

## **Lancaster systems (Hydraulic And Pneumatic)**

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### **HYDRAULIC SYSTEM**

1. There are four pumps (one on each engine) supplying the gun turrets as given in the "engine Auxiliary Sheet"
2. Two main pumps (on each inbound engine) which feed the following services:

Main Wheel Units	Carburettor Air Intake Shutters
Flaps	Fuel Jettison
Bomb doors	

### **UNDER CARRIAGE CONTROL**

The lever controlling the hydraulic operation of the undercarriage is on the right of the pilot's seat, aft of the trimming tabs mechanism, and has two positions only.

To retract the undercarriage, the lever is pulled up. A spring loaded safety bolt must be held aside, before the lever can be raised, but automatically engages when the undercarriage is lowered.

A warning horn is also provided, but only works in conjunction with the throttle levers of the Inboard engines. The warning horn is on the "port" side of the pilot's seat. The test button and indicator light is just to the rear of the horn, "port side" also. The tail wheel units is fixed.

### **THE UNDERCARRIAGE INDICATOR**

This instrument is mounted on the left hand side of the Instrument Panel and operates as follows:

Locked down	-	Two Green Lights
Unlocked	-	Two Red Lights
Locked Up	-	No Lights

The lights can be dimmed for night use by rotating the knob at the centre of the indicator. A change-over switch is provided below the indicator switch to bring into operation an auxiliary set of green lights in the event of failure of the primary set. An additional set of red lamps is wired in parallel, and light with the primary set. The indicator switch is fitted beside the main ignition switches; a box attached to the switch knob prevents the ignition being switched on until the indicator switch "ON"

## **FLAPS CONTROL**

The push-pull handle controlling the hydraulic operation of the flaps is also on the right of the pilots seat in front of the tab controls.

To lower the flaps, the handle is pushed down until the indicator on the left hand side of the instrument panel shows the requested setting, then the handle should be returned to the "normal" position afterwards. The indicator switch is mounted immediately above the flaps indicator.

When a certain degree of flaps is selected, and after a period of flying, a further downward selection is desired. The selector handle should first be pulled "up" from the neutral position until the indicator shows flaps coming "up", then the selection down can be made as required.

The idea of this is to break a hydraulic lock which occurs in the flap jack, caused by the pressure on the flaps acting on the jack, and the oil pressure is not sufficient to overcome this. So the "up" position is selected, which allows the pressure on the flaps to drop, and at the same time allow the automatic cut-out to "cut in". At approximately 200 lbs per square inch. This will continue to build up to a pressure of 850 lbs per square inch, when it "cuts out" again. This pressure will be sufficient to operate the flaps at any time.

## **HYDRAULIC HAND PUMP**

In the event of failure of the engine driven pumps, the hydraulic system can be operated by means of a hand pump, situated on the port side on the fuselage, just aft of the port spar. The hydraulic Accumulator is also stored neat to the hand pump, which gauge fitted, minimum pressure, 220 lbs per square inch, maximum, 850 lbs per square inch.

## **EMERGENCY OPERATION OF THE MAIN WHEEL UNITS AND FLAPS**

If the hydraulic system fails, the undercarriage and flaps can be lowered by compressed air. The controls consists of a "knob" just forward of the Flight Engineers panel, starboard side "pull to operate"

When the emergency control is operated, the undercarriage is lower irrespective of the position on the normal control lever, and compressed air is admitted to the flaps control valve. After the undercarriage is lowered, the flaps may be lowered by operating the flaps control which admitted air pressure to the flaps jack. The flaps can be raised again, but this should only be done in extreme emergency, as there may not be sufficient air pressure to lower them again. Also, in raising the flaps by this method, extreme care must be taken to raise them slowly, by stages.

## **BRAKES**

The pneumatic brake lever with parking catch, is on the pilot's hand wheel. Differential control is provided by the rudder pedals and a triple pressure gauge is fitted on the right hand side of the instrument panel.

## **TWO SPEED SUPERCHARGER CONTROL**

The superchargers are controlled by electro-pneumatic rams which are operated by a double switch, near the center of the instrument panel. A warning lamp shows if the switch is moved to the "F.S" (down position when the main wheels are lowered) On aircraft with manual control lever the "up" position in the FULL (S) gear of this lever is on the right side of the starboard master fuel cock. In the event of failure of the Ram, the supercharger will go into "M" gear.

## **CARBURETTOR AIR INTAKE CONTROL**

These shutters are hydraulically operated. The control is on the port side of the pilot's floor. The positions of the control are:

"AFT" for COLD AIR

"FORWARD" for HOT AIR

In the event of failure, the shutters will close due to the slip stream forcing them up.

## **RADIATOR SHUTTERS**

They are pneumatically operated, the control being automatic by means of an electrical thermostat. Control switches are situated on the starboard side of the fuselage forward of the Flight Engineers panel, near the main instrument panel. In the event of failure of the system, the shutter will tend to close due to the slip stream forcing them up.

## **MAIN WHEELS UNIT SAFETY LINKS**

Two red coloured jury struts are provided for fixing into the main wheel units frames when the aircraft is on the ground. Those struts prevent the wheels from being accidentally retracted.

## **BOMB DOOR CONTROL**

The bomb doors are opened hydraulically by pushing down the level on the left of the pilot's seat. The bomb release is inoperative until the bomb doors begin to open which releases two automatic trip switches situated at the front of the bomb bay, one at each side.

Note: as fifteen minutes of pumping to necessary to open the bomb doors by hand pump, it is recommended that the bomb doors be opened by the pilot before the engines are switched off, if it is subsequently required to "bomb up"

