Transport Canada Approved Flight Manual Supplement
For

WIPLINE MODEL 3450 AMPHIBIOUS FLOATS

This supplemental manual is applicable to Wipline Model 3450 amphibious float equipped FBA-2C2 airplanes or Wipline Model 3450 amphibious float equipped FBA-2C1 airplanes with Mod 1043 installed. Mod 1043 replaces the plain flap system on the model FBA-2C1 airplane with a slotted Fowler-type flap system (commonly referred to as "Fowler Flaps"). Therefore where 2C2 is used in this manual it is acceptable to read 2C1 with Mod 1043 installed.

This Supplement must be attached to the Transport Canada Approved Airplane Flight Manual when the airplane is modified by the installation of Wipline Model 3450 amphibious floats in accordance with Found Aircraft Canada drawing D213 Issue 2 or later approved revision.

The information contained herein supplements or supersedes the basic flight manual, airplane markings and/or placards only in those areas listed herein.

For Limitations, Procedures, and Performance information not contained in this Supplement, consult the airplane markings and placards and/or basic Airplane Flight Manual, (P/N: FAC2-M400).

Approved: 

Date: 15 APRIL 2004

P/N M400-S09

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SECTION 1
GENERAL

INTRODUCTION

This supplemental manual is applicable to Wipline Model 3450 amphibious float equipped FBA-2C2 airplanes or Wipline Model 3450 amphibious float equipped FBA-2C1 airplanes with Mod 1043 installed. Mod 1043 replaces the plain flap system on the model FBA-2C1 airplane with a slotted Fowler-type flap system (commonly referred to as "Fowler Flaps"). Therefore where 2C2 is used in this manual it is acceptable to read 2C1 with Mod 1043 installed.

This supplement provides information and limitations not included in the Transport Canada approved markings and placards, and/or Airplane Flight Manual (P/N: FAC2-M400).

The aircraft is to be operated under the "NORMAL CATEGORY" only.

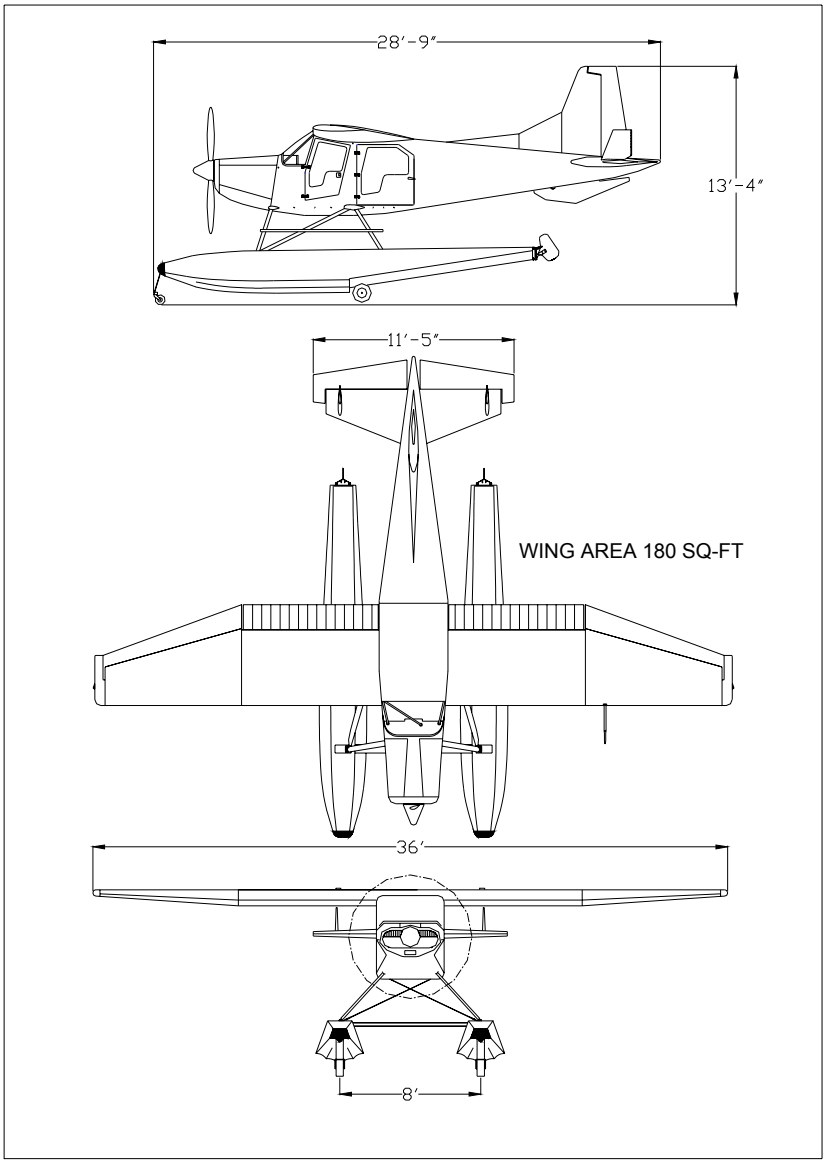


Figure 1 Three View - Normal Ground Attitude

DESCRIPTIVE DATA

MAXIMUM CERTIFICATED WEIGHTS

Maximum Operational Weight:

Takeoff:	3700 lbs
Landing:	3700 lbs

Maximum Weights in Baggage Compartment:

Main Baggage Area	250 lbs maximum

STANDARD AIRPLANE WEIGHTS

Standard Empty Weight:	2550 lbs *
Maximum Useful Load:	1150 lbs *

* the above weights may vary depending on configuration.

SPECIFIC LOADINGS

Wing Loading:	20.6 lbs/sq.ft.
Power Loading:	12.3 lbs/hp

SECTION 2
LIMITATIONS

INTRODUCTION

The FBA-2C2 Bush Hawk-XP Wipline amphibious plane must be operated in accordance with the limitations contained in this section. These include operating limitations, instrument markings, colour coding and basic placards, powerplant, systems and equipment limitations. The limitations shown in this section apply only to operations of the FBA-2C2 Bush Hawk-XP equipped with Wipline Model 3450 amphibious floats.

AIRSPEED LIMITATIONS

Airspeed limitations and their operational significance are shown below:

	SPEED	KCAS	KIAS	REMARKS
V_A	Maneuvering Speed	117	118	Do not make full or abrupt control movements above this speed.
V_{LO}	Maximum Landing Gear Operating Speed	158	159	Do not extend or retract landing gear above this speed.
V_{LE}	Maximum Landing Gear Extended Speed	158	159	Do not exceed this speed with landing gear extended.

NOTE

The operating speeds for the float installation are unchanged from the landplane operating airspeeds except for the indicated stall speeds.
The airspeed indicator markings remain unchanged from the landplane as the floatplane stall speeds are more conservative than the landplane stall speeds.

WEIGHT LIMITS

Maximum Takeoff Weight:	3700 lbs.
Maximum Landing Weight:	3700 lbs.
Maximum Weight in Baggage Compartment	250 lbs. (Arm = 94")
Maximum Weight in Float Baggage Compartments	50 lbs. each (Arm = -4")

CENTER-OF-GRAVITY LIMITS

Center-of-Gravity Range:

Forward:	17.0 inches aft of datum at 2750 lbs or less. 20.5 inches aft of datum at 3700 lbs max. GW with linear variation with weight in between.
Aft:	23.5 inches aft of datum at all weights.
Reference Datum:	Lower forward corner of the front door

OTHER LIMITATIONS

FLAP LIMITATIONS

Approved Takeoff Range:
From Land or Water..... 0^o to 20^o
Approved Landing Range: ..... 0^o to 30^o

WATER RUDDER LIMITATIONS

Water rudders must be retracted for all flight operations.

AMPHIBIAN OPERATIONS

Landing on water is PROHIBITED unless all four landing gears are fully retracted.

PLACARDS

The following information is displayed in the form of composite or individual placards.

1. Above the airspeed indicator:

MANEUVER SPEED = 118 KIAS

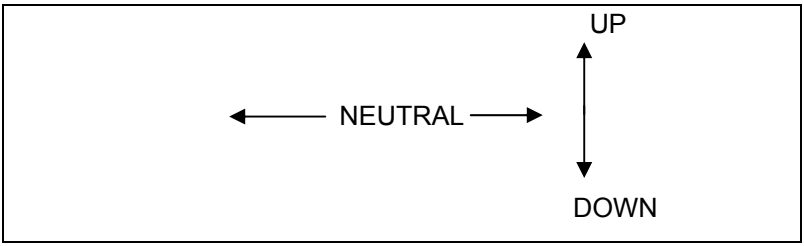
2. Located on the centre instrument panel below the throttle control

DO NOT LAND ON WATER UNLESS GEAR IS FULLY RETRACTED

3. Located forward of the emergency hand pump

EMERGENCY HANDPUMP OPERATION
1. PULL GEAR MOTOR CIRCUIT BREAKER
2. LANDING GEAR POSITION SWITCH TO DESIRED POSITION
3. EMERGENCY GEAR SELECTOR VALVE TO DESIRED GEAR POSITION
4. PUMP GEAR TO DESIRED POSITION

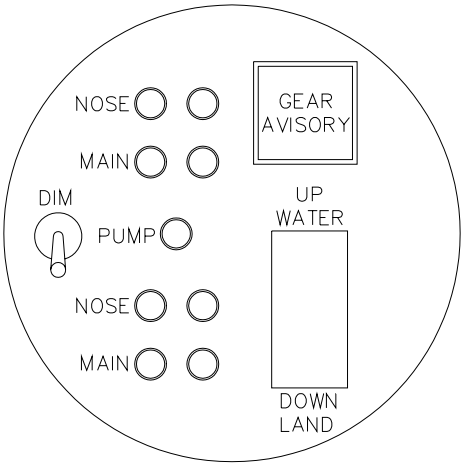
4. Located near Emergency Hand Pump selector



5. Located below Emergency Hand Pump Direction placard

CAUTION
EXCESSIVE MECHANICAL
FORCE AT ENDS OF STROKE
MAY CAUSE PUMP DAMAGE

6. Located on the gear selector switch



7. Located near the Emergency Hand Pump and Hand Pump handle

WATER RUDDER CONTROL

DOWN UP

8. Located on the centre instrument panel below the throttle control

FOR AIRCRAFT EQUIPPED WITH
WIPLINE MODEL 3450 FLOATS,
MAX GROSS = 3700 LBS.
REFER TO FMS M400-S09

SECTION 3
EMERGENCY PROCEDURES

NOTE

These items supplement the FBA-2C2 emergency procedures. Be sure to follow the FBA-2C2 procedures in Flight Manual P/N FAC2-M400 except as noted below.

INTRODUCTION

This section provides the operational checklists that are specific to FBA-2C2 with Wipline Model 3450 amphibious floats in abnormal circumstances and emergencies that may occur on the water or during flight. Only the sections that are affected by the Wipline floats are included in this supplement.

Emergency landings on water should be done with water rudders up, aircraft should be established in a normal water landing attitude with the tail slightly low. On touchdown on the water, gently pull the elevator back to the full up position allowing the floatplane to come off the step and decelerate. If damage occurs to the floats causing compartments to flood, open doors, get life vest on, and taxi aircraft to shallow water as quickly as possible.

Emergency landings on land should be done with water rudders up, aircraft in a normal landing attitude on touchdown, and the control wheel full aft after contact.

AIRSPEEDS FOR EMERGENCY OPERATION

Engine Failure after Takeoff
- Wing Flaps - Up ..... 80 KIAS
- Wing Flaps - 10° ..... 75 KIAS
- Wing Flaps - 20° ..... 70 KIAS

Maneuvering Speed .....118 KIAS
Maximum Glide (Flaps - Up) ..... 75 KIAS
Precautionary Landing With Engine Power
- Wing Flaps - Up ..... 80 KIAS
- Wing Flaps - 30° ..... 70 KIAS

Landing Without Engine Power
- Wing Flaps - Up ..... 80 KIAS
- Wing Flaps - 30° ..... 70 KIAS

EMERGENCY PROCEDURES CHECKLISTS

ENGINE FAILURES

ENGINE FAILURE DURING TAKEOFF RUN (ON WATER)

1. Throttle ..... IDLE
2. Control Wheel ..... FULL AFT.
3. Flaps ..... RETRACT
4. Mixture ..... IDLE CUT OFF.
5. Ignition Switch ..... OFF
6. Master Switch..... OFF
7. Alternator Switch ..... OFF

ENGINE FAILURE DURING TAKEOFF RUN (ON LAND)

1. Throttle ..... IDLE
2. Brakes..... APPLY
3. Wing Flaps ..... RETRACT
4. Mixture ..... IDLE CUT OFF.
5. Ignition Switch ..... OFF
6. Master Switch..... OFF
7. Alternator Switch ..... OFF

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. Land..... LAND or WATER
   (Straight ahead turning only to avoid obstacles)
2. Airspeed ..... 80 KIAS (Flaps UP)
   70 KIAS (Flaps 20°)

If time permits:

3. Mixture ..... IDLE CUT-OFF
4. Fuel Shutoff Valve ..... OFF
5. Ignition Switch ..... OFF
6. Master Switch..... OFF
7. Alternator Switch ..... OFF
8. Flaps ..... AS REQUIRED

FORCED LANDINGS

EMERGENCY LANDING ON WATER WITHOUT ENGINE POWER

1. Landing Gear ..... UP
2. Seats ..... SECURE
3. Seat belts ..... FASTENED
4. Loose Articles ..... SECURE
5. Airspeed ..... 80 KIAS (Flaps UP)
   70 KIAS (Flaps 30°)

WARNING
DO NOT LAND ON WATER UNLESS ALL (4) LANDING GEARS ARE FULLY RETRACTED.

Before touchdown:

6. Doors ..... UNLATCH PRIOR TO TOUCHDOWN
7. Mixture ..... IDLE CUT-OFF
8. Auxiliary Fuel Pump Switch ..... OFF
9. Fuel Shutoff Valve ..... OFF
10. Ignition Switch ..... OFF
11. Water Rudders ..... UP
12. Master Switch ..... OFF
13. Alternator ..... OFF
14. Touchdown ..... SLIGHTLY TAIL LOW
15. Control Wheel ..... HOLD FULL AFT

EMERGENCY LANDING ON LAND WITHOUT ENGINE POWER

1.	Landing Gear	DOWN for firm and smooth terrain UP for soft and rough terrain
2.	Seats	SECURE
3.	Seat belts	FASTENED
4.	Loose Articles	SECURE
5.	Airspeed	80 KIAS (Flaps - UP) 70 KIAS (Flaps - 30^{o})

Before touchdown:

6.	Doors	UNLATCH PRIOR TO TOUCHDOWN
7.	Mixture	IDLE CUT-OFF
8.	Auxiliary Fuel Pump Switch	OFF
9.	Fuel Shutoff Valve	OFF
10.	Ignition Switch	OFF
11.	Water Rudders	UP
12.	Master Switch	OFF
13.	Alternator Switch	OFF
14.	Touchdown Attitude	LEVEL if gear up TAIL LOW if gear extended

After touchdown:

15.	Brakes	APPLY AS REQUIRED
16.	Control Wheel	FULL AFT (after contact if gear is up)

PRECAUTIONARY LANDING WITH ENGINE POWER

1. Seats ..... SECURE
2. Seat Belts ..... FASTENED
3. Loose Articles ..... SECURE
4. Airspeed ..... 80 KIAS Minimum
5. Wing Flaps ..... UP
6. Selected Field ..... FLY OVER
   Note terrain and obstructions.
7. Radio & Electrical Switches ..... OFF
8. Wing Flaps ..... 10~20^{o} (or 30^{o} for steep approach)
9. Airspeed ..... 75 KIAS (Flaps 10^{o})
   70 KIAS (Flaps 30^{o})
10. Propeller ..... HIGH RPM
11. Doors ..... UNLATCHED PRIOR TO TOUCHDOWN

After touchdown:

12. Ignition Switch ..... OFF
13. Master Switch ..... OFF
14. Alternator ..... OFF
15. Brakes ..... APPLY AS REQUIRED.

LANDING GEAR MALFUNCTION PROCEDURES

LANDING GEAR FAILS TO RETRACT

1. Master Switch .....ON
2. Landing Gear Handle .....CHECK (handle full up)
3. Gear Motor Circuit Breaker .....IN
4. Emergency Hand Pump Selector Valve .....CHECK
   (in OFF position)
5. Gear Control Circuit Breaker .....IN
6. Gear Advisory Circuit Breaker.....IN
7. Gear Up Lights.....CHECK bulb operation
   (press-to-test)
8. Main Gear Visual Indicators .....VISUALLY CHECK
   (at float inspection openings)
9. Landing Gear Handle .....RECYCLE
10. Landing Gear Motor.....CHECK operation
    (motor indicator light, ammeter and noise)
11. Rotate the Emergency Hand Pump Selector Valve briefly into the UP position (this reduces pressure in the system allowing the pressure switches to sense low pressure allowing the pump to cycle)

If the landing gear still does not retract and a water landing is desired:

12. Gear Motor Circuit Breaker .....PULL
13. Landing Gear Handle .....UP
14. Emergency Hand Pump Selector Valve .....ROTATE
    (to UP position-clockwise 90 deg.)
15. Emergency Hand Pump.....PUMP
    (up and down until gear is in UP position - approximately 155 strokes -- there should be significant force on the pump handle with the final stroke)
16. Gear Up Lights.....CHECK
    ILLUMINATED
17. Main Gear Visual Indicators .....VISUALLY CHECK
    (at float inspection openings).
18. Nose Gear.....VISUALLY CHECK
    (gear is nested in the bow of the float)

LANDING GEAR FAILS TO EXTEND

1. Master Switch ..... ON
2. Landing Gear Handle..... CHECK (handle full down)
3. Emergency Hand Pump Selector Valve... CHECK
   (in OFF position)
4. Gear Motor Circuit Breaker..... IN
5. Gear Control Circuit Breaker..... IN
6. Gear Advisory Circuit Breaker..... IN
7. Gear Down Lights ..... CHECK bulb operation
   (press-to-test)
8. Main Gear Visual Indicators..... VISUALLY CHECK
   (at float inspection openings)
9. Landing Gear Handle..... RECYCLE
10. Landing Gear Motor ..... CHECK operation
    (motor indicator light, ammeter and noise)
11. Rotate the Emergency Hand Pump Selector Valve briefly into the DOWN position (this reduces pressure in the system allowing the pressure switches to sense low pressure allowing the pump to cycle)

If the landing gear still does not extend and a wheels down landing is desired:

12. Gear Motor Circuit Breaker..... PULL
13. Landing Gear Handle..... DOWN
14. Emergency Hand Pump Selector Valve..... ROTATE
    (to DOWN position-counter clockwise 90 deg.)
15. Emergency Hand Pump ..... PUMP
    (up and down until gear is in DOWN position - approximately 155 strokes -- there should be significant force on the pump handle with the final stroke)
16. Gear Down Lights ..... CHECK
    ILLUMINATED

GEAR UP OR PARTIALLY EXTENDED LANDING
(ON GROUND ONLY)

1. Seats ..... SECURE
2. Seat Belts ..... FASTENED
3. Loose Articles ..... SECURE
4. Runway ..... SELECT longest smooth ground or grass surface available
5. Wing Flaps ..... 30^{o}
6. Airspeed ..... 70 KIAS
7. Master Switch ..... OFF
8. Doors ..... UNLATCH PRIOR TO TOUCHDOWN
9. Touchdown ..... LEVEL ATTITUDE AT MINIMUM RATE OF DESCENT
10. Control Wheel ..... FULL AFT (after touchdown)
11. Mixture ..... IDLE CUT OFF (after touchdown)
12. Fuel ..... OFF (after touchdown)
13. Ignition Switch ..... OFF

AMPLIFIED EMERGENCY PROCEDURES

MECHANICAL FAILURE

If it is ascertained that a mechanical failure has occurred and the gear will not achieve either a gear up or a gear down position with visual confirmation, the best course of action will be dependent upon the nature of the failure and the choices of landing surfaces available. In the unlikely event that a landing gear has failed in an intermediate position, and cannot be moved to either a Gear Up or Gear Down position, the amphibian should **be landed on land only.**

WARNING

DO NOT LAND IN THE WATER WITH THE WHEELS EITHER PARTIALLY OR FULLY EXTENDED. IF THE LANDING **MUST** BE ACCOMPLISHED ON WATER AND THE GEAR IS PARTIALLY OR FULLY EXTENDED, IT IS SUGGESTED THAT A POWER-ON FULL STALL LANDING WITH FULL FLAPS (30°) WOULD BE THE BEST PROCEDURE.

DURING DECELERATION AFTER TOUCHDOWN, WITH THE GEAR EXTENDED, THE FLOAT BOWS WILL SUBMERGE AND THERE IS A HIGH PROBABILITY OF FLIPPING THE AMPHIBIAN ONTO ITS BACK CAUSING EITHER FATAL OR SERIOUS INJURY.

SECTION 4
NORMAL PROCEDURES

NOTE

These items supplement the FBA-2C2 normal procedures. Be sure to follow the FBA-2C2 procedures in Flight Manual P/N FAC2-M400 except as noted below.

AIRSPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following airspeeds are based on a maximum weight of 3700lb. and may be used at a lesser weight.

CONDITION	KIAS
TAKEOFF	
Normal Climb Out	70-80
Short Field Takeoff - Flaps 15 deg, Speed at 50 feet	67
Short Field Takeoff – Flaps 20 deg, Speed at 50 feet	65
ENROUTE CLIMB, FLAPS UP	
Normal - Sea Level	75-85
Best Rate of Climb - Sea Level	79
Best Angle of Climb - Sea Level	65
LANDING APPROACH	
Normal Approach - Flaps Up	80-90
Normal Approach - Flaps 30 deg	65-75
Short Field Approach - Flaps 30 deg	66
BALKED LANDING	
Maximum Power - Flaps 30 deg	80
MAXIMUM RECOMMENDED TURBULENT AIR PENETRATION SPEED	118
MAXIMUM DEMONSTRATED CROSSWIND VELOCITY	
Takeoff or Landing	15

NORMAL PROCEDURES CHECKLISTS

PREFLIGHT INSPECTION

BEFORE ENTERING FLOATPLANE

1. Floatplane Approved Flight Manual Supplement with Airplane Flight Manual should be available in the airplane.
2. Floats, Struts, and Float Fairings .... INSPECT for dents, cracks, etc.
3. Float Compartments..... INSPECT for water accumulation.
4. Pump out each float compartment. Ensure the rubber stoppers are replaced after pumping and they are seated with a snug fit. Inspect the floats for leaks if there appears to be an excess amount of water in any of the compartments. If there is red hydraulic fluid in any water, investigate fittings and lines in that bay before proceeding and check level of hydraulic fluid in the pump reservoir.
5. Water Rudders ..... CHECK actuation cables
6. Landing Gear ..... INSPECT
   Check the tires for cuts, bruises and proper inflation. Proper tire inflation for 6.00-6 main wheel tires is 50 +/- 5 psi; tire inflation for the 4.10-4 nose wheel tires is 50 +/- 5 psi

PRIOR TO ENGINE START

1. Landing Gear Switch ..... DOWN (on land); UP (on water)
2. Water Rudder Operation..... CHECK VISUALLY
3. Water Rudders ..... DOWN for taxing on water (lever full forward)
   UP for taxing on land (lever full aft)
4. Water Rudders ..... CHECK freedom of movement and security

TAKEOFF

NORMAL TAKEOFF ON WATER

1. Doors ..... CLOSED, UNLOCKED
2. Landing Gear ..... UP (all blue lights on)
3. Water Rudders ..... UP (retraction lever full aft)
4. Wing Flaps ..... 10~20 deg (20 deg recommended)
5. Pitch Trim ..... SET to NEUTRAL
6. Mixture ..... RICH
7. Control Wheel ..... HOLD FULL AFT
8. Power ..... FULL THROTTLE at 2700 RPM
9. Elevator Control ..... MOVE FORWARD gently when the nose pitches up and stops rising to attain planing attitude. APPLY LIGHT BACK PRESSURE to lift off at airspeed of 60-65 KIAS.
10. Wing Flaps ..... UP at Safe Speed and altitude
11. Climb Speed ..... 70-80 KIAS

NOTE

To reduce takeoff water run, the technique of raising one float out of the water may be used.

NOTE

If the flap indicator is non-functional, for example, flap indicator reads zero when flaps are deployed, use flaps up for all takeoffs.

NORMAL TAKEOFF ON LAND

1. Doors ..... CLOSED, UNLOCKED
2. Landing Gear ..... DOWN (all green lights on)
3. Water Rudders ..... UP (retraction lever full aft)
4. Wing Flaps ..... 10~20 deg (15 deg recommended)
5. Pitch Trim ..... SET to NEUTRAL
6. Mixture ..... RICH
7. Power ..... FULL THROTTLE at 2700 RPM
8. Control Wheel ..... APPLY LIGHT BACK PRESSURE to lift off airspeed of 60-65 KIAS
9. Wing Flaps ..... UP at Safe Speed and altitude
10. Climb Speed ..... 70-80 KIAS
11. Landing Gear ..... UP

SHORT FIELD TAKEOFF ON LAND

1. Doors ..... CLOSED, UNLOCKED
2. Landing Gear ..... DOWN (all green lights on)
3. Water Rudders ..... UP (retraction lever full aft)
4. Wing Flaps..... 20 deg
5. Brakes ..... APPLY
6. Pitch Trim ..... SET to NEUTRAL
7. Mixture ..... RICH
   (Above 3000 feet, LEAN to obtain maximum RPM)
8. Power..... FULL THROTTLE at 2700 RPM
9. Throttle ..... FULL OPEN
10. Brakes..... RELEASE
11. Climb Speed ..... (Until Obstacles are Cleared)
    65 KIAS for 20 degree flap
    THEN 70-80 KIAS
12. Wing Flaps..... UP at Safe Speed and Altitude
13. Landing Gear ..... UP

ENROUTE CLIMB

1. Airspeed ..... 75-85 KIAS
2. Mixture ..... RICH
   (Above 3000ft, LEAN as required)
3. Power..... FULL THROTTLE at 2600 RPM
4. Auxiliary Fuel Pump Switch ..... OFF

BEFORE LANDING

BEFORE LANDING ON WATER

1. Landing Gear ..... UP
2. Landing Gear Lights ..... CHECK ON (4 BLUE)
3. Landing Gear Position ..... CONFIRM VISUALLY
4. Water Rudders ..... UP
5. Wing Flaps ..... AS DESIRED
   (30 deg for short approach)
6. Doors ..... CLOSED, UNLOCKED
7. Airspeed (Flaps Up) ..... 80-90 KIAS @ 3700 lb
8. Airspeed (Full Flap) ..... 65-75 KIAS @ 3700 lb
   (Reduce 1 knot for each 80 lb Below 3700 lb)

BEFORE LANDING ON LAND

1. Landing Gear ..... DOWN
2. Landing Gear Lights ..... CHECK ON (4 GREEN)
3. Landing Gear Position ..... CONFIRM VISUALLY
4. Water Rudders ..... UP
5. Wing Flaps ..... AS DESIRED
   (30 deg for short approach)
6. Doors ..... CLOSED, UNLOCKED
7. Airspeed (Flaps Up) ..... 80-90 KIAS @ 3700 lb
8. Airspeed (Full Flap) ..... 65-75 KIAS @ 3700 lb
   (Reduce 1 knot for each 80 lb Below 3700 lb)

LANDING

LANDING ON WATER

1. Touchdown ..... SLIGHTLY TAIL LOW (Normal float landing attitude)
2. Control Wheel..... HOLD FULL AFT THROUGH DECELERATION

NOTE

With forward loading, a slight nose-down pitch may occur if the elevator is not held full back as floatplane comes down off the step.

LANDING ON LAND

1. Touchdown ..... SLIGHTLY TAIL LOW (Normal float landing attitude)
2. Control Wheel..... LOWER NOSEWHEELS to runway slowly
3. Brakes ..... MINIMUM REQUIRED

BALKED LANDING

1. Throttle ..... FULL OPEN and 2700 RPM
2. Flap ..... 20^{o}
3. Climb Speed ..... 80 KIAS
4. Flaps ..... SLOWLY RETRACT to FLAPS UP

AFTER LANDING

1. Water Rudders ..... DOWN (except on land)

SECURING AIRPLANE

1. Fuel Selector Valve ..... OFF

AMPLIFIED NORMAL PROCEDURES

WATER TAXIING

The water rudders should be in down position when taxiing. Engine speeds lower than 800 rpm should be used for normal taxi. Taxiing with higher RPM may result in engine overheating and the taxiing speed will not be appreciably increased. Also, higher taxiing speeds may cause excess water spray to strike the propeller tip and cause propeller tip erosion.

During all low speed taxi operations, the elevator should be positioned to keep the bows of the floats out of the water as far as possible. Normally, this requires holding the elevator control full aft except when taxiing downwind in high wind conditions. For minimum taxi speed in close quarters, use idle RPM and a single magneto. This procedure is recommended for short periods of time only.

Although taxiing is very simple with the water rudders, it is sometimes necessary to sail the floatplane under high wind condition. In addition to the normal flight controls, the wing flaps, ailerons and cabin doors will aid in sailing. Water rudders should be retracted during sailing.

To taxi great distances, it may be advisable to taxi on the step with the water rudders retracted. Turns on the step from an upwind heading may be made with safety providing they are not too sharp and if ailerons are used to counteract any overturning / rolling tendency.

CROSSWIND OPERATIONS

In most floatplane operating areas, crosswind operating conditions are limited - either the water channel is narrow and the body of water is not greatly stirred up by winds or the body of water is large enough to allow pilots to minimize the crosswind and accept greater wave action. In higher winds where waves have been stirred up, spray may be developed during the early part of the takeoff run which is aggravated under increasing crosswinds. To minimize the adverse impact of spray on visibility and in extreme cases on engine operation, takeoffs should be made as nearly into the wind as possible.

TAKEOFF ON WATER

Start the takeoff by applying full throttle smoothly while holding the control wheel full aft. When the nose stops rising, move the control wheel forward slowly to place the floats on the step. Slow control movement and light control pressures produce the best results. Attempts to force the floatplane into the planing attitude will generally result in loss of speed and delay in getting on the step. The floatplane will assume a planing attitude which permits acceleration to takeoff speed, at which time the floatplane will fly off smoothly.

Takeoff flap between 10^{o}~20^{o} can be used and 20^{o} is recommended throughout the takeoff run. When the airplane reaches a safe altitude and airspeed, retract the wing flaps slowly especially when flying over glassy water as a loss of altitude cannot be easily defined due to the loss of reference over glassy water.

If porpoising is encountered while on the step, apply slight positive backpressure to the yoke to reduce and stop the porpoise. If this does not correct the porpoising, immediately reduce power to idle and allow the floatplane to slow to taxi speed, at which time the takeoff can again be initiated.

To clear an obstacle after takeoff with 20 degrees wing flap, use an obstacle clearance speed of 65 KIAS for maximum performance. Under some adverse combinations of higher takeoff weight, pressure altitude, and high air temperature or operation on glassy water, the airplane may require significantly longer takeoff distances to accelerate to lift-off speed and extra takeoff distance should be allowed when any of these conditions exist.

If lift-off is difficult due to high lake elevation or glassy water, the following procedure is recommended. With the floatplane in the planing attitude, apply ample aileron as required to raise one float out of the water. When one float leaves the water, apply slight elevator backpressure to complete the takeoff. Care must be taken

to stop the rising wing as soon as the float is clear of the water, and in crosswinds, raise only the downwind wing. With one float out of the water, the floatplane should accelerate to takeoff speed much more rapidly.
For a crosswind takeoff, start the takeoff with wing flaps up, ailerons deflected partially into the wind and water rudders extended for better directional control. Flaps should be extended to 20 degree and the water rudders retracted when the floatplane is planing on the step. The remainder of the takeoff is normal. If the floats are lifted from the water one at a time, the downwind float should be lifted first.

TAKEOFF ON LAND

With the flaps extended to 15º and the pitch trim and elevator at the neutral position, gradually open the throttle to full power. As the speed increases and the aircraft feels lighter, apply gentle aft pressure on the control yoke and the aircraft will fly smoothly off the runway. To clear an obstacle after takeoff, establish a trimmed speed of 70~80 KIAS. When a safe altitude is reached, retract the flaps slowly and incrementally, trimming as necessary. Retract landing gear once a wheel extended runway landing is impractical.

NORMAL LANDING

Normal landings can be made power on or power off using approach speeds of 80~90 KIAS with flaps up and 70~80 KIAS with flaps down. For a restricted landing area, use an approach speed of 70 KIAS with flaps 30 degrees.

GLASSY WATER LANDING

With glassy water conditions, flaps should be extended to 20 degrees and enough power used to maintain a low rate of descent (approximately 200 feet per minute). The floatplane should be flown onto the water in a slightly nose up normal float landing attitude at this sink rate with no flare attempted since height above glassy water is impossible to judge. Power should be reduced to idle and control wheel backpressure increased upon contacting the surface. As the floatplane decelerates off the step, apply full backpressure on the control wheel. If this glassy water technique is used in conjunction with an obstacle clearance approach, allowance should be made for appreciably longer total landing distances than are typical of normal water conditions.

CROSSWIND LANDING

The wing-low slip method should be used with the upwind float contacting the surface first while maintaining a slightly nose up normal float landing attitude.

BEACHING-HEELING IN

(Stern of the floats on the beach)

The amphibian may be heeled into a beach, but with caution. The wheel well area can scoop sand, mud, rocks, or clay. If one leaves the plane secured with the step area embedded in the sand, wave action can help bring sand into the wheel well area. Clay or mud can also stick into this area posing a problem. The problem comes from not having clearance, because of debris buildup, for the main gear truck to fully extend to the full gear down position. The main landing gear has tremendous leverage as it travels into its over center position and can damage the float and gear truck if there is a restriction.

A method (no guarantees) of cleansing this area is proposed. With the gear still retracted, after leaving the beach, aggressively plow the floats to flush this area. This puts the plane at a high angle of attack and introduces water for flushing. Do this a couple of times and even go up on the step for a moment.

After washing the area and the airplane is at idle power lower the gear. Assure that all the green lights illuminate, indicating gear down position is achieved. If a main gear light does not illuminate, proceed to inspect the problem. Ideally, finding a float dolly, which will lift the floats out of the water with the gear retracted, will give opportunity to investigate the problem.

SECTION 5
PERFORMANCE

HEIGHT LOSS IN STALLS

The height loss of up to 200 ft may occur in stalls.

AIRSPEED CALIBRATION

The airspeed calibration is slightly changed due to the float installation and the weight increase from the landplane configuration. It is still acceptable to use the landplane airspeed calibration. A copy of this table is included for convenience.

NORMAL STATIC SOURCE

CONDITIONS:
Power required for level flight or maximum power descent

	KCAS			
KIAS	Flaps 0^o	Flaps 10^o	Flaps 20^o	Flaps 30^o
50	---	---	47	49
55	---	55	52	54
60	60	60	58	60
70	70	70	69	70
80	80	80	80	80
90	90	89	90	90
100	100	99	100	100
110	109	109	110	110
115	114	114	114	114
120	119	---	---	---
130	129	---	---	---
140	139	---	---	---
150	148	---	---	---
160	158	---	---	---

STALL SPEED
AT 3700 POUNDS

CONDITIONS
POWER OFF

MOST FORWARD CENTRE OF GRAVITY

FLAP SETTING	ANGLE OF BANK							
	0 °		30 °		45 °		60 °	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	54	60	58	64	64	71	76	85
10	51	58	55	62	61	69	72	82
15	48	55	52	59	57	65	68	77
20	46	53	49	57	55	63	65	75
30	44	51	47	55	52	61	62	72

NOTE:

1. Altitude loss during stall recovery may be upto 200 feet
2. Indicate speeds are approximate

Figure 2 Stall Speeds

SHORT FIELD TAKEOFF DISTANCE ON LAND AT 3700 POUNDS

CONDITIONS:
FLAPS: 15 degree
FULL THROTTLE PRIOR TO BRAKE RELEASE, 2700 RPM
PAVED, LEVEL, DRY RUNWAY
ZERO WIND
LIFT OFF SPEED 60 KIAS
50FT SPEED 65 KIAS

	0°C		10°C		20°C		30°C		40°C	
PRESS. ALTITUDE	GND DIST.	TOTAL DIST.	GND DIST.	TOTAL DIST.	GND DIST.	TOTAL DIST.	GND DIST.	TOTAL DIST.	GND DIST.	TOTAL DIST.
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	882	1642	948	1758	1020	1886	1097	2026	1180	2178
1000	981	1827	1056	1963	1138	2112	1226	2275	1320	2454
2000	1098	2050	1184	2210	1277	2385	1378	2580	1488	2794
3000	1237	2325	1336	2514	1445	2727	1563	2964	1693	3230
4000	1394	2644	1509	2873	1636	3134	1776	3429	1930	3768
5000	1584	3047	1719	3333	1871	3664	2039	4049	2226	4498
6000	1818	3575	1982	3946	2167	4392	2374	4923	---	---
7000	2116	4383	2319	4923	---	---	---	---	---	---
8000	---	---	---	---	---	---	---	---	---	---

NOTES:

1. Takeoff distances are estimated from derived drag polars.
2. Decrease total distance by 10% for each 10 knots headwind.
3. In tailwinds, increase total distance 10% for each 2 knots.
4. For operation on dry glass runways, increase above ground roll distances by 15%
5. For operation in outside air temperatures colder than this table provides, use coldest data shown.
6. For operation in outside air temperatures warmer than this table provides, use extreme caution.

Figure 3 Short Field Takeoff Distance

BEST ANGLE-OF-CLIMB
AT 3700 POUNDS

CONDITIONS:
Flaps Up
2600 RPM
Full Throttle
Mixture at Best Power Schedule

PRESS ALT	CLIMB SPEED	BEST ANGLE OF CLIMB (deg)			
FEET	KIAS	-20°C	0°C	20°C	40°C
S.L	65	6.9	6.2	5.5	4.8
2,000	67	6.0	5.3	4.6	4.0
4,000	68	4.7	4.1	3.5	3.0
6,000	70	3.5	3.0	2.4	2.0
8,000	70	2.5	2.0	1.5	1.0
10,000	71	1.5	1.0	0.5	0.1

Figure 4 Best Angle-of-Climb

BEST RATE-OF-CLIMB AT 3700 POUNDS

CONDITIONS:
Flaps Up
2600 RPM
Full Throttle
Mixture at Best Power Schedule

PRESS ALT	CLIMB SPEED	RATE OF CLIMB (FPM)			
FEET	KIAS	-20°C	0°C	20°C	40°C
S.L	79	830	770	707	644
2000	78	737	676	613	549
4000	76	604	543	480	417
6000	74	471	410	347	284
8000	73	339	277	214	151
10,000	72	209	146	- - -	- - -

Figure 5 Best Rate-of-Climb

TIME, FUEL AND DISTANCE TO CLIMB AT 3700 POUNDS

CONDITIONS:
Flaps Up
Full Throttle
2600 RPM
Mixture at Best Power Schedule
Standard Temperatures
At Best Rate of Climb

				FROM SEA LEVEL			
PRESS ALT FEET	TEMP °C	CLIMB SPEED KIAS	RATE OF CLIMB FPM	TIME IN MIN	FUEL USED LITRES	FUEL USED U.S GAL	DIST IN NM
S.L	15	78	723	0	0	0.0	
1000	13	78	700	1	2	0.5	2
2000	11	77	641	3	4	1.1	4
3000	9	76	581	5	7	1.7	6
4000	7	76	521	6	9	2.4	8
5000	5	75	460	8	12	3.1	11
6000	3	74	400	11	15	3.9	14
7000	1	74	340	13	18	4.8	18
8000	-1	73	280	17	22	5.8	22
9000	-3	72	220	21	27	7.1	28
10000	-5	72	161	26	33	8.7	35

NOTES:
1. Add 7.5 litres (2 US gallons) of fuel for engine start, run-up, taxi and take off allowance.
2. Mixture leaned to climb schedule.
3. Increase time, fuel and distance by 10% for each 10^0 C above standard temperature.
4. Distances shown are based on zero wind.

Figure 6 Time, Fuel and Distance to Climb

SECTION 6
WEIGHT AND BALANCE

The Bush Hawk-XP equipped with Wipline floats must be loaded in accordance with the limitations in Section 2. These are shown as an aircraft weight/moment envelope or an aircraft weight versus c.g. locations chart on the following pages.

WARNING
IT IS THE RESPONSIBILITY OF THE AIRPLANE OWNER AND PILOT TO ENSURE THAT THE AIRPLANE IS LOADED PROPERLY.

FLOAT BAGGAGE COMPARTMENTS

Baggage may be carried in the float baggage compartments in accordance with the following limitations.

Compartment	Max. Weight	Arm	Moment/1000
LEFT	50 lbs	-4 in.	-0.2
RIGHT	50 lbs	-4 in.	-0.2

FLOATPLANE REFERENCE DATUM

The floatplane reference datum for the purpose of weight and balance is the lower forward corner of the front doors.

FLOATPLANE WEIGHING PROCEDURES

1. **Preparation:**
   a) Inflate tires to recommended operating procedures.
   b) De-fuel airplane. Refer to FAC2-M200 Maintenance Manual.
   c) Service engine oil as required to obtain a normal full indication.
   d) Move sliding seats to the most forward position.
   e) Raise flaps to the fully retracted position.
   f) Place all control surfaces in neutral position.
   g) Remove all non-required items from airplane.

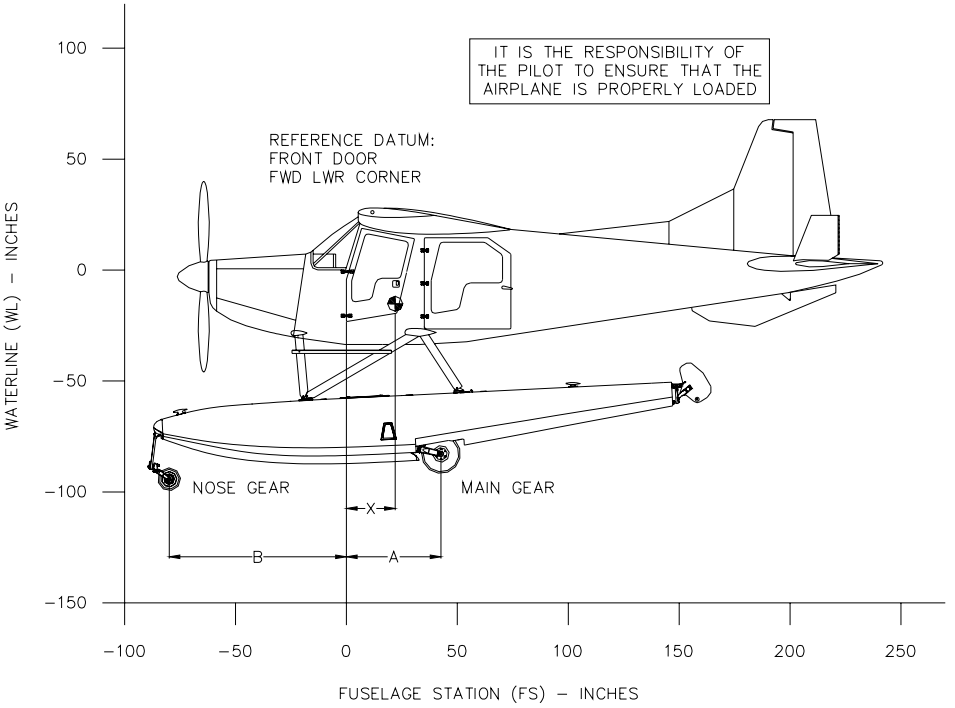
2. **Levelling:**
   a) Deflate the main wheel and/or lower or raise the nose wheel to properly level the aircraft fuselage floor (aft seat compartment).
   b) Drop plumb lines from both front door datum points. Mark the locations on the floor. Connect the points and extend the line out to the centre of both floats.
   c) Place scales under each wheel. A minimum scale capacity of 1500 pounds is recommended for the main scales and 1000 pounds for the tail scale. If only three scales are available, place the nose wheels on a common platform and a scale below the platform to get the total weight at the nose wheel.

3. **Weighing:**
   a) With the airplane level and, record the weight shown on each scale. Deduct the tare, if any, from each reading.

4. **Measuring Arms:**
   a) Obtain measurement **A** and **B** by measuring horizontally (along the floor) from the floatplane reference datum line previously drawn on the floor (Item 2b) to the main wheel and to the nose wheel. See the illustration below.

5. **Calculate CG and Weight:**

   a) Using weights from Item 3 and measurements from Item 4, the airplane Basic Empty Weight and C.G. can be determined by completing the following table.


IT IS THE RESPONSIBILITY OF THE PILOT TO ENSURE THAT THE AIRPLANE IS PROPERLY LOADED
REFERENCE DATUM:
FRONT DOOR
FWD LWR CORNER
NOSE GEAR
MAIN GEAR
X
B
A
WATERLINE (WL) – INCHES
100
50
0
–50
–100
–150
–100
–50
0
50
100
150
200
250
FUSELAGE STATION (FS) – INCHES

Weighing Point	Tare (lbs)	Scale Reading (lbs)	Net Weight (lbs)	Arm (inches)	Moment (in-lbs)
R Nose				***B*** =	
L Nose				***B*** =	
R Main (Float)				***A*** =	
L Main (Float)				***A*** =	
Total (Weighed)				**CG=**	
CG = Total Moment / Total Net Weight Use spaces below to add or subtract items from weighed condition.					
Empty Weight				**CG=**	
Drainable Unusable Fuel (6 lbs/USG), 1.7 USG			10.2	21.8	222.4
Basic Empty Weight					

Net Weight = Scale Reading - Tare
Moment = Net Weight * Arm
Arm is measured from the aircraft datum (front door forward lower corner).
If only three scales are available, place the nose gears on a common platform. Place a scale under this common platform and make one reading.

FLOATPLANE WEIGHT AND BALANCE PROCEDURES

The following information will enable you to operate your FBA-2C2 within the prescribed weight and centre of gravity limitations. To figure weight and balance, use the Sample Loading Problem, Loading Graph (in Section 6 of M400), and Centre of Gravity Moment Envelopes as follows:

1. Take the Basic Empty Weight and Moment from appropriate weight and balance records carried in your airplane and enter them in the column titled YOUR AIRPLANE on the Sample Loading Problem.

NOTE

In addition to the Basic Empty Weight and Moment noted on these records, the C.G. arm (fuselage station) is also shown, but need not be used on the Sample Loading Problem. The moment which is shown must be divided by 1000 and this value used as the moment/1000 on the loading problem.

2. Use the Loading Graph to determine the moment/1000 for each additional item to be carried; then list these on the loading problem.

NOTE

Loading Graph information for the pilot, passengers and baggage is based on seats positioned for average occupants and baggage loaded in the centre of the aft baggage compartment as shown on the Loading Arrangements diagram. For loadings which may differ from these, the Sample Loading Problem lists fuselage stations for these items to indicate their forward and aft C.G. range limitations (seat travel and baggage compartment limitation). Additional moment calculations, based on the actual weight and C.G. arm (fuselage station) of the item being loaded, must be made if the position of the load is different from that shown on the Loading Graph.

3. Total the weights and moments/1000 and plot these values on the centre of Gravity Moment Envelope to determine whether the point falls within the envelope, and if the loading is acceptable.

SAMPLE LOADING PROBLEM FOR FLOATPLANE	WEIGHT AND MOMENT TABULATION				
	SAMPLE AIRPLANE			YOUR AIRPLANE	
	WEIGHT (lbs)	MOMENT (lb-in /1000)	ARM (in)	WEIGHT (lbs)	MOMENT (lb-in /1000)
1. Basic Empty Weight (Use the data pertaining to your airplane as it is presently equipped. Includes unusable fuel and full oil).	2550	39.7	15.6		
2. Usable Fuel (At 6.0 lbs/USG) 98 USG Maximum 50 USG (used for example)	300	6.5	21.8		
3. Pilot and Front Passenger (Station 17.8 & 200 pounds each)	400	7.1	17.8		
4. Rear Passenger (Station 55.0 & 200 pounds each)	400	22.0	55.0		
5. Main Baggage Area (Station 76 to 114; 250 pounds. max. @ Station 94)	50	4.7	94.0		
6. Ramp Weight and Moment (add columns)	3700	80.1			
7. Fuel Allowance for Engine Start, Taxi and Run-Up	-7	-0.2	21.8		
8. Takeoff Weight and Moment (Subtract Step 7 from Step 6)	3693	79.9	21.6		
9. Locate this point (3693 at 79.9) on the Centre of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable.					

CENTER OF GRAVITY MOMENT ENVELOPE

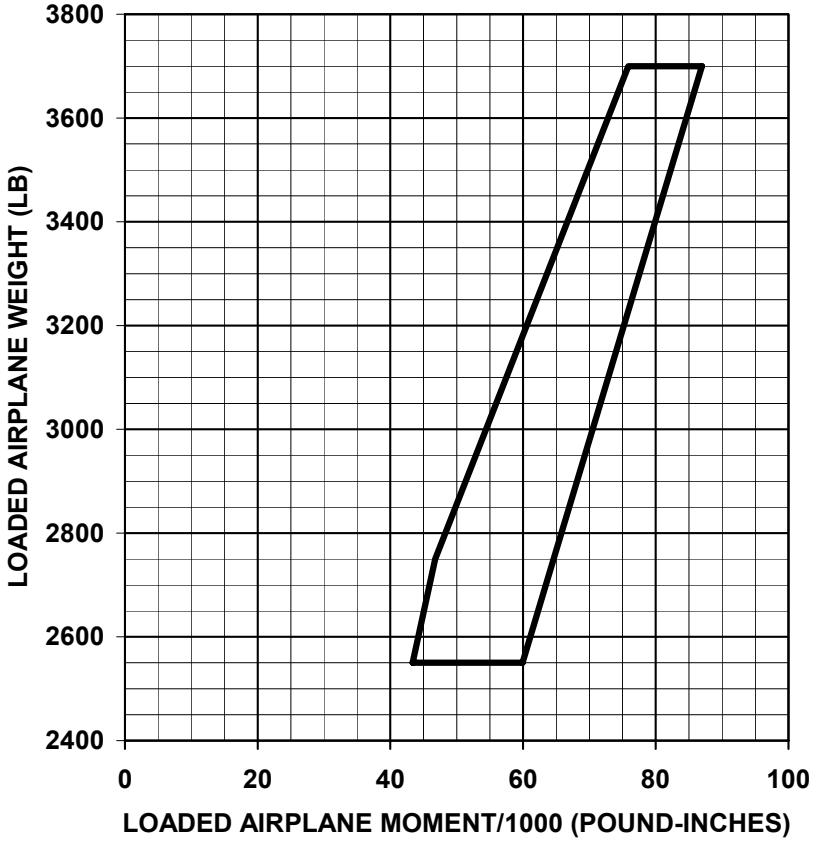


Figure 7 Loaded Airplane Moment/1000 (pound-inches)

CENTER OF GRAVITY RANGE ENVELOPE

Figure 8 Airplane CG Location (Inches AFT of Datum)

SECTION 7
AIRPLANE AND SYSTEMS DESCRIPTION

In addition to the Wipline Model 3450 floats installation, the aircraft must incorporate the Found Aircraft Canada Inc. approved floatplane kit. With either of these installations, the floatplane is identical to the landplane with the following exceptions:

FOUND AIRCRAFT CANADA MODIFICATIONS

1. Floats, incorporating retractable landing gear and water rudder steering system, replace the landing gear.
2. Water rudder steering cables for retraction and steering control of the water rudders.
3. A water rudder retraction lever connected to the dual water rudders by cables is located on the cabin floor between the front seats.
4. Hydraulic system to support the retractable landing gear system.
5. Ventral fin located on the bottom of the fuselage and the finlets on the top of the stabilizer.
6. Loading steps, which are mounted to the float struts.
7. Floatplane placards.
8. Amphibian placards are added

WATER RUDDER SYSTEM

Retractable water rudders, mounted at the aft end of each float, are connected by a system of cables and springs to the rudder pedals. Normal rudder pedal operation moves the water rudders to provide steering control for taxiing.

A water rudder retraction lever, located on the cabin floor between the front seats, is used to manually raise and lower the water rudders. The handle should be in the UP (aft) position during takeoff, landing, and in flight. With the handle in this position, the water rudders are up. When the lever is rotated forward to the DOWN position, the water rudders extend to the full down position for water taxiing.

AMPHIBIOUS LANDING GEAR SYSTEM

1. Water operation procedures are similar to any common amphibian.
2. Landing gear operation.

    a. The aircraft is equipped with landing gear powered by an electro-hydraulic power pack (located in the aft fuselage of the aircraft). An emergency hand pump is provided for operation of float landing gear in case of power or electrical failure.
    b. A set of four blue lights (one for each wheel) indicates gear up position and a set of four green lights indicates gear down position. The four blue lights indicate gear up and locked. The four lights of each colour are the means of identifying that the landing gear is locked in either the up or down position. There are visual indicators on the topside of the floats also.
    c. A red light marked "PUMP ON" is also provided to warn the pilot that the power pack is running during gear transit. It should shut off automatically after the desired gear position is attained by means of pressure-sensing switch cutting off the power when pressure builds up after gears are locked. Should this sensing device fail, and the pump does not shut off, the power can be manually turned off by pulling out the landing gear circuit breaker. The gear can still be operated using the power pack by turning the power back on (pushing the landing gear circuit breaker in) and selecting the next desired position and again manually turning off the power if necessary. The faulty pressure-sensing switch should be repaired at the time of next landing.
    d. The pressure switch is also designed to turn on the power pack when pressure in the system drops below a certain value to rebuild the system pressure back up to shut off pressure. Therefore, if the pump comes on momentarily (an aural cue) when turning on the master switch, or the red light momentarily illuminates during flight, it merely means the pressure has fallen off and the pump is coming on to build it up. A sight gauge is provided on the power pack reservoir and the level should be kept in the upper 25% of the range. Excessive illumination of the red light indicates a significant hydraulic leak (either internal or external) and the circuit breaker should be pulled and fluid level checked followed by repair of the system if needed.

e. An emergency hand pump is located on the floor between the two front seats for use in the event the normal hydraulic system fails. The hand pump may be used to retract or extend the landing gear.

f. Prior to utilizing the emergency hand pump, pull the circuit breaker to deactivate the electric hydraulic pump. Select UP or DOWN using the normal landing gear selector handle. Hand pump handle, pump vertically (as much as 155 cycles for extension or retraction). When a gear reaches the selected position, its indicator light will illuminate. After all four gears are in the selected position, there is a noted increase in resistance of hand pump operation.