

Performance

COMMERCIAL PILOT LICENCE AEROPLANE

TRAINING AND EXAMINATION WORKBOOK

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DESIGNED FOR THE CIVIL AVIATION SAFETY AUTHORITY MANUAL OF STANDARDS



online practice exams



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Operational Restrictions

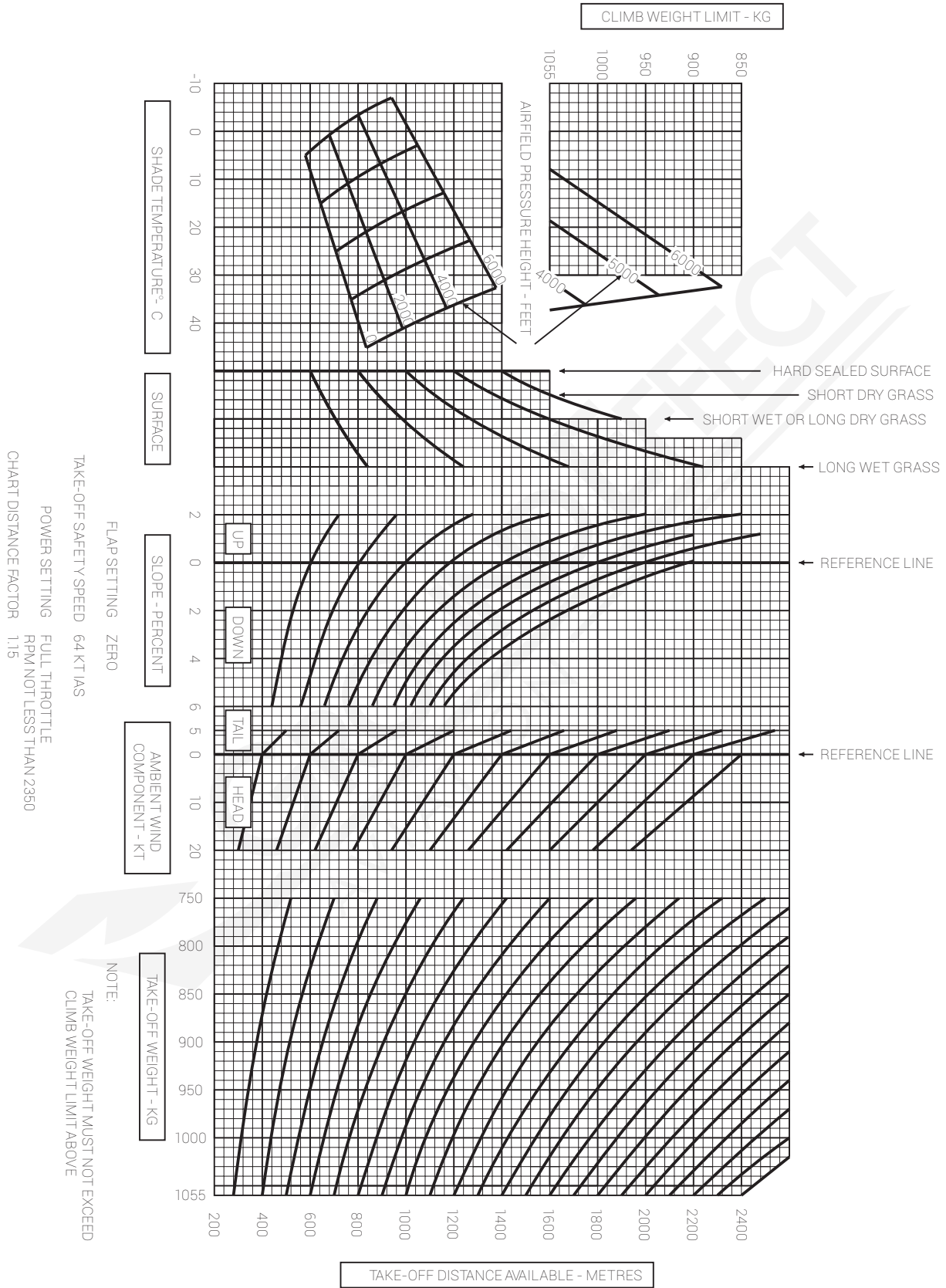
Some of the examination questions are subject to interpretation and don't necessarily comply with every individual flying school's daily operations. The following assumptions will be made in each examination:

- All fuel calculations shall be done in accordance with CAAP 234-1(1).
- Selection of and operation into and out of aeroplane landing areas other than licenced aerodromes shall be in accordance with CAAP 92-1(1).
- Candidates can assume that all aircraft equipment is serviceable.
- All air legislation, information and extracts are current as of the October 2013 updates, the use of documents outside of this range may result in incorrect answers.

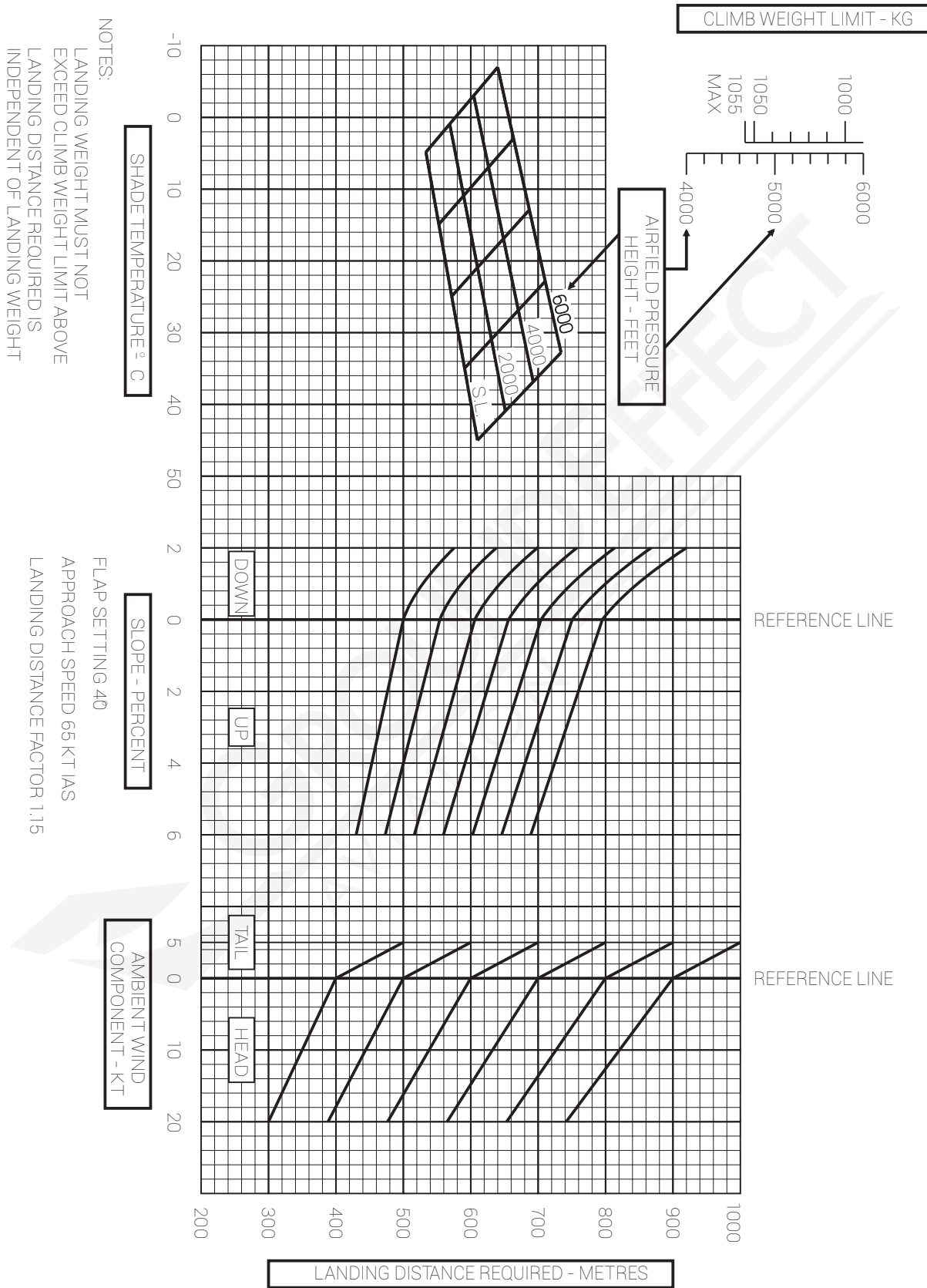
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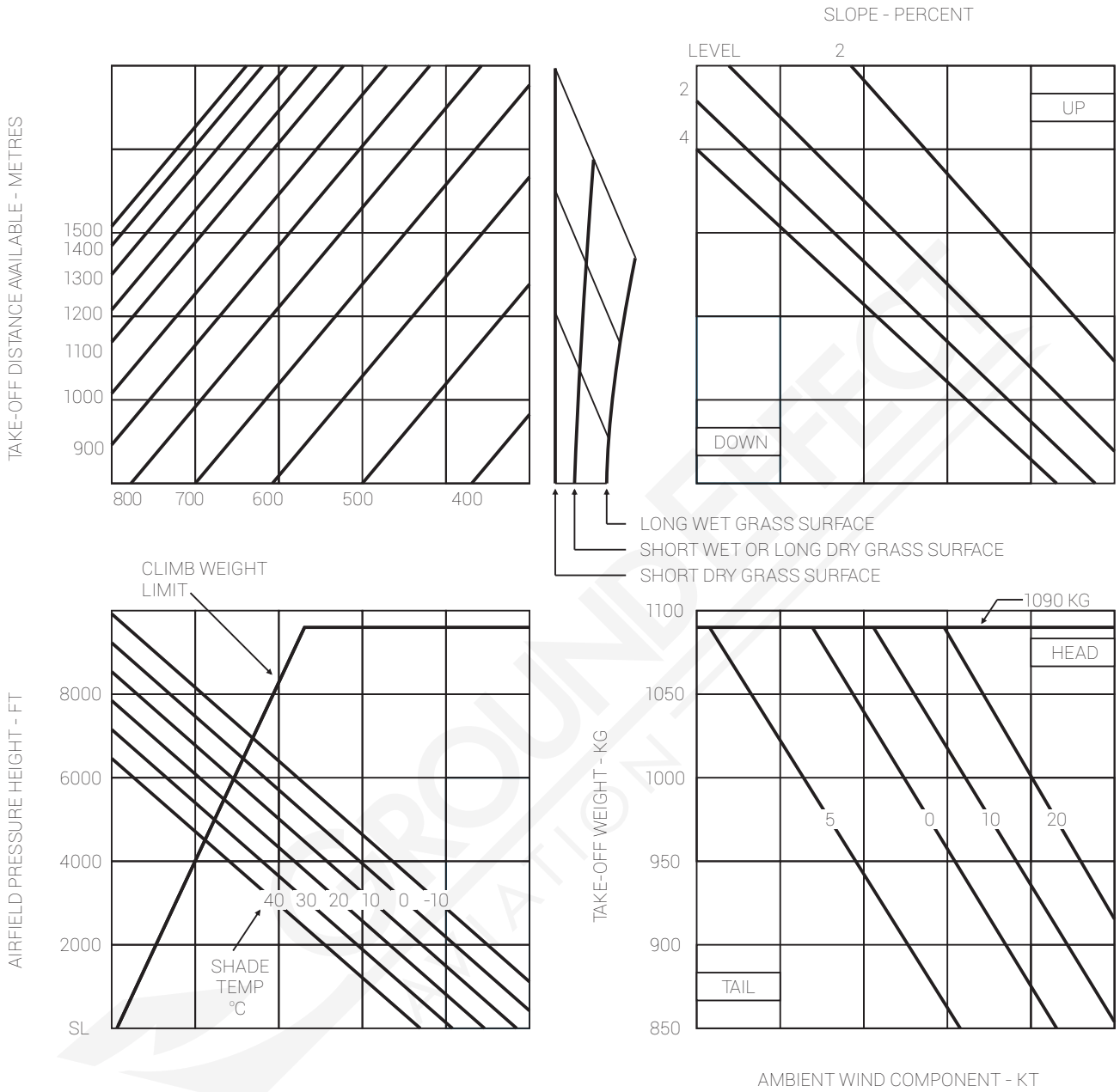
LINEAR TAKE-OFF PERFORMANCE CHART



LINEAR LANDING PERFORMANCE CHART



BOXED TAKE-OFF PERFORMANCE CHART

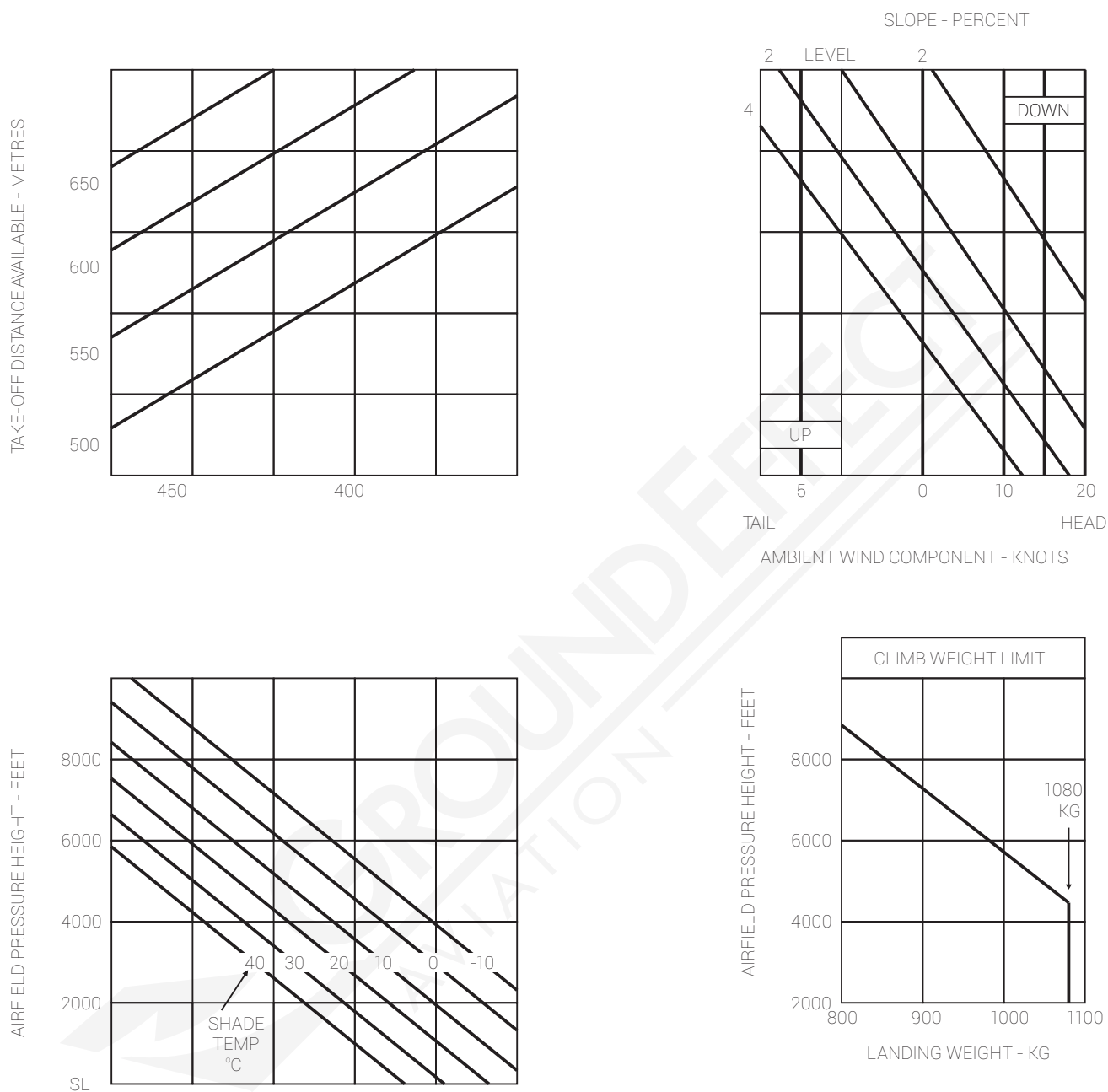


NOTES:

- (1) THE GROSS WEIGHT AT TAKE-OFF SHALL NOT EXCEED THE LESSER OF (A) AND (B)
- (2) MAXIMUM TAKE-OFF WEIGHT = 1090 KG

POWER TO BE USED	FULL THROTTLE
FLAP SETTING	10 DEGREES
TAKE-OFF SAFETY SPEED	60 KT IAS
TAKE-OFF DISTANCE FACTOR	1.15

BOXED LANDING PERFORMANCE CHART



NOTES:

- (1) THE GROSS WEIGHT AT TAKE-OFF SHALL NOT EXCEED (A)
- (2) LANDING WEIGHT DOES NOT VARY SIGNIFICANTLY WITH WEIGHT

FLAP SETTING	30 DEGREES
APPROACH SPEED	58 KIAS
LANDING DISTANCE FACTOR	1.15

TRAINING AND EXAMINATION WORKBOOK

Loading System Alpha Configuration: 6/7 Seats

INSTRUCTIONS FOR USE OF LOADING SYSTEM

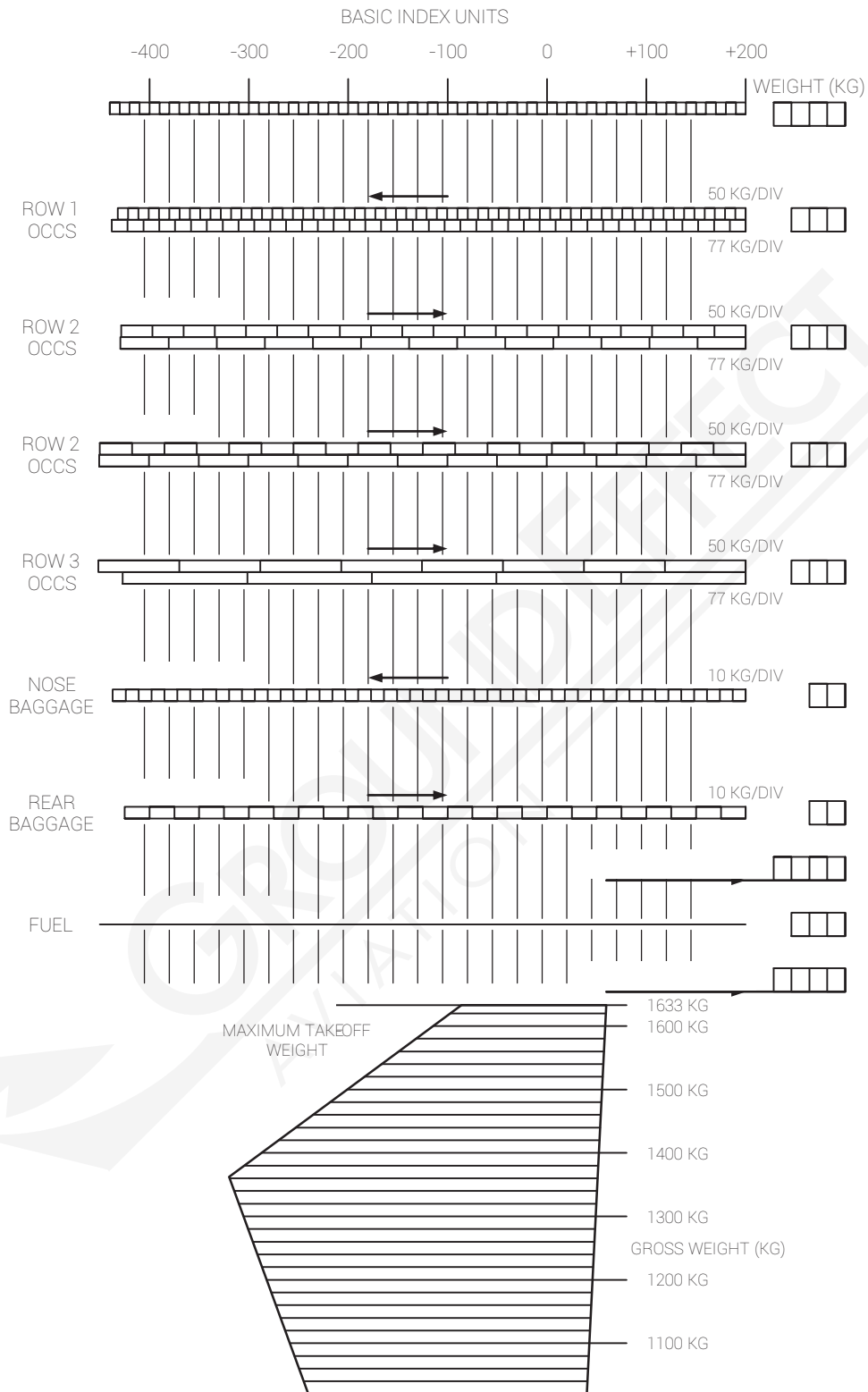
1. Obtain Basic Empty Weight and Index Units from current section of 6.2 of Flight Manual.
 2. Mark Basic Empty Weight index Units on top scale. Enter Basic Empty Weight at top of right-hand column.
 3. Enter weights of load items required for flight in appropriate squares of right-hand column. Maximum weights for load items are indicated on Index Unit scales.
 4. Total weights in right-hand column to obtain Zero Fuel Weight and Take-off Weight.
** Draw horizontal lines on CG envelope graph corresponding to Zero Fuel Weight and Take- Off Weight.
 5. Draw a line vertically down from point marked on Basic Empty Weight Index Units scale to first load item scale.
* Move to the left or right on this load item index scale as per arrow directions, and mark point as appropriate to the load indicated in the right hand column.
(e.g. 154 KG load @ 77 KG/div. = 2 div.).
 6. Draw a line vertically down from the point marked on the first load item index scale to the second load item index scale and continue as per * above. Continue down the scales to "Rear Baggage". Draw a line vertically from the "Rear Baggage" point down to intersect the Zero Fuel Weight line and Take-Off Weight line previously marked on the CG envelope graph.
 7. The two intersection points as per 7, above must not exceed the boundaries of the CG envelope graph. If they do, re-organise the load in the aircraft and start again with steps 3 to 7.
- * DO NOT EXCEED MAXIMUM TAKE-OFF WEIGHT AS SHOWN ON CG ENVELOPE DIAGRAM OF THIS LOADING SYSTEM.**

EXAMPLE:

Basic Empty Weight	1050 KG	
Empty Index Units	-260	
Row 1	150 KG (2 persons)	
Row 2 (forward facing)	160 KG (2 persons)	
Row 3	120 KG (2 persons)	
Nose baggage	40 KG	----- Zero Fuel Weight = 1520 KG Nil
Rear baggage Fuel	Nil	
Fuel	113 KG	----- Take-Off Weight = 1633 KG

Note: Basic Empty Weight includes unusable fuel and full oil.

LOADING SYSTEM ALPHA Figure 7



TRAINING AND EXAMINATION WORKBOOK

Loading System Bravo Configuration: 4 Seats

INSTRUCTIONS FOR USE OF LOADING SYSTEM

To check the loading of the aircraft before take-off, calculate the total weight and total moments as shown in the example below.

Plot the total weight and moment on the "Centre of Gravity Envelope" chart, and if the intersection point lies within the envelope, the loading is acceptable.

AIRCRAFT LIMITATIONS

Maximum Take-Off Weight

Normal category: 1000 KG / 2200 lbs

Utility category: 841 KG / 1850 lbs

Maximum baggage compartment 53kg / 120lb

NOTES:

1. The aircraft is fitted with standard tanks (37 US gallons @ 6lb/gal)
2. Empty weight includes unusable fuel and undrainable oil
3. Obtain Moment / 1000 inch pounds from the loading graph

EXAMPLE:

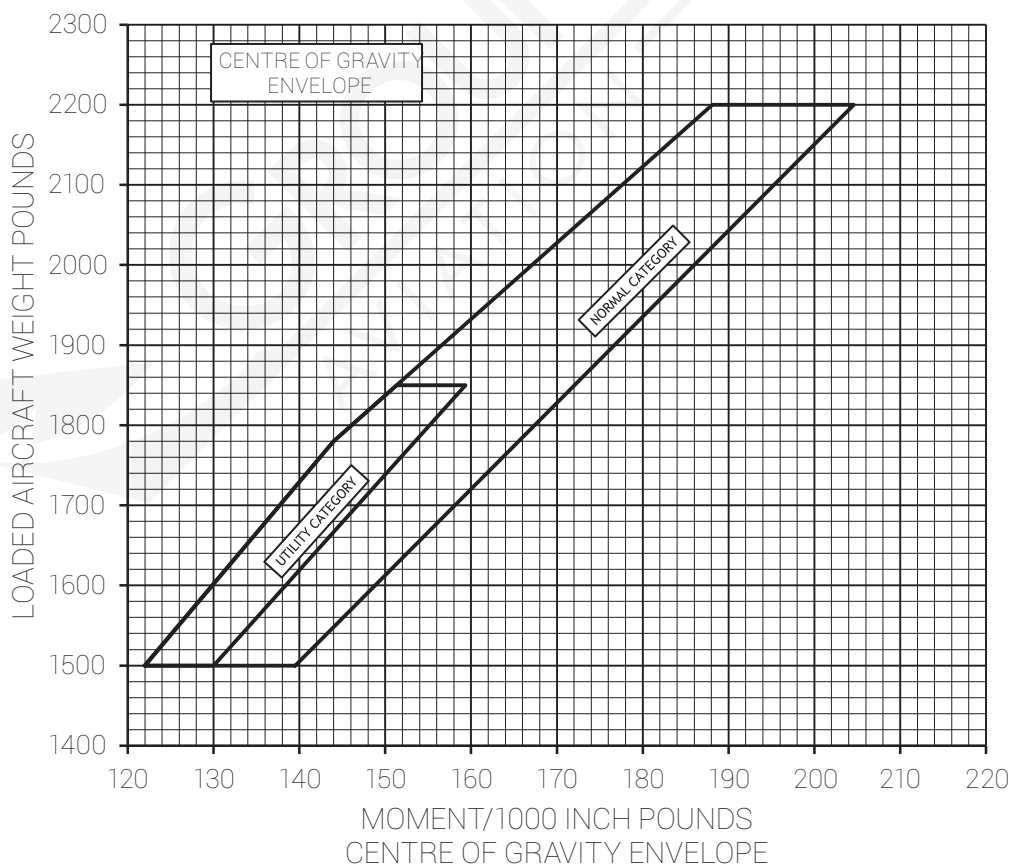
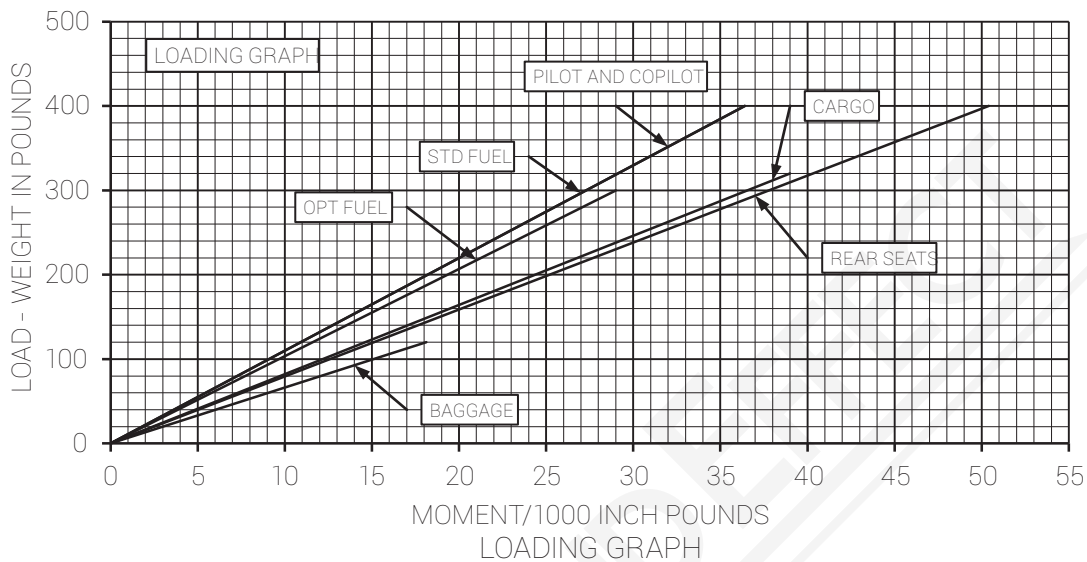
	WEIGHT (LBS)	ARM (IN)	MOMENT/1000 IN LB
Empty weight	1260	80	100.80
Oil	15	32	.48
Fuel (141 litres)	222	91	20.02
Pilot & Co-Pilot	320	91	29.19
Rear seat passengers	350	126	44.10
Baggage	25	151	3.78
Take-Off Weight	2192		198.30

Check CG is within the envelope

LOADING SYSTEM BRAVO

Figure 8

Add weight of items to be carried to aeroplane licenced empty weight. Add moment/1000 of items to be carried to total aeroplane moment/1000. Use Centre of Gravity Envelope to determine acceptability.



TRAINING AND EXAMINATION WORKBOOK

Loading System Charlie Configuration: 4 Seats

INSTRUCTIONS FOR USE OF LOADING SYSTEM

To check the loading of the aircraft before take-off, calculate the total weight and total moments as shown in the example below.

Plot the total weight and moment on the "Centre of Gravity Envelope" chart, and if the intersection point lies within the envelope, the loading is acceptable.

AIRCRAFT LIMITATIONS

Maximum Take-Off Weight	
Normal category:	1115 KG
Utility category:	925 KG
Maximum baggage compartment	122 KG

NOTES:

1. Aircraft empty weight includes unusable fuel and undrainable oil
2. All arms are in mm aft of datum
3. 1 index unit = 100 KG mm

EXAMPLE:

Aircraft empty weight	687	19,522
Full oil	7	86
1 pilot + 1 passenger (Row 1)	140	3,850
2 passengers (Row 2)	160	5,760
Baggage	20	842
Zero Fuel Weight	1,014	30,060
Fuel 140 litres	99	2,920
Take-Off Weight	1,113	32,980

CG CHECK:

1. At Zero Fuel Weight = $(30,060 \times 100)/1014$ = 2965 mm OK
2. At Take-Off Weight = $(32,980 \times 100)/1113$ = 2963 mm OK

 TRAINING AND EXAMINATION WORKBOOK

Loading System Charlie

INDEX UNITS

FUEL(LITRES)	KG	ARM: 2950	BAGGAGE	ARM:4210
20	14	413	10	421
40	28	826	20	842
60	43	1268	30	1263
80	57	1682	40	1684
100	71	2095	60	2526
120	85	2507	70	2947
140	99	2920	80	3368
160	114	3363	90	6789
080	129	3806	10	4210
200	152	4189	110	4631
216	153	4513	122	5136

OCCUPANTS

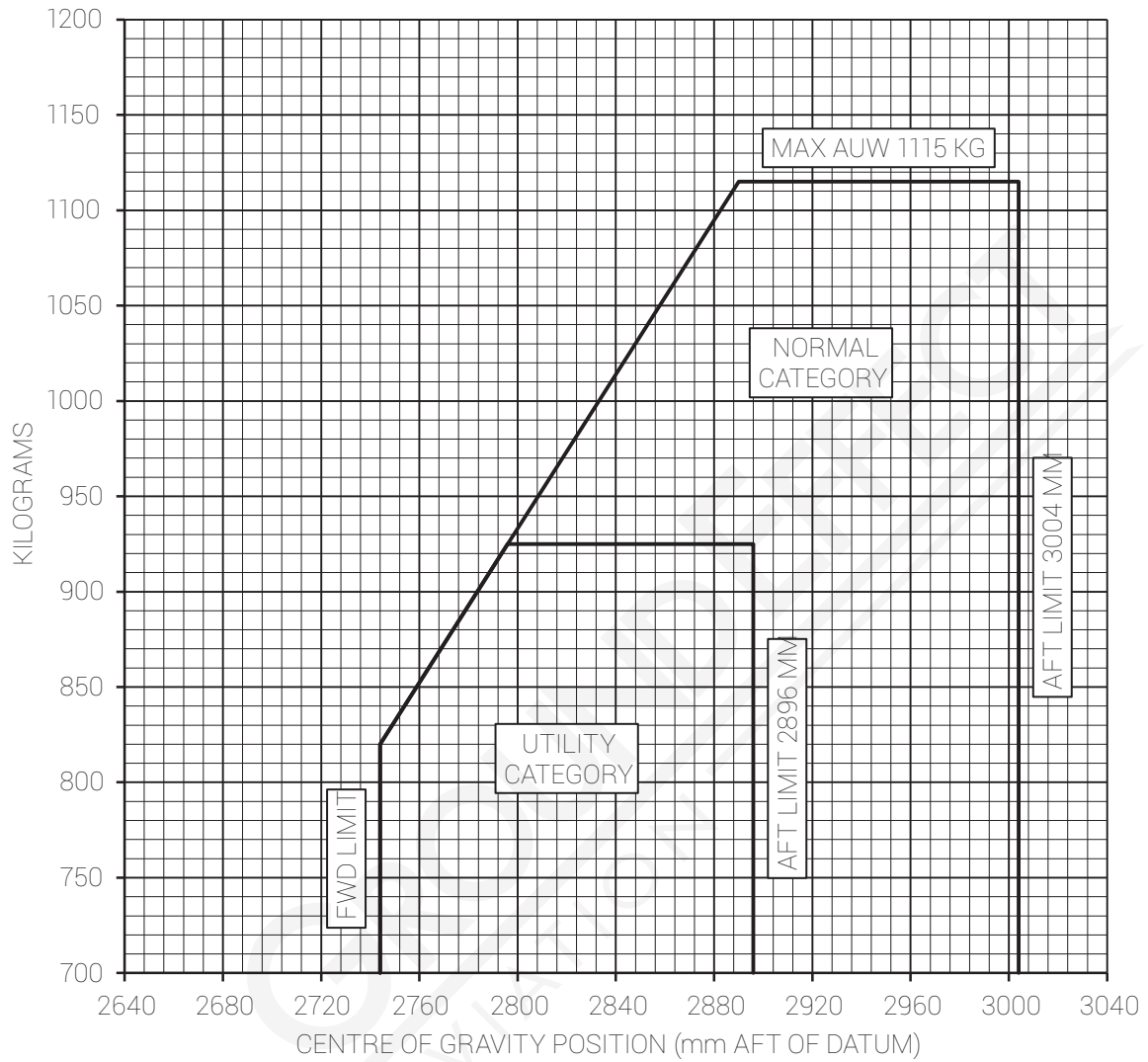
KG	ROW 1 ARM: 2750	ROW 2 ARM: 3600
40	1,100	1,440
45	1,237	1,620
50	1,375	1,800
55	1,512	1,980
60	1,650	2,160
65	1,786	2,340
70	1,925	2,520
75	2,063	2,700
80	2,200	2,880
85	2,338	3,060
90	2,475	3,240

OIL ARM:123

US QUARTS	LITRES	KG	INDEX UNIT
6	5.7	5.0	62
7	6.6	6.0	74
8	7.6	7.0	86

LOADING SYSTEM CHARLIE

Figure 9

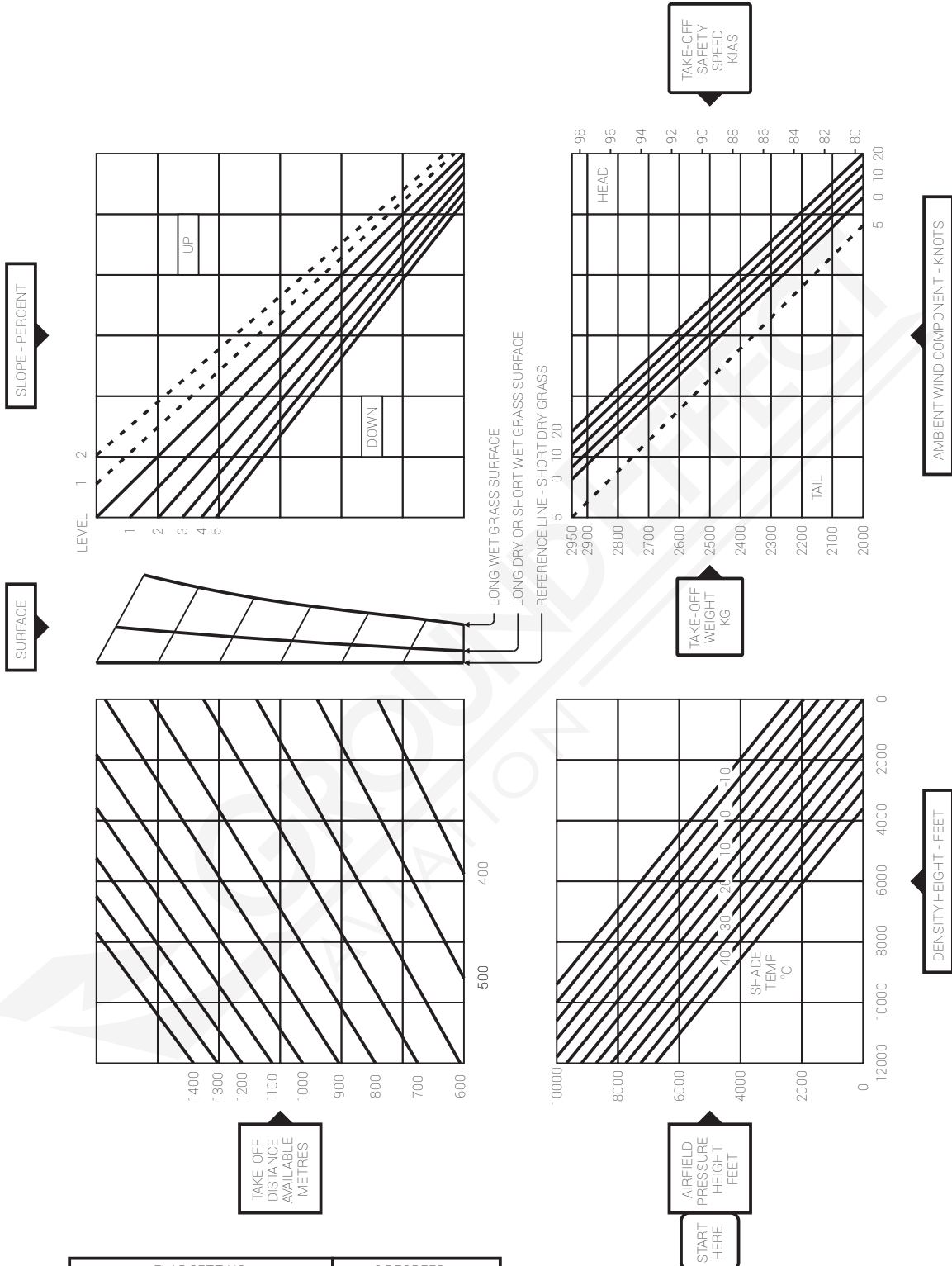


ALLOWABLE CENTRE OF GRAVITY ENVELOPE

CONVERSION FACTORS

1 inch	=	25.4mm		
1 foot	=	0305m		
1 pound	=	0.454kg		
1 imperial gal	=	1.201US gal	=	4.546lt
100/103 AVGAS specific gravity	=	0.71		

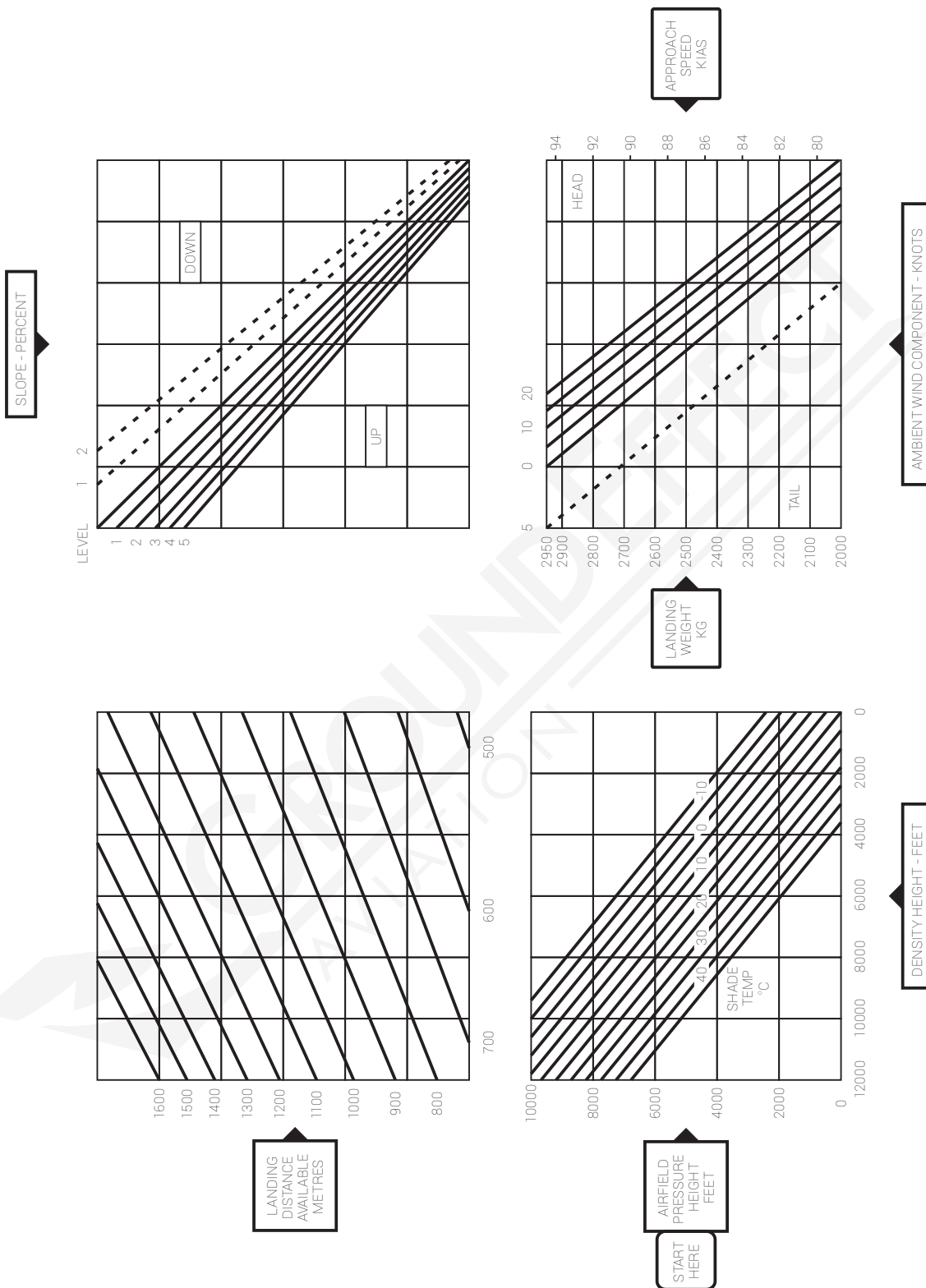
ECHO TAKE-OFF PERFORMANCE CHART



FLAP SETTING	0 DEGREES
TAKE-OFF SAFETY SPEED	SEE SCALE
TAKE-OFF DISTANCE FACTOR	1.22
RPM	3400 RPM
MANIFOLD PRESSURE	37.4 IN HG

START HERE

ECHO LANDING PERFORMANCE CHART



FLAP SETTING	45 DEGREES
APPROACH SPEED	SEE SCALE
DISTANCE FACTOR	1.26

TRAINING AND EXAMINATION WORKBOOK

Loading System Echo Configuration: 6 Seats

INSTRUCTIONS FOR USE OF LOADING SYSTEM

1. Moment Index chart (on page 18) may be used to determine the balance of the aeroplane. Locate the weight (in kg) of a particular load item on the vertical scale and move horizontally to the line representing the location of that item. From that point drop vertically to read off the Moment Index for that item.
2. Obtain the aeroplane basic empty weight and index units from the examination question. Add up the required total weight (Gross Weight) of the aeroplane and the corresponding Total Moment Index.
3. Refer to the Centre of Gravity chart (on page 19). Locate the Gross Weight of the loaded aeroplane (in kg) on the vertical scale and move horizontally to meet the vertical line representing the Total Moment Index of the loaded aeroplane. If the point of intersection, which represents the Centre of Gravity, falls in the shaded area, the aeroplane is correctly loaded.

Note: The Centre of Gravity must lie within the shaded area at ALL stages of flight.

Weight Limitations:	Maximum Take-Off Weight	2950kg
	Maximum Landing Weight	2725kg
	Maximum Zero Fuel Weight	2630kg

Balance Data:	The Mean Aerodynamic Chord (MAC) data is as follows:	
	Length of Chord	2950kg
	Location of leading edge	2725kg

Loading Data:

Location	Maximum Permissible Load	Load Arm (mm Aft of Datum)
----------	--------------------------	----------------------------

Seating:

Row 1 (seats 1 & 2)	Pilot + 1 passenger	2290
Row 2 (seats 3 & 4)	2 passengers	3300
Row 3 (seats 5 & 6)	2 passengers	4300

Cargo & Baggage Compts:

Forward compt.	55 kg	500
Left wing compt.	55 kg	3550
Right wing compt.	55 kg	3550
Rear compt.	155 kg	5000
Floor loading intensity	(All compts) 450 kg/m ²	

Cargo & Baggage Compts:

Forward compt.	50 US gal	1780
Left wing compt.	50 US gal	1780
Right wing compt.	40 US gal	2800
Rear compt.	40 US gal	2800

TRAINING AND EXAMINATION WORKBOOK

Loading System Echo

Note: All passenger seats weight 5 kg each and may be removed to permit the carriage of additional cargo or baggage in the cabin.

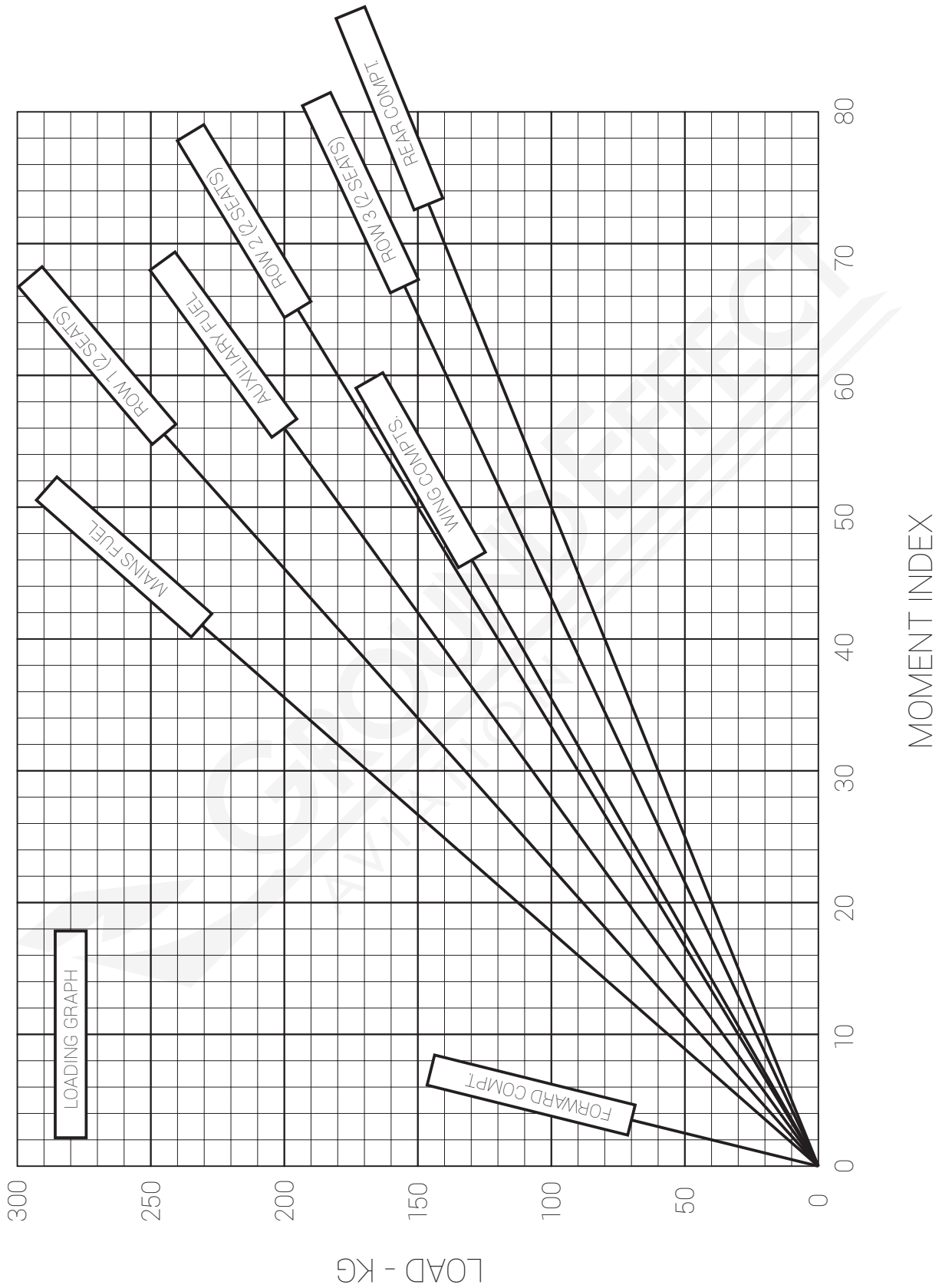
The maximum permissible load in the area otherwise occupied by a passenger seat is 82kg. If a passenger seat is removed, adjust the empty weight and empty moment.

Example:

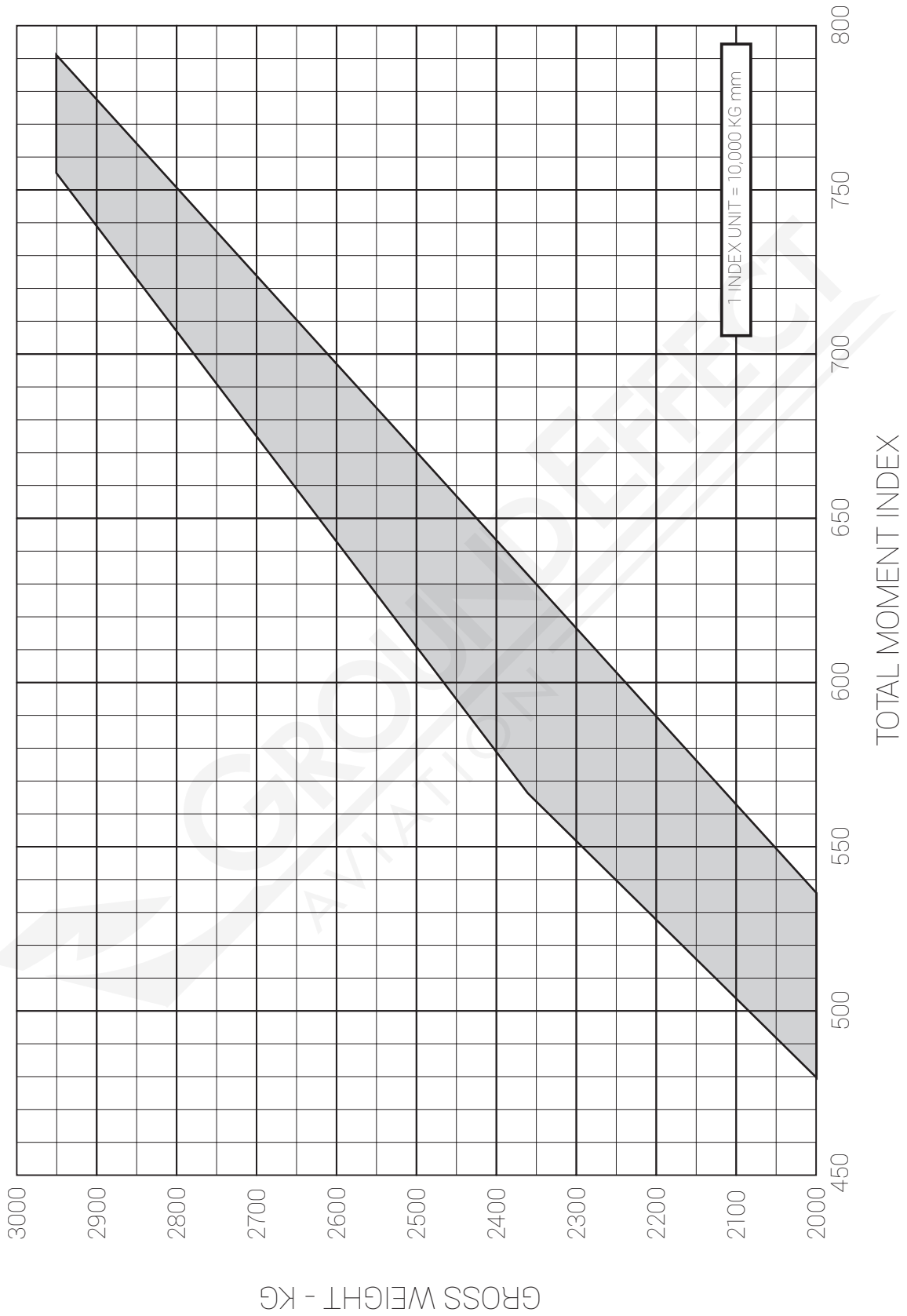
	Weight	Moment Index
Basic empty weight	2 passengers	3300
Row 1 (Pilot and 1 passenger)	2 passengers	4300
Row 3 (2 passengers)		
Rear compt.		
Zero fuel weight		
Mains fuel		
Take-off weight		
Fuel burn		
Landing weight		

Note: Refer to the Centre of Gravity Chart (on page 19) to assess whether the horizontal line from "Gross Weight" in question intersects the vertical line from its corresponding Total Moment Index in the shaded area.

ECHO LOADING GRAPH



ECHO CENTRE OF GRAVITY ENVELOPE





Credits

The content of this workbook was created and written by Matt Rayson, a highly experienced flight instructor and charter pilot. Matt and the team at Ground Effect Aviation are proud to offer this series of examination preparation books to all Australian aviation students and wish everyone the best of luck with their studies.

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The sole purpose of this workbook is as a training aid for use in conjunction with the Ground Effect Aviation practice exams.

The diagrammatic information, loading systems and performance data contained in this workbook has been designed to replicate that used by the Civil Aviation Safety Authority solely as an examination preparation tool.

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