Soaring Fundamentals SG2-33

Weight & Balance

Empty	Gross	Useful Load
612 lbs	1040 lbs	428 lbs

Two conditions must be satisfied - 1) total weight of aircraft plus crew must not exceed max gross weight, 2) CG must be within POH CG range.

Examples – 200lbs front + 200lbs rear CG = 81.5" (within limits) Total Weight 1012 lbs
90lbsfront + 200lbs rear CG outside limits without ballast Total Weight 902 lbs.

Solo - Front Seat Only

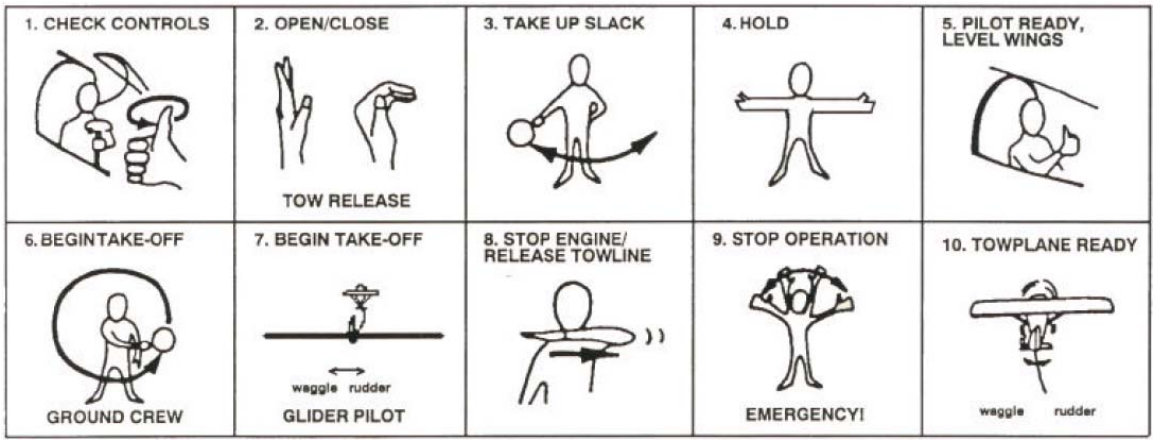
W&B Formulas

Moment = Weight x Arm
CG = Moment/Weight

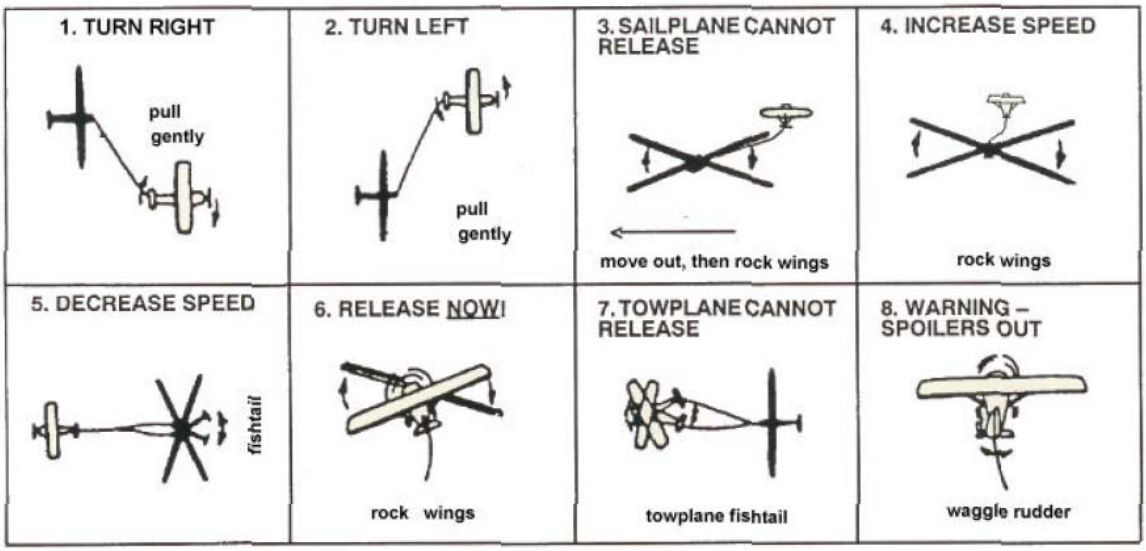
$$\text{New CG} = \frac{\text{Original Moment} +/- \Delta \text{ Moment}}{\text{Original Weight} +/- \Delta \text{ Weight}}$$

Soaring Signals

On The Ground



In The Air



SG2-33 - Flight

Slow Flight – at speeds just above stall, controls are mushy, use shallow bank angle.

Stalls – make clearing turns prior to making stalls, *no stalls below 1500 agl.*
Stall Recovery – lower nose. Turning Stall Recovery – lower nose and use rudder opposite turn. Once unstalled, coordinate aileron and rudder.

Spins – 3500 agl 1) Clearing Turns 2) Approaching stall – stick full aft, full rudder. Recovery – full rudder opposite rotation, neutralize rudder, recover from dive.

Steep Turns – 60 ^{o} bank, 2g load factor, 40% increase in stall speed, 46 mph min. dual, opposite aileron needed in turn.

Spiral Recovery – relax elevator back pressure, shallow bank angle to less than 45 ^{o} raise nose, roll out wings level.

Speeds	Solo	Dual
Stall	31	33
Minimum Sink	38	42
Best L/D	45	50
V_A	65	65
V_{NE}	98	98

Forward Slip – used to increase drag and lose altitude. Use opposite aileron and rudder to increase drag. Balance controls as required to maintain straight ground track. Speed brakes may be used in conjunction with slip for additional altitude loss.

For turning slip, use top rudder.

Side Slip – use to compensate for crosswind. Lower wing into wind to offset drift, maintain ground-track heading with rudder.

Approach to Landing Speed – Best L/D + Wind Speed

Landing Approach

- IAP – 1000 ft
- Abeam touchdown point on downwind – 800 ft
- Speedbrakes on base – adjust as necessary for conditions
- Aim 150 ft short of intended touchdown point
- Adjust speedbrakes for touchdown control

Towing – High Tow = Above Wake Low Tow = Below Wake

Boxing Wake Exercise – Fly rectangle around tow plane – mostly rudder with little bank

Slack In Rope – Yaw away from slack or slowly apply spoilers

Rope Break

Make initial turn into crosswind

Altitude	Plan of Action
Below 200ft agl	Land straight ahead
Above 200ft agl	180 ^{o} turn and land
Above 800ft agl	Fly normal pattern

Flight Tips

Off-Field Landing – have field chosen by 1500' agl
Fly upwind, crosswind, downwind, and final

Thermalling – Circle in the same direction as the first glider in the thermal. Circle at min. sink speed – add a little speed if turbulent. Use variometer to detect thermal boundaries.

Runway Selection – grass and hard-surface runways are available. Make your decision as early as possible - no last second changes.

Field selection priority
1. Freshly mowed
2. Cultivated
3. Short crop
4. Pasture
5. Tall crop

Crosswinds

Crosswind takeoff

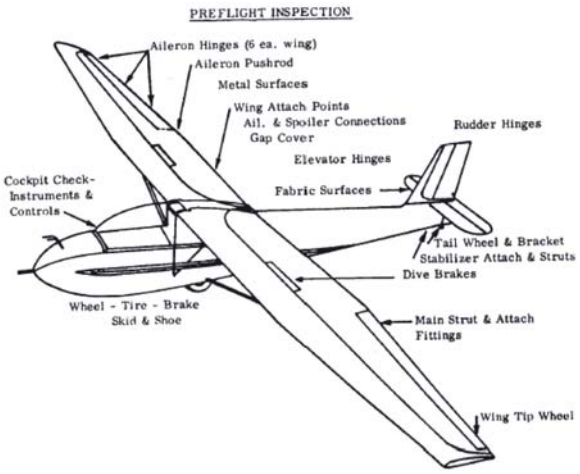
- Have wing runner hold upwind wing slightly low
- After sailplane takeoff, crab into wind
- After towplane takeoff, aim sailplane at towplane

Crosswind Landing

- Add wind component to approach speed
- Crab or forward-slip to remain aligned with landing area
- In strong crosswinds, land diagonally across runway

Note - *The above information is offered only as a guide – use the information found in your aircraft's POH as the final authority.*

SGS 2-33 PRE FLIGHT CHECK LIST



INTERIOR

1. REGISTRATION AND AIRWORTHINESS CERTIFICATE
2. OPERATION PLACARD - GROSS WEIGHT AND C.G. WITHIN LIMITS.
3. BALLAST - SECURED IN PLACE (IF REQUIRED)
4. FLIGHT CONTROLS - -FREEDOM OF MOVEMENT IN PROPER DIRECTION.
5. SPOILERS, DIVE BRAKES - PROPER OPERATION AND RETRACTION, WHEEL BREAK
6. TRIM CONTROL - PROPER OPERATION AND SET FOR TAKEOFF
7. INSTRUMENTS CHECKED
8. SEATBELT AND SHOULDER HARNESS
9. CANOPY - ATTACHMENT AND RELEASE
10. WING AND FLIGHT CONTROL ATTACHMENTS PROPER AND COMPLETE (7 SAFETY PINS)
11. LOOSE ITEMS REMOVED OR SECURED

EXTERIOR

1. NOSE - DAMAGE, PITOT TUBE AND STATIC PORTS, VENTILATOR AND YAW STRING
2. LEFT SIDE OF NOSE
3. TOW HITCH AND RELEASE
4. SKID
5. WHEEL AND TIRE (15 PSI)
6. LEFT WING
   - DAMAGE, DENTS TEARS WRINKLES POPPED RIVETS
   - WING STRUTS AND ATTACHMENTS
   - TIP WHEEL
   - AILERON - HINGES AND LINKAGE
   - SPOILERS
7. LEFT SIDE FUSELAGE SKIN
8. EMPENNAGE
   - GENERAL CONDITION
   - BOLTS AND STRUTS SAFETIED
   - HINGES AND LINKAGE CHECKED AND SAFETIED
   - FREEDOM OF RUDDER AND ELEVATOR
9. TAIL WHEEL AND UNDERSIDE OF FUSELAGE
10. RIGHT WING
    - DAMAGE, DENTS TEARS WRINKLES POPPED RIVETS
    - WING STRUTS AND ATTACHMENTS
    - TIP WHEEL
    - AILERON - HINGES AND LINKAGE
    - SPOILERS
11. RIGHT SIDE FUSELAGE SKIN

SGS 2-33 FLIGHT CHECK LIST

PRE-LAUNCH

ALTIMETER & TRIM SET
BALLAST
BELTS
CONTROLS
CABLES
CANOPY CLOSED& LOCKED
SPOILERS
WIND DIRECTION & VELOCITY
TRAFFIC
EMERGENCY PROCEDURES

PRE-LANDING

TRAFFIC
WIND DIRECTION & VELOCITY
RUNWAY CHOICE & TRAFFIC
GEAR DOWN
SPOILERS AS NEEDED
SPEED

2-33A GROSS WEIGHT and BALANCE CALCULATIONS

When preparing for any particular flight the pilot must answer two questions:

1. Is my weight and my passenger's weight within the maximum limits of gross weight for this flight? and
2. Is the sailplane properly balanced for this flight?

The following procedure is designed to help the pilot determine the actual weight and balance of his 2-33A for any particular flight loading. To do this, we calculate the moments of the aircraft and each occupant using the equation weight X arm = moment (WA = M).

The sailplane must be balanced within forward and rearward C.G. limits when it is flown. These limits are defined at Sta. 78.20" for the forward limit, and Sta. 86.10" for the rear limit. This figure is constant for all 2-33's. The weight and empty center of gravity of each specific 2-33 is determined at manufacture, or on any subsequent reweighing, so this information is available to any pilot from Schweizer Form I-4427 to calculate his operational weight and balance. Also known are the arm (or distance aft of Station "O") for the optional ballast, the front pilot and the rear pilot. With this given information we can develop a form for calculating the actual arm (or c.g. location) for the sailplane for any particular loading.

Items Known:

Front Pilot Weight_____ Sta. 43.80

Rear Pilot Weight_____ Sta. 74.70

Sailplane Empty Weight_____ 2-33 s/n _____

Removable Ballast Weight - 0 or 19½ lbs. (all 2-33's)

Baggage Capacity — None allowed.

Sailplane Empty C.G. _____ 2-33 s/n _____

Limits: Forward: Sta. 78.20 (all 2-33's)

Rear: Sta. 86.10 (all 2-33's)

To Be Determined:

1. Whether the actual CG of the particular 2-33 to be flown will fall within the above limits.
2. Whether total gross weight is not greater than the maximum allowable 1,040 lbs. for any 2-33.

Example Sailplane Serial Number 369
(See Form I 4427 on next page)

My Sailplane - Serial Number _____
(Refer to Form I-4427 for your aircraft)

ITEM	WEIGHT	ARM	MOMENT	WEIGHT	ARM	MOMENT
Sailplane empty weight & empty C.G.	612	96.12	58,825			
Front Pilot Weight	170	43.80	7,446		43.80	
Rear Pilot Weight	150	74.70	11,205		74.70	
Ballast, if used	0	14.75	- 0 -		14.75	
Total Moment			77,476			
Total Weight	932					
Total Moment / Total Weight =	77,476 / 932 =	83.13	Actual flying CG	Total Moment / Total Weight =	=	Actual flying CG

This CG is between the limits of Sta. 78.20 and 86.10, and gross weight is less than 1,040 lbs., so this sailplane has a proper flight weight and balance loading.

1. Is this between the CG limits?
2. Is total weight less than 1,040 lbs.?