INSTRUCTIONS

FOR

Operation and Maintenance

OF

AIRCRAFT WEIGHT AND BALANCE COMPUTERS

FOR

MODELS PBY-5 AIRPLANE
PBY-5A AIRPLANE
PBY-5B AIRPLANE

BUREAU OF AERONAUTICS, U. S. NAVY

Manufactured by

LIBRASCOPE
INCORPORATED

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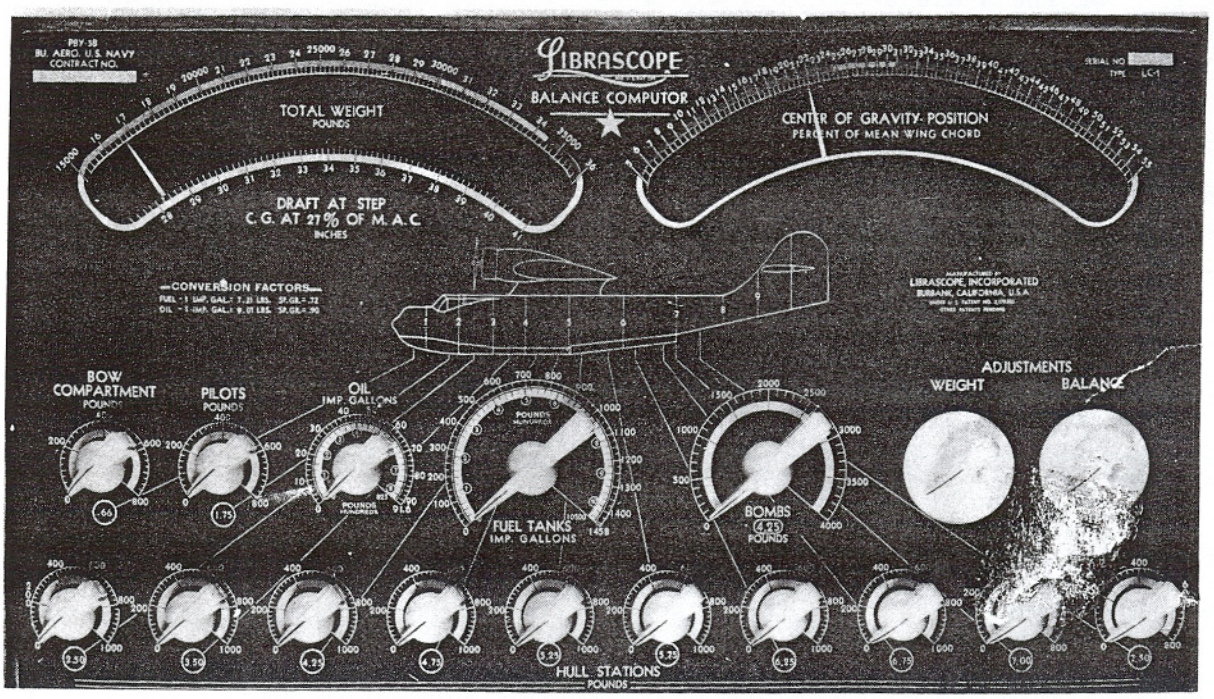

I - GENERAL:

LIBRASCOPE Balance Computors are designed for specific types of airplanes and can be used for determining the gross weight and balance of the type designated only. The designation of the type airplane for which the computor is designed appears on the face of each instrument.

The input dials on the instrument represent locations in the airplane where items of useful load are carried. The location represented by each dial is indicated by a line running from the dial to the facsimile of the airplane on the face of the instrument. The scales representing oil and fuel are calibrated in both gallons and pounds. The weight and specific gravity upon which the gallon calibrations are based are indicated on the faceplate. All other input dials are calibrated in pounds.

Two knobs with white dials are provided for setting the Basic Weight Empty and the Basic Weight Empty Center of Gravity Position of the airplane into the computor. These dials are labeled "ADJUSTMENTS", "WEIGHT" and "BALANCE", respectively.

The pointer on the Total Weight Scale registers at all times the total weight in pounds set into the computor. The section of the scale up to the Normal Gross Weight of the airplane is shown in green.

The pointer on the Center of Gravity Position Scale registers at all times the location of the center of gravity of the total weight set into the computor in percent of mean aerodynamic wing chord of the airplane. The section of the scale shown in green indicates the allowable operating limits of the airplane.

II - OPERATION INSTRUCTIONS:

Terms used in the operation instructions of the LIBRASCOPE Balance Computor are defined as follows:

BARE WEIGHT EMPTY - Bare Weight Empty is the weight in pounds of the official empty weight of the airplane.

BARE WEIGHT EMPTY CENTER OF GRAVITY POSITION - Bare Weight Empty Center of Gravity Position is the position of the center of gravity in percent of mean aerodynamic wing chord of the airplane at Bare Weight Empty.

BASIC WEIGHT EMPTY - Basic Weight Empty is the weight of Bare Weight Empty plus items of equipment which always are carried in the airplane.

BASIC WEIGHT EMPTY CENTER OF GRAVITY POSITION - Basic Weight Empty Center of Gravity Position is the position of the center of gravity in percent of mean aerodynamic wing chord of the airplane at Basic Weight Empty.

IIa - INITIAL SETTING OF DIALS:

Basic Weight Empty values of weight and center of gravity position are not the same for all airplanes of the same type; therefore, before the various items of useful load may be set into the computor, initial settings on adjustment knobs must be made. The adjustment knobs are used to set into the computor the basic values of weight and center of gravity position of the particular airplane to be loaded.

With all individual pointer knobs set at zero readings, the Basic Weight Empty of the airplane to be loaded is set into the balance computor by turning the "Weight Adjustment" Knob until the Total Weight Pointer registers the Basic Weight Empty value on the "Total Weight" Scale. The Basic Weight Empty Center of Gravity Position is then set into the computor by turning the "Balance Adjustment" Knob until the Center of Gravity Position Pointer registers the required value on the "Center of Gravity Position" Scale.

Initial setting markings may be made on the white weight and balance adjustment dials by removing the pointer knob and the transparent plastacelle disc. Removal of the pointer knob may be accomplished by loosening the set screw in the handle of the knob.

IIb - LOADING OF AIRPLANE:

After the desired Basic Weight value has been set on the Total Weight Dial and the desired Center of Gravity value has been set on the Center of Gravity Position Dial, load is set into the computor by turning the individual pointer knobs representing location of oil tanks, fuel tanks, hull stations, etc. Items of weight may be entered on the dials representing hull stations nearest the location of the item as placed into the airplane. When items of high weight are located between stations represented by the computor dials and greater accuracy is desired, the weight may be divided between the two adjacent dials.

Example: The possibility of an item weighing 100 pounds or more being located at a distance greater than 20 inches from a station represented by a dial on the computor is very remote. However, if 100 pounds were located 20 inches from the station dial at which it was entered and the total weight of the airplane was 25,000 pounds, the error in the Total Weight Center of Gravity Position reading would be less than one-half of one per cent M.A.C. Furthermore, and generally, the distribution of items of weight fore, as well as aft, of the stations represented on the computor would tend to reduce the error.

Complete and progressive balance schedules for flight programs may be easily and quickly laid out with the aid of the LIBRASCOPE Balance Computor After setting initial values of Basic Weight Empty and Basic Weight Empty Center of Gravity Position into the computor by means of the adjustment knobs, items of useful load which will remain in fixed positions throughout the flight should be entered on their respective dials. These items may include part of the crew and items of equipment. Fuel and oil to be carried and bombs or torpedoes, if carried, should be set on their respective dials.

Movable items of equipment, crew members, and cargo may then be placed into the compartments which, when the weights represented by these items are set on the corresponding balance computor dials, gives the desired Center of Gravity Position for level flight. Crew members and items of useful load which can be readily moved may then be transferred from their level flight positions to other locations which will give the most desirable Center of Gravity Position for take-off, climb, etc. Plans may also be worked out to show the shifting of cargo necessary to compensate for the consumption of fuel, and thus maintain at all times the desired Center of Gravity Position for level flight.

III - MAINTENANCE:

CAUTION: Additional weight should NEVER be set into the instrument after the Total Weight Pointer has reached the maximum weight value on the scale.

Should the pointer knobs become loose on their shafts in service, the set screw in the knob may be tightened with a slender small-sized screwdriver.

The LIBRASCOPE Balance Computor mechanism has proven to be trouble-free in service. The mechanism should require no adjustment and as lubrication is not necessary, the case need not be removed.

Should breakage occur in any part of the mechanism, it will be immediately obvious in the operation of the instrument, and replacements and service will be made without charge if reported to LIBRASCOPE, INCORPORATED, Burbank, California.