

Exhaust Gas Thermometers and Jet Pipe Temperature Limiters1. Introduction

A means whereby the temperature of the engine is indicated is required so that the engine can be run at a safe and efficient temperature. For this, four exhaust gas temperature gauges are fitted, one for each engine and operate from the output of a set of thermo-couples and an A.C. servo potentiometer. To avoid having to make frequent throttle adjustments with change in temperature a system of R.P.M. control with jet pipe temperature is incorporated.

2. Exhaust Gas Thermometers

Indication of exhaust gas temperature is given on a moving coil temperature gauge on 1P. Eight thermo-couples mounted in the rear of the jet pipe, develop an e.m.f. relative to the temperature. This e.m.f. is fed to a servo potentiometer where it is amplified and then fed to the gauge. Variations of temperature cause variations of e.m.f. and so change the temperature indication accordingly.

3. Jet Pipe Temperature Limiters

To avoid having to control the jet pipe temperature to a safe level by frequent throttle adjustment, a system whereby the fuel flow and hence temperature is controlled by the output of the jet pipe thermo-couples is embodied.

The output of the thermo-couples is fed into the limiter amplifier where it is compared against a datum. The output of the amplifier is fed to an Electro-Pressure control valve in the engine fuel system. If the temperature of the jet pipe and consequently the output of the thermo-couples is below the datum of the amplifier then the valve is not affected. If however, the temperature is above datum, then the valve is energised to reduce fuel flow to the engine and hence a reduction in temperature.

Two datums are obtainable by the selection of the CRUISE/TAKE OFF switch which will select a datum of either 605°C in CRUISE or 660°C in TAKE OFF. This switch also brings into operation, in the CRUISE position, an R.P.M. governor solenoid. A second switch marked ON/OVER-RIDE is used to isolate the limiters during ground runs or should a fault develop in flight. The temperature will have to be manually controlled while the switch is selected to OVER-RIDE.

Two further switches mounted on 3P and labelled NORMAL/TEST, are used to test the limiters independent of the R.P.M. governor. One switch controls the outboard engines, the other the inboard engines.

4. Operation - Take Off

The jet pipe limiters are brought into operation by selecting the limiter switch to ON and then selecting either CRUISE or TAKE OFF on the datum switch.

With the limiter switch to 'ON' relay 491 is de-energised to ensure the output of the amplifier is connected to the Electro-Pressure control valve. With the CRUISE/TAKE OFF switch in the TAKE OFF position the R.P.M. governor solenoid is isolated and the magnetic indicator is de-energised black.

With an increase of engine temperature, the limiter system will remain inoperative until the output of the thermo-couples exceeds the datum when the output of the amplifier will cause the Electro-Pressure control valve to energise and reduce fuel flow to the engine. Further opening of the throttles will produce a further rise in temperature which again will be controlled by a further reduction in fuel flow by the Electro-Pressure control valve.

5. Cruise

With the system working as per para.4, selecting of CRUISE on the CRUISE/TAKE OFF switch will result as follows. 28V from fuse 583 will be fed to energise the magnetic indicator to White, also via the test switch to energise the R.F.M. governor solenoid.

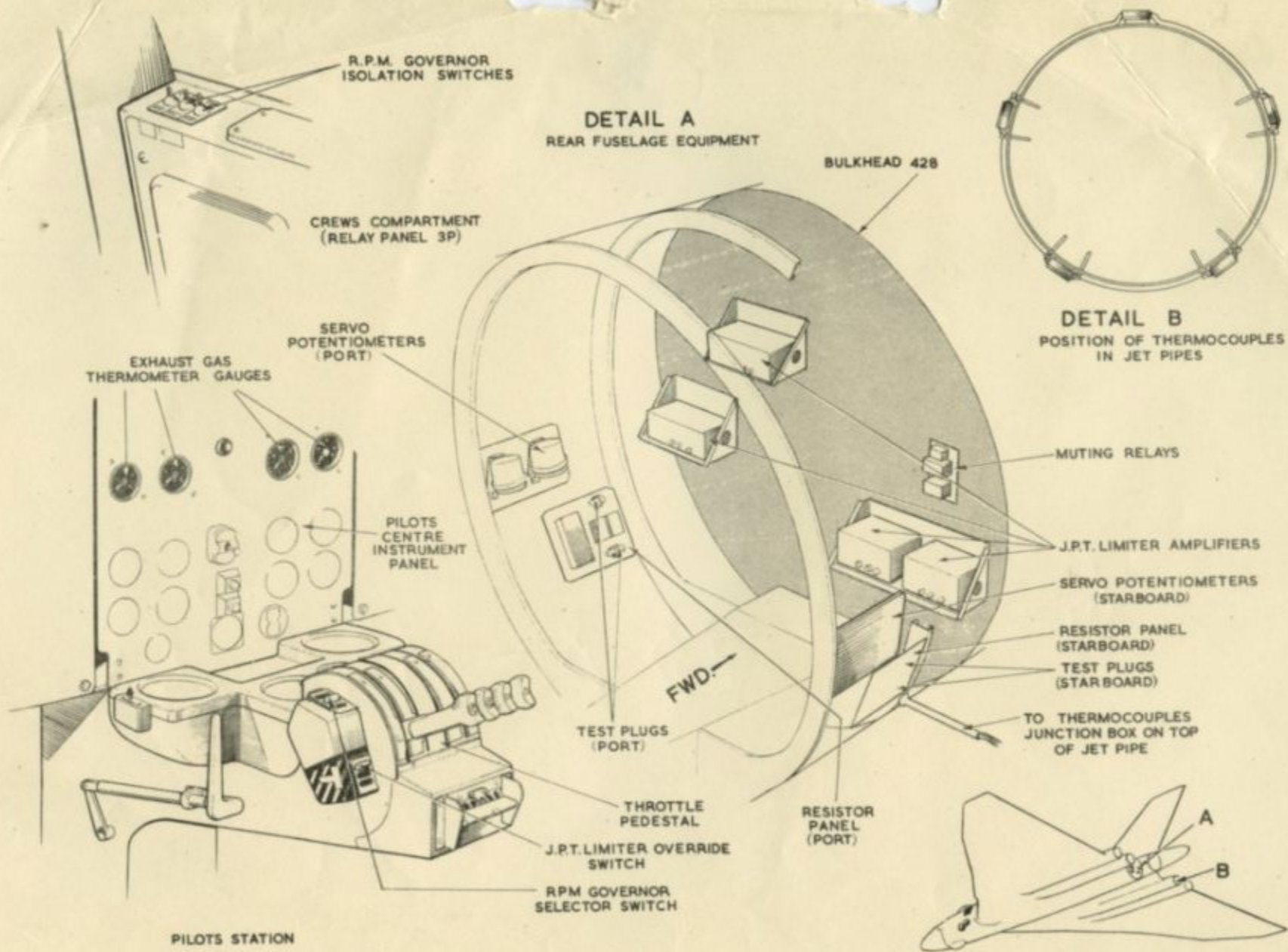


Fig.2 Jet pipe temperature equipment

RESTRICTED

This reduces the fuel flow to the engine to limit the engine to cruise R.P.M. At the same time 28V from fuse 583 is fed to the limiter amplifier to energise a relay and change the datum of the system from 660°C to 605°C. The engine temperature will now be controlled in the same way as for take-off.

6. Over-ride

If during flight a fault develops on the system, muting can be applied by selecting over-ride on the limiter switch. This will cause 28V, from fuse 538, to energise relay 491. With relay 491 energised the output of the limiter amplifier is disconnected from the Electro-Pressure control valve and reconnects to a 33 ohm resistor, as a dummy load. This results in the non-control of fuel flow from the jet pipe temperature and under these conditions, limitation must be carried out manually by observation of the temperature gauges and manual throttle adjustment.

7. Test

Under ~~certain~~^{COAD} operating conditions the engine R.P.M. is controlled by the mechanical fuel control with the temperature still below datum. To enable the testing of the limiter control a test switch which will isolate the ^{CAUSE} R.P.M. governor solenoid can be used. This will allow the engine R.P.M. to increase until the limiting temperature is reached. Only used to test CRUISE datum.

8. Component Location

<u>Component</u>	<u>No.</u>	<u>Location</u>
Temperature gauges	4	1P
Thermo Couples	32	8 per engine rear jet pipe
Servo potentiometers	4	Rudder Compartment
Limiter Amplifiers	4	Rudder Compartment
Muting Relays	2	Rudder Compartment.
Test Plugs	4	Rudder Compartment
Limiter Switch On Over-ride	1	Throttle Pedestal
Limiter Switch CRUISE/TAKE OFF	1	Throttle Pedestal
Test Switch	2	3P
Magnetic Indicator	1	1P

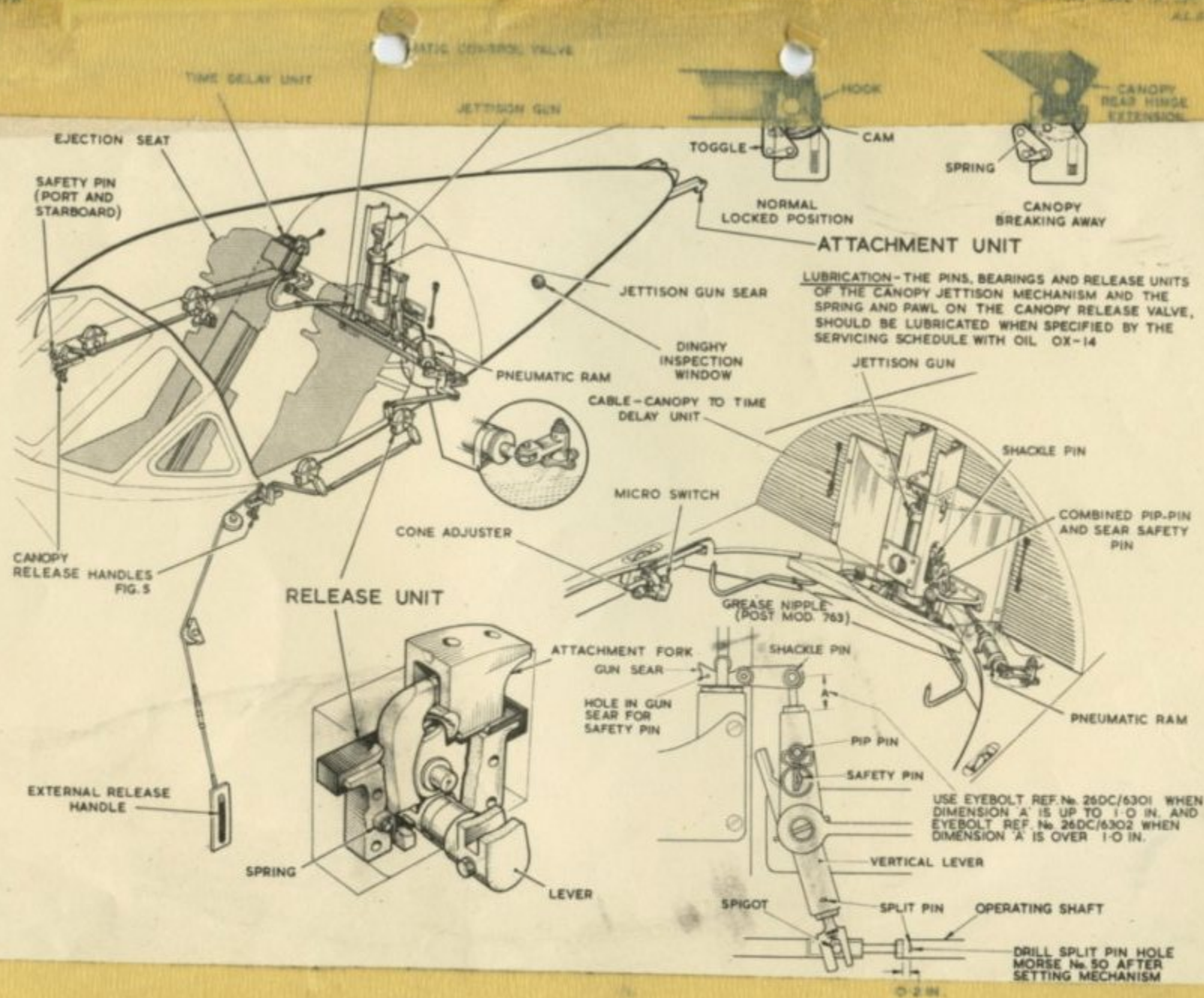


Fig. 6. Canopy jettison mechanism.
 (If Gun Seat Pin retained)
RESTRICTED



This file was downloaded
from the RTFM Library.

Link: www.scottbouch.com/rtfm

Please see site for usage terms,
and more aircraft documents.