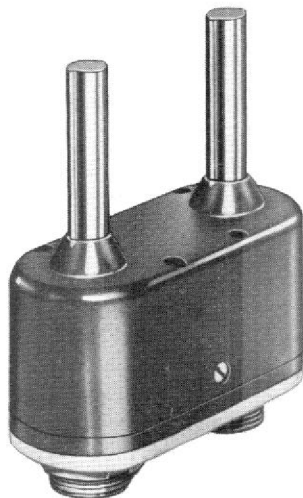


# **Ice Warning System**



## ICE WARNING SYSTEM

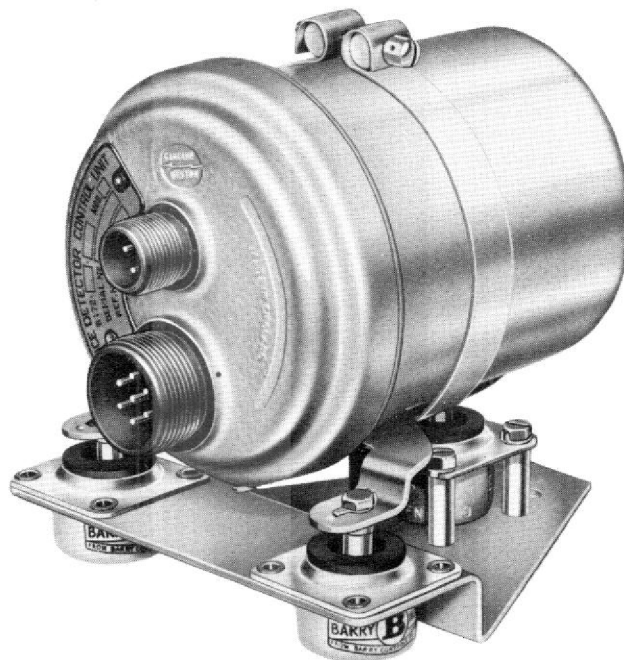
The Sangamo Weston Ice Warning System has three basic units. These are (a) the detector head, Model S171, (b) the resistance bulb, Model S110G, and (c) the control unit, of which two versions are available, the automatic re-set version, Model S172 Form 2, and the manual re-set version, Model S172 Form 3. Equipment fitted with the Form 1 control unit automatically re-sets when icing conditions are no longer present. Where the Form 3 control unit is fitted, the equipment requires to be re-set manually to ascertain whether or not icing conditions still exist.



*Model S171 Form 1  
Detector Head*



*Model S110 G Form 26  
Resistance Bulb*



*Model S172  
Control Unit  
Form 2 illustrated  
Form 3 has the larger  
Cannon connector only*



The complete equipment is designed to operate upon the occurrence of two conditions responsible for the formation of ice. These conditions are the presence of free water in the atmosphere, and a local temperature below freezing point.

Any part of an aircraft where a pressure drop occurs, such as the air intake of an axial flow jet engine, may suffer from icing conditions even though the surrounding temperature is above freezing point.

The detector head is basically a water sensitive device designed to notify the presence of free water, whilst the resistance bulb is used to provide information regarding the temperature of the atmosphere. By this means, two signals are obtained which are fed to the control unit to initiate either a warning device or de-icing equipment or both.

Test switches can be fitted so that a routine check of the installation can be made as part of the normal aircraft test procedure. Additionally, it is essential that some form of isolation switch is fitted to prevent the detector head from being switched on when the aircraft is on the ground as this would result in the detector head being burnt out. This can be effected by use of a ram switch but some operators prefer an alternative method. Recommended makes of switches are tabulated herein.

The equipment is light, easy to install and indexing of cables is provided so that correct assembly is automatic.

The detector head has been fully type tested and the complete equipment satisfies the requirements laid down in British Standard G.100 and R.A.E. Tech. Memo DES.1, and has received Ministry of Supply approval.

## INSTALLATION

### *Detector head—Model S 171*

The following conditions of installation must be fulfilled for proper operation.

- (a) The air flow over the detector head must be laminar at all velocities.
- (b) There must be no shielding of the detector head from the free water in the air, that is, there must be no projections in front of the detector head.
- (c) The detector head must be fitted so that the elements are vertical, projecting either upwards or downwards. The airflow must be in line with two elements under normal flying conditions. Any deviation of airflow greater than 5 degrees might, in certain conditions, initiate a false signal.
- (d) The elements must be outside the aircraft boundary layer.





It is suggested that the detector head is mounted flush with the aircraft skin so that the elements project outside the surface with the housing inside. If it is not possible to find a suitable position on the aircraft, the detector head may be mounted in a heated mast. When the aircraft skin or mast is heated, the detector head must be thermally insulated, although the degree of insulation is not critical.

For axial flow jet engines, which under certain conditions are susceptible to icing, the detector head can be mounted inside the engine inlet in which case the vertical attitude, referred to in (c) above, does not necessarily apply. The detector head has been designed to withstand the worst conditions laid down in British Standard G.100, R.A.E. Tech. Memo DES.1 and DTD.1085B. It is suitable for air velocities of from 90 knots to Mach 2.5.

#### *Resistance bulb—Model S 110G*

Normally the Form 26 version is used but other forms may be employed if preferred.

The point of installation of the bulb is of considerable importance. If it can be mounted on the nose probe of the aircraft, consistent readings can be obtained and deleterious effects from shock wave formation are reduced.

In icing cloud, the resistance bulb will ice up, but as it only has to operate at one point, it will still indicate below zero irrespective of the shielding effect, of the ice.

#### *Control Unit—Model S 172*

The control unit is normally fitted on an A.V. mounting bracket and must be installed in a horizontal position. It is limited to a temperature range of  $-40^{\circ}\text{C}$   $+70^{\circ}\text{C}$  and is most conveniently fitted in the pressurized section of the aircraft.

#### PERFORMANCE

The system complies with Ministry of Supply, specification No. DTD(RD1) 3875. The equipment normally operates at a water concentration of 0.1 gram per cubic metre but a different level may be required for some applications, for example, highly manoeuvrable aircraft.

#### SUPPLY

Detector head and control unit: 23.5-28.5 volts d.c., 2.5 amp. approximately.

#### OUTPUT

The maximum load which the equipment will control is 1 ampere at 23.5-28.5 volts. This is sufficient to operate a warning light and/or a power relay which can be used to initiate de-icing equipment.

See over for weight and drawing references.



### AUTOMATIC RESET VERSION

MODEL	FORM	DESCRIPTION ETC.	F.D.	WEIGHT
S171	1	Detector head	981	4 oz (113 g)
S110G	as required	Resistance bulb (See Section 14)	-	2 oz (57 g)
L.5	"	Lead (length as required - See Section 18)	982	13 oz (369 g)
L.5	"	Lead (length as required - 2 off) (See Section 18)	751	13 oz (369 g)
S172	2	Automatic Control Box	1024	25 oz (709 g)
Part No. 172354		A.V. Mounting bracket f.u.w. Control box	1030	9 oz (255 g)

### MANUAL RESET VERSION

S171	1	Detector head	981	4 oz (113 g)
S110G	as required	Resistance bulb (See Section 14)	-	2 oz (57 g)
L.5	"	Lead (length as required - See Section 18)	982	13 oz (369 g)
L.5	"	Lead (length as required - 2 off) (See Section 18)	751	13 oz (369 g)
S172	3	Manual re set control box	1028	18 oz (510 g)
Part No. 171962		A.V. mounting bracket f.u.w. Control box	1030	9 oz (255 g)

### MATING SOCKETS

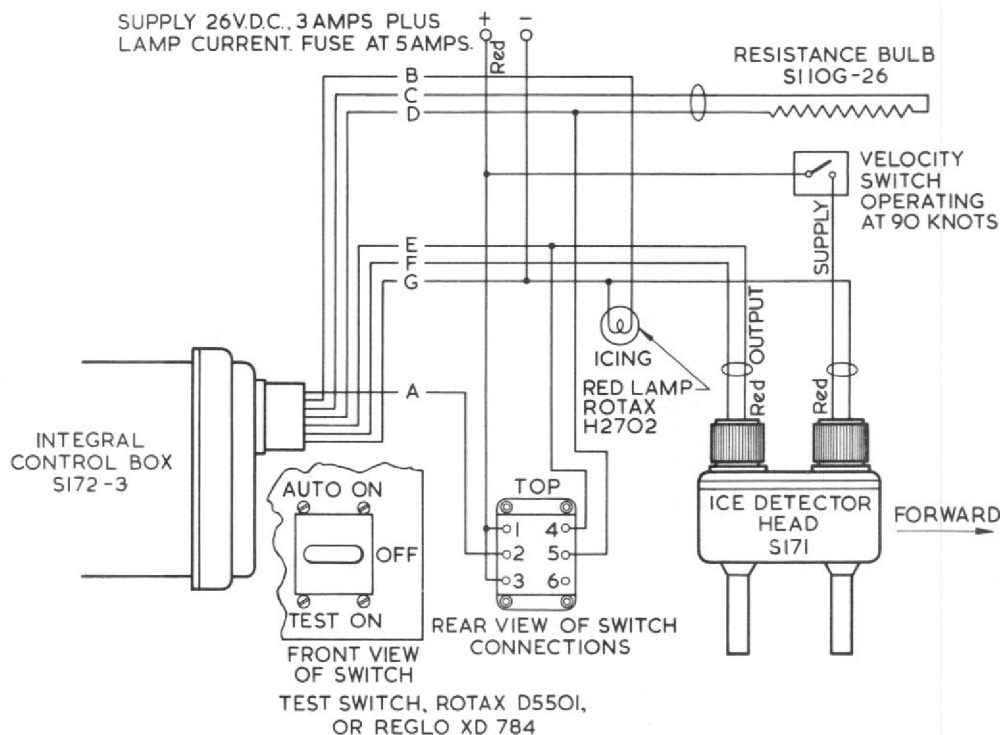
	FOR CONNECTION TO			
	S172.2.	S172.3.	Ram Switch	Approx. Weight
Breeze Socket 2 pin Body Size A. Part No. CZ.56085	-	-	1	2 oz (57 g)
7 pin Cannon Socket Free 16S Shell size Ref: AN.3106E-16-S-1S	1	1	-	3 oz (85 g)
3 pin Cannon Socket Free 10SL Shell size Ref: AN.3106E-10-SL-3S	1	-	-	2 oz (57 g)

### OPTIONAL EXTRAS

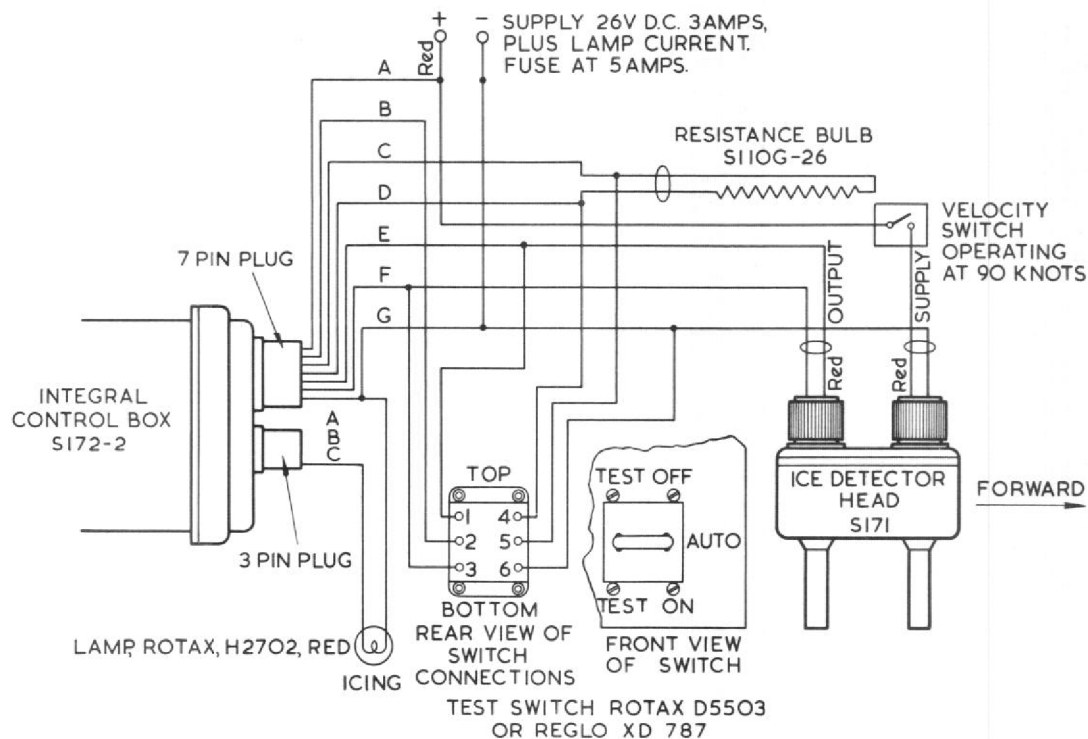
Item	Maker	S.W. Drawing	Makers Ref.	A.M. Ref.	Req'd for Auto System	Req'd for Manual System	Approx. Weight
Cockpit Warning Lamp	Rotax	172366	H.2702	5C/1638	1	1	1 oz (28 g)
Ram Switch (Air Pressure)	Teddington	172368	EGW/A/6	5C/4259	1	1	19 oz (539 g)
On-Off-On Switch	C.W.C. (Reglo)	172364	XD.784	5C/4199	-	1	4 oz (113 g)
On-Off-On Switch (Biassed off)	C.W.C. (Reglo)	172365	XD.787	5C/4224	1	-	4 oz (113 g)



## WIRING DIAGRAMS



### *Manual Reset Version*



### *Automatic Reset Version*

This file was downloaded  
from the RTFM Library.

Link: [www.scottbouch.com/rtfm](http://www.scottbouch.com/rtfm)

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

