Cessna

# SKYWAGON 180

## FLOATPLANE AMPHIBIAN AND SKIPLANE

1969 - 1972

## OWNER'S MANUAL SUPPLEMENT

D710-13-RPC-150-10/84

# PERFORMANCE - SPECIFICATIONS

SKYWAGON 180

| | FLOATPLANE (Edo Model 249A - 2870 Floats) | FLOATPLANE (Edo Model 628 - 2960 Floats) | AMPHIBIAN (Edo Model 597 - 2790 Floats) | SKIPLANE (FluiDyne Model C-3200 and CT-3600 Skis) |
|---|---|---|---|---|
| GROSS WEIGHT | 2820 lbs | 2950 lbs | 2950 lbs | 2800 lbs |
| SPEED: | | | | |
| Top Speed at Sea Level | 149 mph | 149 mph | 149 mph | 149 mph |
| Cruise, 75% Power at 6500 ft | 147 mph | 147 mph | 147 mph | 144 mph |
| RANGE: | | | | |
| Cruise, 75% Power at 6500 ft | 630 mi | 630 mi | 630 mi | 620 mi |
| 60 Gallons, No Reserve | 4.3 hrs | 4.3 hrs | 4.3 hrs | 4.3 hrs |
| | 147 mph | 147 mph | 147 mph | 144 mph |
| Cruise, 75% Power at 6500 ft | 835 mi | 835 mi | 835 mi | 820 mi |
| 79 Gallons, No Reserve | 5.7 hrs | 5.7 hrs | 5.7 hrs | 5.7 hrs |
| | 147 mph | 147 mph | 147 mph | 144 mph |
| Optimum Range at 10,000 ft | 895 mi | 830 mi | 830 mi | 725 mi |
| 60 Gallons, No Reserve | 8.1 hrs | 7.2 hrs | 7.2 hrs | 7.2 hrs |
| | 110 mph | 114 mph | 114 mph | 101 mph |
| Optimum Range at 10,000 ft | 1175 mi | 1090 mi | 1090 mi | 955 mi |
| 79 Gallons, No Reserve | 10.7 hrs | 9.5 hrs | 9.5 hrs | 9.5 hrs |
| | 110 mph | 114 mph | 114 mph | 101 mph |
| RATE OF CLIMB AT SEA LEVEL | 1075 fpm | 990 fpm | 990 fpm | ..... |
| SERVICE CEILING | 17,000 ft | 16,000 ft | 16,000 ft | ..... |
| TAKE-OFF: | | | On Land / On Water | |
| Water Run or Ground Run | 1145 ft | 1280 ft | 1360 ft / 1280 ft | ..... |
| Total Distance Over 50-Foot Obstacle | 1860 ft | 2070 ft | 2185 ft / 2070 ft | ..... |
| LANDING: | | | | |
| Water Run or Ground Run | 700 ft | 735 ft | 1025 ft / 735 ft | ..... |
| Total Distance Over 50-Foot Obstacle | 1670 ft | 1720 ft | 1490 ft / 1720 ft | ..... |
| EMPTY WEIGHT (Approximate) | 1840 lbs | 1855 lbs | 2100 lbs | 1690 lbs |
| BAGGAGE (Cabin Area) | 350 lbs | 350 lbs | 350 lbs | 350 lbs |
| AFT BAGGAGE | 50 lbs | 50 lbs | 50 lbs | 50 lbs |
| WING LOADING: Pounds/Sq Foot | 16.2 | 17.0 | 17.0 | 16.1 |
| POWER LOADING: Pounds/HP | 12.3 | 12.8 | 12.8 | 12.2 |
| FUEL CAPACITY: Total | | | | |
| Standard Tanks | 65 gal. | 65 gal. | 65 gal. | 65 gal. |
| Optional Long Range Tanks | 84 gal. | 84 gal. | 84 gal. | 84 gal. |
| OIL CAPACITY: Total | 12 qts | 12 qts | 12 qts | 12 qts |
| PROPELLER: Constant Speed (Diameter) | 88 in. | 88 in. | 88 in. | 82 in. |
| ENGINE: | | | | |
| Continental Engine 230 rated HP at 2600 RPM | O-470-R | O-470-R | O-470-R | O-470-R |
| WING SPAN | 36 ft, 2 in. | 36 ft, 2 in. | 36 ft, 2 in. | 36 ft, 2 in. |
| LENGTH | 27 ft | 27 ft | 27 ft, 6 in. | 25 ft, 6 in. |
| HEIGHT | 12 ft | 12 ft | 12 ft, 6 in. | 7 ft, 9 in. |

## CRUISE PERFORMANCE
SKIPLANE

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 2800 Pounds

| RPM | MP | % BHP | TAS MPH | GAL/ HOUR | 60 GAL (NO RESERVE) ENDR. HOURS | 60 GAL (NO RESERVE) RANGE MILES | 79 GAL (NO RESERVE) ENDR. HOURS | 79 GAL (NO RESERVE) RANGE MILES |
|---|---|---|---|---|---|---|---|---|
| **7500 FEET** | | | | | | | | |
| 2450 | 21 | 70 | 140 | 13.1 | 4.6 | 640 | 6.0 | 845 |
| | 20 | 67 | 135 | 12.4 | 4.8 | 655 | 6.4 | 865 |
| | 19 | 62 | 130 | 11.7 | 5.1 | 665 | 6.7 | 875 |
| | 18 | 58 | 125 | 11.1 | 5.4 | 675 | 7.1 | 890 |
| 2300 | 21 | 66 | 134 | 12.1 | 4.9 | 665 | 6.5 | 875 |
| | 20 | 62 | 130 | 11.5 | 5.2 | 675 | 6.9 | 890 |
| | 19 | 58 | 125 | 10.9 | 5.5 | 685 | 7.3 | 905 |
| | 18 | 54 | 119 | 10.3 | 5.8 | 695 | 7.7 | 910 |
| 2200 | 21 | 62 | 129 | 11.3 | 5.3 | 685 | 7.0 | 905 |
| | 20 | 58 | 124 | 10.7 | 5.6 | 700 | 7.4 | 920 |
| | 19 | 54 | 119 | 10.1 | 5.9 | 705 | 7.8 | 925 |
| | 18 | 50 | 112 | 9.5 | 6.3 | 710 | 8.3 | 935 |
| 2000 MAXIMUM RANGE SETTING | 19 | 46 | 105 | 8.6 | 6.9 | 725 | 9.1 | 955 |
| | 18 | 42 | 98 | 8.1 | 7.4 | 720 | 9.7 | 950 |
| | 17 | 39 | 89 | 7.6 | 7.9 | 705 | 10.4 | 930 |
| | 16 | 36 | 81 | 7.0 | 8.5 | 690 | 11.2 | 910 |
| **10,000 FEET** | | | | | | | | |
| 2450 | 19 | 64 | 134 | 11.9 | 5.0 | 675 | 6.6 | 885 |
| | 18 | 60 | 128 | 11.3 | 5.3 | 685 | 7.0 | 900 |
| | 17 | 55 | 122 | 10.6 | 5.7 | 690 | 7.4 | 905 |
| | 16 | 51 | 115 | 10.0 | 6.0 | 690 | 7.9 | 910 |
| 2300 | 19 | 60 | 128 | 11.1 | 5.4 | 695 | 7.1 | 910 |
| | 18 | 56 | 122 | 10.5 | 5.7 | 700 | 7.5 | 920 |
| | 17 | 52 | 116 | 9.9 | 6.1 | 705 | 8.0 | 925 |
| | 16 | 47 | 108 | 9.2 | 6.5 | 700 | 8.6 | 925 |
| 2200 | 19 | 56 | 122 | 10.3 | 5.8 | 710 | 7.6 | 935 |
| | 18 | 52 | 116 | 9.8 | 6.1 | 715 | 8.1 | 940 |
| | 17 | 48 | 109 | 9.2 | 6.6 | 715 | 8.6 | 945 |
| | 16 | 44 | 101 | 8.6 | 7.0 | 710 | 9.2 | 930 |
| 2000 MAXIMUM RANGE SETTING | 18 | 44 | 101 | 8.4 | 7.2 | 725 | 9.5 | 955 |
| | 17 | 41 | 93 | 7.8 | 7.7 | 710 | 10.1 | 935 |
| | 16 | 37 | 84 | 7.3 | 8.3 | 695 | 10.9 | 915 |
| | 15 | 34 | 76 | 6.7 | 8.9 | 680 | 11.8 | 895 |

Figure 3-1 (Sheet 2 of 2).

# CRUISE PERFORMANCE

SKIPLANE

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 2800 Pounds

| RPM | MP | % BHP | TAS MPH | GAL/ HOUR | 60 GAL (NO RESERVE) ENDR. HOURS | 60 GAL (NO RESERVE) RANGE MILES | 79 GAL (NO RESERVE) ENDR. HOURS | 79 GAL (NO RESERVE) RANGE MILES |
|---|---|---|---|---|---|---|---|---|
| **2500 FEET** | | | | | | | | |
| 2450 | 23 | 76 | 140 | 14.2 | 4.2 | 590 | 5.6 | 780 |
| | 22 | 72 | 137 | 13.5 | 4.5 | 610 | 5.9 | 805 |
| | 21 | 68 | 133 | 12.7 | 4.7 | 630 | 6.2 | 830 |
| | 20 | 64 | 128 | 12.0 | 5.0 | 640 | 6.6 | 845 |
| 2300 | 23 | 71 | 136 | 13.0 | 4.6 | 625 | 6.1 | 820 |
| | 22 | 67 | 132 | 12.3 | 4.9 | 640 | 6.4 | 845 |
| | 21 | 63 | 127 | 11.7 | 5.1 | 655 | 6.8 | 860 |
| | 20 | 59 | 122 | 11.0 | 5.4 | 665 | 7.2 | 875 |
| 2200 | 23 | 66 | 131 | 12.0 | 5.0 | 650 | 6.6 | 860 |
| | 22 | 62 | 126 | 11.4 | 5.3 | 665 | 6.9 | 875 |
| | 21 | 59 | 121 | 10.8 | 5.6 | 675 | 7.3 | 890 |
| | 20 | 55 | 117 | 10.2 | 5.9 | 685 | 7.7 | 905 |
| 2000 MAXIMUM RANGE SETTING | 20 | 46 | 103 | 8.7 | 6.9 | 715 | 9.1 | 940 |
| | 19 | 43 | 97 | 8.2 | 7.4 | 715 | 9.7 | 945 |
| | 18 | 39 | 90 | 7.6 | 7.9 | 710 | 10.4 | 935 |
| | 17 | 36 | 82 | 7.1 | 8.5 | 695 | 11.1 | 915 |
| **5000 FEET** | | | | | | | | |
| 2450 | 23 | 77 | 144 | 14.4 | 4.2 | 600 | 5.5 | 790 |
| | 22 | 73 | 141 | 13.6 | 4.4 | 620 | 5.8 | 815 |
| | 21 | 69 | 136 | 12.9 | 4.7 | 635 | 6.1 | 835 |
| | 20 | 65 | 132 | 12.2 | 4.9 | 650 | 6.5 | 855 |
| 2300 | 23 | 72 | 139 | 13.2 | 4.5 | 630 | 6.0 | 830 |
| | 22 | 68 | 135 | 12.6 | 4.8 | 645 | 6.3 | 850 |
| | 21 | 65 | 131 | 11.9 | 5.0 | 660 | 6.6 | 870 |
| | 20 | 61 | 126 | 11.3 | 5.3 | 670 | 7.0 | 885 |
| 2200 | 23 | 68 | 135 | 12.3 | 4.9 | 655 | 6.4 | 865 |
| | 22 | 64 | 130 | 11.7 | 5.2 | 670 | 6.8 | 880 |
| | 21 | 60 | 125 | 11.0 | 5.4 | 680 | 7.2 | 895 |
| | 20 | 56 | 120 | 10.4 | 5.8 | 695 | 7.6 | 910 |
| 2000 MAXIMUM RANGE SETTING | 19 | 44 | 101 | 8.4 | 7.1 | 720 | 9.4 | 950 |
| | 18 | 41 | 94 | 7.9 | 7.6 | 715 | 10.0 | 945 |
| | 17 | 37 | 86 | 7.3 | 8.2 | 700 | 10.8 | 925 |
| | 16 | 34 | 77 | 6.8 | 8.9 | 685 | 11.7 | 905 |

Figure 3-1 (Sheet 1 of 2).



# TABLE OF CONTENTS

# INTRODUCTION

This supplement, written especially for operators of the Cessna Skywagon 180 floatplane, amphibian and skiplane, provides information not found in the Owner's Manual. It contains procedures and data required for safe and efficient operation of airplanes equipped with either standard floats, amphibious floats, retractable wheel type skis or fixed type wheel replacement skis.

Information contained in the Owner's Manual for the landplane, which is the same as that for the floatplane, amphibian and skiplane, is not repeated in this supplement.

The information provided herein is applicable to airplanes equipped with one of the following:

(1) Floatplane - Edo Model 249A-2870 Floats.

Floatplane - Edo Model 628-2960 Floats.

(2) Amphibian - Edo Model 597-2790 Amphibious Floats.

(3) Skiplane (Retractable Wheel Type Skis) - FluiDyne Model C-3200 Main Wheel Skis and FluiDyne Model CT-3600 Tail Wheel Ski.

Skiplane (Wheel Replacement Skis) - FluiDyne Model A3500A Main Wheel Skis and FluiDyne Model CT-3600 Tail Wheel Ski.



# OPERATIONAL DATA

In the Cruise Performance charts, figure 3-1, range and endurance are given for lean mixture, and are based on zero wind, 2800 pounds gross weight and standard atmospheric conditions.

NOTE

Performance figures were compiled from flight tests with an airplane equipped with FluiDyne Model C-3200 retractable wheel skis on the main gear and a FluiDyne Model CT-3600 ski on the tail gear. It is expected that performance of aircraft with other wheel ski installations would be approximately the same.

Allowances for fuel reserve, headwinds, take-off and climb, and variations in mixture leaning technique should be made and are in addition to those on the charts. Other indeterminate variables such as carburetor metering-characteristics, engine and propeller conditions, and turbulence of the atmosphere may account for variations of 10% or more in maximum range. Comparison of estimated and actual performance on several flights will give you a basis on which to determine these allowances.

## CRUISE.

Observe the same engine speed limits as for the landplane. Skiplane speed, range and endurance are shown on the Cruise Performance charts, figure 3-1.

## LANDING.

The landing speeds and stalling speeds for the skiplane are identical to those for the landplane. Under the most favorable conditions of smooth packed snow at temperatures of approximately 32° F., the skiplane landing distance is approximately 20% greater than that shown for a landplane. Caution should be exercised in that other temperatures or other snow conditions may either decrease or increase this distance.

# OPERATING LIMITATIONS

## MAXIMUM GROSS WEIGHT.

Skiplane . . . . . 2800 lbs

## WEIGHT AND BALANCE.

The loading instructions given in the Owner's Manual for the landplane should be used when figuring skiplane weight and balance problems. However, it will be necessary to use the licensed empty weight and moment of your skiplane from your Weight and Balance Data Sheet. This empty weight will, in some cases, include a ballast weight which is installed on fuselage station 230 bulkhead. This weight must be installed and removed with the skis.

When skis have been installed by anyone other than the factory, the Repair and Alteration Form FAA-337 must be consulted for the licensed empty weight and moment of your skiplane.



*Section I*

# FLOATPLANE

# OPERATING CHECK LIST

## BEFORE ENTERING THE FLOATPLANE.

(1) Inspect the floats and fairings for dents, cracks, scratches, etc.
(2) Remove rubber balls (which serve as a stopper on the standpipe in each float compartment) and pump out any accumulation of water. Reinstall rubber balls with enough pressure for a snug fit.

## BEFORE STARTING ENGINE.

(1) Operate and visually check the water rudders for proper retraction and rudder action.
(2) Water Rudders -- Down for taxiing.

## TAKE-OFF.

(1) Water Rudders -- Up.
(2) Set wing flaps 20° (second notch).
(3) Hold the control wheel full back and advance the throttle slowly.
(4) Place the airplane in a planing attitude (on the step) by slowly moving the control wheel forward when the bow wave moves aft of the wing strut position.
(5) As the airplane accelerates, apply light control wheel back pressure and allow the airplane to fly off smoothly.

NOTE

To reduce take-off water run, the technique of raising one float out of the water may be used. This procedure is described on page 1-5 under paragraph "Normal Take-Off."

(6) Climb out at 75-85 MPH. With obstacles ahead, climb at 65 MPH.

## CLIMB.

The maximum rate of climb is obtained with flaps retracted at full throttle, 2600 RPM and 83 MPH (see Maximum Rate-Of-Climb Data chart, figure 1-7).

## BEFORE LANDING.

(1) Water Rudders -- Up.
(2) Maintain 75-85 MPH with wing flaps extended.

## LANDING.

(1) Landing technique is conventional for all wing flap settings.

## AFTER LANDING.

(1) Water Rudders -- Down.



### B. WHEEL REPLACEMENT SKIS.

(1) The conventional wheel and brake assembly on each main landing gear is replaced with a main gear ski assembly including special attaching parts and rigging components together with specially designed Cessna ski axles.

(2) A tailwheel ski, designed with an opening in the bottom of the ski, is mounted such that the tailwheel protrudes below the ski for operation on either snow or bare surfaces.

## TAXIING.

Normal skiplane taxiing techniques are used. Due to the characteristics of tail ski steering, the minimum turning radius is increased as compared to landplane taxiing with the use of brakes.

NOTE

Do not extend or retract the skis while in motion on the ground. Landing gear drag, caused by one ski preceding the other during the retraction or extension cycle, will result in a ground looping tendency.

## TAKE-OFF.

Under the most favorable conditions of smooth packed snow at temperatures approximately 32° F., skiplane take-off distance is approximately 10% greater than the distance for the landplane. Caution should be exercised in that lower temperatures or other snow conditions will usually increase this distance.

## CLIMB.

Skiplane airspeeds and techniques used during climb are identical to those used for the landplane. The rate of climb is approximately 50 to 200 feet per minute lower due to the additional drag of the ski installation, depending upon (1) the type of ski (wheel replacement or wheel), or ski rigging, and (3) ice accumulation.

## THE SKIPLANE.

The skiplane is identical to the landplane with the following exceptions:

### A. RETRACTABLE WHEEL SKIS.

(1) Main wheel skis are attached to the landing gear strut at the wheel by a link which allows the ski to be moved aft and down so that the airplane rests on the ski for operation on snow, or forward and up so that the wheel protrudes below the bottom of the ski for operation on bare surfaces.

The skis are actuated by a hydraulic system consisting of a hand pump and selector valve in the cabin, and hydraulic actuators on each ski. The hydraulic controls are contained in a pedestal mounted on the cabin floor just to the right of the floor tunnel.

A fixed tailwheel ski, designed with an opening in the bottom of the ski, is mounted such that the tailwheel protrudes below the ski for operation on either snow or bare surfaces.

(2) To retract or extend the main landing gear skis:

(a) Move selector valve lever to "WHEELS" for operation on wheels, or to "SKIS" for operation on skis.

(b) Operate hydraulic pump handle until it can no longer be moved (due to hydraulic pressure buildup when the ski actuators reach the end of their travel).

(c) Return selector valve lever to "NEUT" position. This locks the hydraulic system and prevents creepage or further motion of the hydraulic components.

NOTE

Do not cycle the skis while taxiing or while parked on abrasive surfaces.



DESCRIPTION AND OPERATING DETAILS

## THE FLOATPLANE.

The floatplane is identical to the landplane with the following exceptions:

(1) Floats, incorporating a water rudder steering system, replace the landing gear. A water rudder retraction handle, connected to the water rudders by cables and springs, is located on the cabin floor tunnel.
(2) Additional fuselage structure is added to support the float installation.
(3) An additional structural "V" brace is installed between the top of the front door posts and the cowl deck.
(4) The airplane has additional corrosion-proofing and stainless steel cables.
(5) On aircraft with Edo Model 628-2960 floats, the standard airspeed indicator is replaced with an indicator having a recalibrated airspeed indicator dial. (The standard landplane airspeed indicator dial is utilized on aircraft with Edo Model 249A-2870 floats.)
(6) The standard propeller is replaced with a propeller of larger diameter (88 inches).
(7) A reinforced engine mount replaces the standard engine mount.
(8) Cowl flap stops are installed to maintain a slight opening of the cowl flaps for increased engine cooling.
(9) Hoisting provisions are added to the top of the fuselage.
(10) Floatplane placards are added.
(11) Fueling steps and assist handles are mounted on the forward fuselage, and steps are mounted on the wing struts to aid in refueling the airplane. Inboard fuel fillers are added when long range fuel tanks are installed.

NOTE

A reduction of approximately five gallons of usable fuel in each tank will result when inboard fillers are used to fill the long range fuel tanks.

### WATER RUDDER STEERING SYSTEM.

Retractable water rudders, mounted at the aft end of each float, are

connected by a system of cables and springs to the airplane rudder pedals. When the water rudders are extended, normal pedal operation moves the water rudders to provide steering control for taxiing.

A water rudder retraction handle, located on the cabin floor tunnel, is used to manually raise and lower the water rudders. During take-off, landing, and in flight, the retraction handle is normally full aft in the "RETRACT" position. With the handle in this position, the water rudders are up. When the handle is moved full forward to the "EXTEND" position, the water rudders are down.

The retraction handle incorporates a spring-loaded catch device located near the cross-bar at the end of the handle. The catch is designed to latch over a locking pin when the retraction handle is pulled aft to "RETRACT," thereby securing the handle in the retracted position.

Pulling the exposed end of the retraction handle catch aft, while pushing downward slightly on the retraction handle with the right hand, will release the handle from the retraction locking pin. The handle then can be rotated full forward to extend the water rudders for taxiing.

## TAXIING.

Taxi with water rudders down. It is best to limit the engine speed to 1000 RPM for normal taxi because water piles up in front of the float bow at higher engine speeds. Taxiing with higher engine RPM may result in engine overheating and will not appreciably increase the taxi speed.

For minimum taxi speed in close quarters, use idle RPM with full carburetor heat 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 in close quarters. In addition to the normal flight controls, the wing flaps, cabin doors, and water rudders will aid in "sailing."

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



*Section III*

# SKIPLANE

## OPERATING CHECK LIST

### BEFORE ENTERING THE SKIPLANE.

(1) Check that the skis are not frozen to the snow or icy surface.
(2) Check hydraulic components for leakage, and skis and attachments for condition (retractable wheel skis only).
(3) Check the Weight and Balance Data, and load the airplane to maintain the center of gravity within designated limits.

NOTE

The installation of skis causes a significant forward shift in center of gravity location, and ballast is required under certain loading conditions. Refer to Weight and Balance, page 3-4, for additional information.

### BEFORE TAKE-OFF.

(1) A full throttle RPM check is recommended only when the condition of the engine is in doubt. Due to the absence of brakes on the skiplane, this check is normally done during the initial portion of the take-off.
(2) Check that the gear is pumped to the maximum position (retractable wheel skis only).

### LANDING.

(1) Visually check position of main wheel ski. If a wheel landing is intended, the skis should be retracted; when a landing on skis is intended, the skis should be extended beneath the landing gear wheels.
(2) Check that the gear is pumped to the maximum position (retractable wheel skis only).
(3) The landing technique is conventional for all wing flap settings.

# TAKE-OFF.

## NORMAL TAKE-OFF.

The use of 20° wing flaps (second notch) throughout the take-off run is recommended. Take-off distances are given on figure 1-6.

Apply full throttle smoothly and hold the control wheel full back. Watch the point where the bow wave leaves the float and move the control wheel forward slowly as this point moves aft of the wing strut. Slow control movement and light control pressures produce the best results. Attempts to force the airplane into the planing attitude will generally result in loss of speed and delay in getting on the step. The airplane will assume a planing attitude which permits acceleration to take-off speed (50 to 60 MPH) at which time the airplane will fly off smoothly.

If lift off is difficult due to high lake elevation or glassy water, the following procedure is recommended: With the airplane in the planing position, apply full aileron to raise one float out of the water. When one float leaves the water, apply slight elevator back pressure to complete the take-off. 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 airplane accelerates to take-off speed almost instantly.

If porpoising is encountered while on the step, apply additional control wheel back pressure to correct the excessively nose-low attitude.

## CROSSWIND TAKE-OFF.

Start the take-off run with flaps up and water rudders extended for better directional control. Flaps are extended to 20° and the water rudders are retracted when the airplane is on the step; the remainder of the take-off is normal. If the floats are lifted from the water one at a time, the down-wind float should be lifted first.

# CLIMB.

Normal climbs are conducted at 90-110 MPH with wing flaps up and cowl flaps opened as required for engine cooling. If optimum flaps-up climb performance is desired, climb at 83 MPH at sea level with full throttle and 2600 RPM. Reduce this climb speed about 1/2 MPH for each 1000 feet above sea level.

To climb steeply over an obstacle with wing flaps retracted, use an obstacle clearance speed of 70 MPH.

NOTE

Steep climbs at these low speeds should be of short duration to improve engine cooling.

To clear an obstacle after take-off with 20° wing flaps, use an obstacle clearance speed of 65 MPH. Upon reaching a safe altitude and airspeed, retract the wing flaps slowly, especially when flying over glassy water, because a loss of altitude is not very apparent over such a surface.

## CRUISE.

Observe the same engine speed limits as for the landplane. Speed, range and endurance are shown on the Cruise Performance charts, figure 1-8.

NOTE

Range and endurance figures must be reduced to allow for a reduction of approximately five gallons of usable fuel in each tank when inboard fillers are used to fill the long range fuel tanks.

## LANDING.

Power-off landings may be made with any wing flap setting. However, with glassy water it is recommended that a power approach and landing be made with 0° - 20° wing flaps to maintain a low rate of descent.

# OPERATING LIMITATIONS

## MAXIMUM GROSS WEIGHT.

Floatplane with Edo Model 249A-2870 Floats . . . . . 2820 lbs
Floatplane with Edo Model 628-2960 Floats . . . . . 2950 lbs



**AMPHIBIAN LANDING DISTANCE ... WATER**

LANDING DISTANCE WITH 40° FLAPS ON SHELTERED WATER

| GROSS WEIGHT POUNDS | APPROACH IAS MPH | AT SEA LEVEL & 59°F | | AT 2500 FT. & 50°F | | AT 5000 FT. & 41°F | | AT 7500 FT. & 32°F | |
|---|---|---|---|---|---|---|---|---|---|
| | | WATER RUN | TOTAL TO CLEAR 50' OBS | WATER RUN | TOTAL TO CLEAR 50' OBS | WATER RUN | TOTAL TO CLEAR 50' OBS | WATER RUN | TOTAL TO CLEAR 50' OBS |
| 2950 | 76 | 735 | 1720 | 860 | 1915 | 995 | 2125 | 1155 | 2380 |

NOTE: DISTANCES SHOWN ARE BASED ON ZERO WIND AND POWER OFF.
REDUCE LANDING DISTANCES 10% FOR EACH 6 MPH HEADWIND.

**AMPHIBIAN LANDING DISTANCE ... LAND**

LANDING DISTANCE WITH 40° FLAPS ON HARD SURFACED RUNWAY

| GROSS WEIGHT POUNDS | APPROACH IAS MPH | AT SEA LEVEL & 59°F | | AT 2500 FT. & 50°F | | AT 5000 FT. & 41°F | | AT 7500 FT. & 32°F | |
|---|---|---|---|---|---|---|---|---|---|
| | | GROUND ROLL | TOTAL TO CLEAR 50' OBS | GROUND ROLL | TOTAL TO CLEAR 50' OBS | GROUND ROLL | TOTAL TO CLEAR 50' OBS | GROUND ROLL | TOTAL TO CLEAR 50' OBS |
| 2950 | 76 | 1025 | 1490 | 1090 | 1580 | 1150 | 1675 | 1225 | 1780 |

NOTE: DISTANCES SHOWN ARE BASED ON ZERO WIND AND POWER OFF.
REDUCE LANDING DISTANCES 10% FOR EACH 6 MPH HEADWIND.

Figure 2-9.

## CRUISE PERFORMANCE
AMPHIBIAN

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 2950 Pounds

| RPM | MP | % BHP | TAS MPH | GAL/ HOUR | 60 GAL (NO RESERVE) ENDR. HOURS | 60 GAL (NO RESERVE) RANGE MILES | 79 GAL (NO RESERVE) ENDR. HOURS | 79 GAL (NO RESERVE) RANGE MILES |
|---|---|---|---|---|---|---|---|---|
| **7500 FEET** | | | | | | | | |
| 2450 | 21 | 70 | 145 | 13.0 | 4.6 | 670 | 6.1 | 880 |
| | 20 | 66 | 141 | 12.3 | 4.9 | 690 | 6.4 | 910 |
| | 19 | 62 | 137 | 11.6 | 5.2 | 710 | 6.8 | 935 |
| | 18 | 58 | 133 | 11.0 | 5.5 | 725 | 7.2 | 955 |
| 2300 | 21 | 65 | 141 | 12.0 | 5.0 | 700 | 6.6 | 925 |
| | 20 | 62 | 137 | 11.4 | 5.3 | 720 | 6.9 | 950 |
| | 19 | 58 | 133 | 10.8 | 5.5 | 740 | 7.3 | 970 |
| | 18 | 54 | 128 | 10.2 | 5.9 | 755 | 7.7 | 995 |
| 2200 | 21 | 61 | 137 | 11.2 | 5.4 | 735 | 7.1 | 965 |
| | 20 | 58 | 133 | 10.6 | 5.7 | 750 | 7.5 | 990 |
| | 19 | 54 | 128 | 10.0 | 6.0 | 770 | 7.9 | 1010 |
| | 18 | 50 | 123 | 9.5 | 6.3 | 780 | 8.3 | 1025 |
| 2000 MAXIMUM RANGE SETTINGS | 18 | 42 | 110 | 8.1 | 7.4 | 820 | 9.8 | 1080 |
| | 17 | 39 | 102 | 7.5 | 8.0 | 815 | 10.5 | 1075 |
| | 16 | 35 | 95 | 7.0 | 8.6 | 815 | 11.3 | 1070 |
| | 15 | 32 | 87 | 6.4 | 9.4 | 810 | 12.3 | 1065 |
| **10,000 FEET** | | | | | | | | |
| 2450 | 19 | 63 | 142 | 11.8 | 5.1 | 720 | 6.7 | 945 |
| | 18 | 59 | 137 | 11.2 | 5.4 | 735 | 7.1 | 970 |
| | 17 | 55 | 132 | 10.6 | 5.7 | 750 | 7.5 | 990 |
| | 16 | 51 | 126 | 9.9 | 6.1 | 765 | 8.0 | 1005 |
| 2300 | 19 | 59 | 137 | 11.0 | 5.4 | 745 | 7.2 | 985 |
| | 18 | 55 | 133 | 10.4 | 5.7 | 760 | 7.6 | 1005 |
| | 17 | 51 | 127 | 9.8 | 6.1 | 775 | 8.0 | 1020 |
| | 16 | 47 | 120 | 9.2 | 6.5 | 785 | 8.6 | 1035 |
| 2200 | 19 | 55 | 133 | 10.3 | 5.8 | 775 | 7.7 | 1020 |
| | 18 | 51 | 127 | 9.7 | 6.2 | 790 | 8.1 | 1040 |
| | 17 | 48 | 121 | 9.1 | 6.6 | 800 | 8.7 | 1050 |
| | 16 | 44 | 115 | 8.5 | 7.0 | 805 | 9.3 | 1060 |
| 2000 MAXIMUM RANGE SETTINGS | 18 | 44 | 114 | 8.3 | 7.2 | 830 | 9.5 | 1090 |
| | 17 | 40 | 106 | 7.8 | 7.7 | 825 | 10.2 | 1085 |
| | 16 | 37 | 98 | 7.2 | 8.3 | 820 | 10.9 | 1080 |
| | 15 | 33 | 91 | 6.7 | 9.0 | 815 | 11.9 | 1075 |

NOTE: Range and endurance figures must be reduced to allow for a reduction of approximately five gallons of usable fuel in each tank when inboard fillers are used to fill long range fuel tanks.

Figure 2-8 (Sheet 2 of 2).



## AIRSPEED INDICATOR MARKINGS.

The following is a list of the certificated calibrated airspeed markings (CAS) for the floatplane with Edo Model 628-2960 floats. Indicator markings for the floatplane with Edo Model 249A-2870 floats are found in the landplane Owner's Manual.

| | |
|---|---|
| Never Exceed (glide or dive, smooth air) | 164 MPH (red line) |
| Caution Range | 130-164 MPH (yellow arc) |
| Normal Operating Range | 64-130 MPH (green arc) |
| Flap Operating Range | 55-100 MPH (white arc) |

## WEIGHT AND BALANCE.

The following information will enable you to operate your floatplane within the prescribed weight and center of gravity limitations.

In figuring your loading problems, be certain that you use the Licensed Empty Weight of your particular floatplane as shown on its Weight and Balance Data sheet. This sheet, plus an Equipment List, is included with each floatplane as it leaves the factory. When the floats have been installed by anyone other than the factory, the Repair and Alteration Form FAA-337 must be consulted for proper weight and balance information.

The loading instructions given in the Owner's Manual for the landplane should be used as a guide when figuring floatplane weight and balance problems. In conjunction with these instructions, use the Seating-Cargo Arrangements Diagram and Cabin Stations Diagram in the Owner's Manual and the Sample Problem, Loading Graph and Center of Gravity Moment Envelope in this supplement.

# SAMPLE LOADING PROBLEM

FLOATPLANE

| | | SAMPLE AIRPLANE | | YOUR AIRPLANE | |
|---|---|---|---|---|---|
| | | Weight (lbs.) | Moment (lb.-ins. /1000) | Weight (lbs.) | Moment (lb.-ins. /1000) |
| 1. | Licensed Empty Weight (Sample Airplane) | 1975 | 77.7 | | |
| 2. | Oil (12 qts.-Full oil may be assumed for all flights.) | 22 | -0.3 | 22 | -0.3 |
| 3. | Fuel (60 gal. @ 6 lbs./gallon) | 360 | 17.3 | | |
| | Fuel (Long Range - 79 gal. @ 6 lbs./gallon) | | | | |
| 4. | Pilot and Copilot | 340 | 12.2 | | |
| 5. | Center Passengers (6-place version) | | | | |
| | Aft Passengers IV (6-place version) | | | | |
| | Rear Passengers V (4-place version) | 170 | 11.9 | | |
| 6. | Baggage V * | 83 | 7.8 | | |
| | Cargo "A" * | | | | |
| | Cargo "B" * | | | | |
| | Cargo "C" * | | | | |
| | Cargo "D" * | | | | |
| | Aft Baggage * | | | | |
| 7. | TOTAL WEIGHT AND MOMENT | 2950 | 126.6 | | |

8. Locate this point (2950 at 126.6) on the center of gravity moment envelope, and since this point falls within the envelope, the loading is acceptable.

* Refer to the seating and cargo arrangements diagram in the Owner's Manual for maximum allowable weights in these areas.

Figure 1-1.





# CRUISE PERFORMANCE

AMPHIBIAN

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight - 2950 Pounds

| RPM | MP | % BHP | TAS MPH | GAL/ HOUR | 60 GAL (NO RESERVE) ENDR. HOURS | 60 GAL (NO RESERVE) RANGE MILES | 79 GAL (NO RESERVE) ENDR. HOURS | 79 GAL (NO RESERVE) RANGE MILES |
|---|---|---|---|---|---|---|---|---|
| **2500 FEET** | | | | | | | | |
| 2450 | 23 | 76 | 142 | 14.1 | 4.3 | 605 | 5.6 | 795 |
| | 22 | 72 | 139 | 13.3 | 4.5 | 625 | 5.9 | 825 |
| | 21 | 68 | 137 | 12.6 | 4.8 | 650 | 6.3 | 855 |
| | 20 | 64 | 133 | 11.9 | 5.0 | 670 | 6.6 | 885 |
| 2300 | 23 | 70 | 138 | 12.9 | 4.6 | 640 | 6.1 | 845 |
| | 22 | 67 | 136 | 12.3 | 4.9 | 665 | 6.4 | 875 |
| | 21 | 63 | 132 | 11.6 | 5.2 | 685 | 6.8 | 900 |
| | 20 | 59 | 129 | 11.0 | 5.5 | 705 | 7.2 | 925 |
| 2200 | 23 | 66 | 135 | 11.9 | 5.0 | 680 | 6.6 | 890 |
| | 22 | 62 | 132 | 11.3 | 5.3 | 700 | 7.0 | 920 |
| | 21 | 58 | 128 | 10.7 | 5.6 | 720 | 7.4 | 945 |
| | 20 | 54 | 124 | 10.1 | 5.9 | 735 | 7.8 | 970 |
| 2000 MAXIMUM RANGE SETTINGS | 19 | 42 | 108 | 8.1 | 7.4 | 800 | 9.7 | 1055 |
| | 18 | 39 | 102 | 7.6 | 7.9 | 810 | 10.4 | 1065 |
| | 17 | 36 | 95 | 7.0 | 8.5 | 805 | 11.2 | 1060 |
| | 16 | 32 | 87 | 6.5 | 9.3 | 800 | 12.2 | 1055 |
| **5000 FEET** | | | | | | | | |
| 2450 | 23 | 77 | 146 | 14.3 | 4.2 | 615 | 5.5 | 810 |
| | 22 | 73 | 143 | 13.5 | 4.4 | 635 | 5.8 | 840 |
| | 21 | 69 | 141 | 12.8 | 4.7 | 660 | 6.2 | 870 |
| | 20 | 65 | 137 | 12.1 | 5.0 | 680 | 6.5 | 895 |
| 2300 | 23 | 71 | 142 | 13.1 | 4.6 | 650 | 6.0 | 855 |
| | 22 | 68 | 140 | 12.5 | 4.8 | 670 | 6.3 | 885 |
| | 21 | 64 | 136 | 11.8 | 5.1 | 695 | 6.7 | 910 |
| | 20 | 60 | 133 | 11.2 | 5.4 | 710 | 7.1 | 935 |
| 2200 | 23 | 67 | 139 | 12.2 | 4.9 | 685 | 6.5 | 900 |
| | 22 | 63 | 136 | 11.6 | 5.2 | 705 | 6.8 | 930 |
| | 21 | 60 | 132 | 10.9 | 5.5 | 725 | 7.2 | 955 |
| | 20 | 56 | 129 | 10.4 | 5.8 | 745 | 7.6 | 980 |
| 2000 MAXIMUM RANGE SETTINGS | 19 | 44 | 112 | 8.3 | 7.2 | 805 | 9.5 | 1060 |
| | 18 | 41 | 106 | 7.8 | 7.7 | 815 | 10.1 | 1075 |
| | 17 | 37 | 98 | 7.3 | 8.2 | 810 | 10.8 | 1070 |
| | 16 | 34 | 91 | 6.7 | 8.9 | 805 | 11.7 | 1065 |

NOTE: Range and endurance figures must be reduced to allow for a reduction of approximately five gallons of usable fuel in each tank when inboard fillers are used to fill long range fuel tanks.

Figure 2-8 (Sheet 1 of 2).

# AMPHIBIAN MAXIMUM RATE-OF-CLIMB DATA

| GROSS WEIGHT LBS. | AT SEA LEVEL & 59°F. | | | AT 5000 FT. & 41°F. | | | AT 10,000 FT. & 23°F. | | | AT 15,000 FT. & 5°F. | | | AT 20,000 FT. & -12°F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IAS MPH | RATE OF CLIMB FT/MIN | GAL. OF FUEL USED | IAS MPH | RATE OF CLIMB FT/MIN | FROM S. L. FUEL USED | IAS MPH | RATE OF CLIMB FT/MIN | FROM S. L. FUEL USED | IAS MPH | RATE OF CLIMB FT/MIN | FROM S. L. FUEL USED | IAS MPH | RATE OF CLIMB FT/MIN | FROM S. L. FUEL USED |
| 2950 | 83 | 990 | 1.5 | 81 | 715 | 3.6 | 78 | 430 | 6.5 | 75 | 155 | 12.1 | --- | --- | --- |
| 2600 | 80 | 1230 | 1.5 | 78 | 925 | 3.2 | 75 | 625 | 5.3 | 71 | 325 | 8.5 | 69 | 20 | 19.1 |
| 2300 | 78 | 1480 | 1.5 | 76 | 1150 | 2.9 | 73 | 820 | 4.8 | 68 | 490 | 7.1 | 65 | 160 | 12.0 |

NOTES: 1. FLAPS UP, FULL THROTTLE, 2600 RPM, AND MIXTURE LEANED FOR SMOOTH OPERATION ABOVE 5000 FT.
2. FUEL USED INCLUDES WARM-UP AND TAKE-OFF ALLOWANCES.
3. FOR HOT WEATHER, DECREASE RATE OF CLIMB 30 FT./MIN. FOR EACH 10°F ABOVE STANDARD DAY TEMPERATURE FOR PARTICULAR ALTITUDE.

Figure 2-7.

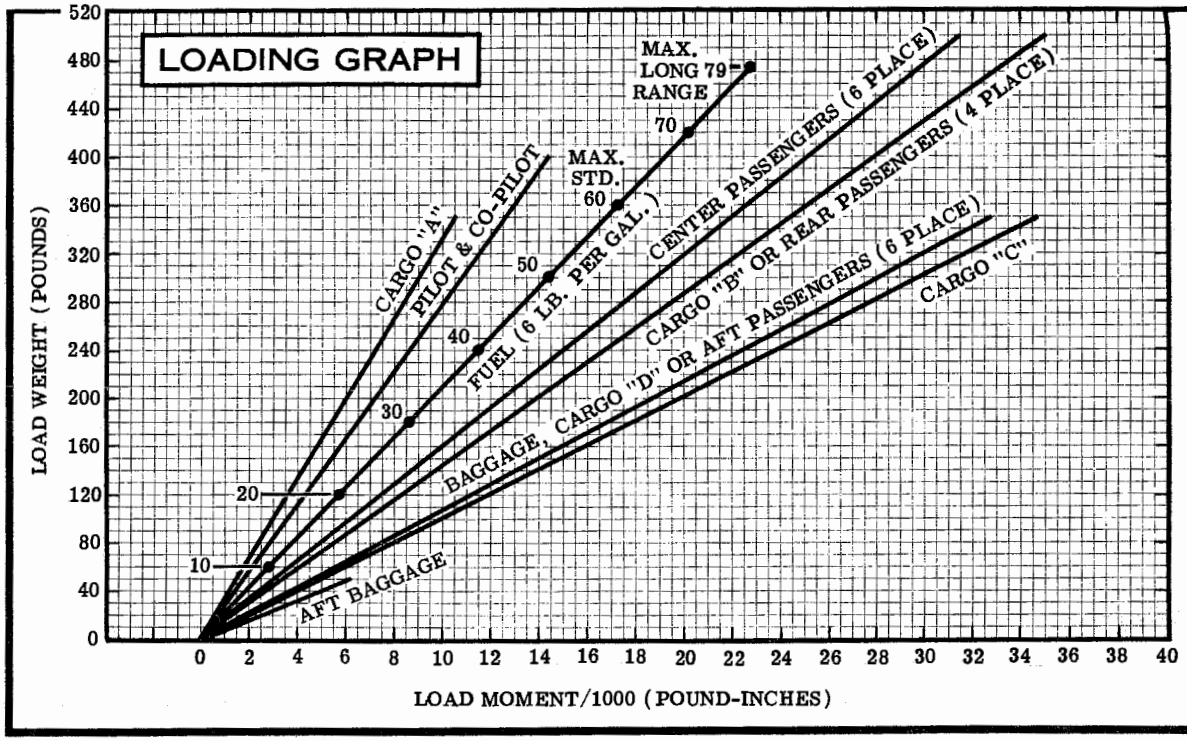


Figure 1-2.

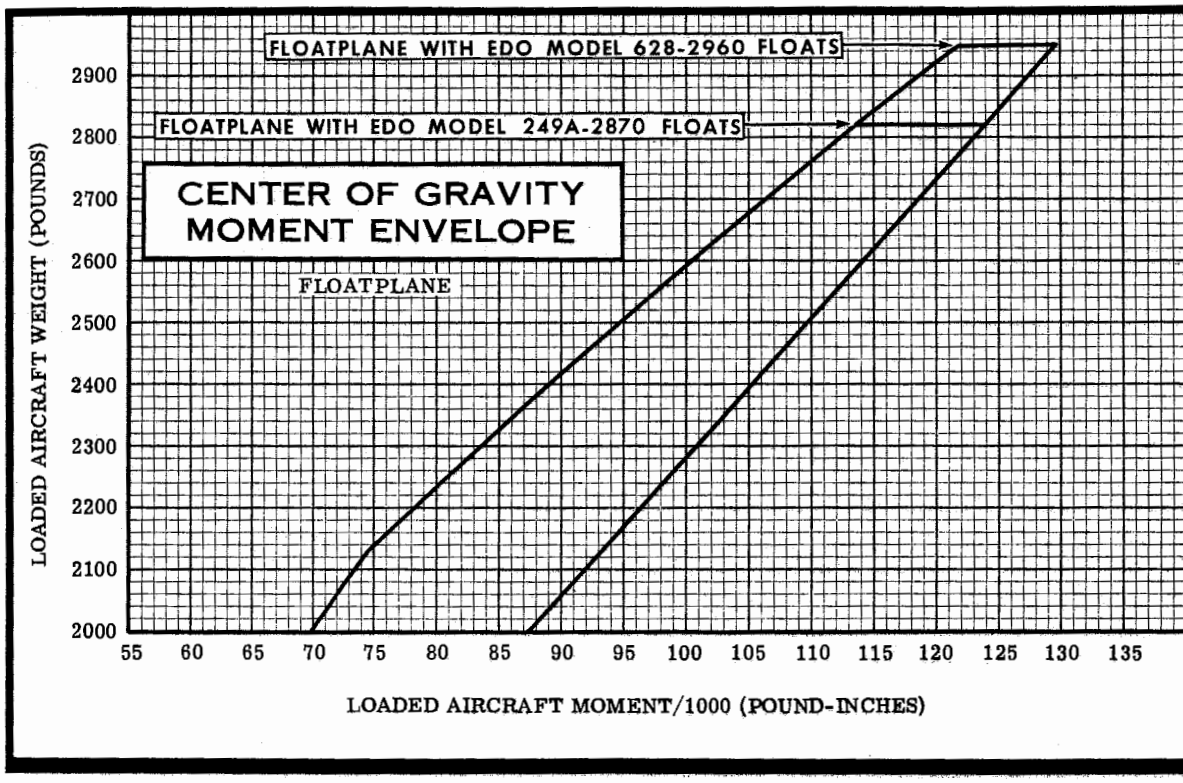


Figure 1-3.

## AMPHIBIAN TAKE-OFF DATA...WATER

TAKE-OFF DISTANCE WITH 20° FLAPS FROM SHELTERED WATER

| GROSS WEIGHT LBS. | IAS @ 50 FT. | HEAD WIND MPH | AT SEA LEVEL & 59°F. | | AT 2500 FT. & 50°F. | | AT 5000 FT. & 41°F. | | AT 7500 FT. & 32°F. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | WATER RUN | TOTAL TO CLEAR 50' OBSTACLE | WATER RUN | TOTAL TO CLEAR 50' OBSTACLE | WATER RUN | TOTAL TO CLEAR 50' OBSTACLE | WATER RUN | TOTAL TO CLEAR 50' OBSTACLE |
| 2950 | 65 | 0 | 1280 | 2070 | 1610 | 2575 | 2035 | 3240 | 2630 | 4320 |
| | | 15 | 830 | 1450 | 1045 | 1820 | 1345 | 2325 | 1770 | 3145 |
| | | 30 | 460 | 925 | 600 | 1190 | 790 | 1550 | 1070 | 2145 |
| 2600 | 61 | 0 | 925 | 1530 | 1140 | 1850 | 1415 | 2275 | 1795 | 2880 |
| | | 15 | 570 | 1045 | 720 | 1280 | 910 | 1595 | 1175 | 2050 |
| | | 30 | 295 | 640 | 390 | 800 | 510 | 1025 | 680 | 1340 |
| 2300 | 58 | 0 | 675 | 1170 | 825 | 1390 | 1015 | 1670 | 1270 | 2015 |
| | | 15 | 400 | 785 | 500 | 940 | 630 | 1145 | 805 | 1400 |
| | | 30 | 195 | 465 | 255 | 570 | 335 | 710 | 440 | 880 |

NOTE: INCREASE DISTANCES 10% FOR EACH 25°F. ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE.

## AMPHIBIAN TAKE-OFF DATA...LAND

TAKE-OFF DISTANCE WITH 20° FLAPS FROM HARD SURFACED RUNWAY

| GROSS WEIGHT LBS. | IAS @ 50 FT. | HEAD WIND MPH | AT SEA LEVEL & 59°F. | | AT 2500 FT. & 50°F. | | AT 5000 FT. & 41°F. | | AT 7500 FT. & 32°F. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | GROUND RUN | TOTAL TO CLEAR 50' OBSTACLE | GROUND RUN | TOTAL TO CLEAR 50' OBSTACLE | GROUND RUN | TOTAL TO CLEAR 50' OBSTACLE | GROUND RUN | TOTAL TO CLEAR 50' OBSTACLE |
| 2950 | 70 | 0 | 1360 | 2185 | 1640 | 2630 | 2045 | 3270 | 2610 | 4190 |
| | | 15 | 940 | 1515 | 1160 | 1850 | 1480 | 2350 | 1910 | 3075 |
| | | 30 | 605 | 955 | 750 | 1210 | 990 | 1590 | 1330 | 2120 |
| 2600 | 66 | 0 | 875 | 1400 | 1085 | 1735 | 1340 | 2145 | 1685 | 2695 |
| | | 15 | 610 | 975 | 755 | 1210 | 940 | 1505 | 1210 | 1935 |
| | | 30 | 375 | 605 | 480 | 765 | 605 | 970 | 800 | 1285 |
| 2400 | 63 | 0 | 710 | 1135 | 855 | 1365 | 1050 | 1685 | 1310 | 2095 |
| | | 15 | 480 | 765 | 585 | 935 | 730 | 1170 | 925 | 1480 |
| | | 30 | 290 | 460 | 360 | 580 | 465 | 740 | 600 | 965 |

NOTE: INCREASE DISTANCES 10% FOR EACH 25°F. ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE.

Figure 2-6.

| STALLING SPEEDS | POWER OFF — MPH-CAS<br>AMPHIBIAN WITH EDO MODEL 597-2790 FLOATS | | |
|---|---|---|---|
| *Gross Weight* 2950 LBS. | ANGLE OF BANK | | |
| CONFIGURATION | 0° | 30° | 60° |
| FLAPS UP | 65 | 70 | 92 |
| FLAPS 20° | 61 | 66 | 86 |
| FLAPS 40° | 58 | 62 | 82 |

Figure 2-5.



# OPERATIONAL DATA

In the Cruise Performance charts, figure 1-8, range and endurance are given for lean mixture, and are based on an aircraft equipped with Edo Model 628-2960 Floats at zero wind, 60 and 79 gallons of fuel for cruise, 2950 pounds gross weight and standard atmospheric conditions. (There are no significant differences in performance for aircraft equipped with Edo Model 249A-2870 Floats at 2820 pounds gross weight).

Allowances for fuel reserve, headwinds, take-off and climb, and variations in mixture leaning technique should be made and are in addition to those on the charts. Other indeterminate variables such as carburetor metering-characteristics, engine and propeller conditions, and turbulence of the atmosphere may account for variations of 10% or more in maximum range.

| AIRSPEED CORRECTION TABLE<br>FLOATPLANE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FLAPS UP | | | | | | | | |
| IAS-MPH | 60 | 80 | 100 | 120 | 140 | 160 | | |
| CAS-MPH | 68 | 84 | 101 | 120 | 138 | 158 | | |
| *FLAPS DOWN | | | | | | | | |
| IAS-MPH | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 |
| CAS-MPH | 55 | 60 | 67 | 75 | 84 | 93 | 102 | 111 |
| *MAXIMUM FLAP SPEED 110 MPH, CAS | | | | | | | | |

Figure 1-4.

## STALLING SPEEDS

POWER OFF — MPH-CAS
FLOATPLANE WITH EDO MODEL 628-2960 FLOATS

| *Gross Weight* 2950 LBS. CONFIGURATION | ANGLE OF BANK 0° | 30° | 60° |
|---|---|---|---|
| FLAPS UP | 65 | 70 | 92 |
| FLAPS 20° | 61 | 66 | 86 |
| FLAPS 40° | 58 | 62 | 82 |

NOTE: WHEN THE AIRCRAFT IS EQUIPPED WITH EDO MODEL 249A-2870 FLOATS, STALL SPEEDS ARE APPROXIMATELY 1 MPH LESS THAN THE FIGURES SHOWN ABOVE BECAUSE OF REDUCED GROSS WEIGHT.

Figure 1-5.



# OPERATIONAL DATA

In the Cruise Performance charts, figure 2-8, range and endurance are given for lean mixture, and are based on an aircraft equipped with Edo Model 597-2790 Amphibious Floats at zero wind, 60 and 79 gallons of fuel for cruise, 2950 pounds gross weight and standard atmospheric conditions.

Allowances for fuel reserve, headwinds, take-off and climb, and variations in mixture leaning technique should be made and are in addition to those on the charts. Other indeterminate variables such as carburetor metering-characteristics, engine and propeller conditions, and turbulence of the atmosphere may account for variations of 10% or more in maximum range.

## AIRSPEED CORRECTION TABLE

AMPHIBIAN

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **FLAPS UP** | | | | | | | | |
| IAS-MPH | 60 | 80 | 100 | 120 | 140 | 160 | | |
| CAS-MPH | 68 | 84 | 101 | 120 | 138 | 158 | | |
| ***FLAPS DOWN** | | | | | | | | |
| IAS-MPH | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 |
| CAS-MPH | 55 | 60 | 67 | 75 | 84 | 93 | 102 | 111 |

*MAXIMUM FLAP SPEED 110 MPH, CAS

Figure 2-4.

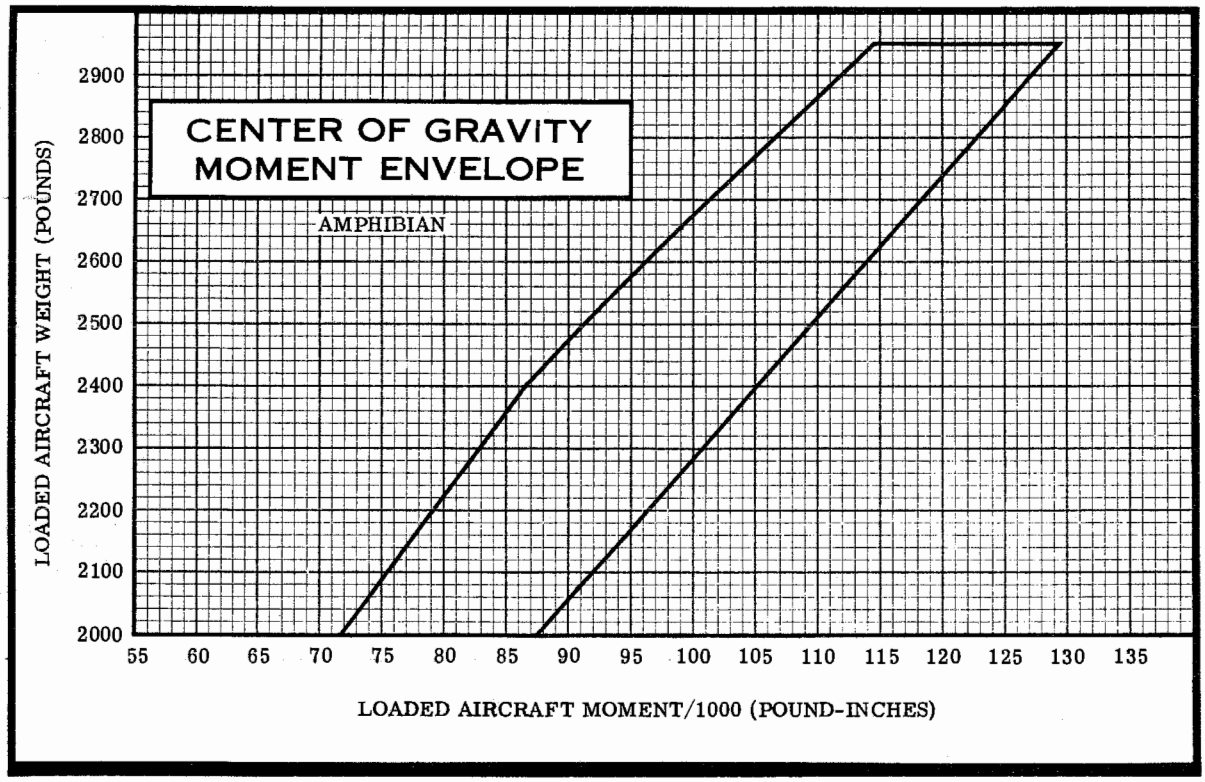


Figure 2-3.

# FLOATPLANE TAKE-OFF DATA

## TAKE-OFF DISTANCE WITH 20° FLAPS FROM SHELTERED WATER

| GROSS WEIGHT LBS. | IAS @ 50 FT. | HEAD WIND MPH | AT SEA LEVEL & 59°F. | | AT 2500 FT. & 50°F. | | AT 5000 FT. & 41°F. | | AT 7500 FT. & 32°F. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | WATER RUN | TOTAL TO CLEAR 50' OBSTACLE | WATER RUN | TOTAL TO CLEAR 50' OBSTACLE | WATER RUN | TOTAL TO CLEAR 50' OBSTACLE | WATER RUN | TOTAL TO CLEAR 50' OBSTACLE |
| 2950 | 65 | 0 | 1280 | 2070 | 1610 | 2575 | 2035 | 3240 | 2630 | 4320 |
| | | 15 | 830 | 1450 | 1045 | 1820 | 1345 | 2325 | 1770 | 3145 |
| | | 30 | 460 | 925 | 600 | 1190 | 790 | 1550 | 1070 | 2145 |
| 2820 (SEE NOTE I BELOW) | 64 | 0 | 1145 | 1860 | 1430 | 2290 | 1790 | 2855 | 2300 | 3740 |
| | | 15 | 725 | 1285 | 915 | 1605 | 1170 | 2030 | 1530 | 2700 |
| | | 30 | 390 | 810 | 515 | 1030 | 680 | 1335 | 915 | 1815 |
| 2600 | 61 | 0 | 925 | 1530 | 1140 | 1850 | 1415 | 2275 | 1795 | 2880 |
| | | 15 | 570 | 1045 | 720 | 1280 | 910 | 1595 | 1175 | 2050 |
| | | 30 | 295 | 640 | 390 | 800 | 510 | 1025 | 680 | 1340 |
| 2300 | 58 | 0 | 675 | 1170 | 825 | 1390 | 1015 | 1670 | 1270 | 2015 |
| | | 15 | 400 | 785 | 500 | 940 | 630 | 1145 | 805 | 1400 |
| | | 30 | 195 | 465 | 255 | 570 | 335 | 710 | 440 | 880 |

NOTES: 1. THE MAXIMUM ALLOWABLE GROSS WEIGHT FOR AIRCRAFT EQUIPPED WITH EDO MODEL 249A-2870 FLOATS IS 2820 LBS.
2. INCREASE DISTANCES 10% FOR EACH 25°F. ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE.

Figure 1-6.

# FLOATPLANE MAXIMUM RATE-OF-CLIMB DATA

| GROSS WEIGHT LBS. | AT SEA LEVEL & 59°F. | | | AT 5000 FT. & 41°F. | | | AT 10,000 FT. & 23°F. | | | AT 15,000 FT. & 5°F. | | | AT 20,000 FT. & -12°F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IAS MPH | RATE OF CLIMB FT/MIN | GAL. OF FUEL USED | IAS MPH | RATE OF CLIMB FT/MIN | FROM S.L. FUEL USED | IAS MPH | RATE OF CLIMB FT/MIN | FROM S.L. FUEL USED | IAS MPH | RATE OF CLIMB FT/MIN | FROM S.L. FUEL USED | IAS MPH | RATE OF CLIMB FT/MIN | FROM S.L. FUEL USED |
| 2950 | 83 | 990 | 1.5 | 81 | 715 | 3.6 | 78 | 430 | 6.5 | 75 | 155 | 12.1 | --- | --- | --- |
| 2820 (SEE NOTE 1 BELOW) | 82 | 1075 | 1.5 | 80 | 790 | 3.5 | 77 | 500 | 6.0 | 73 | 215 | 10.4 | --- | --- | --- |
| 2600 | 80 | 1230 | 1.5 | 78 | 925 | 3.2 | 75 | 625 | 5.3 | 71 | 325 | 8.5 | 69 | 20 | 19.1 |
| 2300 | 78 | 1480 | 1.5 | 76 | 1150 | 2.9 | 73 | 820 | 4.8 | 68 | 490 | 7.1 | 65 | 160 | 12.0 |

NOTES:
1. THE MAXIMUM ALLOWABLE GROSS WEIGHT FOR AIRCRAFT EQUIPPED WITH EDO MODEL 249A-2870 FLOATS IS 2820 LBS.
2. FLAPS UP, FULL THROTTLE, 2600 RPM, AND MIXTURE LEANED FOR SMOOTH OPERATION ABOVE 5000 FT.
3. FUEL USED INCLUDES WARM-UP AND TAKE-OFF ALLOWANCES.
4. FOR HOT WEATHER, DECREASE RATE OF CLIMB 30 FT./MIN. FOR EACH 10°F ABOVE STANDARD DAY TEMPERATURE FOR PARTICULAR ALTITUDE.

Figure 1-7.

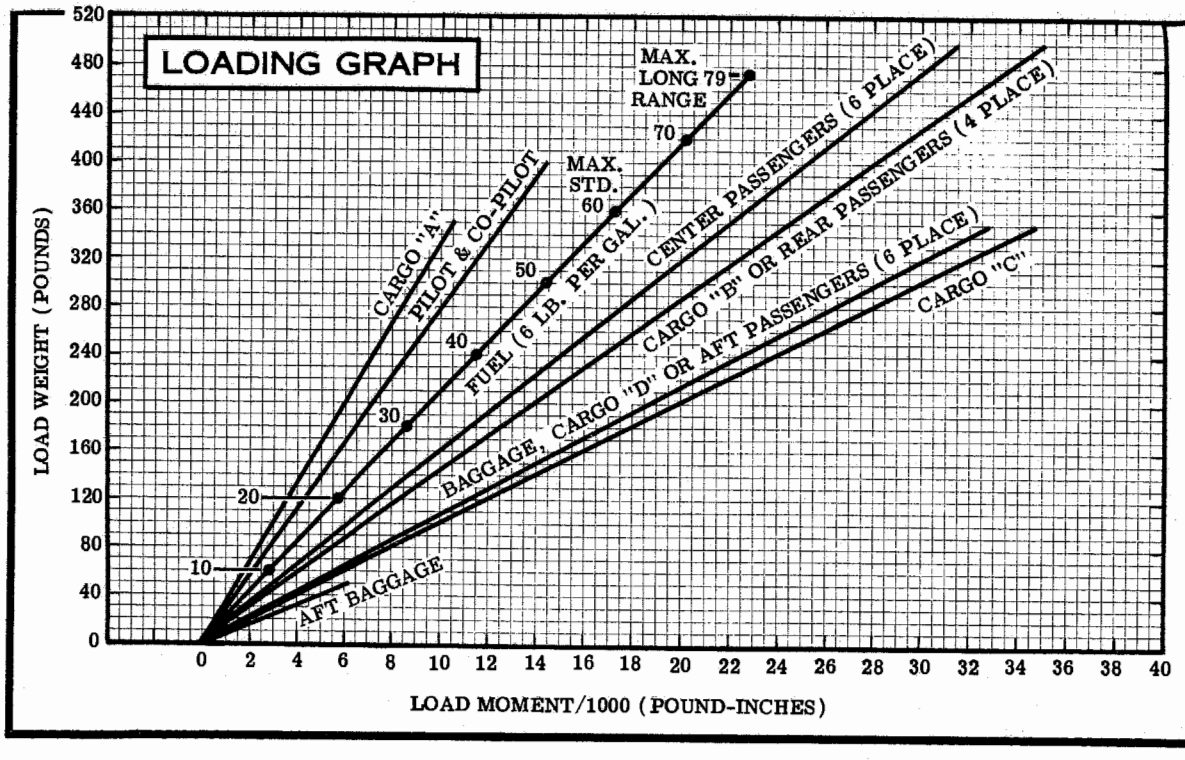


Figure 2-2.

# SAMPLE LOADING PROBLEM

AMPHIBIAN

| | | SAMPLE AIRPLANE | | YOUR AIRPLANE | |
|---|---|---|---|---|---|
| | | Weight (lbs.) | Moment (lb.-ins. /1000) | Weight (lbs.) | Moment (lb.-ins. /1000) |
| 1. | Licensed Empty Weight (Sample Airplane) | 2190 | 83.1 | | |
| 2. | Oil (12 qts.-Full oil may be assumed for all flights.) | 22 | -0.3 | 22 | -0.3 |
| 3. | Fuel (60 gal. @ 6 lbs./gallon) | 360 | 17.3 | | |
| | Fuel (Long Range - 79 gal. @ 6 lbs./gallon) | | | | |
| 4. | Pilot and Copilot | 340 | 12.2 | | |
| 5. | Center Passengers (6-place version) | | | | |
| | Aft Passengers IV (6-place version) | | | | |
| | Rear Passengers V (4-place version) | | | | |
| 6. | Baggage V * | 38 | 3.6 | | |
| | Cargo "A" * | | | | |
| | Cargo "B" * | | | | |
| | Cargo "C" * | | | | |
| | Cargo "D" * | | | | |
| | Aft Baggage * | | | | |
| 7. | TOTAL WEIGHT AND MOMENT | 2950 | 115.9 | | |

8. Locate this point (2950 at 115.9) on the center of gravity moment envelope, and since this point falls within the envelope, the loading is acceptable.

* Refer to the seating and cargo arrangements diagram in the Owner's Manual for maximum allowable weights in these areas.

Figure 2-1.

# CRUISE PERFORMANCE

FLOATPLANE

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 2950 Pounds

| RPM | MP | % BHP | TAS MPH | GAL/ HOUR | 60 GAL (NO RESERVE) ENDR. HOURS | 60 GAL (NO RESERVE) RANGE MILES | 79 GAL (NO RESERVE) ENDR. HOURS | 79 GAL (NO RESERVE) RANGE MILES |
|---|---|---|---|---|---|---|---|---|
| **2500 FEET** | | | | | | | | |
| 2450 | 23 | 76 | 142 | 14.1 | 4.3 | 605 | 5.6 | 795 |
| | 22 | 72 | 139 | 13.3 | 4.5 | 625 | 5.9 | 825 |
| | 21 | 68 | 137 | 12.6 | 4.8 | 650 | 6.3 | 855 |
| | 20 | 64 | 133 | 11.9 | 5.0 | 670 | 6.6 | 885 |
| 2300 | 23 | 70 | 138 | 12.9 | 4.6 | 640 | 6.1 | 845 |
| | 22 | 67 | 136 | 12.3 | 4.9 | 665 | 6.4 | 875 |
| | 21 | 63 | 132 | 11.6 | 5.2 | 685 | 6.8 | 900 |
| | 20 | 59 | 129 | 11.0 | 5.5 | 705 | 7.2 | 925 |
| 2200 | 23 | 66 | 135 | 11.9 | 5.0 | 680 | 6.6 | 890 |
| | 22 | 62 | 132 | 11.3 | 5.3 | 700 | 7.0 | 920 |
| | 21 | 58 | 128 | 10.7 | 5.6 | 720 | 7.4 | 945 |
| | 20 | 54 | 124 | 10.1 | 5.9 | 735 | 7.8 | 970 |
| 2000 MAXIMUM RANGE SETTINGS | 19 | 42 | 108 | 8.1 | 7.4 | 800 | 9.7 | 1055 |
| | 18 | 39 | 102 | 7.6 | 7.9 | 810 | 10.4 | 1065 |
| | 17 | 36 | 95 | 7.0 | 8.5 | 805 | 11.2 | 1060 |
| | 16 | 32 | 87 | 6.5 | 9.3 | 800 | 12.2 | 1055 |
| **5000 FEET** | | | | | | | | |
| 2450 | 23 | 77 | 146 | 14.3 | 4.2 | 615 | 5.5 | 810 |
| | 22 | 73 | 143 | 13.5 | 4.4 | 635 | 5.8 | 840 |
| | 21 | 69 | 141 | 12.8 | 4.7 | 660 | 6.2 | 870 |
| | 20 | 65 | 137 | 12.1 | 5.0 | 680 | 6.5 | 895 |
| 2300 | 23 | 71 | 142 | 13.1 | 4.6 | 650 | 6.0 | 855 |
| | 22 | 68 | 140 | 12.5 | 4.8 | 670 | 6.3 | 885 |
| | 21 | 64 | 136 | 11.8 | 5.1 | 695 | 6.7 | 910 |
| | 20 | 60 | 133 | 11.2 | 5.4 | 710 | 7.1 | 935 |
| 2200 | 23 | 67 | 139 | 12.2 | 4.9 | 685 | 6.5 | 900 |
| | 22 | 63 | 136 | 11.6 | 5.2 | 705 | 6.8 | 930 |
| | 21 | 60 | 132 | 10.9 | 5.5 | 725 | 7.2 | 955 |
| | 20 | 56 | 129 | 10.4 | 5.8 | 745 | 7.6 | 980 |
| 2000 MAXIMUM RANGE SETTINGS | 19 | 44 | 112 | 8.3 | 7.2 | 805 | 9.5 | 1060 |
| | 18 | 41 | 106 | 7.8 | 7.7 | 815 | 10.1 | 1075 |
| | 17 | 37 | 98 | 7.3 | 8.2 | 810 | 10.8 | 1070 |
| | 16 | 34 | 91 | 6.7 | 8.9 | 805 | 11.7 | 1065 |

NOTE: Range and endurance figures must be reduced to allow for a reduction of approximately five gallons of usable fuel in each tank when inboard fillers are used to fill long range fuel tanks.

Figure 1-8 (Sheet 1 of 2).

## CRUISE PERFORMANCE
FLOATPLANE

LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight - 2950 Pounds

| RPM | MP | % BHP | TAS MPH | GAL/ HOUR | 60 GAL (NO RESERVE) ENDR. HOURS | 60 GAL (NO RESERVE) RANGE MILES | 79 GAL (NO RESERVE) ENDR. HOURS | 79 GAL (NO RESERVE) RANGE MILES |
|---|---|---|---|---|---|---|---|---|
| **7500 FEET** | | | | | | | | |
| 2450 | 21 | 70 | 145 | 13.0 | 4.6 | 670 | 6.1 | 880 |
| | 20 | 66 | 141 | 12.3 | 4.9 | 690 | 6.4 | 910 |
| | 19 | 62 | 137 | 11.6 | 5.2 | 710 | 6.8 | 935 |
| | 18 | 58 | 133 | 11.0 | 5.5 | 725 | 7.2 | 955 |
| 2300 | 21 | 65 | 141 | 12.0 | 5.0 | 700 | 6.6 | 925 |
| | 20 | 62 | 137 | 11.4 | 5.3 | 720 | 6.9 | 950 |
| | 19 | 58 | 133 | 10.8 | 5.5 | 740 | 7.3 | 970 |
| | 18 | 54 | 128 | 10.2 | 5.9 | 755 | 7.7 | 995 |
| 2200 | 21 | 61 | 137 | 11.2 | 5.4 | 735 | 7.1 | 965 |
| | 20 | 58 | 133 | 10.6 | 5.7 | 750 | 7.5 | 990 |
| | 19 | 54 | 128 | 10.0 | 6.0 | 770 | 7.9 | 1010 |
| | 18 | 50 | 123 | 9.5 | 6.3 | 780 | 8.3 | 1025 |
| 2000 MAXIMUM RANGE SETTINGS | 18 | 42 | 110 | 8.1 | 7.4 | 820 | 9.8 | 1080 |
| | 17 | 39 | 102 | 7.5 | 8.0 | 815 | 10.5 | 1075 |
| | 16 | 35 | 95 | 7.0 | 8.6 | 815 | 11.3 | 1070 |
| | 15 | 32 | 87 | 6.4 | 9.4 | 810 | 12.3 | 1065 |
| **10,000 FEET** | | | | | | | | |
| 2450 | 19 | 63 | 142 | 11.8 | 5.1 | 720 | 6.7 | 945 |
| | 18 | 59 | 137 | 11.2 | 5.4 | 735 | 7.1 | 970 |
| | 17 | 55 | 132 | 10.6 | 5.7 | 750 | 7.5 | 990 |
| | 16 | 51 | 126 | 9.9 | 6.1 | 765 | 8.0 | 1005 |
| 2300 | 19 | 59 | 137 | 11.0 | 5.4 | 745 | 7.2 | 985 |
| | 18 | 55 | 133 | 10.4 | 5.7 | 760 | 7.6 | 1005 |
| | 17 | 51 | 127 | 9.8 | 6.1 | 775 | 8.0 | 1020 |
| | 16 | 47 | 120 | 9.2 | 6.5 | 785 | 8.6 | 1035 |
| 2200 | 19 | 55 | 133 | 10.3 | 5.8 | 775 | 7.7 | 1020 |
| | 18 | 51 | 127 | 9.7 | 6.2 | 790 | 8.1 | 1040 |
| | 17 | 48 | 121 | 9.1 | 6.6 | 800 | 8.7 | 1050 |
| | 16 | 44 | 115 | 8.5 | 7.0 | 805 | 9.3 | 1060 |
| 2000 MAXIMUM RANGE SETTINGS | 18 | 44 | 114 | 8.3 | 7.2 | 830 | 9.5 | 1090 |
| | 17 | 40 | 106 | 7.8 | 7.7 | 825 | 10.2 | 1085 |
| | 16 | 37 | 98 | 7.2 | 8.3 | 820 | 10.9 | 1080 |
| | 15 | 33 | 91 | 6.7 | 9.0 | 815 | 11.9 | 1075 |

NOTE: Range and endurance figures must be reduced to allow for a reduction of approximately five gallons of usable fuel in each tank when inboard fillers are used to fill long range fuel tanks.

Figure 1-8 (Sheet 2 of 2).



# WEIGHT AND BALANCE.

The following information will enable you to operate your amphibian within the prescribed weight and center of gravity limitations.

In figuring your loading problems, be certain that you use the Licensed Empty Weight of your particular amphibian as shown on its Weight and Balance Data Sheet. This sheet, plus an Equipment List, is included with each amphibian as it leaves the factory.

When amphibious floats have been installed by anyone other than the factory, the Repair and Alteration Form FAA-337 must be consulted for the proper weight and balance information. Special attention should be directed to the possible need of ballast weight on the rearmost bulkhead to prevent a nose heavy condition on certain amphibians.

The loading instructions given in the Owner's Manual for the landplane should be used as a guide when figuring amphibian weight and balance problems. In conjunction with these instructions, use the Seating-Cargo Arrangements Diagram and Cabin Stations Diagram in the Owner's Manual and the Sample Problem, Loading Graph and Center of Gravity Moment Envelope in this supplement.

the retracted position. The landing gear position lights should be checked by pushing them in to test. If there is no response, the landing gear position light circuit breaker should be checked. If it is ascertained that a mechanical failure has occurred, the recommended procedure in this case is to retract the other gear, if it was extended, and land on the sod. A dry grassy surface is preferable.

Landings of this sort have produced no tendency to nose over, even when conducted on hard surfaced runways, and will result in little or no damage to the floats.

IMPORTANT

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 (40°) would be the best procedure.

# OPERATING LIMITATIONS

## MAXIMUM GROSS WEIGHT.

Amphibian with Edo Model 597-2790 Floats . . . . . 2950 lbs

## AIRSPEED INDICATOR MARKINGS.

The following is a list of the certificated calibrated airspeed markings (CAS) for the amphibian with Edo Model 597-2790 floats.

Never Exceed (glide or dive, smooth air) . . . . 164 MPH (red line)
Caution Range . . . . . 130-164 MPH (yellow arc)
Normal Operating Range . . . . . 64-130 MPH (green arc)
Flap Operating Range . . . . . 55-100 MPH (white arc)



## FLOATPLANE LANDING DISTANCE

LANDING DISTANCE WITH 40° FLAPS ON SHELTERED WATER

| GROSS WEIGHT POUNDS | APPROACH IAS MPH | AT SEA LEVEL & 59°F. | | AT 2500 FT. & 50°F | | AT 5000 FT. & 41°F | | AT 7500 FT. & 32°F | |
|---|---|---|---|---|---|---|---|---|---|
| | | WATER RUN | TOTAL TO CLEAR 50' OBS | WATER RUN | TOTAL TO CLEAR 50' OBS | WATER RUN | TOTAL TO CLEAR 50' OBS | WATER RUN | TOTAL TO CLEAR 50' OBS |
| 2950 | 76 | 735 | 1720 | 860 | 1915 | 995 | 2125 | 1155 | 2380 |

NOTE: DISTANCES SHOWN ARE BASED ON ZERO WIND AND POWER OFF.
REDUCE LANDING DISTANCES 10% FOR EACH 6 MPH HEADWIND.

Figure 1-9.

## CRUISE.

Observe the same engine speed limits as for the landplane. Speed, range and endurance are shown on the Cruise Performance charts, figure 2-8.

NOTE

Range and endurance figures must be reduced to allow for a reduction of approximately five gallons of usable fuel in each tank when inboard fillers are used to fill the long range fuel tanks.

## LANDING.

### LANDING ON WATER.

Power-off landings may be made with any wing flap setting. However, with glassy water it is recommended that a power approach and landing be made with 0° - 20° wing flaps to maintain a low rate of descent.

### LANDING ON LAND.

Power-off approaches and landings may be made with any wing flap setting. It is recommended, however, that a power approach and landing be made to reduce the rapid rate of descent which accompanies the power-off approach. The landing approach attitude and flare is the same as for an aircraft equipped with a tricycle gear. The approaches should be made at 85-95 MPH with the wing flaps up and 80-90 MPH with the flaps down, depending upon the air turbulence.

## AMPHIBIAN EMERGENCY GEAR PROCEDURE.

The amphibian is not equipped with an emergency system to operate the landing gear, except when the optional engine-driven hydraulic pump is installed; then the hand pump may be considered an emergency system.

If the appropriate position light does not show the gear to be in a locked position (either "UP" or "DOWN"), a visual check may be made by observing the main landing gear latch fittings in the float inspection openings. The nose gear is partially visible over the float bow when in

### CROSSWIND TAKE-OFF ON WATER.

Start the take-off run with the wing flaps up and the water rudders extended for better directional control. Wing flaps are lowered to 20° and the water rudders are retracted when the airplane is on the step; the remainder of the take-off is normal. If the floats are lifted from the water one at a time, the down-wind float should be lifted first.

### TAKE-OFF ON LAND.

Take-offs are accomplished with the wing flaps extended 20° (second notch), full throttle and 2600 RPM. As speed increases, the elevator control should be gradually moved to the neutral position, and when the airplane feels light (60-70 MPH), a light back pressure on the control wheel will allow the airplane to fly off smoothly.

The landing gear should be retracted when the point is reached where a wheels down forced landing on that runway would be impractical.

## CLIMB.

Normal climbs are conducted at 90-110 MPH with wing flaps up and cowl flaps opened as required for engine cooling. If optimum flaps-up climb performance is desired, climb at 83 MPH at sea level with full throttle and 2600 RPM. Reduce this climb speed about 1/2 MPH for each 1000 feet above sea level.

To climb steeply over an obstacle with wing flaps retracted, use an obstacle clearance speed of 75 MPH.

NOTE

Steep climbs at these low speeds should be of short duration to improve engine cooling.

To clear an obstacle after take-off with 20° wing flaps, use an obstacle clearance speed of 65-70 MPH. Upon reaching a safe altitude and airspeed, retract wing flaps slowly, especially when flying over glassy water, because a loss of altitude is not very apparent over such a surface.



*Section II*

# AMPHIBIAN

## OPERATING CHECK LIST

### BEFORE ENTERING THE AMPHIBIAN.

(1) Inspect the floats and fairings for dents, cracks, scratches, etc.
(2) Remove rubber balls (which serve as a stopper on the standpipe in each float compartment) and pump out any accumulation of water. Reinstall rubber balls with enough pressure for a snug fit.
(3) Check the wheel struts for proper inflation; check the tires for cuts, bruises and proper inflation.

NOTE

Refer to placards on the nose wheel struts for strut inflation procedures. Proper tire inflation for 6.00 x 6 main wheel tires is 37 psi; tire inflation for the 10 x 3.50 nose wheel tires is 41 psi.

### BEFORE STARTING ENGINE.

(1) Landing Gear Lever -- "DOWN" (amphibian on land) or "UP" (amphibian on water).
(2) Operate and visually check water rudders for proper retraction and rudder action. (With amphibian on land, pull water rudder retraction handle aft to "RETRACT" position for taxiing.)
(3) Water Rudders -- Down (for taxiing on water) or up (for taxiing on land).

### TAKE-OFF.

#### TAKE-OFF ON WATER.

(1) Landing Gear Lever -- "UP."

(2) Water Rudders -- Up.
(3) Set wing flaps 20° (second notch).
(4) Hold the control wheel full back and advance the throttle slowly.
(5) Place airplane in a planing attitude (on the step) by slowly moving the control wheel forward when the bow wave moves aft of the wing strut position.
(6) As the airplane accelerates, apply light control wheel back pressure and allow the airplane to fly off smoothly.

NOTE

To reduce take-off water run, the technique of raising one float out of the water may be used. This procedure is described on page 2-7 under paragraph "Take-Off On Water."

(7) Climb out at 75-85 MPH. With obstacles ahead, climb at 65 MPH.

### TAKE-OFF ON LAND.

(1) Set wing flaps 20° (second notch).
(2) Power -- Full throttle and 2600 RPM.
(3) When amphibian feels light (60-70 MPH), apply light back pressure to control wheel and allow airplane to fly off smoothly.
(4) After take-off, level off slightly and accelerate to an efficient climb speed; then retract the landing gear.
(5) Climb out at 75-85 MPH. With obstacles ahead, climb at 70 MPH.

## CLIMB.

The maximum rate of climb is obtained with flaps retracted at full throttle, 2600 RPM and 83 MPH. (See Maximum Rate-Of Climb Data chart, figure 2-7).

## BEFORE LANDING ON WATER.

(1) Landing Gear Lever -- "UP."
(2) Landing Gear Blue Indicator Light -- Check illuminated.
(3) Water Rudders -- Up.
(4) Maintain 75-85 MPH with wing flaps extended.



plished by use of the brakes installed on the main wheels. An occasional tapping of the brakes is all that is required to maintain the desired taxi path under normal conditions.

When taxiing in a strong crosswind it will be necessary to use a considerable amount of upwind brake since the amphibian weathercocks downwind on land, which is contrary to the normal tendency of the landplane. Winds in excess of 30 MPH may cause the downwind main strut to "bottom, which will allow the plane to tilt 3° to 5° in that direction. The amphibian will feel buoyant then since the wind can get under the upwind wing. Although the aircraft has been safely taxied in crosswinds of 40 MPH, this is recommended only in cases of emergency due to the excessive wear on the brakes.

## TAKE-OFF.

### TAKE-OFF ON WATER.

The use of 20° wing flaps (second notch) throughout the take-off run is recommended. Take-off distances are given on figure 2-6.

Apply full throttle smoothly and hold the control wheel full back. Watch the point where the bow wave leaves the float, and move the control wheel forward slowly as this point moves aft of the wing strut. Slow control movement and light control pressures produce the best results. Attempts to force the airplane into the planing attitude will generally result in loss of speed and delay in getting on the step. The airplane will assume a planing attitude which permits acceleration to take-off speed (50 to 60 MPH) at which time the airplane will fly off smoothly.

If lift off is difficult due to high lake elevation or glassy water, the following procedure is recommended: With the airplane in the planing position, apply full aileron to raise one float out of the water. When one float leaves the water, apply slight elevator back pressure to complete the take-off. 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 airplane accelerates to take-off speed almost instantly.

If porpoising is encountered while on the step, apply additional control wheel back pressure to correct the excessively nose-low attitude.

Main gear position can be double-checked by glancing through a small opening on top of each float and noting the position of the retract mechanism lock. When the locking fitting is completely forward, the gear is retracted. When it is fully aft, the gear is down and locked. The nose gear can be seen over the bow of the floats when in the fully retracted position. However, it disappears from view when extended.

The electrical circuits for the gear position lights are protected by a "push-to-reset" circuit breaker on the left side of the landing gear control unit.

## TAXIING.

### TAXIING ON WATER.

Taxi with water rudders down. It is best to limit the engine speed to 1000 RPM for normal taxi because water piles up in front of the float bow at higher engine speeds. Taxiing with higher engine RPM may result in engine overheating and will not appreciably increase the taxi speed.

For minimum taxi speed in close quarters, use idle RPM with full carburetor heat 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 amphibian in close quarters. In addition to the normal flight controls, the wing flaps, cabin doors, and water rudders will aid in "sailing."

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

Do not taxi the amphibian in water with the landing gear extended except when beaching the aircraft. If the landing gear is extended, there is a much stronger tendency for the bows to submerge while taxiing downwind. In the retracted position, the nose wheels will serve as bumpers for floating docks and obstructions.

### TAXIING ON LAND.

The bow wheels are full swiveling on this aircraft. Steering is accom-



## BEFORE LANDING ON LAND.

(1) Landing Gear Lever -- "DOWN" below 130 MPH.
(2) Landing Gear Amber Indicator Light -- Check illuminated.
(3) Water Rudders -- Up.
(4) Maintain 75-85 MPH with wing flaps extended.

## LANDING.

### NORMAL LANDING ON WATER.

(1) Landing technique is conventional for all wing flap settings.

### NORMAL LANDING ON LAND.

(1) Land on main wheels first (nose slightly above level flight attitude).
(2) Lower the nose wheels gently to the runway after speed is diminished.
(3) Avoid excessive braking unless obstacle is ahead.

### CROSSWIND LANDING ON LAND.

(1) If field length permits, land with wing flaps retracted.
(2) Use wing low, crab, or combination method of drift correction.
(3) Land in nearly level attitude.
(4) Lower nose wheels to runway immediately after touchdown and hold control wheel forward.
(5) Maintain a straight path by using a combination of ailerons, upwind rudder (amphibian weathercocks downwind on land) and occasional upwind braking.

## AFTER LANDING.

(1) Water Rudders -- Down (except on land).

# DESCRIPTION AND OPERATING DETAILS

## THE AMPHIBIAN.

The amphibian is identical to the landplane with the following exceptions:

(1) Amphibious floats, incorporating a water rudder steering system, replace the landing gear. Each float has a hydraulically-retractable main wheel and nose (or bow) wheel, both of which are mounted on air-oil shock struts. The main wheels retract to a position slightly above and aft of the float steps, which shield the wheels hydrodynamically. The nosewheels retract up to the bow point of the floats where they serve as bumpers for floating docks and obstructions. Each float also has a retractable water rudder. A water rudder retraction handle, connected to the water rudders by cables and springs, is located on the cabin floor tunnel.
(2) Additional fuselage structure is added to support the float installation.
(3) An additional structural "V" brace is installed between the top of the front door posts and the cowl deck.
(4) The airplane has additional corrosion-proofing and stainless steel cables.
(5) The standard airspeed indicator is replaced with an indicator having a recalibrated airspeed indicator dial.
(6) The standard propeller is replaced with a propeller of larger diameter (88 inches).
(7) A reinforced engine mount replaces the standard engine mount.
(8) Cowl flap stops are installed to maintain a slight opening of the cowl flaps for increased engine cooling.
(9) Hoisting provisions are added to the top of the fuselage.
(10) Floatplane placards are added.
(11) Fueling steps and assist handles are mounted on the forward fuselage, and steps are mounted on the wing struts to aid in refueling the airplane. Inboard fuel fillers are added when long range fuel tanks are installed.

NOTE

A reduction of approximately five gallons of usable fuel in each tank will result when inboard fillers are used to fill the long range fuel tanks.



### WATER RUDDER STEERING SYSTEM.

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

A water rudder retraction handle, located on the cabin floor tunnel, is used to manually raise and lower the water rudders. During take-off, landing, and in flight, the retraction handle is normally full aft in the "RETRACT" position. With the handle in this position, the water rudders are up. When the handle is moved full forward to the "EXTEND" position, the water rudders are down.

The retraction handle incorporates a spring-loaded catch device located near the cross-bar at the end of the handle. The catch is designed to latch over a locking pin when the retraction handle is pulled aft to "RETRACT," thereby securing the handle in the retracted position.

Pulling the exposed end of the retraction handle catch aft, while pushing downward slightly on the retraction handle with the right hand, will release the handle from the retraction locking pin. The handle then can be rotated full forward to extend the water rudders for taxiing.

### AMPHIBIOUS LANDING GEAR CONTROLS.

Gear actuation on the amphibian is accomplished by an engine-driven hydraulic pump (optional equipment) or by a hand-operated hydraulic pump located on the cabin floor tunnel. When the optional engine-driven hydraulic pump is installed, the hand-operated pump may be used as an emergency pump or as an aid to the engine-driven pump to speed up the gear actuation time when desired. Gear retraction or extension requires approximately 12 seconds. Using the hand pump only, approximately 26 complete strokes are required to retract or extend the gear.

Retraction and extension of the amphibious landing gear wheels are controlled by a two-position lever, marked "UP" and "DOWN," located on the bottom of the instrument panel. Beside the lever are two "press-to-test" position lights. The upper (blue) light comes on when the gear is fully retracted, remaining on until the gear is lowered. The lower (amber) light comes on when the gear is down and locked, remaining on until the gear is unlocked. Neither light burns while the gear is in an intermediate position.