Dear Pilot,

Thank you for your interest in this research project.

In this study, we are interested in investigating the effects of varying blood sugar levels on pilots' performance. We will monitor blood sugar levels and collect cognitive, physiological, mood, and flight performance data in normal cockpit tasks during various simulated flight scenarios. You will be scheduled for two sessions, depending on your schedule. The experiment is expected to run from 8 am to 4 pm on both days. You are asked to fast 8 hours prior to the experiment (water only). You will receive $200 for your participation in this study.

This information packet contains information about the experiment, the procedures, a map of where we're located, and forms that you will need to bring with you to the experiment. Please read through these items carefully before you come in, and call us if you have any problems or questions. Please contact us in advance, if you need to re-schedule

For any questions or scheduling concerns, call Jeff Currin 541.485.2400 ext 313

Thanks again and see you soon!

Dr. Robert Mauro
Senior Research Scientist
Decision Research

Packet Contents:

- Protocol & Informed Consent Form
- Fasting sheet
- Standard Operating Procedures Packet
- Normal and Non-Normal Checklists

Effect of Blood Sugar Levels on Pilots' Performance Study

To the Research Participant: Please read this protocol and consent form carefully. Make sure all of your questions have been answered to your satisfaction before signing.

In this study, researchers will be collecting cognitive, mood, and flight performance data in normal cockpit tasks during various single-pilot simulated flight scenarios, to study the effects of varying blood sugar levels on pilots' performance. The data collected (i.e., videotape, audiotape, flight, and observer) from this study will be de-identified, kept confidential, and will not be shared with any regulatory agencies. As a participant in this study, you will be assigned an identification number and scheduled for two days. The experiment will run from 8am to 4pm each day. You will receive $200 for your participation in this study. Your participation is voluntary and, at any time, you can choose to withdraw from this study without penalty.

On both days, you will need to enter the experiment after having fasted for at least 8 hours prior to your arrival. Upon arrival, you will complete a brief demographics form, after which you will be fitted with a monitor that will continuously record your blood sugar (or glucose) levels throughout the session. Operation of the monitor, or Continuous Glucose Monitoring System (CGMS) requires insertion of a wafer-thin glucose sensor subcutaneously (just beneath the skin). You may experience mild discomfort; however, this fitting is virtually imperceptible. Once fitted, you will take a brief series of paper-pencil and auditory measures. Then, you will be briefed on the simulated flight scenarios and practice flying for about an hour. A fingerstick test will then be given (identical to what diabetics do to check their own blood sugar), using the One Touch Ultra Soft Sampler in order to accurately calibrate the CGMS. The Sampler uses a spring-loaded sampler lancet to prick the tip of the finger to take a single tiny blood drop sample. You will be given a drink (e.g., orange juice) and then returned to the simulated flight scenarios. There will be four 1-hr flight legs each day with fifteen-minute breaks in between. Some discomfort can be expected due to the lack of food while flying; a snack may or may not be provided during the sessions. However, food and drink will be provided to you at the end of the experiment. You will be briefed on the procedures and perform routine flight duties including instrument approach procedures, and communication with ATC. You will also complete brief physiological and mood measures after each flight leg, and complete a series of cognitive measures following the final flight leg. After the final flight leg each day, you will take a series of cognitive measures, similar to the measures taken at the beginning of the experiment, you will then eat the food and drink that will be provided to you during a twenty-minute period. After this period, you will complete another series of cognitive measures. The CGMS unit will then be removed. The procedure for the second day will be very similar to the first. You will not be given feedback about your performance.

All necessary safety precautions will be taken in dealing with blood samples. Researchers have been trained in dealing with blood sampling. If, at any time, you feel any discomfort, pain, or swelling due to the sensor and/or finger stick please inform the researchers present. Additional information and literature regarding the equipment and/or the procedures are available upon request. Any comments, questions, or concerns before, during, or after the experiment are welcome. Thank you for participating in this study!

a) **I agree to participate** in the Effect of Blood Glucose Levels on Pilots' Performance research experiment as described in the protocol.

b) **I understand that my participation could cause me minimal risk*, inconvenience, or discomfort**. The purpose and procedures have been explained to me and I understand the risks and discomforts as described in the protocol.

* ***Minimal risk*** means that the probability and magnitude of harm or discomfort anticipated in the research are not greater, in and of themselves, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

c) **To my knowledge**, I have no medical conditions including Hepatitis B, Hepatitis C, HIV and/or pregnancy, that will prevent my participation in this study. I understand that if my medical status should change while I am participating in the research experiment, there may be unforeseeable risks

to me (or the embryo or fetus, if applicable). I agree to notify the Principal Investigator (PI), Dr. Robert Mauro at 1-541-485-2400 or the experimenter, of any known changes in my condition.

d) **My consent to participate has been freely given**. I may withdraw my consent, and thereby withdraw from the study at any time without penalty or loss of benefits to which I am entitled. I understand that the experimenters may request my withdrawal or the study may be terminated for any reason. I agree to comply with a safe termination.

e) **I am not releasing NASA or Decision Research from liability for any injury** arising as a result of my participation in this study.

f) **I hereby agree that all audio and video records collected in the course of this study will be available** to the Principal and Co-Investigators. To protect the identity of video and audio data of participants, this information will not be made available to anybody other than the experimenters. Video equipment will not record participants' faces. I grant NASA and Decision Research permission to reproduce and publish all records, notes, or performance data collected from my participation, provided there will be no association of my name with the collected data and that confidentiality is maintained, unless specifically waived by me. I understand that data from this study will only be presented in the aggregate, and that there will be no way for individual's data to be extracted from it.

Please check the box and write-in your initials if you grant permission for the following:

- ❑ **____ I grant the experimenters permission to record, videotape, and audiotape my performance during the experiment.**

g) **I have had an opportunity to ask questions and have received satisfactory answers** to all my questions. I understand that the PI for the study is the person responsible for this activity and that any questions regarding the research will be addressed to him during the course of the study. I have read the above agreement and protocol prior to signing this form and I understand its content.

I agree to participate in this experiment. To my knowledge I have no medical, psychological, or physiological conditions which would prevent me from participating in this study. I understand that I can withdraw from this portion of the experiment at any time, without penalty. I understand that any write-up and/or presentation of these data will be in aggregate form, such that any identifying information collected from this study will be kept confidential. I have read the above description, had an opportunity to ask questions and received sufficient information about the equipment and procedures used in this study, and I understand the expectations of the experiment.

Participant Signature	Print Name	Date
Experimenter Signature	Print Name	Date

Thank you for your interest in participating in this study investigating blood sugar levels and pilot performance!

Preparation Guidelines

To participate in this experiment, we will require you to do two things: one, treat the simulated flights as any other real flight (i.e, adhere to "bottle to throttle" regulations) and two, fast (do not eat or drink anything, except water) past midnight the night before you're scheduled to arrive. Since you will be participating on two occasions (two consecutive or non-consecutive days), we request that you enter into the experiment in as similar a state or condition on both occasions. This means, for example, if you slept 7 hours the night before you participated on Tuesday, try to sleep 7 hours the next night

before you participate again on Wednesday. This goes for alcohol, caffeine, and nicotine consumption. These substances can all have varying effects on blood glucose levels, and in order to maintain consistency in the experiment, it is best if these guidelines are followed. If you feel that any of this may pose a problem and/or if you have any questions, please let us know. We will ask you specifically about these items both times you come in, but it will be useful to be consistent and take note of your behaviors on the following:

- caffeine consumption
- alcohol consumption
- nicotine consumption
- amount of sleep
- amount of exercise
- approved medications/or illness (e.g., colds, flu)
- vitamins, supplements

Pilot's Flight Training Guide for Blood Sugar Level And Pilot Performance Study

Thank you for participating in a flight simulation study where over the course of two non-consecutive days you will fly four, approximately one-hour flight legs each day. The flights replicate a scheduled FAR-135 air-courier operation, Checks-R-Us, LLC, carrying packages containing bank checks. The flights will be conducted on IFR flight plans in predominantly simulated IFR conditions.

The simulator replicates a single engine piston aircraft modeled after the performance of a Piper PA28R (Piper Arrow 4) with cockpit layout and controls similar to that aircraft. There will be a 30 minute simulator familiarization prior to each day's flights. Any differences between the performance model, the simulator cockpit, and the actual aircraft will be noted during the scheduled familiarization training.

A copy of the normal and non-normal checklist is included separately.

Experiment considerations

A simulator operator and an observer will be present during the flights. These are solo flights and, although only directed at you, all flights have a full ATC and dispatch component and are both acted by the simulator operator. The company's call signs for ATC and dispatch communications are respectively "Bank Check" and "Check".

Since all communications are recorded, please use the headset once seated in the pilot seat and refrain from removing the headset until completion of the Shutdown Checklist.

ATIS will be played when you select the appropriate ATIS frequency in the "active com" window and will continue to play until the ATIS frequency is in the standby window or dialed away.

Flight planning

Each day has four flight legs with distances varying between 85 and 130 NM and take place in the Northeast and eastern Midwest of the U.S. At the start of each day a day-planner will be given listing the scheduled flight leg's departure and destination airports. In addition, prior to each flight leg a dispatch issued flight release will be provided listing departure, destination, and alternate airports (if required), filed route, altitude, distance, minimum required fuel and fuel burn based on forecast winds aloft. The leg specific flight release will also include weight and balance information for that leg.

The paragraphs below discuss and explain the various components that make up the flight release.

Figure A is an example of the fuel loading section as it appears on the flight release. Line 6 of figure A shows the required fuel ("**REQD**") as it is calculated by dispatch. The required fuel is the sum of anticipated fuel needed to fly form the departure to the destination airport (figure A, line 3, "**DEST KXXX**"), from the destination to the listed alternate airport (figure A, line 5 "**ALTN KXXX**"), plus 45 minutes reserve at normal cruising speed (figure A, line 4, "**RESV**"). If conditions are forecast that may

have an impact on the flight time (severe weather, airport delays/holding, etc.) and are not reflected in the required fuel load of the flight release, the pilot can request additional contingency fuel (figure. A line 7, "**CONTGY**") from dispatch. If contingency fuel has been requested and subsequently approved by dispatch, the pilot notes this on the release by filling in the requested additional gallons on line 7, "**CONTGY**", and adding the contingency fuel to the required fuel and write the sum of those two lines (6 an 7) on line 8, "**TOTAL**" (total fuel load). If no contingency fuel has been requested, the total fuel (figure. A line 8,"**TOTAL**") equals the required fuel. The pilot should fill out 0 on contingency fuel line and the required fuel amount on the total fuel line. In the sample the pilot agreed with the dispatcher to add 3 gallons contingency fuel, which brings the total to 26 gallons.

Other information given in the fuel section of the release is the estimated time (figure A. line 2, "**ETE**"), distance (figure A. line 2, "**DIST**") and filed altitude (figure A. line 2, "**ALT**") from the departure airport to the destination, destination to the alternate, etc. The altitude to fly to the alternate is for fuel calculation only and based on historical data.

From: Checks-R-Us Dispatch
To: Bank Check 133
KMHT-**K**BTV

Flight Plan Filed: today 0500LCL

1 **ETD**: 0900LCL *** **BEW**: 1750LBS. *** **TOTAL CARGO**: 594 Lbs. *** **AIRCFT:** N231CC

2

	FUEL(GAL)	ETE	DIST	ALT	ARRIVE	
3	DEST KSEA	11	00:55	0122	8000	0955LCL
4	RESV	9	00:45			
5	ALTN KPGH	3	00:12	0020	4000	
6	REQD	23	01:52			
7	CONTGY	3				
8	TOTAL	26				

Figure A. Sample Flight Release – Fuel Section

The flight release also includes current weather, forecasts, winds aloft, and NOTAMS for the flight's departure, destination and alternate airports. Figure B is an example of the departure airport weather information. Similar information is included for the destination and, if required, the alternate airports.

The times in the flight release (ETD, METAR, TAF, etc.) are converted from ZULU to local times (LCL). The dates in the flight release (TAF, etc.) are valid for the day of the flight and are designated with "td"(today). The local valid period for all forecasts (TAF) are 24 hours. This period is indicated with a two-digit start date ("td") followed by the two-digit beginning hour (local time) and two-digit ending date ("tm" – tomorrow) and hour (local).

For example, TAF KBFI 0520LCL td06/tm06 indicates a 24-hour TAF for Boeing Field, WA, issued at 0520LCL today. The starting time is "td06", today 0600 LCL, and will end "tm06", tomorrow 0600LCL . The remainder of the TAF data is formatted in accordance with ICAO standards.

Issued NOTAMs are decoded in raw format and have a generic identifier (xx/xxx). All NOTAMS are current for the day of the flights and, therefore, have no effective date.

Departure Weather
KMHT Terminal Weather
METAR
METAR KBFI 0753LCL 36010KT 6SM 010 OVC 19/9 A2982
METAR KBFI 0652LCL 35008KT 6SM 011 OVC 17/9 A2981
METAR KBFI 0558LCL 35009KT 6SM 012 OVC 16/9 A2979
TAF
TAF KBFI td0543LCL td06/tm06 01012KT P6SM SCT008 OVC013
FMtd0900 02012KT P6SM BKN012
FMtd1500 03012KT 6SM -RA BR OVC015
FMtd2300 03009KT 3SM RA BR OVC008
FMtm0200 03009KT 1SM BR OVC005
NOTAM
BFI BFI xx/xxx BFI/NAV RWY 17 ILS Outer Marker Decommissioned
BFI BFI xx/xxx BFI /Obstacle TOWER 986 (419 AGL) 7.46 East Lights Out of Service
PIREP
UA /OV BFI td /TM 0700LCL /FL085 /TP P28A /TOPS 065 /TB NEG LGT BLO 035

Figure B. Sample Flight Release – Departure Airport Weather Information

Weight and Balance

As part of the preflight planning, prior to each flight a weight and balance computation based on a PA-28R must be completed. The weight and balance information will be provided with the leg's flight release and consists of a Weight and Balance Form, a Cargo Loading Sheet and CG Datum and Weight Graph.

Weight and Balance Form (figure D)

Below are the weight and balance items listed on the PA-28R Weight and Balance form:

- Aircraft Basic Empty weight (BEW)
  - The BEW is provided in the first section of the flight release (figure A. line 1, "BEW") and prefilled in the Weight and Balance Form.
- Pilot weight and personal baggage (200 lbs.)
  - This is a standard weight for every flight and is prefilled in the Weight and Balance Form (figure D).
- Cargo Areas 1, 2 and 3
  - In addition to the manufacturer's designated cargo area in the rear of the aircraft, the front and rear passenger areas have been retrofitted to carry cargo as well. Therefore, all aircraft have 3 cargo areas. Cargo areas 1 and 2 have loading limitations of 150 lbs. and 200 lbs., respectively, and cargo area 3 has no particular weight limitation.
- Fuel load (provided in the fuel section of flight release – see Sample Flight Release (figure A)).

- As mentioned in the Flight Planning section, the minimum fuel load for departure cannot be less than the required fuel stated on the flight release. However, if needed (and per dispatcher's approval), contingency fuel can be added.
- For weight and balance computation use a density of 6.0 lb/US gallon.

- Max Takeoff Weight
  - All aircraft have a maximum takeoff weight limitation of 2700 lbs.
- Fuel burn
  - The fuel burn for each leg can be found in the fuel section of the flight release (figure. A, line 3, "**DEST KXXX**").

Cargo Loading Sheet (figure C)

The objective of each flight is to carry the most cargo possible - measured in weight - to the destination airport. The flight specific cargo is loaded and transported for that flight leg only (i.e., no carry-through cargo) and is listed on the Cargo Loading Sheet. The Cargo Loading Sheet is divided into two sections, "Priority Packages Cargo Area 1 and 2 Only" and "Non-Priority Packages Cargo Area 3 Only." Due to their size and shape, priority packages only fit in Cargo areas 1 or 2. Subsequently, non-priority packages are loaded only in cargo area 3. The "Package" column lists the weight (lbs.) of each package loaded for the flight and its adjacent column, "Cargo Area," specifies the cargo area in which the associated package is to be loaded.

As the categorization indicates, priority packages have to be transported to, and delivered at the intended destination airport. If the total cargo load exceeds the aircraft's weight and balance limitation, only non-priority packages are off loaded and left behind at the departure airport.

CG Datum and Weight Graph (figure E)

The shaded area of the CG Datum and Weight Graph is the CG envelope. The aircraft can be safely operated within this envelope. If the calculated CG falls outside the envelope, the aircraft is outside its weight and balance limitation and corrective action is required.

Loading Instructions

Loading the cargo areas and determining the weight and balance is a 5 step process: 1) required fuel onboard, 2) determine the maximum allowable weight in cargo area 3, 3) loading cargo areas 1 and 2, 4) selecting non-priority packages for cargo area 3, and 5) determining the center of gravity (CG).

Step 1 – Determining Total Fuel Onboard
Read and interpret the flight release and determine if the required fuel load (**REQD**) is appropriate for the stated flight conditions. If weather and/or airport conditions ((thunderstorms, airport delays, etc.) dictate to take additional fuel discuss the desired amount with the dispatcher. If additional fuel is approved by the dispatcher, add the agreed upon amount on the contingency fuel line (**CONTGY**). If no additional fuel is required, write zero in the provided space.

Step 2 – Loading Cargo Areas 1 and 2 (see figure C).
For every flight the total weight of the listed priority packages to be loaded in areas 1 and 2 is 350 lbs. (which is the equivalent of the combined weight limitation of those 2 cargo areas). During this step of

the loading process the pilot's task is to distribute the priority packages over cargo area 1 and 2. Each flight's priority cargo has a unique package combination that enables the pilot to load exactly 150 lbs. in cargo area 1 and 200 lbs. in cargo area 2. Therefore, if distributed correctly, every priority package listed for that flight is loaded in either cargo area 1 or 2 without exceeding their respective loading capacities and without priority packages left behind. To indicate in which cargo area – 1 or 2 - a package is to be loaded, circle either number 1 or 2 in the cell adjacent to the package weight on the flight's Cargo Loading Sheet.

Step 3 – Determining Maximum Allowable Weight for Cargo Area 3 (see figure D).
If loaded correctly, every flight cargo areas 1 and 2 are loaded to their max capacity and, therefore, their weight and moment are fixed. The BEW and the total fuel onboard for departure are the two variables that determine the loading capacity of cargo area 3.

Transfer the results from step 2, the total fuel onboard (if required, adjusted for wx and/or other delays) and fuel burn from the fuel section of the flight release to the corresponding cells in the Weight and Balance Form. Subtract the BEW, pilot and bag, cargo area 1 &2 and total fuel from the max takeoff weight (2700 lbs.). The result is the max allowable weight that can be loaded into cargo area 3.

Step 4 – Loading Cargo Area 3 (see figure C).
Once the loading capacity for cargo area 3 has been determined, mix and match non-priority packages in a manner that the combined package weight equals or is close to the calculated capacity of cargo area 3. The flight's non-priority packages are listed in the second part of the Cargo Loading Sheet. Circle the number 3 in the cell adjacent to the weight of those packages that will be loaded in cargo area 3 and, if needed, cross out the packages that will be left behind.

Step 5 – Determining the Center of Gravity (see figure D and E).
Write the takeoff weight in the appropriate cell.

Multiply the weights listed in the Weight and Balance form with the arms in the adjacent cells and write the results in the corresponding cells of the moment column. Total the moments and divide it by the takeoff weight. If the resulting number falls within the shaded area of the CG Datum and Weight Graph (figure E), the aircraft is loaded within its limitations.

To ensure the entire flight is within the aircraft's weight and balance limitation, determine the landing weight CG location by deducting the fuel burn weight and moment from their respective takeoff weight and moment. Divide the resulting moment by the landing weight and locate the point on the CG Datum and Weight Graph.

If the takeoff or landing CG is outside the aircraft's limitation, the pilot is required to correct this by adjusting the non-priority package weight (cargo area 3) such that the airplane is loaded within its weight and balance limitation.

Priority Packages Cargo Area 1 and 2 Only			
circle the cargo area in which the package should be loaded (max cargo capacity area 1: 150 lbs.; area 2: 200 lbs.)			
Cargo Area	Package (lbs.)	Package (lbs.)	Cargo Area
1 – 2	74	36	1 – 2
1 – 2	69	33	1 – 2
1 – 2	55	21	1 – 2
1 – 2	47	15	1 – 2
1 – 2			1 – 2
Non-Priority Packages Cargo Area 3 Only cross out the excess (off-loaded) cargo (if required)			
Cargo Area	Package (lbs.)	Package (lbs.)	Cargo Area
3	58	17	3
3	56	16	3
3	46	8	3
3	38	8	3
3	23		3
3	20		3

Figure C. Cargo Loading Sheet

	Weight (lbs.)	Arm (in)	Moment (lbs. x in)
BEW	1750	80.9	141575
Pilot + bag	200	80.5	16100
Cargo Area 1 (150 lbs. Max.)	150	118.1	17715
Cargo Area 2 (200 lbs. Max.)	200	129.1	25820
Cargo Area 3 (No Max.)	244	142.2	34696.8
Total Fuel (72 Gal. Max)	26 x 6	95.0	14820
Takeoff WT (2700 lbs.)	2700		250727
Fuel Burn	12 x 6	96.0	6912
Landing WT	2628		243815

Figure D. Weight and Balance Form

tep 1: Total Fuel Onboard Calculation

		FUEL(GAL)	ETE
DIST	ALT	ARRIVE	
DEST KSEA		11	
RESV		9	
REQD		23	
CONTGY		3	
TOTAL		26	

The total fuel for this sample flight is 26 Gal.
26Gal. x 6 Lbs./Gal = 156 lbs.)

tep 2: Loading Cargo Areas 1 and 2
ee figure C)

Cargo area 1: 55 + 15 + 47 + 33 = 150
Cargo area 2: 74 + 36 + 69 + 21 = 200

tep 3: Determining max weight for Cargo Area 3
ee figure D)

Max Takeoff Weight – BEW – Pilot –Cargo Area 1 – Cargo Area 2 – Total Fuel =

Max Weight Cargo Area 3

2700 – 1750 – 200 – 150 – 200 – 156 = 244

tep 4: Loading Cargo Area 3
ee figure C)

58 + 56 + 38 + 23 + 20 + 17 + 16 + 8 + 8= 244

non-priority package of 46 pounds won't be loade

tep 5: Determine the Center of Gravity
ee figures D & E)

alculate individual moments (lbs. x arm).

otal Moments/Takeoff Weight = CG

$$\frac{250727}{2700} = 92.9$$

anding CG = 92.8

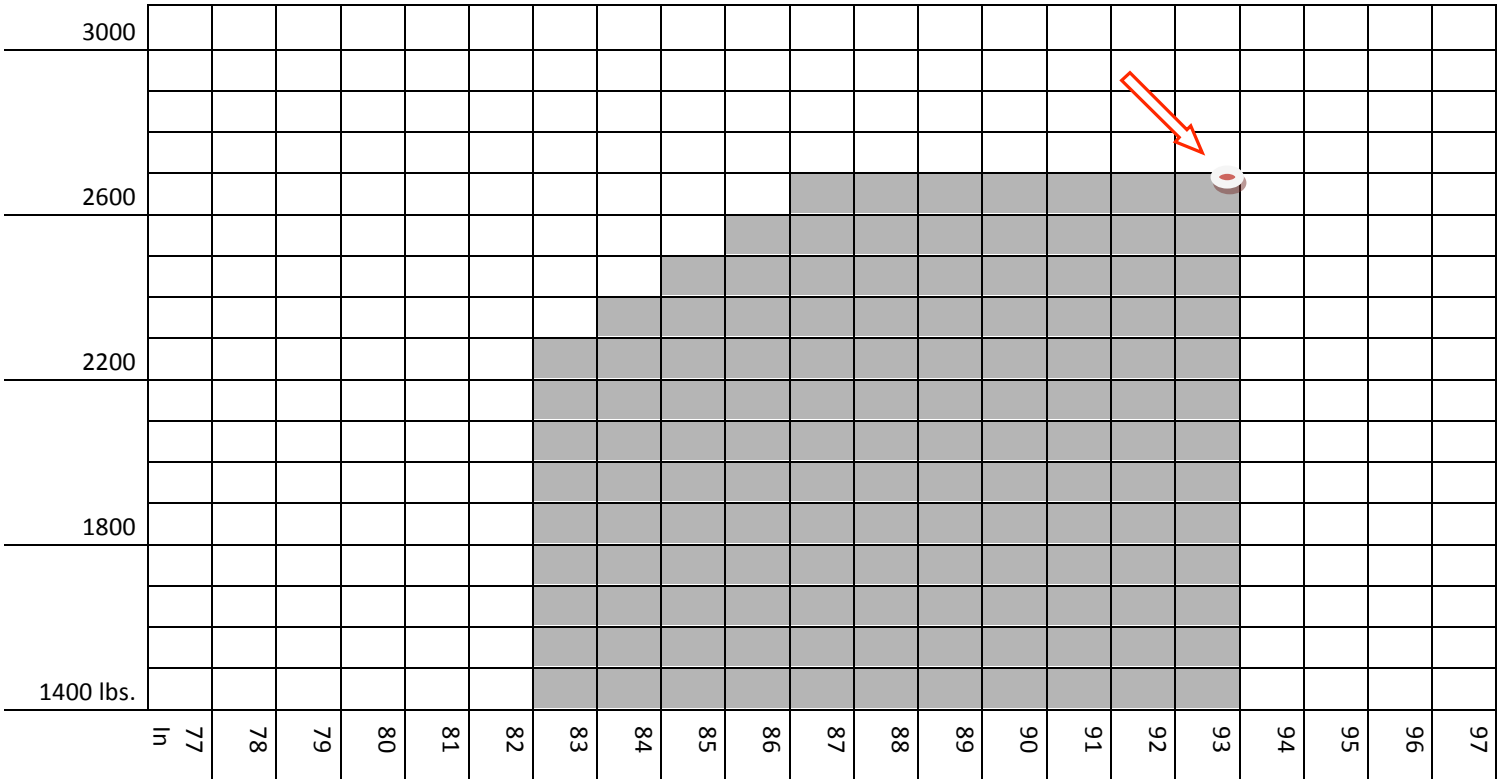


Figure E: CG Datum and Weight Graph

Weight and balance considerations:

Checks-R-Us, LLC. is a commercial enterprise with a for-profit philosophy. Although posters with slogans like, “We are Freight Dogs, Not Fuel Hogs,” “The Leave No Check Behind Act,” and “We Transport Checks, Not Fuel” are no longer in the pilots’ lounge, and management and dispatcher did away with the “pilot-who-delivered-the-most-cargo list,” they still encourage pilots to deliver as many packages as possible. As stated previously, the flight release fuel load is in compliance with FAR 135 IFR fuel requirements, however, if the pilot deems it prudent to depart with more fuel than the required fuel for possible contingencies (wx, delays, etc.), the pilot should make the request with the dispatcher, and specify the additional contingency fuel load.

To get familiar with the weight and balance calculation, we recommend solving the 3 practice calculations in Appendix B of this document.

Fuel planning

Fuel capacity (gal): 77 usable, 5 unusable.

Plan a 12 gallon burn for each flight hour. Normal cruise speed is 125 KTAS and 10 GPH with a cruise power setting of 24 in. and 2400 RPM.

Safety Procedures and Minimum Weather requirements

Participants are asked to comply with the safety procedures and minimum weather requirements as they are outlined in the Lane Community College (LCC) Training Course. Following is a selection of these procedures.

- Appropriate checklist must be utilized during each phase of flight; the checklist includes the following steps: before starting engine, starting engine, before take-off, take-off, enroute climb, cruise, in range/before landing, after landing and engine shutdown. (For the purpose of this experiment, the exterior preflight inspection is considered complete once the pilot is inside the simulator.)
- Engines will not be leaned below 5000 feet unless the power setting is below 75%.
- Discrepancies that are in conflict with LCC policies, affect airworthiness, and/or violate FARs are to be reported to the experimenter.
- To avoid runway incursions, all taxi instructions are to be attended to and questioned if there appears to be a potential for unintended operations on a runway.
- Flight into known-icing is not approved. No route of flight or altitude will be accepted if it is likely for the flight to encounter icing. If icing is encountered, steps must be taken to return to non-icing conditions as soon as possible.
- Maximum surface winds for take-off and landing, existing and forecast, are per LCC "solo" flight requirements: headwind component of 20 knots, crosswind component of 10 knots, or a 5 knot tailwind component.
- Takeoff visibility is per LCC "dual IFR day or Night" requirement and is in accordance with applicable 14CFR 135 standards.
- Landing ceiling and visibility are per LCC "dual IFR day or Night" requirements and is in accordance with applicable 14CFR 91 standards.

Additional safety procedures and reminders

- Flight plan and weight and balance: Verify the flight plan meets the actual weather and fuel requirements. Verify the weight and balance is accurate and complete. Hand the copy of the flight plan/release and completed weight and balance to simulator operator.
- Verify the fuel on-board is either the minimum or preferred amount as stated in the flight plan/release, or it reflects your adjusted calculations.
- Verify that the company frequency of 135.85 is set and monitored in the number two communication radio.

Appendix A – V-speeds and Power Setting

Vr	75
Vy	95
Vlo (retraction)	109
Vlo (extension)	140
Va	135
Vfe	111
Vno	169
Vne	202

Idle:

Propeller	700-1000 RPM

Run-Up:

Man Press	15”
Propeller	maximum

Takeoff:

Man Press	maximum
Propeller	2700 RPM.
Rotate	75 KIAS

Climb:

Man Press	25”
Propeller	2500 RPM
Airspeed	95 KIAS - 9 degree pitch up

Use 95 KIAS for all climbs except above 10,000 ft, then 90 KIAS)

Cruise:

Man Press	24” (or maximum whichever is less)
Propeller	2400 RPM

Lean 100 degrees from full rich.

Descent:

Man Press	20”
Propeller	2400 RPM
Airspeed	130-140 KIAS
Descent rate	500-700 FPM

Carburetor heat on for all descents

Maneuver for Approach:

Man Press	13-15”
Propeller	2400 RPM
Airspeed	100-110 KIAS

Approach (ILS):

Man Press	14”
Propeller	2400 RPM
Flaps	10
Gear	down
Airspeed	100 KIAS

Landing Assured;

Flaps	Full
Man Press	14”
Propeller	2400 RPM
Airspeed	90 KIAS

Cross threshold at 80 KIAS.

Go Around/Missed Approach:

Flaps 10:

Man Press	maximum
Propeller	maximum
Mixture	rich

Pitch up to 9 degrees

Airspeed	95 KIAS

Positive rate; gear up

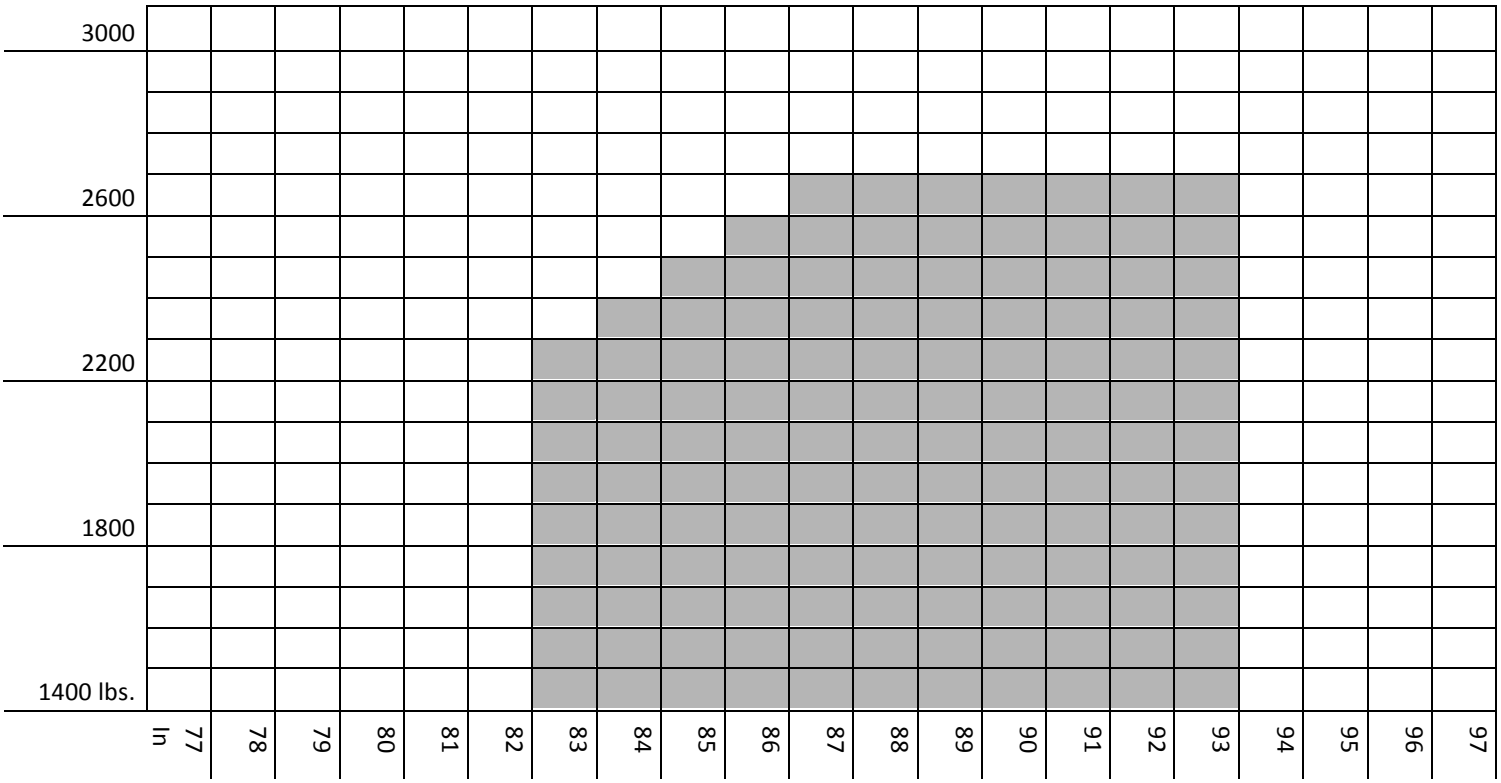
Flaps	up
Carburetor heat	closed
cowl flaps	open

Do not reduce power until climbing 1000 ft.

Appendix B - Practice Weight and Balance Calculations

Below are 3 practice weight and balance calculations. Use the CG Datum and Weight Graph for all 3 scenarios.

The total fuel onboard and fuel burn is prefilled in the Cargo Loading Sheet.



CG Datum and Weight Graph

Priority Packages Cargo Area 1 and 2 Only			
circle the cargo area in which the package should be loaded (max cargo capacity area 1: 150 lbs.; area 2: 200 lbs.)			
Cargo Area	Package (lbs.)	Package (lbs.)	Cargo Area
1 – 2	110	33	1 – 2
1 – 2	69		1 – 2
1 – 2	51		1 – 2
1 – 2	47		1 – 2
1 – 2	40		1 – 2
Non-Priority Packages Cargo Area 3 Only cross out the excess (off-loaded) cargo (if required)			
Cargo Area	Package (lbs.)	Package (lbs.)	Cargo Area
3	50		3
3	41		3
3	33		3
3	32		3
3	31		3
3	23		3

Cargo Loading Sheet – 1

	Weight (lbs.)	Arm (in)	Moment (lbs. x in)
BEW	1775	80.9	143598
Pilot + bag	200	80.5	16100
Cargo Area 1 (150 lbs. Max.)		118.1	
Cargo Area 2 (200 lbs. Max.)		129.1	
Cargo Area 3 (No Max.)		142.2	
Fuel (72 Gal. Max)	120	95.0	11400
Takeoff WT (2700 lbs.)			

Cargo Area 1:
110 + 40 = 150

Cargo Area 2:
69 + 51 + 47 +33 = 200

Max Cargo Area 3: 2700 – 2344 = 356

All non-priority cargo (210 lbs.) can be loaded in cargo area 3.

Takeoff CG = $\frac{244495}{2655}$ = 92.1

Landing CG = $\frac{238735}{2595}$ = 92.0

Fuel Burn	60	96.0	5760
Landing WT			

Weight and Balance Form - 1

Priority Packages Cargo Area 1 and 2 Only			
circle the cargo area in which the package should be loaded (max cargo capacity area 1: 150 lbs.; area 2: 200 lbs.)			
Cargo Area	Package (lbs.)	Package (lbs.)	Cargo Area
1 – 2	61	26	1 – 2
1 – 2	54	25	1 – 2
1 – 2	47	25	1 – 2
1 – 2	42	23	1 – 2
1 – 2	29	18	1 – 2
Non-Priority Packages Cargo Area 3 Only cross out the excess (off-loaded) cargo (if required)			
Cargo Area	Package (lbs.)	Package (lbs.)	Cargo Area
3	45	31	3
3	41	25	3
3	36	25	3
3	34	9	3
3	33		3
3	32		3

Cargo Loading Sheet – 2

	Weight (lbs.)	Arm (in)	Moment (lbs. x in)
BEW	1775	80.9	136721
Pilot + bag	200	80.5	16100
Cargo Area 1 (150 lbs. Max.)		118.1	
Cargo Area 2 (200 lbs. Max.)		129.1	
Cargo Area 3 (No Max.)		142.2	
Fuel (72 Gal. Max)	120	95.0	11400
Takeoff WT (2700 lbs.)			

Cargo Area 1:
$61 + 29 + 18 + 42 = 150$

Cargo Area 2:
$54 + 26 + 47 + 23 + 25 + 25 = 200$

Max Cargo Area 3: $2700 - 2445 = 255$

To stay under the max takeoff weight, 2 non-priority packages (31 and 25 lbs.) cannot be loaded in cargo area 3

Takeoff CG = $\frac{250894}{2700} = 92.9$

Landing CG = $\frac{244558}{2634} = 92.8$

Fuel Burn	66	96.0	6336
Landing WT			

Weight and Balance Form - 2

Priority Packages Cargo Area 1 and 2 Only			
circle the cargo area in which the package should be loaded (max cargo capacity area 1: 150 lbs.; area 2: 200 lbs.)			
Cargo Area	Package (lbs.)	Package (lbs.)	Cargo Area
1 – 2	69	34	1 – 2
1 – 2	46	28	1 – 2
1 – 2	37	23	1 – 2
1 – 2	35	22	1 – 2
1 – 2	35	21	1 – 2
Non-Priority Packages Cargo Area 3 Only cross out the excess (off-loaded) cargo (if required)			
Cargo Area	Package (lbs.)	Package (lbs.)	Cargo Area
3	55	25	3
3	44	9	3
3	36		3
3	35		3
3	33		3
3	32		3

Cargo Loading Sheet – 3

	Weight (lbs.)	Arm (in)	Moment (lbs. x in)
BEW	1710	80.9	138339
Pilot + bag	200	80.5	16100
Cargo Area 1 (150 lbs. Max.)		118.1	
Cargo Area 2 (200 lbs. Max.)		129.1	
Cargo Area 3 (No Max.)		142.2	
Fuel (72 Gal. Max)	138	95.0	13110
Takeoff WT (2700 lbs.)			

Cargo Area 1:
46 + 34 + 35 + 35 = 150

Cargo Area 2:
69 + 21 + 37 +23 + 22 + 28 = 200

Max Cargo Area 3: 2700 – 2398 = 302

All non-priority cargo (269 lbs.) can be loaded in cargo area 3. However, the CG will be outside the envelope.

Not taking the 32 lbs. non-priority package will put the aircraft within its limitations.

Takeoff CG = $\frac{244785}{2635}$ = 92.9

Landing CG = $\frac{239025}{2575}$ = 92.8

Fuel Burn	60	96.0	5760
Landing WT			