

Chapter 6

LIQUID OXYGEN PACKAGE UNIT (10-22S-571A)

Ref. No. 6D/3015

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Introduction

1. The liquid oxygen package unit, Ref. No. 6D/3015 consists of a 3½ litre capacity liquid oxygen system provided as an interchangeable unit. Although this equipment is basically similar to earlier type liquid oxygen package units, it differs in that it is easily removed from the aircraft for the purpose of replenishing the liquid oxygen supply. Earlier versions of this equipment consisted of two 3½ litre systems coupled together as one assembly. With this version two separate 3½ litre systems are provided, but coupled together with a remote two-way check valve (fig. 3). The method used for the quick removal and replacement of this unit is mainly an R.N. requirement to reduce evaporation losses experienced with the present system of charging in-situ from liquid oxygen replenishing trolleys.

WARNING

The presence of oil or grease in contact with oxygen at high pressure is dangerous since it introduces a grave risk of explosion.

DESCRIPTION

2. The liquid oxygen package unit, Ref. No. 6D/3015 consists of the following components:—

- (1) Liquid oxygen container (805480) Ref. No. 6D/3016.
- (2) Fill and vent valve (801416) Ref. No. 6D/2166.
- (3) Pressure control valve (801427) Ref. No. 6D/2699.
- (4) Liquid oxygen check valve (805478) Ref. No. 6D/2264.
- (5) Indicator, contents, Ref. No. 6D/2605 (External to package unit).
- (6) Contents gauge control unit, (802213) Ref. No. 6D/2362.
- (7) Two-way liquid oxygen check valve, Ref. No. 6D/2672.
- (8) Cradle, container.

Liquid oxygen container (805480) Ref. No. 6D/3016

3. This container is basically a 3½ litre spherical

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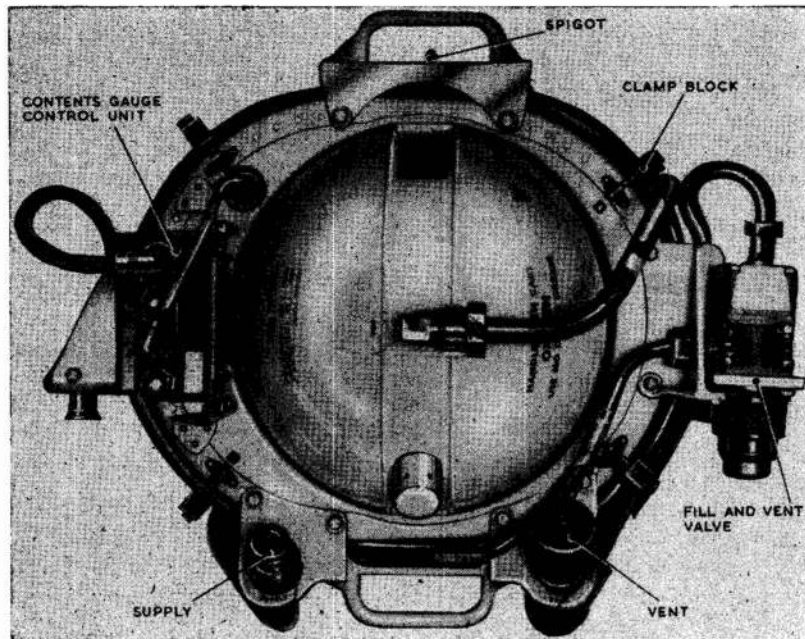


Fig. 1. Liquid oxygen package unit, Ref. No. 6D/3015

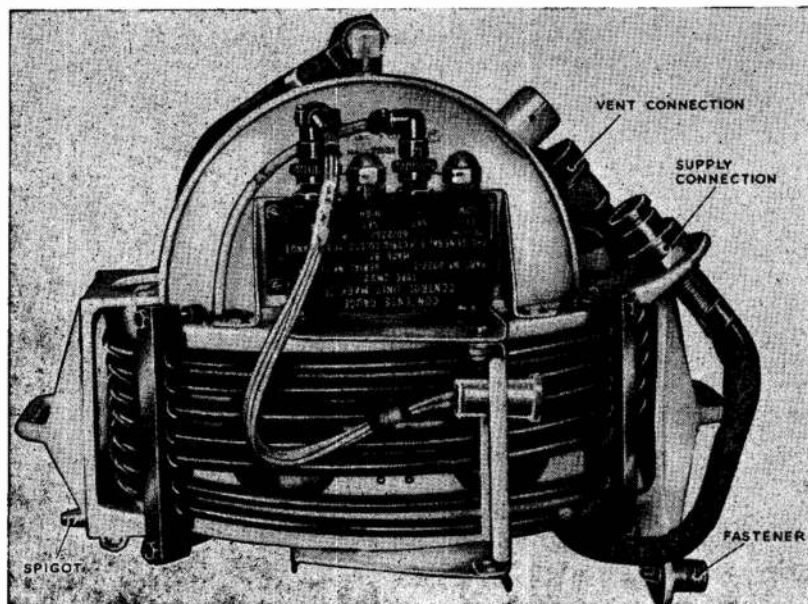


Fig. 2. Side view showing contents gauge control unit

container, Ref. No. 6D/2165 but differs in respect of the vent connection (fig. 1 and 2) located at the top of the container. When the container, Ref. No. 6D/2165 is used in this particular liquid oxygen package unit, a right angle connection is incorporated in the vent to facilitate clearance in the installation. This modification is identified by introducing the container under Ref. No. 6D/3016. For further details of liquid oxygen containers used in package units, reference should be made to Sect. 3, Chap. 1.

Fill and vent valve (801416) Ref. No. 6D/2166

4. Basically this liquid oxygen fill and vent valve,

Ref. No. 6D/2166 (fig. 1) is common to almost all liquid oxygen units but it differs in detail to suit the installation requirements of various liquid oxygen systems. The difference is confined mainly to the disposition of the pipe-line connectors and the dimensions of connectors. Details of this valve are given in Sect. 1, Chap. 1.

Pressure control valve (801427) Ref. No. 6D/2699

5. The liquid oxygen control valve controls the system working pressure, provides an economizer circuit and limits the maximum system pressure by relief valves. This valve which is located at

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A.P.1275G, Vol. 1 (2nd Edn.), Part 3, Sect. 4, Chap. 6
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the base of the cradle is fully described in Sect. 2, Chap. 2.

Liquid oxygen check valve (805478) Ref. No. 6D/2264

6. The liquid oxygen check valve is used in aircraft liquid oxygen systems to limit the delivery of liquid oxygen from an oxygen container to an aircraft oxygen breathing circuit. A series of check valves are available for liquid oxygen systems, which are similar in application and internal construction, but differ externally to enable external circuits to be used to suit particular aircraft installations. In this instance the two systems are coupled together (fig. 3) by a two-way check valve, Ref. No. 6D/2672 which is located external to the package unit. Details of liquid oxygen check valves are given in Sect. 1, Chap. 3.

Two-way liquid oxygen check valve (802900) Ref. No. 6D/2672

7. A two-way check valve (802900), Ref. No. 6D/2672 enables the two containers to be linked together and provide duplicate safety in the event of one system failure. This valve is identical in principle to the two-way check valve 6D/2265 but differs in the differential pressure setting. Check valve 6D/2265 operates at 10 lb/in², check valve 6D/2672 operates at 25 lb/in².

Contents gauge control unit (802213) Ref. No. 6D/2362

8. Referring to fig. 2, the contents gauge unit is used for aircraft liquid oxygen systems to convert the capacitance value provided by the quantity of liquid oxygen available in the container, for reproduction to a remote indicator. This unit which consists of an amplifier, oscillator and capacitance bridge, utilizes the difference in dielectric constant between gaseous and liquid oxygen, to measure the quantity of liquid in the container. It embodies two cable connectors and two adjustments which are used for calibration purposes. One electrical cable from this unit is connected to the probe in the container, the other cable is fed to the contents gauge via six-pole socket fixed to a bracket in the cradle. This contents gauge control unit is illustrated and described in Sect. 2, Chap. 1.

Cradle, container

9. The cradle is of light alloy with brackets fixed at the base to accommodate associated components. The container is supported on fabric-lined shoes and secured in aircraft by means of three-point fixing arrangement, i.e. a spigot engaging with a corresponding aperture finally tightened with the aid of two Dzus fasteners in the front of the unit. The coiled piping surrounding the cradle is a temperature raising line.

Indicator, contents (803161), Ref. No. 6D/2605

10. The liquid contents indicator, Ref. No. 6D/2605 is calculated in fractions, i.e. 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and F. This indicator is controlled by a capacitance measuring instrument which supplies current to a d.c. millimeter movement. Details of liquid oxygen content indications are given in Sect. 2. This instrument is fitted external to the package unit.

SERVICING

11. For details, filling, purging and emptying liquid oxygen systems, reference should be made to Part 1, Sect. 3, Chap. 3 of this Publication. For servicing individual components associated with this Unit, reference should be made to the appropriate chapters in Part 3 of this publication.

Renewal of bursting disc

12. Note . . .

The fragile nature of the bursting disc demands great care in handling when removed or refitted. If scratched or bent the bursting pressures may be considerably reduced. The following instructions are to be applied whenever it is necessary to replace a bursting disc.

Referring to fig. 4, then:—

- (1) Remove the pipe line assembly containing the bursting disc.
- (2) Break the locking wire attached between the body and nut.
- (3) Place the flats of the body between the jaws of a small smooth jawed vice.
- (4) Unscrew the nut from the body.
- (5) Remove the retaining piece. Remove and discard the old bursting disc. Remove and discard the old washer-seal. Extreme care is to be taken to prevent any contamination and ingress of foreign matter at this stage. Ensure that the counter bore housing the washer-seal is clean and flat.
- (6) Fit new washer-seal (Ref. No. 6D/3305). Fit new bursting disc (Ref. No. 6D/2554). Replace retaining piece. Place the flats of the body between the jaws of a smooth jawed vice, screw the nut on to the body and tighten to a torque loading of 200 lb. in. using a correctly calibrated torque wrench. Wire lock the nut to the body using 0.020 inch dia. stainless steel wire.

- (7) Replace the pipe line assembly and purge the package unit as detailed in A.P.1275G, Vol. 1 (2nd Edn.), Part 1, Sect. 3, Chap 3, Para. 5.

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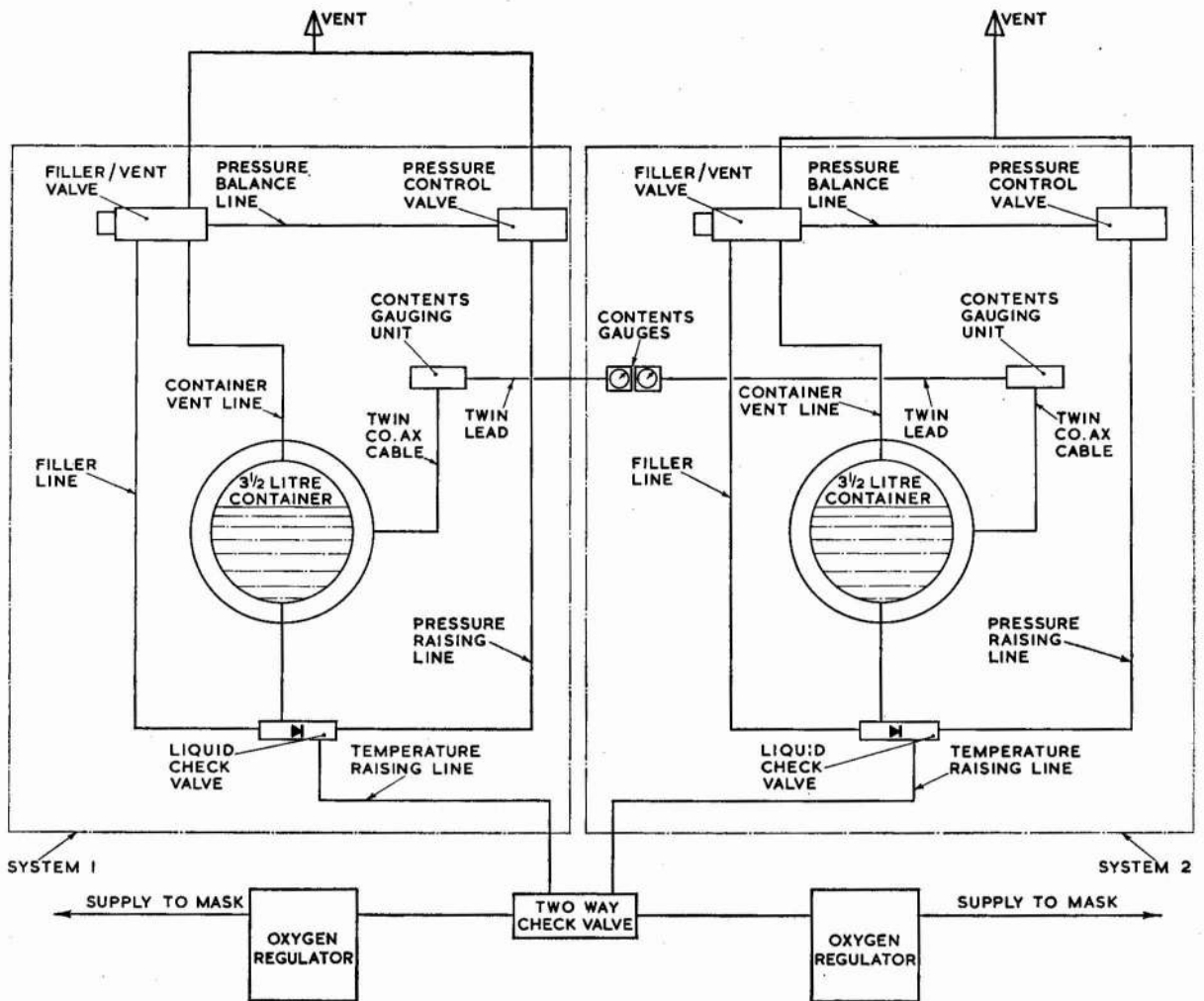


Fig. 3. Layout of two 3 1/2 litre systems (schematic)

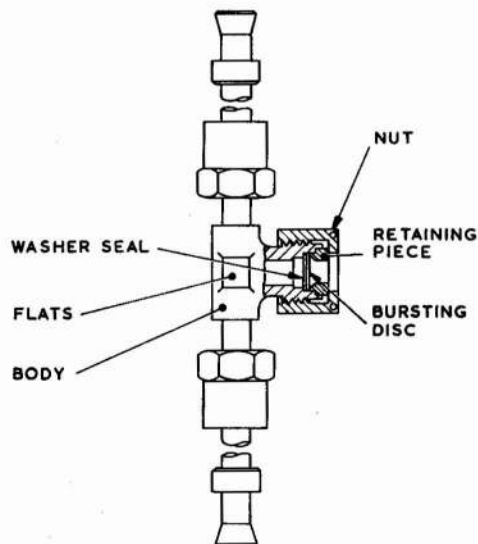


Fig. 4. Bursting disc and vent pipe assembly

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