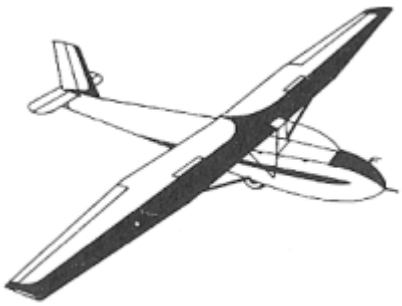
DISCLAIMER: This scanned version of the Schweizer 2-33A Sailplane manual is provided *without* warranty of completeness or accuracy. It is solely as a service to builders of scale model aircraft who are in search of reference material. Under no circumstances should this reproduction be used as a guide for the operation of a full-scale, human-occupied aircraft. Contact Sikorsky Aircraft Corporation for copies of an official manual.



SCHWEIZER AIRCRAFT CORP.

ELMIRA, N.Y.

GENERAL DESCRIPTION

The SGS 2-33 is a conventional two-place tandem, intermediate-training sailplane, manufactured by Schewizer Aircraft Corp., Elmira, New York. Its construction is all metal with fabric cover on the fuselage and tail surfaces. It has a one piece canopy for increased visibility. The wings are tapered in the outboard section, and have dive-brakes incorporated.

Overall dimensions are:
Length - 25' 9"
Span - 51' 0"
Height - 9' 3-1/2"
Wing View - 219.48 sq.ft.
Aspect Ratio - 11.85-1

FLIGHT CONTROLS-

2. Dive Brake & Wheel Brake (Ref. Item 2 on Page 1-2)

Beginning

(page 1-2a)

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5. Trim Lever (Reference Item 5 on Page 1-2)

On sailplane serial no. 500 and up, a ratchet-lock trim installation (P/N 33140G) is provided, superseding the bungee-type trim found on lower serial-number ships.

The trim control lever for the ratchet-lock trim system is located just forward and to the left of the front cockpit control stick. The system is integral with the forward control stick and torque tube assemblies.

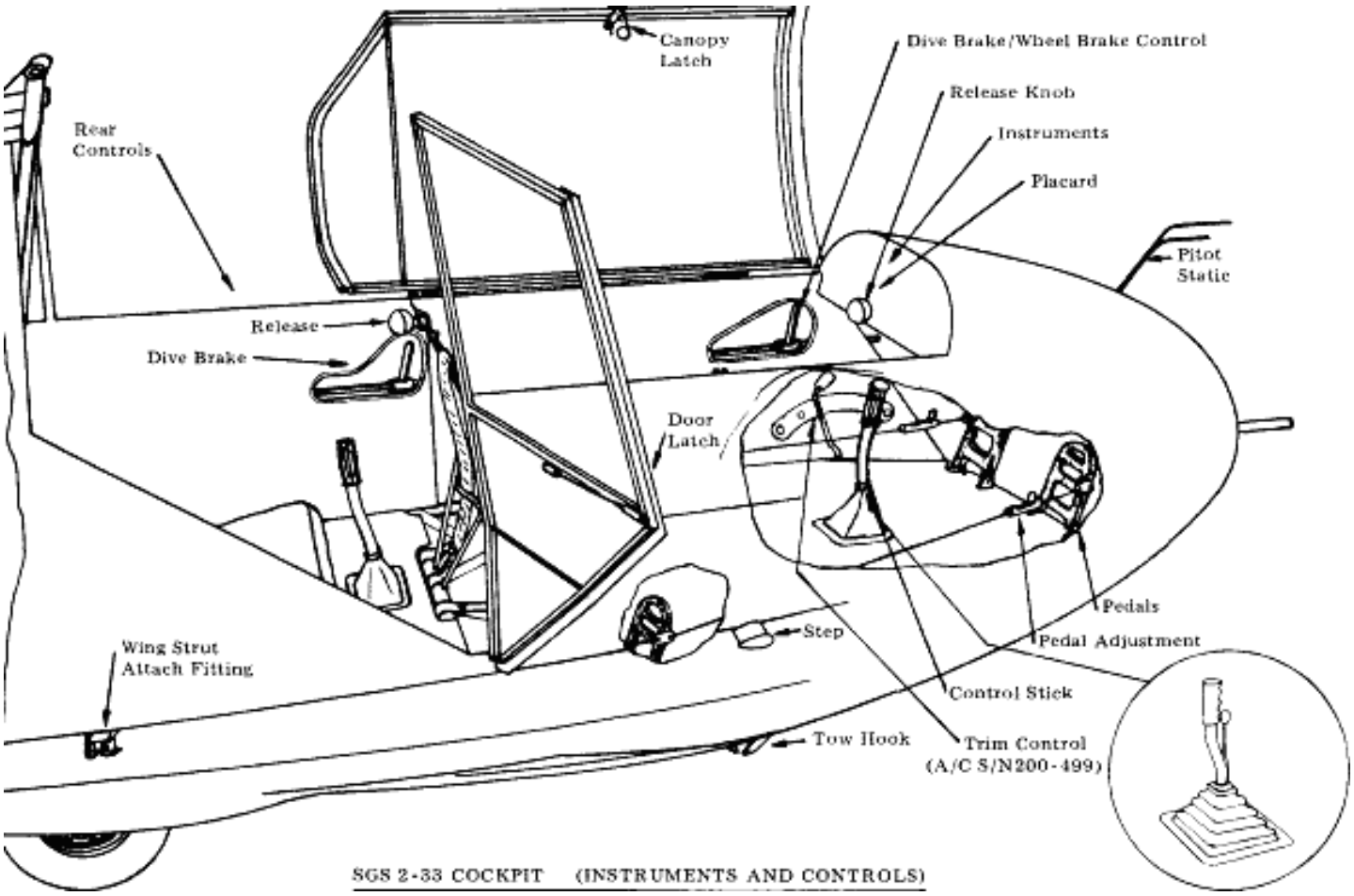
The trim is operated with the fingers of control stick hand by aft pressure on the locking lever. The control stick is then moved to the position which gives the desired airspeed, at which point the locking lever is released to engage the trim lock.

Prior to take-off, the trim should be set (locked) at the elevator-neutral position which is checked by stick line-up with the trim placard neutral-arrow, located on the floorboard to the left of the control stick.

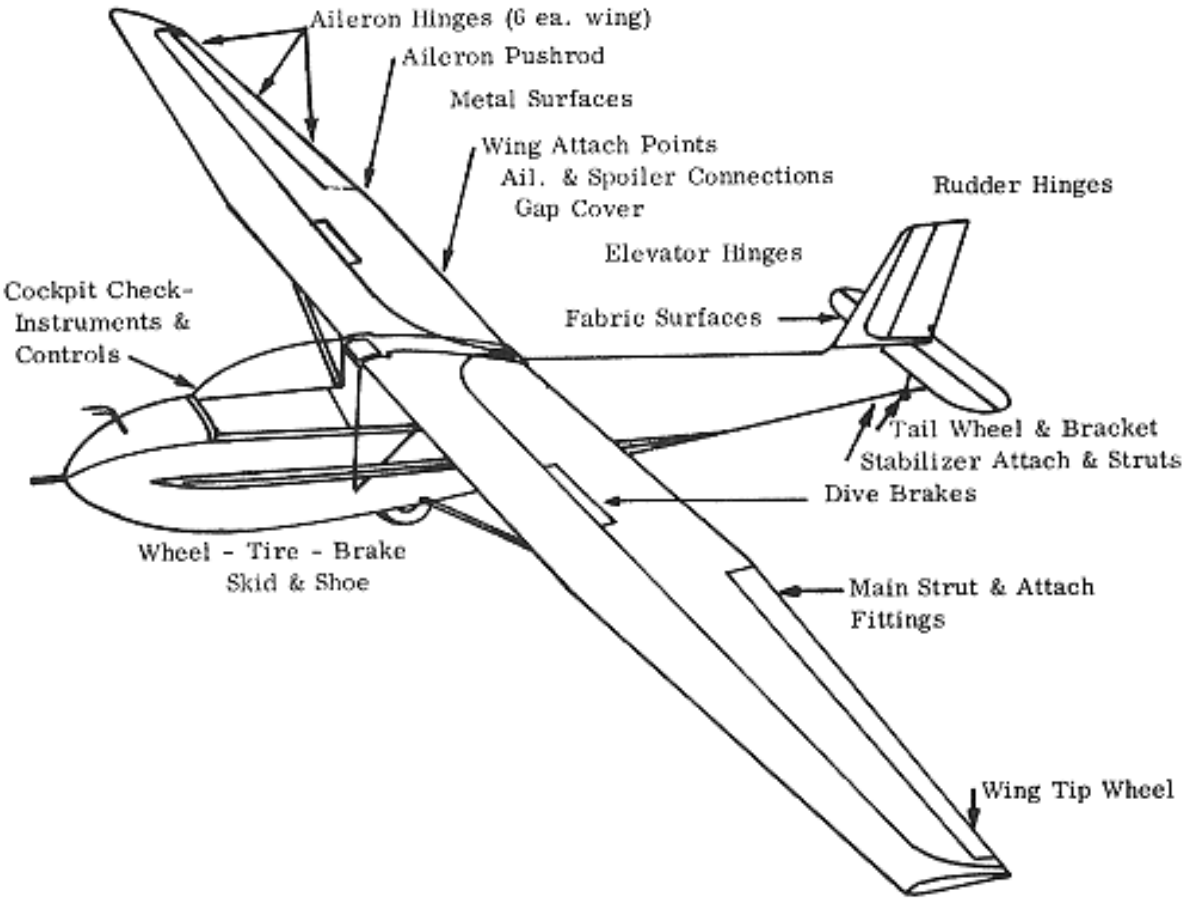
After take-off, the desired trim settings may then be obtained as noted above.

Maintenance of the ratchet lock trim system is limited to maintaining security of attachments and periodic lubrication, with special attention to the spring-cartridge, per codes "A" and "B", Page 2-5 of the Erection and Maintenance Instructions section of this manual. There are no field adjustments to be made to the trim system or the spring cartridge.

(page 1-2b)



SGS 2-33 COCKPIT (INSTRUMENTS AND CONTROLS)



CHECK ALL POINTS AS LISTED

1. Wing:
   a. Strut fittings
   b. Dive brake hinges and connections
   c. Aileron hinges and push rod attachments

2. Tail Assembly:
   a. Hinge points, rudder and elevator
   b. Push rod attachment to elevator horn
   c. Stabilizer struts and stabilizer attachment to fuselage.
   d. Rudder cable connection to rudder horn
   e. Tail wheel assembly

3. Fuselage:
   a. Release control
   b. Flight controls for free movement including release
   c. Instruments
   d. Canopy attach points and latch
   e. Safety belts and shoulder harnesses
   f. Rear door and window attach points and latches
   g. Fabric for damage
   h. Wheel, tire and brake
   i. Static and pitot tubes for water or other foreign objects.

4. Tow Rope:
   a. Condition and attachment of rings.

WINCH OR AUTO TOWS

Precautions:

1. Be sure equipment is suitable for purpose
2. Person driving car or operating winch should be experienced with equipment and know towing characteristics of the SGS 2-33.
3. Never hook rope or wire to empty sailplane.

Winch or auto tows may be executed in the usual manner using either the forward, or the CG release, although the latter should result in a higher altitude. There is no tendency to oscillate with either release. Maximum speed for auto, or winch tow. is 69 MPH.

CAUTION:

1. Do not climb at full back stick position until a safe height for stall recovery is reached (75 - 100 ft.).
2. Level out before releasing.

Aero Towing:

1. Trim (bungee lever) forward position recommended for solo take-off.
2. You will notice that aileron control is somewhat heavy at fast towing speeds, but they reduce to a normal level at slower speeds.

FREE FLIGHT

Flying Speeds: Best gliding speed (L/D) 23-1 at 50 mph . . . 2 place
" " " (L/D) 23-1 at 45 mph . . . 1 place
Min. sinking speed 42 mph 3.1 FPS . . . . . 2 place
" " " 38 mph 2.6 FPS . . . . . 1 place

Flight Limits-speeds: Dive - 98 mph
Aero Tow - 98 mph
Dive brakes extended - 98 mph
Auto or winch tow - 69 mph

Aerobatics: Mild aerobatics to 80 mph can be done. Inverted flight prohibited.

Stalls: Are very gentle and always straight ahead with no tendency to go off to either direction. Buffeting occurs before the stall 31 mph solo, 34 mph dual.

WINCH OR AUTO TOWS

Spins — The 2-33 will spin, depending on the weight of pilots and equipment, etc., Care should be taken to avoid stalls and spins at low altitude by using adequate air-speed.

Useful Loads — The placard weight/s on the instrument panel must be strictly adhered to. This will insure that center of gravity will be maintained in flight. The weights stamped are maximums and minimums which are easily compared with that of the pilot and passenger.

NOTE: Seat ballast must be added if minimum weight of pilot! s is less than placard minimum.

Spiralling 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.

Example:

	SGS 2-33 Solo	SGS 2-33 Dual
Stalling speed-level flight	31 mph	33 mph
" " -30° bank	33.5 mph	35.5 mph
Buffeting	34-37 mph	35-38 mph
Spiralling speed	38 mph	42 mph

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.

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.

LANDING

Pattern

It is general practice to fly a traffic pattern. Downwind and base legs and final approach. Extra speed is also used depending on wind velocity and gust conditions. It is good practice to add 1 mph to airspeed for each mph of wind.

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. 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.

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.

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 flare-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 sailplane.

Touch down with dive brakes closed

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

Taxiing after touch down

Even though sailplane is on the ground, it should literally be flown to a stop with use of all controls. Wheel brake may be used if a quick stop is desired or necessary.

Getting out of the 2-33

On the ground it is tail down when empty, and nose down with pilot in the seat. When pilot gets out he should keep his weight on the side of the cockpit until he is in a position to lower the tail gently to the ground.

GENERAL FLIGHT PROCEDURE IN STRONG WINDS

1. Be careful during ground handling operations.
   Keep tail high to and from tie down area.

2. Keep well up-wind of your landing area.

3. When going against wind, it is good practice to add wind velocity to air speed at best L/D.

EXAMPLE

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

This speed will give a better glide angle than a slower approach.

4. 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 touch down. Be careful while the ship is rolling.

Downwind landing in high winds - Land with brake full on and maintain control as long as possible.

TIE DOWNS

The 2-33 should never be left unattended in strong winds or gusty conditions. Tie down points are at each wing where main struts are attached and at tail wheel bracket. Be sure ropes and stakes used for tying down are adequate and in good condition.

Flight Limitations for 2-33 and 2-33A

In any aircraft, it is important to know the opera ling limits and that exceeding these limits can highly endanger the aircraft and its occupants. The following information is provided for the 2-33 and 2-33A at 1,040 lbs. gross weight.

The speeds with which you should be familiar are:

Placard Speed (never exceed) with or without Dive Brakes open	98 mph
Placard Speed (never exceed) for aero tow)	98 mph
Speed to begin maneuvering with caution	65 mph
Placard Speed (Never exceed) for auto or winch tow	69 mph

In the 2-33, at speeds over 65 mph, the pilot must maneuver with caution. The maximum load factor which should be attained in flight is 4.67 G, and the pilot can easily exceed this in abrupt maneuvers at speeds over 65 mph. The speeds between 65 mph and the 98 mph placard should be treated as a cautionary range and maneuvering within this range should be gradually reduced to a minimum as velocity increases.

The 2-33 limit load factor of 4.67 should not be exceeded in operation. A safety factor of 1.5 is required by the FAA which gives an ultimate load factor of 7.0, but this safety factor is required to allow for material variations and inadvertent atmospheric conditions. Because of its light wing loading, a sailplane can develop very high loads if speed limitations are not rigidly adhered to. Normal category light airplanes are usually certified to a limit load factor of 3.8 G's.

Understanding the Flight Envelope

The FAA required design flight envelope is presented on the following page. On the horizontal axis are indicated velocities in miles per hour, and on the vertical axis are load factors expressed in "G" units.

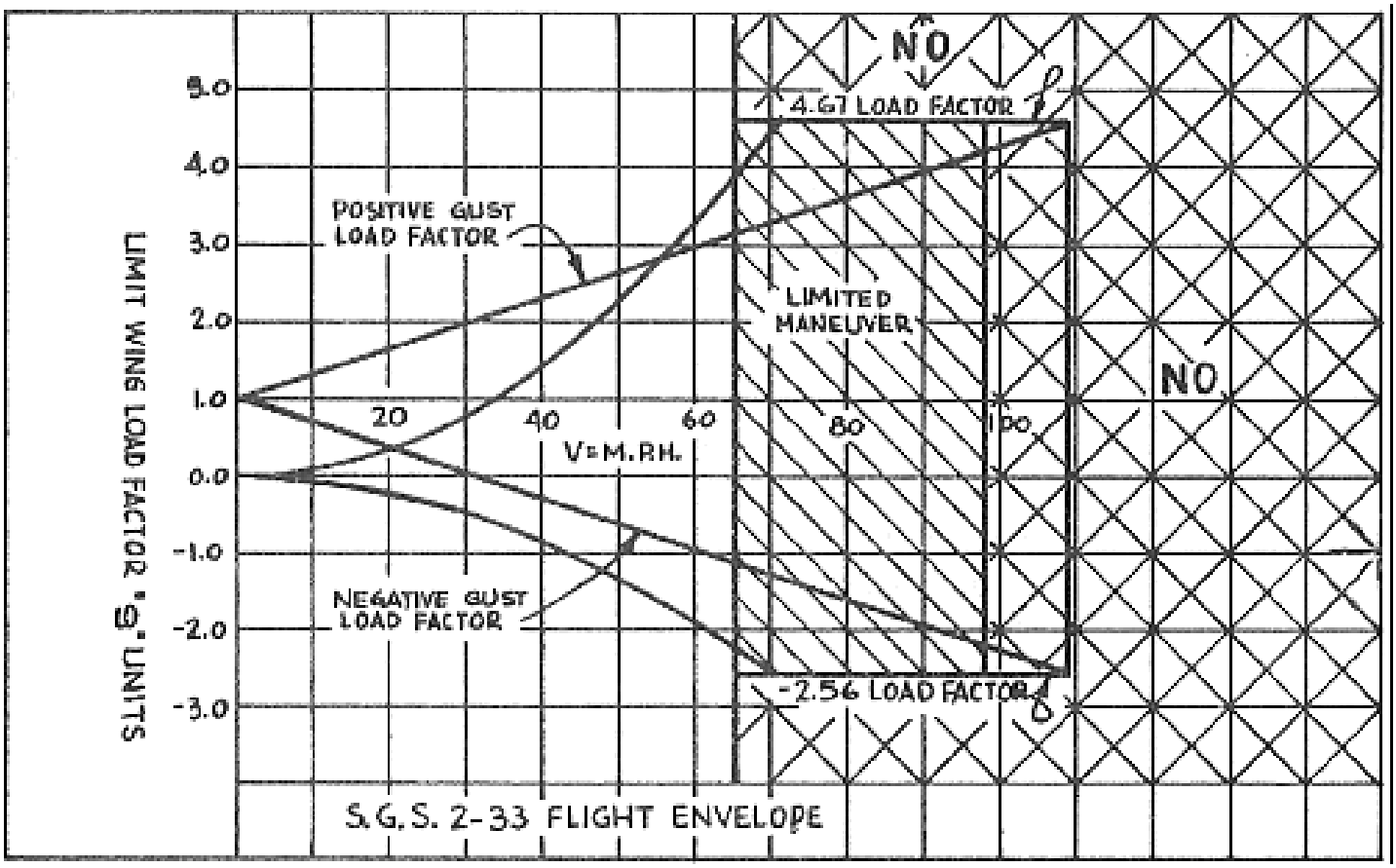
3. When going against wind, it is good practice to add wind velocity to air speed at best L/D. 4. Land into the wind whenever possible. In crosswind landing, crab into the wind to maintain desired path over the ground and at the last moment, straighten ship to line of flight and touch down. Be careful while the ship is rolling. The straight lines labeled "gust load factors" represent the effect of the FAA required 24 ft. per second gust on the sailplane as speed varies. They diverge from the one "G" situation where the glider would be at rest or in perfectly balanced level flight. The curved lines diverging from zero "G" represent forces which can be induced by moving the elevator (or other) control abruptly at various speeds. As you can see, the faster you fly the more effect moving your controls will have. Gusts will also have more effect as speed increases. The speed for maneuvering with caution occurs where "G" loading from an abruptly moved control meets the 4.67 limit load factor. Assuming smooth and limited movement of the controls, the placard or "red-line" speed occurs where gusts could meet the 4.67 limit load factor without any maneuvering.

Normal placard speeds are reduced 10% from design speeds to provide an extra margin of safety. Thus, on the graph, the diagonal hatched area indicates speeds at which you must use caution in maneuvers. You should neither maneuver nor fly so fast as to expose your ship to loads within the cross-hatched area marked, "NO".

It can be inferred from the graph that abrupt maneuvering in gusty conditions is dangerous and can lead to very high "G" loads.

In normal operation the major cases of high "G" loads are tight spirals in thermals which would not normally exceed 2 or 2.5 G's. Winch or auto towing can produce high loads, but if the auto-winch placard speed is observed, this will be within safe limits. The best ground launch climb is obtained at speeds well below placard limits.

Although the 2-33 is capable of performing some aerobatic maneuvers, they must be done with extreme caution since it is very easy to greatly exceed the placard or cautionary speeds in improperly executed maneuvers. Inverted flight is not permitted. Aerobatics should not be done without previous instruction in two-place aircraft.



2-33A GROSS WEIGHT
and
BALANCE CALCULATIONS

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.

WEIGHT AND BALANCE CALCULATIONS

SGS 2-33 or 2-33A

Example Sailplane Serial Number 389
(See Form I 4427 on next page)

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

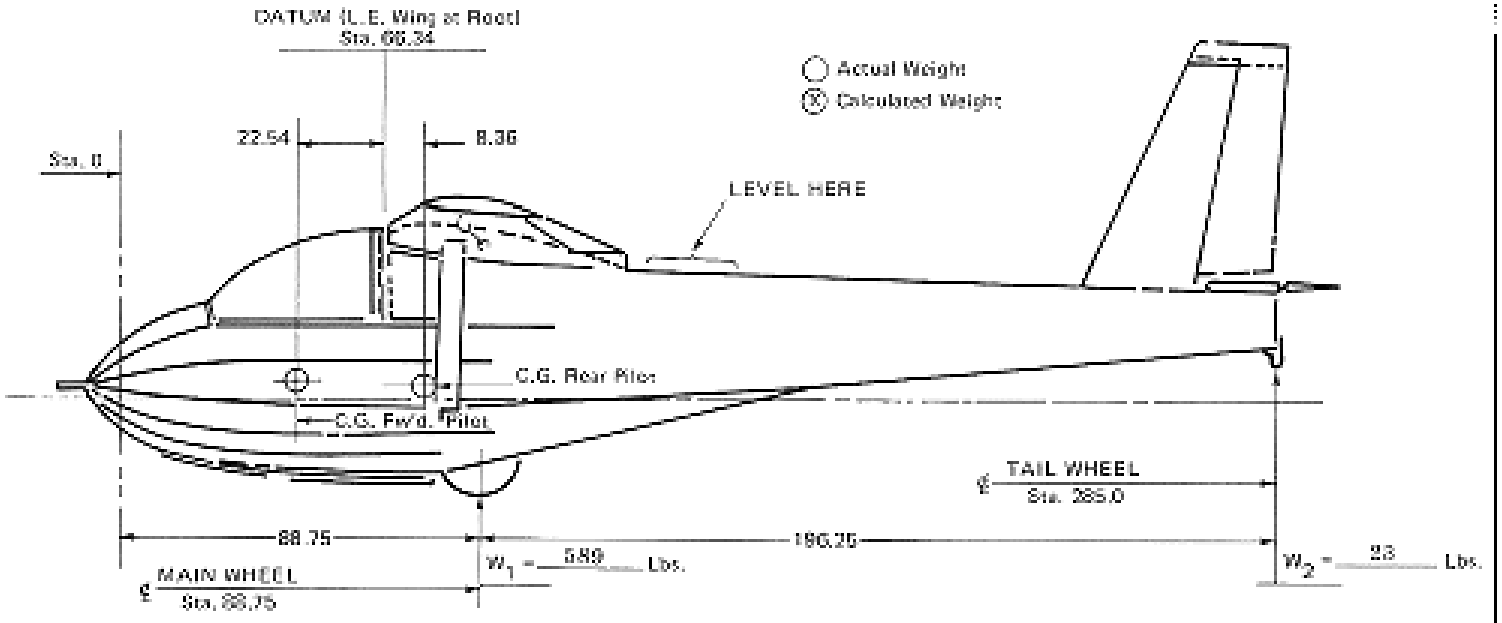
ITEM	WEIGHT	ARM	MOMENT	WEIGHT	ARM	MOMENT
Sailplane empty weight & empty C.G.	612	96.12	58,825			
Front Pilot Weight	170	43.80	7,446		43.80	
Rear Pilot Weight	150	74.70	11,205		74.70	
Ballast, if used	0	14.75	- 0 -		14.75	
Total Moment			77,476			
Total Weight	932					
Total Moment / Total Weight	77,476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

SCHWEIZER AIRCRAFT CORPORATION
ELMIRA, NEW YORK 14902

WEIGHT & BALANCE, MODEL NO. SGS 2-33A SER. NO. 369 REG. NO. N-33969 DATE February 27, 1975



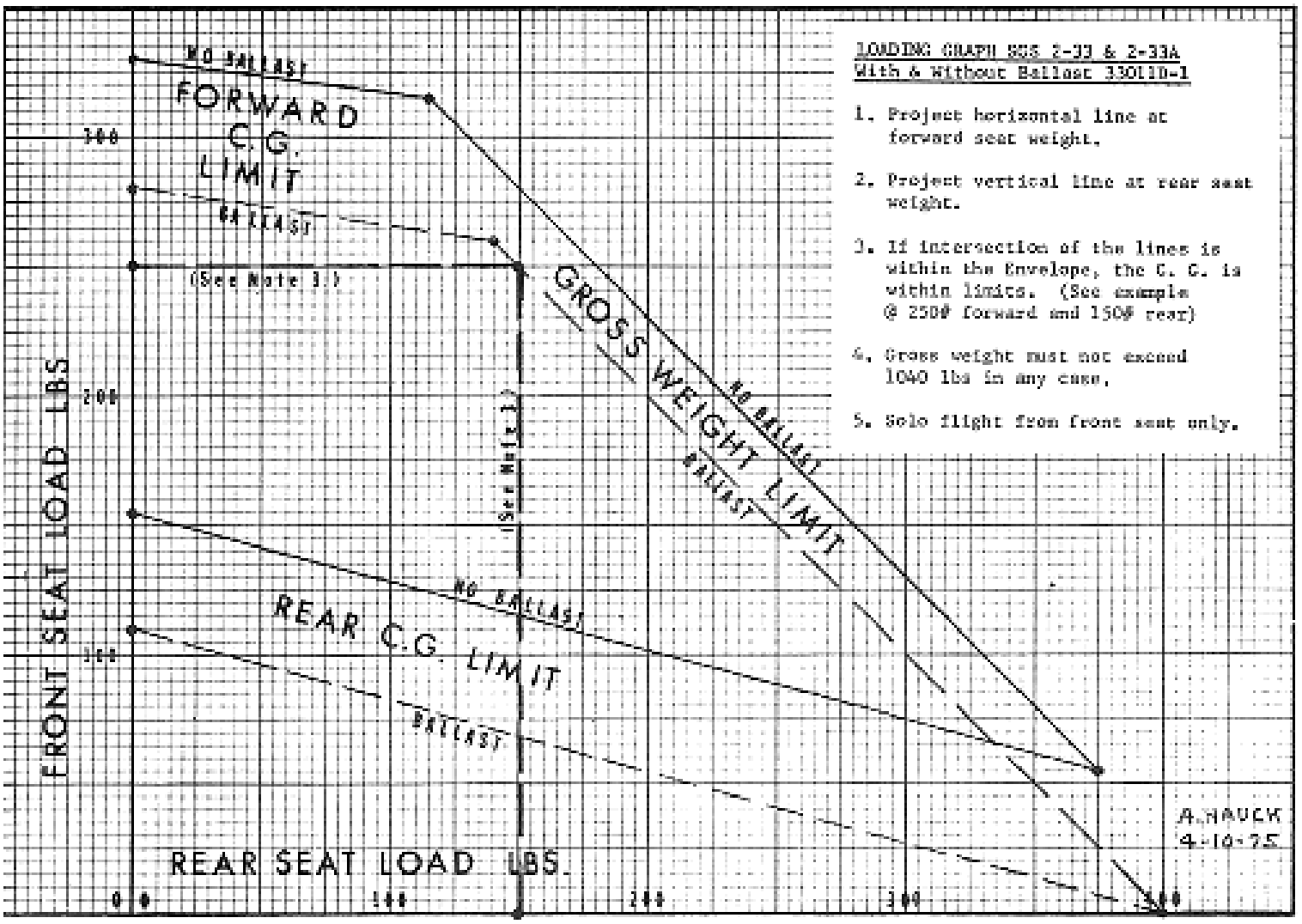
Empty Wt. = $W_1 + W_2$ = 589 + 23 = 612 Lbs.

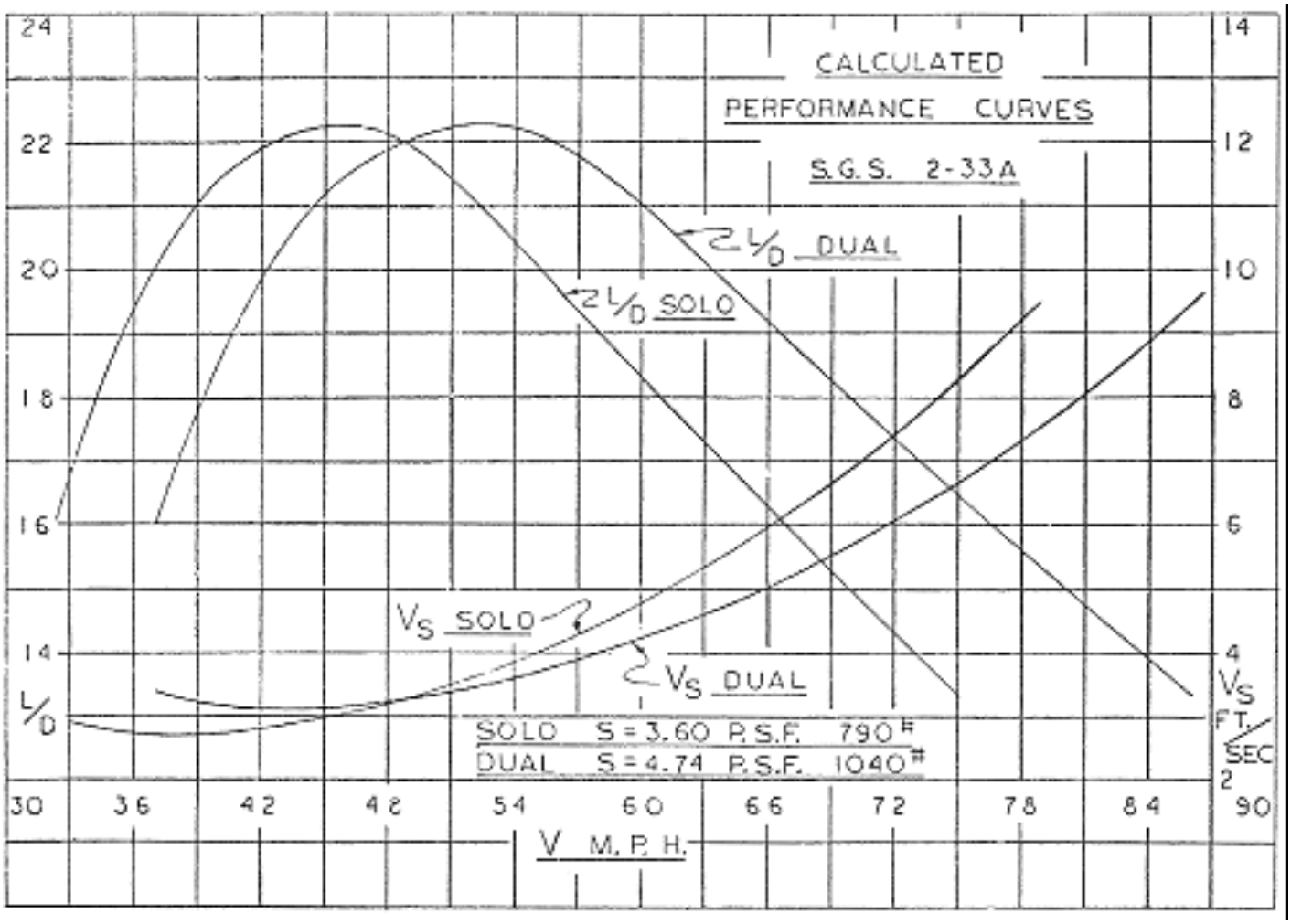
Empty C.G. (Sta.) = $\frac{W_2 \times 196.25 + 88.75}{W_1 + W_2}$ = $\frac{23 \times 196.25 + 88.75}{612}$ = Sta. 96.12

SHIP AS WEIGHED INCLUDES EQUIPMENT LISTED ON 1-4427-3

NOTES: See Glider Data Sheet No. G2EA - Fw'd Pilot C.G. at Sta. 43.20 - Rear Pilot C.G. at Sta. 74.70

CLASS II, UTILITY: C.G. Limits - Sta. 78.20 to Sta. 86.10, or, 11.56" to 19.46" Aft Datum.


LOADING GRAPH SCS 2-33 & 2-33A
With & Without Ballast 33011D-1
1. Project horizontal line at forward seat weight.
2. Project vertical line at rear seat weight.
3. If intersection of the lines is within the Envelope, the C. G. is within limits. (See example @ 250# forward and 150# rear)
4. Gross weight must not exceed 1040 lbs in any case.
5. Solo flight from front seat only.
NO BALLAST
FORWARD C.G. LIMIT
BALLAST
(See Note 3.)
GROSS WEIGHT LIMIT
NO BALLAST
BALLAST
(See Note 4.)
NO BALLAST
REAR C.G. LIMIT
BALLAST
FRONT SEAT LOAD LBS.
REAR SEAT LOAD LBS.
A. HAUCK
4-10-75


CALCULATED
PERFORMANCE CURVES
S.G.S. 2-33A
L/D DUAL
L/D SOLO
VS SOLO
VS DUAL
SOLO S = 3.60 P.S.F. 790#
DUAL S = 4.74 P.S.F. 1040#
L/D
VS FT./SEC
V M.P.H.
24
22
20
18
16
14
14
12
10
8
6
4
2
30
36
42
48
54
60
66
72
78
84
90

ERECTION AND MAINTENANCE INSTRUCTIONS

MODEL SGS 2-33

SCHWEIZER AIRCRAFT CORP. Form F-114
ELMIRA, NEW YORK 14902 3-78

SGS 2-33 - ERECTION PROCEDURE

A. TO REMOVE A/C FROM TRAILER

1. Remove trailer from towing vehicle and block wheels.

2. Raise rear of trailer and block in position with sawhorse, jack or other suitable means.

3. Remove wing-to-trailer tie-down from wing tip skid brace from L. H. wing. (Note: R. H. wing is mounted on the L. H. side of trailer and L. H. wing on R. H. side of trailer.)

4. Remove upper wing-to-trailer attach pin, support the wing to prevent twisting.

5. Remove lower wing to trailer attach pin and remove wing from trailer and place on ground.

6. Remove blocking means from rear of trailer.

7. Raise and block the front end so that aft end of the trailer rests on the ground.

8. Remove the rear tail wheel bracket-to-trailer jack attachment, bolt and support fuselage.

9. Remove front fuselage tie downs and carefully roll the ship aft out of wheel well and off trailer into assembly position.

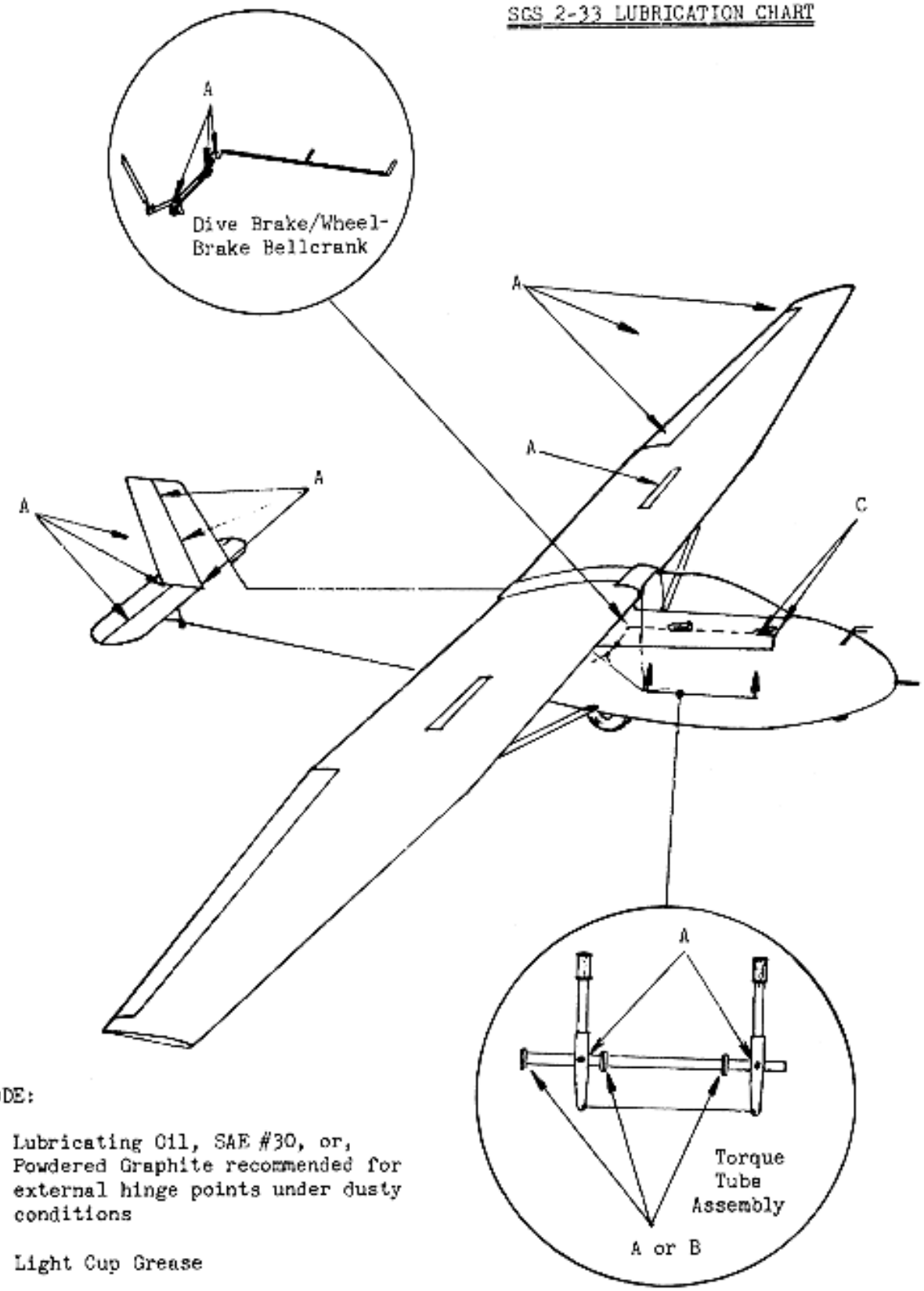
B. ASSEMBLY OF THE AIRCRAFT

1. With the fuselage in an upright position, attach wing struts to fuselage with (2) AN7 (7/16") bolts and #2 Commercial safety pins.

   NOTE: The wing and strut attach bolts must have a grip-length of 1-13/16" min., to avoid threads in bearing.

2. Lift and place L. H. wing in position and attach to fuselage with an AN7 (7/16") bolt in front fitting and an AN6 (3/8") bolt in rear fitting. Install #2 Commercial safety pins in bolts.

SGS 2-33 LUBRICATION CHART



CODE:

A. Lubricating Oil, SAE #30, or, Powdered Graphite recommended for external hinge points under dusty conditions

B. Light Cup Grease

C. Dry, Stick-type Lubricant

FIGURE 1.

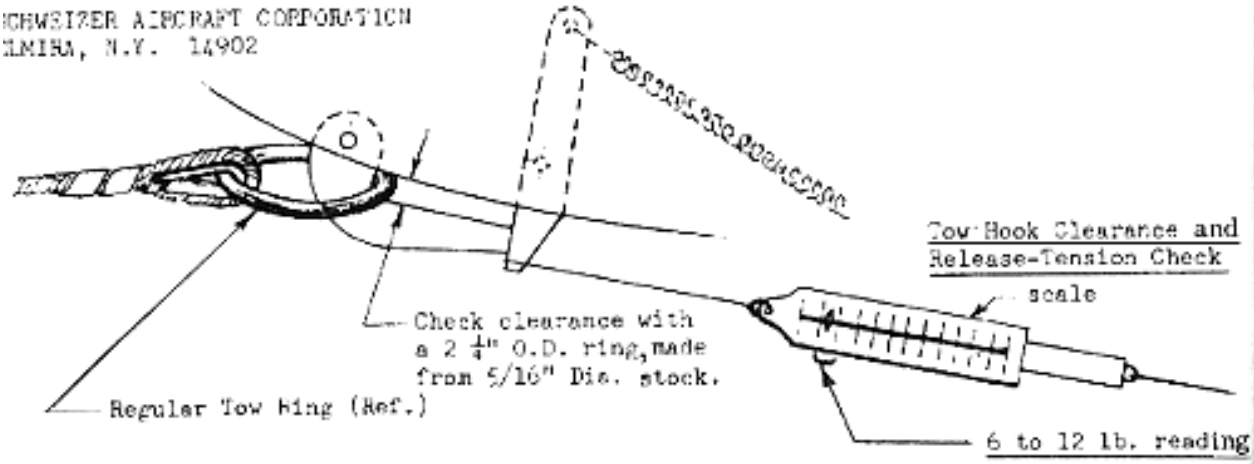
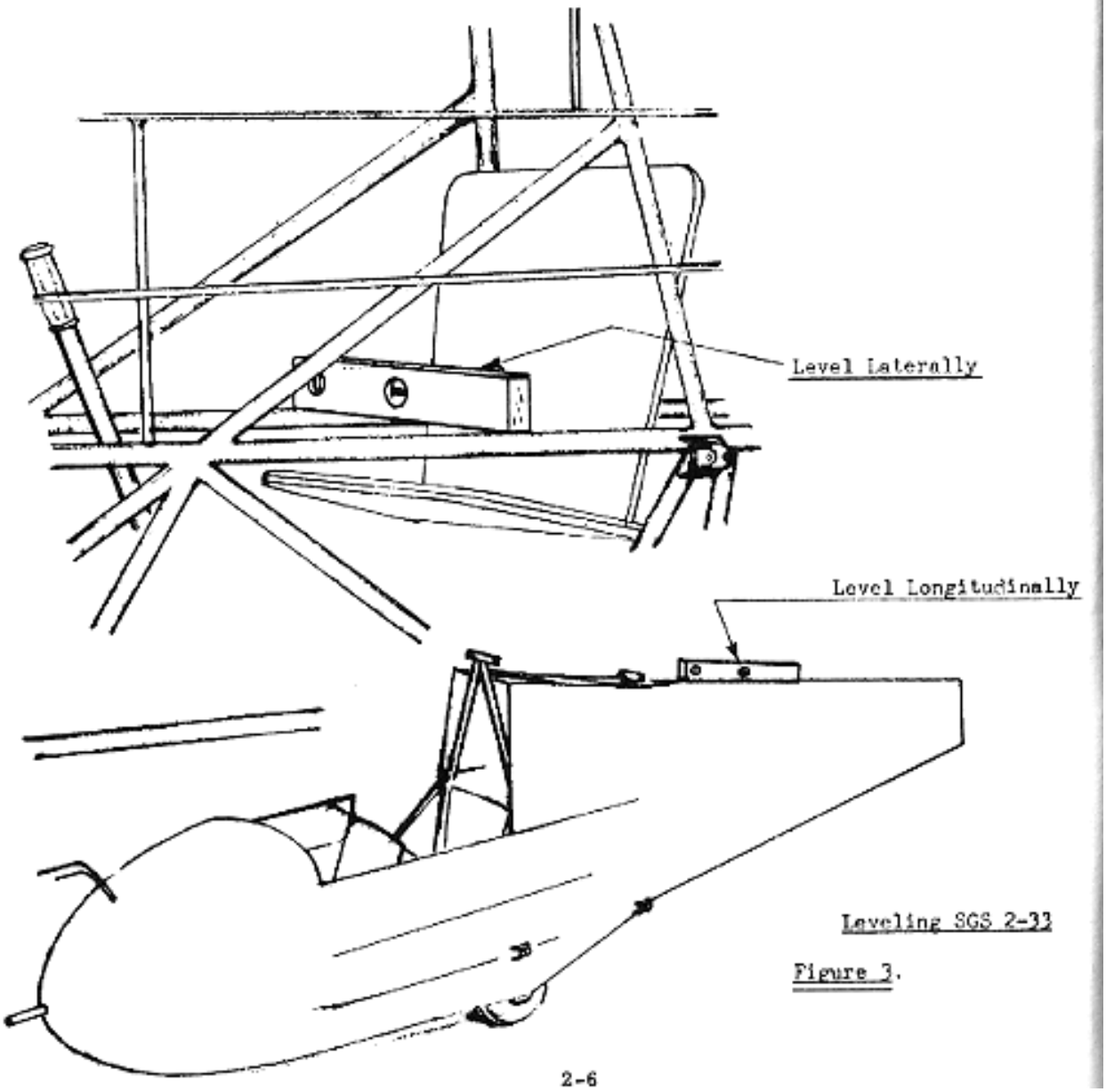


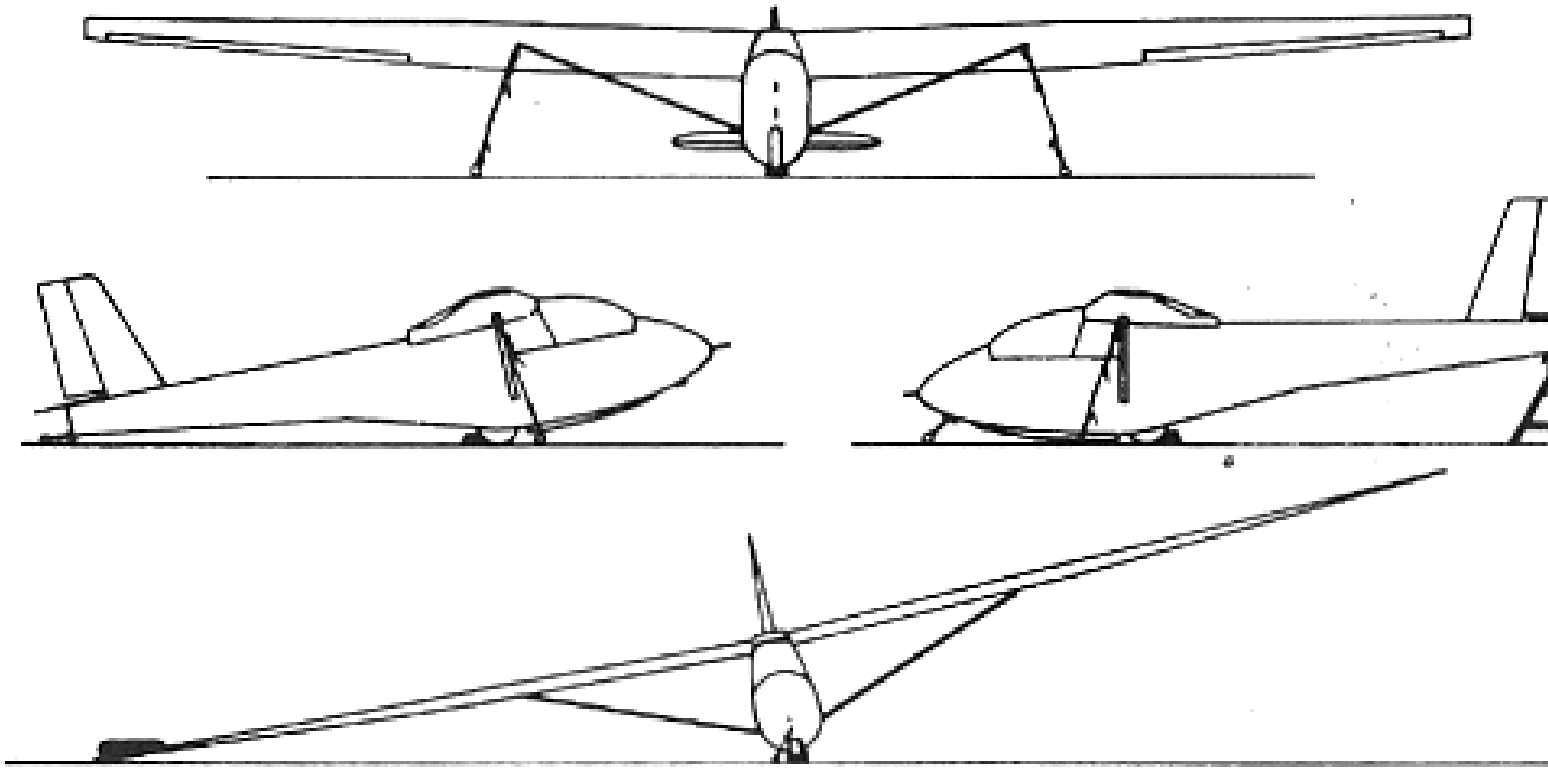
FIGURE 2.



Leveling SGS 2-33

Figure 3.

SAILPLANE TIE DOWNS



(back cover)