

MEGHAN RICE
CFI/CFII

LIMITATIONS

Pilot & Plane



GIRLS LOVE TO FLY

PA.I.F PERFORMANCE & LIMITATIONS

Aircraft

1

Atmosphere

Density Altitude & Weather

3

Configuration

Flaps & Landing Gear

2

Pilot Technique

Level of experience & comfort

4

Airport Environment

Terrain, obstacles, runway surface

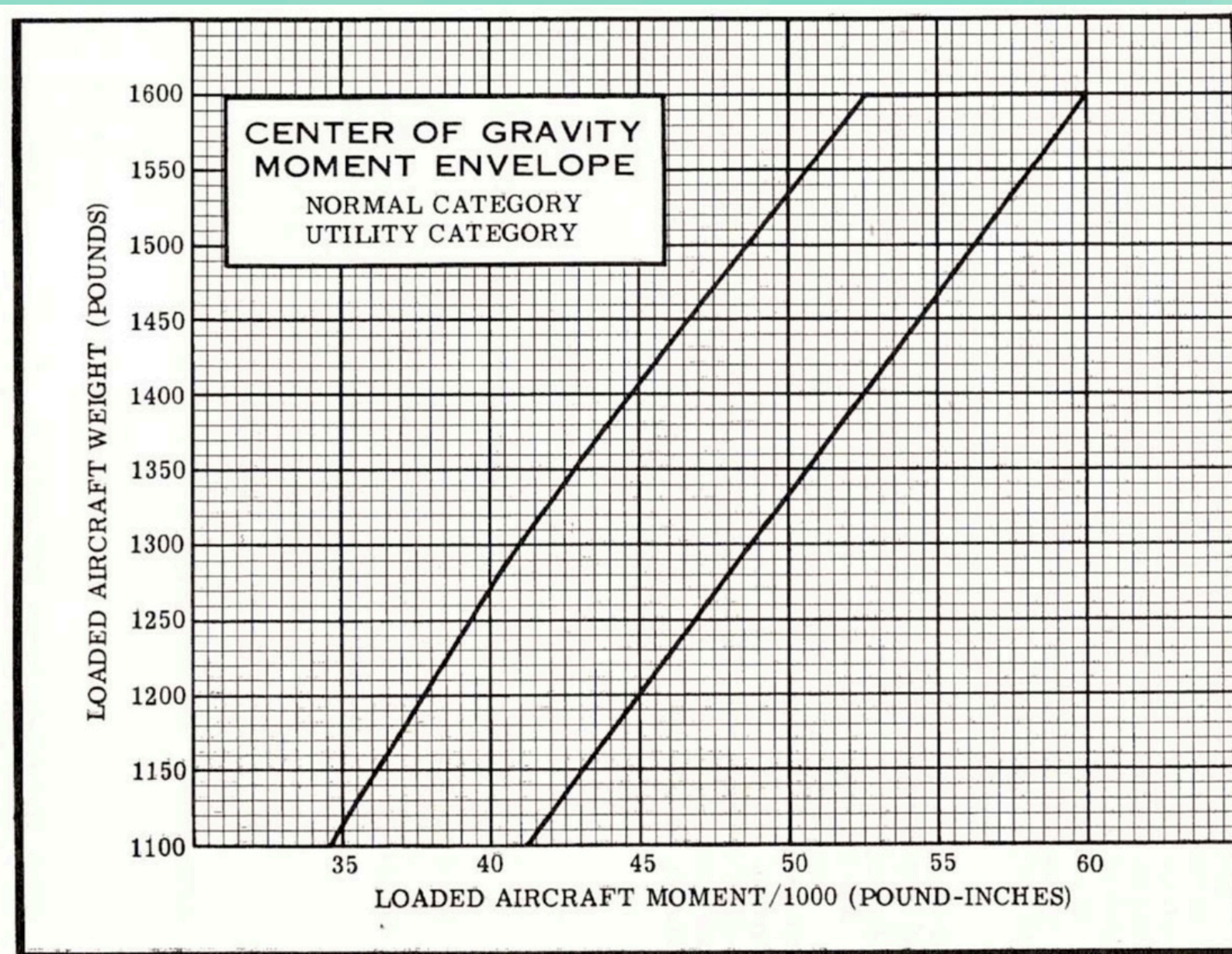


WEIGHT & BALANCE

Forward vs Aft CG

WEIGHT X ARM = MOMENT

ITEM	WEIGHT	ARM	MOMENT
------	--------	-----	--------

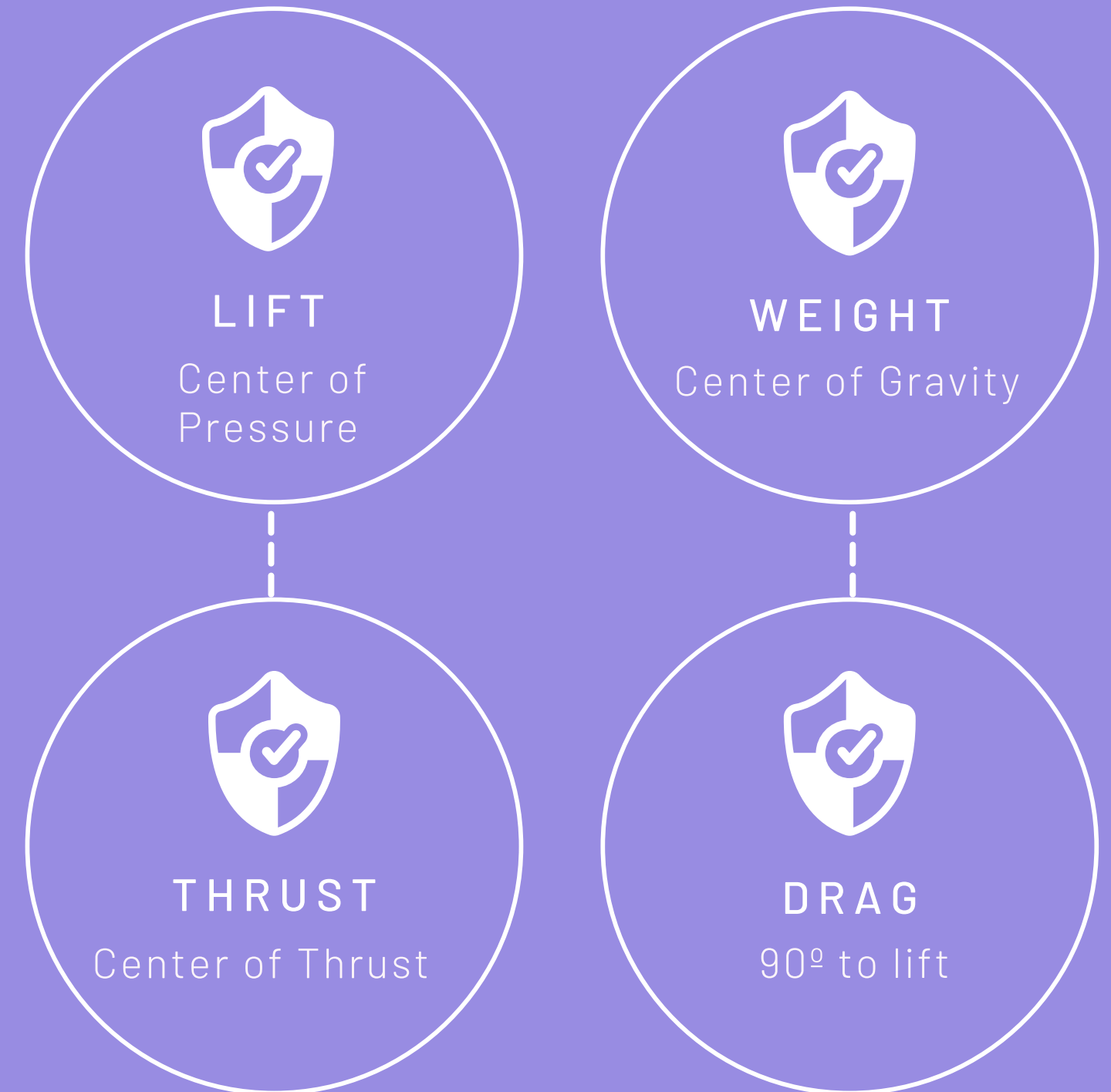


AERODYNAMICS

4 FORCES OF FLIGHT

Four forces work together to determine an aircraft's behavior.

Straight and level flight is the perfect example of what happens when all the flight forces are in equilibrium.



Theories of **LIFT**

“

If a fluid flow speeds up,
there is a simultaneous
pressure drop.

”

Bernoulli

“

For every action, there is
an equal and opposite
reaction.

”

Newton

ANGLE OF ATTACK

The plane stalls when it exceeds the “critical angle of attack”.



Chord Line

An imaginary line from leading edge to trailing edge of the camber.



Camber

Measure of the curvature of an airfoil.



Relative Wind

Direction of the wind in relation to the airfoil. Always parallels opposite of motion.



Va

Maneuvering speed

CHARTS 91.103

When in doubt, keep numbers conservative.

— TAKE-OFF DISTANCE —											FLAPS RETRACTED		HARD SURFACE RUNWAY	
GROSS WT. LBS.	IAS 50 FT. MPH	HEAD WIND KNOTS	AT SEA LEVEL & 59° F.		AT 2500 FT. & 50° F.		AT 5000 FT. & 41° F.		AT 7500 FT. & 32° F.					
			GROUND RUN	TOTAL TO CLEAR 50 FT. OBS	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS	GROUND RUN	TOTAL TO CLEAR 50 FT. OBS				
1600	64	0	735	1385	910	1660	1115	1985	1360	2440				
		10	500	1035	630	1250	780	1510	970	1875				
		20	305	730	395	890	505	1090	640	1375				
NOTES: 1. Increase the distances 10% for each 35° F. increase in temperature above standard for the particular altitude.														
2. For operation on a dry, grass runway, increase distances (both "ground run" and "total to clear 50 ft. obstacle") by 7% of the "total to clear 50 ft. obstacle" figure.														

— MAXIMUM RATE-OF-CLIMB DATA —										
GROSS WEIGHT LBS.	AT SEA LEVEL & 59° F.			AT 5000 FT. & 41° F.			AT 10000 FT. & 23° F.			
	IAS, MPH	RATE OF CLIMB FT. /MIN.	FUEL USED, GAL.	IAS, MPH	RATE OF CLIMB FT. /MIN.	FUEL USED FROM S.L., GAL.	IAS, MPH	RATE OF CLIMB FT. /MIN.	FUEL USED FROM S.L., GAL.	
1600	73	670	0.6	69	440	1.6	65	220	3.0	
NOTES: 1. Flaps retracted, full throttle, mixture leaned to smooth operation above 5000 ft.										
2. Fuel used includes warm-up and take-off allowances.										
3. For hot weather, decrease rate of climb 15 ft. /min. for each 10° F above standard day temperature for particular altitude.										

— LANDING DISTANCE —											FLAPS LOWERED TO 40° - POWER OFF		HARD SURFACE RUNWAY - ZERO WIND	
GROSS WEIGHT LBS.	APPROACH SPEED, IAS, MPH	AT SEA LEVEL & 59° F.		AT 2500 FT. & 50° F.		AT 5000 FT. & 41° F.		AT 7500 FT. & 32° F.						
		GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS					
1600	58	445	1075	470	1135	495	1195	520	1255					
NOTES: 1. Decrease the distances shown by 10% for each 4 knots of headwind.														
2. Increase the distance by 10% for each 60° F. temperature increase above standard.														
3. For operation on a dry, grassy runway, increase distances (both "ground roll" and "total to clear 50 ft. obstacle") by 20% of the "total to clear 50 ft. obstacle" figure.														

Figure 5-3.

— CRUISE PERFORMANCE —						WITH LEAN MIXTURE		
ALTITUDE	RPM	%BHP	TAS MPH	GAL./HR.	END. HOURS		RANGE, MILES	
					STANDARD	LONG RANGE	STANDARD	LONG RANGE
					22.5 GAL.	35 GAL.	22.5 GAL.	35 GAL.
2500	2750	92	121	7.0	3.2	5.0	390	605
	2700	87	119	6.6	3.4	5.3	410	635
	2600	77	114	5.8	3.9	6.1	445	690
	2500	68	108	5.1	4.4	6.9	475	740
	2400	60	103	4.6	4.9	7.7	505	790
	2300	53	96	4.1	5.5	8.6	535	830
	2200	46	89	3.6	6.2	9.7	550	860
	2100	40	79	3.2	7.0	10.9	555	865
5000	2750	85	121	6.4	3.5	5.5	425	660
	2700	80	118	6.0	3.8	5.8	445	690
	2600	71	113	5.3	4.2	6.6	475	740
	2500	63	107	4.8	4.7	7.4	505	790
	2400	56	101	4.3	5.3	8.2	530	830
	2300	49	93	3.8	5.9	9.2	550	860
	2200	43	84	3.4	6.6	10.3	560	870
	2100	37	71	3.0	7.5	11.7	540	835
7500	2700	74	117	5.5	4.1	6.3	480	745
	2600	66	111	4.9	4.6	7.1	505	790
	2500	58	105	4.4	5.1	7.9	535	830
	2400	52	98	4.0	5.7	8.8	555	860
	2300	45	89	3.6	6.3	9.8	560	875
	2200	40	77	3.2	7.1	11.1	550	850
10,000	2700	68	116	5.1	4.4	6.8	510	790
	2600	61	109	4.6	4.9	7.6	535	830
	2500	54	102	4.1	5.4	8.5	555	865
	2400	48	93	3.7	6.1	9.4	565	880
	2300	42	82	3.3	6.8	10.6	555	860
12,500	2650	60	110	4.5	5.0	7.8	550	855
	2600	56	106	4.3	5.3	8.2	555	865
	2500	50	97	3.9	5.8	9.1	565	880
	2400	44	86	3.5	6.5	10.1	560	870

NOTES: 1. Maximum cruise is normally limited to 75% power.
2. In the above calculations of endurance in hours and range in miles, no allowances were made for take-off or reserve.

Figure 5-4.

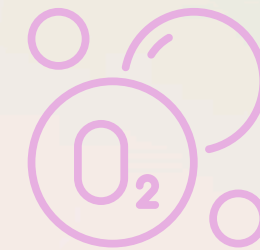
PA.I.H HUMAN FACTORS

IMSAFE (AIM 8-1-1)

85% of general aviation accidents are caused by pilot error.

Human Factors include:

- Aeromedical
- Stress/Emotions
- Energy Levels
- Attitudes
- Confirmation Bias



HYPOXIA

Lack of oxygen

AIM 8-1-2



HYPERVENTILATION

Anxiety or panic

AIM 8-1-3



CO POISON

Carbon Monoxide

AIM 8-1-4



DISORIENTATION

Loss of awareness

AIM 8-1-5

ALCOHOL & DRUGS

91.17

REQUIRED DUTY
Route Plan

REQUIRED DUTY
Pre-Flight

REQUIRED DUTY
Check Wx

REQUIRED DUTY
Weight & Balance



HAZARDOUS ATTITUDES

ANTI- AUTHORITY

Follow the rules, they
are probably right.

MACHO

Taking chances is
foolish.

INVULNERABILITY

It could happen to me,

IMPULSIVITY

Not so fast, think first.

RESIGNATION

I am not helpless. I
can make a
difference.

Maneuvering Speed
4 Forces of Flight

THANK YOU

