

QC
Avro
CF105
72-Sys.11-34

REPORT NO. 72/System 11/34

FIRE AND OVERHEAT DETECTION

S.H. BROWN

SEPT. '57

UNCLASSIFIED



A. V. ROE CANADA LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

UNCLASSIFIED
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AIRCRAFT:

REPORT NO. 72/System 11/34

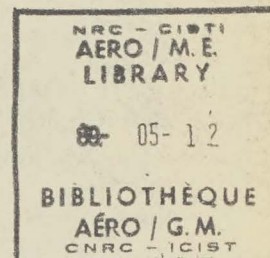
FILE NO:

NO. OF SHEETS: 2

TITLE:

FIRE AND OVERHEAT DETECTION

Classification cancelled/changed to.....
(date).....
by authority of *[Signature]* *FL*
Signature *[Signature]* *FL*



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PREPARED BY S.H. Brown

DATE Sept. '57.

CHECKED BY

DATE

SUPERVISED BY

DATE

APPROVED BY C.S.R. Marshall DATE Sept. '57.

ISSUE NO.	REVISION NO.	REVISED BY	APPROVED BY	DATE	REMARKS

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AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

UNCLASSIFIED

REPORT NO 72/System 11/34

SHEET NO 1

TECHNICAL DEPARTMENT

AIRCRAFT:

FIRE AND OVERHEAT
DETECTION.

PREPARED BY

DATE

S.H. Brown

Sept. 1957

CHECKED BY

DATE

The following are the requirements

1. Fire Detection - Both engine compartments
- Compartment between the engines
(Hydraulics Bay).
2. Overheat Detection - Both engine compartments
Compartment between the engines
Joint leakage Air Cond. engine
bleed lines.

To obtain a combination of overheat and fire detection system for Engine Compartments and the compartment between the engines a continuous wire detection system is proposed. The detection element would be installed similar to the Arrow I installation. To obtain the combination of overheat and fire warning a different control box would be necessary with two signal outputs i.e. one for overheat and the second for fire. The two circuits in the control box monitor the same sensing element. The overheat alarm would only be activated when the dropping resistance of the element reached a fixed signal setting for an overheat condition. The fire circuit, in addition to responding to the fixed setting for fire would also activate the fire alarm if the rate of change of temperature was of sufficient magnitude (representing a fire) providing the temperature was above the maximum ambient.

The joint leakage sensing for the Air Conditioning engine bleed lines will utilize either the point sensing system (thermostats) or continuous wire similar to the overheat detection quoted above. Tests will be conducted at Avro to decide which is the better of the two systems for detecting leakage at the joints.

A master warning system is incorporated in the Arrow A/C with two master lights (Red and Amber) positioned on the Pilot's main instrument panel. A separate indication panel housing the individual indicators is located on the Pilot's right hand forward console. Three separate combination switch and red indicator lights are positioned on the left hand console for fire indication in the right engine, left engine and Hydraulic bay compartments.

We propose to supply the master Amber warning together with an individual warning on the right hand panel for overheat conditions in the engine compartments and the compartment

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TECHNICAL DEPARTMENT

FIRE AND OVERHEAT
DETECTION.

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DATE

between the engines and for a leakage warning on the air conditioning engine bleed lines, and the master Red warning together with an individual red indicator light on the left hand console for fire indication.

There is a condition in the master warning system whereby both the Master Red and Master Amber illuminate simultaneously. This condition applies when simultaneous or consecutive failure of the two flying control hydraulic systems occurs.

A Master Red Indication only - Fire - look to left to determine zone.

A Master Amber Indication only or both masters illuminated simultaneously - look to right to determine cause of indication.

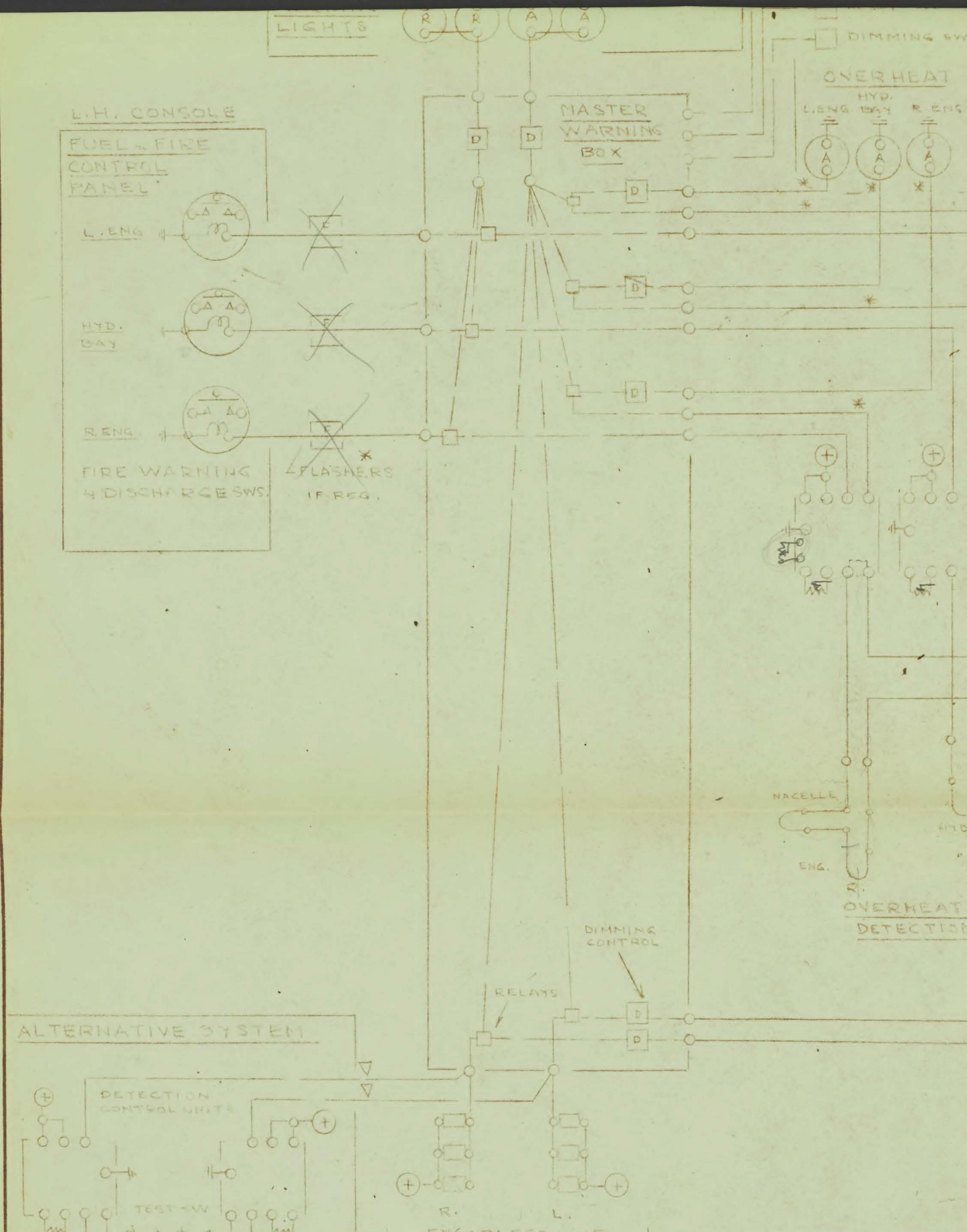
An additional feature of the combination overheat and fire indication system is that if the rate of rise in temperature is relatively slow the overheat warning will activate at its predetermined point and, if the temperature continues to rise, remain on until the point is reached where the fire signal is given at which time the overheat signal is cut out. If the rate of temperature rise, when above maximum ambient, is fast enough the fire alarm is activated as soon as the first signal setting is reached. The overheat signal is bypassed and does not appear.

It has been indicated that we consider a flashing signal for fire, however, we have not proposed a flashing red in the fore-going due to the unreliability of the flasher units used in warning circuits and it is felt that the Master warning light is sufficiently eye-catching to render flashing lights unnecessary.

If the R.C.A.F. are not in agreement with this thinking and prefer a flashing light then we would recommend the flasher be installed in the individual red fire warning lines as these three lights are not dimmed by the master dimming switch. We would definitely not recommend a flasher in the master red circuit for the following reasons:-

The complication in circuitry to supply only the fire signal flashing on the master red and still retain a continuous signal on the master red in the event of a double flying control hydraulic failure and the complication in circuitry to make the flasher operate when dimming has been selected (A series parallel combination of resistors are necessary to ensure the flasher retains the same current flow for operation during dimming).

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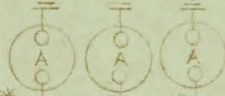


WARNING PANEL

DIMMING SW.

OVERHEAT

HYD. L. ENG. DAY R. ENG.



OVERHEAT

ENG. BLEED

L. R.



R.H. CONSOLE

DETECTION
CONTROL UNITS

DETECTION
SYSTEM
TEST SW.

*Double throw sw
(1 set for fire & ...)*

NACELLE

ENG.

HYD. DAY

NACELLE

ENG.

OVERHEAT & FIRE
DETECTION LOOPS

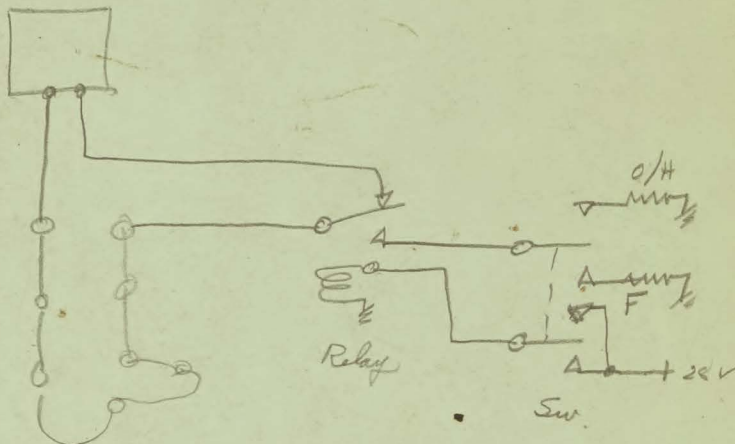
* - ADDITION

▽ - ALTERNATE

OVERHEAT

ENG. BLEED

L. R.

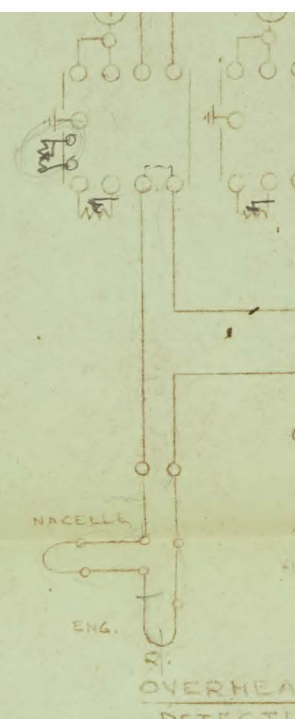


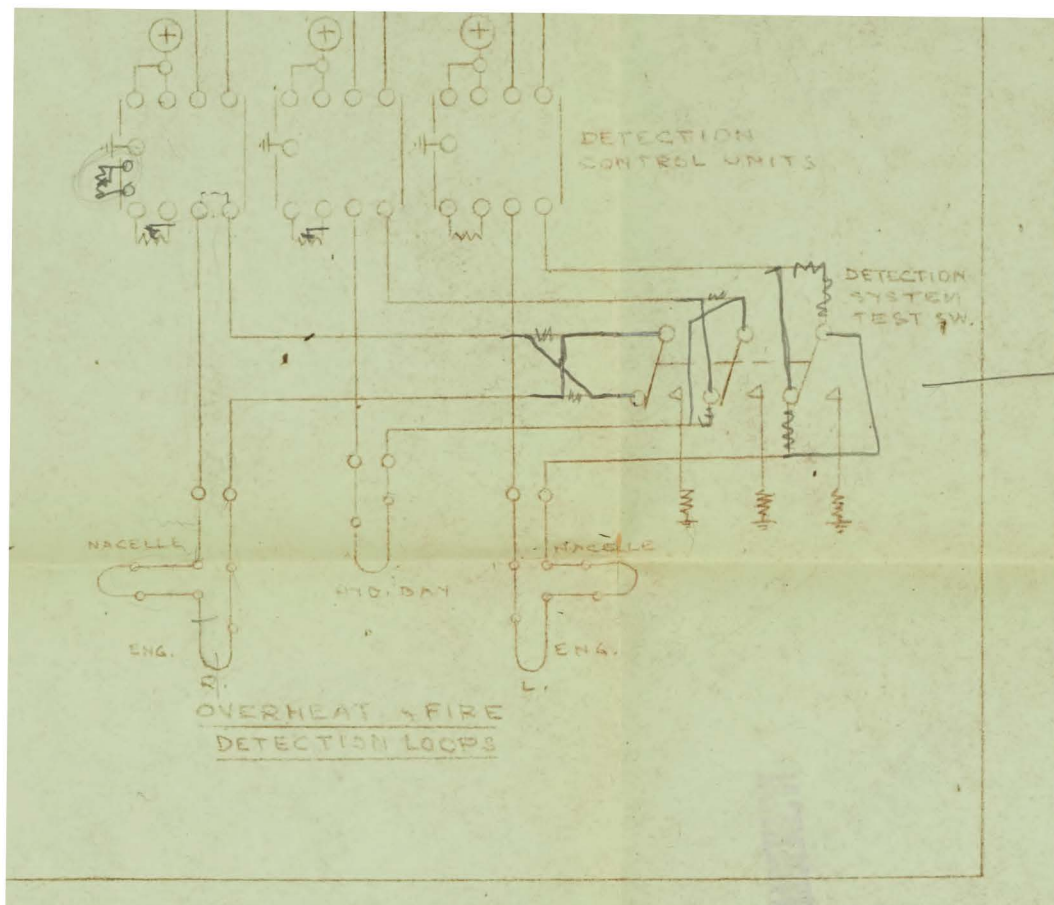
Double throw ^{2 sets} with resistors
(1 set for fire test, 1 set for overheat test)

* - ADDITIONS

▽ - ALTERNATIVE

FLASHERS
IF REQ.

[illegible]



*Double throw SW
(1 set for fire test)*

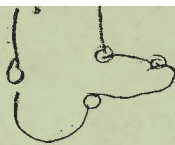
* - ADDITIONS
▽ - ALTERNAT.

REF.	PART No.	DESCRIPTION	L.H. UNIT No.	R.H. OFF	DESC FIN

DRAWING PARTS

A E. WYLLIE AUG. 6 1957 SAB	ISSUE No.	REFERENCE DRAWINGS		DESCRIPTION FIRE & OVERHEAT PROTECT SYSTEMS
	MOD. No.	DWG. No.	DESCRIPTION	
	E.R.N. No.			
	DRAWN BY			
	DATE			
	CHECKED			
	STRENGTH APP.			
	DESIGN APP.			
 AVRO AIRCRAFT LTD. MALTON ONT.				

DETECTION
SYSTEM
TEST SW.



Relay

Sw.

+ 28 V

Double throw ^{2 sets} with resistors
(1 set for fire test, 1 set for overheat test)

* - ADDITIONS

▽ - ALTERNATIVE

DESCRIPTION	L.H.	R.H.	DESCRIPTION	SPEC ^N —COND ^N	LOFT REF.	EST.	ACT.
	UNIT No.OFF		FINISHED PART SPECIFICATION			WEIGHT/PART LB.	

DRAWING PARTS LIST

DESCRIPTION FIRE & OVERHEAT PROTECTION SYSTEMS			SCALE
			FINISH TO DWG.
			LIMITS UNLESS NOTED
	ARROW 2		
TYPE/MARK		SHOWN ON DRAWING	
DRAWING NUMBER			
 AVRO AIRCRAFT LIMITED MALTON ONTARIO		712 SIVISITEIM11314	

