United States Army Aviation Warfighting Center
Fort Rucker, Alabama
December 2007

UH-60A
STUDENT HANDOUT

UH-60A PERFORMANCE PLANNING
4758-9

PROPONENT FOR THIS STUDENT HANDOUT IS:

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TERMINAL LEARNING OBJECTIVE

ACTION: Complete or verify a Performance Planning Card (PPC),DA Form 5701-60-R.

CONDITIONS: Given the aviation missile command (AMCOM)-approved performance planning software and computer, or a blank PPC, the aircraft operator's manual, mission conditions, engine torque factors, and aircraft basic weight.

STADARDS: Complete the PPC IAW with TC 1-237, Task 1010.

Note: IAW Task 1010 in TC 1-237 the preferred method is to use the AMCOM-approved performance planning software; however this lesson was designed to use a blank PPC and the aircraft operator's manual.

SAFETY REQUIREMENTS: Use care when operating training aids and/or devices.

RISK ASSESSMENT: Low

ENVIRONMENTAL CONSIDERATIONS: It is the responsibility of all soldiers and DA civilians to protect the environment from damage.

EVALUATION: This is a academically non-testable block of instruction, however understanding the basic information received in this lesson will provide you with a better understanding of the performance capabilities of the UH-60, therefore assisting you in being a safer pilot.

Learning Step/Activity 1 State the purpose of the PPC.

a. Purpose of the PPC.

(1) To determine and have available aircraft performance data required to complete the mission.

(2) To organize performance planning data required for the mission.

(3) Using the DA Form 5701-60-R is mandatory, when available, to organize performance planning data required for the mission.

b. Regular use of Chapter 7 / 7A in TM 1-1520-237-10 is recommended for the following reasons:

(1) Knowledge of your performance margin will allow you to make better decisions when unexpected conditions or alternate missions are encountered.

(2) Situations requiring maximum performance will be more readily recognized.

(3) Familiarity with the data will allow performance to be computed more easily and quickly.

(4) Experience will be gained in accurately estimating the effects of variables for which data are not presented.

Learning Step/Activity 2 Describe the four major sections of the PPC.

a. The four major sections of the DA Form 5701-60-R:

(1) Departure

(2) Remarks

(3) Cruise

(4) Arrival - Complete this section in its entirety if arrival conditions at destination have increased from departure conditions in any of the following by the minimum amount:

(a) An increase of 5 degrees Celsius or more.

(b) An increase of 1000 feet PA or more.

(c) An increase of 500 pounds or more

Learning Step/Activity 3 Define terms associated with the PPC.

a. Definition of terms.

(1) Chapter 7 versus Chapter 7A and the –CL (-10, Page 7-1, Note)

(2) Limits (-10, Paragraph 7.4, CAUTION)

(3) Clean/High Drag Configuration (-10, Page 7-3, Para 7.7)

(a) The data presented in the performance charts is primarily derived from a "clean" or "high drag" configured UH-60A/L aircraft.

(b) Clean Configuration (-10 Paragraph 7.7) - Assumes all doors and windows are closed and includes fixed provisions for the ESSS, main rotor de-ice system, mounting brackets for the IR jammer and chaff dispenser, HIRSS with baffles installed and the wire strike protection system.

Note: Aircraft which have an external configuration that differs from the clean configuration may be corrected for drag differences on cruise performance as discussed in –10, Chapter 7, Section VI (Drag).

(4) Torque Factor Terms (-10, Paragraph 7.10 & 7.10.1)

(a) Engine Torque Factor (ETF).

1. The comparison of an individual engine's torque available to a specification engine's (1.0 ETF) torque available at a reference temperature of 35 degrees Celsius.

2. The ETF must be in the range of 0.85 to 1.0.

3. The ETF indicates degradation of performance based on engine usage.

(b) Aircraft Torque Factor (ATF).

1. ATF is the average of the two ETFs. It indicates the aircraft's total performance capability based on the condition of the two engines.

2. ATF is based on 35 degrees Celsius and is allowed to range from 0.9 to 1.0. If the ATF is not within this range, do not fly the aircraft.

Note: ETF and ATF values can be found in the aircraft's hit check log.

(c) Torque Ratio (TR). An adjustment of ATF and ETFs for actual ambient temperature of less than 35 degrees Celsius (No adjustment is required for ATF or ETF of 1.0 or temperatures above 35 degrees Celsius).

Torque factor chart indicates improved engine and aircraft performance as temperature decreases below +35 degrees Celsius. (For temperatures of -5 degrees and below, use the value found at the -5 degree line.)

(5) Engine Bleed Air (-10, Paragraph 7.12)

(6) HIRSS (-10, Paragraph 7.13)

(7) Fuel Flow (-10, Paragraph 7.17 C 1 & 2)

(8) Standards (TC 1-237, Task 1010)

Learning Step/Activity 4 Complete the Departure Section of the PPC.

Note: The items below are numbered to match the items on the DA-FORM 5706-60-R in the back of your student handout.

1 – PA Record the forecast maximum pressure altitude (PA) for the mission location and current PA for the time and location of departure.

2 – FAT Record the forecast maximum free air temperature (FAT) for the mission location and the FAT for the time and location of departure.

Note: Forecast maximum PA and FAT will be used when computing all items in the departure section except for GO/NO GO Torque OGE/IGE, item 10, and Predicted Hover Torque, item 12, which will be computed using forecast PA and FAT for time and location of departure.

3 – AIRCRAFT GWT Record the total planned aircraft gross weight (GWT) at takeoff. This includes the aircraft basic weight, crew, internal load, internal fuel, and when applicable, external stores support system (ESSS) stores and sling load. Several times throughout the PPC, this weight will be used for computations. Use the actual weight of the aircraft and all additions for these computations.

4 – STORES WEIGHT Record the planned jettisonable weight of any external stores, such as sling loads, ESSS wing stores, Volcano, or other jettisonable items.

5 – FUEL WEIGHT Record total planned fuel weight (internal and/or external) at takeoff.

6 – ATF/ETF Record the ATF and ETFs in the appropriate blocks.

7 – TR Use the aircraft TORQUE FACTOR chart to compute torque ratios as described below.

Step 1: Enter the appropriate aircraft TORQUE FACTOR chart on the left at the appropriate FAT. Move right to the ATF or ETF.

Step 2: Move straight down to the bottom of the chart and record the TR.

Note: Two instances when the chart is not needed: (1) If ambient temperature is 35 degrees Celsius or above, the ETF's are the TR's. (2) If an ETF/ATF is 1.0, then the torque ratio will be 1.0, regardless of ambient temperature.

Note: Torque ratios will be written to three decimal places, (Example .943).

8 – MAX TORQUE AVAILABLE Maximum torque available is defined as the maximum amount of torque an engine can produce at 100% RPM R at a given PA and FAT. Use the appropriate MAXIMUM TORQUE AVAILABLE chart and the procedure described below to determine the maximum torque available for Departure and Arrival.

Note: Certain FAT and PA combinations will exceed –10, Chapter 5 torque limitations. This item represents actual maximum torque available values. During aircraft operations, -10, Chapter 5 torque limitations shall not be exceeded.

Step 1: Enter the MAXIMUM TORQUE AVAILABLE chart at the appropriate FAT then move right to the appropriate PA.

Step 2: Move down to read the SPECIFICATION TORQUE AVAILABLE PER ENGINE ~ %.

Step 3: If the ATF or ETF is less than 1.0, multiply the specification torque by the torque ratio to obtain maximum torque available. An alternate method is to continue down to the TORQUE RATIO line, move left to read the maximum TORQUE AVAILABLE ~ % per engine. Record MAX TORQUE AVAILABLE.

Note: Adjust maximum torque available as required for planned use of engine anti-ice and/or cockpit heater according to the appropriate aircraft operator's manual.

9 – MAX ALLOWABLE GWT OGE / IGE Max allowable gross weight OGE/IGE is the most weight the aircraft is able or allowed to lift Out of Ground Effect (OGE) and In Ground Effect (IGE) at zero airspeed and 100% RPM R at a given pressure altitude and FAT. Use the appropriate HOVER chart to compute maximum allowable gross weight OGE/IGE as described below. Annotate the computed maximum allowable gross weight OGE/IGE or the maximum gross weight per the appropriate aircraft operator's manual, Chapter 5, whichever is less.

Note: If OGE capability does not exist, the MAX HOVER HEIGHT IGE must be computed.

Note: If the blade erosion kit is installed adjust the maximum allowable GWT according to the appropriate aircraft operator's manual.

Note: If the dual engine maximum torque available exceeds the transmission torque limits, use the DUAL ENGINE TRANS LIMIT line to compute the maximum allowable gross weight OGE.

a. MAX ALLOWABLE GWT OGE

Step 1: Enter the HOVER chart at the TORQUE PER ENGINE ~ % (OGE) at the dual engine MAX TORQUE AVAILABLE, then move right to the GROSS WEIGHT ~ 1000 LB chart.

Step 2: Reenter the HOVER chart at the appropriate FAT and move right to the appropriate PA, then move down to the GROSS WEIGHT ~ 1000 LB chart. Read the maximum allowable gross weight OGE at the intersection of this step and step 1 above. Record the MAX ALLOWABLE GWT OGE.

b. MAX ALLOWABLE GWT IGE

Step 1: Enter the HOVER chart at the TORQUE PER ENGINE ~ % (IGE) at the dual engine MAX TORQUE AVAILABLE then move up to the desired IGE WHEEL HEIGHT ~ FT (normally the 10-ft line), then move right to the GROSS WEIGHT ~ 1000 LB chart.

Step 2: Reenter the HOVER chart at the appropriate FAT and move right to the appropriate PA, then move down to the GROSS WEIGHT ~ 1000 LB chart. Read the Max Allowable GWT IGE at the intersection of this step and step 1 above. Record the MAX ALLOWABLE GWT IGE.

10 – GO/NO-GO TORQUE OGE/IGE GO/NO-GO torque is essentially a weight check at a hover height of 10 feet. These torque values will determine if the aircraft weight is at or below your Max Allowable

GWT OGE/IGE. Use the appropriate HOVER chart as described below:

a. OGE – Use maximum allowable gross weight OGE, item 9.

b. IGE – Use maximum allowable gross weight IGE, item 9.

Note: GO/NO GO is computed using forecast FAT and PA at the time and location of departure.

Step 1: Enter the chart at the appropriate FAT.

Step 2: Move right to the appropriate PA.

Step 3: Move down to the weight(s) computed for MAX ALLOWABLE GWT OGE/IGE.

Step 4: Move left to the 10-foot hover line (or WHEEL HEIGHT ~ FT that will be used to check the GO/NO-GO)
.

Step 5: Move down to read the GO/NO-GO torque value(s). Record the GO/NO-GO TORQUE OGE/IGE.

Note: Maximum Allowable GWT OGE/IGE was computed using the maximum forecast pressure altitude and temperature for the mission. When the departure temperature is less than maximum, the torque required to hover at a given gross weight is less. During the hover power check, exceeding the GO/NO GO torque value prior to the Wheel Height ~ Ft used in step 4 above indicates the aircraft is heavier than the Maximum Allowable GWT OGE/IGE (as applicable) determined in item 9 and will be incapable of OGE/IGE operations (as applicable) when maximum FAT and PA conditions are encountered.

Note: If Maximum Allowable GWT OGE/IGE, item 9, was limited by the maximum gross weight per the aircraft operator's manual, chapter 5, exceeding this torque value prior to the Wheel Height ~ Ft used in step 4 above indicates the aircraft is above the maximum structural weight limit.

<u>11 – MAX HOVER HEIGHT IGE</u> If OGE capability does not exist; use the appropriate hover chart to compute the MAX HOVER HEIGHT IGE, as described below.

Step 1: Enter the HOVER chart at the appropriate FAT and move right to the appropriate PA, then move down to the AIRCRAFT GWT, then move left to the WHEEL HEIGHT ~ FT lines.

Step 2: Reenter the bottom of the HOVER chart at the TORQUE PER ENGINE ~ % (IGE) at the Dual Engine MAX TORQUE AVAILABLE then up to the intersection from Step 1 above. Interpolate hover height as required. Record the MAX HOVER HEIGHT IGE.

Note: If OGE capability does exist, place OGE in this block.

<u>12 – PREDICTED HOVER TORQUE</u> (Dual-Engine and Single-Engine) is the torque required to maintain a hover at predicted takeoff gross weight and takeoff conditions. Use the appropriate HOVER chart as described below for torque required to hover. Use AIRCRAFT GWT and forecast FAT and PA at the time and location of departure.

a. PREDICTED HOVER TORQUE (Dual Engine)

Step 1: Enter the chart at the appropriate FAT.

Step 2: Move right to the appropriate PA.

Step 3: Move down to planned aircraft gross weight.

Step 4: Move left to the 10-foot hover line (or WHEEL HEIGHT that will be used).

Step 5: Move down to read and record Dual Engine PREDICTED HOVER TORQUE.

b. PREDICTED HOVER TORQUE (Single-Engine) – Double the PREDICTED HOVER TORQUE value that was computed for PREDICTED HOVER TORQUE (Dual Engine). Enter that value in the appropriate blocks, even if it exceeds the MAX TORQUE AVAILABLE (Single-Engine).

Note: At the time of departure, maximum torque available may be higher than what is listed in MAX TORQUE AVAILABLE, item 8, due to item 8 being computed using maximum FAT for the mission. At the time of departure, engine performance may be increased due to a lower FAT. If this is the case, the aircraft may be able to sustain hover capability, single engine, even though MAX TORQUE AVAILABLE, item 8, may be less than PREDICTED HOVER TORQUE – SINGLE ENGINE.

Note: PREDICTED HOVER TORQUE (SINGLE ENGINE) is computed using a specific wheel height. If NA is recorded in the appropriate block(s), the aircraft may still be capable of sustaining single-engine hover at a lower wheel height.

Note: If the blade erosion kit is installed, adjust the torque required according to the appropriate aircraft operator's manual.

13 – MIN SE AIRSPEED-IAS-W/O STORES / W/STORES is the slowest airspeed at which the aircraft can maintain single engine level flight with and without external stores. Use the appropriate CRUISE chart for departure conditions to compute the minimum single-engine airspeed with and without external stores as described below.

Note: If the aircraft will be operating without external stores, record NA in the w/stores block.

Note: External stores are defined as a sling load, ESSS wing stores, Volcano, or other jettisonable items.

Step 1: Using the SE ~ 30 MIN line enter the bottom of the CRUISE chart at the lowest ETF.

Step 2: Follow the slant of the line up to the first intersection of aircraft gross weight (without external stores). Read left or right for the IAS ~ KTS. Record MIN SE AIRSPEED - IAS – W/O STORES.

Note: If aircraft is operating with external stores, repeat steps 1 and 2 above using aircraft gross weight with external stores and record MIN SE - IAS – W/ STORES

14 – ZERO FUEL WEIGHT Use the appropriate DD Form 365-4 from the aircraft logbook to record the ZERO FUEL WEIGHT.

Note: The zero fuel weight on the DD Form 365-4 is computed using standard, average, or estimated weight for personnel, equipment, and fuel. Actual weights may vary greatly from those on the DD Form 365-4. Special consideration must be given to the actual weights of any items placed on the helicopter. If the PC feels that an accurate weight cannot be estimated, compute an adjusted ZERO FUEL WEIGHT. The method to determine adjusted zero fuel weight is described below. If the load configuration is different from that on the 365-4, the PC has two methods available to determine aircraft ZERO FUEL WEIGHT.

a. Method 1: Use the appropriate DD Form 365-4 from the aircraft logbook and add additional weights of cargo and personnel, then subtract indicating fuel. Record the ZERO FUEL WEIGHT.

b. Method 2: This method is completed in the aircraft and is described below.

Note: The PC must adjust for certain hover conditions such as wind and surface condition.

Note: Use the HOVER chart from the appropriate aircraft -10/CL to compute the adjusted ZERO FUEL WEIGHT.

Step 1: Note FAT, PA, and total indicated fuel weight.

Step 2: While at a hover, note wheel height and hover torque.

Step 3: Enter the HOVER chart at the noted FAT. Move down to the noted PA then left to the GROSS WEIGHT ~ 1000 LB chart.

Step 4: Reenter the HOVER chart at the TORQUE PER ENGINE ~ % (IGE) at the noted hover torque. Move up to the WHEEL HEIGHT ~ FT for the noted hover height, then move right to the intersection of step 3 above. Note aircraft gross weight.

Step 5: Subtract the noted total indicating fuel weight from the gross weight computed in step 4. Record the adjusted ZERO FUEL WEIGHT.

Note: Although data needed to compute ZERO FUEL WEIGHT is noted at a hover, the calculation should be made when practical.

Learning Step/Activity 5 Complete the Remarks Section of the PPC.

a. Record mission information such as drag factors, fuel requirements, GO/NO-GO for sling loads, and EMER SE – IAS.

Note: The EMER SE – IAS is the emergency single engine airspeed based on the mission and briefed for the purpose of crew coordination. This airspeed is selected from the MIN/MAX – IAS range computed in item 14, cruise data and is used immediately following an emergency that requires adjustment to a single engine airspeed. When an aircraft does not have single engine capability, the MAX ENDURANCE – IAS, item 9, or the OPTIMUM IAS AT MAX ALLOWABLE GWT, item 19, as appropriate, should be briefed as the emergency single engine airspeed.

Note: Normally, only one EMER SE – IAS is selected. However, when the MIN/MAX – IAS range, item 14, is wide, the crew may select two emergency single engine airspeeds, one slow and one fast based on mission profile, modes of flight, environmental conditions, or other factors.

Learning Step/Activity 6 Complete the Cruise Section of the PPC.

a. Cruise information is obtained from the appropriate cruise charts found in Chapter 7 of TM 1-1520-237-10.

b. Cruise charts are broken down by PA (2,000-foot increments) and FAT (10°C increments).

Note: Ensure the cruise chart you are using has the proper PA, FAT, engine model, and drag configuration for your mission.

Note: When using the CRUISE charts, adjust torques for ETF and ATF values that are less than 1.0, and interpolate values as required.

Note: The items below are numbered to match the items on the DA-FORM 5706-60-R in the back of your student handout.

1 – PA Record planned cruise PA.

2 – FAT Record forecast FAT at the planned cruise PA.

3 – MIN/MAX-IAS (DUAL ENGINE) It is the slowest and fastest airspeed at which the aircraft can maintain level flight while operating at a given weight, PA and FAT. Use the appropriate CRUISE chart to compute the minimum / maximum indicated airspeeds as described below.

a. Clean and high drag configuration.

Step 1: Enter the bottom of the CRUISE chart at the ATF or transmission torque limit whichever is less.

Step 2: Follow slant of the TORQUE AVAILABLE ~ 30 MIN (T-700) or 10~MIN (T-701) line up to the first intersection of AIRCRAFT GWT (item 3, departure data). Read left or right for minimum IAS ~ KTS. Record the MIN-IAS (DUAL ENGINE). If the maximum torque available line is right of the gross weight line, record 0 for the MIN-IAS.

Step 3: Continue up to the second intersection of AIRCRAFT GWT (item 3, departure data). Read left or right for maximum IAS~KTS. Record the MAX-IAS (DUAL ENGINE).

Note: If the maximum torque available line is to the left of (does not intersect) the AIRCRAFT GWT, (item 3, departure data), the aircraft cannot maintain dual engine level flight for the conditions. .

b. Alternative or external load configuration.

For alternative or external load configurations, refer to the –10, Chapter 7, Section VI, DRAG and TC 1-237 (ATM).

4 – CRUISE SPEED-IAS/TAS (DUAL ENGINE) Select an IAS that falls within the range of MIN / MAX – IAS (IAS ~ KTS scale). Enter the CRUISE chart at cruise IAS and move laterally to the TRUE AIRSPEED ~ KTS scale. Record the CRUISE SPEED-TAS (DUAL ENGINE).

Note: IAS for classroom purposes is 120 knots (actual airspeed is based on mission requirements).

5 – MAX TORQUE AVAILABLE (DUAL ENGINE) Maximum torque available (dual engine) can be derived from the CRUISE chart by referencing the TORQUE AVAILABLE ~ 30 MINUTE (T700) or 10 MINUTE (T701) ATF 1.0 line. If the ATF is between 1.0 and 0.9, interpolation is required to determine actual maximum torque available.

Note: The maximum torque may exceed the transmission torque limit. During normal aircraft operations, the aircraft operator's manual, chapter 5 torque limitations shall not be exceeded.

Note: Max torque is derived from the cruise charts and takes into account the effect of ram-air on engine performance at a selected airspeed. Torque values may vary when flying at airspeeds other than the planned cruise airspeed.

Step 1: Enter the bottom of the CRUISE chart at the TORQUE AVAILABLE ~ 30 MIN line (T-700) adjusted for the ATF and follow the slant of the line up to DUAL ENGINE CRUISE IAS (item 6).

Step 2: Read straight down (do not follow the slant of the line) to the TORQUE PER ENGINE ~ % to read the MAX TORQUE AVAILABLE. Record MAX TORQUE AVAILABLE (DUAL ENGINE).

Note: Adjust as required for planned use of engine anti-ice and/or cockpit heater according to the appropriate aircraft operator's manual.

Note: The maximum torque available 30 ~ MINUTE limit for the T700 engine and the 10 ~ MINUTE limit for the T701C can also be derived from the tabular data in the CL for maximum torques up to 100 or 120 percent respectfully. If the ATF is between 1.0 and 0.9, interpolation is required.

6 – CRUISE TORQUE / CONTINUOUS TORQUE AVAILABLE (DUAL ENGINE) Cruise Torque is defined as the torque required to maintain flight in cruise conditions at planned cruise IAS. Use the appropriate CRUISE chart to compute the torque required for cruise as described below.

a. Clean and high drag configuration.

(1) CRUISE TORQUE

Step 1: Enter the CRUISE chart at the selected cruise IAS from above. Move left or right as appropriate to the aircraft Gross Weight (plus sling load if applicable).

Step 2: Move down to the TORQUE PER ENGINE ~ % line to read the CRUISE torque. Record the dual engine CRUISE TORQUE.

Note: The continuous torque available is also referred to as MAXIMUM CONTINUOUS POWER (MCP). This is defined as the power level an engine can produce continuously and remain out of time limited engine operating limitations such as 30 minute TGT values.

(2) CONTINUOUS TORQUE

Step 1: Enter the CRUISE chart at the selected cruise IAS in item 4 above. Move left or right as appropriate to the TORQUE AVAILABLE ~ MCP line, using the ETF of the weakest engine. If the ETF of the weakest engine is between 0.85 and 1.0, then interpolation is required. TORQUE AVAILABLE ~ MCP is predicated on the weakest engine.

Step 2: Move straight down (do not follow the slant of the line) to the TORQUE PER ENGINE % to read the CONTINUOUS TORQUE. Record the CONT TORQUE AVAILABLE (DUAL ENGINE).

Note: Adjust CONTINUOUS TORQUE for planned use of engine anti-ice and/or cockpit heater according to the appropriate aircraft operator's manual.

Note: Compare the CONTINUOUS TORQUE in step 4 with the CRUISE TORQUE from step 2 (dual engine) to determine if the aircraft will be operating in a time limited condition (above maximum continuous power) for this IAS.

(b) For alternative or external load configurations, refer to the –10, Chapter 7, Section VI, DRAG and TC 1-237 (ATM).

7 – CRUISE FUEL FLOW (DUAL ENGINE).

a. Cruise Chart Method. Use the appropriate CRUISE chart.

Step 1: Enter the bottom of the chart at the cruise torque value computed above.

Step 2: Move up to TOTAL FUEL FLOW ~ 100 LB/HR and read cruise fuel flow. Record the dual-engine CRUISE FUEL FLOW.

Note: Adjust as required for planned use of engine anti-ice and/or cockpit heater according to the appropriate aircraft operator's manual.

b. Engine fuel flow chart method. Use the SINGLE/DUAL ENGINE FUEL FLOW chart as per the –10, Chapter 7, Section VIII, FUEL FLOW and TC 1-237(ATM).

8 – MAX RANGE-IAS / TORQUE (DUAL ENGINE) is defined as the GWT and airspeed combination that will result in the greatest flight range (distance) per pound of fuel burned. Use the appropriate cruise chart to compute the maximum range indicated as described below.

a. Clean and high drag configuration.

Step 1: Move up along the gross weight line to the intersection of the gross weight line and the MAX RANGE line.

Step 2: Move left or right as required to find the MAXIMUM RANGE IAS. Record MAX RANGE – IAS (DUAL ENGINE).

Step 3: At the intersection of the gross weight line and the MAX RANGE line, move straight down to the TORQUE PER ENGINE □ % line, then read torque for the maximum range indicated airspeed. Record MAX RANGE-TORQUE (DUAL ENGINE).

Note: Refer to TM 1-1520-237-10, 7-14 (d) for headwind and tailwind conditions.

b. For alternative or external load configurations, refer to the –10, Chapter 7, Section VI, DRAG and TC 1-237 (ATM).

9 – MAX ENDURANCE-IAS / TORQUE (DUAL ENGINE)-MAX ENDURANCE-IAS is defined as the GWT and airspeed combination that will allow the most time aloft. Use the appropriate CRUISE chart to compute maximum endurance indicated airspeed and torque as described below.

a. Clean and high drag configuration.

Step 1: Enter the bottom of the appropriate cruise chart at AIRCRAFT GWT (item 3, departure data). Move up along the gross weight line to the intersection of the gross weight line and the MAX END AND R/C line. Move left or right as required to the IAS ~ KTS value then read maximum endurance indicated airspeed. Record MAX ENDURANCE – IAS.

Step 2: At the intersection of the GW ~ 1000 LB line and the MAX END AND R/C line, read straight down and find the torque value associated with MAX END-IAS. Record MAX ENDURANCE ~ TORQUE (DUAL ENGINE).

b. Alternative or external load configuration.

Note: The torque change to compensate for drag (alternative or sling load configuration) at MAX END – IAS is often negligible and not computed.

10 – CRITICAL TORQUE (CT)(DUAL ENGINE) is the dual-engine torque value, which when exceeded, may not allow the aircraft to maintain % RPM R within normal limits under single-engine operations in the same flight conditions.

Step 1: Enter the bottom of the CRUISE chart at the ETF of the lowest ETF engine and follow the SE 30 – MIN line (T700) to the selected dual engine cruise speed-IAS, item 4.

Step 2: Read straight down (do not follow the slant of the line) and record CRITICAL TORQUE (DUAL ENGINE).

WARNING: During dual-engine flight, conditions that require torque settings greater than the critical torque indicates the pilot is operating outside the aircraft low ETF single-engine capability. If operating dual-engine above the CT and an engine fails, malfunctions or must be shut down, the pilot, in these circumstances, must immediately adjust torque, airspeed, and/or gross weight to establish single-engine capability.

11 – MAX ALLOWABLE GWT and OPTIMUM IAS AT MAX ALLOWABLE GWT (DUAL ENGINE)
Optimum IAS at Max Allowable GWT is the airspeed that must be flown in order to maintain level flight in cruise conditions while at Max Allowable GWT. Use the appropriate CRUISE chart to compute the MAX

ALLOWABLE GWT and OPTIMUM IAS at MAX ALLOWABLE GWT (DUAL ENGINE), as described below.

Step 1: Enter the bottom of the CRUISE chart at the TORQUE AVAILABLE ~ 30-MIN (T700) line, adjusted for the ATF.

Step 2: Follow the slant of the line up to the intersection of the MAXIMUM END and R/C line and then read maximum gross weight. If the maximum torque available line is to the right of the GW ~ 1000 LB lines, enter the maximum gross weight according to the operator's manual, chapter 5 limits. Record MAX ALLOWABLE GWT (DUAL ENGINE).

Step 3: Read right or left as required to the IAS~KTS scale for OPTIMUM IAS AT MAX ALLOWABLE GWT. Record OPTIMUM IAS AT MAX ALLOWABLE GWT (DUAL ENGINE).

Note: The torque change to compensate for drag (alternative or sling load configuration) at MAX END-IAS is often negligible and not computed.

<u>12 – MAX R/C-IAS/TORQUE (DUAL ENGINE</u>) MAX R/C IAS is defined as the adjusted indicated airspeed that will allow the fastest climb rate for the conditions, using maximum torque. Use the appropriate CRUISE chart to compute maximum rate of climb indicated airspeed and torque as described below.

a. Clean and high drag configuration.

Step 1: Enter the cruise chart at the intersection of the GW ~ 1000 LB at the AIRCRAFT GWT (item 3, departure data), and the MAX END AND R/C line. Move right to intersect the TORQUE AVAILABLE ~ 30 MIN line (T700) or transmission torque limit, whichever is less. Read straight down to determine maximum torque available at maximum endurance airspeed. If the maximum torque is greater than the dual engine transmission torque limit from the operator's manual, chapter 5, use the transmission torque limit. Record MAX R/C – Torque (Dual Engine).

Step 2: Subtract the torque value found in item 9, step 2 above, from the MAX R/C – Torque (step 1 above) to find the TORQUE INCREASE PER ENGINE ~ % TRQ. Note the TORQUE INCREASE PER ENGINE.

Step 3: Use the CLIMB/DESCENT charts in the -10, Chapter 7, Section VII. Enter the bottom of the Climb/Descent chart for clean or high drag as appropriate at the TORQUE INCREASE – PER ENGINE - % TRQ using the value from Step 2 above.

Step 4: Move up to the GROSS WEIGHT ~ 1000 LB line at the AIRCRAFT GWT (item 3, departure data), then move left to read the RATE OF CLIMB ~ FT/MIN. Note the rate of climb.

Step 5: Use the AIRSPEED SYSTEM CORRECTIONS charts in the -10, Chapter 7, Section IX. Enter the appropriate AIRSPEED SYSTEM CORRECTION chart for clean or high drag at the MAX END – IAS from item 9, step 4 above. Move up to the appropriate segmented line for the rate of climb value derived from Step 4 above (R/C greater or less than 1400 ft/min).

Step 6: Move left to read the CORRECTION TO ADD ~ KNOTS. Add or subtract this value to/from the MAX END – IAS from item 9, step 1 above.. Record the resultant MAX R/C – IAS (DUAL ENGINE).

Note: The torque change to compensate for drag (alternative or sling load configuration) at MAX END – IAS is often negligible and not computed.

<u>13 –MAX ALTITUDE-MSL-MAX ENDURANCE-IAS (DUAL ENGINE)</u> When cruise flight, dual and/or single engine is not possible at the planned cruise pressure altitude, use the appropriate CRUISE chart to compute the maximum altitude. Compute MAX ALTITUDE – MSL based on MAX END – IAS.

Note: Several different cruise charts may have to be referenced when computing the MAX ALTITUDE – MSL. It is recommended to start with the 10,000 FT CRUISE chart and forecast temperature for DUAL ENGINE.

Step1: Enter the CRUISE chart at the MAX END AND R/C line. Move left or right along that line until you intercept the AIRCRAFRT GWT (item 3, departure data).

Step 2: If the intersection of MAX END AND R/C line and AIRCRAFT GWT (item 3) is to the left of the TORQUE AVAILABLE ~ 30 MINUTE (10 – MINUTE if applicable) line adjusted for ATF, flight is still possible at MAX END – IAS. Move to the next higher CRUISE chart and repeat steps 1 and 2. If the intersection of MAX END AND R/C line and AIRCRAFT GWT (item 3) is to the right of the TORQUE AVAILABLE ~ 30 – MINUTE (10 MINUTE if applicable) line adjusted for ATF, flight is no longer possible at MAX END IAS. Move to the next lower CRUISE chart and repeat steps 1 and 2.

Step 3: Record the MAX ALTITUDE – MSL (DUAL ENGINE) and MAX ENDURANCE-IAS that will allow you to maintain flight at the AIRCRAFT GWT (item 3, departure data). Interpolation between the charts is authorized.

Note: To achieve your MAX ALTITUDE – MSL you must fly at MAX END – IAS.

Note: Ensure you account for changes in FAT as you change CRUISE charts.

Note: The torque change to compensate for drag (alternative or sling load configuration) at MAX END – IAS is often negligible and not computed.

14 – MIN / MAX-IAS (SINGLE ENGINE) - Minimum and maximum single engine airspeeds based upon gross weight, power available and conditions. Single engine level flight may not be possible at takeoff, but may become possible as fuel is consumed. Use the appropriate CRUISE chart to compute the minimum / maximum indicated airspeeds as described below.

Step 1: Enter the bottom of the CRUISE chart at the SE ~ 30 MIN (T700) line adjusted to the ETF of the weakest engine, but no more than one-half of the transmission torque limit single engine.

Step 2: Follow the slant of the line to the first intersection of the GW ~ 1000 LB at the AIRCRAFT WT, (item 3, departure data) then read left or right for minimum-IAS ~ KTS. Record the MIN-IAS (SINGLE ENGINE).

Step 3: Continue up to the second intersection of the GW ~ 1000 LB at the AIRCRAFT GWT, (item 3, departure data) then read left or right for the maximum-IAS. Record the MAX-IAS (SINGLE ENGINE).

Note: If the maximum torque available line is to the left of (does not intersect) the GW ~ 1000 LB at he AIRCRAFT GWT (item 3, departure data), the aircraft cannot maintain single engine level flight for the conditions. As fuel is consumed, single engine capability may become possible.

Note: The torque change to compensate for drag (alternative or external load configuration) at minimum indicated airspeed is often negligible and not computed.

Note: The maximum indicated airspeed, single engine, is adjusted for alternate or external load configurations.

15 – CRUISE SPEED-IAS/TAS (SINGLE ENGINE) Select an IAS that falls within the range of MIN / MAX SE – IAS, item 14 above. Record CRUISE SPEED-IAS (SINGLE ENGINE). Enter the CRUISE chart at cruise speed-IAS (SINGLE ENGINE)) and move laterally to the TRUE AIRSPEED ~ KTS scale. Record CRUISE SPEED-TAS (SINGLE ENGINE).

Note: Do not confuse single engine cruise speed with emergency single engine airspeed. The emergency single engine airspeed is the speed used immediately following an emergency that requires adjustment to single engine airspeed. Single engine cruise speed and associated data is used in the pre-mission planning process. In the event an engine fails, malfunctions or must be shut down, and single engine operations are possible but landing is not practical (such as over water, jungle, densely forested areas, mountainous terrain or other impractical landing areas), the single engine cruise speed may be used after establishing emergency single engine speed when required to reach the intended landing area. The single engine cruise IAS may, in some instances, equal the emergency single engine IAS.

<u>16 – MAXIMUM TORQUE AVAILABLE (SINGLE ENGINE)</u> Maximum torque available (single engine) is derived from the Cruise chart by referencing the TORQUE AVAILABLE ~ 30 MINUTE (T700 or 2.5 ~ MINUTE T701) line. If the ETF is between 1.0 and 0.85, interpolation is required to determine actual maximum torque available.

Note: The maximum torque available may exceed the transmission torque limit. During normal aircraft operations, the aircraft operator's manual, chapter 5 torque limitations shall not be exceeded.

Note: Max torque is derived from the cruise charts and takes into account the effect of ram air on engine performance at a selected airspeed. Torque values may vary when flying at airspeeds other than the planned cruise airspeed.

Step 1: Enter the CRUISE chart at the selected IAS in item 15 above. Move left or right as appropriate to the TORQUE AVALIABLE ~ 30 MIN (T700) line and adjust for ETF. Enter at the bottom of the CRUISE chart at the ETF for engine #1 and follow the slant of the line up to the intersection of the planned CRUISE-IAS (SINGLE ENGINE) (item 15).

Step 2: Read straight down (do not follow the slant of the line) to determine the MAX TORQUE AVAILABLE (SINGLE ENGINE).

Step 3: Record MAX TORQUE AVILABLE (SINGLE ENGINE).

Step 4: Repeat Steps 1 - 3 for the other engine if the ETF's differ.

Note: Adjust as required for planned use of engine anti-ice and/or cockpit heater according to the appropriate aircraft operator's manual.

Note: The maximum torque available – 30 ~ MINUTE limit for the T700 engine and the 10 ~ MINUTE limit for the T701C can also be derived from the tabular data in the CL. If the ATF is between 1.0 and 0.9, interpolation is required.

<u>17 – CRUISE TORQUE/CONT TORQUE AVAILABLE (SINGLE ENGINE)</u> Use the appropriate CRUISE chart to compute the cruise torque and the continuous torque available as described below.

a. Clean and high drag configuration.

Step 1: Enter the CRUISE chart at the selected single-engine cruise IAS (item 15). Move left or right as appropriate to the GW ~ 1000 LB at the AIRCRAFT GWT (item 3, departure data).

Step 2: Move straight down to the TORQUE PER ENGINE □ % and double the torque value. Record the CRUISE TORQUE (SINGLE ENGINE).

Step 3: Enter the CRUISE chart at the selected cruise IAS in item 15 above. Move left or right as appropriate to the TORQUE AVAILABLE ~ MCP line, using the ETF of the weakest engine. If the ETF of the weakest engine is between 0.85 and 1.0, then interpolation is required.

Step 4: Move straight down (do not follow the slant of the line) to the TORQUE PER ENGINE % to read the CONTINUOUS TORQUE. Record the CONT TORQUE AVAILABLE (SINGLE ENGINE).

Note: Adjust CONTINUOUS TORQUE for planned use of engine anti-ice and/or cockpit heater according to the appropriate aircraft operator's manual.

Note: Compare the CONTINUOUS TORQUE from step 4 with the CRUISE TORQUE from step 2 to determine if the aircraft will be operating in a time limited condition (above maximum continuous power) for this IAS.

Note: The continuous torque available may exceed the transmission torque limit. During normal aircraft operations, the aircraft operator's manual, chapter 5 torque limitations shall not be exceeded.

18 – CRUISE FUEL FLOW (SINGLE ENGINE)

a. Cruise chart method – Use the appropriate CRUISE chart.

Step 1: Enter the bottom of the chart at torque value computed in item 17 above CRUISE TORQUE (SINGLE ENGINE).

Step 2: Move up to TOTAL FUEL FLOW ~ 100 LB/HR and read the cruise fuel flow. Divide the cruise fuel flow value in half. Record the CRUISE FUEL FLOW (SINGLE ENGINE).

Note: Adjust as required for planned use of engine anti-ice and/or cockpit heater according to the appropriate aircraft operator's manual.

b. Engine fuel flow chart method - Use the SINGLE/DUAL ENGINE FUEL FLOW chart as per the –10, Chapter 7, Section VIII, FUEL FLOW.

19 – MAX ALLOWABLE GWT and OPTIMUM IAS AT MAX ALLOWABLE GWT (SINGLE ENGINE)
Optimum IAS at Max Allowable GWT is the airspeed that must be flown in order to maintain level flight in cruise conditions while at Max Allowable GWT. Use the appropriate CRUISE chart to compute the MAX ALLOWABLE GWT and OPTIMUM IAS at MAX ALLOWABLE GWT (SINGLE ENGINE), as described below.

a. Clean and high drag configuration.

Step 1: Enter the bottom of the CRUISE chart at the TORQUE AVAILABLE SE ~ 30 MIN (T700) line adjusted for the ETF of the lowest engine.

Step 2: Follow the slant of the line up to the intersection of MAX END AND R/C line then read and record the MAX ALLOWABLE GWT (SINGLE ENGINE). Read left or right for optimum IAS ~ KTS at maximum allowable gross weight. Record the OPTIMUM IAS AT MAX ALLOWABLE GWT (SINGLE ENGINE). If the maximum torque available line is right of the GW ~ 1000 LB line, note the maximum torque available and enter MAX ALLOWABLE GWT (SINGLE ENGINE) according to the appropriate aircraft operator's manual, chapter 5. Then read left or right from the respective value and record OPTIMUM IAS AT MAX ALLOWABLE GWT (SINGLE ENGINE).

Note: If the MAX ALLOWABLE GWT is less than the AIRCRAFT GWT, then the aircraft cannot maintain single-engine level flight for the conditions. As fuel is consumed, single engine capability may become possible.

20 – MAX ALTITUDE-MSL/MAX ENDURANCE-IAS (SINGLE ENGINE)) Use the appropriate CRUISE chart for the single engine MAX ALTITUDE – MSL calculation as described below. The lowest ETF for your aircraft will be used for this computation.

Note: When the capability to maintain level flight after an engine failure or malfunction is not possible, continued flight may still be possible by adjusting to MAX END – IAS and adjusting collective to the MAXIMUM TORQUE AVAILABLE to attain minimum rate of descent while descending to a lower PA (where level flight may be possible) and/or jettisoning the external stores (if no allowable altitude/temperature combination cruise charts yield a GWT greater than or equal to the AIRCRAFT GWT, item 3, departure data).

Note: The torque change to compensate for drag (alternative and sling load configuration) is often negligible at MAX END – IAS and not computed.

Step 1: Enter the appropriate CRUISE chart at the MAX END AND R/C line. Move left or right along that line until you intercept the GW ~ 1000 LB at the AIRCRAFT GWT (item 3, departure data).

Step 2: If the intersection of MAX END AND R/C line and GW ~ 1000 LB at the AIRCRAFT GWT (item 3, departure data) is to the left of the TORQUE AVAILABLE SE 30 MIN (T700) line adjusted for the lowest ETF engine, flight is still possible at MAX END – IAS. Move to the next higher CRUISE chart and repeat steps 1 and 2. If the intersection of MAX END AND R/C line and GW ~ 1000 Lb at the AIRCRAFT GWT (item 3, departure data) is to the right of the TORQUE AVAILABLE ~ 30 MIN (T700) line adjusted for the lowest ETF engine, flight is no longer possible at MAX END – IAS. Move to the next lower CRUISE chart and repeat steps 1 and 2.

Step 3: Record the MAX ALTITUDE – MSL SE and MAX END-IAS that will allow flight at the AIRCRAFT GWT (item 3, departure data). Interpolation between the charts is authorized.

Note: Ensure FAT is adjusted for pressure altitude in the CRUISE charts.

Note: If aircraft is equipped with stores and no CRUISE chart will yield a MAX ALLOWABLE GWT – (SINGLE ENGINE) that is greater than or equal to the AIRCRAFT GWT, level flight is not possible. Subtract the weight of the stores and adjust the AIRCRAFT GWT to reflect the new AIRCRAFT GWT (without stores) and attempt to re-compute the MAX ALTITUDE – MSL (Single Engine).

Note: If level flight cannot be maintained either with or without stores, record NA in MAX ALTITUDE – MSL (SINGLE ENGINE) block.

21 – MAX ANGLE Use the AIRSPEED FOR ONSET OF BLADE STALL chart in the appropriate aircraft operator's manual, Chapter 5, to compute the maximum bank angle for the planned cruise IAS as described below.

Step 1: Enter the chart at the cruise PRESSURE ALTITUDE ~ 1000 FT (item 1, cruise data). Move right to the cruise temperature FAT ~□ C (item 2, cruise data).

Step 2: Move down to the GROSS WEIGHT ~ 1000 LB at the AIRCRAFT GWT (item 3, departure data) then move left to the ANGLE OF BANK □ DEG chart.

Step 3: Reenter the chart at the INDICATED AIRSPEED □ KTS at the planned cruise airspeed, (item 4, cruise data), then move up to the ANGLE OF BANK □ DEG chart. Record derived MAX ANGLE or 60□, whichever is less.

22 – Vne IAS Vne is defined as velocity never to exceed due to structural limitations, and avoidance of the likelihood of encountering compressibility or retreating blade stall (FM 1-203). Use the appropriate AIRSPEED OPERATING LIMITATIONS chart in the aircraft operator's manual, chapter 5, to compute the Vne as described below.

Step 1: Enter the chart at the cruise FREE AIR TEMPERATURE ~ □ C (item 2, cruise data). Move right to the cruise PRESSURE ALTITUDE ~ 1000 FT (item 1, cruise data).

Step 2: Move down to the GROSS WEIGHT ~ 1000 LB at the AIRCRAFT GWT, (item 3, departure data). If the COMPRESSIBILITY LIMITS ~ FAT or the MACH LIMIT dashed temperature line (-10 to -50 C) is reached prior to the aircraft GROSS WEIGHT ~ 1000 LBS, stop there.

Step 3: Move left to the MAXIMUM INDICATED AIRSPEED (VNE) ~ KNOTS line for the Vne value. Record Vne-IAS.

Learning Step/Activity 7 Complete the Arrival Section of the PPC.

Only complete this section if arrival conditions at destination have increased from departure data in any of the following by the minimum amount: 5 degrees Celsius, 1,000 feet PA, or 500 pounds.

Note: If mission requirements dictate the need for additional arrival information, complete the second arrival section as described below using applicable PA, FAT, and/or landing gross weight data. Additional copies of page 2 may be added for multiple arrivals.

1 – PA Record forecast PA for time of arrival.

2 – FAT Record forecast FAT for time of arrival. If unavailable, use maximum forecast FAT for the mission.

3 – LANDING GWT Record the estimated gross weight for arrival.

4 – TORQUE RATIO Compute the torque ratios for dual and single engine the same as item 7, (departure data), using arrival FAT.

5 – MAX TORQUE AVAILABLE Compute maximum torque available for dual and single engine the same as item 8, (departure data), using arrival forecast PA and FAT.

Note: Adjust as required for planned use of engine anti-ice and/or cockpit heater according to the appropriate aircraft operator's manual.

Note: Dual engine information may also be derived from the tabular performance data in the aircraft operator's CL.

6 – PREDICTED HOVER TORQUE Compute the predicted hover torque the same as item 12, (departure data), using arrival forecast PA and FAT.

7 – MAX ALLOWABLE GWT OGE/IGE Compute the maximum allowable gross weight the same as in item 9, (departure data), using arrival forecast FAT and PA.

8 – MAX HOVER HEIGHT IGE If OGE capability does not exist, compute the maximum hover height IGE the same as item 11, (departure data), using arrival forecast PA and FAT.

9 – MIN SE – IAS - W/O STORES / W/STORES Compute the minimum single-engine airspeed with external stores and without external stores the same as item 13, (departure data), using arrival forecast PA and FAT.

Learning Step/Activity 8 Perform In-flight updates to the PPC.

Note: Updates – Care should be taken to monitor performance requirements in the accomplishment of the mission. The PPC should be updated in flight or on the ground as the mission progresses. At a minimum, updates to ZERO FUEL WEIGHT, AIRCRAFT GWT, MAX TORQUE AVAILABLE, and MAX ALLOWABLE GWT (OGE) are required when there is intent to land and/or takeoff and when operating within 3,000 pounds of the MAX ALLOWABLE GWT (OGE) and there is an increase of 1000 feet pressure altitude, and/or 10 degrees Celsius from the planned PPC.

a. ZERO FUEL WEIGHT – Update zero fuel weight the same as item 14, departure data.

b. AIRCRAFT WEIGHT - Update the aircraft weight as described below. The tabular performance data in the back of the appropriate aircraft operator's CL will be used for the following computations.

Note: Update when internal and/or external load weights have changed. Adjust zero fuel weight as in item 14 (departure data).

Step 1: When internal and/or external load weights have not changed - Add the total remaining indicated fuel weight (internal/external) to the zero fuel weight.

Step 2: When internal and/or external load weights have changed - Perform a hover check to determine a readjusted zero fuel weight.

c. MAX TORQUE AVAILABLE - Use the appropriate tabular performance data MAXIMUM TORQUE AVAILABLE table in the TM 1-1520-237-CL. as described below. Example Conditions = PA +8,000, ATF .96, FAT +10oC

Step 1: Read Max Torque Available at the intersection of PA and FAT (1.0 or 0.9 ATF).

Note: If the ATF is between 0.9 and 1.0, interpolate the maximum torque available as described in steps 2 through 5. **Example** Conditions = PA +8,000, ATF .96, FAT +10oC

Step 2: Determine a multiplication factor that reflects your aircraft ATF.
Example: .96 ATF is 6/10 the difference between ATF .90 and 1.0. Multiplication factor is .6.

Step 3: Determine Max Torques Available for a 0.9 ATF and 1.0 ATF.
Example: 1.0 = 85%, .90 = 81%

Step 4: Subtract Max Torque Available 0.9 ATF from the Max Torque Available 1.0 ATF.
Example: 85 – 81 = 4%

Step 5: Multiply the results of Step 4 by the multiplication factor from Step 2.
Example: 4 x .6 = 2.4%

Step 6: Add the results of Step 4 to the Max Torque Available 0.9 ATF.
Example: 81 +2.4 = 83.4 % Max Torque Available for .96 ATF

c. MAX ALLOWABLE GWT OGE - Use the appropriate maximum OGE HOVER WEIGHT AND TORQUE REQUIRED table in the TM 1-1520-237-CL as described below. Example Conditions = PA +8,000, ATF .96, FAT +10oC

Note: At or below –15oC, the MAXIMUM OGE HOVER WEIGHT AND TORQUE REQUIRED (T700) table in the –CL presents data for ATF 1.0 only.

Step 1: Read Max Allowable GWT OGE at the intersection of PA and FAT (1.0 or 0.9 ATF).

Note: The MAXIMUM OGE HOVER WEIGHT AND TORQUE REQUIRED (T700) chart in the –CL presents data for ATF's 0.9 and 1.0. Calculations must be made for ATF's between 0.9 and 1.0 as described in steps 2 through 5.

Step 2: Determine a multiplication factor for your ATF relative to 0.9 ATF and 1.0 ATF.
Example: .96 ATF is 6/10 the difference between ATF .90 and 1.0. Multiplication factor is .6.

Step 3: Read Max Allowable GWT's at the intersection of PA and FAT (1.0 and 0.9)
Example: 1.0 ATF = 17,300 pounds, .9 ATF = 16,600 pounds

Step 4: Subtract the Max Allowable GWT 9.9 ATF from the Max Allowable GWT 1.0 ATF.
Example: 17,300 – 16,600 = 700 pounds.

Step 5: Multiply the results of Step 3 by the multiplication factor from Step 2.
Example: 700 x .6 = 420 pounds

Step 6: Add the results of Step 4 to the Max Allowable GWT .90 ATF.
Example: 16,600 + 420 = 17,020 pounds Max Allowable GWT for .96 ATF.

Learning Step/Activity 9 Complete the Performance Planning Practical Exercise on your own. Your IP will evaluate it at the flightline.

H-60 PERFORMANCE PLANNING CARD

For use of this form, see TC 1-237; the proponent agency is TRADOC.

DEPARTURE

AIRCRAFT GWT: 14,000 lb	PA: 2500 ft/ 1500 ft	FAT: 25 °C/ 20 °C	
STORES WEIGHT: lb	DUAL ENGINE	SINGLE ENGINE #1	SINGLE ENGINE #2
FUEL WEIGHT: 2000 lb			
ZERO FUEL WEIGHT: lb			
	ATF:	ETF: 1.0	ETF: .90
TORQUE RATIO			
MAX TORQUE AVAILABLE	%	%	%
MAX ALLOWABLE GWT OGE/IGE	lb / lb		
GO/NO GO TORQUE OGE/IGE	% / %		
MAX HOVER HEIGHT IGE	ft		
PREDICTED HOVER TORQUE	%	%	%
MIN SE AIRSPEED - IAS- WO/W STORES		kts	kts

REMARKS:

EMER SE IAS :

CRUISE

PA: 4000 ft / FAT 10 °C	MAX ANGLE: °	Vne-IAS: kts	
	DUAL ENGINE	SINGLE ENGINE #1	SINGLE ENGINE #2
MAX TORQUE AVAILABLE	%	%	%
MIN / MAX - IAS	kts / kts	kts	kts
CRUISE SPEED - IAS / TAS	120 kts / kts	80 kts	kts
CRUISE TORQUE / CONT TORQUE AVAILABLE	% / %	%	%
CRUISE FUEL FLOW	pph	pph	
MAX RANGE - IAS / TORQUE	kts / %		
MAX ENDURANCE - IAS / TORQUE	kts / %		
CRITICAL TORQUE	%		
MAX ALLOWABLE GWT	lb	lb	
OPTIMUM IAS AT MAX ALLOWABLE GWT	kts	kts	
MAX R/C - IAS / TORQUE	kts / %		
MAX ALTITUDE - MSL/MAX ENDURANCE-IAS	ft / kts	ft	kts

ARRIVAL

LANDING GWT: 13,280 lb	PA: 2800 ft	FAT: 25 °C	
	DUAL ENGINE	SINGLE ENGINE #1	SINGLE ENGINE #2
TORQUE RATIO			
MAX TORQUE AVAILABLE	%	%	%
PREDICTED HOVER TORQUE	%	%	%
MAX ALLOWABLE GWT OGE/ IGE	lb / lb		
MAX HOVER HEIGHT IGE	ft		
MIN SE AIRSPEED - IAS- WO/ W STORES		kts	kts

ARRIVAL

LANDING GWT: lb	PA: ft	FAT: °C	
	DUAL ENGINE	SINGLE ENGINE #1	SINGLE ENGINE #2
TORQUE RATIO			
MAX TORQUE AVAILABLE	%	%	%
PREDICTED HOVER TORQUE	%	%	%
MAX ALLOWABLE GWT OGE/ IGE	lb / lb		
MAX HOVER HEIGHT IGE	ft		
MIN SE AIRSPEED - IAS- WO/ W STORES		kts	kts

REMARKS:

H-60 PERFORMANCE PLANNING CARD

For use of this form, see TC 1-237; the proponent agency is TRADOC.

DEPARTURE

AIRCRAFT GWT: (3) lb	PA: (1) ft/ (1) ft	FAT: (2) °C/ (2) °C	
STORES WEIGHT: (4) lb			
FUEL WEIGHT: (5) lb			
ZERO FUEL WEIGHT: (14) lb			

	DUAL ENGINE	SINGLE ENGINE #1	SINGLE ENGINE #2
	ATF: (6)	ETF: (6)	ETF: (6)
TORQUE RATIO	(7)	(7)	(7)
MAX TORQUE AVAILABLE	(8) %	(8) %	(8) %
MAX ALLOWABLE GWT OGE/IGE	(9) lb / (9) lb		
GO/NO GO TORQUE OGE/IGE	(10) % / (10) %		
MAX HOVER HEIGHT IGE	(11) ft		
PREDICTED HOVER TORQUE	(12) %	(12) %	(12) %
MIN SE AIRSPEED - IAS- WO/ W STORES		(13) kts	(13) kts

REMARKS:

EMER SE IAS :

CRUISE

PA: (1) ft	FAT (2) °C	MAX ANGLE: (21) °	Vne-IAS: (22) kts

	DUAL ENGINE		SINGLE ENGINE #1	SINGLE ENGINE #2
MAX TORQUE AVAILABLE	(5) %		(16) %	(16) %
MIN / MAX - IAS	(3) kts	(3) kts	(14) kts	(14) kts
CRUISE SPEED - IAS / TAS	(4) kts	(4) kts	(15) kts	(15) kts
CRUISE TORQUE / CONT TORQUE AVAILABLE	(6) %	(6) %	(17) %	(17) %
CRUISE FUEL FLOW	(7) pph		(18) pph	
MAX RANGE - IAS / TORQUE	(8) kts	(8) %		
MAX ENDURANCE - IAS / TORQUE	(9) kts	(9) %		
CRITICAL TORQUE	(10) %			
MAX ALLOWABLE GWT	(11) lb		(19) lb	
OPTIMUM IAS AT MAX ALLOWABLE GWT	(11) kts		(19) kts	
MAX R/C - IAS / TORQUE	(12) kts	(12) %		
MAX ALTITUDE -MSL/MAX ENDURANCE-IAS	(13) ft	(13) kts	(20) ft	(20) kts

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ARRIVAL

LANDING GWT: (3) lb	PA: (1) ft	FAT: (2) °C	

	DUAL ENGINE	SINGLE ENGINE #1	SINGLE ENGINE #2
TORQUE RATIO	(4)	(4)	(4)
MAX TORQUE AVAILABLE	(5) %	(5) %	(5) %
PREDICTED HOVER TORQUE	(6) %	(6) %	(6) %
MAX ALLOWABLE GWT OGE/ IGE	(7) lb / (7) lb		
MAX HOVER HEIGHT IGE	(8) ft		
MIN SE AIRSPEED - IAS- WO/ W STORES		(9) kts	(9) kts

ARRIVAL

LANDING GWT: lb	PA: ft	FAT: °C	

	DUAL ENGINE	SINGLE ENGINE #1	SINGLE ENGINE #2
TORQUE RATIO			
MAX TORQUE AVAILABLE	%	%	%
PREDICTED HOVER TORQUE	%	%	%
MAX ALLOWABLE GWT OGE/ IGE	lb / lb		
MAX HOVER HEIGHT IGE	ft		
MIN SE AIRSPEED - IAS- WO/ W STORES		kts	kts

REMARKS:

DA FORM 5701-60-R, PAGE 2 OF 2

APD V1.00

H-60 PERFORMANCE PLANNING CARD

For use of this form, see TC 1-237; the proponent agency is TRADOC.

DEPARTURE

AIRCRAFT GWT: lb	PA: ft/ ft	FAT: °C/ °C	
STORES WEIGHT: lb	DUAL ENGINE	SINGLE ENGINE	
FUEL WEIGHT: lb		#1	#2
ZERO FUEL WEIGHT: lb			
	ATF:	ETF:	ETF:
TORQUE RATIO			
MAX TORQUE AVAILABLE	%	%	%
MAX ALLOWABLE GWT OGE/IGE	lb / lb		
GO/NO GO TORQUE OGE/IGE	% / %		
MAX HOVER HEIGHT IGE	ft		
PREDICTED HOVER TORQUE	%	%	%
MIN SE AIRSPEED - IAS- WO/ W STORES		kts	kts

REMARKS:

EMER SE IAS:

CRUISE

PA: ft | FAT °C	MAX ANGLE: °	Vne-IAS: kts	
	DUAL ENGINE	SINGLE ENGINE	
		#1	#2
MAX TORQUE AVAILABLE	%	%	%
MIN / MAX - IAS	kts / kts	kts	kts
CRUISE SPEED - IAS / TAS	kts / kts	kts	kts
CRUISE TORQUE /CONT TORQUE AVAILABLE	% / %	%	%
CRUISE FUEL FLOW	pph	pph	
MAX RANGE - IAS / TORQUE	kts / %		
MAX ENDURANCE - IAS / TORQUE	kts / %		
CRITICAL TORQUE	%		
MAX ALLOWABLE GWT	lb	lb	
OPTIMUM IAS AT MAX ALLOWABLE GWT	kts	kts	
MAX R/C - IAS / TORQUE	kts / %		
MAX ALTITUDE - MSL/MAX ENDURANCE-IAS	ft / kts	ft	kts

ARRIVAL

LANDING GWT: lb	PA: ft	FAT: °C	
	DUAL ENGINE	SINGLE ENGINE	
		#1	#2
TORQUE RATIO			
MAX TORQUE AVAILABLE	%	%	%
PREDICTED HOVER TORQUE	%	%	%
MAX ALLOWABLE GWT OGE/ IGE	lb / lb		
MAX HOVER HEIGHT IGE	ft		
MIN SE AIRSPEED - IAS- WO/ W STORES		kts	kts

ARRIVAL

LANDING GWT: lb	PA: ft	FAT: °C	
	DUAL ENGINE	SINGLE ENGINE	
		#1	#2
TORQUE RATIO			
MAX TORQUE AVAILABLE	%	%	%
PREDICTED HOVER TORQUE	%	%	%
MAX ALLOWABLE GWT OGE/ IGE	lb / lb		
MAX HOVER HEIGHT IGE	ft		
MIN SE AIRSPEED - IAS- WO/ W STORES		kts	kts

REMARKS: