SGS 2-33A
N7782S

Aircraft Information and Checkout Program

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Introduction

Each M-ASA member wishing to fly the SGS 2-33A must complete a check out with a M-ASA instructor prior to solo flight in the aircraft. This checkout is separate and distinct from any checkouts in a SGS 2-33A at some other location. Aircraft checkouts at M-ASA are valid for 24 months. The CFIG's signature in the logbook of the member indicates that the pilot has satisfied the CFIG he/she is competent to conduct flights as PIC in the sailplane. Members wishing to fly the aircraft from the backseat must also be checked out flying from that location prior to flying the glider from the back seat.

About this booklet

This booklet has been assembled to help M-ASA members quickly locate information needed to check out in and operate the SGS 2-33A. Information in this booklet comes from the FAA approved Flight Manual, The Aircraft's Type Certificate Data Sheet (TCDS), and M-ASA operations procedures. Where appropriate, aircraft specific data has been added to facilitate understanding and use. This book does not replace the manufacturer's documentation; the intent is to augment it. For detailed descriptions, assembly instructions and performance information the SGS 2-33A Flight Manual dated June 4, 2010 must be used. This updated manual is available from K & L Soaring (www.klsoaring.com).

Considerations Regarding Glider Usage

Clean the glider before putting it away. Bugs, dust and dirt all diminish the appeal of the glider and degrade performance. M-ASA invests in the equipment for member use. If we want it to remain in a condition worthy of our use; **we must take care of it**.

Make sure the battery is put on charge for the next flying day.

Documenting the Checkout

Instructors must endorse the pilot's logbook and complete the applicable checkout/recurrent training sheet when the checkout is complete. A sample log book endorsement is provided below:

(Pilot's Name) holder of certificate number (pilot's certificate number) has completed a checkout and is authorized to act as PIC in [front/rear seat as applicable] of the SGS 2-33A. Date: xx/xx/xx (the date the checkout was accomplished) (CFI's name) (CFI's cert. #) EXP xx/xx/xx (CFI's cert. expiration date)

Aircraft Description

The SGS 2-33 is a two seat tandem trainer. It was manufactured by the Schweizer Aircraft Corporation, Elmira, New York. Its construction is metal with fabric covering on the fuselage and tail surfaces. The wings are tapered in the outboard section and incorporate dive-brakes.

Canopies

The SGS 2-33A has a single canopy over the front cockpit. It is hinged on the left hand side. The latch is on the right side and must be rotated full forward to secure the canopy. The rear seat is accessed via a door on the right side. It also has a window on the left side which can be opened in flight.

Rudder Pedals

The front seat rudder pedals are ground adjustable. The rear seat rudder pedals are not adjustable.

Wheel Brake

The wheel brake is actuated at the aft end of airbrake travel. The brake is a mechanical drum brake. Although the brake and skid combination is very effective, planning your touchdown and rollout to not rely on the brake would be a good plan.

Landing Gear

The SGS 2-33A normally sits on its main wheel and nose skid when loaded. The main landing gear is fixed. The tire pressure for the main wheel is 15 PSI.

Weak Links

In practice M-ASA uses an 1100 lbs link (white).

Cockpit Layout and Controls

Front Cockpit

Figure 2 SGS 2-33A Front Cockpit

Equipment

Battery

The aircraft has provisions to mount the battery on the floor board between the front seat rudder pedals. The battery powers the radio and electronic variometer. Charging is done with the battery remaining in the aircraft. The charger cord plugs into the instrument panel. Ensure the battery is charged and properly secured prior to flight.

Communications Radio

The SGS 2-33A is equipped with a MicroAir communications radio mounted in the front seat instrument panel. Boom microphones are provided in each cockpit. Push to talk switches exist on each control stick. Additionally, an extra push to talk switch is mounted on the canopy frame accessible from the rear seat.

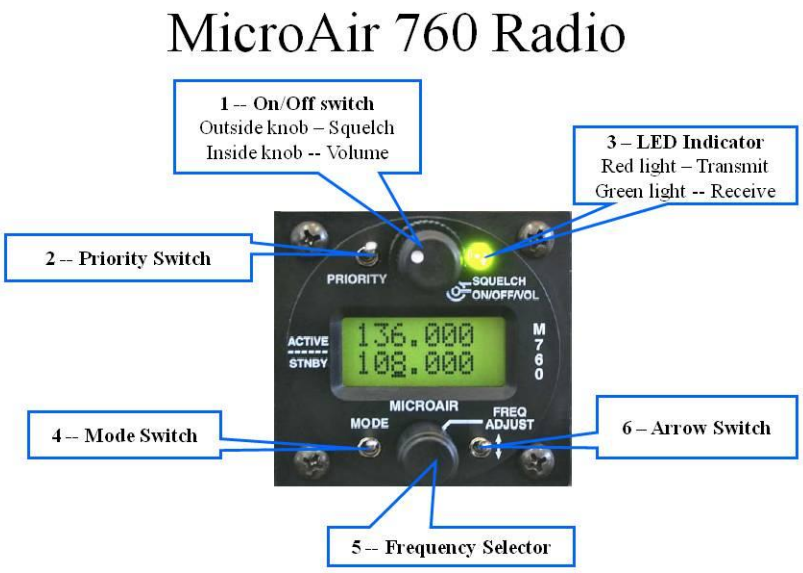


Figure 1 MicroAir Radio

Control Description

1. **On/Off Switch** This is a double knob with an inner knob and an outer ring.
    a. The inner knob controls the power and the volume. Turn fully counterclockwise to switch off. Turn clockwise to switch on and adjust volume.
    b. The outer ring control adjusts the squelch threshold. Clockwise for up or closed.
2. **Priority Switch** Activating this control will switch to memory location 25. It also doubles as memory channel delete.
3. **LED Indicator**
    a) When the light is off the radio is in a muted receive condition.
    b) Steady green indicates the squelch is open or a signal present.
    c) Steady red light indicates the radio is in a transmit condition.
    d) A flashing red light indicates the PTT has been depressed for longer than 40 seconds. (This is helpful for indicating a possible stuck PTT switch).
4. **Mode Switch selects 3 display pages**
    a) Default is 2-line frequency display. The top line is the active frequency. Bottom line is the change or standby frequency. To transfer the standby frequency to the active simply hit the transfer (arrowed switch) once. The active and standby frequencies will now have switched over. Remember the top line is always the active frequency.

b) Push mode again to access the memory display. Up to 25 memory channels can be programmed.

c) Push in the mode again to display the memory-programming page.

5. **Frequency Selector**

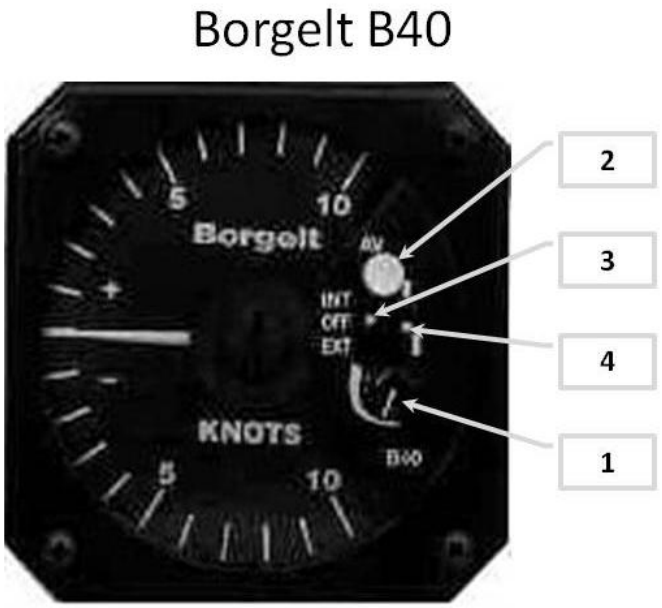
a) In the 2-line frequency display mode, turning the knob left or right will change the standby (bottom) frequency. the MHz (121, 122, 123 etc) Press the knob once to activate the KHz change (025,050,075 etc) the cursor will underline the KHz, (after 5 seconds of inactivity it will revert to MHz).

b) Turn the frequency selector knob left or right to move the channels up or down.

6. **Arrow Switch** This switch toggles between active and standby frequencies. In the memory mode; selecting this switch enters a scan of the preset frequencies. To stop scanning hit the switch again or activate one of the PTT switches.

External memory toggle: In the active/stnby mode it acts as a flip flop switch, in the memory mode it toggles up by one preset. Holding the switch for 3 seconds will enter the scan mode. There is an external memory switch mounted on the rear bar of the front canopy accessible from the rear seat.

Variometer



The Borgelt B40 variometer provides total energy rate of climb displayed on the round meter with accompanying audio.

1. **Volume** (symbol) adjusts audio volume
2. **AV** - Push button switch - selects averager function on the meter while the button is pressed.
3. **Power switch - selects voltage source**

INT – selects the internal 9 volt battery (if fitted)

OFF - turns off the Variometer
EXT - selects 12 volt sailplane power

4. **ARROWS** Audio mode switch
position up = audio above zero only
position down = full range audio

Explanation of Audio - the audio is at all times an audio variometer.

a) In lift a chopped rising tone is heard which saturates at 15 knots of lift
b) In sink provides a solid tone which becomes `clicks' if sinking faster than 5 knots.
c) If `up only' mode is selected for the audio, no sound is heard in sink.

Operations

Ground Handling:

Most ground maneuvering is common sense, DO NOT place any side loads on the tail wheel. Turning the glider on the ground must be done with the tail raised. Never leave the canopy open when the glider is unattended or you are moving it.

When moving the glider on the ground, secure the controls with the seatbelts to prevent control damage. Care must be used when pushing the glider backward. Pot holes, gullies of hills may damage the elevator. The best approach is to not push it backward.

Preflight Inspection

During preflight, evaluate the overall cleanliness and condition of the glider. The canopy must be clean and in good condition. Also check the security of all control surface seals and taped joints.

1. **Forward Fuselage:**
    a. Fabric for damage
    b. Pitot & Static tubes for water or foreign objects
    c. Skid and shoe
    d. Release hook and release system
    e. Main wheel and brake
    f. Tire pressure (15 psi)
2. **Cockpit:**
    a. Release controls (front and back)
    b. Canopy condition including; attach points, latch and lanyard
    c. Flight controls for free and proper movement
    d. Battery installed and secure
    e. Instruments
    f. Safety belts and shoulder harnesses
    g. Rear door and window attach points and latches
    h. Wing attach bolts
    i. Aileron connections
    j. Proper paperwork (AROW)
    k. Review weight and balance limits
3. **Wings:** *(don't forget to inspect both)*
    a. Strut attachment and fittings
    b. Dive brake hinges and connections

c. Aileron hinges (6 ea. wing)
d. Aileron pushrod
e. Metal surfaces
f. Wing tip wheels

4. Aft Fuselage:

a. Fabric for damage
b. Vertical fin attachment
c. Stabilizer struts and stabilizer attachment to fuselage
d. Hinge points, rudder and elevator
e. Pushrod attachment to the elevator horn
f. Rudder cable connection to rudder horn
g. Tail wheel and bracket assembly

Takeoff (aero tow)

In aircraft with the bungee trim systems the forward position is recommended for solo take-off. Aileron control is somewhat heavy at faster towing speeds. Control heaviness reduces to a normal level at slower speeds.

Release from tow

Make sure you clear for traffic prior to releasing and turning from the tow plane. This includes clearing for your right turn as well as insuring there is not a conflict for the tow plane when he descends to the left.

Schweizer recommends releasing from tow with minimal tension on the tow rope. This is often called a soft release. An effective technique is to move out to the right as if boxing the wake. Then move back toward the center position creating the slightest bow in the rope. As you see the bow form, pull the release and enter your right turn as the rope falls away to the left. Never in this process should you climb above a normal high tow position or dive upon the tow plane.

SGS 2-33A Pre-Launch Checklist

Battery	Connected and Secured
Controls	Function and Hookup
Ballast	Weight & Ballast checked
Wind	Direction & Speed
Emergency Plan	Discussed
Aircraft Power	Battery on
Altimeter	Set
Radio	On, frequency set
Variometer	Mode & volume

SGS 2-33A Takeoff Checklist

Controls	Free and proper
Straps	Secure both seats
Wind	Direction & Speed
Altimeter	Set
Radio	Frequency & volume

Variometer	Volume set
Trim	Set
Tow Rope	Connected
Canopy	Both closed, locked & verified
Brakes	Closed & locked

Free Flight

At speeds over 65 MPH, maneuver with caution.

Slow Flying and Stalls

Stalls in the 2-33 are very gentle and straight ahead with no tendency to go off to either direction. Buffeting occurs before the stall 31 mph solo, 34 mph dual. When flying solo, the stalling speed of the 2-33 is 31 mph with dive-brakes closed and 34 mph with dive-brakes open. For dual flight, the speeds are 33 mph and 35 mph, respectively.

Spins

The 2-33 will spin, depending on pilot weight and equipment etc. Care should be taken to avoid stalls and spins at low altitude by using adequate airspeed and coordinated control inputs.

Spiraling in thermals

In order to remain aloft or gain altitude it is necessary to spiral. The diameter of a thermal is normally quite small; therefore, a fairly steep bank is required. Although this is general practice, it may not be necessary in areas where large diameter thermals are found. The best flying speed in any thermal, at any degree of bank, is a few miles per hour above the buffet-before-the-stall. Keep in mind that the steeper the spiral, the higher the minimum-sink and stalling speed will be. Sometimes it is necessary to spiral very steeply and sacrifice slow speed and low sink to remain within the limits of the thermal. This is especially true in strong, small-diameter thermals.

Approach and Landing

Pattern

It is general practice to fly a traffic pattern consisting of downwind, base and final legs. The pattern speed flown should be adjusted for wind velocity and gust conditions. For a no wind condition, using an approach speed of 1.5 times the stall speed works well for the 2-33. On windy days, it is good practice to add ½ the wind velocity to this approach speed to compensate for turbulence and penetration.

Dive brakes/Spoilers

Approach should be made high, with use of dive brakes. Dive brakes increase sink, which in turn makes a steeper and more controllable glide path. They can also be used to lose altitude rapidly at any time during a flight, or during a tow to take up slack, or to lower sailplane from a too-high position.

It is unsafe, however, to make an approach with dive brakes open in the speed range of 36 to 43 mph as the rate of descent is so great that a proper flare-out for landing cannot be made.

Slipping

The SGS 2-33 can be slipped both forward and while turning. The slipping-turn is done in a normal procedure but due to limited rudder area, the forward slip must be done with very little low wing and full rudder. The airspeed should be kept between 45 - 50 mph for fastest rate of descent.

Touch down

Can be done with dive brakes either open or closed although it is preferable to land with them open. With dive brakes open, the glide path is quite steep; therefore, a f1are-out must be executed 2 - 5 ft. above the ground at 43 - 46 mph. By holding a level attitude close to the ground, the sailplane will settle to a smooth, level touch-down. DO NOT FLARE OUT TOO HIGH. - This will cause a very hard landing and may result in injury to occupants or damage to the sailplane.

Touchdown with the dive brakes closed

This is executed by letting the sailplane land itself at, or near, 40 mph. Be careful not to ease stick back after touchdown. This will cause a steeper angle of attack and the sailplane will lift off.

SGS 2-33A Landing Checklist

Altimeter	Update Setting
Radio	On, frequency, volume
Variometer	Volume set
Speed	50 MPH plus ½ wind
Trim	Set for pattern speed
Airbrakes	Checked

Performance

Weights and Specifications

SGS 2-33 Dimensions	
Wing Span	51.0 ft
Length	25.75 ft
Height	5.3 ft
Aspect Ratio	11.85
Wing Area	219.48 ft^2
Load Factors	
Load Limit	+4.67g to -2.56g

SGS 2-33 Weights	
Empty Weight	665 lbs
Payload	375 lbs
Gross Weight	1,040 lbs
SGS 2-33 Weight Limits	
Minimum Fwd Pilot	137 lbs
Minimum Fwd Pilot 100# aft	110 lbs

Figure 2 SGS 2-33A Weights and Specifications

Weight & Balance

Operating an aircraft within the proper center of gravity is essential for flight safety. Like people, all aircraft are different. This is true of M-ASA's SGS 2-33 as well. Pilots must be aware of the different limitations of each of our aircraft and ensure they adhere to the maximum weight limitations and loading constraints. To assist with this each aircraft has a placard affixed to the instrument panel listing key loading limits.

SGS 2-33A #152 N7782S 5/4/2009

Item	Weight	Arm	Moment
Sailplane Empty Weight and CG	665.0	94.79	63035.35
Front Pilot Weight	0	43.80	0
Rear Pilot weight	0	74.70	0
Totals	665		63035.35

Total legal weight < 1040 lbs? 375.00

Actual Flying CG 94.79 limits between 78.20 and 86.10

Figure 3 Weight & Balance Equation

Removable ballast may be used to compensate for lighter pilot weights. All pilots must be aware of the use of ballast and ensure it is used when needed and removed when it is not. There is no reason to operate on the extreme limits of the flight envelope. If close to the limit, use ballast to bring the aircraft well within the envelope. When operating the M-ASA 2-33, weight bags (shot bags) may be placed under the front seat cushion. These bags must be secured so as not to have the potential to interfere with flight controls. They have their weight marked on them and this weight is directly added to that of the front seat occupant to determine cockpit load.

Using a load chart can facilitate a quick determination. The load chart below displays the weight and balance envelopes for the SGS 2-33A.

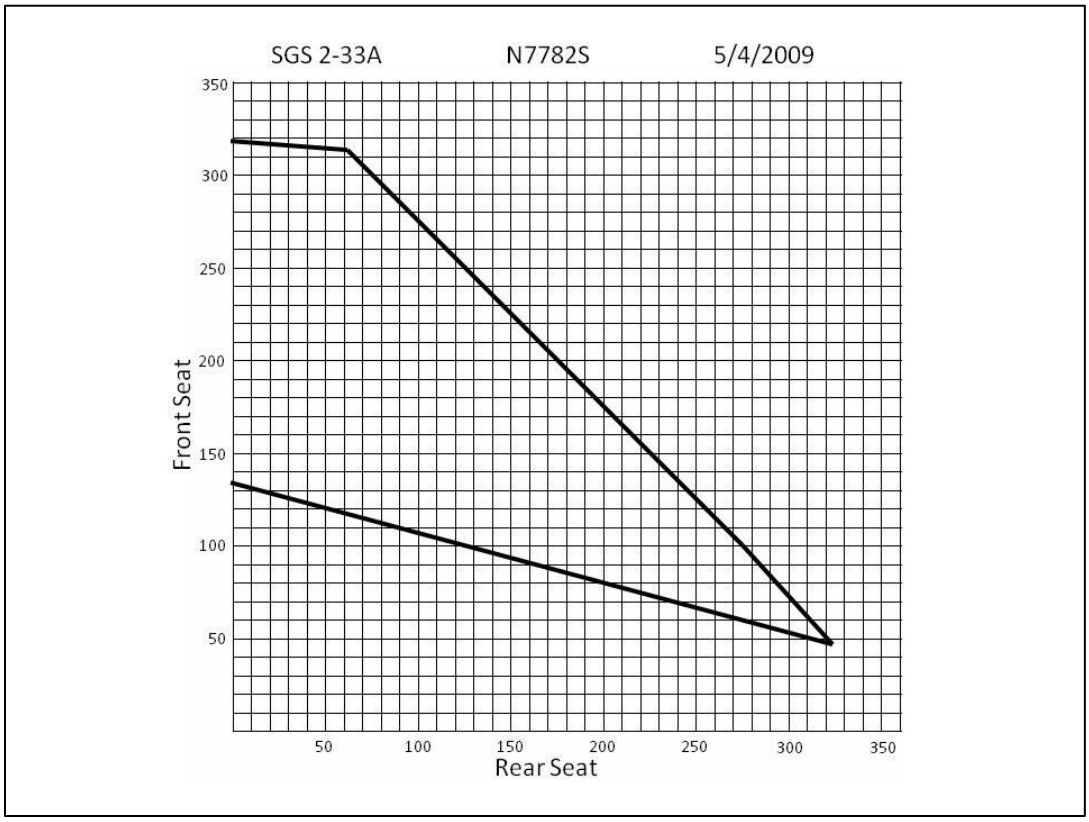


Figure 4 SGS 2-33A Loading

Performance Airspeeds and Limitations

Stall Speeds (Vso)			
Solo	31 mph	Dual	33 mph
Minimum Sink		**Recommended Airspeeds**	
Solo	2.6 fps @ 38 mph	Maneuvering Speed (V_A)	65 mph
Dual	3.1 fps @ 46 mph	Maximum Aero Tow (V_T)	98 mph
Best L/D		Maximum Ground Tow (V_W)	69 mph
Solo	23 @ 45 mph	Maximum Dive Brakes (V_{DF})	98 mph
Dual	23 @ 50 mph	Redline (V_{NE})	98 mph

Figure 5 SGS 2-33A Performance Airspeeds and Limitations

The graphing below facilitates plotting wind speed relative to runway orientation to determine the crosswind component. This particular graph is oriented for the Mid Atlantic Soaring Center's runway 15/33. Generically, you could use the same graph to plot wind based on degrees off heading to determine the component. Each ring of the graph represents one knot. M-ASA does not specify crosswind or tailwind limits. Pilots are expected to use proper judgment. Understanding the wind components using a chart like this will aid your decision making. The yellow highlighted ring is at 15 knots. It is only provided as a reminder that extra caution should be used as wind speed increases.

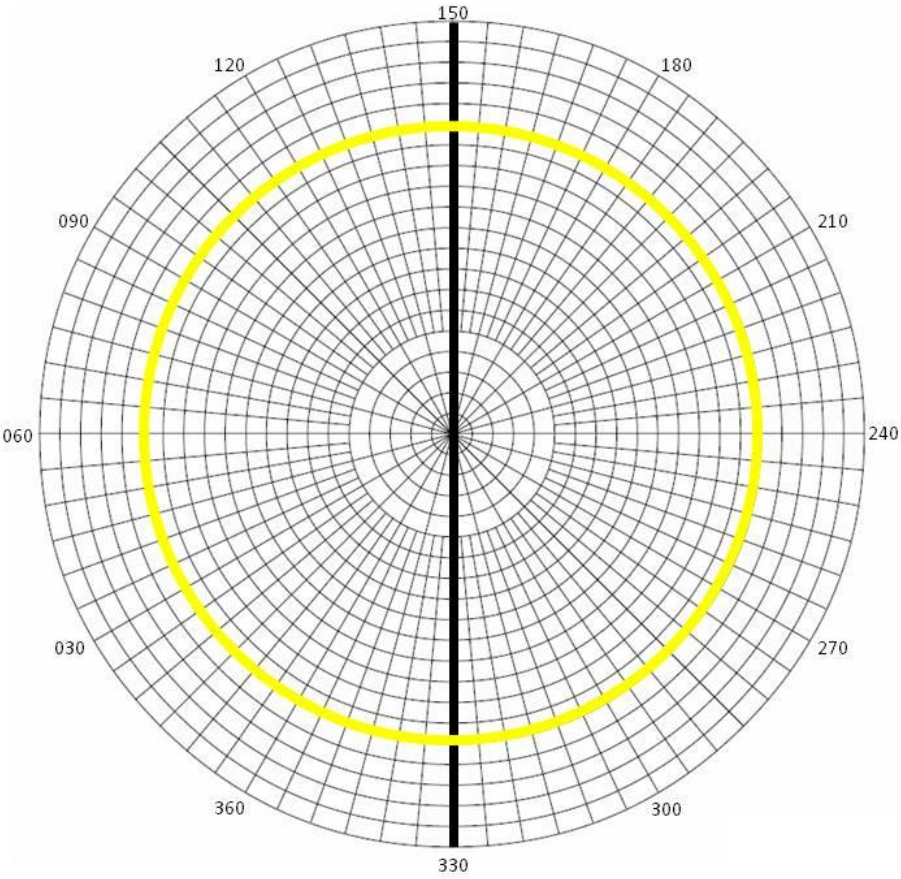


Figure 6 Wind Component

Glide Performance

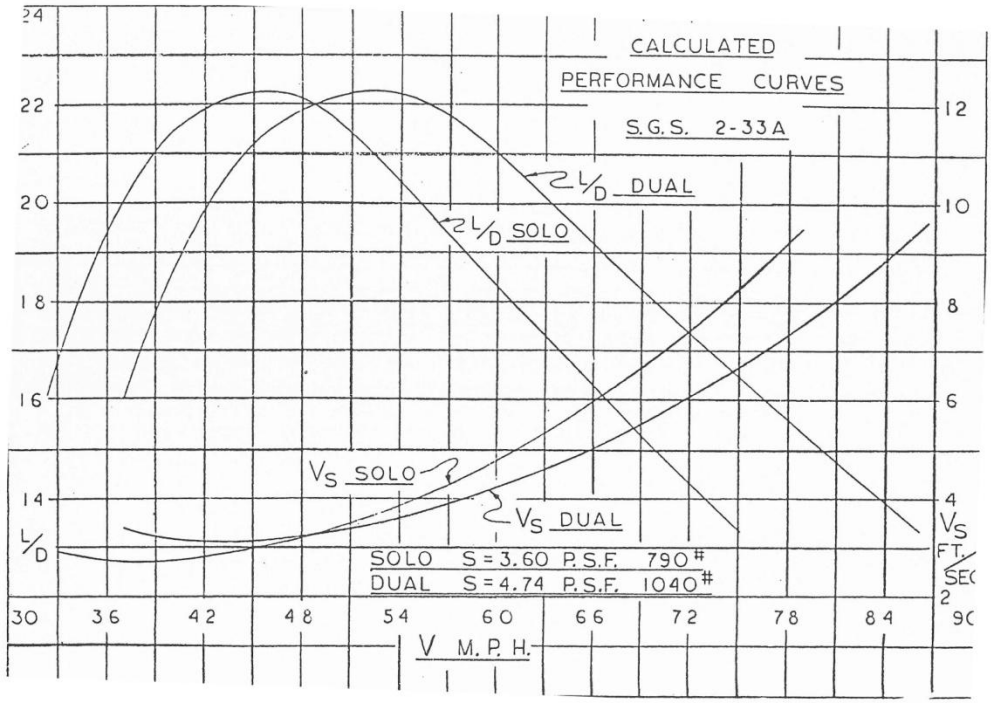


Figure 7 SGS 2-33A Polar

Emergency Procedures

Exit from a Spin

Exit from a spin can be accomplished by the following method:

1. Full opposite rudder
2. Neutralize the stick
3. Ailerons should be centered
4. When rotation stops centralize the rudder and pull out of the dive gently.

Operating in strong winds

Ground

1. Be careful during ground handling operations.
2. Keep the tail high going to and from tie down area.
3. Have enough people to handle the aircraft in the event of a gust

Air

1. Keep well up-wind of your landing area.
2. When going against wind, it is good practice to add wind velocity to air speed at best L/D.

Speed @ best L/D (solo)	45 mph
Wind velocity	+15 mph
Desired speed	60 mph

Land into the wind whenever possible. In crosswind landing, crab into the wind to maintain desired path over the ground and at the last moment, straighten ship to line of flight and touchdown. Be careful while the ship is rolling.

Downwind landing in high winds – The aircraft flight manual discusses a section specifically about downwind landing. Their recommendation is to land with the brake full on and maintain control as long as possible. The result is essentially a controlled crash where you use the 2-33's wheel brake and nose skid to stop abruptly. Although effective in the rugged 2-33, this technique is less desirable in other gliders. First and foremost consideration should be given to landing the opposite direction and turning the tailwind into a headwind. If the tailwind landing is unavoidable keep the wings level and use the brake and skid to stop the glider.

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Transporting, assembly and disassembly

Trailer

The SGS 2-33A trailer is stored in one of the club's trailer hangars. It is a single axle open trailer without brakes. The coupling requires a standard 2" ball. The electrical connection for the lights is a flat 4 connector. All rigging equipment is stored in the trailer. The wings and fuselage are secured at the front of the trailer. The horizontal stabilizer mounts in the aft section above the fuselage.

Assembly & Disassembly

Refer to the SGS 2-33A Flight – Erection – Maintenance Manual for detailed assembly and disassembly instructions.

Summary

Hopefully you found the format and content of this booklet helpful, whether you are doing an initial checkout, recurrent training or just inquisitive. Take advantage of the club's instructor team. Their knowledge along with written materials like this booklet will help you get the most enjoyment out of the ship.

Fly safe, and have fun