AirClassics™

CX-2
Pathfinder
Flight Computer

Instructions

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INTRODUCTION

ASA's CX-2 is the next generation of aviation comput-
ers. Using the latest microchip and display technolo-
gies, it out-performs its most sophisticated electronic
rivals.

The features of the CX-2 make it the most versatile and
useful aviation calculator available.

1. *May be used for FAA Exams.* The CX-2 complies
   with Advisory Circular (AC) 60-11, "Test Aids and
   Materials that May be Used by Airman Knowledge
   Testing Applicants." Therefore you may bring the
   CX-2 with you to the testing centers for all pilot,
   mechanic, and dispatcher FAA exams.
2. *Numerous aviation functions.* You can calculate
   everything from true airspeed and Mach number, to
   headwind/crosswind components and center of
   cravity (CG), and everything in between. A menu
   of 34 aviation functions gives you access to 40 avi-
   ation calculations. The menu structure provides
   easy entry, review, and editing within each function.
3. *User-friendly.* The LCD screen displays a menu of
   functions, or the inputs and outputs of a selected
   function, for easy-to-read menus and data displays.
   The inputs and outputs of each function are sepa-
   rated on the display screen so it is clear which num-
   bers were entered and which were calculated.
   Inputs and outputs are clearly labeled and the
   answers or results are displayed along with their
   corresponding units of measurement. The menu
   organization reflects how a flight is normally
   planned and executed. This results in a natural flow
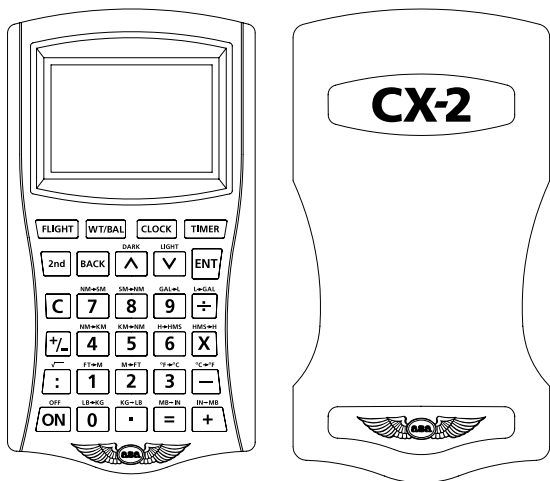
Figure 1: *The CX-2 flight computer*

from one function to the next with a minimum of keystrokes: to plan a flight, simply work from the menus in sequential order as you fill in your flight plan form.

4. *Ergonomic design.* The CX-2 features a very simple keyboard and slim design. The carrying case will protect your computer inside the flight bag, and fits on the backside of the unit for easy storage while in use.

5. *Unit conversions.* The CX-2 has 16 reciprocal unit-conversions: nautical and statute miles, nautical miles and kilometers, feet and meters, pounds and kilograms, gallons and liters, time in an hours:minutes:seconds format and time in decimal format, Fahrenheit and Celsius temperatures, and millibars and inches of mercury.

6. *Timers and clocks.* The CX-2 has two timers: a stopwatch that counts up, and a count down timer. The stopwatch can be used to keep track of elapsed time or to determine the time required to fly a known distance. The count down timer can be used as a reminder to switch fuel tanks, or to determine the missed approach point on a nonprecision instrument approach. An internal clock continues running even when the flight computer is turned off. Both UTC and local time can be displayed, and the time can be set with either UTC or local time.

7. *Interactive functions.* The CX-2 is designed so the functions can be used together. You can perform "chain" calculations where the answer to a preceding problem is automatically entered in subsequent problems. Standard mathematical calculations and conversions can be performed within each aviation function.

KEYPAD

The CX-2's simple keypad was made possible because of the sophisticated display screen and menu structure. The advantages of such a keypad are twofold: A calculator with 29 keys is simpler to use than one with 40 or more, and it is small enough to fit in a shirt pocket. Both advantages make the CX-2 more useful to a pilot in day-to-day operations.

| FLIGHT | WT/BAL | CLOCK | TIMER | Selects each of the four main menus.

| 2nd | Selects second or shifted function for other keys.
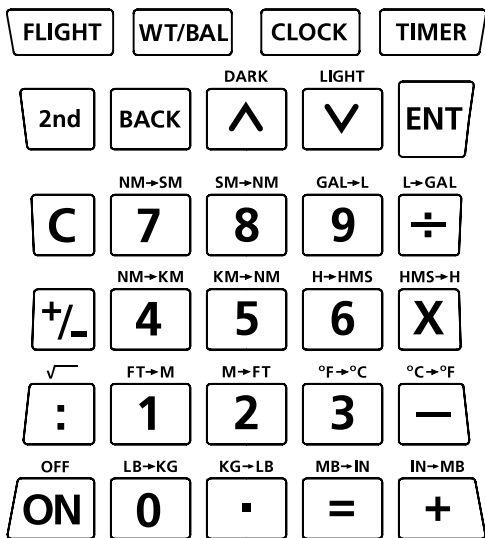
Figure 2: *CX-2 keypad*

BACK   Changes display to the previous menu.

∧ and **∨**   Used to navigate about the menu structure. When alternated with **2nd**, darkens and lightens display screen (select **2nd** followed by the **∧** or **∨** in sequence until the desired shading is achieved).

ENT   Selects highlighted menu item, enters current input line when function is requesting input.

C   Clears current input line. In calculator mode, clears the math completely.

$\boxed{+/-}$ Changes sign (positive or negative) of current input line.

$\boxed{:}$ Separates hours from minutes and minutes from seconds on time inputs. For example, 2 hours, 38 minutes and 45 seconds will display as 02:38:45. When preceded by $\boxed{\text{2nd}}$ key, activates the square root function.

$\boxed{\text{ON}}$ Turns CX-2 on and resets to calculator mode. When preceded by $\boxed{\text{2nd}}$ key, turns CX-2 off.

$\boxed{\div}\,\boxed{\text{X}}\,\boxed{-}\,\boxed{+}$ Standard arithmetic operators.

$\boxed{0}\;\boxed{1}\;\boxed{2}\;\boxed{3}\;\boxed{4}\;\boxed{5}\;\boxed{6}\;\boxed{7}\;\boxed{8}\;\boxed{9}$
Numeric keys for selecting menu item and entering numbers. Conversion functions active if preceded by the $\boxed{\text{2nd}}$ key.

$\boxed{\cdot}$ Decimal point.

$\boxed{=}$ Completes the calculation.

Resetting: To reset the CX-2, remove all of the batteries. This will clear all stored information. The FAA requires that all the memory in an electronic flight computer be cleared prior to use during FAA Knowledge Exams.

GETTING STARTED

Push the ON button to turn the flight computer on. Pressing the 2nd key followed by the ON key will turn the calculator off. The CX-2 will automatically turn off if no key is pressed for 7 minutes. This feature prevents battery exhaustion if the computer is inadvertently left on.

When first turned on, the CX-2 is in calculator mode with **Calculator** displayed at the top of the screen. The CX-2 can be returned to this mode at any time by pressing the ON key. Each time the computer returns to the calculator mode, an internal test checks the battery power. LOW BATTERY displays on the calculator screen when less than an hour of power remains, as a recommendation to change the batteries.

An "E" is displayed whenever the result of the arithmetic operation is a number that exceeds 8 digits. You may either press C to clear the display, or just type in a new number.

CONVERSIONS

Often it is necessary to convert from one unit of measurement to another. The CX-2 has 16 conversion functions that are activated by pressing and releasing the [2nd] key, followed by pressing and releasing one of the regular calculator keys. The unit conversions appear above the regular calculator keys.

Nautical to Statute [2nd] [7]
Statute to Nautical [2nd] [8]

Many of the aviation functions of the CX-2 require distance inputs in nautical miles or speed inputs in knots (nautical miles per hour). Many aircraft, especially older ones, have their airspeed indicators and flight manual set up for statute miles. The CX-2 allows you to convert to nautical easily. For example, to convert 180 MPH to knots, key in:

[1] [8] [0] [2nd] [8]

You will get an answer of 156.4157 knots.

The CX-2 converts nautical to statute miles in much the same way. To convert 200 knots to MPH, enter:

[2] [0] [0] [2nd] [7]

You will get a result of 230.1559 MPH.

Nautical to Kilometers [2nd] [4]
Kilometers to Nautical [2nd] [5]

These reciprocal conversions are performed in the same way as for nautical and statute. To convert 100 KM to nautical miles, enter:

[1] [0] [0] [2nd] [5]

You will get 53.99568 NM.

To convert 200 knots to KPH (Kilometers per hour), enter:

2 **0** **0** **2nd** **4**

The answer is 370.4 KPH.

Kilometers to Statute **2nd** **5** **2nd** **7**
Statute to Kilometers **2nd** **8** **2nd** **4**

The CX-2 does not have a function that allows direct conversion of statute miles and kilometers. However, since both can be converted to and from nautical units, you can "chain" two conversions with an interim answer in nautical. For example, to convert 10 kilometers to statute miles, enter:

1 **0** **2nd** **5**

(the interim answer is 5.399568 NM), then enter:

2nd **7**

and the final answer is 6.213712 SM.

To convert 55 MPH to KPH, enter:

5 **5** **2nd** **8** **2nd** **4**

The interim answer is 47.79369 knots, and the final answer is 88.51392 KPH.

Feet to Meters **2nd** **1**
Meters to Feet **2nd** **2**

To convert 100 meters to feet, enter:

1 **0** **0** **2nd** **2**

The answer is 328.084 feet.

To convert 10,000 feet to meters, enter:

1 **0** **0** **0** **0** **2nd** **1**

The answer is 3,048 meters.

Pounds to Kilograms $\boxed{2nd}$ $\boxed{0}$
Kilograms to Pounds $\boxed{2nd}$ $\boxed{.}$

To convert 2,000 pounds to kilograms, enter:

$\boxed{2}$ $\boxed{0}$ $\boxed{0}$ $\boxed{0}$ $\boxed{2nd}$ $\boxed{0}$

The answer is 907.1847 kilograms.

To convert 160 KG to pounds, enter:

$\boxed{1}$ $\boxed{6}$ $\boxed{0}$ $\boxed{2nd}$ $\boxed{.}$

The answer is 352.7396 pounds.

Gallons to Liters $\boxed{2nd}$ $\boxed{9}$
Liters to Gallons $\boxed{2nd}$ $\boxed{\div}$

To convert 50 gallons to liters, enter:

$\boxed{5}$ $\boxed{0}$ $\boxed{2nd}$ $\boxed{9}$

The answer is 189.2706 liters.

To convert 100 liters to gallons, enter:

$\boxed{1}$ $\boxed{0}$ $\boxed{0}$ $\boxed{2nd}$ $\boxed{\div}$

The answer is 26.4172 gallons.

H.h to HH:MM:SS $\boxed{2nd}$ $\boxed{6}$
HH:MM:SS to H.h $\boxed{2nd}$ $\boxed{X}$

The CX-2 can display time in two formats: hours, minutes and seconds separated by colons (HH:MM:SS), or hours only (H.h, e.g., 2 hours, 30 minutes is displayed as 2.5 hours), and it can convert from one mode of display to the other.

Start by entering 2 hours, 30 minutes and 30 seconds. Clear the display, if necessary, by pushing $\boxed{C}$. Next, push:

$\boxed{2}$ $\boxed{:}$ $\boxed{3}$ $\boxed{0}$ $\boxed{:}$ $\boxed{3}$ $\boxed{0}$

The display will be 02:30:30.

Add 30 seconds to the display by keying:

[+ \ ] [0] [:] [0] [:] [3] [0] [=]

The display will be 02:31:00. The HH:MM:SS display can be easily converted to an H.h format. To convert the 02:31:00 in the current display, key in:

[2nd] [X]

The display will be 2.516667 hours.

The maximum time in HH:MM:SS mode is 99:59:59. For times greater than 99:59:59, the screen will display E. Time entries of 100 or more hours must be made in the H.h format.

Assume you plan to fly 63 nautical miles at a ground speed of 120 knots and need to calculate the time required. The formula is:

Distance ÷ Speed = Time

Key in:

[6] [3] [÷] [1] [2] [0] [=]

This is 0.525 hours. To convert to HH:MM:SS, key in:

[2nd] [6]

The display will be 00:31:30.

Note: This calculation and conversion may be performed automatically by the "Leg Time" function in the Plan Leg menu.

Fahrenheit to Celsius [2nd] [3]
Celsius to Fahrenheit [2nd] [·]

To convert 59° Fahrenheit to its Celsius equivalent, enter:

[5] [9] [2nd] [3]

The answer is 15°C.

To convert -20° Celsius to Fahrenheit, enter:

[2] [0] [+/_] [2nd] [—]

The answer is -4°F.

Millibars to Inches [2nd] [=]
Inches to Millibars [2nd] [+ \

To convert 970 mb pressure to inches of mercury, enter:

[9] [7] [0] [2nd] [=]

The answer is 28.64408 inches.

To convert 29.78 inches of mercury to mb, enter

[2] [9] [·] [7] [8] [2nd] [+ \

The answer is 1008.467 mb

MENU SYSTEM

The CX-2 menu system is organized to reflect the natural order of flight. Simply work through the menus in sequential order as you complete your flight plan. Figure 3 shows the menu organization.* When a menu is displayed, the menu items can be selected by pressing the corresponding digit key; or you can highlight a particular choice by pressing the [∧] and [∨] keys followed by the [ENT] key. To return to the previous menu, press the [BACK] key. You can go directly to the Flight, Wt/Bal, Clock, and Timer menus by pressing the [FLIGHT], [WT/BAL], [CLOCK], and [TIMER] hot keys. You can reach any CX-2 function with a maximum of 3 keystrokes.

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* See Appendix C for a quick guide to names and abbreviations of the various functions.
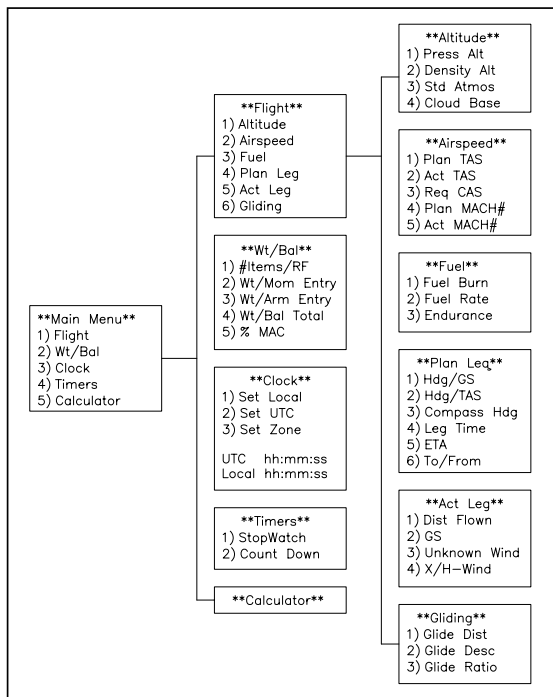
Figure 3: *All functions are within 3 clicks. The calculator is organized for easy navigation and follows the logic associated with flight planning of a typical flight.*

The computer will prompt you for the inputs, and the answers will display below the double line at the bottom of the screen. The formulas used for these functions require that inputs for speed be made in knots, temperature in degrees Celsius, altitude in feet, and time in the hours:minutes:seconds format. Fuel is dis-

played as Xph, where X can be gallons, liters, or pounds as long as the same unit is used for the Rate and Fuel. The CX-2 will convert any headings exceeding 360 to remain within 360°. For example, if you enter 390 for any heading, the CX-2 will change this to 30 once you press $\boxed{\text{ENT}}$. All math and conversion functions can be carried out on any input line. You may convert an output (answer) through the calculator mode.

The CX-2 remembers the most recent display of variables, whether it was an input or an answer. The CX-2 will offer these again for any subsequent function requiring the same variables for a solution. This allows for "chains" of problems, where a value that is an answer in one function will be automatically entered as input in a succeeding function. If a function is repeated, any and all input lines will be re-entered automatically. This allows you to repeat a calculation where only one or two inputs are changed, with a minimum of effort. You may delete the inputs to be changed by pressing $\boxed{\text{C}}$ or simply typing in replacement numbers. Resetting the computer will delete everything in memory. To reset the computer, remove all of the batteries. This will reset all variables to zero.

The numbers displayed as inputs are the numbers used in the calculations. The CX-2 will round each input variable to a number of decimal places appropriate for the variable. Similarly, each function output variable is also rounded to a number of decimal places appropriate for the variable. This rounding procedure means the display will always be accurate for the numbers displayed, will keep numbers manageable, yet allows for precise answers.

CALCULATOR

Standard mathematics is conventional in the CX-2. The computer performs the four standard arithmetic operations (addition, subtraction, multiplication and division), as well as the square root function, $\boxed{\text{2nd}}$ $\boxed{\text{:}}$. It will accept input numbers up to a maximum of 7 digits and dispay results with a maximum of 8 digits with a floating decimal point and a minus sign. The sign of any number can be changed with the $\boxed{\text{+/-}}$ key.

With the CX-2 turned on, add the numbers 123 and 456 by pressing:

$\boxed{1}$ $\boxed{2}$ $\boxed{3}$ $\boxed{+}$ \ $\boxed{4}$ $\boxed{5}$ $\boxed{6}$ $\boxed{=}$

The number 579 will be displayed. Now press $\boxed{\text{+/-}}$ to change the number to:

-579

As a final step, multiply -579 by 6.5 by keying in:

$\boxed{X}$ $\boxed{6}$ $\boxed{\cdot}$ $\boxed{5}$ $\boxed{=}$

resulting in the answer:

-3763.5

Refer to Appendix A for additional practice problems.

FLIGHT

Altitude

Press Alt

In aviation calculations, air pressure is normally specified by an altitude in a standard atmosphere, instead of pounds per square inch or inches of mercury. The altitude corresponding to a given pressure is called the pressure altitude (PAlt). An aviation altimeter displays PAlt when the altimeter setting window is adjusted to

the standard atmospheric pressure at sea level, 29.92" Hg. PAlt is required to calculate true airspeed (TAS) and density altitude (DAlt).

The Press Alt function calculates PAlt, given the indicated altitude (IAlt) and altimeter setting (Hg) obtained from the automated flight service station (AFSS) or Air Traffic Control (ATC). An altimeter adjusted to this setting will indicate the altitude of the airfield when the aircraft is on the ground.

Problem: You are planning to fly at 4,500 feet IAlt and the current altimeter setting is 30.15" Hg. What PAlt should you use to calculate the TAS?

Solution: Press the ⌊FLIGHT⌋ key. Select the Altitude sub-menu by pressing ⌊ 1 ⌋ or highlight the Altitude line and press ⌊ENT⌋. Select the Press Alt function by pressing ⌊ 1 ⌋ or highlight the Press Alt line and press ⌊ENT⌋. The Press Alt function will position the curser for you to enter IAlt. Press:

⌊ 4 ⌋ ⌊ 5 ⌋ ⌊ 0 ⌋ ⌊ 0 ⌋ ⌊ENT⌋

The curser will then be positioned to enter the altimeter setting Hg. Press:

⌊ 3 ⌋ ⌊ 0 ⌋ ⌊ · ⌋ ⌊ 1 ⌋ ⌊ 5 ⌋ ⌊ENT⌋

The display will show 4,288 feet PAlt.

Problem: What is the PAlt at an airport with a field elevation of 5,900 feet and a 29.75" Hg altimeter setting?

Solution: Select the Press Alt function and enter ⌊ 5 ⌋ ⌊ 9 ⌋ ⌊ 0 ⌋ ⌊ 0 ⌋ for IAlt and ⌊ 2 ⌋ ⌊ 9 ⌋ ⌊ · ⌋ ⌊ 7 ⌋ ⌊ 5 ⌋ for Hg. The display will show 6,058 feet PAlt.

Density Alt

In aviation calculations, air density is normally specified by an altitude in a standard atmosphere, instead of pounds per cubic foot. The altitude corresponding to a given density is called the density altitude (DAlt). The Density Alt function computes DAlt based on PAlt and the outside air temperature (OAT).

Problem: What is the DAlt at an airport with a field elevation of 5,900, 29.75" Hg altimeter setting, and 75°F OAT?

Solution: First, calculate PAlt as shown in the previous problem. Press `BACK` to return to the Altitude menu. Press 2 or highlight the Density Alt line and press `ENT`. The Density Alt function will automatically display 6,058 feet PAlt, just computed. Press `ENT` to accept this input. Next you are prompted for the OAT in degrees Celsius. Press:

`7` `5` `2nd` `3` `ENT`

to enter 75° Fahrenheit, convert to Celsius, and enter the result as the OAT input. The display will show 23.89°C OAT and 8,426 feet DAlt.

Std Atmos

Since air pressure and air density are specified by an altitude in a standard atmosphere, you may want to find the standard atmosphere for a given altitude. The International Civil Aviation Organization (ICAO) has established standard conditions for temperature and pressure. You can enter an altitude (Alt) in the Std Atmos function and obtain OAT in Celsius; pressure in inches of mercury (Hg); and pressure in millibars (mb)

for the standard atmosphere. The Std Atmos function is valid up to 200,000 feet.

Problem: What are the standard atmospheric conditions at sea level?

Solution: Press the |FLIGHT| key. Select the Altitude submenu by pressing | 1 | or highlight the Altitude line (or if continuing from the previous example, press |BACK| to return to the Altitude menu). Press | 3 | or highlight the Std Atmos line and press |ENT|. You are prompted for the altitude. Press:

| 0 | |ENT|

to enter 0 feet, or sea level. The display will show 15.00°C OAT, 29.92" Hg, and 1013.3 mb.

Problem: What are the standard atmospheric conditions at 20,000 feet?

Solution: Select the Std Atmos function. You are prompted for the altitude. Press:

| 2 | 0 | 0 | 0 | 0 | |ENT|

to enter 20,000 feet. The display will show -24.62°C OAT, 13.75", and 465.6 mb.

Cloud Base

The Cloud Base function computes the altitude of the cloud base above ground level (AGL). The function prompts for the dew point and OAT at the airfield, both in degrees Celsius. If you want the elevation of the cloud base above mean sea level (MSL), you must add the elevation of the airfield to the result from the Cloud Base function.

Problem: At approximately what altitude above the surface can the pilot expect the base of cumuliform clouds if the surface air temperature is 82°F and the dew point is 38°F?

Solution: Press the ⌜FLIGHT⌝ key. Select the Altitude sub-menu by pressing ⌜**1**⌝ or highlight the Altitude line (or if continuing from the previous example, press ⌜**BACK**⌝ to return to the Altitude menu). Press ⌜**4**⌝ or highlight the Cloud Base line and press ⌜**ENT**⌝. You are prompted for the OAT. Press:

⌜**8**⌝ ⌜**2**⌝ ⌜**2nd**⌝ ⌜**3**⌝ ⌜**ENT**⌝

to convert 82°F to Celsius. You are then prompted for dew point (Dewp). Press:

⌜**3**⌝ ⌜**8**⌝ ⌜**2nd**⌝ ⌜**3**⌝ ⌜**ENT**⌝

The answer is 10,002 feet AGL.

Airspeed

The difference between Plan and Actual TAS and Mach number is in the temperature input. Plan airspeeds require the use of OAT, obtainable from the preflight weather briefing or from what you read on a thermometer on the ground. Actual airspeeds require the use of total air temperature (TAT), which is obtained by a probe having velocity with respect to the air (essentially, the thermometer in your aircraft). TAT is warmer than OAT, because of kinetic heating due to compression on the upstream side of the probe. Since the "Act" airspeed functions use a correction for temperature rise, and "Plan" airspeed functions do not, it is important to use the function appropriate to the type of temperature available. As a general rule, use "Plan" air-

speeds for preflight planning, where OAT is available during ground operations, and use "Act" airspeeds for in-flight calculations, where TAT is available.

Plan TAS

The Plan TAS function computes the true airspeed (TAS) for a planned calibrated airspeed (CAS). The inputs to this function are Planned CAS, OAT, and PAlt.

It is important to use the OAT and PAlt at the planned flight altitude. OAT may be obtained from winds aloft forecasts. OAT can also be determined from the TAT during flight as described in the Act TAS function. PAlt is normally obtained from the Press Alt function. The Plan TAS function calculates TAS, TAT (which can be used as a cross-check with the in-flight TAT), and Mach Number (MACH).

Problem: You plan to fly 125 knots CAS, 8,500 feet PAlt, and -5°C OAT. Compute TAS and TAT.

Solution: Press the `FLIGHT` key. Select the Airspeed sub-menu by pressing `2` or highlight the Airspeed line. Press `1` to select the Plan TAS function. Press:

`1` `2` `5` `ENT`

to enter 125 knots for the planned CAS. Press:

`5` `+/-` `ENT`

to enter -5°C OAT. Press:

`8` `5` `0` `0` `ENT`

to enter 8,500 feet PAlt. The display will show 141.0 kts TAS, -2.38°C TAT, and 0.2210 MACH.

Act TAS

The Act TAS function computes true airspeed using information from instruments during an actual flight. The inputs to this function are CAS, TAT, and PAlt. The Act TAS function calculates TAS, OAT (which can be used as an input to Plan TAS and Req CAS functions), and Mach Number (MACH).

Problem: Compute the TAS at 6,500 feet PAlt, +10°C TAT, at a CAS of 150 MPH.

Solution: Press the ⌊FLIGHT⌋ key. Select the Airspeed sub-menu by pressing ⌊2⌋ or highlight the Airspeed line (or if continuing from the previous example, press ⌊BACK⌋ to return to the Airspeed menu). Press ⌊2⌋ to select the Act TAS function. The function will prompt for the CAS in knots. Press:

⌊1⌋ ⌊5⌋ ⌊0⌋ ⌊2nd⌋ ⌊8⌋ ⌊ENT⌋

to enter 150 MPH; convert from statute miles per hour to nautical miles per hour, and enter the result 130.3 kts CAS. Then press:

⌊1⌋ ⌊0⌋ ⌊ENT⌋ ⌊6⌋ ⌊5⌋ ⌊0⌋ ⌊0⌋ ⌊ENT⌋

to enter 10°C TAT and 6,500 feet PAlt. The display will show 144.8 kts TAS, 7.24°C OAT, and 0.2218 MACH.

Req CAS

The Req CAS function computes the calibrated airspeed required to achieve a given true airspeed. The inputs to this function are TAS, OAT, and PAlt. The Req CAS function calculates CAS, TAT, and MACH.

Problem: What is the required CAS or MACH to obtain 150 knots TAS with 6,500 feet PAlt and -5°C OAT?

Solution: Press the `FLIGHT` key. Select the Airspeed sub-menu by pressing `2` or highlight the Airspeed line (or if continuing from the previous example, press `BACK` to return to the Airspeed menu). Press `3` to select the Req CAS function, press:

`1` `5` `0` `ENT`

to enter 150 knots TAS, then:

`5` `+/_` `ENT`

to enter -5°C OAT, and press:

`6` `5` `0` `0` `ENT`

to enter 6,500 feet PAlt. The display will show 138.1 kts CAS, -2.04°C TAT, and 0.2351 MACH.

Plan MACH#

The Plan MACH# function computes true airspeed for a planned MACH. The inputs to this function are Planned MACH and OAT.

It is important to use the OAT at the planned flight altitude. The Plan MACH# function computes TAS, and TAT (to be used as a cross-check against the in-flight TAT).

Problem: Compute TAS for 0.72 MACH and -35°C OAT.

Solution: Press the `FLIGHT` key. Select the Airspeed sub-menu by pressing `2` or highlight the Airspeed line (or if continuing from the previous example, press `BACK` to return to the Airspeed menu). Press `4` to select the

Plan Mach# function and press:

$\boxed{\cdot}$ $\boxed{7}$ $\boxed{2}$ $\boxed{\text{ENT}}$

to enter 0.72 MACH. Next, press:

$\boxed{3}$ $\boxed{5}$ $\boxed{^+/_-}$ $\boxed{\text{ENT}}$

to enter -35°C OAT. The display will now show 433.0 kts TAS and -10.31°C TAT.

Act MACH#

The Act MACH# function computes true airspeed using information from instruments during an actual flight. The inputs to this function are Actual MACH, and TAT. The Act MACH# function calculates TAS, and OAT.

Problem: Compute the TAS given 0.82 MACH with -20°C TAT.

Solution: Press the $\boxed{\text{FLIGHT}}$ key. Select the Airspeed sub-menu by pressing $\boxed{2}$ or highlight the Airspeed line (or if continuing from the previous example, press $\boxed{\text{BACK}}$ to return to the Airspeed menu). Press 5 to select the Act MACH# function and press:

$\boxed{\cdot}$ $\boxed{8}$ $\boxed{2}$ $\boxed{\text{ENT}}$

to enter 0.82 MACH. Next, press:

$\boxed{2}$ $\boxed{0}$ $\boxed{^+/_-}$ $\boxed{\text{ENT}}$

to enter -20°C OAT. The display will show 477.3 kts TAS and -50.01°C OAT.

Fuel

Fuel Burn

The Fuel Burn function calculates the amount of fuel (Fuel) consumed over a specified time Duration (Dur) at a specified rate (Rate).

Problem: How much fuel will burn in 1 hour, 14 minutes, and 38 seconds at a rate of 9.5 gallons per hour?

Solution: Press the FLIGHT key. Select the Fuel submenu by pressing 3 or highlight the Fuel line. Press 1 to select the Fuel Burn function, and press:

1 : 1 4 : 3 8 ENT

to enter 1:14:38 Dur, and then:

9 . 5 ENT

to enter 9.5 Xph Rate. The display will show 11.8X Fuel. The unit X can be gallons, liters, or pounds as long as the same unit is used for the Rate and Fuel. In this problem, the rate was 9.5 gallons per hour so the answer is 11.8 gallons.

Fuel Rate

The Fuel Rate function calculates the fuel rate (Rate) from the amount of fuel (Fuel) consumed over a given time duration (Dur).

Problem: What is rate of fuel consumption if 9,500 pounds of fuel were burned in the last 2 hours, 30 minutes?

Solution: Press the FLIGHT key. Select the Fuel submenu by pressing 3 or highlight the Fuel line (or if continuing from the previous example, press BACK to return to the Fuel menu). Press 2 to select the Fuel Rate function and press:

2 : 3 0 ENT

to enter 2:30 Dur, and then:

9 5 0 0 ENT

to enter 9,500X Fuel. The display will show a 3,800

Xph Rate. Since the amount of fuel was given in pounds, the answer is in pounds per hour.

Endurance

The Endurance function calculates the duration of time (Dur) a specified amount of fuel (Fuel) will be consumed at a specified rate (Rate).

Problem: How much flight time do you have with 38 gallons of fuel on board, and a power setting that gives a fuel burn rate of 9.5 gallons per hour?

Solution: Press the `FLIGHT` key. Select the Fuel submenu by pressing `3` or highlight the Fuel line (or if continuing from the previous example, press `BACK` to return to the Fuel menu). Press `3` to select the Endurance function. Press:

`3` `8` `ENT`

to enter 38X Fuel, and

`9` `·` `5` `ENT`

to enter 9.5 Xph Rate. The display will now show 4:00:00 Dur. (4:00:00 is 4 hours, 0 minutes, 0 seconds.) The units for Fuel and Rate must match. In this problem, Fuel was in gallons and Rate was in gallons per hour.

Plan Leg
Hdg/GS

The Hdg/GS function computes the true heading (THdg) required to maintain a desired true course (TCrs), given the TAS and wind conditions. The inputs to this function are TCrs, TAS, wind direction (WDir), and wind speed (WSpd). The outputs are THdg, and GS.

Problem: What is the THdg given a 155° TCrs, 125 kts TAS, with winds of 350° WDir and 15 kts WSpd?

Solution: Press the `FLIGHT` key. Select the Plan Leg submenu by pressing `4` or highlight the Plan Leg line. Press `1` to select the Hdg/GS function and press:

`1` `5` `5` `ENT`

to enter 155° TCrs, then press:

`1` `2` `5` `ENT`

to enter 125 kts TAS, then:

`3` `5` `0` `ENT`

to enter 350° WDir, and:

`1` `5` `ENT`

to enter 15 kts WSpd.

The display will show 153.2° THdg and 139.4 kts GS.

Hdg/TAS

Occasionally it is necessary to arrive at a checkpoint at a specific time. To do this, the GS must be precisely controlled and the wind conditions will dictate the required TAS. The Hdg/TAS function computes the TAS and THdg required to maintain a desired TCrs given the GS and wind conditions. The inputs to this function are TCrs, GS, WDir, and WSpd. The outputs are THdg and TAS.

Problem: Determine the THdg and TAS to maintain a ground speed of 143 knots while flying on a true course of 010°. The winds aloft forecast indicates winds of 250° at 25 knots at cruise altitude.

Solution: Press the `FLIGHT` key. Select the Plan Leg submenu by pressing `4` or highlight the Plan Leg line (or if continuing from the previous example, press `BACK`

to return to the Plan Leg menu). Press $\boxed{2}$ to select the Hdg/TAS function and press:

$\boxed{0}$ $\boxed{1}$ $\boxed{0}$ $\boxed{\text{ENT}}$

to enter 10° TCrs,

$\boxed{1}$ $\boxed{4}$ $\boxed{3}$ $\boxed{\text{ENT}}$

to enter 143 kts GS, then press:

$\boxed{2}$ $\boxed{5}$ $\boxed{0}$ $\boxed{\text{ENT}}$

to enter 250° WDir, and:

$\boxed{2}$ $\boxed{5}$ $\boxed{\text{ENT}}$

to enter 25 kts WSpd. The display will show 0.6° THdg and 132.3 kts TAS. You should fly a heading of 001° at 132 knots.

Compass Hdg

This function is used to account for the inherent inaccuracies of the compass, caused by the difference between the direction indicated by the magnetic compass and the true north pole (magnetic variation), as well as magnetic disturbances within the aircraft (deviation). The inputs to this function are THdg, magnetic variation (Var), and deviation (Dev). The output is the compass heading (CHdg).

Problem: What is the compass heading for a flight on a true heading of 203°, where the compass deviation card indicates a 4° compass deviation and the sectional chart indicates the flight will have a 4° westerly variation?

Solution: Press the $\boxed{\text{FLIGHT}}$ key. Select the Plan Leg submenu by pressing $\boxed{4}$ or highlight the Plan Leg line (or if continuing from the previous example, press $\boxed{\text{BACK}}$

to return to the Plan Leg menu). Press $\boxed{3}$ to select the Compass Hdg function. Press:

$\boxed{2}\ \boxed{0}\ \boxed{3}\ \boxed{\text{ENT}}$

to enter the true heading, then:

$\boxed{4}\ \boxed{\text{ENT}}$

to enter the westerly variation (east is least, west is best: enter a positive number for a westerly variation and a negative number for an easterly variation), and press:

$\boxed{4}\ \boxed{\text{ENT}}$

to enter the deviation. The display will show 211.0° for the CHdg.

Leg Time
The Leg Time function computes the time duration of a leg given its distance (Dist) and ground speed (GS). In most cases, GS comes from the Hdg/GS function.

Problem: Compute the time required to fly 153 nautical miles at a ground speed of 123 knots.

Solution: Press the $\boxed{\text{FLIGHT}}$ key. Select the Plan Leg submenu by pressing $\boxed{4}$ or highlight the Plan Leg line (or if continuing from the previous example, press $\boxed{\text{BACK}}$ to return to the Plan Leg menu). Press $\boxed{4}$ to select the Leg Time function. Press:

$\boxed{1}\ \boxed{5}\ \boxed{3}\ \boxed{\text{ENT}}$

to enter 153 NM Dist, then:

$\boxed{1}\ \boxed{2}\ \boxed{3}\ \boxed{\text{ENT}}$

to enter 123 kts GS. The display will show 01:14:38 Dur.

ETA

The ETA function computes the estimated time of arrival (ETA), given the departure time (Dep) and flight duration (Dur). Typically, Dur comes from the Leg Time function.

Problem: What is your ETA if you plan to depart at 9:30 a.m., for a 2.5 hour flight?

Solution: Press the `FLIGHT` key. Select the Plan Leg submenu by pressing `4` or highlight the Plan Leg line (or if continuing from the previous example, press `BACK` to return to the Plan Leg menu). Press `5` to select the ETA function and press:

`9` `:` `3` `0` `:` `ENT`

to enter your departure time, then:

`2` `·` `5` `2nd` `6` `ENT`

to first convert your 2.5 hour flight to the HH:MM:SS format, and enter the 2 hour, 30 minute flight. The display will show 12:00:00 as the ETA. Remember, you may use the calculator on each input line, so you could add all your legs to find the ETA for your total flight.

To/From

The To/From function converts a course from (From) a location into the course to (To) the same location along the same radial, providing the reciprocal of any number.

Problem: What is the course TO the VORTAC if you are on the 150° radial?

Solution: Press the `FLIGHT` key. Select the Plan Leg submenu by pressing `4` or highlight the Plan Leg line (or if continuing from the previous example, press `BACK` to

return to the Plan Leg menu). Press $\boxed{6}$ to select the To/From function and press:

$\boxed{1}$ $\boxed{5}$ $\boxed{0}$ $\boxed{\text{ENT}}$

The display will show 330° as the course FROM the station.

Act Leg

Dist Flown

The Dist Flown function computes how far you will fly (or have flown) given a ground speed and flight duration.

Problem: How far will you fly in 24 minutes at an average speed of 130 knots?

Solution: Press the $\boxed{\text{FLIGHT}}$ key. Select the Act Leg submenu by pressing $\boxed{5}$ or highlight the Act Leg line. Press $\boxed{1}$ to select the Dist Flown function and press:

$\boxed{0}$ $\boxed{:}$ $\boxed{2}$ $\boxed{4}$ $\boxed{\text{ENT}}$

to enter 00:24:00 Dur. Next, press:

$\boxed{1}$ $\boxed{3}$ $\boxed{0}$ $\boxed{\text{ENT}}$

to enter 130 kts GS. The display will now show 52.0 NM Dist.

GS

The GS function computes ground speed given a distance (Dist) and flight duration (Dur).

Problem: What is the ground speed if 5 nautical miles are flown in 2 minutes, 32 seconds?

Solution: Press the $\boxed{\text{FLIGHT}}$ key. Select the Act Leg submenu by pressing $\boxed{5}$ or highlight the Act Leg line (or if continuing from the previous example, press $\boxed{\text{BACK}}$ to

return to the Act Leg menu). Press $\boxed{2}$ to select the GS function. Press:

$\boxed{0}$ $\boxed{:}$ $\boxed{2}$ $\boxed{:}$ $\boxed{3}$ $\boxed{2}$ $\boxed{\text{ENT}}$

to enter 00:02:32 Dur, and press:

$\boxed{5}$ $\boxed{\text{ENT}}$

to enter 5 NM Dist. The display will show 118.4 kts GS.

Unknown Wind

The Unknown Wind function allows you to compute the wind direction and speed during a flight. The inputs to this function are THdg, GS, TCrs, and TAS, and the outputs are WDir and WSpd.

Problem: Find the wind direction and speed given 350° THdg, 478 kts GS, 355° TCrs, and 500 kts TAS.
Solution: Press the $\boxed{\text{FLIGHT}}$ key. Select the Act Leg sub-menu by pressing $\boxed{5}$ or highlight the Act Leg line (or if continuing from the previous example, press $\boxed{\text{BACK}}$ to return to the Act Leg menu). Press $\boxed{3}$ to select the Unknown Wind function and press:

$\boxed{3}$ $\boxed{5}$ $\boxed{0}$ $\boxed{\text{ENT}}$

to enter 350° THdg,

$\boxed{4}$ $\boxed{7}$ $\boxed{8}$ $\boxed{\text{ENT}}$

to enter 478 kts GS,

$\boxed{3}$ $\boxed{5}$ $\boxed{5}$ $\boxed{\text{ENT}}$

to enter 355° TCrs, and

$\boxed{5}$ $\boxed{0}$ $\boxed{0}$ $\boxed{\text{ENT}}$

to enter 500 kts TAS. The display will show 289.8° WDir and 48.0 kts WSpd.

X/H-Wind

The X/H-Wind function computes the head- or tail-wind component and the left or right crosswind component for a given wind and runway. The wind speed must be in knots. Since runways are numbered by their magnetic course, the wind direction must be magnetic as well (predicted winds aloft are given in true, rather than magnetic orientation, while airport wind advisories and runway headings are both magnetic). The runway number must be entered — not the course. The inputs are WDir, WSpd, and runway (RnWy) — it must be the runway number, not the heading. For example, runway 27 (not 270), and runway 9 (not 90). The outputs are crosswind (XWnd) — negative is a left crosswind, positive is a right crosswind; headwind (HWnd) — negative is a headwind, positive is a tail-wind.

Problem: Assume a wind of 350° at 10 knots. What are the head/tailwind and crosswind components for a landing on runway 03?

Solution: Press the `FLIGHT` key. Select the Act Leg submenu by pressing `5` or highlight the Act Leg line (or if continuing from the previous example, press `BACK` to return to the Act Leg menu). Press `4` to select the X/H-Wind function and press:

`3` `5` `0` `ENT`

`1` `0` `ENT`

`3` `ENT`

to enter the WDir, WSpd, and RnWy. The answer will be -6.4 XWnd (the negative sign indicates a left cross-

wind) and -7.7 HWnd (the negative sign indicates a headwind).

Gliding

Glide Dist
Glide Dist computes the horizontal distance (DIST) in nautical miles, given the glide ratio (RAT) and descent (DESC) in feet.

Problem: An aircraft has a best glide ratio of 30:1. What is the maximum number of nautical miles traveled while losing 2,000 feet?

Solution: Press the `FLIGHT` key. Select the Gliding submenu by pressing `6` or highlight the Gliding line. Press `1` for the Glide Dist function, then press:

`2` `0` `0` `0` `ENT`

`3` `0` `ENT`

to enter the glide descent altitude and ratio. The answer is a distance of 9.9 NM.

Glide Desc
Glide Desc computes descent (DESC) in feet, given the glide ratio and horizontal distance in nautical miles.

Problem: How many feet will an aircraft sink in 15 nautical miles if the lift/drag ratio is 22:1?

Solution: Press the `FLIGHT` key. Select the Gliding submenu by pressing `6` or highlight the Gliding line (or if continuing from the previous example, press `BACK` to return to the Gliding menu). Press `2` for the Glide

Desc function, then press:

[1] [5] [ENT]

[2] [2] [ENT]

to enter the glide distance and ratio. The answer is
4,143 feet.

Glide Ratio

Glide Ratio computes the glide ratio (RAT) given the
horizontal distance in nautical miles and the descent in
feet.

Problem: An aircraft has lost 2,000 feet in 9 nautical
miles. What is the glide ratio for the aircraft?

Solution: Press the [FLIGHT] key. Select the Gliding sub-
menu by pressing [6] or highlight the Gliding line (or
if continuing from the previous example, press [BACK] to
return to the Gliding menu). Press [3] for the Glide
Ratio function, then press:

[9] [ENT]

[2] [0] [0] [0] [ENT]

for the gliding distance and altitude. The answer is a
glide ratio of 27:1.

WT/BAL

The CX-2 performs all of the calculations necessary for
proper aircraft loading. The first four items in the
Wt/Bal menu are used to define the number of entries
and the moment reduction factor (#Items/RF), enter
weight/moment items (Wt/Mom Entry), enter
weight/arm items (Wt/Arm Entry), and obtain the

gross weight and center of gravity (Wt/Bal Total). The steps are described below in the context of solving a basic weight and balance problem.

Standard weights used in aviation include:

AvGas . . . . .6 lbs/gal
Jet fuel . . . . .6.84 lbs/gal
Oil . . . . .7.5 lbs/gal
(Remember: there are 4 quarts in a gallon)

Problem: Find the gross weight (GW) and center of gravity (CG), given:
1. Aircraft empty weight, 1,495 lbs weight, 151,593 lb-in moment
2. Pilot and passengers, 380 lbs, 64" arm
3. Rear-seat passenger, 150 lbs, 75" arm
4. Fuel, 180 lbs, 96" arm

Solution: Press the WT/BAL key.
1. Select the #Items/RF submenu by pressing 1. This function does not involve any calculations but is required to begin each weight and balance problem. This is where you define the parameters for the totals (weight, moment, and CG). You are prompted to enter the number of items involved in the calculation. Press 4 ENT. You are then prompted for the reduction factor (RF). Reduction factors are used with aircraft that generate large moments for the purpose of keeping the numbers a manageable size. It does not affect the arms or weights involved in the calculation. An RF of 100 means each moment is divided by 100 before the calculator displays it or the operator enters it; this will be taken into account when the total and CG are computed.

Use the CX-2 default RF of 1 for this problem, which means the moment entries will be taken at face value.

2. Press $\boxed{\text{BACK}}$, then $\boxed{2}$ to select the Wt/Mom Entry function. This is where you enter the information for given items that provide moments (instead of arms). The function defaults to the first item number. Press $\boxed{\text{ENT}}$, $\boxed{1}$ $\boxed{4}$ $\boxed{9}$ $\boxed{5}$ $\boxed{\text{ENT}}$ for the weight, and $\boxed{1}$ $\boxed{5}$ $\boxed{1}$ $\boxed{5}$ $\boxed{9}$ $\boxed{3}$ $\boxed{\text{ENT}}$ for the moment. This results in 101.40" for the arm.

3. Press $\boxed{\text{BACK}}$, then $\boxed{3}$ to select the Wt/Arm Entry function. This is where you enter the information for given items that provide arms (instead of moments). The computer starts by displaying what was entered for item number one. Press $\boxed{2}$ $\boxed{\text{ENT}}$, $\boxed{3}$ $\boxed{8}$ $\boxed{0}$ $\boxed{\text{ENT}}$, $\boxed{6}$ $\boxed{4}$ $\boxed{\text{ENT}}$ to input the information for item number 2. This results in a moment of 24,320.00 lb-in and returns the cursor to the top of the screen. Press $\boxed{3}$ $\boxed{\text{ENT}}$, $\boxed{1}$ $\boxed{5}$ $\boxed{0}$ $\boxed{\text{ENT}}$, $\boxed{7}$ $\boxed{5}$ $\boxed{\text{ENT}}$ to provide the inputs for item number 3. This results in a moment of 11,250.00 lb-in and again returns the cursor to the top of the screen. Press $\boxed{4}$ $\boxed{\text{ENT}}$, $\boxed{1}$ $\boxed{8}$ $\boxed{0}$ $\boxed{\text{ENT}}$, $\boxed{9}$ $\boxed{6}$ $\boxed{\text{ENT}}$ to provide the inputs for item number 4. This results in a moment of 17,280.00 lb-in and again returns the cursor to the top of the screen.

4. Press $\boxed{\text{BACK}}$ then $\boxed{4}$ to select the Wt/Bal Total function. This screen displays output only, accounting for the inputs in the previous 3 submenus. For this problem, the outputs are:

#Items 4
RF 1

Wt . . . . .2,205 lbs
Mom . . . . . .204,443 lb-in
CG . . . . .92.72"

If the given information provides for all arms, then you do not need to use the Wt/Mom Entry function. Likewise, if the given information provides for all moments, then you do not need to use the Wt/Arm Entry function.

Problem: Given the information above, find the GW and CG if a 150-lb passenger exits the aircraft, and 50 lbs of fuel is added.

Solution: Press $\boxed{\text{BACK}}$, followed by $\boxed{3}$ to select the Wt/Arm Entry function. The #Items/RF is not changing, nor is the empty weight of the aircraft, so you do not need to review the first 2 submenus.

1. To change the passenger load, press $\boxed{2}$ $\boxed{\text{ENT}}$ to define which item you are changing. Your previous entries for this item will display. Press $\boxed{-}$ $\boxed{1}$ $\boxed{5}$ $\boxed{0}$ $\boxed{=}$ $\boxed{\text{ENT}}$ to find the new passenger weight (230 lbs). A new moment for this item is calculated to be 14,720.00 lb-in.

2. To change the fuel load, press $\boxed{\vee}$ to return to item number and $\boxed{4}$ $\boxed{\text{ENT}}$ to define the item number. Press $\boxed{+}$ $\boxed{5}$ $\boxed{0}$ $\boxed{=}$ $\boxed{\text{ENT}}$ to find the new passenger weight (230 lbs). Press $\boxed{\text{ENT}}$ to accept the same arm. A new moment for this item is calculated to be 22,080.00 lb-in.

3. Press $\boxed{\text{BACK}}$ then $\boxed{4}$ to select the Wt/Bal Total function. This screen will display output only, accounting for the weight/load changes:

```
#Items  . . . . .4
RF  . . . . . . . .1
Wt  . . . . . . . .2,105 lbs
Mom  . . . . . .199,643 lb-in
CG  . . . . . . . .94.84"
```

Problem: Continuing from the previous problems, now assume the 150-lb passenger moves to the front seat. Calculate the GW and CG given this weight shift.
Solution: Press `BACK`, followed by `3` to select the Wt/Arm Entry function. The #Items/RF is not changing, nor is the empty weight of the aircraft, so you do not need to review the first 2 submenus.

1. To change the passenger load, press `2` `ENT` to define which item you are changing. Your previous entries for this item will display. Press `+` `\` `1` `5` `0` `=` `ENT` to find the new passenger weight (380 lbs). A new moment for this item is calculated to be 24,320.00 lb-in.

2. To change the rear-seat load, press `V` and `3` `ENT` to define the item number. Press `−` `1` `5` `0` `=` `ENT` to find the new passenger weight (0 lbs). Press `ENT` to accept the same arm. A new moment for this item is calculated to be 0 lb-in.

3. Press `BACK` then `4` to select the Wt/Bal Total function. This screen will display output only, accounting for the weight/load changes:

```
#Items  . . . . .4
RF  . . . . . . . .1
Wt  . . . . . . . .2,105 lbs
Mom  . . . . . .197,993 lb-in
CG  . . . . . . . .94.06"
```

The last item in the **Wt/Bal** menu is %MAC. Large aircraft operations often require the CG be expressed as a percent of the mean aerodynamic chord (%MAC). This function calculates the %MAC given the CG, the length of the mean aerodynamic chord (MAC), and the leading edge of the mean aerodynamic chord (LMAC).

Problem: Determine the CG in percent of MAC given.

MAC . . . . 860.2 to 1040.9
CG . . . . .910.2"
LMAC . . . . 860.2"

Solution: Press $\boxed{\text{WT/BAL}}$, followed by $\boxed{5}$ to select the %MAC function. 1,040.9 - 860.2 = $\boxed{\text{ENT}}$ for the MAC, 910.2 $\boxed{\text{ENT}}$ for CG, and 860.2 $\boxed{\text{ENT}}$ for LMAC to find 27.7% for the CG in %MAC.

CLOCK

The internal clock lets you set both local and UTC time and will continue running even with the calculator turned off. The CX-2 contains a single clock representing Coordinated Universal Time (UTC), also known as Greenwich Mean Time (GMT) or Zulu Time. You can set the Local Zone and the CX-2 displays both UTC and local time in a 24-hour format. To set the clock using Local time, you must set the local zone first. Tables 1 and 2 on the next page show the numbers of the time zones to specify when setting clock information.

To set the clock for 11:15 a.m. for the Pacific Standard time zone:
1. Press CLOCK.
2. Press $\boxed{3}$ to set the zone (see the tables below for

the time zone number to input). Press ⬚**1** ⬚**6** .
The CX-2 will return to the previous menu.

3. Press ⬚**1** for the Set Local menu.
4. Press ⬚**1** ⬚**1** ⬚**:** ⬚**1** ⬚**5** ⬚**ENT** to enter 11:15. The
    CX-2 will return to the previous menu and display
    both the local and UTC time.

Table 1. *United States standard UTC time zones*

Eastern Standard Time..19
Central Standard Time..18
Mountain Standard Time...17
Pacific Standard Time...16

Note: add 1 hour for daylight time.

Table 2. *Worldwide time zones*

Input	Location
0	(GMT) Casablanca, Monrovia, Dublin, Edinburgh, Lisbon, London
1	Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna, Belgrade, Bratislava, Budapest, Ljublijana, Prague, Brussels, Copenhagen, Madrid, Paris, Vilnius, Sarajevo, Skopje, Sofija, Warsaw, Zagreb
2	Athens, Istanbul, Minsk, Bucharest, Cairo, Harare, Pretoria, Helsinki, Riga, Tallinn, Israel
3	Baghdad, Kuwait, Riyadh, Moscow, St. Petersburg, Volgograd, Nairobi
3.5	Tehran
4	Abu Dhabi, Muscat, Baku, Tbilisi
4.5	Kabul
5	Ekaterinburg, Islamabad, Karachi, Tashkent
5.5	Bombay, Calcutta, Madras, New Delhi

6	Almaty, Dhaka, Colombo
7	Bangkok, Hanoi, Jakorta
8	Beijing, Chongqing, Hong Kong, Urumqi, Perth, Singapore,Teipei
9	Osaka, Sapporo, Tokyo, Seoul, Yakutsk
9.5	Adelaide, Darwin
10	Brisbane, Canberra, Melbourne, Sydney, Guam, Port Moresby, Hobart, Vladivostok
11	Magadan, Solomon Is., New Caledonia
12	Auckland, Wellington, Fiji, Kamchatka, Marshall Is., Eniwetok, Kwajalein
13	Midway Island, Samoa
14	Hawaii
15	Alaska
16	Pacific Time (U.S., Canada), Tijuana
17	Arizona, Mountain Time (U.S., Canada)
18	Central Time (U.S., Canada), Mexico City, Tegucigalpa, Saskatchewan
19	Bogota, Lima, Quito, Eastern Time (U.S., Canada), Indiana
20	Atlantic Time (Canada), Caracas, LaPaz
20.5	Newfoundland
21	Brasilia, Buenos Aires, Georgetown
22	Mid-Atlantic
23	Azores, Cape Verde Is.

If the time is after noon, you will need to enter the time based on a 24-hour clock; for example, 2 p.m. would be 14:00:00. To set the clock to 1:30 p.m.:

1. Press **3** for Set Zone. Press **1** **6** **ENT** for Pacific Standard time.

2. Press $\boxed{1}$ to set the local time. Press $\boxed{1}\boxed{3}\boxed{:}$ $\boxed{3}\boxed{0}\boxed{\text{ENT}}$.
3. Results in UTC of 21:05 (8 hours later).

You can convert time using the Calculator.

Problem: The local time is 9:15 in the Eastern daylight region. What is the time in UTC?
Solution: Press $\boxed{\text{ON}}$, then press $\boxed{9}\boxed{:}\boxed{1}\boxed{5}$ $\boxed{+}\boxed{1}\boxed{9}\boxed{:}\boxed{=}$ to convert local to UTC (28:15:00). Press $\boxed{-}\boxed{2}\boxed{4}\boxed{:}\boxed{=}$ to return the answer to a 24-hour clock format: 04:15:00.

Problem: You are currently flying in Mountain Standard time, the arrival airport is in the Central Standard zone. Convert your Mountain-time ETA of 16:30 to the local time:
Solution: Press $\boxed{\text{ON}}$, then press $\boxed{1}\boxed{6}\boxed{:}\boxed{3}\boxed{0}$ $\boxed{+}\boxed{1}\boxed{:}\boxed{=}$ to convert mountain to central (17:30:00), since there is only a 1-hour difference between the two zones.

TIMER

The CX-2 has two timers: a stopwatch that counts up, and a count down timer. The stopwatch can be used to keep track of elapsed time or to determine the time required to fly a known distance. The count down timer can be used as a reminder to switch fuel tanks or to determine the missed approach point on a nonprecision instrument approach.

Stopwatch

The Stopwatch will count from zero to 99:59:59. Press `TIMER` followed by `1` to access the Stopwatch.

1. Press `1` (Run) to start the Stopwatch.
2. Press `2` (Stop) to stop the Stopwatch. If you then press `1`, the stopwatch will begin again from where it left off.
3. Press `3` (Reset) to return the Stopwatch to 00:00:00. Press `1` to begin the stopwatch again.

Count Down

The count down will run from any preset value (as high as 99:59:59) down to zero. Press `TIMER` followed by `2` to access the count down timer.

1. Using the arrow keys, put the cursor over Set and type in the value you want to begin the count down from. Press `0` `:` `2` `:` `3` `0` to enter 2 minutes, 30 seconds. Press `ENT` for the count down timer to start running.
2. Use the down arrow key to stop the timer at any time.
3. The set time will continue displaying at the top of the screen, while the timer at the bottom will display the count down progress from this value.
4. The timer will continue counting down after zero is reached. In this case, a negative sign will precede the time.

APPENDIX A: Sample Problems

Problems   *Solutions*

Math Review

$(2 + 63) \cdot 3 = $ _____ 195

$17 \div 6 = $ _____ 2.833333

$5 - 12.5° = $ _____ -7.5

Time

$2:30:00 + 00:37:30 = $ _____ 03:07:30

$8:30:00 - 5:15:00 = $ _____ 03:15:00

Conversions

52 SM = _____ NM	45.18676
175 MPH = _____ NM	152.0708
600 KTS = _____ MPH	690.4677
600 KTS = _____ KPH	1,111.2
200 MPH = _____ KMH	321.8688
11,000 Meters = _____ Feet	36,089.24
5,280 Feet = _____ Meters	1,609.344
0°F = _____ °C	-17.77778
20°C = _____ °F	68
-40°F = _____ °C	-40
200 Gal = _____ Liters	757.0824
500 Liters = _____ Gal	132.086
120 lb = _____ kg	54.43108
90 kg = _____ lb	198.416
29.92 in = _____ mb	1,013.208
1,016.6 mb = _____ in	30.02018

Altitude
Press Alt

Determine the pressure altitude with an indicated altitude of 1,380 feet MSL with an altimeter setting of 28.22 at standard temperature.   2,990 ft

Density Alt

Determine the density altitude for these conditions: altimeter setting 29.25, runway temperature 81°F, airport elevation 5,250 ft MSL.   8,563 ft

Std Atmos

The maximum temperature limitation for takeoff is International Standard Atmosphere (ISA) +34°C. Which is the highest temperature that will allow a takeoff from a 7,000-foot pressure altitude airport?
                                                            95.234°F

Cloud Base

At approximately what altitude above the surface would the pilot expect the base of cumuliform clouds if the surface temp. is 82°F and the dew point is 38°F?
                                                            10,002 ft

Airspeed
Plan TAS

What is your plan true airspeed given the following conditions: pressure altitude 35,000 feet, OAT -55°C, CAS 285 kts?

        TAS 480.3 kts,   TAT -24.62°C,   MACH 0.8345

Act TAS

What is your actual true airspeed with a total air temperature of 0°C, CAS 150 knots, and pressure altitude 25,000?

TAS 234.1 kts, OAT -7.22°C, MACH 0.3684

ReqCAS

What is the required calibrated airspeed with the TAS 145 knots, OAT 45°F, and pressure altitude 3,000?

CAS 139.2 kts, TAT 9.99°C, MACH 0.2222

Plan MACH#

What is the true airspeed at OAT -40°C and MACH .72?

TAS 428.4 kts, TAT -15.83°C

Act MACH#

What is the true airspeed at TAT °C -17° and MACH .84?

TAS 490.4 kts, OAT -48.68°C

Fuel
Fuel Burn

How much fuel will burn if you fly 02:45:00, at a fuel rate of 17.8 gal/hr?   48.9 gal

Fuel Rate

What is the fuel rate if you burn 35 gallons in 1.2 hours?   29.2 gal/hr

Endurance

What is the endurance if you burn 9,500 lbs at a rate of 1,500 lbs/hr?   06:20:00

Plan Leg

Hdg/GS

What is your true heading and ground speed given the following conditions: Wind 330° at 16 knots, course 165°, and TAS 145?   THdg 166.6°, GS 160.4 kts

Hdg/TAS

What is your heading and TAS given the winds 250° at 20 knots, a course of 210°, and ground speed of 180 knots?   TAS 195.7 kts, Hdg 213.8°

Compass Hdg

What is the compass heading given a true heading of 203°, 5° westerly variation, and 4° deviation?

CHdg 212.0°

Leg Time

What is the estimated time enroute for a distance of 75 KM, at a ground speed of 115 MPH?

Dur 00:24:19

ETA

What is the estimated time of arrival for a trip departing at 10:00, with a leg time of 33 minutes?

ETA 10:33:00

To/From

A CDI is centered with the OBS set to 210° with a TO indication. What radial is the aircraft crossing?

To 30.0°

Act Leg
Dist Flown

How far have you traveled if you have a 138-knot ground speed, and have been flying for 40 minutes?

Dist 92.0 NM

GS

What is your ground speed if you traveled 10 NM in 00:01:22? GS 439.0 kts

Unknown Wind

What are the winds aloft if you are flying a 222° heading for a 215° course, with a TAS of 145 knots, and ground speed of 159.4 knots?

WDir 346.2°, WSpd 23.5 kts

X/H-Wind

The winds are at 280° at 12 knots, and you are landing on runway 32. What will the headwind/crosswind component be on landing?

XWnd -7.7 (Left), HWnd -9.2 (Headwind)

Gliding
Glide Dist

A glider has a best glide ratio of 27:1. How many nautical miles can it travel while losing 2,000 feet?

8.9 NM

Glide Desc

How many feet will a sailplane sink in 10 NM if its lift/drag ratio is 30:1? 2,025 ft

Glide Ratio

A sailplane has lost 4,100 feet in 15 NM; therefore, glide ratio for this aircraft is approximately _____.

Rat 22:1

Wt/Bal

What is the CG and gross weight for the following conditions? (Use an RF of 1):

	WT	Arm
EW	1830	41.8
Front Seats	290	35.5
Rear Seat	85	70.7
Bags	100	95.5
Fuel (75 gal)	450	48.59

Answer: #Items 5, RF 1, Wt 2,755 lbs, Mom 124,214 lb-in, CG 45.09"

What is the CG and gross weight for the following conditions? (Use an RF of 1,000):

	WT	Mom/1000
Empty Wt	88350	80486.8
Fwd Pass.	3280	1570
Aft Pass.	7140	6631.6
Fwd Cargo	2200	1278
Aft Cargo	4450	4744
Fuel Tank #1	12000	10770
Fuel Tank #3	12000	10770
Fuel Tank #2	12000	9793

Answer: #Items 8, RF 1,000, Wt 141,420 lbs, Mom 126,043 lb-in, CG 891.27"

% MAC

What is the CG in %MAC given following conditions:

MAC . . . . .180.7"

CG . . . . .891.27"

LMAC 860.2

Answer: %MAC 17.2%

APPENDIX B: Service Policy

Troubleshooting

Visit the ASA website (www.asa2fly.com) for manual revisions, technical support, and FAQs for this product.

1. If the CX-2 screen display fails to illuminate, check for improperly inserted or discharged batteries. See battery replacement instructions.

2. The CX-2 screen is adjustable for display brightness. Press and release $\boxed{\text{2nd}}$, then press and release $\boxed{\wedge}$ for a darker display. Press and release $\boxed{\text{2nd}}$, then press and release $\boxed{\vee}$ for a lighter display.

3. To ensure problems are being entered accurately, read the operating instructions once more.

4. The CX-2 is intended to function effectively within an extensive span of atmospheric conditions. However, if subjected to direct sunlight or excessive temperatures for a prolonged period of time, the display may go blank. If this happens, remove the computer from the heat and sunlight and it will display correctly within several minutes.

If your computer is not working properly after performing these three steps, return PREPAID to:

Aviation Supplies & Academics, Inc.
7005 132nd Place SE
Newcastle, Washington 98059-3153

ASA cannot assume any responsibility for loss of or damage to shipments.

Please describe the difficulty experienced with the computer, as well as return address information. Be

sure to include name, address, city, state, and zip code. Please print. The shipment should be carefully packaged and adequately protected against shock and rough handling.

Battery Replacement

The CX-2 flight computer uses 4 AAA batteries. This calculator has been designed to consume very little current from your alkaline batteries; therefore, the batteries should last a long time under normal conditions. If the calculator uses more than one set of batteries per year it should be returned to ASA for replacement. To replace batteries:

1. Remove the battery cover on the back of the unit.
2. Remove old batteries and replace with new, in the same configuration as the old.
3. Slide the cover back on CX-2 until it clicks and fits flush with the rest.

Limited Warranty

Aviation Supplies & Academics, Inc. (ASA) warrants this electronic computer, Model Number CX-2, to the original purchaser for a period of five years from the initial date of purchase, against defects in material and workmanship. Batteries are not covered by this warranty.

For the above five-year limited warranty period, ASA will either amend or substitute a reconditioned model of identical quality (at ASA's option), provided the product is returned postage prepaid to ASA. In the event of substitution with a reconditioned model, the warranty of the original computer will be upheld. Other than the above requirements, repair, adjustments and/or substitutions will be made at no charge.

ASA strives to provide the most rugged and reliable equipment possible. So few items are received for repair that it is not economical to maintain parts inventory, test equipment, and trained repair technicians to perform electronic repair work. Therefore, a replacement unit (new or remanufactured) is sent in exchange for units returned for service or repair.

ASA will not be liable for lapse of use of the computer or other secondary or sequential costs, expenditures, or damages brought about by the purchaser. Implied warranties originating out of this sale, including *but not* limited to the implied warranties of merchantability and fitness for a particular purpose, are limited in duration to the above five-year period. ASA shall not be liable for loss of use of the computer or other incidental or consequential costs, expenses, or damages incurred by the purchaser.

Some states do not allow the exclusion or limitation of implied warranties or consequential damages; so, the above limitations or exclusions may not apply to you.

Record the purchase date in the space provided below. Refer to this when contacting ASA regarding this product.

The CX-2 is an instruction and information aid, and is not an avionics instrument.

Purchase Date: _____

APPENDIX C: Abbreviations Guide

Act . . . . .actual
CAS . . . . .calibrated airspeed
CG . . . . .center of gravity
Compass Hdg (CHdg) . . . . .compass heading
Density Alt (DAlt) . . . . .density altitude
Dep . . . . .departure time
Desc . . . . .descent
Dev . . . . .deviation
Dist Flown .distance flown
Dur . . . . .duration
ETA . . . . .estimate time of arrival
Glide Desc . . . . .glide descent
Glide Dist .gliding distance
GMT . . . . .Greenwich Mean Time
GS . . . . .ground speed
GW . . . . .gross weight
Hdg . . . . .heading
HWnd . . . . .headwind
IAlt . . . . .indicated altitude
#Items/RF . . . . . . .number of entries/reduction factor
LMAC . . . . .leading edge MAC
MAC . . . . .mean aerodynamic chord
MACH . . . . .Mach number
OAT . . . . .outside air temperature
Plan . . . . .planned
Press Alt (PAlt) . . . . .pressure altitude
ReqCAS . . . . .required CAS

RnWy . . . . .runway
Std Atmos . . . . .standard atmosphere
TAS . . . . .true airspeed
TAT . . . . .total air temperature
TCrs . . . . .true course
THdg . . . . .true heading
UTC . . . . .Universal Coordinated Time
Var . . . . .magnetic variation
WDir . . . . .wind direction
WSpd . . . . .wind speed
Wt/Arm . . . . .weight/arm
WT/BAL . . . . .weight and balance
Wt/Mom . . . . .weight/moment
X/H-Wind . . .crosswind, head or tailwind component
XWnd . . . . .crosswind

INDEX

NOTES