Appendix 1

TEST RIG - FUEL TANK PRESSURISATION

LIST OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Type	Avro Part No. U.1383
Ref.No.	26DC/95218

DIMENSIONS

Length	4ft. 6in.
Width	3ft. 7in.
Height	6ft. 0in.
Weight	6 cwt.
Electrical supply	230-250 volt, 50 c/s, single phase

DESCRIPTION

Introduction

1. The Fuel Tank Pressurisation Test Rig (Ref.No.26DC/95218) has been designed to facilitate ground servicing of the fuel tank pressurisation system which is described in the chapter.

2. The test rig enables the fuel pressurisation control panel and associated vent valves to be tested for correct functioning after removal from the aircraft and bay servicing. The following control function may be found for each tank group.

(1) Initial pressurisation (level flight conditions)

(2) Normal outward venting (climbing conditions)

(3) Emergency outward venting

(4) Normal inward venting (diving conditions)

(5) Emergency inward venting

3. The following paragraphs contain a detailed description of the test rig, give the recommended installation, operating and servicing procedures together with the tests to be carried out on the fuel tank pressurisation control panels.

CONSTRUCTION (fig.1A and 2A)

4. The test rig is intended as a static rig to be installed in a servicing bay. It has a welded angle-iron framework covered with panels of mild steel sheet secured by rivets and self-tapping screws. The panels completely cover the framework with the exception of the back, which is left open to give access to components.

5. The front panel is of stepped

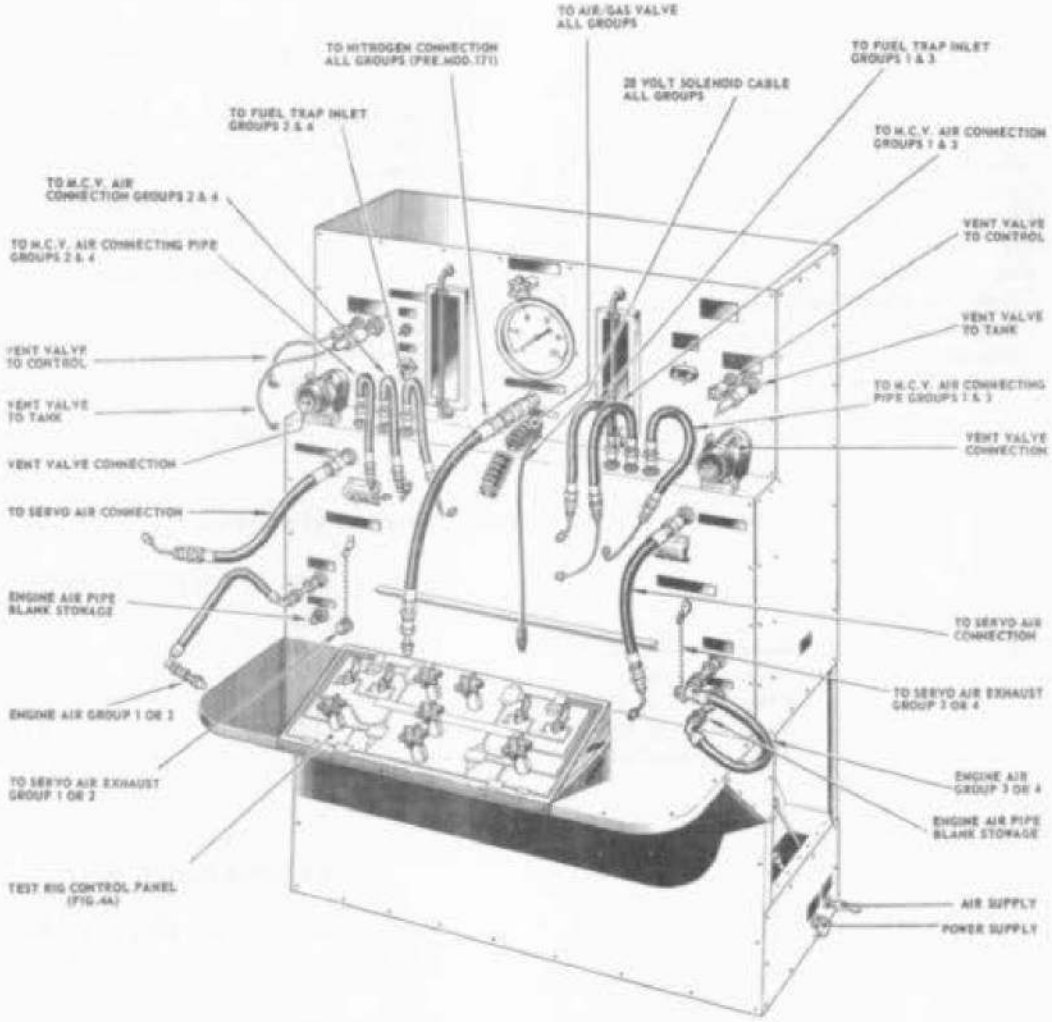


Fig.1A. General view (showing connections)

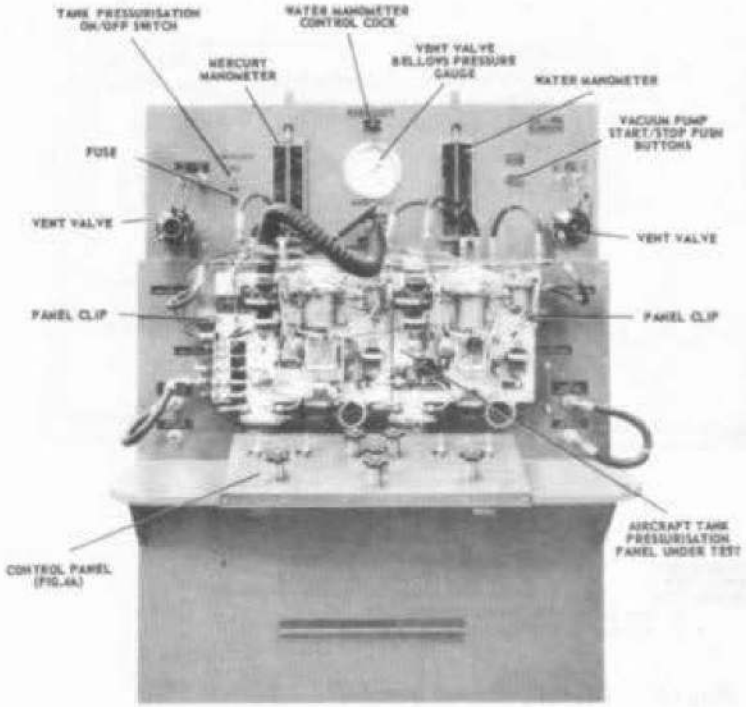


Fig.2A. Front view of test rig

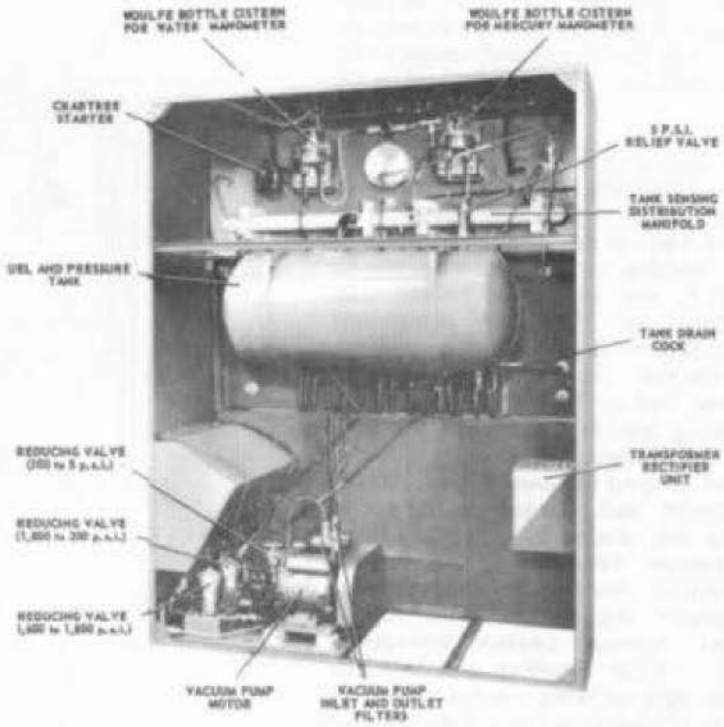


Fig.3A. Rear view of test rig

construction to facilitate pipe connection to the aircraft pressurisation panel, and a shelf is fitted at normal desk height to accommodate an inclined rig control panel. Provision is made for mounting the aircraft panel under test, immediately above the control panel and in the centre of the front panel. Appropriate connections are arranged around this central position so that they can be readily coupled to either a port or starboard pressurisation panel.

6. The upper front panel accommodates pipe connections and mountings for two tank vent valves. These are mounted on the extreme right and left of the panel respectively with spring clips on the 'step' to support them. Also mounted on this panel are electrical components (para.15), a mercury manometer for reading normal tank pressures, a water manometer and control cock for indicating negative tank pressures and an air gauge for the vent valve bellows pressure.

TEST RIG CONTROL PANEL (fig.4A)

7. The test rig control panel is fabricated from a light-alloy sheet suitably stiffened and secured in an inclined position at desk height. The panel has a dark grey anodic finish engraved with a line diagram of the tank pressurisation system. Hand operated control valves are mounted in their correct relative positions on the panel and all components are identified in white engraved lettering.

8. The following valves are fitted on the control panel:-

(1) Air Valve Control Cock (2 off - one for each Master Control Valve). Each valve is interposed in the line between the air connection of the M.C.V. and the four way union, and when closed, prevents restricted air from bleeding away regardless of the position of the M.C.V. piston. When this valve is closed therefore, the

air valve of the air/gas valve is kept permanently closed by the restricted air pressure and no simulated engine air can flow through the air/gas valve to the tank.

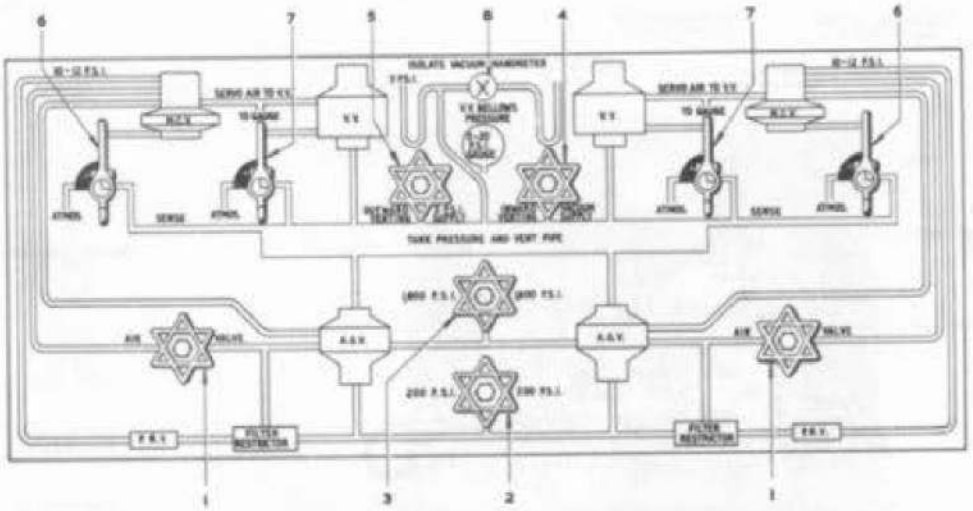
(2) Tank Pressure Sensing Control Cock (4 off - one for each M.C.V., and one for each Vent Valve). These items, two position 3-way cocks, are interposed in the tank sensing connection adjacent to each M.C.V. and each vent valve. In one position, the associated component i.e., the Master Control Valve or Vent Valve senses tank pressure in the normal way, and in the other position, the tank sensing line is closed and the tank sensing diaphragm of the associated component is open to atmosphere. Normally outward and inward venting can operate in any one of three ways - i.e., tank pressure sensed by the M.C.V. causes normal venting, or alternatively, tank pressure sensed by either one of two vent valves causes emergency venting. It is therefore possible, by use of the tank sensing control cocks, to test each of these venting functions by isolating consecutively two components at a time.

(3) Inward Venting Control Cock - Controls the vacuum supply to the tank to simulate inward venting conditions. May also be used as a leak source from the tank (without the vacuum pump running) to simulate the usage of fuel in level flight.

(4) Outward Venting Control Cock - Controls the 5 p.s.i. supply to the tank and vent manifold and is used to regulate the rate of change of tank pressure.

(5) 200 p.s.i. Control Cock - Controls the 200 p.s.i. engine air supply to the air/gas valve and associated servo lines.

(6) 1,800 p.s.i. Control Cock - Controls the 1,800 p.s.i. simulated nitrogen supply to the air/gas valve.



1. AIR VALVE CONTROL COCK
2. 200 P.S.I. CONTROL COCK
3. 1,800 P.S.I. CONTROL COCK
4. INWARD VENTING CONTROL COCK
5. OUTWARD VENTING CONTROL COCK
6. MASTER CONTROL VALVE, TANK SENSING COCK
7. VENT VALVE, TANK SENSING CONTROL COCK
8. WATER MANOMETER CONTROL COCK

Fig.4A. Test rig control panel

(7) Water manometer control cock - Used to connect the manometer to tank pressure when negative pressures are being used for inward venting testing.

NOTE...
The water manometer control cock must remain closed except when inward venting testing.

AIR SYSTEM

9. Provision is made on the right hand side panel (fig.5A) for connecting a ground air supply. Originally a high pressure air bottle of 3,600 p.s.i. was necessary in order to obtain a simulated nitrogen pressure of 1,800 p.s.i., but on control panels, post Mod.171, a workshop air supply of 200 p.s.i. is acceptable. This means that either method of air supply may be connected to the test rig, as both systems are suitably reduced by a series of pressure reducing valves to accurately simulate air/gas supplies.

10. Air pressure indication is provided by three pressure gauges recessed into the right hand side panel (fig.5A). These show initial air supply pressure, simulated nitrogen pressure and engine supply pressure, respectively.

11. Three pressure reducing valves mounted on the base of the test rig, immediately below the pressure gauge recess, are accessible from the rear (fig.3A). The arrangement is shown diagrammatically in fig.6A and the three reduction stages are as follows:-

(1) 3,600 p.s.i. to 1,800 p.s.i. (for nitrogen simulation).

(2) 1,800 p.s.i. to 200 p.s.i. (simulated engine air).

(3) 200 p.s.i. to 5 p.s.i. (tank supplies).

Provision is made on all three reducing valves for hand adjustment so that pressure reduction figures may be accurately set prior to each test.

12. A light-alloy fuel and pressure tank is installed centrally in the rear of the test rig, and although termed as such, does not require fuel for testing purposes. The tank takes the place of a normal aircraft tank group and under the influence of either a ground air supply (suitably reduced), or a vacuum pump depression, can be made to accurately simulate the normal rise and fall of tank pressures during flight. A safety valve, set to 5 p.s.i., is fitted to the top of the tank and a moisture drain cock is fitted at the lowest point. Positive tank pressure indication is provided by a mercury manometer, mounted in the upper front panel.

13. To facilitate connection of aircraft control equipment and rig instrumentation, a distribution manifold is connected to, and is mounted directly above, the fuel and pressure tank.

VACUUM SYSTEM

14. An electrically driven vacuum pump, mounted on the base of the test rig, is accessible from the rear. On selection, the pump can be started and connected to the test tank in order to simulate negative tank pressures. Negative pressure indication is provided by a water manometer mounted on the upper front panel.

ELECTRICAL POWER SUPPLIES

15. A 230-250 volt, 50 c/s, single phase a.c. power supply socket is provided on the lower right hand side panel. A ground supply connected to this point provides power for the electrically driven vacuum pump. A Crabtree starter unit, incorporating START/STOP push buttons, is mounted on the upper right hand front panel.

16. Tank pressurisation is controlled by a 28-volt d.c. solenoid operated valve, one to each tank group. On the test rig a supply for these valves is obtained from a transformer rectifier unit installed in the left hand rear of the rig. A mains control switch for the transformer rectifier unit, together with a 28-volt output fuse are mounted on the upper front panel and a 28-volt supply cable of sufficient length to connect to either a port or starboard pressurisation panel, is available at the lower centre top panel.

17. A theoretical wiring diagram for the test rig is shown in fig.7A.

INSTALLATION

General

18. The test rig must normally be installed in a component servicing bay on a steady and level base. The appropriate air supply and a 230-250 volt, 50 c/s single phase power supply must be available at the right hand side panel.

Temperature control

19. Ideally some degree of temperature control in the servicing bay is desirable, but is not essential. Temperature is only critical in the case of the emergency inward venting range which tends to drift with temperature changes.

20. The Vent Valves control emergency inward venting and this should normally occur over the range 0 to -4·0 in. water gauge. This figure depends on the valve setting tolerance and the ambient temperature, which under laboratory setting conditions should be 23 deg.C. However, because of the comparatively large tolerance on this type of valve it is normally not necessary to insist on laboratory temperature conditions when carrying out tests in service, but it is important that before rejecting any vent valves which appear on, or below the -4·0 in. water gauge limit, to first ascertain that the test temperature is not less than 23 deg.C.

Manometer filling

21. For storage and transit purposes both the mercury and water manometers are drained and must be refilled before the rig is brought into use. Fill the mercury manometer with clean mercury (preferably from a sealed container) and fill the water manometer with distilled water containing a few drops of a suitable wetting agent. Use the following filling procedure:-

◀ Set the manometer scale to the approximate mid position. ▶

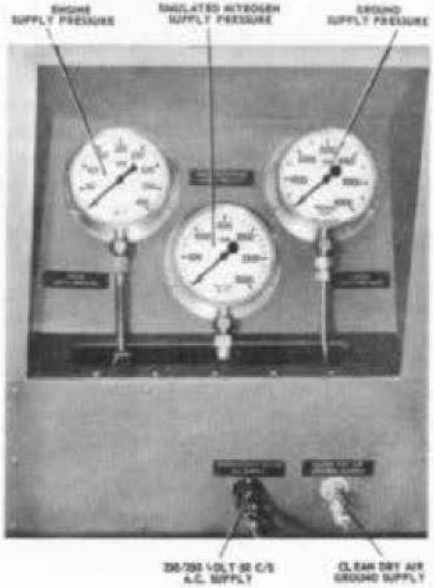


Fig.5A. External connections and pressure gauge recess

In the case of the water manometer only, remove the vacuum pipe rubber connecting tubing.

Remove the clamp which secures the Woulfe bottle.

Carefully invert the Woulfe bottle with bungs and manometer tubing still connected.

Remove the rubber tubing from the glass adapters which fit through the rubber bungs.

NOTE...
Do not remove the glass tubing or rubber bungs, as leaks can develop if they are frequently disturbed

With the Woulfe bottle on a bench, approximately half fill with mercury or distilled water, as appropriate. This operation may be accomplished quite easily if a paper funnel is made with the end rolled small enough to engage inside the lip of the glass tube.

Carefully invert the Woulfe bottle with one finger held over the normal outlet tube. The vent or inlet glass tube has a stack-pipe and with care no liquid should be lost from this connection during the turning operation.

Reconnect the manometer tube, releasing the finger from the outlet tube as connection is made.

Secure the Woulfe bottle in the inverted position, with the two rubber bungs resting on the wooden support block.

Check the zero setting on the manometer scale. (With the bottles half filled, the liquid level should be on the high side). Bleed back to zero mark by partly disconnecting the rubber tube at the bottle. Slight inaccuracies can be adjusted on the manometer scale.

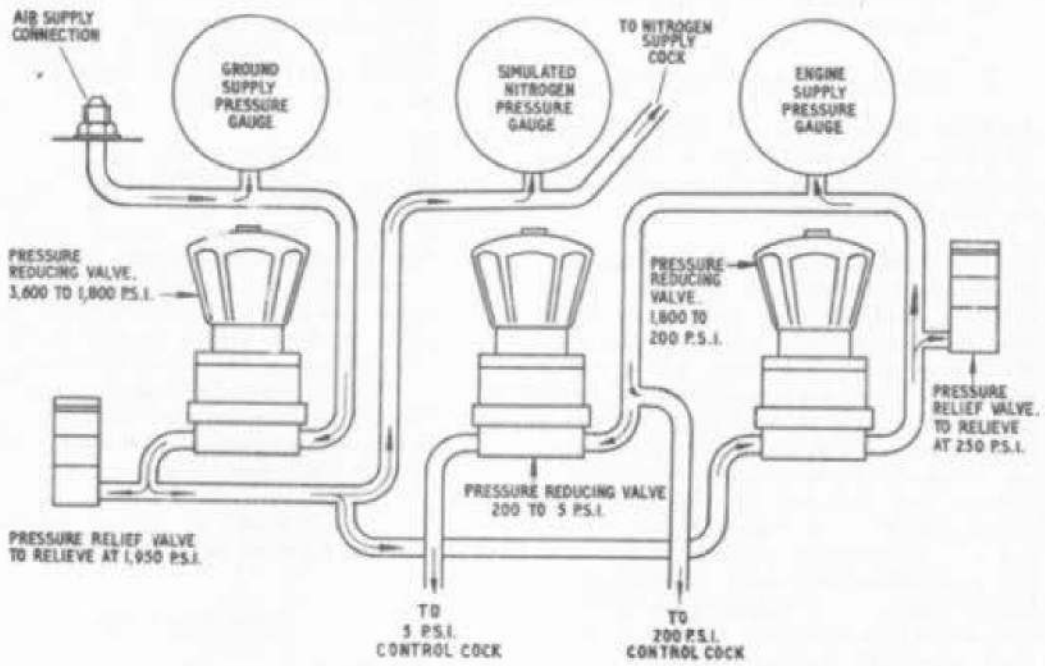


Fig.6A. Arrangement of pressure reducing and relief valves

In the case of the water manometer only, replace the rubber tubing on the vacuum connection.

OPERATION

General

22. On completion of the installation, the test rig is ready to receive either a port or starboard tank pressurisation control panel, together with two vent valves.

23. To avoid rejecting control panels and/or components unnecessarily, it is important that aircraft panels are maintained in their normal upright attitude as removed and carried from the aircraft to the servicing bay, and that the following components in each tank group are serviced prior to carrying out rig tests:-

Fuel traps (2 per group)
Air drier (1 per group)
Filter restrictor (1 per group)

Fitting aircraft control panel

24. To avoid crossed or incorrectly positioned pipes it is recommended that the following fitting procedure is followed whenever an aircraft control panel is connected to the test rig:-

(1) Secure the control panel to the test rig by panel retaining cleats.

(2) Connect flexible hose marked TO

AIR/GAS VALVE, to the air/gas valve of the group under test.

(3) Disconnect pipes marked AIR at both master control valves.

(4) Connect the two pipes on the test rig marked TO M.C.V. AIR CONNECTION to the union marked AIR on each group master control valve.

(5) Connect pipes on test rig marked TO M.C.V. AIR CONNECTING PIPE, to the pipes disconnected in item (3).

(6) Connect the test rig hoses marked TO FUEL TRAP INLET to the open end of the fuel traps in both groups, in the FLOW direction.

(7) Connect the test rig hoses, marked TO SERVO CONNECTION to the servo-pipes of the group under test (i.e., SERVO 1, SERVO 2, SERVO 3 or SERVO 4, as appropriate).

(8) Connect the test rig hose marked TO ENGINE AIR GROUPS 1 and 2 (or 3 and 4 as appropriate) to the corresponding engine air supply union on the aircraft panel.

(9) Connect the test rig hose marked TO ENGINE AIR, GROUPS 3 AND 4 (or 1 and 2 as appropriate) to the adjacent blanking stowage on the test rig marked ENGINE AIR PIPE STOWAGE.

(10) Connect the blanking union which is held on a short chain and marked TO SERVO AIR EXHAUST to the adjacent union on the aircraft panel marked SERVO AIR EXHAUST.

(11) Connect the test rig 28-volt electrical lead to the solenoid valve supply socket on the aircraft panel.

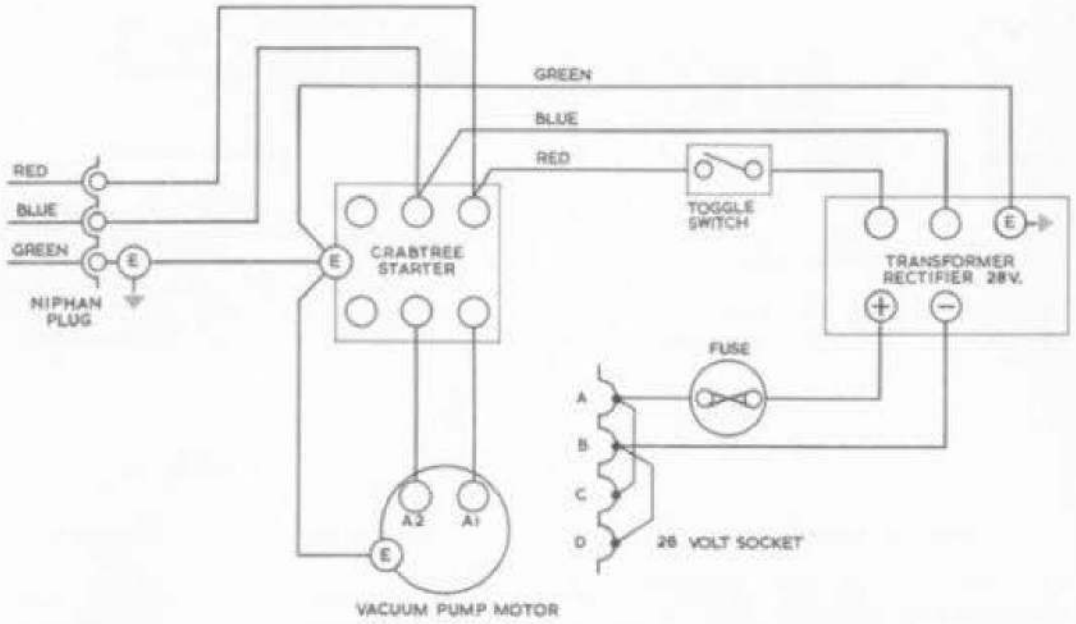


Fig.7A. Electrical circuit

NOTE...
The following additional item is only applicable to aircraft control panels pre Mod.171.

(12) Connect the test rig hose marked TO NITROGEN CONNECTION to the nitrogen pipe tee-connection on the aircraft control panel.

Fitting vent valves

25. Each of the four tank groups must be tested separately with a pair of vent valves in position. It is not necessary to selectively fit vent valves from the particular group in which they are connected on the aircraft, but each pair of vent valves should be changed before testing the next group. Thereafter serviced and tested vent valves may be fitted to any location in the aircraft.

26. Vent valves may be fitted to the test rig, as follows:-

(1) Fit a vent valve into a retaining clip and connect the large bore tank sensing pipe.

(2) Connect the test rig pipe marked TO CONTROL, to the CONTROL connection on the vent valve.

(3) Connect the test rig pipe marked TO TANK to the tank connection on the vent valve.

(4) Repeat items (1) to (3) for the second vent valve.

SERVICING

General

27. To ensure efficient operation of the test rig a periodic check must be made of all H.P. and L.P. valves and pipes for air leakage. If leakage is suspected a comprehensive check must be made using a soap solution.

MANOMETERS

28. The manometers should give little trouble once filling and zero levels have been established, but if the zero levels are not maintained check for leakage at connecting tubes and rubber bungs.

VACUUM PUMP

29. This component is designed to operate over long periods without attention; no oiling or greasing is necessary. However, the inlet and outlet filters, mounted on top of the pump, must be cleaned periodically. At approximately six monthly intervals, when the rig is in use, remove the wire gauze filter elements and clean in non-lead petrol. Dry the gauzes in an air blast before fitting.

ELECTRIC MOTOR

30. Little servicing is necessary apart from periodic lubrication of the motor bearings. Lubricate very sparingly with grease XG-271 at the two grease nipples provided.

TESTS

PRE-TEST REQUIREMENTS

31. To prevent the possibility of damage occurring to the test rig or the aircraft control panel, through crossed or incorrectly positioned pipes, it is important that all connections are visually rechecked before conducting any tests.

32. The water manometer control cock must always be in the fully closed position except for inward vent testing. Failure to observe this precaution will result in a positive pressure being applied to the water manometer which will force water from the manometer tube.

33. When connecting external air and electrical supplies to the test rig, carry out the following procedure:-

Tank pressurisation switch	-	set to OFF
Air supply cock, 1,800 p.s.i.	-	set to CLOSED
Air supply cock, 200 p.s.i.	-	set to CLOSED
Ground air supply	-	connect to test rig
External electrical supply	-	connect to test rig

34. Before carrying out tests, check the zero settings of both the mercury and water manometers.

TEST PROCEDURE

35. In order to ensure accurate results it is recommended that the tests, detailed in the following paragraphs, be repeated three times for each tank group.

Initial pressurisation	-	Air valve closing limits, 1·82 to 2·3 p.s.i.
Normal outward venting	-	Master control valve limits 2·65 to 3·0 p.s.i.
Emergency outward venting	-	Vent valve limits 2·75 to 3·25 p.s.i.
Normal inward venting	-	Master control valve limits 0 to minus 4·5 in. W.G.
Emergency inward venting	-	Vent valve limits 0 to minus 4·0 in. W.G.

NOTES...

The variation in the limits quoted for normal and emergency inward venting is acceptable due to the piston valve of the master control valve being more sluggish than the diaphragm valve of the vent valve. Also, after the master control valve piston has moved to the inward vent position the vent valve bellows pressure has to bleed away through approximately 30ft. of piping, while the vent valve, as well as responding more quickly bleeds the bellows pressure direct to atmosphere through its own gauze covered static outlet. Therefore, at fast rates of descent, the vent valve will operate before the master control valve, and for safety the limits must be tighter.

◀ *The 9 to 14·5 p.s.i. pressure controlling range given in these tests covers the full 'flow' and 'no flow' conditions as measured on the test rig only. When installed in the aircraft the pressure reducing valve outlet pressure is 9 to 12·5 p.s.i. as stated in Sect.4, Chap.6.* ▶

To carry out the tests, an aircraft fuel tank pressurisation control panel and two vent valves must be installed in the rig.

Initial pressurisation (level flight)

36. Air valve closing limits 1·82 to 2·3 p.s.i.

(1) Air valve control cock	Set valve of group not required for test to CLOSED.
(2) Master control valve tank sensing cock.	Set valve of group not required for test to ATMOSPHERE.
(3) Master control valve tank sensing cock	Set valve of group in use to NORMAL.
(4) Vent valve tank sensing control cock (2 off).	Set to NORMAL.
(5) Water manometer control cock.	Set to CLOSED.
(6) Ground air supply	Ensure reading on engine supply pressure gauge is 200 p.s.i.
(7) Ground air supply cock	Set to OPEN and wait for the air valve of the air/gas valve to close. *NOTE...* *This is indicated when air ceases to flow from the vent valves.*
(8) Tank pressurisation switch	Set to ON.
(9) Air valve control cock	Set to OPEN.

NOTE . . .
The air valve of the air/gas valve should open and the vent valves close. This is indicated by a reading of 9 to 14·5 p.s.i. on the vent valve bellows pressure gauge and a tank pressure of 1·82 to 2·3 p.s.i. on the mercury manometer when the system has settled.

(10) Tank pressure switch	(a) Set to OFF and ensure that the tank pressure falls to zero and the bellows pressure to 4 p.s.i. or less. (b) Reset the switch to ON.
(11) Inward venting control cock	(a) Open slightly to allow air to escape from the tank to simulate usage of fuel, and check that the air valve opens at 1·7 to 2·0 p.s.i. (b) Check that the air valve closes when pressure reading of 1·82 to 2·3 p.s.i. is shown on mercury manometer. (c) Set the inward venting control cock to CLOSED.

NOTE . . .
The following items 12, 13, 14 and 15 are only applicable in the case of early type pressurisation panels (pre Mod.171), incorporating a nitrogen supply to the gas valve:-

(12) Simulated nitrogen supply	Ensure nitrogen pressure gauge is set to 1,800 p.s.i. maximum.
(13) Control cock (1,800 p.s.i.)	Open slowly, and check that the tank pressure builds up, until at 2·02 to 2·5 p.s.i. the gas valve closes.
(14) Inward venting control cock	(a) Open slowly to allow air to escape from the tank to simulate usage of fuel and check that tank pressure slowly hunts between a minimum of 1·9 to 2·2 p.s.i. and a maximum of 2·02 to 2·5 p.s.i. (b) Set inward venting control cock to CLOSED.
(15) Control cock (1,800 p.s.i.)	Set to CLOSED.
(16) Tank pressurisation switch	Set to OFF.
(17) Air valve control cock	Set to CLOSED.

Normal outward venting (climbing)

37. Master control valve, limits 2·65 to 3·0.

(1) Vent valve tank sensing control cocks (2 off).	Set both cocks to ATMOSPHERE.
(2) Inward venting control cock	Set to CLOSED.
(3) Air valve control cock	Ensure air valve control cock of group not required for test, is set to CLOSED.

(4)	M.C.V. tank sensing control cock	Ensure cock of group not required for test is set to ATMOSPHERE.
(5)	M.C.V. tank sensing control cock.	Set cock in use to NORMAL.
(6)	Water manometer control cock	Set to CLOSED.
(7)	Tank pressurisation switch	Set to ON.
(8)	Simulated engine air supply	Ensure reading on gauge is 200 p.s.i.
(9)	Control panel supply cock (200 p.s.i.)	Set to ON and wait for air valve of the air/gas valve to close. *NOTE . . .* *This is indicated when air ceases to flow from the vent valves.*
(10)	Outward venting control cock (5 p.s.i.)	(a) Open slowly to give a rate of change of pressure of 1 p.s.i. per minute, as shown on the mercury manometer. (b) Check tank pressure reading on mercury manometer which should now read between 2·65 to 3·0 p.s.i.

NOTE . . .
When the above pressure is reached both vent valves should outward vent, and rising and falling of the tank pressure should continue in a series of slow pulses. This condition should be maintained for several minutes in order to conduct a satisfactory test.

(11)	Outward venting control cock 5 p.s.i.	Set to CLOSED.
(12)	Tank pressurisation switch	Set to OFF.

Emergency outward venting

38. Vent valve limits 2·75 to 3·25 p.s.i.

(1)	Vent valve tank sensing control cocks (2 off)	Ensure both valves are set to NORMAL.
(2)	M.C.V. tank sensing control cock.	Set to NORMAL.
(3)	Tank pressurisation switch	Set to ON to allow tank pressure to rise to 1·82 to 2·3 p.s.i.
(4)	Air valve control cock	Set to CLOSED in order to prevent the air valve from opening, when the tank sensing control is removed from the M.C.V.
(5)	M.C.V. tank sensing control cock	Set to ATMOSPHERE.
(6)	Vent valve tank sensing control cock left hand side (1 off).	Set to ATMOSPHERE.

NOTE . . .
The vent valve now left with NORMAL tank sensing is the valve under test.

(7)	Outward venting control cock 5 p.s.i.	(a) Open slightly to give a rate of change of pressure of 1 p.s.i. per minute as shown on the mercury manometer. (b) Observe tank pressure rises and outward venting occurs at a pressure of 2·75 to 3·25 p.s.i., as shown on the mercury manometer.

NOTE . . .
When the above pressure is reached the vent valve should outward vent and rising and falling of the tank pressure should continue in a series of slow hunts.

In the case of some valves it may be found that the first outward vent occurs within the correct limit of 2·75 to 3·25 p.s.i. but the valve then remains feathered partially open, maintaining a steady bellows pressure of 6 to 8 p.s.i. and a tank pressure at, or below the normal outward venting pressure. In such cases the 5 p.s.i. air supply to the tank should be reduced to allow the tank pressure to fall, and if the bellows pressure recovers to 9 p.s.i. minimum before the tank pressure drops to 2·3 p.s.i., the valve is satisfactory.

A change over to the vent valve not yet tested may be accomplished as follows:-

(8)	Vent valve tank sensing control cock of vent valve not yet tested (i.e., left hand side).	Set to NORMAL.
(9)	Vent valve tank sensing control cock of vent valve already tested (i.e., right hand side).	Set to ATMOSPHERE.

(10) Carry out checks as detailed in item (7) (a) and (b), for the second vent valve, and outward venting should occur once again between 2·75 and 3·25 p.s.i.

(11) Outward venting control cock (5 p.s.i.).	On completion of tests, set to CLOSED.
(12) Tank pressurisation switch	Set to OFF to depressurise the system.

Normal inward venting

39. Master control valve, limits 0 to minus 4·5 in. water gauge.

(1) Vent valve tank sensing control cocks (2 off).	Set both valves to ATMOSPHERE
(2) M.C.V. tank sensing control cock.	Set to NORMAL
(3) Air valve control cock	Set to CLOSED.
(4) Tank pressurisation switch	Set to ON.
(5) Mercury manometer	Check reading is ZERO.

NOTE . . .
If any pressure is showing on the mercury manometer, select the pressurisation switch to OFF and then ON again. If pressure is still showing this may be due to the tank temperature being lower than ambient because of depressurisation after earlier tests. In these circumstances the tank temperature should be allowed to return to normal before selecting the tank pressurisation switch to ON again.

(6) Vent valve bellows pressure gauge.	A check reading, which should be between 9 and 14·5 p.s.i.
(7) Water manometer isolation cock.	Open, slowly.
(8) Vacuum pump.	Select ON
(9) Inward venting control cock	(a) Open slowly and adjust to give a rate of change of pressure of 1 in. W.G. in 20 sec. (b) Observe that inward venting relieves the tank depression before it exceeds minus 4·5 in. W.G.

NOTE . . .
Inward venting should take place in a series of hunts for as long as the vacuum pump is running.

(10) Vacuum pump.	Select OFF and ensure that the vent valve bellows pressure rises to between 9 and 14·5 p.s.i.
(11) Water manometer control cock	Set to CLOSED.
(12) Inward venting control cock	Set to CLOSED.
(13) Tank pressurisation switch	Set to OFF.

Emergency inward venting

40. Vent valve, limits 0 to minus 4·0 in. water gauge.

(1) Vent valve tank sensing control cocks (2 off).	(a) Set control cock of one vent valve to ATMOSPHERE and the other vent valve to NORMAL.

NOTE . . .
The vent valve left with NORMAL tank sensing is the valve under test.

(2) M.C.V. control cocks (2 off)	Set both valves to ATMOSPHERE
(3) Air valve control cock	Set to CLOSED.
(4) Tank pressurisation switch	Select ON.
(5) Mercury manometer	Ensure reading ZERO.
(6) Water manometer cock	Set to OPEN.
(7) Vacuum pump	Select ON
(8) Inward venting cock	Open slowly to give a rate of change of pressure of 3·5 in. W.G. per sec.
(9) Vacuum pump	(a) Select OFF and allow the vent valve bellows pressure to build up between 9 and 14·5 p.s.i. (b) Select ON and note the maximum negative pressure reached on the first inward vent. This figure must not exceed minus 4·0 in. W.G.

(c) Select OFF.

NOTE . . .
If the vacuum pump is left running, subsequent inward vent depression will be lower, as the bellows pressure does not fully recover. It is, therefore, the first inward vent from full bellows pressure which is important, and this must not exceed minus 4·0 in. W.G.

(10) Vent valve tank sensing control cocks (2 off).

(a) Set control cock of vent valve just tested to ATMOSPHERE.

(b) Set control cock of valve to be tested to NORMAL.

(11) Repeat test items (2) to (9) inclusive, for the second vent valve.

(12)	Water manometer cock	Set to CLOSED
(13)	Inward venting control cock	Set to CLOSED
(14)	Tank pressurisation switch	Select to OFF
(15)	Air control cock	Set to OFF

NOTE . . .
The above sequence of operations represents the tests on one tank group and one pair of vent valves only. A second pair of vent valves should therefore be fitted, and all applicable connections changed over to the other group on the panel. The second control panel may then be fitted and tested in a like manner, making sure to change the two vent valves after each group is tested.

TABLE 1
SCHEDULE OF PARTS

Main components and some consumable items only:-

A.V.Roe Part No.	Description	Qty.
7b/U.1383	Spring clip, 4 in. dia.	2
119/U.1383	Rubber bung 15 mm. 3/8 in. dia. hole	2
120/U.1383	Cork bung, size 5	2
131/U.1383	Woulfe bottle, 500 c.c.	2
125/U.1383	Tank assy.	1
132/U.1383	Manometer tube, glass 3/8 in. o/d. x 12 in. long E.285	2
133/U.1383	3/8 in. needle valve	7
135/U.1383	Pressure gauge 0-20 p.s.i.	1
136/U.1383	Pressure gauge 0-400 p.s.i.	1
137/U.1383	Pressure gauge 0-6000 p.s.i.	1
138/U.1383	Pressure gauge 0-300 p.s.i.	1
139/U.1383	P.80 Press. controller 3,600-1,800 p.s.i.	1
140/U.1383	P.40 Press. controller 1,800-200 p.s.i.	1
141/U.1383	L.I. Press. controller 200-5 p.s.i.	1
134/U.1383	Flanged plug and cover 3 pin 5 amp.	1
143/U.1383	Vacuum pump unit R.B.2 Mk.1V, 65 Plant	1
165/U.1383	Switch 250v x 10 amp.	1
116/U.1383	Starter Type D.6	1
174/U.1383	Flexible pipe	8
175/U.1383	Flexible pipe	1
176/U.1383	Flexible pipe	2
177/U.1383	Flexible pipe	1
190/U.1383	Fuseholder L.356	1
191/U.1383	Fuse H.R.C. 3 amp. L639	1
195/U.1383	Relief valve, blow-off 2,000 p.s.i.	1
196/U.1383	Relief valve, blow-off 250 p.s.i.	1