OLYMPUS 202/301 SERIES

SECTION 23

TANK PRESSURISATION SYSTEM

Purpose

The tank pressurisation system forms two useful functions. These are namely:

a. Prevents loss of fuel due to boiling effect of altitude.

b. Prevents the collapse of emptying fuel tanks.

The system maintains the pressure in the tank between 1.82 and 2.3 psi above atmospheric pressure. The pressurising medium is air bleed from the engine compressor.

Components

For each group of tanks a control panel carrying nine components is fitted. Two vent valves per tank group are utilised one being on the top surface of the fuselage, the other being in the wing forward of the gap in the elevators. The nine components on the control panel are:

a. Solenoid Depressurisation Valve, which is the "ON"/"OFF" switch for the whole system. It directs to the Master Control Valve, Tank Pressure "ON", or Servo air pressure "OFF".

b. Master Control Valve, which is the brain of the system. It allows the Air and Gas Valves and the Vent Valves to control the tank pressure.

c. Air and Gas Valve, Which is connected to the supplies of air and controls its flow into the system.

d. Filter Restrictor, which filters the air subsequently used as servo air.

e. Pressure Reducing Valve, provides a supply of Servo pressure air from 9 to 12.5 psi.

f. Air Drier, fitted before the filter restrictor to prevent ice formation and corrosion.

g. Fuel Traps, isolates all components from the possibility of fuel contamination.

h. Non Return Valve

Operation. Five distinct conditions are available during the operation of the system. There are four conditions with the solenoid depressurisation valve "ON" and one when it is "OFF".

(1) Tank Pressurisation "OFF"

Static and Servo act on M.C.V. Diaphragm.
M.C.V. Ports - A is closed
V is venting

/Ensuring Air.....

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Ensuring Air Valve is closed
Vent Vlave is open.

(2) Tank Pressurisation "ON"

(a) On Starting Engines

Static and Low Tank Pressure act on M.C.V. Diaphragm
M.C.V. Ports A is Venting
V is Closed

Ensuring 1) Air Valve is open allowing pressure into system

ii Vent Valve is closed to increase tank pressure.

(b) Tank Pressure Balanced.

Static and correct tank pressures act on M.C.V. Diaphragm.
M.C.V. Ports A is Closed
V is Closed

Ensuring i) Air Valve is closed

ii Vent Valve is closed

iii Tank Pressure being maintained

(c) Climbing Condition

Low Static and correct tank pressure act on M.C.V. Diaphragm.
M.C.V. Ports A is closed
V is venting

Ensuring i) Air Valve is closed

ii Vent Valve is open

iii Tank Pressure is released until balanced state is reached.

It should be noted that this climb condition can be caused either a decrease in Static pressure or an increase in tank pressure. The reverse condition of descending is similar to condition (a) above.

(d) Diving Condition

Static and less than Static act on the M.C.V, Diaphragm.

M.C.V. Ports A is Venting
V is Venting

/Ensuring i).....

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Ensuring (i) Air Valve is open
(ii) Vent valve is open
(iii) Allowing tank pressure to be increased from all valves to regain balanced state.

Servicing

Periodical examination of the silica-gel crystals in the Air-drier will ensure that the system is free from moisture laden air. The gel when serviceable, is deep blue in colour and changes from this through bluish purple to reddish purple to a deep pink when saturated. The crystals themselves are changed when required. Graphite grease is to be used on all threads. A table, in AP 4505 'B' Vol 1 Book 1 Sect 4 Chap 6 lists the correct instructions for tightening the unions. The unions should be tight under the conditions specified and leaks should not be eliminated by undue tightening of the union.

Testing

Air for testing may be either supplied by ground running one of the engines or using a ground storage air cylinder. When using an engine the RPM must be at least 80% to initiate pressurisation and then reduced to 45%. Using ground supply connected to the connections labelled "compressor air" on the test panel in the main wheel undercarriage bays necessitates the separate checking of the engine and tank pressurisation air feed lines.

(i) By Engine Supply

a. Attach gauge to Tank Pressure Test connection on Test Panel. Remove cover from Servo Air Exhaust Cock.

b. Run appropriate engine and switch "ON" Tank Pressurisation.

c. Check pressure gauge reads 1.82 to 2.3 psi. As fuel is used a slow hunt will occur on gauge.

d. Switch Tank Pressurisation "OFF" and ensure gauge reads atmospheric pressure.

e. Switch tank pressurisation "ON" and increase RPM to take-off, held for 30 secs. Ensure that gauge reads as in (C).

f. Reduce RPM to 45% and check that the reading on the gauge remains steady.

g. Switch Tank Pressurisation "OFF" and increase RPM to 80% and then switch "ON" again.

h. When tank pressure attains reading in (c) above slightly open the servo air exhaust cock.

j. Check that Tank Pressure increase as cock is opened and that emergency outward venting occurs at pressures between 2.65 and 3.0 PSI. Venting should continue as fuel is used.

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k. Stop engine, remove gauge and refit blanks.

(ii) Using Ground Supply

The method is similar to that already described however it is essential that the fuel tanks contain 80% fuel load to limit the amount of air required. Approximately 60,000 litres of air will be needed and the standard charging cylinder contains 15,850 litres at 3,600 psi.

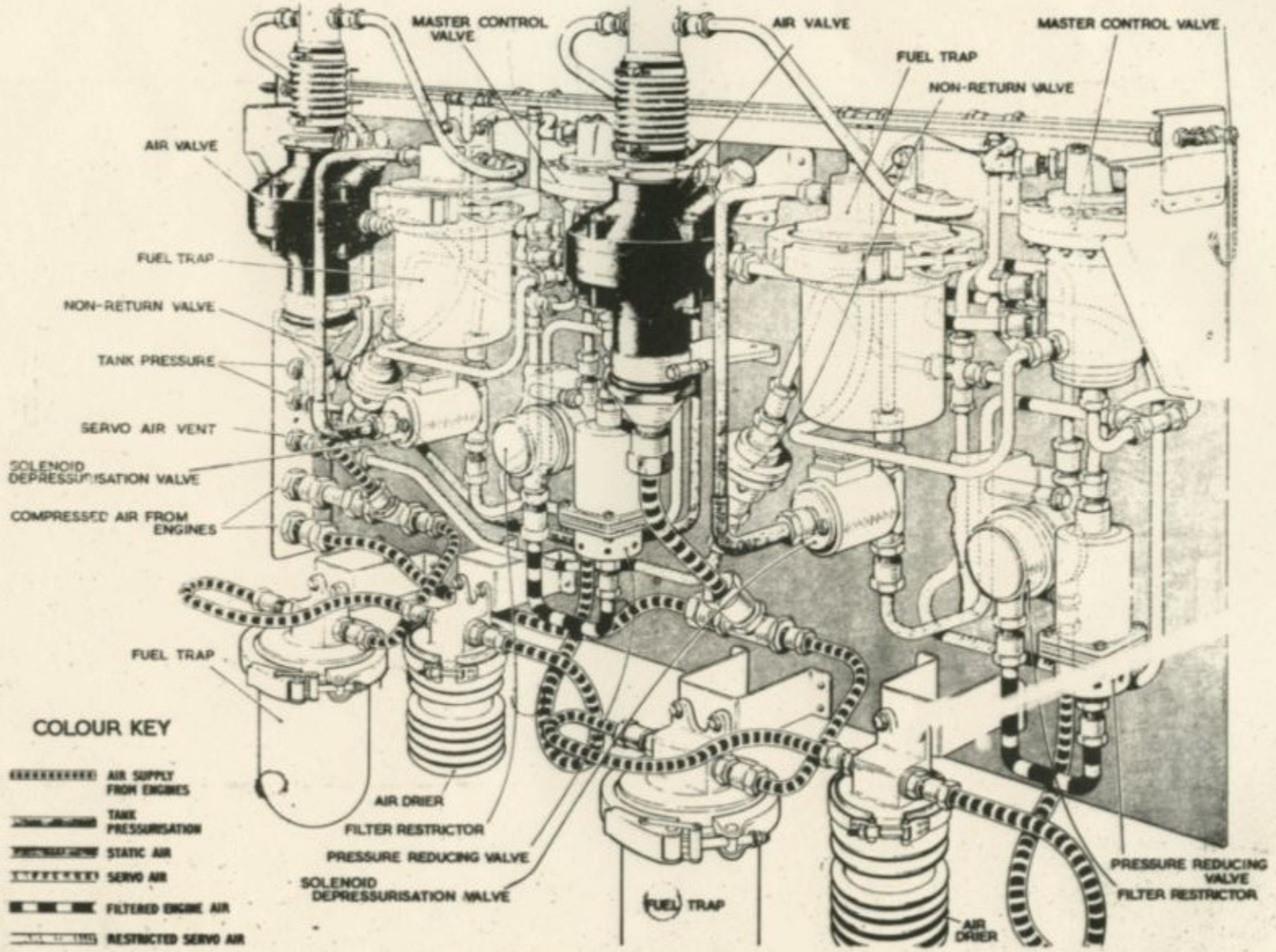
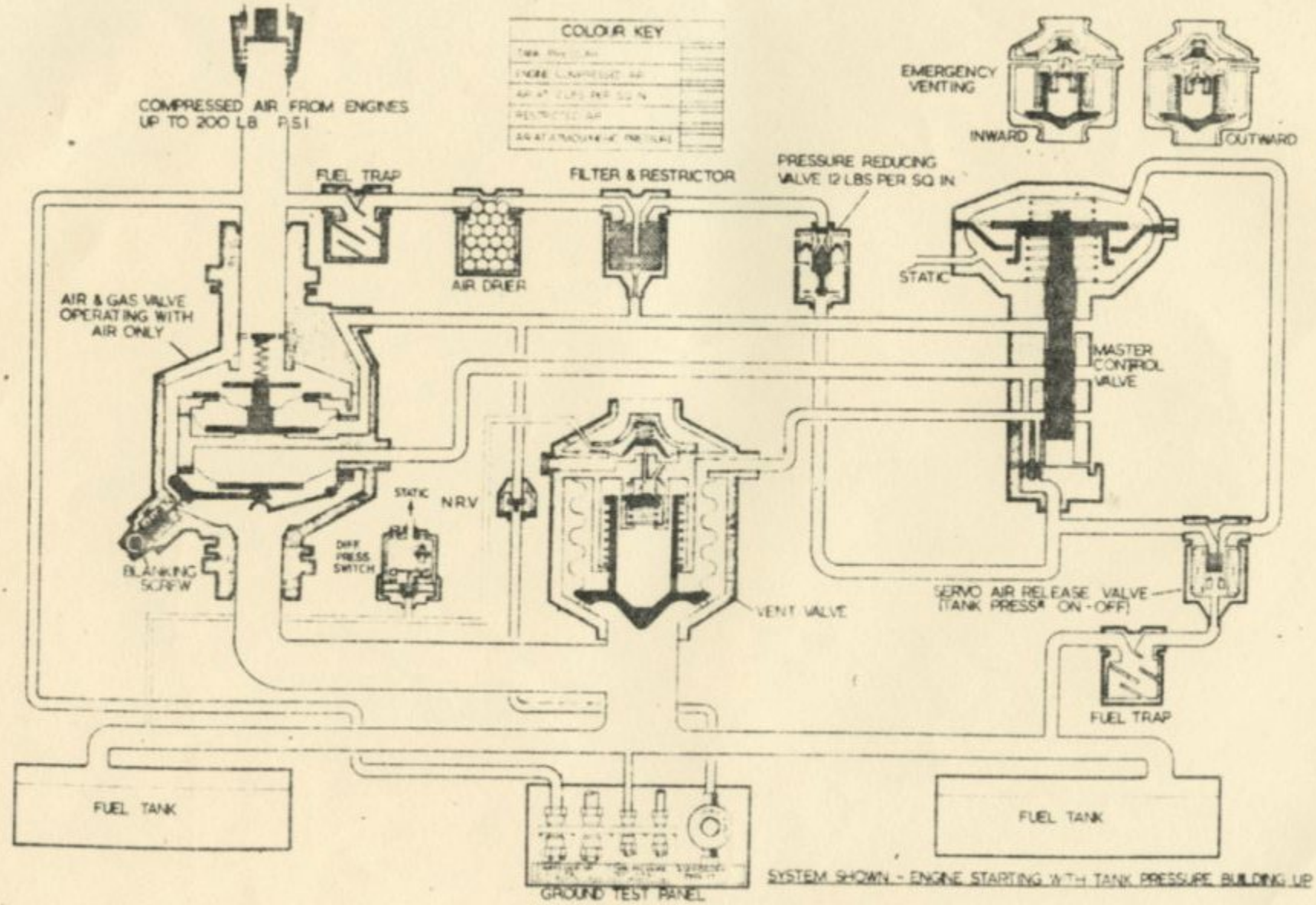


Fig. 4 Tank pressurisation control panel



SYSTEM SHOWN - ENGINE STARTING WITH TANK PRESSURE BUILDING UP

DCVSS

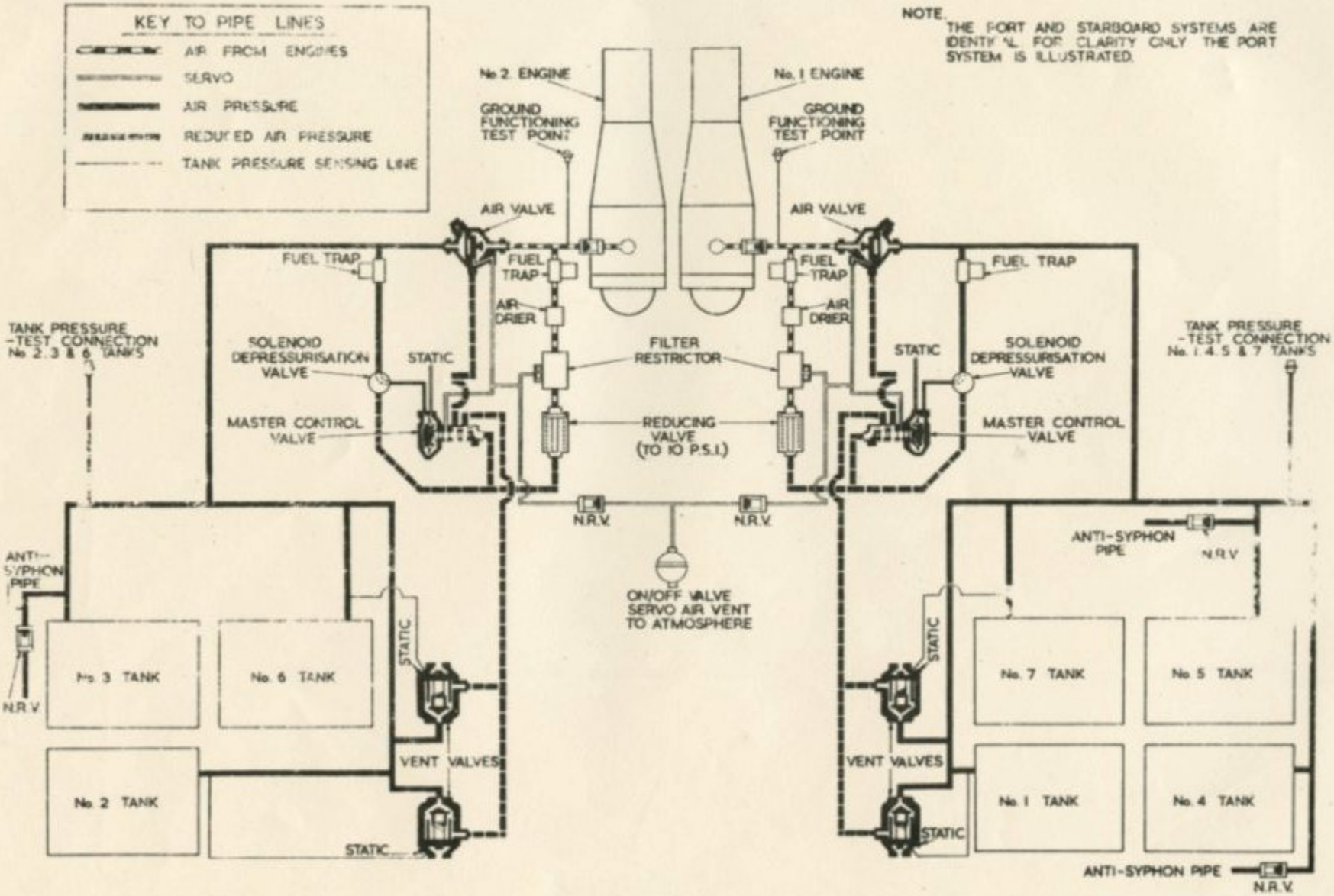


Fig. 1 Fuel tank pressurisation diagram