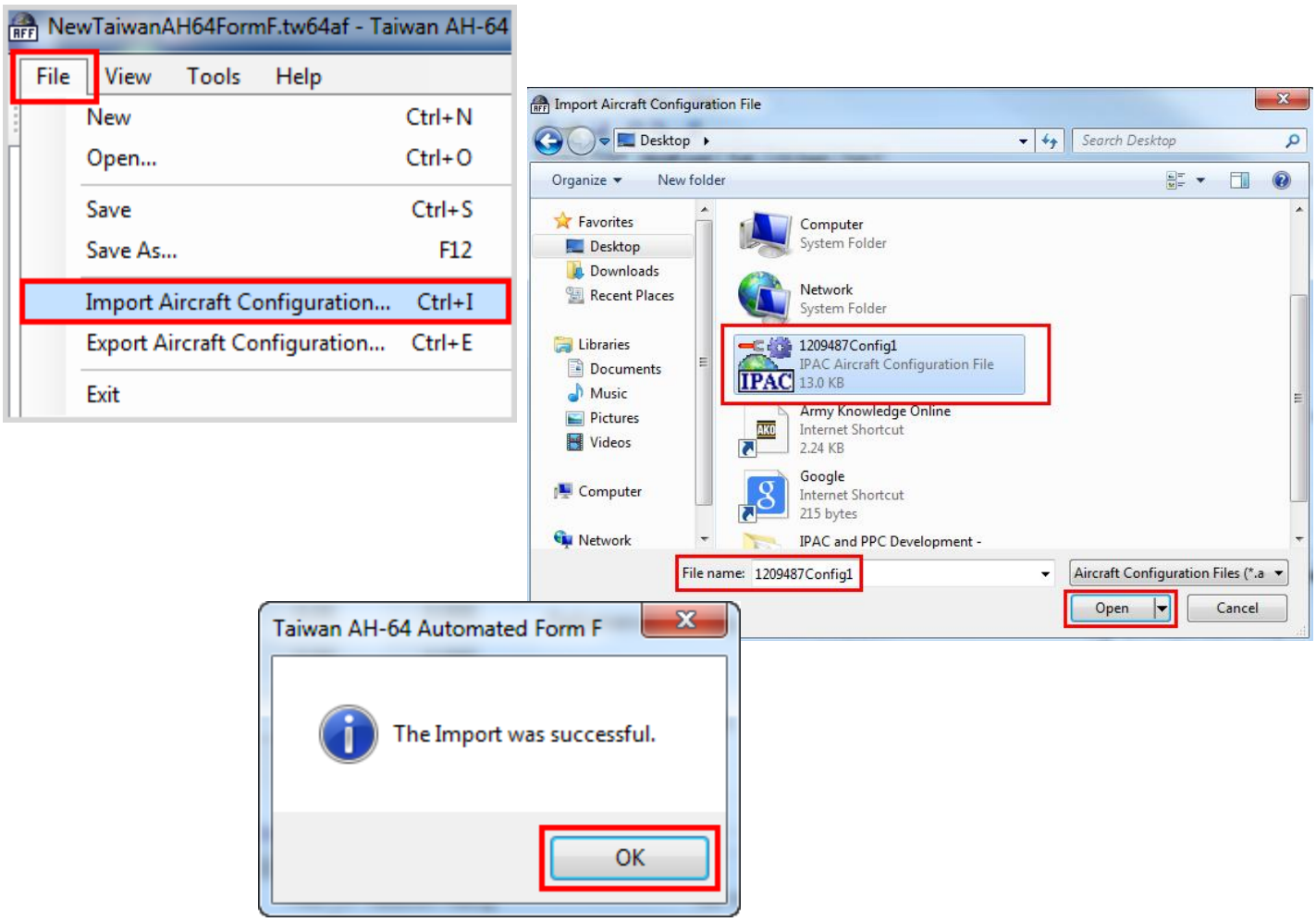


Figure 4-3 Importing .acfg Files

4.2. Operating Weight Tab Inputs

Enter or verify the following data in the Operating Weight tab:

(a) Serial #: 1209487
(b) Basic aircraft Weight: 12455.6
(c) Basic aircraft Lon MOM: 25741.3
(d) Basic aircraft Lat MOM: 0.0
(e) Engine #1 ETF: 1.000
(f) Engine #2 ETF: .95

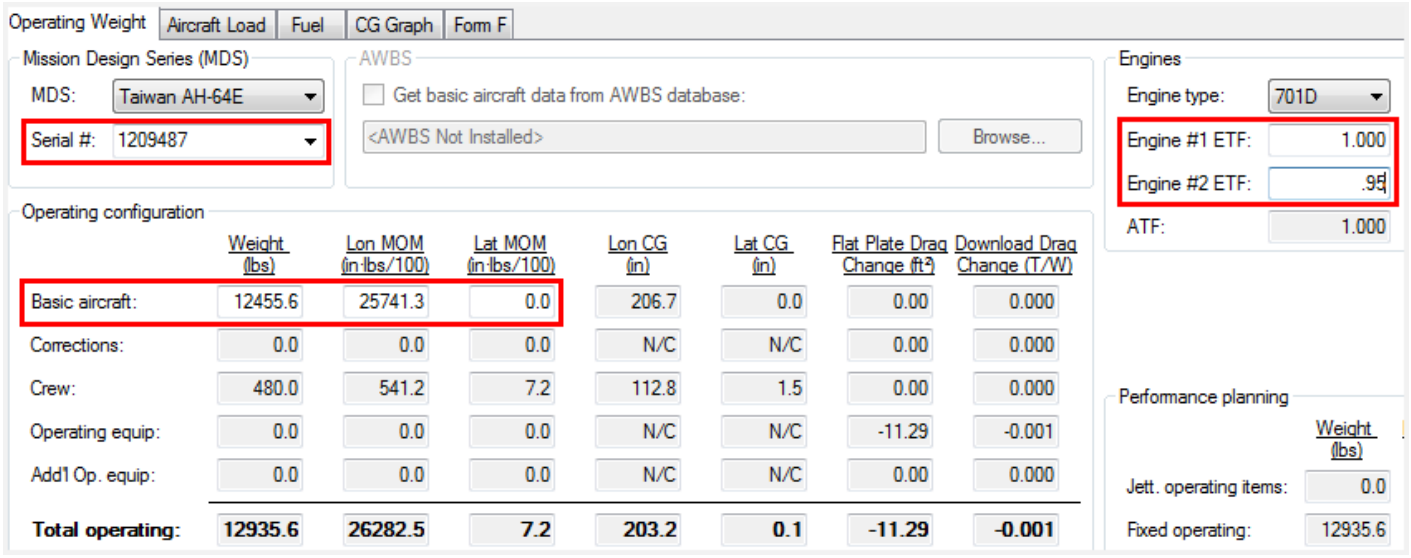


Figure 4-4 Operating Weight Tab Inputs

4.2.1. Crew Dialog Inputs

Select the "**Crew…**" button, and enter or verify the following data:

(1) Pilot Weight: 180
(2) CPG Weight: 160

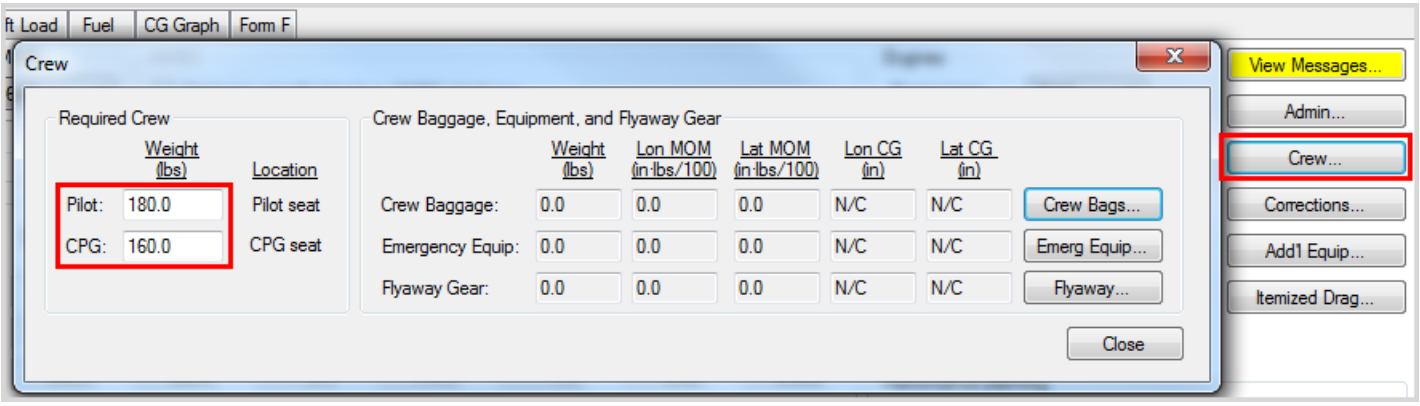


Figure 4-5 Crew Dialog Inputs

(3) Select the "**Crew Bags...**" button, then the "**Add New...**" button and enter or verify the following data:

(a) Name: Crew Bags

(b) Location: **RH Fly Away Storage Bay**

(c) Weight: 10 lbs

(d) Select "**OK**" and "**Close**" to close the Crew Baggage dialog

(e) Select "**Close**" to close the Crew dialog

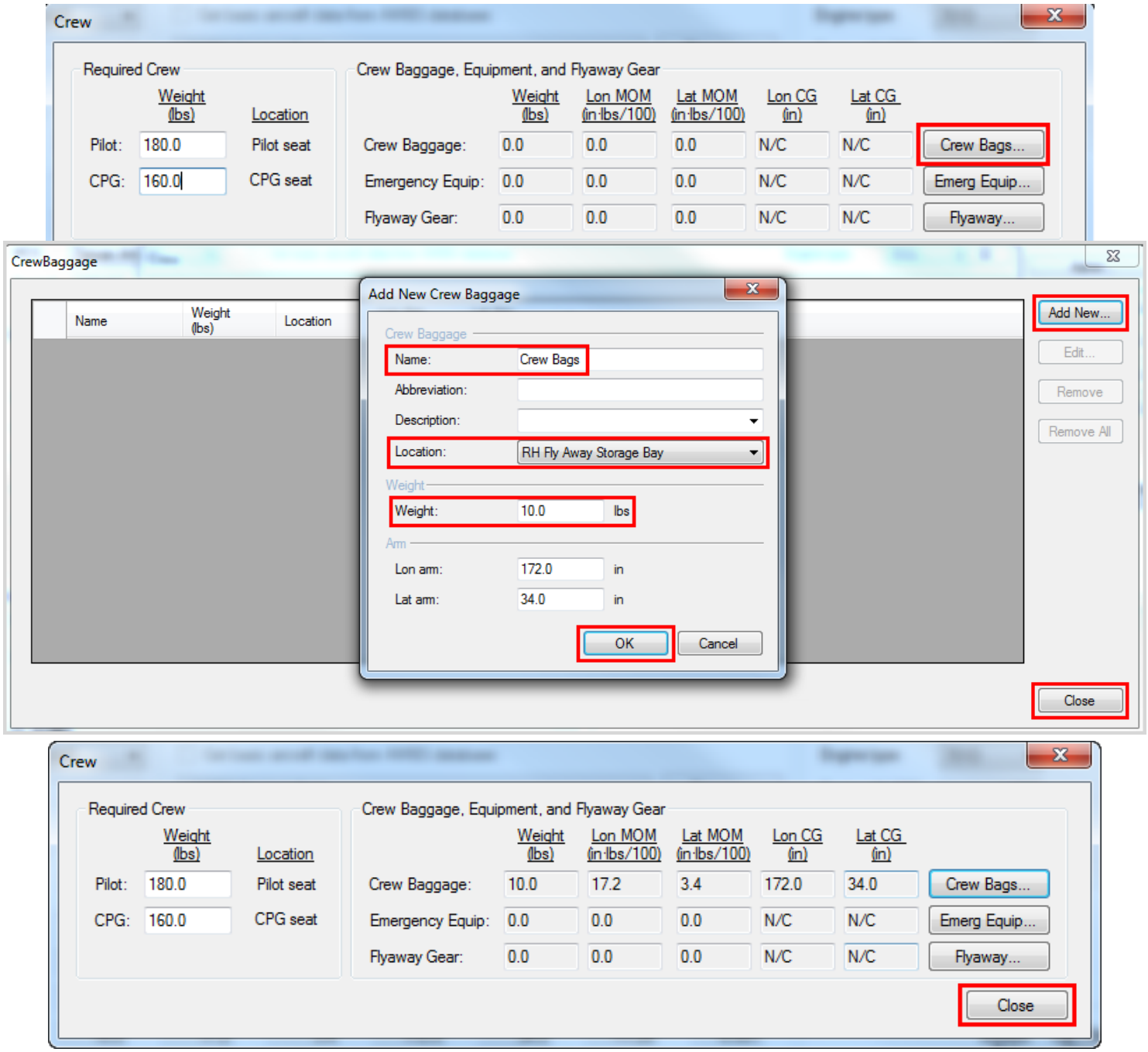


Figure 4-6 Crew Baggage Dialog Inputs

4.2.2. Basic Aircraft and Operating Items Inputs

From the Basic aircraft items section drop-down lists, select or verify the following items:

(a) Ammo Bay: **100 IAFS**
(b) CMWS: Dispensers all **Installed**
(c) EOMS: Sensors all **Installed**
(d) Pylons: All **Installed**
(e) FCR Kit: **Installed**

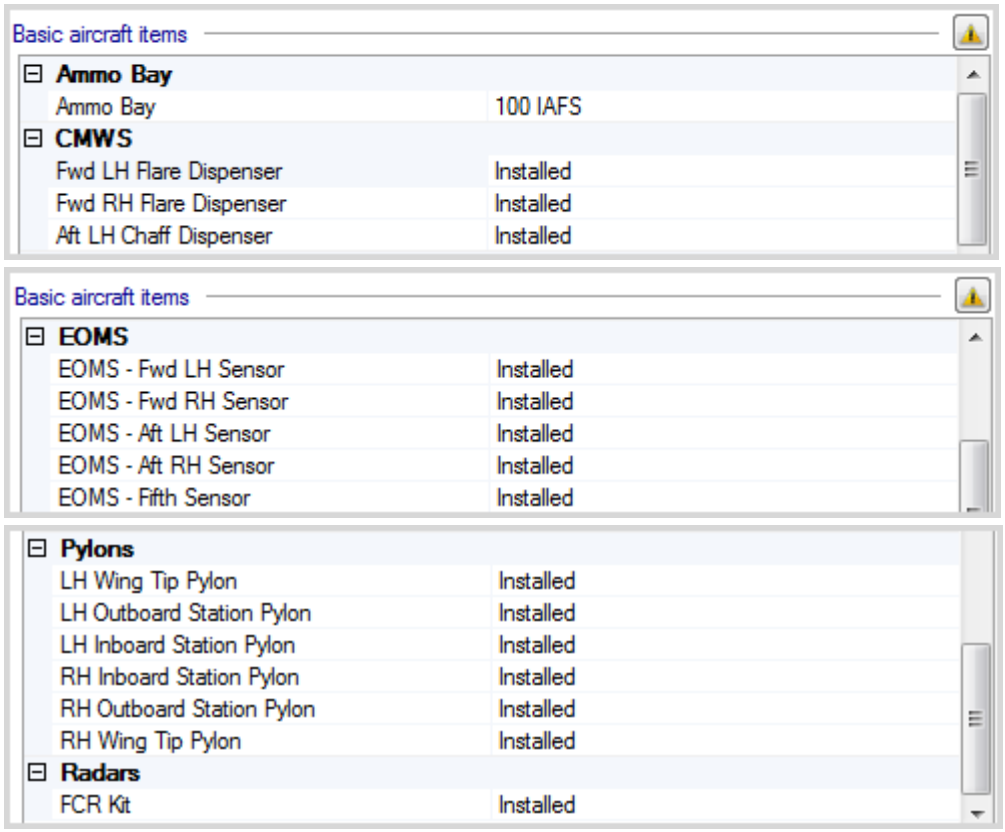


Figure 4-7 Basic Aircraft Items

From the Operating items section drop-down lists, verify the following:

Fwd LH and Fwd RH Tiedown Fitting and Extension: **Not Installed**

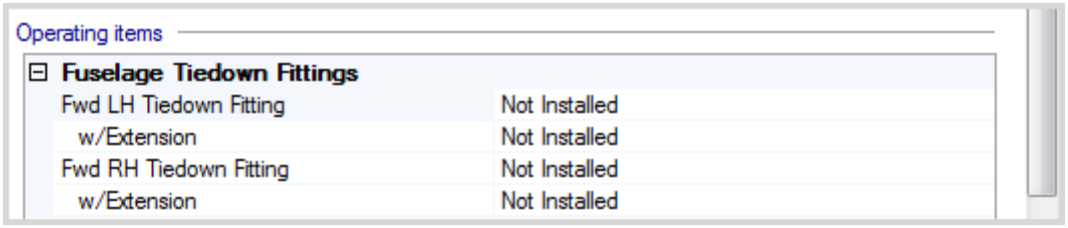


Figure 4-8 Operating Items

4.2.3. Additional Operating Equipment Dialog Inputs

Select the "**Add'l Equip…**" button, and then the "**Add New..**." button to enter or verify the following data in the Additional Operating Item dialog:

(a) Name: Test ASE Antenna
(b) Weight: 1.5 lbs
(c) Lon arm: 371 in
(d) Flat plate drag: 0.44 sq ft
(e) Select "**OK**" to close the Add New Additional Operating Item dialog
(f) Select "**Close**" to close the Additional Operating Equipment dialog

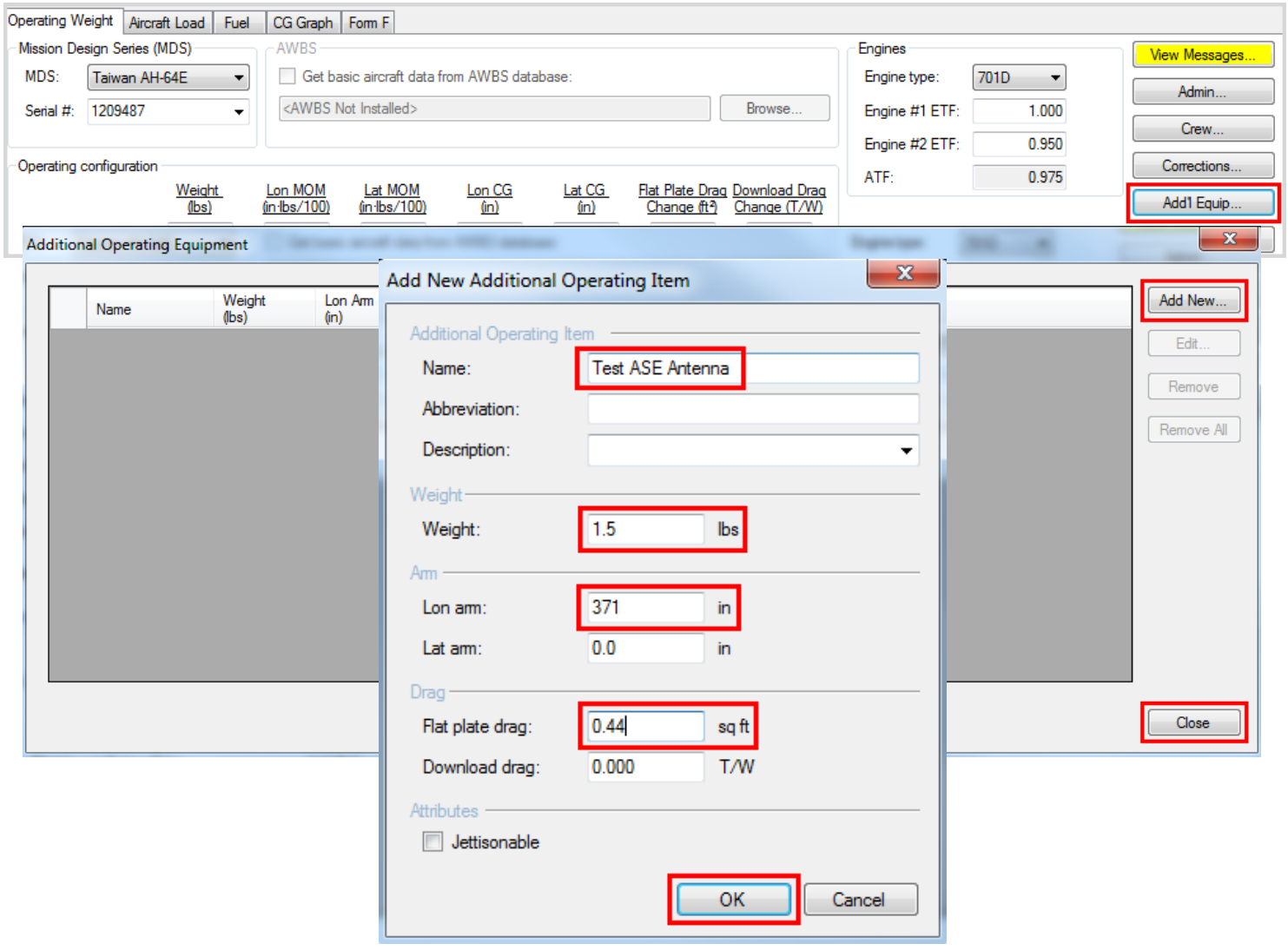


Figure 4-9 Additional Operating Equipment Dialog Inputs

4.3. Aircraft Load Tab Inputs

Select the **Aircraft Load tab** and enter or verify the following data:

(1) Route point is **Takeoff**, and the **Ramp** radio button is selected

(2) Drag and drop the following items:

(a) Station A and B: **ATA Launcher**

(b) Station 1 and 4: **M-261 Rocket Launcher**

(c) Station 2 and 3: **M-299 Hellfire Launcher (4-Rail)**

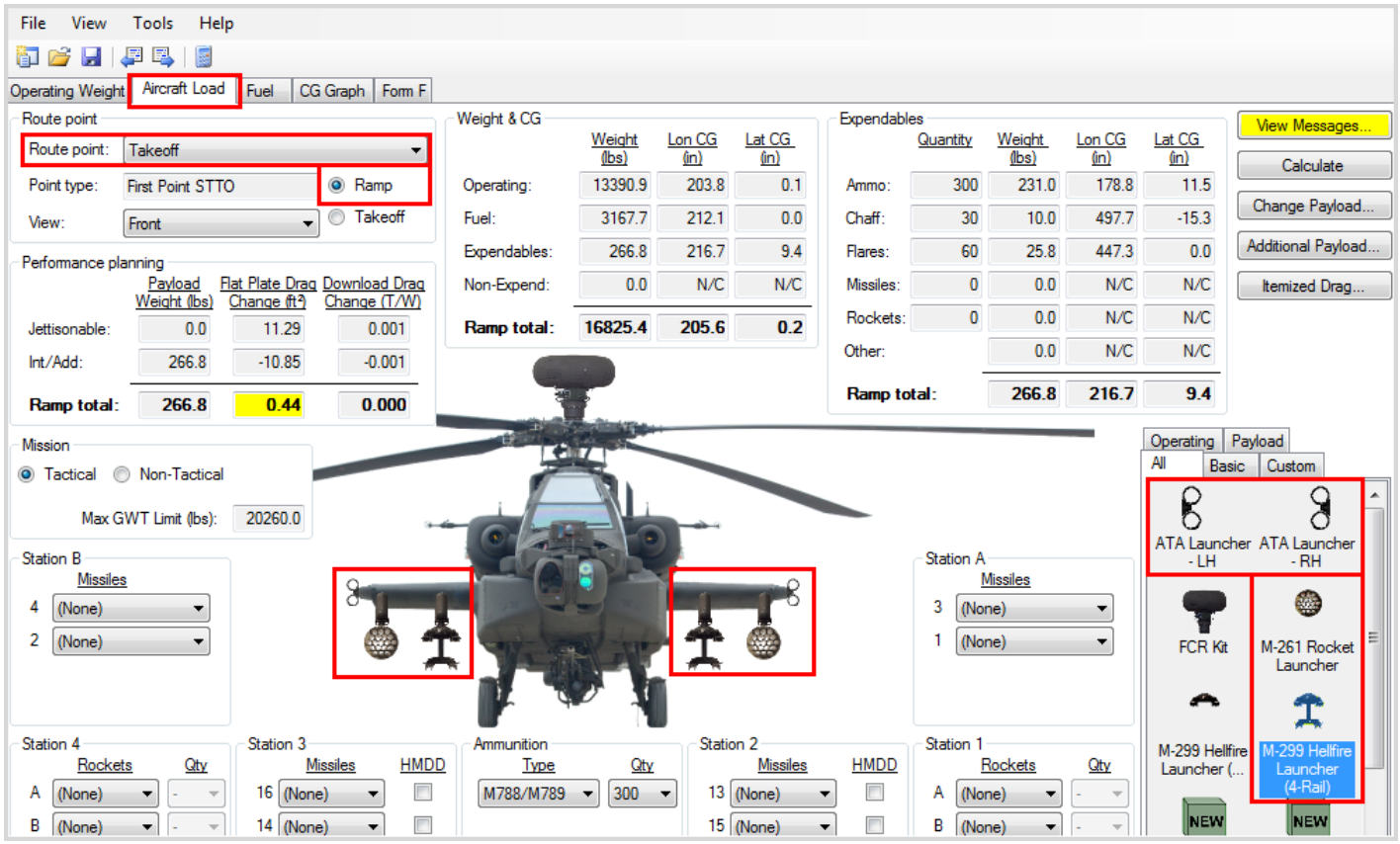


Figure 4-10 Aircraft Load Tab Rocket/Missile Launcher Inputs

(3) Select the following from the pull down menus:

(a) Station A and B: **Stinger Missile** (load all tubes)

(b) Station 2 and 3: **AGM-114N** (load all rails)

(c) Station 1 and 4: **6MP/M261** (load all zones)

(d) Ammunition: **M788/M789** - Qty **300**

Figure 4-11 Stinger Missile Inputs

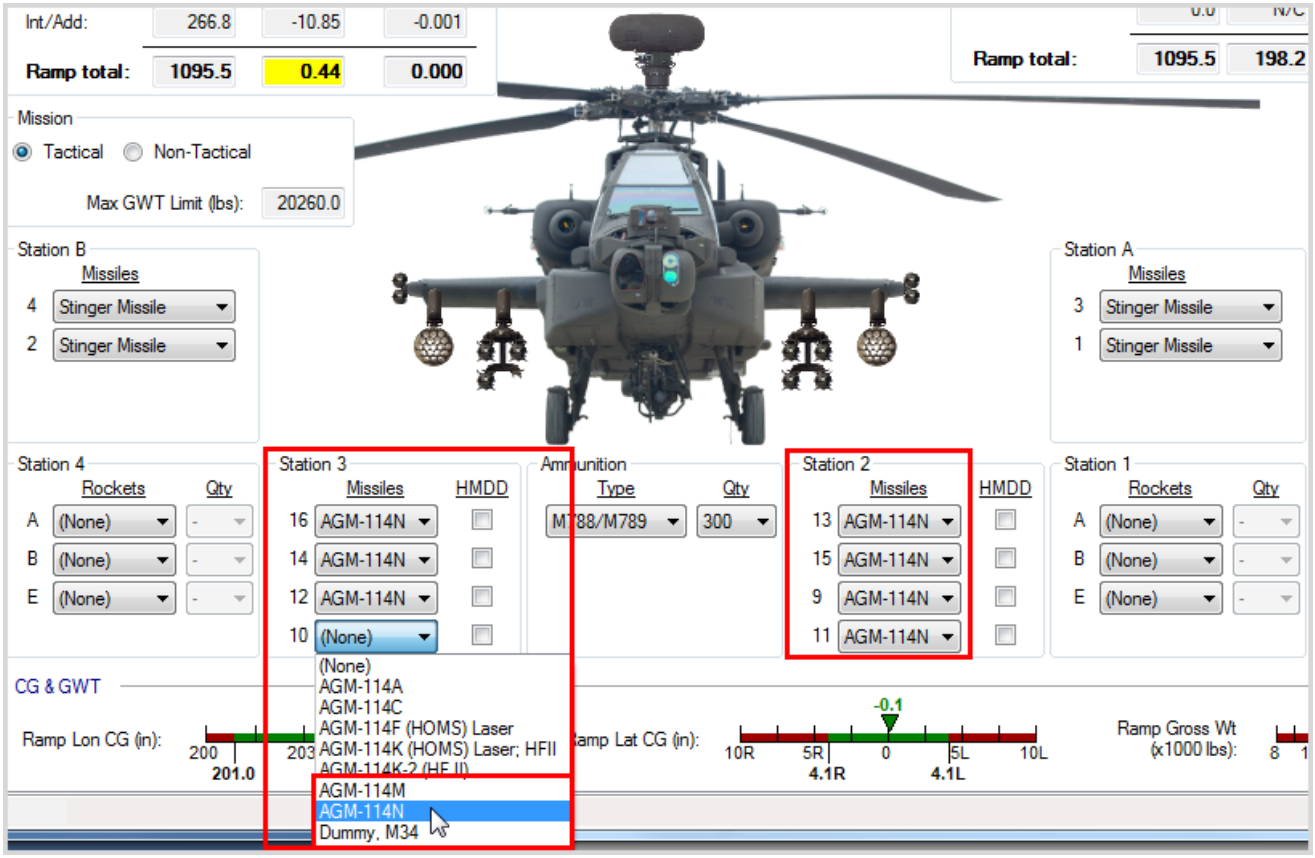


Figure 4-12 Hellfire Missile Inputs

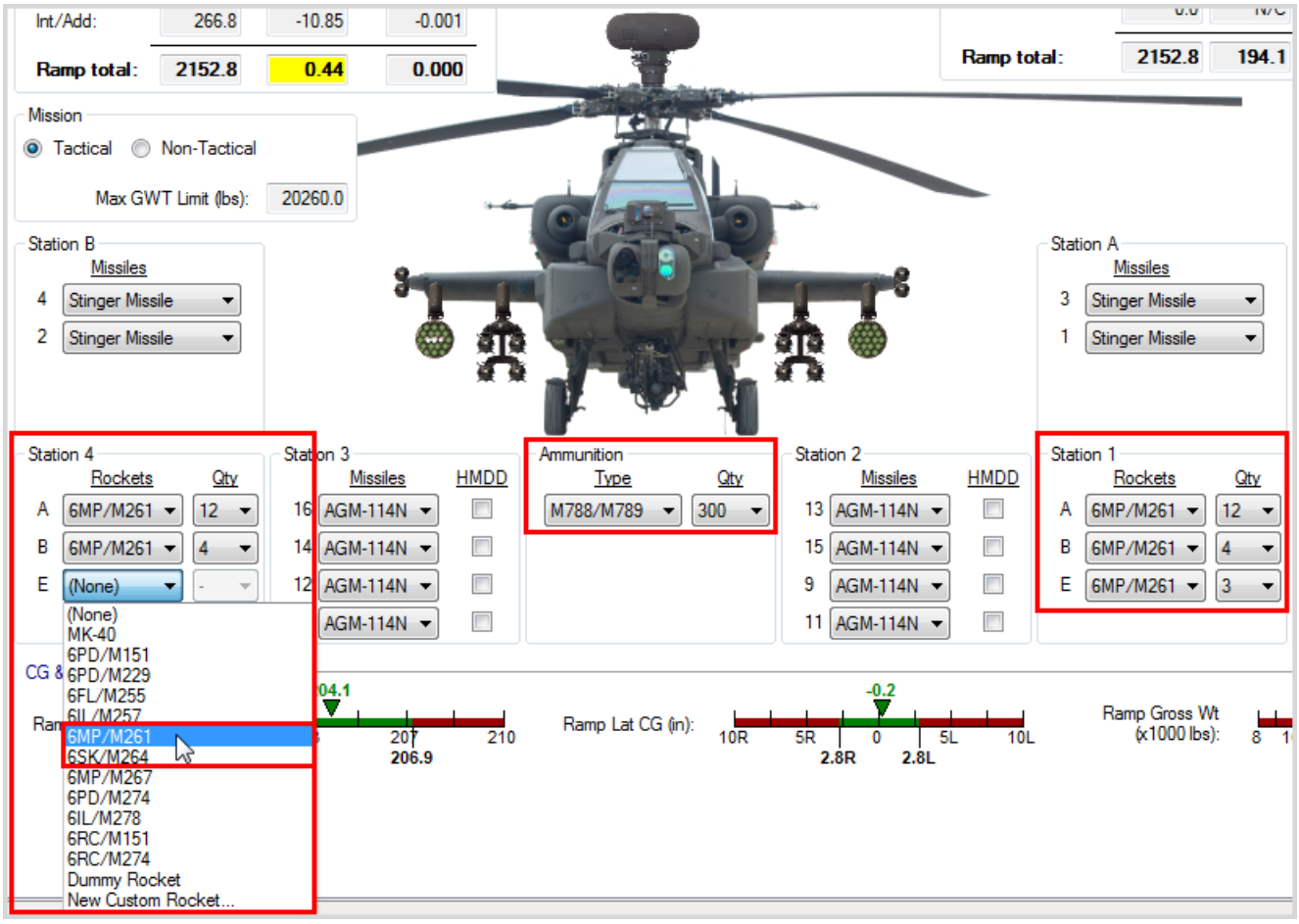


Figure 4-13 Rocket and 30 MM Ammunition Inputs

4.4. Fuel Tab Inputs

Select the **Fuel tab** and enter or verify the following data:

(1) Route point is "**Takeoff**" and "**Takeoff**" radio button is selected

(2) Premission fuel - Initial fuel: 2724.0 lbs

(3) Verify that the Takeoff total fuel in Int/Main is 2511.2 lbs, the total fuel in Aux is 212.8 lbs, and Takeoff total is 2724.0 lbs.

(4) Fuel tanks Transfer/Refuel Order:

(a) Fwd Fuel Cell: **2/1**

(b) Aft Fuel Cell: **2/1**

(c) 100 IAFS Fuel: **1/2**

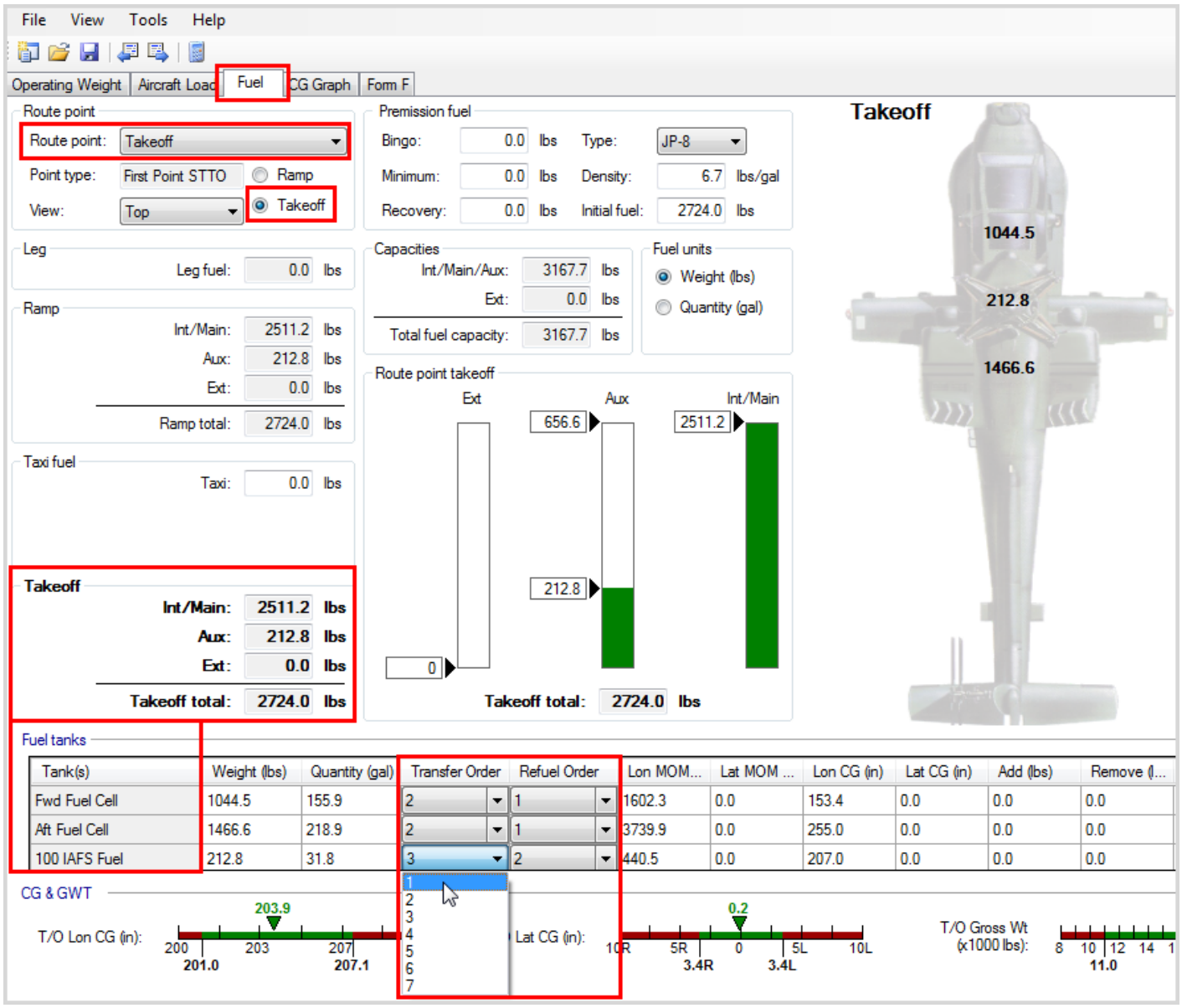


Figure 4-14 Fuel Tab Inputs

4.5. Export Aircraft Configuration

At this point in the planning process the aircraft configuration is set in the AFF-AH64 application. To retrieve the data input for future use, this aircraft configuration can be saved in an .acfg file. To export the .acfg file, select **File** from the Toolbar; select **Export Aircraft Configuration…** as shown below. Select the folder to save the file in (the Desktop in this example), name the file as **1209487AFF**, and select "**Save"**. Select "**OK**" on the AH-64 Automated Form F message.

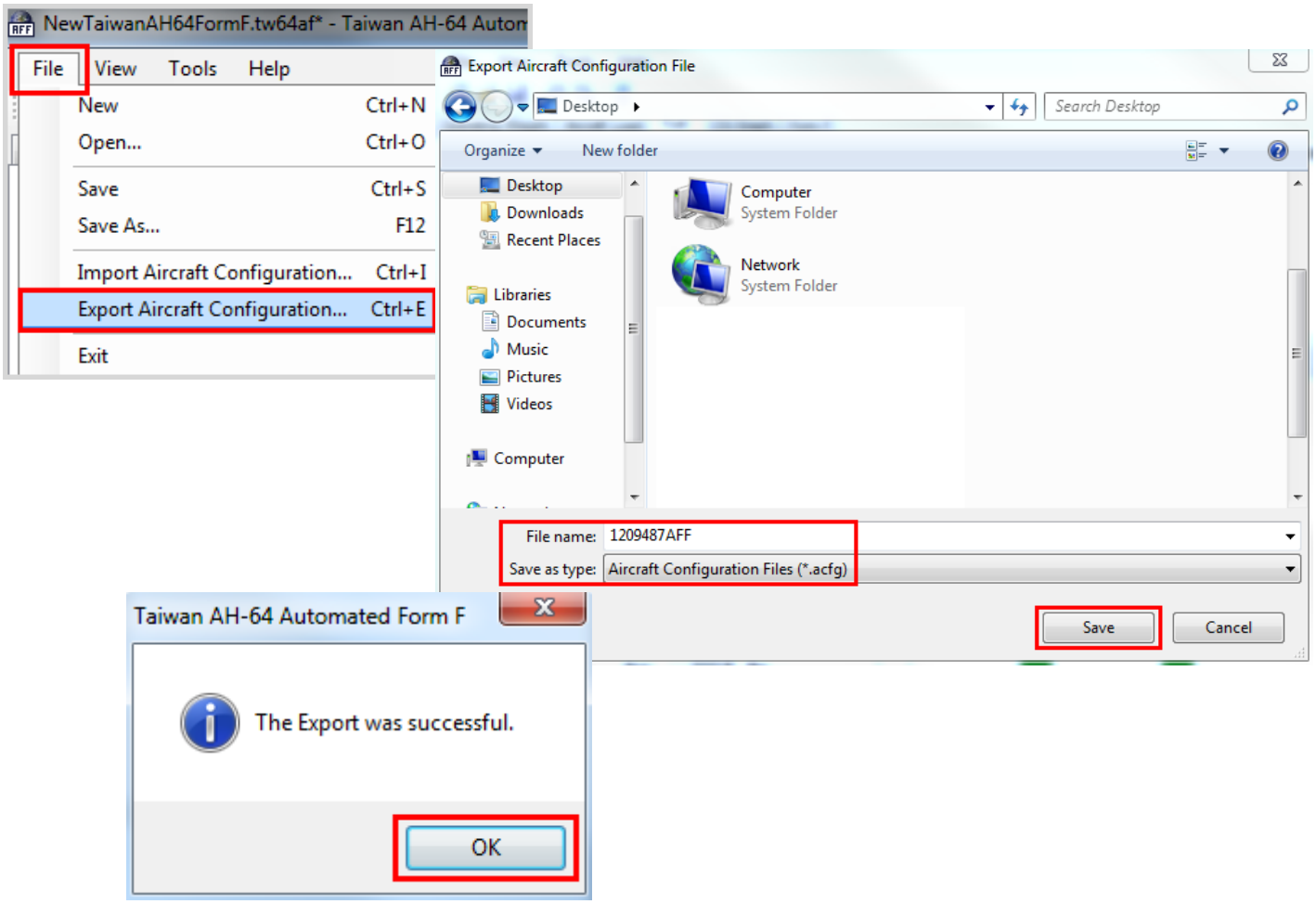


Figure 4-15 Exporting .acfg files from AFF-AH64

4.6. Aircraft Load Tab Inputs

Select the **Aircraft Load tab** and enter or verify the following data:

(1) Change Route point to "**Expend**", and ensure the "**Departure**" radio button is selected

(a) Station A: Right-click on the ATA launcher, and select **Tube 1>Expend**

(b) Station 1: Right-click on the rocket launcher, and select **Zone E>Expend>Expend One**

(c) Station 3: Right-click on the missile launcher, and select **Rail 10>Expend**

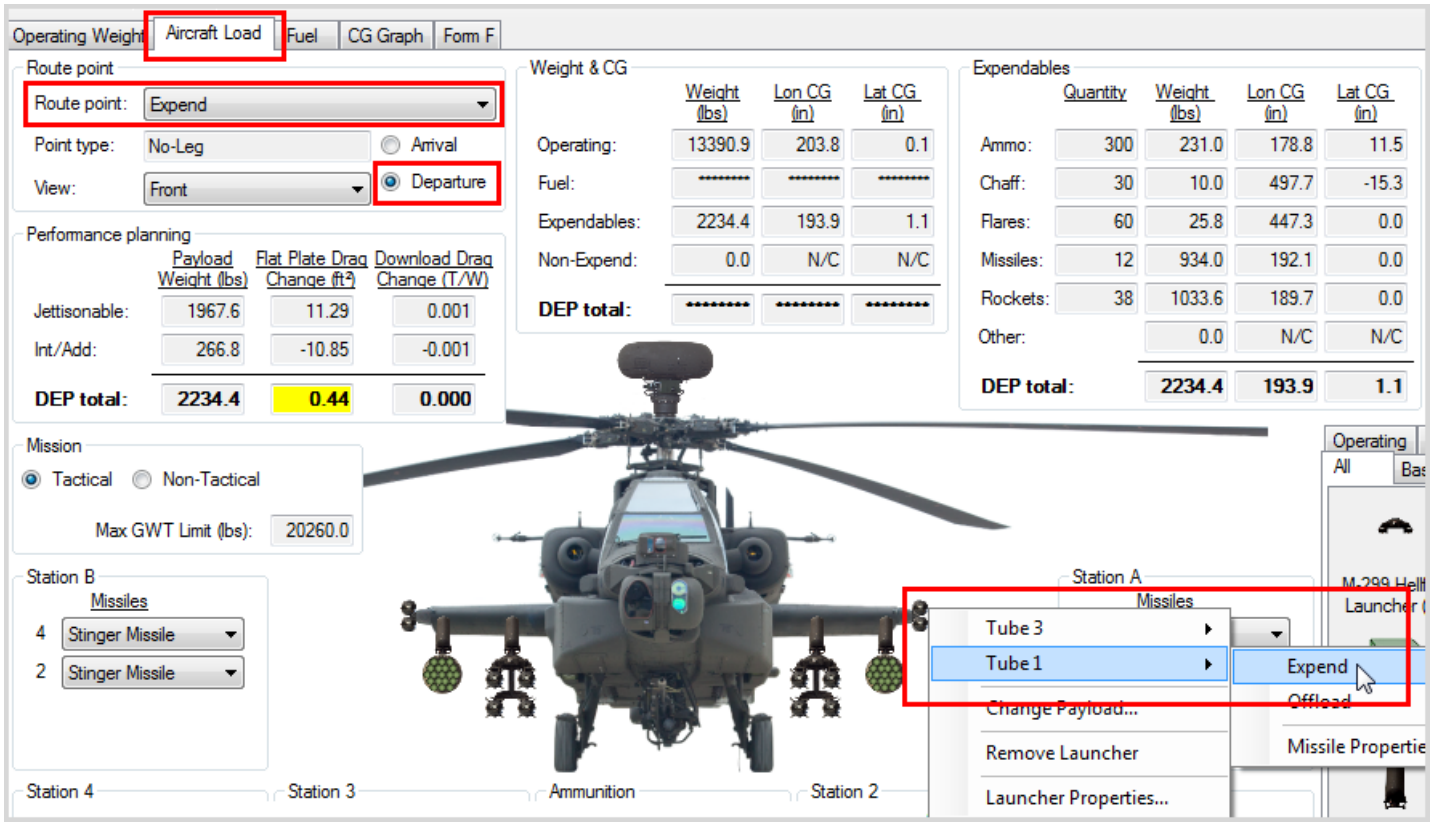


Figure 4-16 Aircraft Load Tab Expend Stinger Missile Inputs

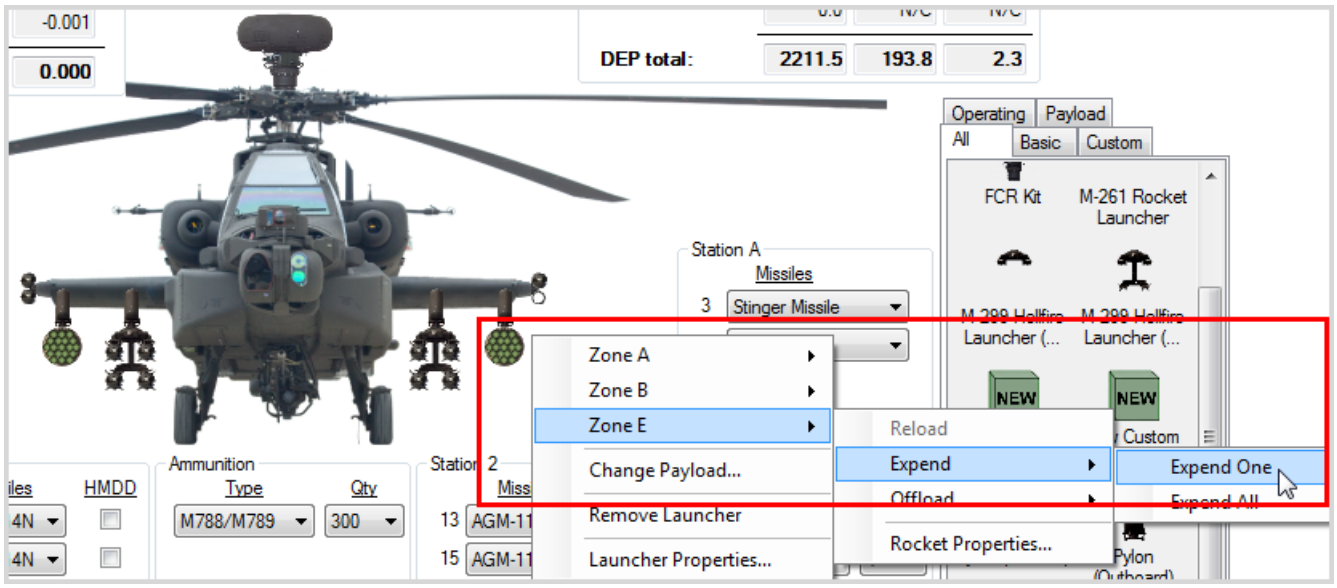


Figure 4-17 Expend Rocket Inputs

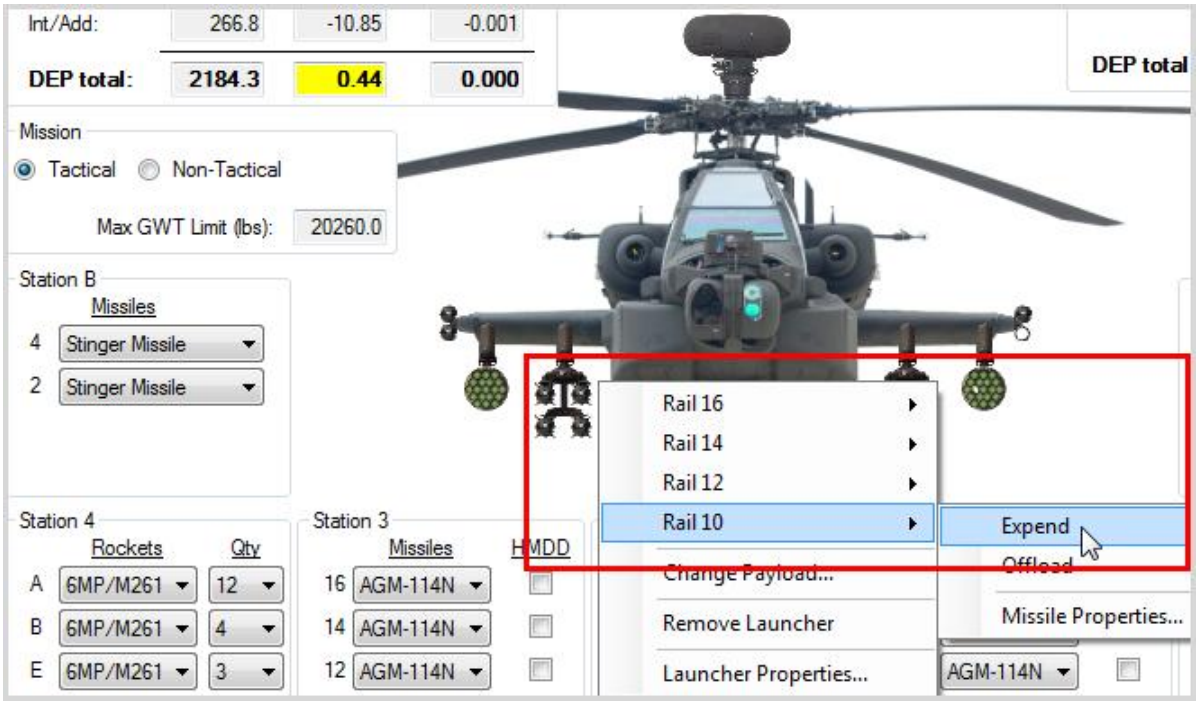


Figure 4-18 Expend Hellfire Missile Inputs

(2) Select the "**Change Payload...**" button

(a) Left click the M788/M789 Expendables Item, select the "**Edit...**" button and enter "**300**" for the Qty Expended (followed by "**OK**")

(b) Select "**Close**" to close the Onload/Offload/Expend Aircraft Payload dialog

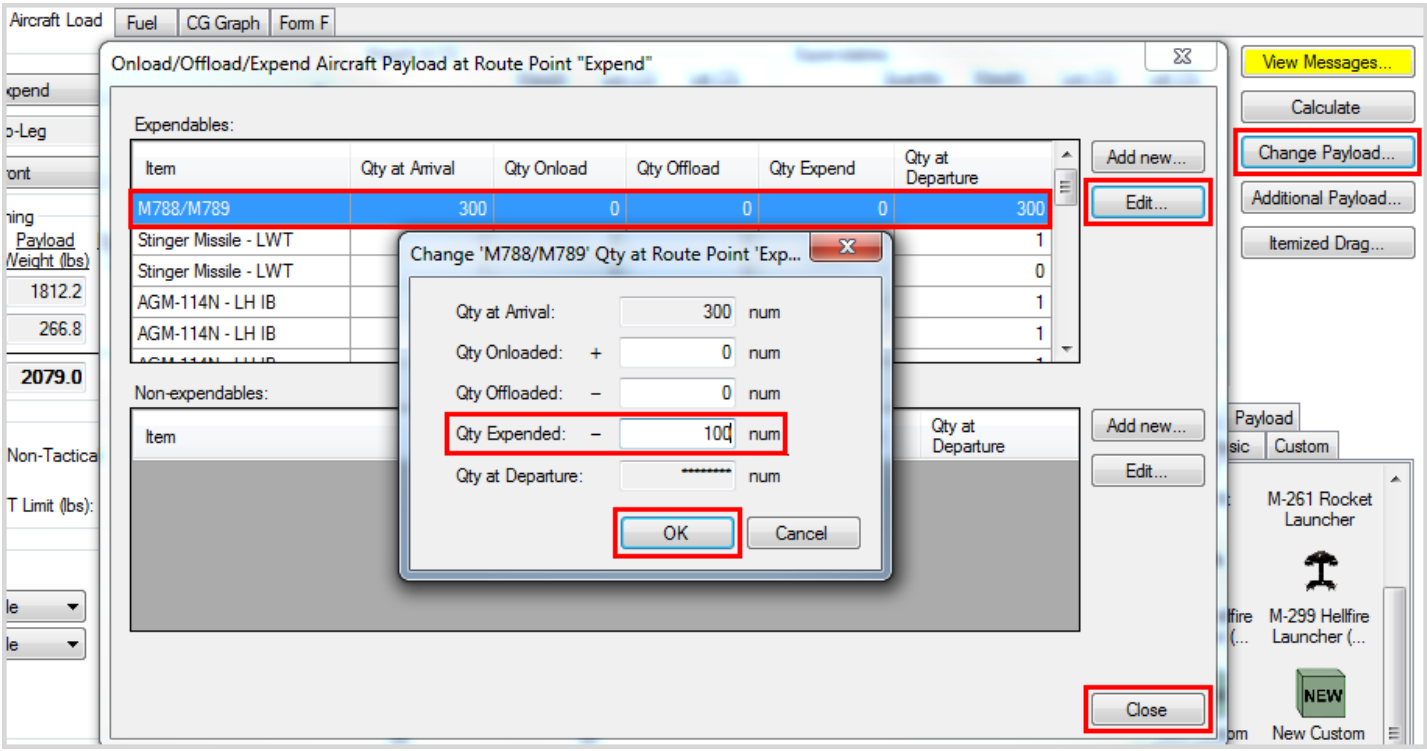


Figure 4-19 Expend 30 MM Inputs

4.7. Fuel Tab Inputs

Select the **Fuel tab** and enter or verify the following data:

(1) Verify Route point is "**Expend**".

(a) Verify the "**Arrival**" radio button is selected

(b) Enter 800.0 lbs for the Leg fuel

(c) Select "**Calculate**"

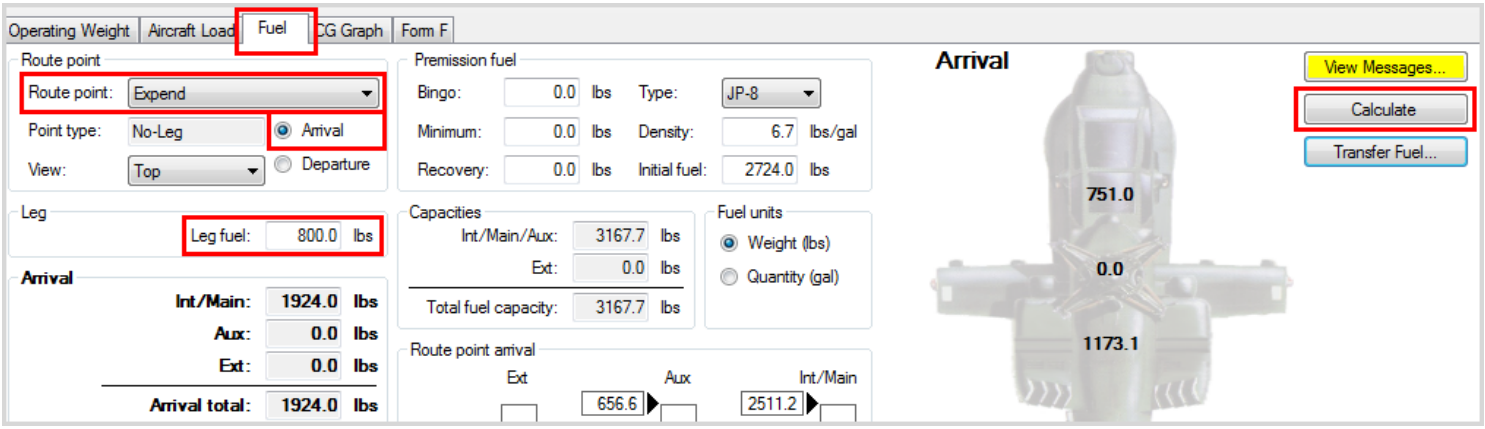


Figure 4-20 Fuel Tab Expend Point Leg Fuel Inputs

(2) Select the "**Departure**" radio button, then the "**Transfer Fuel...**" button and enter the following data:

(a) Transfer fuel from - Aft Fuel Cell: 31.0 gallons

(b) Transfer fuel to - Fwd fuel Cell: 31.0 gallons

(c) Select "**OK**" and "**Calculate**"

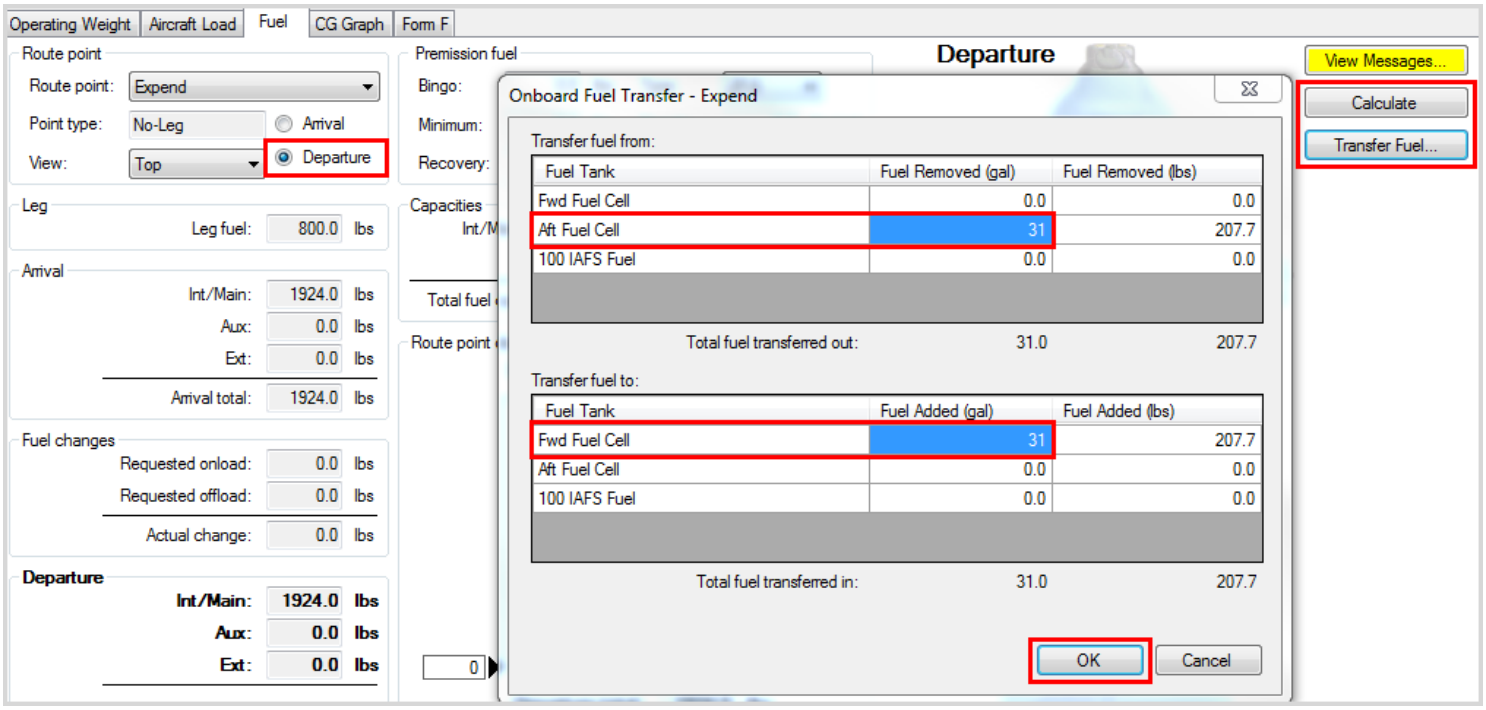


Figure 4-21 Onboard Fuel Transfer Dialog Inputs

4.8. CG Graph Tab

Select the **CG Graph tab**, and examine the CG graphs.

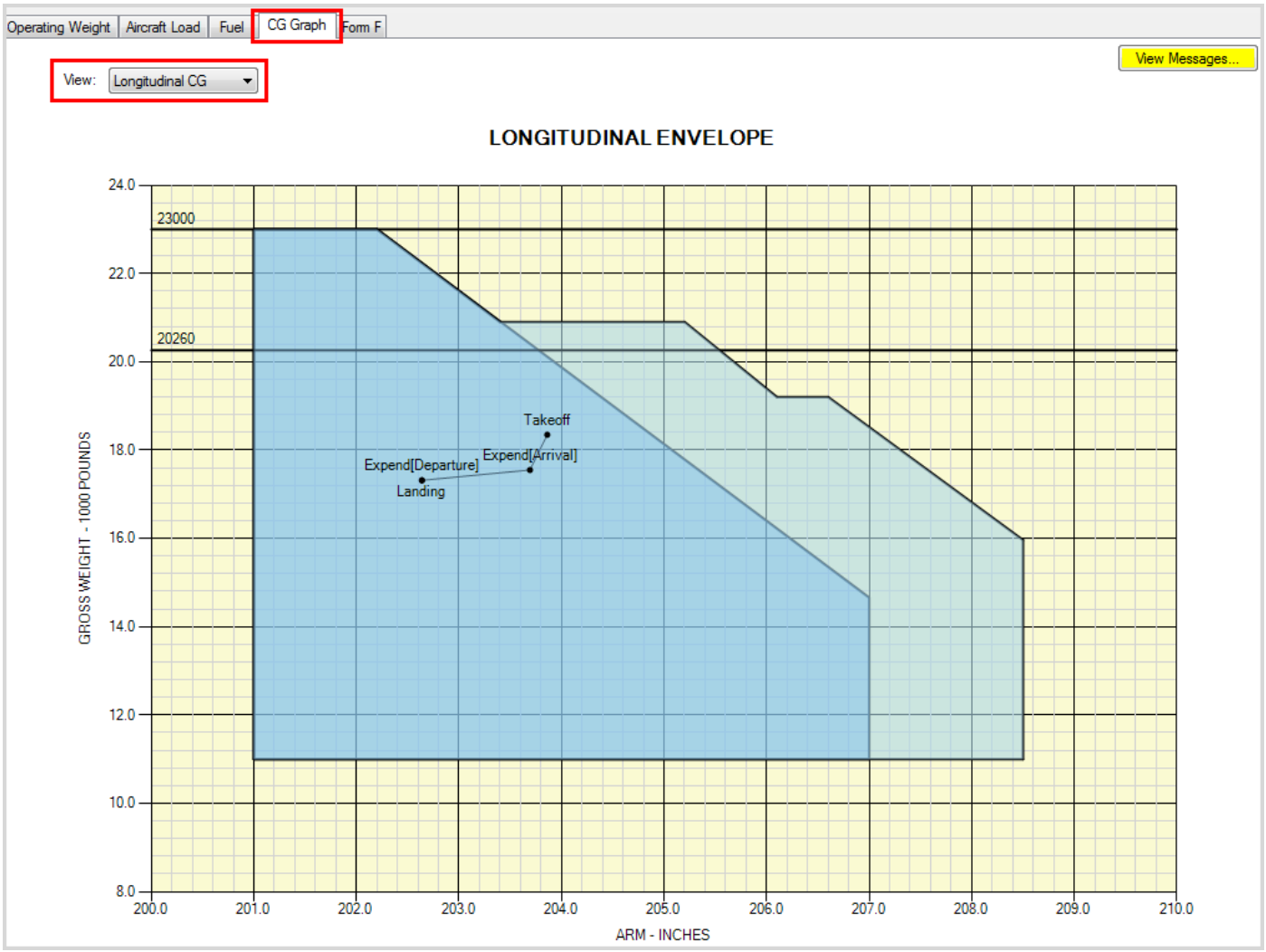


Figure 4-22 CG Tab Longitudinal Limits Graph

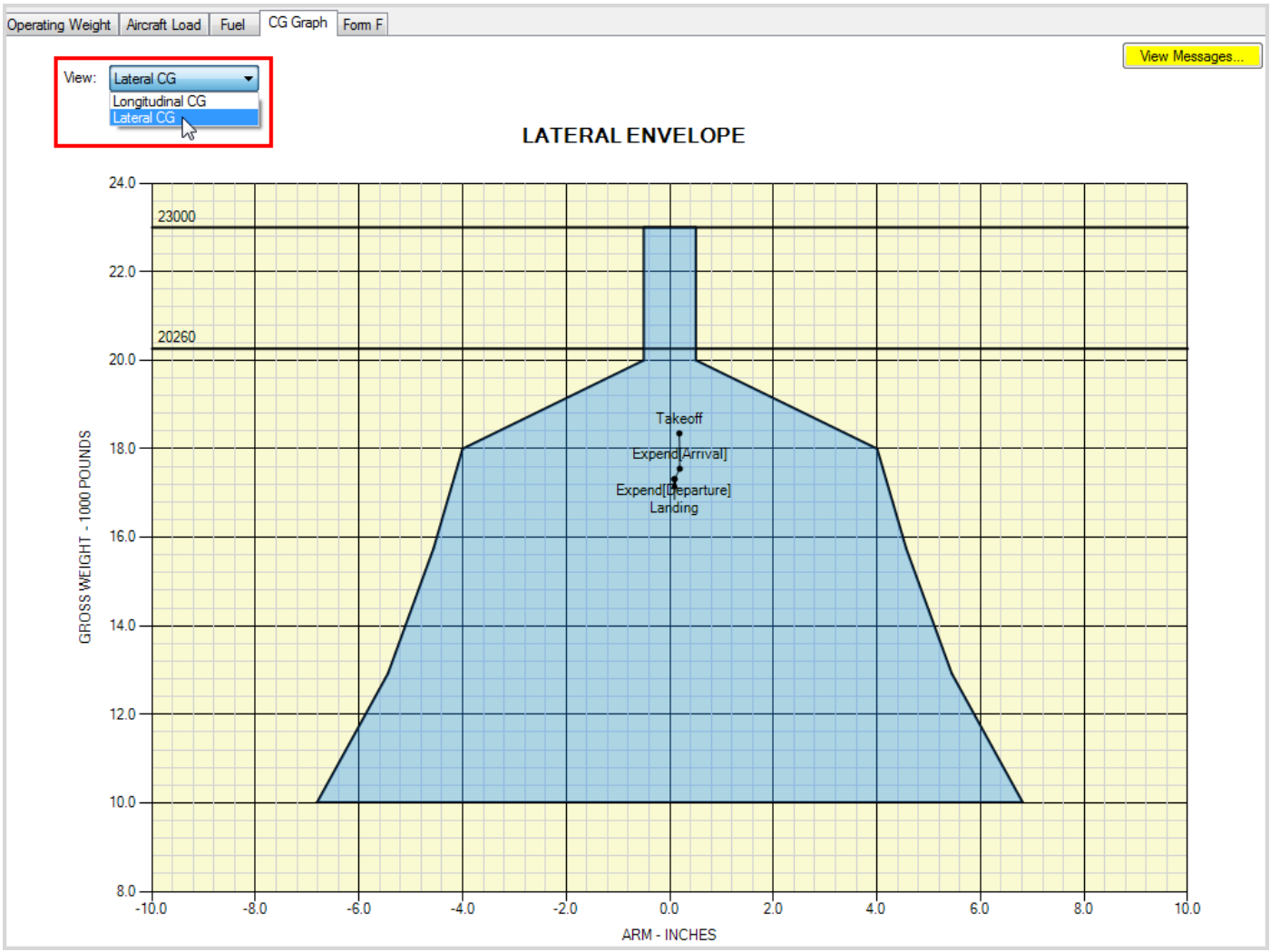


Figure 4-23 CG Tab Lateral Limits Graph

4.9. Form F Tab

Select the **Form F tab** to explore the Form F and select the "**View Messages...**" button to review the Messages dialog. View Messages and the associated output fields change color based on the type of message. Notes are white; Cautions are yellow; and Warnings are red. Close the Messages dialog and select "**Print…**" to print a copy of the Form F. Close AFF-AH64 when complete.

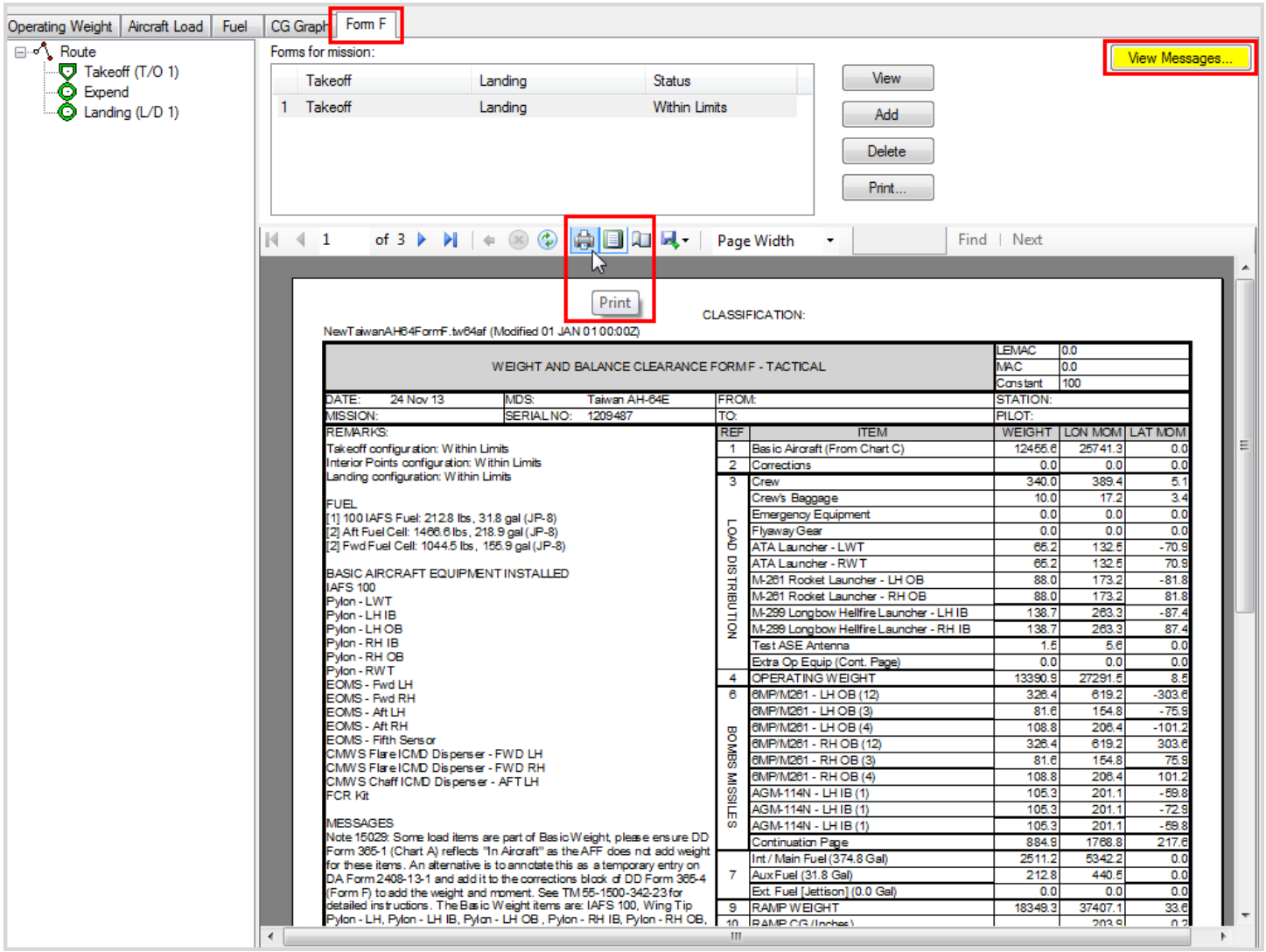


Figure 4-24 Form F Tab

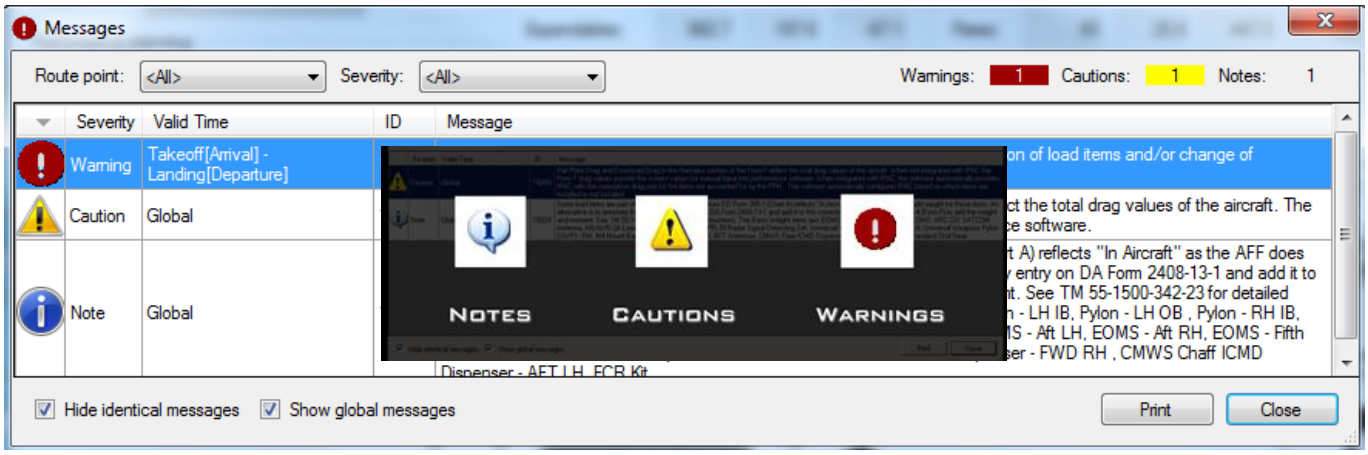


Figure 4-25 Messages Dialog

4.10. Saving .tw64af Files

Though there is no need to save a .tw64af file for this scenario, instructions are given below for future reference. All information (Takeoff, Expend, Landing) from the current AFF-AH64 session can be saved by the use of the following methods:

- Using the Toolbar **File** menu "**Save As…**" function.
- Upon closing **AFF-AH64,** selecting "**Yes**" on the AH-64 Automated Form F message asking "Do you want to save changes to 'NewTaiwanAH64FormF.tw64af'?".

In the example below, the AFF-AH64 file will be saved as 1209487 Gunnery Mission 1. All data entered during the current session will be saved in the Standalone AH-64 AFF file format with a .tw64af extension and can then be used in subsequent AFF-AH64 sessions for similar mission configurations.

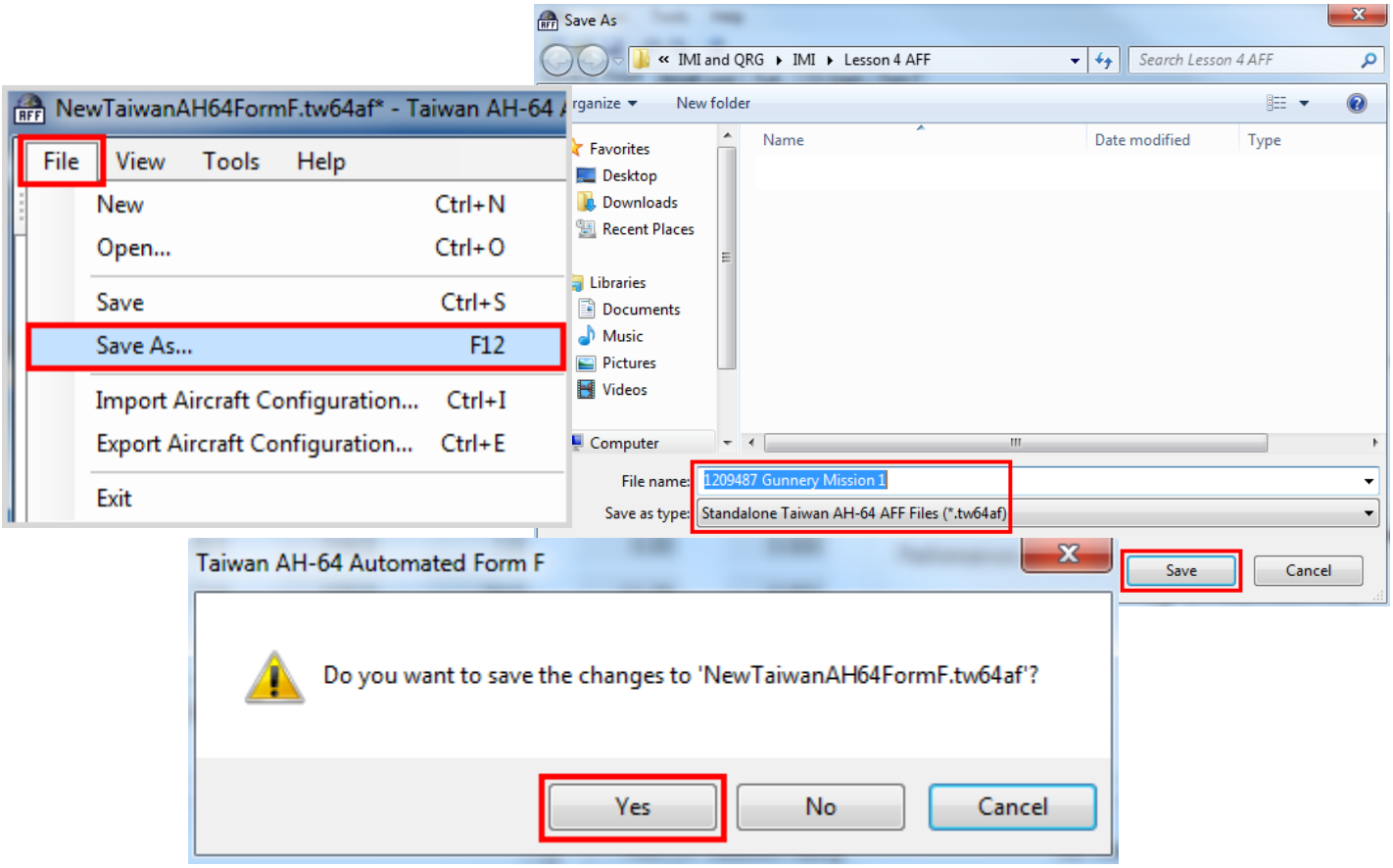


Figure 4-26 Saving .tw64af Files

Appendix A. Acronyms

AFF	Automated Form F
ASE	Aircraft Survivability Equipment
ATA	Air-to-Air
ATF	Aircraft Torque Factor
CMWS	Common Missile Warning System
CG	Center of Gravity
DE	Dual Engine
EOMS	Electro-Optic Missile Sensor
ETF	Engine Torque Factor
FAT	Free Air Temperature
FCR	Fire Control Radar
FF	Fuel Flow
FPM	Flight Performance Model
HF	Hellfire
HMU	Hydromechanical Unit
IAFS	Internal Auxiliary Fuel System
IPAC	Integrated Performance and Aircraft Configuration
IRP	Intermediate Rated Power
KCAS	Knots Calibrated Airspeed
KIAS	Knots Indicated Airspeed
KTAS	Knots True Airspeed
LWIB	Left Wing Inboard
LWOB	Left Wing Outboard
LWT	Left Wing Tip
MCP	Maximum Continuous Power

MDS	Mission Design Series
MRP	Maximum Rated Power
N/C	No Calculation
NG	Gas Generator Speed
NR	Main Rotor Speed
OEI	One Engine Inoperative
PA	Pressure Altitude
PAT	Performance Awareness Tool
PFPS	Portable Flight Planning Software
PMT	Power Management Tool
PPC	Performance Planning Card
RWIB	Right Wing Inboard
RWOB	Right Wing Outboard
RWT	Right Wing Tip
SE	Single Engine
QAvl	Torque Available
QReq	Torque Required
QTY	Quantity
TGT	Turbine Gas Temperature
TQ	Torque
T/W	Thrust divided by Weight (Vertical Drag)
Vmax	Maximum airspeed for selected operating limit
Vmin	Minimum airspeed for selected operating limit

Appendix B. IPAC Support

For additional information, please contact:

Software Engineering Directorate (SED)
Aviation and Missile Research, Development and Engineering Center (AMRDEC)
US Army Research, Development and Engineering Command (RDECOM)
Redstone Arsenal, AL 35898

Phone: 1-256-876-3361

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