

#### KSSU Group

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
				MESSAGE INDEX		30-11-00		
CHAPTER	30 TAB		R 1	OCT 18/00	01F.1	R 101	OCT 18/00	03.1
TCE AND	RAIN PROTECTION		R 2 R 3	OCT 18/00 OCT 18/00	01F.1 01F.1	102	FEB 10/94	03
ICE AND	KAIN PROTECTION		R 4	OCT 18/00	01F.1	30-11-00		
			R 5	OCT 18/00	01F.1	501	OCT 10/96	02
30-CONTE	NTS		R 6	OCT 18/00	01F.1	502	OCT 10/96	04
1	FEB 10/96	KSS	R 7	OCT 18/00	01F.1	503	OCT 10/96	04
2	OCT 18/99	KSS	R 8	OCT 18/00	01F.1	504	OCT 10/96	04
3	OCT 18/99	KSS	9	OCT 10/95	01 F	505	OCT 10/96	04
4 5	FEB 18/00 JUN 18/99	KSS KSS	10 11	OCT 10/95 JUN 10/95	01 F 01 F	506 507	OCT 10/96 OCT 10/96	04 04
6	JUN 18/99	KSS	12	JUN 10/95	01F	508	BLANK	04
Ĭ	0011 10777	ROO	13	FEB 10/97	01F		DEMIK	
30-HOW T	O USE THE FIM		14	FEB 10/97	01 F	30-11-01		
1	JUN 18/99	01	15	FEB 10/97	02F	401	JUN 10/90	01
2	JUN 18/99	01	16	FEB 10/97	04F	402	JUN 18/00	03
70 0			17	FEB 10/97	04F	403	FEB 10/95	01
30-FIM C	UNIENIS JUN 10/89	02	18 19	FEB 10/97 FEB 10/97	04F 05F	404	JUN 18/00	01
1 2	OCT 10/88	01	20	OCT 10/96	04F	30-11-03		
_	001 10700	01	21	JUN 18/99	04F	401	OCT 10/95	01
30-EICAS	MESSAGES		22	JUN 18/99	03F	402	FEB 10/94	01
1	OCT 10/88	01	23	JUN 18/99	03F	403	JUN 18/99	02
2	OCT 10/94	05	24	JUN 18/99	03F	404	JUN 18/99	02
3	OCT 10/94	01	25	JUN 18/99	03F	70 04 00		
4 5	OCT 10/94 OCT 10/94	04 05	26 27	JUN 18/99 JUN 18/99	03F 03F	30-21-00 1	OCT 10/96	04
6	OCT 10/94	03	28	FEB 10/94	03F	2	OCT 10/96	02
	001 10774	05	R 29	OCT 18/00	03F.1	3	OCT 10/96	08
30-FAULT	CODE DIAGRAMS		R 30	OCT 18/00	03F.1	4	OCT 10/96	02
1	FEB 10/93	05	R 31	OCT 18/00	03F.1	5	OCT 10/96	02
2	OCT 10/92	01	R 32	OCT 18/00	03F.1	6	DEC 10/88	02
3 4	OCT 10/88	01	33	OCT 10/97	03F	70 24 00		
5	OCT 10/88 JUN 10/89	01 03	R 34 35	OCT 18/00 FEB 15/99	04F.1 04F	30-21-00 101	APR 10/89	03
6	JUN 10/89 JUN 10/97	03	36	OCT 10/97	03F	102	OCT 10/96	03
	0011 10771	01	37	OCT 10/97	03F	103	FEB 10/93	03
30-FAULT	CODE INDEX		38	OCT 10/97	03F	104	FEB 15/99	02
1	FEB 10/92	01	39	JUN 18/99	02F			
2	FEB 10/97	01	40	JUN 18/99	02F	30-21-00	FED 40 (00	07
3 4	FEB 10/97 JUN 10/97	01 01	41 R 42	JUN 18/99 OCT 18/00	02F 01F.1	501 502	FEB 18/00 FEB 18/00	03 03
5	JUN 10/97 JUN 10/97	05	R 42	OCT 18/00	01F.1	503	FEB 18/00	03
5 6	JUN 10/97	01	44	JUN 18/99	01F	504	FEB 18/00	03
7	JUN 10/97	05	1 ''	0011 10777	011	505	FEB 18/00	03
8	JUN 10/97	03	30-00-00			506	FEB 18/00	06
9	JUN 10/97	04	1 1	FEB 18/00	13	507	FEB 18/00	01
10	OCT 10/94	04	2	JUN 10/96	09	508	JUN 18/99	03
11 12	OCT 10/94 OCT 15/98	04 04	30-11-00			509 510	JUN 18/99 FEB 18/00	03 03
13	OCT 10/94	04	1 1	JUN 10/88	02	510	FEB 18/00	03
14	OCT 10/94	03	2	FEB 10/94	03	512	FEB 18/00	03
15	OCT 10/94	01	F 3	FEB 10/89	05	513	FEB 18/00	02
16	BLANK		F 4	JUN 10/94	03	514	BLANK	
			1					
			1					
			1			1		
			1			1		

R = REVISED, A = ADDED OR D = DELETED
F = FOLDOUT PAGE
98
OCT 18/00

D633U101-98

CHAPTER 30 **EFFECTIVE PAGES** PAGE CONTINUED



#### KSSU Group

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
30-21-03			30-31-00		CONT.	30-41-07		ı
401	OCT 18/99	01	517	JUN 18/99	04	801	JUN 15/98	01
402	JUN 10/95	01	518	JUN 18/99	04	802	JUN 15/98	01
403	OCT 18/99	01	519	JUN 18/99	04	70 /2 00		
404 405	OCT 18/99 OCT 18/99	03 01	520 521	JUN 18/99 JUN 18/99	01 04	30-42-00	OCT 10/93	01
406	OCT 18/99	01	522	JUN 18/99 JUN 18/99	04 04	1 2	JUN 10/97	01
400	001 10/99	U1	) )22	JUN 10/77	04	1 3	JUN 10/97	03
30-21-04			30-40-00			2 3 4 5	JUN 10/89	03
401	JUN 18/99	01	R 101	OCT 18/00	01.1	5	JUN 10/96	03
402	OCT 10/96	02	102	JUN 10/97	01	6	BLANK	
403	JUN 18/99	03	103	JUN 10/97	02			
404	JUN 18/99	01	104	OCT 10/88	01	30-42-00	40/07	
70 24 05			105	OCT 10/97	01	501	FEB 10/97	01
30-21-05 401	FFD 10/07	07	106 R 107	OCT 10/96 OCT 18/00	01 01 <b>.</b> 1	502 503	FEB 10/97 FEB 10/97	01 01
401	FEB 10/93 FEB 10/93	03 03	108	OCT 10/88	01.1	504	BLANK	01
403	FEB 10/93	03	109	JUN 10/96	01	1	DEAIN	
404	BLANK	05	110	JUN 10/96	01	30-42-01		ŀ
	22/		111	JUN 10/96	01	401	JUN 10/91	01
30-31-00			112	BLANK		402	OCT 10/95	01
1	OCT 10/92	02				R 403	OCT 18/00	01.101
2	FEB 10/94	01	30-41-00			404	OCT 10/95	01
F 3	JUN 10/95	04	1	JUN 18/00	01			
F 4	JUN 10/95	02	2	JUN 10/97	01	30-42-02	FFD 40/04	04
70 71 00			3 4 5 6	JUN 18/00 JUN 10/88	01 01	401 402	FEB 10/91 FEB 10/94	01
30-31-00 R 101	OCT 18/00	01.1	4 5	APR 10/89	01	402	OCT 10/95	01 01
102	JUN 10/96	01	1 6	JUN 18/00	03	404	OCT 10/95	01
103	JUN 10/96	01	"	30N 10700	05	405	OCT 15/98	01
104	JUN 10/96	01	30-41-00			406	FEB 15/98	01
105	JUN 10/96	01	501	OCT 10/96	01	407	OCT 15/98	01
106	JUN 18/99	01	502	OCT 10/96	01	408	OCT 15/98	01
107	JUN 18/99	01	R 503	OCT 18/00	01.1	409	JUN 18/00	01
108	OCT 18/99	01	R 504	OCT 18/00	01.1	410	FEB 10/97	01
109	OCT 18/99	01	505	OCT 10/96	01	70 /2 02		
110 111	OCT 18/99 OCT 18/99	01 01	R 506 507	OCT 18/00 OCT 10/96	01.1 01	30-42-02 601	FEB 18/00	01
112	OCT 18/99	01	508	FEB 10/92	01	602	JUN 10/91	01
113	OCT 18/99	01	509	OCT 10/96	01	603	OCT 10/95	01
114	BLANK	٥.	510	FEB 10/92	01	604	JUN 10/91	01
1			511	FEB 10/95	01			
30-31-00			512	BLANK		30-42-03		İ
R 501	OCT 18/00	02.1	I			401	JUN 10/91	01
502	OCT 10/96	01	30-41-01			402	OCT 10/95	01
503	OCT 10/96	02	R 401	OCT 18/00	01.1	403	JUN 10/91	01
R 504	OCT 18/00	02.101	R 402	OCT 18/00	01.1	404	FEB 15/98	03
R 505 506	OCT 18/00 JUN 18/00	02.1 02	R 403 404	OCT 18/00 OCT 10/94	01.1 01	405 406	JUN 10/91 JUN 10/91	03 03
507	OCT 18/99	02 01	404	001 10/94	UI	400	JUN 10/91	US
508	OCT 18/99	01	30-41-06			30-43-00		ŀ
509	JUN 18/99	02	401	OCT 10/96	01	1	OCT 10/97	01
510	JUN 18/00	02	402	OCT 10/96	01	Ż	JUN 10/97	01
511	FEB 18/00	04	403	JUN 10/91	01	3	JUN 10/97	03
512	JUN 18/99	04	404	FEB 15/98	03	4	JUN 10/96	01
513	JUN 18/99	01	405	JUN 10/91	04	5	JUN 10/97	01
514	JUN 18/99	01	406	BLANK		6	JUN 10/97	03
515	JUN 18/99	02	1					
516	JUN 18/99	02	1					

R = REVISED, A = ADDED OR D = DELETED 
F = FOLDOUT PAGE 98 
OCT 18/00 
D633U101-98

CHAPTER 30 **EFFECTIVE PAGES** 2 PAGE CONTINUED



#### KSSU Group

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
30-43-00	CONFIG 1		30-44-02		CONT.	30-71-07		
201	JUN 18/00	01	405	JUN 18/99	01	401	FEB 18/00	01
202	FEB 18/00	02	406	JUN 18/99	01	402	FEB 18/00	01
203	JUN 18/00	01	407	JUN 18/99	01	403	FEB 18/00	01
204	FEB 18/00	02	408	JUN 18/99	01	404	FEB 18/00	01
205	FEB 18/00	02	409	JUN 18/99	01	I		
206	FEB 18/00	01	410	JUN 18/99	01	30-81-00		
207	FEB 18/00	01	İ			1	FEB 10/94	80
208	FEB 18/00	01	30-71-00			2	JUN 10/92	09
209	FEB 18/00	01	] 1	JUN 10/91	05	3	OCT 10/93	03
210	FEB 18/00	01	2	JUN 10/91	01	4	JUN 10/91	07
211	FEB 18/00	01	3	JUN 10/91	02			
212	FEB 18/00	01	4	OCT 10/91	03	30-81-00		
213	FEB 18/00	04	5	JUN 10/91	01	R 101	OCT 18/00	01.1
214	FEB 18/00	05	6	JUN 10/91	01	102	OCT 10/94	01
215	FEB 18/00	05						
216	FEB 18/00	05	30-71-00	40/07	04	30-81-00	40/07	0.4
70 /7 00	CONFTC 3		501	FEB 10/97	01	501	FEB 10/97	04
30-43-00	CONFIG 2	04	502	FEB 10/97	01	502	FEB 10/97	08
201	JUN 10/94	01	503	JUN 10/97	01	503	FEB 10/97	01
202	JUN 10/94	01	504	FEB 10/97	01	504	OCT 10/97	03
30-43-00			505	FEB 10/97	01 04	505	FEB 10/97	01
	IIIN 19700	0/	506	JUN 18/99	06 07	506	FEB 10/97	01
501	JUN 18/99	04	507	FEB 10/97	07 07	70 01 01		
502	JUN 18/99 JUN 18/99	04	508	JUN 10/97	07	30-81-01	FFD 10/0/	00
503 504	JUN 18/00	04 01	30-71-01			401 402	FEB 10/94 JUN 10/93	08 08
704	JUN 10/00	UI	401	JUN 10/93	01	403	JUN 10/93	08 07
30-43-01			402	JUN 10/91	01	404	BLANK	O1
701	JUN 18/99	01	403	FEB 10/95	01	404	DLANK	
702	JUN 18/99	01	404	JUN 10/93	01			
'02	0011 10777	01	101	0011 107 73	01			
30-44-00			30-71-02					
1 1	JUN 10/88	01	401	JUN 10/93	01	1		
2	JUN 10/97	01	402	JUN 10/93	01	1		
3	JUN 10/88	01	İ			i		
4	JUN 10/88	01	30-71-03			I		
			401	JUN 10/93	01			
30-44-00			402	JUN 10/91	01	I		
501	FEB 10/97	01	403	JUN 10/93	01	I		
502	JUN 15/98	01	404	JUN 15/98	01			
503	JUN 15/98	01	70 74 04					
504	BLANK		30-71-04	40./07	00			
70 // 04			401	JUN 10/93	02			
30-44-01	UIN 45 (00	04	402	JUN 10/91	02			
401	JUN 15/98	01	403	FEB 10/95	02			
402	JUN 10/88	01 04	404	FEB 10/95	02			
403 404	JUN 15/98 JUN 10/93	04 04	30-71-05					
404	JUN 10/93 JUN 15/98	0 <del>4</del> 05	401	JUN 10/93	01			
406	FEB 15/98	03	401	JUN 10/93	01			
406	JUN 10/91	03	402	JUN 10/93 JUN 15/98	01			
408	JUN 10/91	02	404	JUN 10/93	01			
	23.1 10//1	<u> </u>	""	3311 10773	٥.			
30-44-02			30-71-06					
401	JUN 18/99	01	401	JUN 10/93	01	I		
402	JUN 18/99	01	402	JUN 10/93	01			
403	JUN 18/99	01						
404	JUN 18/99	01	1					

CHAPTER 30 **EFFECTIVE PAGES** PAGE 3 LAST PAGE



### TABLE OF CONTENTS

	Chapter Section		
Subject	<u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
HOW TO USE THE FIM	30-HOW TO USE THE FI	1 M	ALL
FIM CONTENTS	30-FIM CONTENTS	1	ALL
EICAS MESSAGES	30-EICAS MESSAGES	1	ALL
FAULT CODE DIAGRAMS	30-FAULT CODE DIAGR	1 AMS	ALL
FAULT CODE INDEX	30-FAULT CODE INDEX	1	ALL
CMCS MESSAGE INDEX	30-CMCS MESSAGE IN	1 DEX	ALL
ICE AND RAIN PROTECTION  Description and Operation  General	30-00-00	1 1	ALL
AIRFOIL WING THERMAL ANTI-ICE SYSTEM Description and Operation General Ducts Switch - Control Valves - Control Operation	30–10–00 30–11–00	1 1 1 3 1 3	ALL
Component Location Component Index Component Location		101	ALL
Adjustment/Test Ground Test Operational Test System Test MODULE - ANTI-ICE/RAIN REMOVAL	30–11–01	501 502 501 504	ALL
Removal/Installation VALVE - WING ANTI-ICE	30-11-03	401	ALL
Removal/Installation	20 00	401	ALL

30-CONTENTS

KSS



#### TABLE OF CONTENTS

Chapter Section <u>Subject</u> Subject <u>Page</u> **Effectivity** 30-20-00 AIR INTAKES ENGINE INLET THERMAL ANTI-ICE 30-21-00 SYSTEM Description and Operation 1 ALL General 1 Module - Anti-Ice/Rain Removal 1 Switch - Engine Cowl Overheat 3 3 Switch - Nose Cowl Pressure Valve - Engine Inlet Anti-Ice 1 Operation 3 Component Location 101 ALL Component Index Component Location Adjustment/Test 501 ALL Duct Overpressure Indication 502 Test Operational Test 501 505 System Test SWITCH - NOSE COWL PRESSURE 30-21-04 Removal/Installation 401 ALL SWITCH - OVERHEAT, ENGINE COWL 30-21-05 Removal/Installation 401 ALL VALVE - ENGINE INLET ANTI-ICE 30-21-03 Removal/Installation 401 ALL 30-30-00 PITOT AND STATIC PITOT-STATIC, TOTAL AIR 30-31-00 TEMPERATURE PROBE AND ANGLE OF ATTACK SENSOR ANTI-ICE SYSTEM Description and Operation 1 ALL General 1 Operation Component Location 101 ALL Component Index Component Location Fault Isolation AOA Probe Heat Problems 110 AUX Pitot Static Probe Heat 108 Problems CAPT (F/O) Pitot Static Probe 106 Heat Problems

**30-CONTENTS** 

KSS

104

Page 2 Oct 18/99

TAT Probe Heat Problems



### TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
Adjustment/Test Ground Test Operational Test System Test		501 505 501 509	ALL
WINDOWS AND WINDSHIELD Component Location Component Index Component Location Fault Isolation	30-40-00	101	ALL
General Side Window Heat Problems (Fig.		106 107	
103) Windshield Washer Inop (Fig. 104)		108	
FLIGHT COMPARTMENT WINDOW ANTI-ICE SYSTEM	30-41-00		
Description and Operation General Control Unit - No. 1 Window Heat		1 1 1	ALL
Module - Anti-Ice-Rain Removal Windows - No. 1, Left and Right		1 3	
Windows - No. 2 and 3, Left and Right		3	
Operation Adjustment/Test Operational Test System Test		3 501 501 503	ALL
RETAINER - OVERHEAT THERMOSTAT Approved Repairs THERMOSTATS - CONTROL AND	30-41-07 30-41-06	801	ALL
OVERHEAT Removal/Installation Thermostat, Control -	30 41 00	401 401	ALL
Removal/Installation Thermostat, Overheat - Removal/Installation		403	
UNIT - WINDOW HEAT CONTROL Removal/Installation	30-41-01	401	ALL

**30-CONTENTS** 



### TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
WINDSHIELD WIPER SYSTEM	30-42-00		
Description and Operation	30 .2 33	1	ALL
General		1	
Motor - Converter		1	
Operation		1	
Adjustment/Test		501	ALL
Operational Test		501	
ARM - WIPER	30-42-02		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
BLADE - WIPER	30-42-01		
Removal/Installation		401	ALL
MOTOR - CONVERTER	30-42-03		
Removal/Installation		401	ALL
WINDSHIELD RAIN REPELLENT SYSTEM	30-43-00		
Description and Operation		1	ALL
General		1	
Container and Receptacle		4	
Valves and Nozzles		4	
Visual Reservoir and Plumbing		4	
Operation		5	
Maintenance Practices		201	CONFIG 1 [*]
Flushing Procedure - Rain		214	
Repellent System			
Nozzle - Removal/Installation		201	
Nozzle Fitting -		207	
Removal/Installation			
Solenoid Valve -		210	
Removal/Installation			
<pre>[*] AIRPLANES WITH RAIN REPELLENT S'</pre>	YSTEM		
Maintenance Practices		201	CONFIG 2 [*]
Hydrophobic Coating		201	
Maintenance Practices			
[*] AIRPLANES WITH HYDROPHOBIC COAT	ING ON THE NUM	BER 1 WI	NDOWS
Adjustment/Test		501	[*]
System Test		501	
[*] AIRPLANES WITH RAIN REPELLENT S'	YSTEM	201	
NOZZLE	30-43-01		
Cleaning/Painting		701	ALL

30-CONTENTS

KSS

Page 4 Feb 18/00



### TABLE OF CONTENTS

	Chapter Section		
Subject	<u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
WINDSHIELD WASHER SYSTEM	30-44-00		
Description and Operation		1	ALL
General		1	
Container and Receptacle		1	
Nozzles		1	
Pump		1	
Valves		1 1	
Operation Adjustment/Test		501	ALL
Operational Test		501	ALL
VALVE - SOLENOID AND PUMP	30-44-01	701	
Removal/Installation	30 44 01	401	ALL
Pump - Removal/Installation		405	7.22
Solenoid Valve -		401	
Removal/Installation			
WINDSHIELD WASHER NOZZLE SYSTEM	30-44-02		
Removal/Installation		401	[*]
Nozzle -		401	
Removal/Installation			
Nozzle Fitting -		406	
Removal/Installation			
[*] AIRPLANES WITHOUT RAIN REPELLENT	SYSTEM		
HATER LINES	70 70 00		
WATER LINES WATER LINE AND WASTE DRAIN HEATERS	30-70-00 30-71-00		
Description and Operation	30-71-00	1	ALL
General		1	ALL
Heaters - Waste Tank Drain		4	
Heaters - Waste Water Drains		1	
Heaters - Water Supply Line		1	
Operation		4	
Adjustment/Test		501	ALL
Operational Test		501	
HEATER - GASKET, WASTE TANK	30-71-05		
DRAIN FITTING			
Removal/Installation		401	ALL
HEATER - IN-LINE	30-71-07		
Removal/Installation	70 74 07	401	ALL
HEATER - WASTE TANK RINSE FITTING	30-71-03		
Removal/Installation		401	ALL

30-CONTENTS

KSS Page 5 Jun 18/99

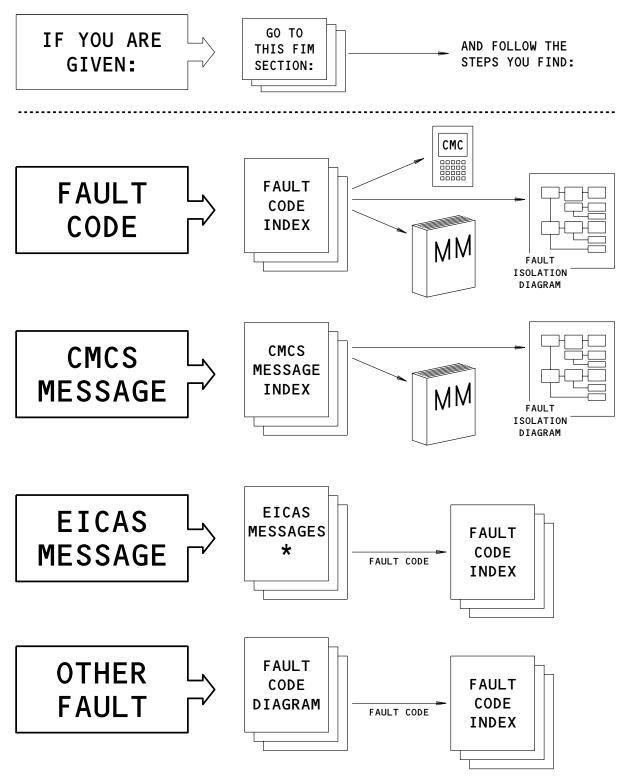


### TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
HEATERS - RIBBON	30-71-01		
Removal/Installation		401	ALL
HOSE - HEATED SUPPLY	30-71-02		
Removal/Installation	70 74 07	401	ALL
THERMOSTATS	30–71–06	/ 01	A.I. I.
Removal/Installation WASTE TANK DRAIN HEATER BLANKET	30-71-04	401	ALL
Removal/Installation	30-71-04	401	ALL
Removae, 1110 ca ceae 1011		101	7122
ICE DETECTION	30-80-00		
ICE DETECTION SYSTEM	30-81-00		
Description and Operation		1	ALL
General		1	
Module - Anti-Ice-Rain Removal		2	
Probe - Ice Detector		1	
Operation		2	ALL
Component Location Component Index		101	ALL
Component Location			
Adjustment/Test		501	ALL
Ground Test		501	7122
Operational Test		503	
PROBE - ICE DETECTOR	30-81-01		
Removal/Installation		401	ALL

30-CONTENTS





 $\star$  THERE IS ALSO A MASTER LIST OF ALL EICAS MESSAGES AT THE FRONT OF THE FIM

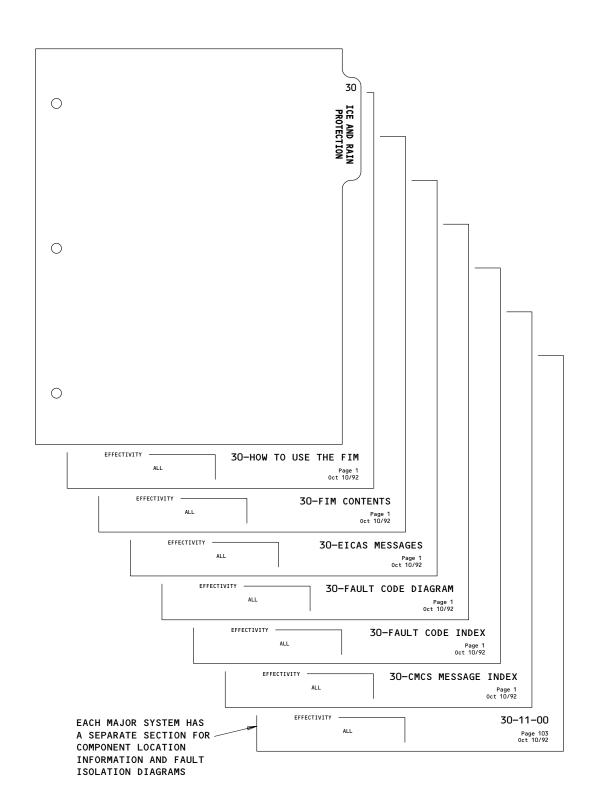
How to Use the FIM Figure 1

ALL 30-HOW TO USE THE FIM

O1 Page 1

Jun 18/99





Subjects in this FIM Chapter Figure 2

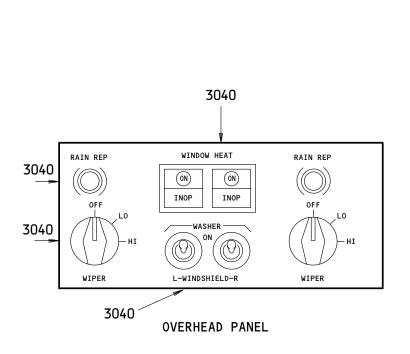
ALL

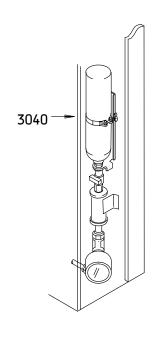
## 30-HOW TO USE THE FIM

01

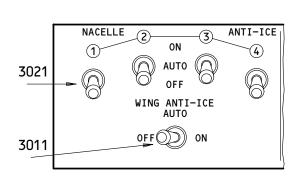
Page 2 Jun 18/99

A91402

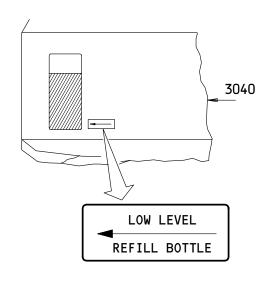




AFT OF 2nd OBSERVER'S SEAT



OVERHEAD PANEL



CAPTAIN'S LOWER SIDE PANEL

### ICE & RAIN PROTECTION - CONTENTS

ALL

## **30-FIM CONTENTS**

02

Page 1 Jun 10/89



TITLE	<u>CHAP/SEC</u>
EICAS MESSAGES	3011,3021 3031,3040
RAIN REPELLENT	3040
WINDOW HEAT SIDE	3040
WINDOW VISUAL IMPAIRMENT	CHAPTER 25
WINDSHIELD WASHER	3040
WINDSHIELD WIPERS	3በፈበ

ICE & RAIN PROTECTION - CONTENTS

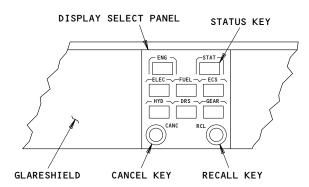
ALL

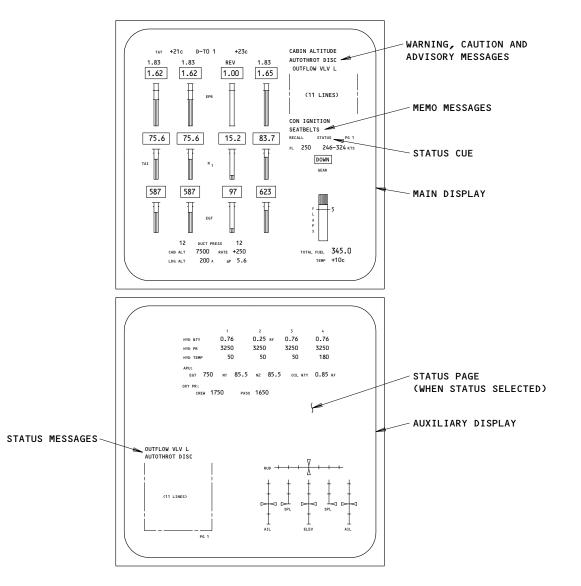
**30-FIM CONTENTS** 

01

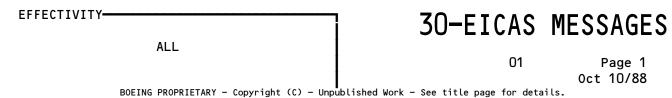
Page 2 Oct 10/88







### **EICAS DISPLAYS**





<del></del>	<del>T</del>	<del>,</del>	<del> </del>
EICAS MESSAGE	LEVEL	DESCRIPTION	FAULT CODE
>ANTI ICE NAC	(ADVISORY)	ANY NACELLE ANTI ICE SYSTEM SELECTED ON AND TAT > 12 DEGREES C, OR OPTIONALLY ANY NACELLE ANTI ICE SYSTEM SELECTED ON AND ICE DETECTOR NO LONGER DETECTS ICE	30 21 01 00
>ANTI ICE NAC	(ADVISORY)	ANY NACELLE ANTI ICE SYSTEM SELECTED ON AND TAT > 12 DEGREES C	30 21 31 00
>ANTI ICE NAC	(ADVISORY)	ANY NACELLE ANTI ICE SYSTEM SELECTED ON AND TAT > 12 DEGREES C AND ICE DETECTOR DOES NOT DETECT NAC ICE	30 21 31 00
ANTI-ICE NAC 1	(STATUS)	ENGINE 1 ANTI-ICE VALVE DISAGREES WITH COMMAND WITH ENGINE RUNNING OR TAI REGULATOR VALVE FAILED	30 21 23 00
ANTI ICE NAC 2	(STATUS)	ENGINE 2 ANTI-ICE VALVE DISAGREES WITH COMMAND WITH ENGINE RUNNING OR TAI REGULATOR VALVE FAILED	30 21 24 00
ANTI ICE NAC 3	(STATUS)	ENGINE 3 ANTI-ICE VALVE DISAGREES WITH COMMAND WITH ENGINE RUNNING OR TAI REGULATOR VALVE FAILED	30 21 25 00
ANTI ICE NAC 4	(STATUS)	ENGINE 4 ANTI-ICE VALVE DISAGREES WITH COMMAND WITH ENGINE RUNNING OR TAI REGULATOR VALVE FAILED	30 21 26 00
>ANTI-ICE WING	(ADVISORY)	ANY WING ANTI ICE SYSTEM SELECTED ON AND TAT > 12 DEGREES C	30 11 05 00
	TCE AND DATA	PROTECTION - FICAS MESSAGES	

ICE AND RAIN PROTECTION - EICAS MESSAGES

EFFECTIVITY-

ALL

**30-EICAS MESSAGES** 

05

Page 2 Oct 10/94



<b></b>	<del>,</del>	<del>r</del>	<del>,</del>
EICAS MESSAGE	LEVEL	DESCRIPTION	FAULT CODE
ANTI ICE WING L	(STATUS)	LEFT WING ANTI-ICE VALVE DISAGREES WITH COMMAND	30 11 02 00
ANTI ICE WING R	(STATUS)	RIGHT WING ANTI-ICE VALVE DISAGREES WITH COMMAND	30 11 04 00
HEAT L AOA	(STATUS)	LEFT ANGLE OF ATTACK PROBE HEAT POWER OR CONTINUITY LOSS	30 31 02 00
HEAT L AOA	(ADVISORY)	LEFT ANGLE OF ATTACK PROBE HEAT POWER OR CONTINUITY LOSS	30 31 01 00
HEAT L TAT	(STATUS)	LEFT TOTAL AIR TEMPERATURE PROBE HEAT POWER OR CONTINUITY LOSS	30 31 04 00
HEAT L TAT	(ADVISORY)	LEFT TOTAL AIR TEMPERATURE PROBE HEAT POWER OR CONTINUITY LOSS	30 31 03 00
HEAT P/S CAPT	(STATUS)	CAPTAIN'S MAIN PITOT HEAT POWER OR CONTINUITY LOSS	30 31 06 00
HEAT P/S CAPT	(ADVISORY)	CAPTAIN'S MAIN PITOT HEAT POWER OR CONTINUITY LOSS	30 31 05 00
HEAT P/S F/O	(STATUS)	FIRST OFFICER PITOT HEAT POWER OR CONTINUITY LOSS	30 31 08 00
HEAT P/S F/O	(ADVISORY)	FIRST OFFICER PITOT HEAT POWER OR CONTINUITY LOSS	30 31 07 00
l	TCE AND DATK	   PROTECTION = FICAS MESSAGES	I

ICE AND RAIN PROTECTION - EICAS MESSAGES

EFFECTIVITY-

## **30-EICAS MESSAGES**

ALL

01 Page 3 0ct 10/94



EICAS MESSAGE	LEVEL	DESCRIPTION	FAULT CODE
	<del></del>		<del> </del>
HEAT P/S L AUX	(STATUS)	LEFT AUXILARY PITOT HEAT POWER OR CONTINUITY LOSS	30 31 10 00
HEAT P/S L AUX	(ADVISORY)	LEFT AUXILARY PITOT HEAT POWER OR CONTINUITY LOSS	30 31 09 00
HEAT P/S R AUX	(STATUS)	RIGHT AUXILARY PITOT HEAT POWER OR CONTINUITY LOSS	30 31 12 00
HEAT P/S R AUX	(ADVISORY)	RIGHT AUXILARY PITOT HEAT POWER OR CONTINUITY LOSS	30 31 11 00
HEAT R AOA	(STATUS)	RIGHT ANGLE OF ATTACK PROBE HEAT POWER OR CONTINUITY LOSS	30 31 14 00
HEAT R AOA	(ADVISORY)	RIGHT ANGLE OF ATTACK PROBE HEAT POWER OR CONTINUITY LOSS	30 31 13 00
HEAT R TAT	(STATUS)	RIGHT TOTAL AIR TEMPERATURE PROBE HEAT POWER OR CONTINUITY LOSS	30 31 16 00
HEAT R TAT	(ADVISORY)	RIGHT TOTAL AIR TEMPERATURE PROBE HEAT POWER OR CONTINUITY LOSS	30 31 15 00
HEAT WINDOW L	(ADVISORY)	CONTROLLER HEATER OR SENSOR FAULT OR SWITCH OFF.	30 40 01 00
HEAT WINDOW R	(ADVISORY)	CONTROLLER HEATER OR SENSOR FAULT OR SWITCH OFF.	30 40 02 00
ICE DETECTOR L	(STATUS)	L ICE DETECTOR FAULT	30 81 02 00
		DDOTECTION - FICAS MESSAGES	

'ICE AND RAIN'PROTECTION - EICAS MESSAGES

EFFECTIVITY-

**30-EICAS MESSAGES** 

ALL

04

Page 4 Oct 10/94



		<u> </u>
LEVEL	DESCRIPTION	FAULT CODE
(STATUS)	R ICE DETECTOR FAULT	30 81 03 00
(ADVISORY)	L AND R ICE DETECTORS FAULT	30 81 01 00
(CAUTION)	ICE DETECTOR DETECTS ICE (NACELLE LEVEL) AND ANY NACELLE ANTI ICE SYSTEM IS OFF IN THE AIR	30 81 07 00
(CAUTION)	LEFT OR RIGHT ICE DETECTOR DETECTS NAC ICE AND ANY NAC ANTI-ICE IS OFF IN THE AIR	30-81-07-00
(CAUTION)	ICE DETECTOR DETECTS ICE (WING LEVEL) AND WING ANTI-ICE SYSTEM IS OFF IN THE AIR	30 81 06 00
(STATUS)	ENG 1 FAN COWL TEMP 250+-5 DEG F	30 21 10 00
(STATUS)	ENG 2 FAN COWL TEMP 250+-5 DEG F	30 21 11 00
(STATUS)	ENG 3 FAN COWL TEMP 250+-5 DEG F	30 21 12 00
(STATUS)	ENG 4 FAN COWL TEMP 250+-5 DEG F	30 21 13 00
(ADVISORY)	ENGINE 1 ANTI-ICE VALVE DISAGREES WITH COMMAND AND ENGINE RUNNING	30 21 14 00
(ADVISORY)	ENGINE 2 ANTI-ICE VALVE DISAGREES WITH COMMAND AND ENGINE RUNNING	30 21 15 00
	(STATUS) (ADVISORY) (CAUTION) (CAUTION) (STATUS) (STATUS) (STATUS) (STATUS) (ADVISORY)	(STATUS)  R ICE DETECTOR FAULT  (ADVISORY)  L AND R ICE DETECTORS FAULT  (CAUTION)  ICE DETECTOR DETECTS ICE (NACELLE LEVEL) AND ANY NACELLE ANTI ICE SYSTEM IS OFF IN THE AIR  (CAUTION)  LEFT OR RIGHT ICE DETECTOR DETECTS NAC ICE AND ANY NAC ANTI-ICE IS OFF IN THE AIR  (CAUTION)  ICE DETECTOR DETECTS ICE (WING LEVEL) AND WING ANTI-ICE SYSTEM IS OFF IN THE AIR  (STATUS)  ENG 1 FAN COWL TEMP 250+-5 DEG F  (STATUS)  ENG 2 FAN COWL TEMP 250+-5 DEG F  (STATUS)  ENG 3 FAN COWL TEMP 250+-5 DEG F  (STATUS)  ENG 4 FAN COWL TEMP 250+-5 DEG F  (ADVISORY)  ENGINE 1 ANTI-ICE VALVE DISAGREES WITH COMMAND AND ENGINE RUNNING

ICE AND RAIN PROTECTION - EICAS MESSAGES

EFFECTIVITY-

ALL

**30-EICAS MESSAGES** 

05

Page 5 Oct 10/94



EICAS MESSAGE	LEVEL	DESCRIPTION	FAULT CODE
NAI VALVE 3	(ADVISORY)	ENGINE 3 ANTI-ICE VALVE DISAGREES WITH COMMAND AND ENGINE RUNNING	30 21 16 00
NAI VALVE 4	(ADVISORY)	ENGINE 4 ANTI-ICE VALVE DISAGREES WITH COMMAND AND ENGINE RUNNING	30 21 17 00
WAI VALVE LEFT	(ADVISORY)	LEFT WING ANTI ICE VALVE DISAGREES WITH COMMAND	30 11 01 00
WAI VALVE RIGHT	(ADVISORY)	RIGHT WING ANTI ICE VALVE DISAGREES WITH COMMAND	30 11 03 00
WINDOW HEAT 1L	(STATUS)	CONTROLLER, HEATER OR SENSOR FAULT OR SWITCH OFF	30 40 03 00
WINDOW HEAT 1R	(STATUS)	CONTROLLER, HEATER OR SENSOR FAULT OR SWITCH OFF	30 40 04 00
WINDOW HEAT 2L	(STATUS)	POWER OFF, OVERHEAT OR WINDOW HEATER FAILURE	30 40 05 00
WINDOW HEAT 2R	(STATUS)	POWER OFF, OVERHEAT OR WINDOW HEATER FAILURE	30 40 06 00
	TCE AND DATA	PROTECTION - FICAS MESSAGES	

ICE AND RAIN PROTECTION - EICAS MESSAGES

EFFECTIVITY-

**30-EICAS MESSAGES** 

ALL

03 Page 6 0ct 10/94



EICAS	OVERHEAD PANEL	FAULT COD LOCATION
WAS MSG DISPLAYED?	LIGHT ILLUMINATED	NOT APPLY
NO		│ NORMAL
HEAT L AOA		→ 30 31 01
HEAT L TAT		30 31 03
HEAT R AOA		30 31 13
HEAT R TAT		→ 30 31 15
HEAT P/S L AUX		→ 30 31 09
HEAT P/S R AUX		→ 30 31 11
HEAT P/S CAPT		→ 30 31 05
HEAT P/S F/O		→ 30 31 07
HEAT WINDOW L	INOP	→ 30 40 01
HEAT WINDOW R	INOP	→ 30 40 02
>ICE DETECTORS	INOF	
NAI VALVE 1		30 81 01
NAI VALVE 2		30 21 14
NAI VALVE 3		30 21 15
NAI VALVE 4		30 21 16
WAI VALVE LEFT		30 21 17
WAI VALVE RIGHT		30 11 01
		<b>→</b> 30 11 03
$\stackrel{ ext{i}}{ o}$ REPORT ANY FAULT SYMPTOM (	OR PATTERN NOT SHOWN ABOVE	→ 30 31 XA

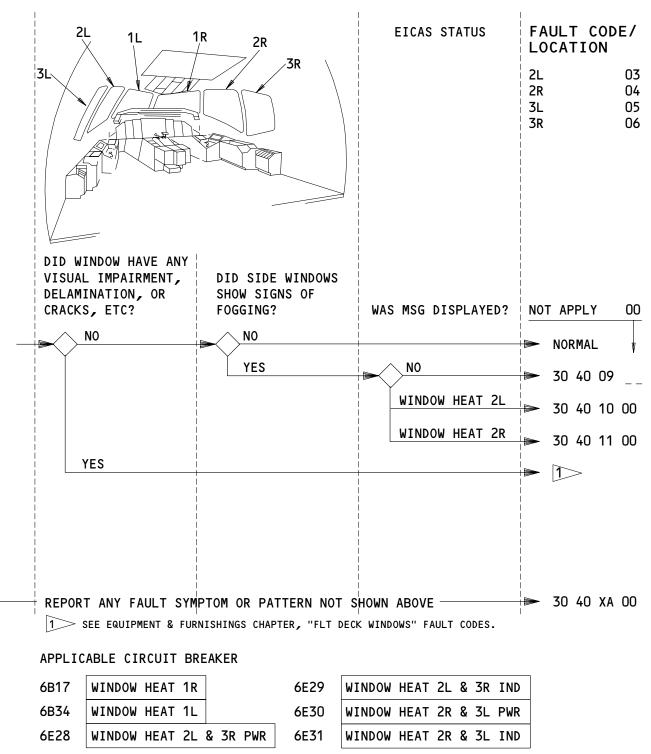
### EICAS MESSAGES - FAULT CODES

# 30-FAULT CODE DIAGRAM

05

Page 1 Feb 10/93





### WINDOW HEAT - FAULT CODES

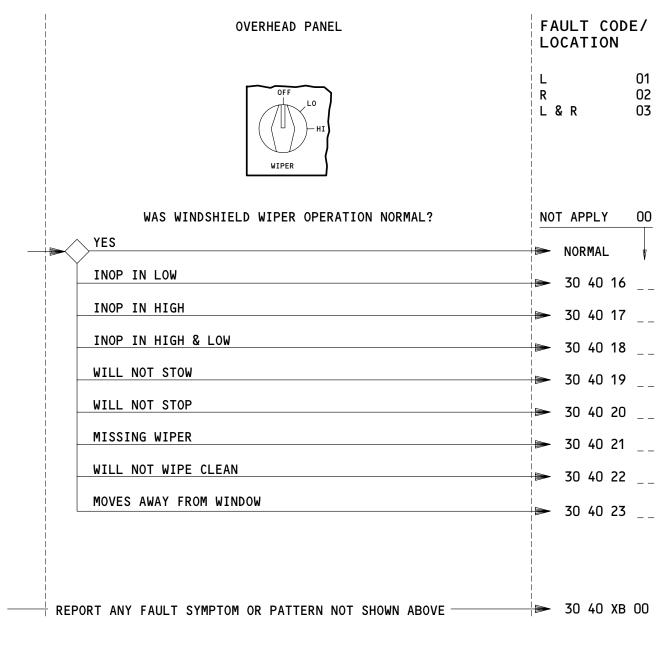
ALL

### 30-FAULT CODE DIAGRAM

01

Page 2 0ct 10/92





### APPLICABLE CIRCUIT BREAKER

7E1 WSHLD WIPER L
7E25 WSHLD WIPER R

### WINDSHIELD WIPERS - FAULT CODES

EFFECTIVITY-

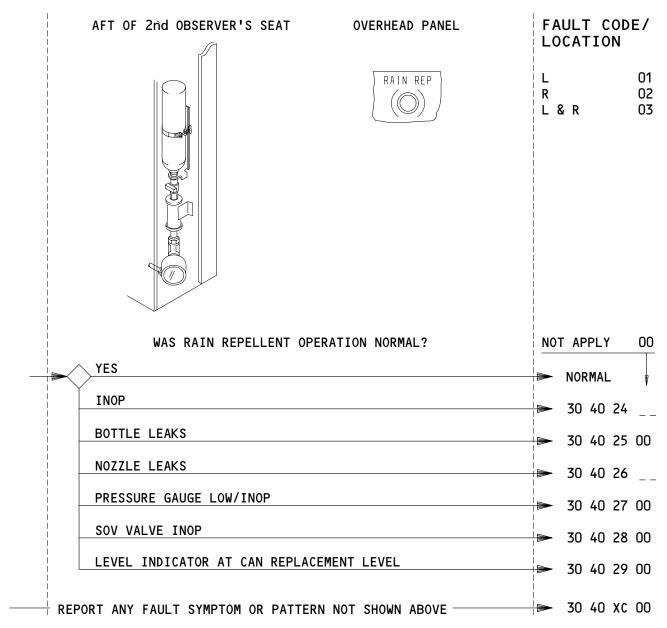
322952

30-FAULT CODE DIAGRAM

01

Page 3 Oct 10/88





APPLICABLE CIRCUIT BREAKER

7E2 WSHLD RAIN REPEL

### RAIN REPELLENT - FAULT CODES

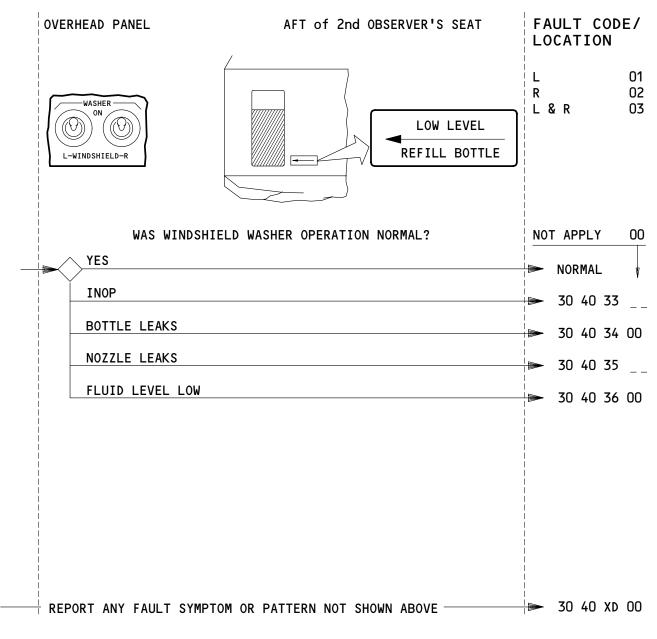
ALL

## 30-FAULT CODE DIAGRAM

01

Page 4 Oct 10/88





### APPLICABLE CIRCUIT BREAKER

6B32 WINDSHIELD WASH PUMP
7E26 WSHLD WASH

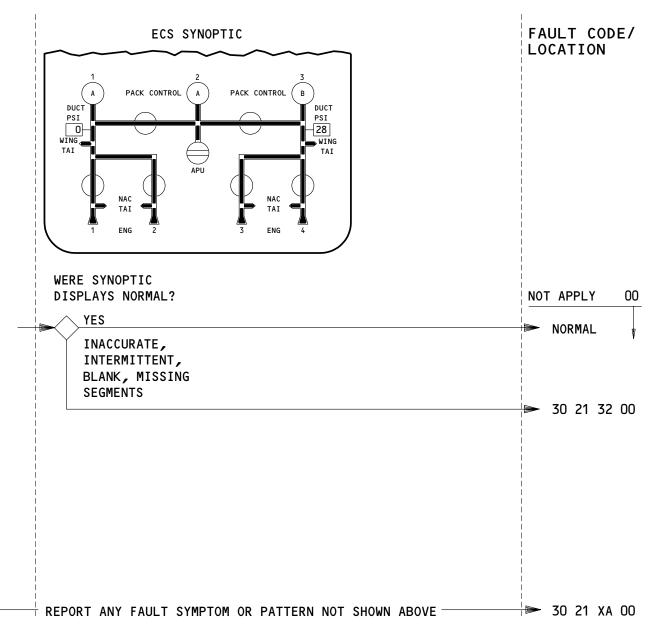
### WINDSHIELD WASHER - FAULT CODES

ALL

## 30-FAULT CODE DIAGRAM

Page 5 Jun 10/89





WING AND NACELLE TAI - FAULT CODES (GROUND)

## 30-FAULT CODE DIAGRAM

01

Page 6 Jun 10/97

655422



#### FAULT CODE INDEX

#### 1. General

- A. The Fault Code Index includes fault isolation or corrective action for each fault code in the Fault Reporting Manual (FRM). The fault codes for each chapter are in numerical order.
  - (1) The first paragraph given with each fault code is the log book report from the FRM. The log book report is a short description of the fault.
  - (2) The numbered paragraphs after the log book report contain the fault isolation or the corrective action.
- B. The fault isolation for most EICAS messages, engine exceedances, or PFD flags includes a list of one or more possible correlated CMCS messages.
  - (1) For each CMCS message in the list, there is the message number and an ATA number. The ATA number is the prompt under which you can find the message in Existing Faults or Fault History on the CDU.
  - (2) The corrective action refers to the procedure in Figure 1 of this section. Figure 1 shows how to use the Present Leg Faults, Existing Faults, and Fault History functions of the CMC to isolate the fault to a specific CMCS message.
- C. For those EICAS status messages which latch into EIU memory when they occur, this index includes the letters NVM, NVM-A, or NVM-G to the right of the log book report.
  - (1) NVM indicates that the message latches if it occurs in the air or on the ground.
  - (2) NVM-A indicates that the message latches only if it occurs in the air.
  - (3) NVM-G indicates that the message latches only if it occurs on the ground.
  - (4) To remove the latched message from the EICAS after you correct the fault, you must use the ERASE function of the CMC.

NOTE: Do <u>not</u> erase a latched EICAS message until you are sure that you have corrected the fault.

EFFECTIVITY-

30-FAULT CODE INDEX

ALL

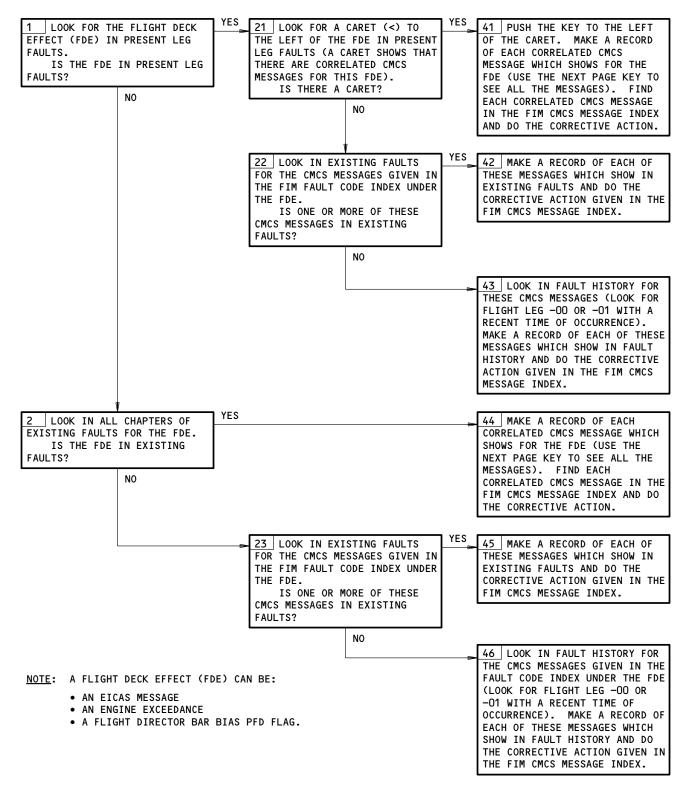


- D. When the CDU shows a large number of Flight Deck Effects (FDEs) or CMCS messages, it is possible that there is a bus failure. Do these steps to isolate the cause of the bus failure:
  - (1) Look at the CMCS messages to determine which system or LRU is related to all the messages.
  - (2) Look at the wiring diagram for each system and determine if the suspect LRUs are on a common bus.
  - (3) Do a check of the wiring between each of the suspect LRUs and the common bus.
  - (4) Repair any problems that you find.
  - (5) If the problem continues, remove each LRU individually to determine which LRU is the cause of the fault.
  - (6) Replace the LRU which caused the fault.

EFFECTIVITY-

ALL

30-FAULT CODE INDEX



Fault Isolation Procedure with the CMCS
Figure 1

30-FAULT CODE INDEX

O1 Page 3

A04371

Feb 10/97

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
30 21 XA 00	The flight crew found a NAC TAI flowbar indication problem that is not on the fault code in the FRM. See the entry that the flight crew wrote in the log book.
30 31 XA 00	<ul> <li>The flight crew found an EICAS message that is not included in the fault code diagram.</li> <li>Go to the CMC Present Leg Faults menu (AMM 45-10-00/201).</li> <li>On the menu, look for the EICAS message that the flight crew found. Push the key adjacent to the EICAS message and look for any CMCS fault messages.</li> <li>If you cannot find the EICAS message or any CMCS message, find the NON-FDE FAULTS message on the menu. Push the key adjacent to the NON-FDE FAULTS message and look for any CMCS messages that are related to the EICAS message.</li> <li>If you cannot find any CMCS messages that are related to the EICAS message, go to the CMCS Existing Faults menu. Push the key adjacent to &lt;30 and look for any CMCS messages that are related to the EI CAS message</li> <li>Refer to the FIM CMCS Message Index for the corrective action.</li> </ul>
30 40 XA 00	The flight crew found a window heat system problem that is not on the fault code diagram in the FRM. See the entry that the flight crew wrote in the log book.  1. MM 30-41-00/501
30 40 XB 00	The flight crew found a windshield wiper problem that is not on the fault code diagram in the FRM. See the entry that the flight crew wrote in the log book.  1. MM 30-42-00/501
30 40 XC 00	The flight crew found a rain repellent problem that is not on the fault code diagram in the FRM. See the entry that the flight crew wrote in the log book.  1. MM 30-43-00/501
30 40 XD 00	The flight crew found a windshield washer problem that is not on the fault code diagram in the FRM. See the entry that the flight crew wrote in the log book.  1. MM 30-44-00/501

EFFECTIVITY-

# 30-FAULT CODE INDEX

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
00 13 03 29	NAI VLV DISAGR shows on the auto snapshot report of the ECS maintenance page.  1. Look for one or more of these EICAS messages:
	30 21 14 00 NAI VALVE 1 30 21 15 00 NAI VALVE 2 30 21 16 00 NAI VALVE 3 30 21 17 00 NAI VALVE 4
30 11 01 00	The EICAS message WAI VALVE LEFT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1):
	30201 (30–11) 30203 (30–11)
30 11 02 00	The EICAS message ANTI-ICE WING L (STATUS) shows.  1. Look for one or more of these CMCS messages (Fig. 1):
	30201 (30–11) 30203 (30–11)
30 11 03 00	The EICAS message WAI VALVE RIGHT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1):
	30201 (30–11) 30202 (30–11)
30 11 04 00	The EICAS message ANTI-ICE WING R (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30201 (30–11) 30202 (30–11)
30 11 05 00	The EICAS message >ANTI ICE WING (ADVISORY) shows.  1. Look for one or more of these CMCS Messages (Fig. 1): 30201 (30-11) 30202 (30-11) 30203 (30-11)
30 21 01 00	Not Used.
30 21 02 00	Not Used.
30 21 03 00	Not Used.
30 21 04 00	Not Used.
30 21 05 00	Not Used.
30 21 06 00	Not Used.
30 21 07 00	Not Used.

30-FAULT CODE INDEX

EFFECTIVITY-

FAULT CODE LOG BOOK REPORT/ CORRECTIVE ACTION 30 21 08 00 Not Used. 30 21 09 00 Not Used. 30 21 10 00 The EICAS message NAI DUCT 1 LEAK (STATUS) shows. (NVM) 1. Look for one or more of these CMCS messages (Fig. 1): 30274 (30-21) 30 21 11 00 The EICAS message NAI DUCT 2 LEAK (STATUS) shows. (NVM) Look for one or more of these CMCS messages (Fig. 1): 30275 (30-21) 30 21 12 00 The EICAS message NAI DUCT 3 LEAK (STATUS) shows. (NVM) 1. Look for one or more of these CMCS messages (Fig. 1): 30276 (30-21) 30 21 13 00 The EICAS message NAI DUCT 4 LEAK (STATUS) shows. (NVM) 1. Look for one or more of these CMCS messages (Fig. 1): 30277 (30-21) 30 21 14 00 The EICAS message NAI VALVE 1 (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1): 30270 (30-21) 30278 (30-21) 36013 (36-11) 36037 (36-21) 30 21 15 00 The EICAS message NAI VALVE 2 (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1): 30271 (30-21) 30279 (30-21) 36014 (36-11) 36038 (36-21) 30 21 16 00 The EICAS message NAI VALVE 3 (ADVISORY) shows. Look for one or more of these CMCS messages (Fig. 1): 30272 (30-21) 30280 (30-21) 36015 (36-11) 36039 (36-21) 30 21 17 00 The EICAS message NAI VALVE 4 (ADVISORY) shows. Look for one or more of these CMCS messages (Fig. 1): 30273 (30-21) 30281 (30-21) 36016 (36-11) 36040 (36-21) 30 21 18 00 Not Used.

EFFECTIVITY-

## 30-FAULT CODE INDEX

ALL

01 Page 6 Jun 10/97

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
30 21 19 00	Not Used.
30 21 20 00	Not Used.
30 21 21 00	Not Used.
30 21 22 00	Not Used.
30 21 23 00	The EICAS message ANTI-ICE NAC 1 (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30270 (30–21) 30278 (30–21) 36013 (36–11) 36037 (36–21)
30 21 24 00	The EICAS message ANTI-ICE NAC 2 (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30271 (30–21) 30279 (30–21) 36014 (36–11) 36038 (36–21)
30 21 25 00	The EICAS message ANTI-ICE NAC 3 (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30272 (30–21) 30280 (30–21) 36015 (36–11)
30 21 26 00	The EICAS message ANTI-ICE NAC 4 (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30273 (30–21) 30281 (30–21) 36016 (36–11)
30 21 27 00	Not Used.
30 21 28 00	Not Used.
30 21 29 00	Not Used.
30 21 30 00	Not Used.

EFFECTIVITY-

ALL

# 30-FAULT CODE INDEX

FAULT CODE LOG BOOK REPORT/ CORRECTIVE ACTION 30 21 31 00 The EICAS message >ANTI ICE NAC (ADVISORY) shows. Set the NACELLE ANTI ICE switches on the P5 overhead panel to AUTO or OFF. 30 21 32 00 Inaccurate, intermittent, blank, missing segment. If the air source is an engine then replace the applicable engine speed card (YMLAOO1, YMLAOO3, YMLAOO5, LMLAOO7). Ref. AMM 77-12-01/401 2. If the air source is not an engine or if the problem still exists then go to FIM 36-20-00/101 Fig.104. 30 31 01 00 The EICAS message HEAT L AOA (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1): 30326 (30-32) 30334 (30-31) 34639 (30–31) 34642 (30–31) 30 31 02 00 The EICAS message HEAT L AOA (STATUS) shows. (NVM-A) 1. Look for one or more of these CMCS messages (Fig. 1): 30326 (30-32) 30334 (30-31) 34639 (30-31) 34642 (30-31) 30 31 03 00 The EICAS message HEAT L TAT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1): 30324 (30-31) 30332 (30–31) 34635 (30-31) 30 31 04 00 The EICAS message HEAT L TAT (STATUS) shows. (NVM-A) 1. Look for one or more of these CMCS messages (Fig. 1): 30324 (30-31) 30332 (30-31) 34635 (30-31) 30 31 05 00 The EICAS message HEAT P/S CAPT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1): 30320 (30-31) 30328 (30–31) 34633 (30–31) 34644 (30-31) 30 31 06 00 The EICAS message HEAT P/S CAPT (STATUS) shows. (NVM-A) 1. Look for one or more of these CMCS messages (Fig. 1): 30320 (30-31) 30328 (30-31) 34633 (30-31) 34644 (30-31) 30 31 07 00 The EICAS message HEAT P/S F/O (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1): 30329 (30–31) 34637 (30–31) 30321 (30–31) 34645 (30-31)

EFFECTIVITY-

## 30-FAULT CODE INDEX

ALL

03



FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
30 31 08 00	The EICAS message HEAT P/S F/O (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30321 (30–31) 30329 (30–31) 34637 (30–31) 34645 (30–31)
30 31 09 00	The EICAS message HEAT P/S L AUX (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1):
	30322 (30–31) 30330 (30–31) 34638 (30–31) 34647 (30–31)
30 31 10 00	The EICAS message HEAT P/S L AUX (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30322 (30–31) 30330 (30–31) 34638 (30–31) 34647 (30–31)
30 31 11 00	The EICAS message HEAT P/S R AUX (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1):
	30323 (30–31) 30331 (30–31) 34634 (30–31) 34646 (30–31)
30 31 12 00	The EICAS message HEAT P/S R AUX (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30323 (30–31) 30331 (30–31) 34634 (30–31) 34646 (30–31)
30 31 13 00	The EICAS message HEAT R AOA (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1):
	30327 (30–32) 30335 (30–31) 34643 (30–31) 34651 (30–31)
30 31 14 00	The EICAS message HEAT R AOA (STATUS) shows. (NVM-A)  1. Look for one or more of these CMCS messages (Fig. 1):
	30327 (30–32) 30335 (30–31) 34643 (30–31) 34651 (30–31)
30 31 15 00	The EICAS message HEAT R TAT (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1):
	30325 (30-31) 30333 (30-31) 34636 (30-31) 34638 (30-31) 34641 (30-31)

EFFECTIVITY-

# 30-FAULT CODE INDEX

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
30 31 16 00	EICAS message HEAT R TAT (STATUS) shows. (NVM-A) Look for one or more of these CMCS messages (Fig. 1):
	30325 (30–31) 30333 (30–31) 34636 (30–31) 34638 (30–31) 34641 (30–31)
30 40 01 00	EICAS message HEAT WINDOW L (ADVISORY) shows. Look for one or more of these CMCS messages (Fig. 1):
	24703 (24-11) 30102 (30-41) 30103 (30-41) 30104 (30-41) 30105 (30-41) 30106 (30-41)
30 40 02 00	EICAS message HEAT WINDOW R (ADVISORY) shows. Look for one or more of these CMCS messages (Fig. 1):
	24701 (24–11) 30112 (30–41) 30113 (30–41) 30114 (30–41) 30115 (30–41) 30116 (30–41)
30 40 03 00	EICAS message WINDOW HEAT 1L (STATUS) shows. (NVM-A) Look for one or more of these CMCS messages (Fig. 1):
	24703 (24-11) 30102 (30-41) 30103 (30-41) 30104 (30-41) 30105 (30-41) 30106 (30-41)
30 40 04 00	EICAS message WINDOW HEAT 1R (STATUS) shows. (NVM-A) Look for one or more of these CMCS messages (Fig. 1):
	24701 (24–11) 30112 (30–41) 30113 (30–41) 30114 (30–41) 30115 (30–41) 30116 (30–41)
30 40 05 00	EICAS message WINDOW HEAT 2L (STATUS) shows. (NVM-A) Look for one or more of these CMCS messages (Fig. 1):
	24701 (24–11) 30120 (30–41)

EFFECTIVITY-

# 30-FAULT CODE INDEX

ALL

FAULT CODE LOG BOOK REPORT/ CORRECTIVE ACTION 30 40 06 00 The EICAS message WINDOW HEAT 2R (STATUS) shows. (NVM-A) 1. Look for one or more of these CMCS messages (Fig. 1): 24702 (24-11) 30122 (30-41) 30 40 07 00 Not Used. 30 40 08 00 Not Used. 30 40 09 \_\_\_ (03=2L, 04=2R, 05=3L, 06=3R) window shows signs of fogging. 1. Replace control thermostat (\$760=2L, \$761=2R, \$759=3L, S762=3R) (MM 30-41-06/401). 30 40 10 00 2L window shows signs of fogging. EICAS status msg WINDOW HEAT 2L displayed. 1. 30-40-00, Fig. 103 Block 1. 30 40 11 00 2R window shows signs of fogging. EICAS status msg WINDOW HEAT 2R displayed. 1. 30-40-00, Fig. 103 Block 1. 30 40 12 00 Not Used. 30 40 13 00 Not Used. 30 40 14 00 Not Used. 30 40 15 00 Not Used.

30 40 16 \_\_ (01=L, 02=R, 03=L & R) windshield wiper(s) inop in low position.

1. Remove anti-ice/rain removal module M7321 from overhead panel (WDM 30-42-11) and check for continuity between pins 22 and 23 of DM7321B (DM7321D) with left (right) WIPER switch in LO position. If there is continuity, replace left (right) motor converter M18 (M17) (MM 30-42-03/401). If there is not continuity, replace left (right) WIPER switch YMES6 (YMES9) (WDM 30-42-11).

EFFECTIVITY-

30-FAULT CODE INDEX

04

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION	

- 30 40 17 \_\_ (01=L, 02=R, 03=L & R) windshield wiper(s) inop in high position.
  - 1. Remove anti-ice/rain removal module M7321 from overhead panel (WDM 30-42-11) and check for continuity between pins 20, 21, and 23 of DM7321B (DM7321D) with left (right) WIPER switch in HI position. If there is continuity, replace left (right) motor converter M18 (M17) (MM 30-42-03/401). If there is not continuity, replace left (right) WIPER switch YMES6 (YMES9) (WDM 30-42-11).
- 30 40 18 \_\_ (01=L, 02=R, 03=L & R) windshield wiper(s) inop in both high and low position.
  - 1. Replace anti-ice/rain removal module M7321 (WDM 30-42-11).
  - 2. If fault persists, replace left (right) motor/converter M18 (M17) (AMM 30-42-03/401).
- 30 40 19 \_\_ (01=L, 02=R, 03=L & R) windshield wiper(s) will not stow.

  1. Replace left (right) windshield wiper motor/converter

  M18 (M17) (AMM 30-42-03/401).
- 30 40 20 \_\_ (01=L, 02=R, 03=L & R) windshield wiper(s) will not turn off.

  1. Replace left (right) motor/converter M18 (M17)
  (MM 30-42-03/401).
- 30 40 21  $\_$  (01=L, 02=R, 03=L & R) windshield wiper(s) missing.
  - 1. Check windshield for signs of damage (MM 56-11-01/601).
  - 2. Replace wiper blade(s) (MM 30-42-01/401) or wiper arm(s) (MM 30-42-02/401) as necessary.
- 30 40 22 \_\_\_ (01=L, 02=R, 03=L & R) windshield wiper(s) will not wipe clean.

  1. Replace wiper blade(s) (MM 30-42-01/401).

EFFECTIVITY-

30-FAULT CODE INDEX

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
30 40 23	(01=L, 02=R, 03=L & R) windshield wiper(s) move(s) away from window.  1. Check pressure of wiper arm (MM 30-42-02/601).
30 40 24	<ol> <li>(01=L, 02=R, 03=L &amp; R) rain repellent system inop.</li> <li>Remove anti-ice/rain removal module M7321 from overhead panel and check for continuity between pin 24 of DM7321A and pin 23 of DM7321A (pin 24 of DM7321C) while left (right) RAIN REP switch is pressed. If there is continuity, replace left (right) solenoid valve V31 (V32) (MM 30-43-00/201). If there is not continuity, replace left (right) rain repellent control switch YMES10 (YMES11) (WDM 30-43-11).</li> </ol>
30 40 25 00	Rain repellent bottle leaks.  1. Replace rain repellent bottle (MM 12-16-02/301).
30 40 26	(01=L, 02=R, 03=L & R) rain repellent system leaking from nozzle  1. Replace left (right) rain repellent solenoid valve  V31 (V32) (MM 30-43-00/201).
30 40 27 00	Rain repellent pressure gauge (low/inop).  1. Replace rain repellent bottle (MM 12-16-02/301).
30 40 28 00	Rain repellent shutoff valve inop.  1. Replace rain repellent shutoff valve.
30 40 29 00	Rain repellent level indicator at can replacement level.  1. Replace rain repellent bottle (MM 12-16-02/301).
30 40 30 00	Not Used.

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
30 40 31 00	Not Used.
30 40 32 00	Not Used.
30 40 33	(01=L, 02=R, 03=L & R) windshield washer system(s) inop. 1. 30-40-00, Fig. 104 Block 1.
30 40 34 00	Windshield washer container leaks.  1. Replace windshield washer container.
30 40 35	<ul> <li>(01=L, 02=R, 03=L &amp; R) windshield washer system(s) leaking from nozzle(s).</li> <li>1. Replace left (right) windshield washer solenoid valve V33 (V34) (MM 30-44-01/401).</li> </ul>
30 40 36 00	Windshield washer fluid level low.  1. Service windshield washer container (MM 12-16-01/301).
30 81 01 00	The EICAS message >ICE DETECTORS (ADVISORY) shows. 1. Look for one or more of these CMCS messages (Fig. 1):
	30254 (30-81) 30255 (30-81)
30 81 02 00	The EICAS message ICE DETECTOR L (STATUS) shows. 1. Look for one or more of these CMCS messages (Fig. 1):
	30254 (30-81)
30 81 03 00	The EICAS message ICE DETECTOR R (STATUS) shows; or the EICAS message ICE DETECTOR R (STATUS) shows.  1. Look for one or more of these CMCS messages (Fig. 1):
	30255 (30–81)

EFFECTIVITY-

# 30-FAULT CODE INDEX



FAULT CODE

LOG BOOK REPORT/
CORRECTIVE ACTION

30 81 04 00 Not Used.

30 81 05 00 Not Used.

30 81 06 00 The EICAS message >ICING WING (CAUTION) shows.

1. Set the WING ANTI ICE switch on the P5 overhead panel to AUTO or ON.

30 81 07 00 The EICAS message >ICING NAC (CAUTION) shows.

1. Set the NACELLE ANTI ICE switches on the P5 overhead panel to AUTO or ON.

EFFECTIVITY-

## 30-FAULT CODE INDEX



1. All CMCS messages have a four digit ATA number along with the five digit CMCS message number displayed on the CDU. The first two digits of each number represent the ATA chapter where the message is covered. For some of the the CMCS messages listed below, the first two digits of the ATA number are different from the first two digits of the CMCS message number. These CMCS messages are covered in more than one chapter. They are included in this chapter to be in agreement with the first two digits of the ATA number:

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30101 WHCU-1L PRIMARY AIR/GND DISAGREE	

## **CORRECTIVE ACTION:**

- A. If the EICAS message A/G DISAGREE (STATUS) also shows, do the corrective action which is given for it in 32-FAULT CODE INDEX.
- B. If the EICAS message A/G DISAGREE (STATUS) does not show, replace the air/ground relay R330 (WDM 30-41-11).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30102 WINDOW HEAT CONTROL UNIT-1L FAIL	HEAT WINDOW L WINDOW HEAT 1L (ADVISORY) (STATUS)

#### **CORRECTIVE ACTION:**

A. Replace the left window heat control unit M73 (MM 30-41-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30103 FORWARD WINDOW HEAT SENSOR-1L FAIL	HEAT WINDOW L WINDOW HEAT 1L (ADVISORY) (STATUS)

## CORRECTIVE ACTION:

- A. METHOD A
  - (1) AIRPLANES WITH BURNDY BLOCK FOR WINDOW HEAT SENSORS; Do the steps that follow:
    - (a) Exchange the wires between terminals FA1 and FA2 at the burndy block TD475 (at the left front corner of the E1-4 shelf) (WDM 30-41-11).
    - (b) Exchange the wires between terminals FC1 and FC2 at TD475.
    - (c) Attach a SPARE SENSOR IN USE note to the wire bundle.
  - (2) ALL EXCEPT AIRPLANES WITH BURNDY BLOCK FOR WINDOW HEAT SENSORS; Do the steps that follow:
    - (a) Disconnect the wafer connector DW1415B at the E1-4 shelf (WDM 30-41-11).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

01F.1

Page 1 Oct 18/00



- (b) Use a pin removal/extraction tool (SWPM 20-72-17), exchange pin B1 with pin B4, and exchange pin B2 with pin B5.
- (c) Attach a SPARE SENSOR IN USE note to the wire bundle.
- (d) Connect DW1415B.
- B. METHOD B
  - (1) At the terminal block of the left windshield A15, move the wire from terminal F to terminal H.
  - (2) Move the wire from terminal G to terminal I.
  - (3) Attach a SPARE SENSOR IN USE note to the wires.
- C. If the two sensors in the window are failed, replace the left windshield A15 (MM 56-11-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30104 FORWARD WINDOW HEATER-1L FAIL	HEAT WINDOW L WINDOW HEAT 1L (ADVISORY) (STATUS)

A. Replace the left windshield A15 (MM 56-11-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK	EFFECT
30105 WINDOW HEAT-1L AC POWER INPUT FAIL	HEAT WINDOW L WINDOW HEAT 1L (ADVISORY) (STATUS)	

## CORRECTIVE ACTION:

- A. Examine and repair the circuit between 6B34 WINDOW HEAT 1L circuit breaker and connector DM73 pins B1 and B2 at the left window heat control unit M73 (WDM 30-41-11).
- B. If the circuit breaker 6B34 WINDOW HEAT 1L opens itself when you try to close it, do this procedure (WDM 30-41-11):
  - (1) Measure the voltage between structure ground and each terminal of the circuit breaker 6B34 WINDOW HEAT 1L.
    - (a) If the voltage at either terminal of the breaker is greater than 122V AC, then there is a fault in the electrical power supply system.

EFFECTIVITY-

ALL

30-CMCS MESSAGE INDEX

01F.1

.

Page 2 Oct 18/00



- (2) Disconnect the wiring from the power terminals A, C, and J at the No. 1 left windshield A15.
- (3) Measure the resistance between terminals A and C of the left No. 1 windshield.
  - (a) If the resistance is less than 7.64 ohms (at an ambient temperature of 60 F or greater), then replace the left No. 1 windshield A15 (MM 56-11-01/401).
  - (b) If the resistance is greater than 7.64 ohms (at an ambient temperature of 60 F or greater), then connect the wiring to the power terminals A, C, and J.
- (4) If the problem continues, replace circuit breaker 6B34 WINDOW HEAT 1L, C1503 (WDM 30-41-11).
- (5) If the problem continues, replace the left window heat control unit M73 (MM 30-41-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30106 WINDOW HEAT L SWITCH OFF OR FAIL OR AC POWER IMBALANCE	HEAT WINDOW L WINDOW HEAT 1L (ADVISORY) (STATUS)

- A. Do this task for the left window heat system: "Operational Test Flight Compartment Window Anti-Ice System" (MM 30-41-00/501). This is a CMC ground test.
  - (1) Look for window heat CMC messages after you run the ground test. If any messages show, do the applicable corrective action given in the FIM CMCS Message Index.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30107 WHCU-1L FAIL OR CMC > WHCU-1L FAIL	

#### **CORRECTIVE ACTION:**

A. CMC S/W -008;

Do the steps that follow:

ALL

- (1) Look for CMCS message 30102, WINDOW HEAT CONTROL UNIT 1L FAIL.
  - (a) If the WINDOW HEAT CONTOL UNIT 1L FAIL message shows, do the corrective action for the CMCS message 30102.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

01F.1

- (b) If the WINDOW HEAT CONTROL UNIT 1L FAIL message does not show, examine and repair the circuit between connector DM7373CA pins A4 and B4 at the left CMC M7373 and connector DM73 pins A24 and A25 at the left window heat control unit M73 (WDM 30-41-11).
  - 1) If the circuit is 0.K., replace the left window heat control unit M73 (AMM 30-41-01/401).
- B. CMC S/W -009;

Do the steps that follow:

- (1) Examine and repair the circuit between connector DM7373CA pins A4 and B4 at the left CMC M7373 and connector DM73 pins A24 and A25 at the left window heat control unit M73 (WDM 30-41-11).
- (2) If the problem continues, replace the left window heat control unit M73 (AMM 30-41-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30108 EIU-L FAIL OR WHCU-1L>EIU-L BUS FAIL	EIU DISAGREE (STATUS)

#### CORRECTIVE ACTION:

- A. Replace the left EIU M7353 (MM 31-61-01/401).
- B. If the problem continues, examine and repair the circuit between connector DM73BA pins 21 and 22 at the left window heat control unit M73 and connector DM7353GA pins C8 and D8 at the left EIU M7353 (WDM 30-41-11).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30109 EIU-C FAIL OR WHCU-1L>EIU-C BUS FAIL	EIU DISAGREE (STATUS)

## **CORRECTIVE ACTION:**

ALL

- A. Replace the center EIU M7352 (MM 31-61-01/401).
- B. If the problem continues, examine and repair the circuit between connector DM73BA pins 21 and 22 at the left window heat control unit M73 and connector DM7352GA pins C8 and D8 at the center EIU M7352 (WDM 30-41-11).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

01F.1



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30110 EIU-R FAIL OR WHCU-1L>EIU-R BUS FAIL	EIU DISAGREE (STATUS)

- A. Replace the right EIU M7351 (MM 31-61-01/401).
- B. If the problem continues, examine and repair the circuit between connector DM73BA pins 21 and 22 at the left window heat control unit M73 and connector DM7351GA pins C8 and D8 at the right EIU M7351 (WDM 30-41-11).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30111 WHCU-1R ALTERNATE AIR/GND DISAGREE	

## **CORRECTIVE ACTION:**

- A. If the EICAS message A/G DISAGREE (STATUS) also shows, do the corrective action which is given for it in 32-FAULT CODE INDEX.
- B. If the EICAS message A/G DISAGREE (STATUS) does not show, replace the air/ground relay R227 (WDM 30-41-12).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30112 WINDOW HEAT CONTROL UNIT-1R FAIL	HEAT WINDOW R WINDOW HEAT 1R (ADVISORY) (STATUS)

#### CORRECTIVE ACTION:

A. Replace the right window heat control unit M237 (MM 30-41-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30113 FORWARD WINDOW HEAT SENSOR-1R FAIL	HEAT WINDOW R WINDOW HEAT 1R (ADVISORY) (STATUS)

#### **CORRECTIVE ACTION:**

- A. METHOD A
  - (1) AIRPLANES WITH BURNDY BLOCK FOR WINDOW HEAT SENSORS; Do the steps that follow:
    - (a) Exchange the wires between terminals FA1 and FA2 at the burndy block TD476 (at the right front corner of the E2-3 shelf) (WDM 30-41-12).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

01F.1

Page 5 Oct 18/00



- (b) Exchange the wires between terminals FC1 and FC2 at TD476.
- (c) Attach a SPARE SENSOR IN USE note to the wire bundle.
- (2) ALL EXCEPT AIRPLANES WITH BURNDY BLOCK FOR WINDOW HEAT SENSORS; Do the steps that follow:
  - (a) Disconnect the wafer connector DW2353E at the E2-3 shelf (WDM 30-41-12).
  - (b) Use a pin removal/extraction tool (SWPM 20-72-17), exchange pin E9 with pin E12, and exchange pin E10 with pin E13.
  - (c) Attach a SPARE SENSOR IN USE note to the wire bundle.
  - (d) Connect DW2353E.
- B. METHOD B
  - (1) At the terminal block of the right windshield A14, move the wire from terminal F to terminal H.
  - (2) Move the wire from terminal G to terminal I.
  - (3) Attach a SPARE SENSOR IN USE note to the wires.
- C. If the two sensors in the window are failed, replace the right windshield A14 (MM 56-11-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30114 FORWARD WINDOW HEATER-1R FAIL	HEAT WINDOW R WINDOW HEAT 1R (ADVISORY) (STATUS)

A. Replace the right windshield A14 (AMM 56-11-01/401).

CMCS MESSAGE	POS	SIBLE FLIGHT DECK EFFECT
30115 WINDOW HEAT-1R AC POWER INPUT FAIL	HEAT WINDOW R (ADVISORY)	WINDOW HEAT 1R (STATUS)

## **CORRECTIVE ACTION:**

- A. Examine and repair the circuit between 6B17 WINDOW HEAT 1R circuit breaker and connector DM237 pins B1 and B2 at the right window heat control unit M237 (WDM 30-41-12).
- B. If the circuit breaker 6B17 WINDOW HEAT 1R opens itself when you try to close it, do this procedure (WDM 30-41-12):
  - (1) Measure the voltage between structure ground and each terminal of the circuit breaker 6B17 WINDOW HEAT 1R.
    - (a) If the voltage at either terminal of the breaker is greater than 122V AC, then there is a fault in the electrical power supply system.
  - (2) Disconnect the wiring from the power terminals A, C, and J at the No. 1 right windshield A14.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

01F.1

Page 6 0ct 18/00



- (3) Measure the resistance between terminals A and C of the right No. 1 windshield.
  - (a) If the resistance is less than 7.64 ohms (at an ambient temperature of 60 F or greater), then replace the right No. 1 windshield A14 (MM 56-11-01/401).
  - (b) If the resistance is greater than 7.64 ohms (at an ambient temperature of 60 F or greater), then connect the wiring to the power terminals A, C, and J.
- (4) If the problem continues, replace circuit breaker 6B17 WINDOW HEAT 1R, C1504 (WDM 30-41-11).
- (5) If the problem continues, replace the right window heat control unit M237 (MM 30-41-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30116 WINDOW HEAT R SWITCH OFF OR FAIL OR AC POWER IMBALANCE	HEAT WINDOW R WINDOW HEAT 1R (ADVISORY) (STATUS)

- A. Do this task for the right window heat system: "Operational Test Flight Compartment Window Anti-Ice System" (MM 30-41-00/501). This is a CMC ground test.
  - (1) Look for window heat CMC messages after you run the ground test. If any messages show, do the applicable corrective action given in the FIM CMCS Message Index.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30117 WHCU-1R FAIL OR CMC > WHCU-1R BUS FAIL	

## **CORRECTIVE ACTION:**

A. CMC S/W -008;

Do the steps that follow:

ALL

- (1) Look for CMCS message 30112, WINDOW HEAT CONTROL UNIT 1R FAIL.
  - (a) If the WINDOW HEAT CONTOL UNIT 1R FAIL message shows, do the corrective action for the CMCS message 30112.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

01F.1

Page 7 Oct 18/00



- (b) If the WINDOW HEAT CONTROL UNIT 1R FAIL message does not show, examine and repair the circuit between connector DM7373CA pins A4 and B4 at the left CMC M7373 and connector DM237 pins A24 and A25 at the right window heat control unit M237 (WDM 30-41-12).
  - 1) If the circuit is 0.K., replace the right window heat control unit M237 (AMM 30-41-01/401).
- B. CMC S/W -009;

Do the steps that follow:

- (1) Examine and repair the circuit between connector DM7373CA pins A4 and B4 at the left CMC M7373 and connector DM237 pins A24 and A25 at the right window heat control unit M237 (WDM 30-41-12).
- (2) If the fault continues, replace the right window heat control unit M237 (AMM 30-41-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30120	WINDOW HEAT 2L
WINDOW 2L HEAT FAIL	(STATUS)

#### CORRECTIVE ACTION:

A. 30-40-00, Fig. 103, Block 1.

NOTE: On windows with overheat thermostat P/N 10-1468, it is possible that this message will show if the window becomes hot due to weather conditions. This can cause the control thermostat to close before the overheat thermostat closes. Uneven heating of the window can also cause the control thermostat to close before the overheat thermostat.

NOTE: To find if there is current through the window, go to the CMC INPUT MONITORING page (AMM 45-10-00/201). Enter E/034/272/00 and look at bit 14. If the bit is a "1", there is current through the window. If the bit is a "0', there is no current through the window.

EFFECTIVITY-

30-CMCS MESSAGE INDEX



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30121 WINDOW 3L HEAT FAIL	

A. 30-40-00, Fig. 103, Block 1.

NOTE: On windows with overheat thermostat P/N 10-1468, it is possible that this message will show if the window becomes hot due to weather conditions. This can cause the control thermostat to close before the overheat thermostat closes. Uneven heating of the window can also cause the control thermostat to close before the overheat thermostat.

NOTE: To find if there is current through the window, go to the CMC INPUT MONITORING page (AMM 45-10-00/201). Enter E/034/272/00 and look at bit 16. If the bit is a "1", there is current through the window. If the bit is a "0', there is no current through the window.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30122	WINDOW HEAT 2R
WINDOW 2R HEAT FAIL	(STATUS)

#### **CORRECTIVE ACTION:**

NOTE:

A. 30-40-00, Fig. 103, Block 1.

NOTE: On windows with overheat thermostat P/N 10-1468, it is possible that this message will show if the window becomes hot due to weather conditions. This can cause the control thermostat to close before the overheat thermostat closes. Uneven heating of the window can also cause the control thermostat to close before

the overheat thermostat.

To find if there is current through the window, go to the CMC INPUT MONITORING page (AMM 45-10-00/201). Enter E/034/272/00 and look at bit 17. If the bit is a "1", there is current through the window. If the bit is a "0', there is no current through the window.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

01F Page 9 0ct 10/95



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30123 WINDOW 3R HEAT FAIL	

A. 30-40-00, Fig. 103, Block 1.

NOTE: On airplanes with overheat thernostat P/N 10-1468, it is possible

that this message will show if the window becomes hot due to weather conditions. This can cause the control thermostat to close before the overheat thermostat closes. Uneven heating of the window can also cause the control thermostat to close before

the overheat thermostat.

NOTE: To find if there is current through the window, go to the CMC

INPUT MONITORING page (AMM 45-10-00/201). Enter E/034/272/00 and look at bit 15. If the bit is a "1", there is current through the window. If the bit is a "0', there is no current through the

window.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30124 WHCU-1L NO TEST RESPONSE	

#### **CORRECTIVE ACTION:**

A. Replace the left window heat control unit M73 (MM 30-41-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30125 WHCU-1R NO TEST RESPONSE	

## **CORRECTIVE ACTION:**

A. Replace the right window heat control unit M237 (MM 30-41-01/401).

30126 EIU DISAGREE EIU-L FAIL OR (STATUS) WHCU-1R>EIU-L BUS FAIL	CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
	EIU-L FAIL OR	

#### CORRECTIVE ACTION:

A. Replace the left EIU M7353 (MM 31-61-01/401).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

01F Page 10 0ct 10/95



B. If the problem continues, examine and repair the circuit between connector DM237BA pins 21 and 22 at the right window heat control unit M237 and connector DM7353GA pins G4 and H4 at the left EIU M7353 (WDM 30-41-12).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30127 EIU-C FAIL OR WHCU-1R>EIU-C BUS FAIL	EIU DISAGREE (STATUS)

#### **CORRECTIVE ACTION:**

- A. Replace the center EIU M7352 (MM 31-61-01/401).
- B. If the problem continues, examine and repair the circuit between connector DM237BA pins 21 and 22 at the right window heat control unit M237 and connector DM7352GA pins G4 and H4 at the center EIU M7352 (WDM 30-41-12).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30128 EIU-R FAIL OR WHCU-1R>EIU-R BUS FAIL	EIU DISAGREE (STATUS)

## **CORRECTIVE ACTION:**

- A. Replace the right EIU M7351 (MM 31-61-01/401).
- B. If the problem continues, examine and repair the circuit between connector DM237BA pins 21 and 22 at the right window heat control unit M237 and connector DM7351GA pins G4 and H4 at the right EIU M7351 (WDM 30-41-12).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30129 WHCU-1R FAIL OR WHCU-1R OUTPUT BUS FAIL	

## **CORRECTIVE ACTION:**

A. Examine and repair the circuit between connector DM237BA pins 21 and 22 at the right window heat control unit M237 and connector DM7351GA pins H4 and G4 at the right EIU M7351 (WDM 30-41-12).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

01F

ALL

Page 11 Jun 10/95



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30130 WHCU-1L FAIL OR WHCU-1L OUTPUT BUS FAIL	

A. Examine and repair the circuit between connector DM73BA pins 21 and 22 at the left window heat control unit M73 and connector DM7351GA pins D8 and C8 at the right EIU M7351 (WDM 30-41-11).

CMCS MESSAGE	POSS	IBLE FLIGHT DECK E	FFECT
30201 WING ANTI-ICE SYSTEM DISAGREE	>ANTI-ICE (ADVISORY) ANTI-ICE WING L (STATUS) WAI VALVE RIGHT (ADVISORY)	>ANTI-ICE NAC (ADVISORY) ANTI-ICE WING R (STATUS)	>ANTI-ICE WING (ADVISORY) WAI VALVE LEFT (ADVISORY)

#### **CORRECTIVE ACTION:**

A. Do the ground test of the wing thermal anti-ice system (MM 30-11-00/501).

CMCS MESSAGE	POSS	IBLE FLIGHT DECK E	FFECT
30202 WING ANTI-ICE RIGHT VALVE FAIL	>ANTI-ICE (ADVISORY) ANTI-ICE WING R (STATUS)	>ANTI-ICE NAC (ADVISORY) WAI VALVE RIGHT (ADVISORY)	>ANTI-ICE WING (ADVISORY)

#### **CORRECTIVE ACTION:**

A. Replace the right wing anti-ice valve V153 (MM 30-11-03/401).

CMCS MESSAGE	POSS	IBLE FLIGHT DECK E	FFECT
30203 WING ANTI-ICE LEFT VALVE FAIL	>ANTI-ICE (ADVISORY) ANTI-ICE WING L (STATUS)	>ANTI-ICE NAC (ADVISORY) WAI VALVE LEFT (ADVISORY)	>ANTI-ICE WING (ADVISORY)

#### **CORRECTIVE ACTION:**

ALL

A. Replace the left wing anti-ice valve V152 (MM 30-11-03/401).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

01F



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30211 WTAIS-L SYSTEM FAIL 'NO LEFT DISAGREE SIGNAL-VALVE OPENING'	

- A. If the CMCS message 30217 was also present, do the step that follows:
  - (1) Replace the left wing anti-ice valve V152 (AMM 30-11-03/401).
- B. If the CMCS message 30217 was not present, do the steps that follow:
  - (1) Replace the left valve disagree relay R7534 (WDM 30-11-11).
  - (2) Do this task: "Ground Test Wing Thermal Anti-Ice System" (AMM 30-11-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30212 WTAIS-R SYSTEM FAIL 'NO RIGHT DISAGREE SIGNAL-VALVE OPENING'	

## **CORRECTIVE ACTION:**

- A. If the CMCS message 30218 was also present, do the step that follows:
  - (1) Replace the right wing anti-ice valve V153 (AMM 30-11-03/401).
- B. If the CMCS message 30218 was not present, do the steps that follow:
  - (1) Replace the right valve disagree relay R7427 (WDM 30-11-12).
  - (2) Do this task: "Ground Test Wing Thermal Anti-Ice System" (AMM 30-11-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30213 WTAIS-L SYSTEM FAIL 'LEFT VALVE SIGNAL NOT OPEN'	

#### CORRECTIVE ACTION:

- A. Replace the left valve open relay R7535 (WDM 30-11-11).
- B. Do this task: "Ground Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

01 F

ALL

Page 13 Feb 10/97



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30214 WTAIS-R SYSTEM FAIL 'RIGHT VALVE SIGNAL NOT OPEN'	

- A. Replace the right valve open relay R7428 (WDM 30-11-12).
- B. Do this task: "Ground Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30217 WTAIS-L SYSTEM FAIL 'NO LEFT DISAGREE SIGNAL-VALVE CLOSING'	

## **CORRECTIVE ACTION:**

- A. If the CMCS message 30211 was also present, do the step that follows:
  - (1) Replace the left wing anti-ice valve V152 (AMM 30-11-03/401).
- B. If the CMCS message 30211 was not present, do the steps that follow:
  - (1) Replace the wing anti-ice relay R7536 (WDM 30-11-11).
  - (2) Do this task: "Ground Test Wing Thermal Anti-Ice System" (AMM 30-11-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30218 WTAIS-R SYSTEM FAIL 'NO RIGHT DISAGREE SIGNAL-VALVE CLOSING'	

## **CORRECTIVE ACTION:**

- A. If the CMCS message 30212 was also present, do the step that follows:
  - (1) Replace the right wing anti-ice valve V153 (AMM 30-11-03/401).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

01F

Page 14 Feb 10/97



- B. If the CMCS message 30212 was not present, do the steps that follow:
  - (1) Replace the wing anti-ice relay R7536 (WDM 30-11-11).
  - (2) Do this task: "Ground Test Wing Thermal Anti-Ice System" (AMM 30-11-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30219 WTAIS-L SYSTEM FAIL 'LEFT VALVE SIGNAL NOT CLOSED'	

- A. Replace the left valve open relay R7535 (WDM 30-11-11).
- B. Do this task: "Ground Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30220 WTAIS-R SYSTEM FAIL 'RIGHT VALVE SIGNAL NOT CLOSED'	

## **CORRECTIVE ACTION:**

- A. Replace the right valve open relay R7428 (WDM 30-11-11).
- B. Do this task: "Ground Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30221 WTAIS-L SYSTEM FAIL 'LEFT DISAGREE SIGNAL ACTIVE - VALVE CLOSED'	

#### CORRECTIVE ACTION:

- A. Replace the wing anti-ice relay R7536 (WDM 30-11-11).
- B. Do this task: "Ground Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).
- C. If the problem continues, replace the left wing anti-ice valve V152 (MM 30-11-03/401). Then do this task: "Ground Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

02F Page 15 Feb 10/97



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30222 WTAIS-R SYSTEM FAIL 'RIGHT DISAGREE SIGNAL ACTIVE - VALVE CLOSED'	

- A. Replace the wing anti-ice relay R7536 (WDM 30-11-11).
- B. Do this task: "Ground Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).
- C. If the problem continues, replace the right wing anti-ice valve V153 (MM 30-11-03/401). Then do this task: "Ground Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30250 LEFT ICE DETECTOR SIGNAL > WTAIS FAIL	

#### CORRECTIVE ACTION:

- A. Make sure that the relay R7776 in the Power Distribution Panel P415 is a 7-second delay relay (P/N 600-154-7001).
- B. Examine and repair the circuit between connector DM6704 pin 6 at the left ice detector M6704 and pin C of the M3411 diode (WDM 30-81-11).
- C. Do this task: "Ground Test Ice Detection System" (Ref 30-81-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30251 RIGHT ICE DETECTOR SIGNAL > WTAIS FAIL	

## **CORRECTIVE ACTION:**

- A. Make sure that the relay R7776 in the Power Distribution Panel P415 is a 7-second delay relay (P/N 600-154-7001).
- B. Examine and repair the circuit between connector DM6703 pin 6 at the right ice detector M6703 and pin C of the M3414 diode (WDM 30-81-12).
- C. Do this task: "Ground Test Ice Detection System" (Ref 30-81-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

04F

Page 16 Feb 10/97



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30252 LEFT ICE DETECTOR FAIL SIGNAL > EIU FAIL	

- A. Examine and repair the circuit between connector DM6704 pin 4 at the left ice detector M6704 and connector DM7351DA pin D3 at the right EIU M7351 (WDM 30-81-11).
- B. Do this task: "Ground Test Ice Detection System" (Ref 30-81-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30253 RIGHT ICE DETECTOR FAIL SIGNAL > EIU FAIL	

## **CORRECTIVE ACTION:**

- A. Examine and repair the circuit between connector DM6703 pin 4 at the right ice detector M6703 and connector DM7351DA pin D9 at the right EIU M7351 (WDM 30-81-12).
- B. Do this task: "Ground Test Ice Detection System" (Ref 30-81-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30254 LEFT ICE DETECTOR FAIL	ICE DETECTOR L (STATUS)	>ICE DETECTORS (ADVISORY)	

#### **CORRECTIVE ACTION:**

A. Replace the left ice detector probe M6704 (MM 30-81-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30255 RIGHT ICE DETECTOR FAIL	ICE DETECTOR R >ICE DETECTORS (STATUS) (ADVISORY)		

## **CORRECTIVE ACTION:**

ALL

A. Replace the right ice detector probe M6703 (MM 30-81-01/401).

EFFECTIVITY-

**30-CMCS MESSAGE INDEX** 

04F Page 17 Feb 10/97



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30258 LEFT WING ICING SIGNAL > EIU FAIL	

- A. Examine and repair the circuit between connector DM6704 pin 6 at the left ice detector M6704 and connector DM7351DA pin E3 at the right EIU M7351 (WDM 30-81-11).
- B. Do this task: "Ground Test Ice Detection System" (Ref 30-81-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30259 RIGHT WING ICING SIGNAL > EIU FAIL	

## **CORRECTIVE ACTION:**

- A. Examine and repair the circuit between connector DM6703 pin 6 at the right ice detector M6703 and connector DM7351DA pin B9 at the right EIU M7351 (WDM 30-81-12).
- B. Do this task: "Ground Test Ice Detection System" (Ref 30-81-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30260 LEFT COWL ICING SIGNAL > EIU FAIL	

## **CORRECTIVE ACTION:**

- A. Examine and repair the circuit between connector DM6704 pin 2 at the left ice detector M6704 and connector DM7351DA pin C3 at the right EIU M7351 (WDM 30-81-11).
- B. Do this task: "Ground Test Ice Detection System" (Ref 30-81-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30261 RIGHT COWL ICING SIGNAL > EIU FAIL	

## **CORRECTIVE ACTION:**

A. Examine and repair the circuit between connector DM6703 pin 2 at the right ice detector M6703 and connector DM7351DA pin C9 at the right EIU M7351 (WDM 30-81-12).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

04F Page 18 Feb 10/97



B. Do this task: "Ground Test - Ice Detection System" (Ref 30-81-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30270 ENG-1 NACELLE TAI VALVE OVERPRESSURE FAIL	ANTI-ICE NAC 1 NAI VALVE 1 (STATUS) (ADVISORY)		

## **CORRECTIVE ACTION:**

- A. Replace the engine anti-ice valve V88 (MM 30-21-03/401).
- B. If the problem continues, replace the nose cowl pressure switch S789 (MM 30-21-04/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30271 ENG-2 NACELLE TAI VALVE OVERPRESSURE FAIL	ANTI-ICE NAC 2 (STATUS)	NAI VALVE 2 (ADVISORY)	

#### **CORRECTIVE ACTION:**

- A. Replace the engine anti-ice valve V88 (MM 30-21-03/401).
- B. If the problem continues, replace the nose cowl pressure switch S790 (MM 30-21-04/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30272 ENG-3 NACELLE TAI VALVE OVERPRESSURE FAIL	ANTI-ICE NAC 3 NAI VALVE 3 (STATUS) (ADVISORY)		

## **CORRECTIVE ACTION:**

- A. Replace the engine anti-ice valve V88 (MM 30-21-03/401).
- B. If the problem continues, replace the nose cowl pressure switch S791. (MM 30-21-04/401).

EFFECTIVITY-

**30-CMCS MESSAGE INDEX** 

05F

Page 19 Feb 10/97



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30273 ENG-4 NACELLE TAI VALVE OVERPRESSURE FAIL	ANTI-ICE NAC 4 (STATUS)	NAI VALVE 4 (ADVISORY)	

- A. Replace the engine anti-ice valve V88 (MM 30-21-03/401).
- B. If the problem continues, replace the nose cowl pressure switch S792 (MM 30-21-04/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30274 ENG-1 COWL SYSTEM OVERHEAT FAIL	ANTI-ICE NAC 1 (STATUS) OVHT ENG 1 COWL (CAUTION)	NAI DUCT 1 LEAK (STATUS) OVHT ENG 1 NAC (CAUTION)	NAI VALVE 1 (ADVISORY)

## **CORRECTIVE ACTION:**

- A. Look for an anti-ice duct leak or a PS3 line leak. Repair the leak if you find one.
- B. If the problem continues, replace the engine cowl overheat switch S1626 (MM 30-21-05/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30275 ENG-2 COWL SYSTEM OVERHEAT FAIL	ANTI-ICE NAC 2 (STATUS) OVHT ENG 2 COWL (CAUTION)	NAI DUCT 2 LEAK (STATUS) OVHT ENG 2 NAC (CAUTION)	NAI VALVE 2 (ADVISORY)

## **CORRECTIVE ACTION:**

- A. Look for an anti-ice duct leak or a PS3 line leak. Repair the leak if you find one.
- B. If the problem continues, replace the engine cowl overheat switch S1627 (MM 30-21-05/401).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

04F

Page 20 Oct 10/96



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30276 ENG-3 COWL SYSTEM OVERHEAT FAIL	ANTI-ICE NAC 3 (STATUS) OVHT ENG 3 COWL (CAUTION)	NAI DUCT 3 LEAK (STATUS) OVHT ENG 3 NAC (CAUTION)	NAI VALVE 3 (ADVISORY)

- A. Look for an anti-ice duct leak or a PS3 line leak. Repair the leak if you find one.
- B. If the problem continues, replace the engine cowl overheat switch S1628 (MM 30-21-05/401).

CMCS MESSAGE	POSS	IBLE FLIGHT DECK E	FFECT
30277 ENG-4 COWL SYSTEM OVERHEAT FAIL	ANTI-ICE NAC 4 (STATUS) OVHT ENG 4 COWL (CAUTION)	NAI DUCT 4 LEAK (STATUS) OVHT ENG 4 NAC (CAUTION)	NAI VALVE 4 (ADVISORY)

## **CORRECTIVE ACTION:**

- A. Look for an anti-ice duct leak or a PS3 line leak. Repair the leak if you find one.
- B. If the problem continues, replace the engine cowl overheat switch S1629 (MM 30-21-05/401).

CMCS MESSAGE	POSS	SIBLE FLIGHT DECK EFFECT
30278 ENG-1 TAI VALVE DISAGREE	ANTI-ICE NAC 1 (STATUS)	NAI VALVE 1 (ADVISORY)

## **CORRECTIVE ACTION:**

<u>NOTE</u>: If <READ SNAPSHOT shows, push the adjacent LSK to see a maintenance page snapshot related to the problem.

NOTE: After you replace a component of the engine anti-ice system, operate the engine at minimum idle (Ref 71-00-00/201) for a short time to make sure that the EICAS message for the engine anti-ice system does not show again.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

04F Page 21 Jun 18/99



- A. AIRPLANES WITH PRATT & WHITNEY OR GENERAL ELECTRIC SERIES ENGINES; Look at the EICAS status page.
  - (1) If the EICAS status message ANTI-ICE NAC 1 does not show, then no corrective action is necessary for this message.
  - (2) If the EICAS status message ANTI-ICE NAC 1 does show, then replace the engine inlet anti-ice valve V88 (MM 30-21-03/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT	
30279 ENG-2 TAI VALVE DISAGREE	ANTI-ICE NAC 2 (STATUS)	NAI VALVE 2 (ADVISORY)

NOTE: If <READ SNAPSHOT shows, push the adjacent LSK to see a maintenance page snapshot related to the problem.

NOTE: After you replace a component of the engine anti-ice system, operate the engine at minimum idle (Ref 71-00-00/201) for a short time to make sure that the EICAS message for the engine anti-ice system does not show again.

- A. AIRPLANES WITH PRATT & WHITNEY OR GENERAL ELECTRIC SERIES ENGINES; Look at the EICAS status page.
  - (1) If the EICAS status message ANTI-ICE NAC 2 does not show, then no corrective action is necessary for this message.
  - (2) If the EICAS status message ANTI-ICE NAC 2 does show, then replace the engine inlet anti-ice valve V159 (MM 30-21-03/401).

CMCS MESSAGE	POSS	SIBLE FLIGHT DECK EFFECT
30280 ENG-3 TAI VALVE DISAGREE	ANTI-ICE NAC 3 (STATUS)	NAI VALVE 3 (ADVISORY)

## **CORRECTIVE ACTION:**

<u>NOTE</u>: If <READ SNAPSHOT shows, push the adjacent LSK to see a maintenance page snapshot related to the problem.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

03F Page 22 Jun 18/99



<u>NOTE</u>: After you replace a component of the engine anti-ice system, operate the engine at minimum idle (Ref 71-00-00/201) for a short time to make sure that the EICAS message for the engine anti-ice system does not show again.

- A. AIRPLANES WITH PRATT & WHITNEY OR GENERAL ELECTRIC SERIES ENGINES; Look at the EICAS status page.
  - (1) If the EICAS status message ANTI-ICE NAC 3 does not show, then no corrective action is necessary for this message.
  - (2) If the EICAS status message ANTI-ICE NAC 3 does show, then replace the engine inlet anti-ice valve V160 (MM 30-21-03/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT	
30281 ENG-4 TAI VALVE DISAGREE	ANTI-ICE NAC 4 (STATUS)	NAI VALVE 4 (ADVISORY)

#### **CORRECTIVE ACTION:**

NOTE: If <READ SNAPSHOT shows, push the adjacent LSK to see a maintenance page snapshot related to the problem.

NOTE: After you replace a component of the engine anti-ice system, operate the engine at minimum idle (Ref 71-00-00/201) for a short time to make sure that the EICAS message for the engine anti-ice system does not show again.

- A. AIRPLANES WITH PRATT & WHITNEY OR GENERAL ELECTRIC SERIES ENGINES; Look at the EICAS status page.
  - (1) If the EICAS status message ANTI-ICE NAC 4 does not show, then no corrective action is necessary for this message.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL



(2) If the EICAS status message ANTI-ICE NAC 4 does show, then replace the engine inlet anti-ice valve V161 (MM 30-21-03/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT	
30310 LEFT PITOT PROBE TEST RELAY OR HIGH/LOW RELAY FAIL		
CORRECTIVE ACTION:  A. Replace the left pitot probe heat test relay R7421 (WDM 30-31-11).  B. Do this task: "Ground Test - Probe Heat System" (Ref 30-31-00/501).		

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30311 RIGHT PITOT PROBE TEST RELAY OR HIGH/LOW RELAY FAIL	

## **CORRECTIVE ACTION:**

- A. Replace the right pitot probe heat test relay R7422 (WDM 30-31-21).
- B. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30312 LEFT PITOT PROBE POWER RELAY FAIL	

## **CORRECTIVE ACTION:**

A. Replace the left pitot probe heat power relay R7423 (WDM 30-31-11).

EFFECTIVITY-

ALL

**30-CMCS MESSAGE INDEX** 

03F



- B. If the problem continues, replace air/ground relay R7334 (WDM 30-31-11).
- C. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30313 RIGHT PITOT PROBE POWER RELAY FAIL	

- A. Replace the right pitot probe heat power relay R7424 (WDM 30-31-21).
- B. If the problem continues, replace air/ground relay R330 (WDM 30-31-21).
- C. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT	
30320 CAPTAINS PITOT HEAT SYSTEM FAIL	HEAT P/S CAPT (STATUS)	HEAT P/S CAPT (ADVISORY)

#### **CORRECTIVE ACTION:**

- A. Remove the left pitot probe hi/low relay, R7425 from the P414 panel. Measure the resistance between pin C2 of socket DR7425 and structure ground. Then measure the resistance between pin C3 of DR7425 and structure ground (WDM 30-31-11).
- B. If either resistance is not in the range of 2 100 ohms, replace the left main (upper) pitot-static probe, A2 (AMM 34-11-01/401).
- C. If both resistances are in the range of 2 100 ohms, replace the left main P/S current sense head relay R7431 and the left main P/S current sense strut relay R7433 (WDM 30-31-11).
- D. Re-install relay R7425.

ALL

E. Do this task: "Ground Test - Probe Heat System" (Ref 30-31-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

03F

.

Page 25 Jun 18/99



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT	
30321 F/O PITOT HEAT SYSTEM FAIL	HEAT P/S F/O (STATUS)	HEAT P/S F/O (ADVISORY)

- A. Remove the right pitot probe hi/low relay, R7426 from the P415 panel. Measure the resistance between pin C2 of socket DR7426 and structure ground. Then measure the resistance between pin C3 of DR7426 and structure ground (WDM 30-31-21).
- B. If either resistance is not in the range of 2 100 ohms, replace the right main (upper) pitot-static probe, A4 (AMM 34-11-01/401).
- C. If both resistances are in the range of 2 100 ohms, replace the right main P/S current sense head relay R7432 and the right main P/S current sense strut relay R7434 (WDM 30-31-21).
- D. Re-install relay R7426.
- E. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30322 LEFT AUX PROBE HEAT SYSTEM FAIL	HEAT P/S L AUX (STATUS)	HEAT P/S L AUX (ADVISORY)	

#### CORRECTIVE ACTION:

- A. Remove the left pitot probe hi/low relay, R7425 from the P414 panel. Measure the resistance between pin B2 of socket DR7425 and structure ground. Then measure the resistance between pin B3 of DR7425 and structure ground (WDM 30-31-11).
- B. If either resistance is not in the range of 2 100 ohms, replace the left aux (lower) pitot-static probe, A1 (AMM 34-11-01/401).
- C. If both resistances are in the range of 2 100 ohms, replace the left aux P/S current sense head relay R7435 and the left aux P/S current sense strut relay R7437 (WDM 30-31-11).

EFFECTIVITY-

ALL

30-CMCS MESSAGE INDEX

03F



- D. If the problem continues, replace the left aux (lower) pitot-static probe, A1 (AMM 34-11-01/401).
- E. Re-install relay R7425.
- F. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT	
30323 RIGHT AUX PROBE HEAT SYSTEM FAIL	HEAT P/S R AUX (STATUS)	HEAT P/S R AUX (ADVISORY)

- A. Remove the right pitot probe hi/low relay, R7426 from the P415 panel. Measure the resistance between pin B2 of socket DR7426 and structure ground. Then measure the resistance between pin B3 of DR7426 and structure ground (WDM 30-31-21).
- B. If either resistance is not in the range of 2 100 ohms, replace the right aux (lower) pitot-static probe, A3 (AMM 34-11-01/401).
- C. If the problem continues, replace the right aux (lower) pitot-static probe, A1 (AMM 34-11-01/401).
- D. If both resistances are in the range of 2 100 ohms, replace the right aux P/S current sense head relay R7436 and the right aux P/S current sense strut relay R7438 (WDM 30-31-21).
- E. Re-install relay R7426.
- F. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30324 LEFT TAT PROBE HEAT SYSTEM FAIL	HEAT L TAT (STATUS)	HEAT L TAT (ADVISORY)	
CORRECTIVE ACTION:			

A. 30-31-00, Fig. 103, Block 1.

ALL

EFFECTIVITY-

30-CMCS MESSAGE INDEX

03F

Page 27 Jun 18/99



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30325 RIGHT TAT PROBE HEAT SYSTEM FAIL	HEAT R TAT (STATUS)	HEAT R TAT (ADVISORY)	
CORRECTIVE ACTION-	<del></del>		

A. 30-31-00, Fig. 103, Block 1.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30326 LEFT AOA PROBE HEAT SYSTEM FAIL	HEAT L AOA (STATUS)	HEAT L AOA (ADVISORY)	

## **CORRECTIVE ACTION:**

- A. Replace the left AOA current sense relay R7565 (WDM 30-32-11).
- B. If the problem continues, replace the left AOA sensor B127 (AMM 34-12-03/401).
- C. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30327 RIGHT AOA PROBE HEAT SYSTEM FAIL	HEAT R AOA (STATUS)	HEAT R AOA (ADVISORY)	

## **CORRECTIVE ACTION:**

- A. Replace the right AOA current sense relay R7564 (WDM 30-32-11).
- B. If the problem continues, replace the right AOA sensor B126 (AMM 34-12-03/401).
- C. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

03F

Page 28 Feb 10/94



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30328 CAPTAINS P/S HEAT FAIL (EIU)	>AIRSPEED LOW (CAUTION) HEAT P/S CAPT (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S CAPT (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

A. Measure the resistance between pin A and B at the electrical connector of the left main (upper) pitot-static probe A2.

<u>NOTE</u>: Resistance values will vary with ambient temperatures because of the temperature compensating characteristics of the heater.

- (1) For 10 inch probes, if the resistance is not 24 + /-10 ohms, then replace the probe (AMM 34-11-01/401).
- (2) For 5 inch probes, if the resistance is not 24 + -4 ohms, then replace the probe (AMM 34-11-01/401).
- B. Measure the resistance between pin C and D at the electrical connector of the left main (upper) pitot-static probe A2.
  - (1) For 10 inch probes, if the resistance is not  $13.5 \pm -5$  ohms, then replace the probe (AMM 34-11-01/401).
  - (2) For 5 inch probes, if the resistance is not 31.5 + -4 ohms, then replace the probe (AMM 34-11-01/401).
- C. Replace the left main P/S current sense head relay R7431 and the left main P/S current sense strut relay R7433 (WDM 30-31-11).
- D. If the problem continues, replace the left main (upper) pitot-static probe A2 (AMM 34-11-01/401).
- E. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

03F.1 Page 29 0ct 18/00



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30329 FIRST OFFICER'S P/S HEAT FAIL (EIU)	>AIRSPEED LOW (CAUTION) HEAT P/S F/O (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S F/O (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

A. Measure the resistance between pin A and B at the electrical connector of the right main (upper) pitot-static probe A4.

NOTE: Resistance values will vary with ambient temperatures because of the temperature compensating characteristics of the heater.

- (1) For 10 inch probes, if the resistance is not 24 + /-10 ohms, then replace the probe (AMM 34-11-01/401).
- (2) For 5 inch probes, if the resistance is not 24 + 7 4 ohms, then replace the probe (AMM 34-11-01/401).
- B. Measure the resistance between pin C and D at the electrical connector of the right main (upper)pitot-static probe A4.
  - (1) For 10 inch probes, if the resistance is not 13.5  $\pm$ 0 ohms, then replace the probe (AMM 34-11-01/401).
  - (2) For 5 inch probes, if the resistance is not 31.5  $\pm$  4 ohms, then replace the probe (AMM 34-11-01/401).
- C. Replace the right main P/S current sense head relay R7432 and the right main P/S current sense strut relay R7434 (WDM 30-31-21).
- D. If the problem continues, replace the right main (upper) pitot-static probe A4 (AMM 34-11-01/401).
- E. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

EFFECTIVITY-

ALL

30-CMCS MESSAGE INDEX

03F.1

Page 30 Oct 18/00



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30330 LEFT AUX P/S HEAT FAIL (EIU)	>AIRSPEED LOW (CAUTION) HEAT P/S L AUX (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S L AUX (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

A. Measure the resistance between pin A and B at the electrical connector of the left aux (lower) pitot-static probe A1.

<u>NOTE</u>: Resistance values will vary with ambient temperatures because of the temperature compensating characteristics of the heater.

- (1) For 10 inch probes, if the resistance is not 24 + /-10 ohms, then replace the probe (AMM 34-11-01/401).
- (2) For 5 inch probes, if the resistance is not 24 + -4 ohms, then replace the probe (AMM 34-11-01/401).
- B. Measure the resistance between pin C and D at the electrical connector of the left aux (lower) pitot-static probe A1.
  - (1) For 10 inch probes, if the resistance is not  $13.5 \pm -5$  ohms, then replace the probe (AMM 34-11-01/401).
  - (2) For 5 inch probes, if the resistance is not 31.5 + -4 ohms, then replace the probe (AMM 34-11-01/401).
- C. Replace the left aux P/S current sense head relay R7435 and the left aux P/S current sense strut relay R7437 (WDM 30-31-11).
  - (1) If the problem continues, replace the left aux (lower) pitot-static probe A1 (AMM 34-11-01/401).
- D. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

03F.1 Page 31 0ct 18/00



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30331 RIGHT AUX P/S HEAT FAIL (EIU)	>AIRSPEED LOW (CAUTION) HEAT P/S R AUX (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S R AUX (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

A. Measure the resistance between pin A and B at the electrical connector of the right aux (lower) pitot-static probe A3.

NOTE: Resistance values will vary with ambient temperatures because of the temperature compensating characteristics of the heater.

- (1) For 10 inch probes, if the resistance is not 24 + /-10 ohms, then replace the probe (AMM 34-11-01/401).
- (2) For 5 inch probes, if the resistance is not 24 + -4 ohms, then replace the probe (AMM 34-11-01/401).
- B. Measure the resistance between pin C and D at the electrical connector of the right aux (lower) pitot-static probe A3.
  - (1) For 10 inch probes, If the resistance is not  $13.5 \pm -5$  ohms, then replace the probe (AMM 34-11-01/401).
  - (2) For 5 inch probes, if the resistance is not 31.5 +/-4 ohms, then replace the probe (AMM 34-11-01/401).
- C. Replace the right aux P/S current sense head relay R7436 and the right aux P/S current sense strut relay R7438 (WDM 30-31-21).
- D. If the problem continues, replace the right aux (lower) pitot-static probe A3 (AMM 34-11-01/401).
- E. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30332 LEFT TAT HEAT FAIL (EIU)	HEAT L TAT (STATUS)	HEAT L TAT (ADVISORY)	

## **CORRECTIVE ACTION:**

A. 30-31-00, Fig. 103, Block 1.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

03F.1 Page 32 0ct 18/00



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30333 RIGHT TAT HEAT FAIL (EIU)	HEAT R TAT (STATUS)	HEAT R TAT (ADVISORY)	
CORRECTIVE ACTION:			

A. 30-31-00, Fig. 103, Block 1.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30334 LEFT AOA HEAT FAIL (EIU)	>AIRSPEED LOW (CAUTION) HEAT L AOA (STATUS) RUD RATIO SNGL (ADVISORY)	ALT DISAGREE (CAUTION) HEAT L AOA (ADVISORY) RUDDER RATIO (STATUS)	FLAP LOAD RELIEF (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)

# **CORRECTIVE ACTION:**

- A. Replace the left AOA current sense relay R7565 (WDM 30-32-11).
- B. If the problem continues, replace the left AOA sensor B127 (AMM 34-12-03/401).
- C. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30335 RIGHT AOA HEAT FAIL (EIU)	>AIRSPEED LOW (CAUTION) HEAT R AOA (STATUS) RUD RATIO SNGL (ADVISORY)	ALT DISAGREE (CAUTION) HEAT R AOA (ADVISORY) RUDDER RATIO (STATUS)	FLAP LOAD RELIEF (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)

## **CORRECTIVE ACTION:**

- A. Replace the right AOA current sense relay R7564 (WDM 30-32-11).
- B. If the problem continues, replace the right AOA sensor B126 (AMM 34-12-03/401).
- C. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

EFFECTIVITY-

**30-CMCS MESSAGE INDEX** 

03F

Page 33 Oct 10/97



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30339 FIRST OFFICER'S P/S HEAT FAIL (EIU & ADC-R)	>AIRSPEED LOW (CAUTION) HEAT P/S F/O (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S F/O (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

- A. Replace the right main P/S current sense head relay R7432 and the right main P/S current sense strut relay R7434 (WDM 30-31-21).
- B. If the problem continues, replace the right main (upper) pitot-static probe A4 (AMM 34-11-01/401).

NOTE: If the Pitot Static probe is the older 10-inch probe, it could be better to replace the probe before the relays.

C. Do this task: "Ground Test - Probe Heat System" (AMM 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30340 CAPTAINS P/S HEAT FAIL (EIU & ADC-L)	>AIRSPEED LOW (CAUTION) HEAT P/S CAPT (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S CAPT (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

## **CORRECTIVE ACTION:**

- A. Replace the left main P/S current sense head relay R7431 and the left main P/S current sense strut relay R7433 (WDM 30-31-11).
- B. If the problem continues, replace the left main (upper) pitot-static probe A2 (AMM 34-11-01/401).

NOTE: If the Pitot Static probe is the older 10-inch probe, it could be better to replace the probe before the relays.

C. Do this task: "Ground Test - Probe Heat System" (AMM 30-31-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

04F.1 Page 34 0ct 18/00



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30341 LEFT AUX P/S HEAT FAIL (EIU & ADC-R)	>AIRSPEED LOW (CAUTION) HEAT P/S L AUX (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S L AUX (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

- A. Replace the left aux P/S current sense head relay R7435 and the left aux P/S current sense strut relay R7437 (WDM 30-31-11).
  - (1) If the problem continues, replace the left aux (lower) pitot-static probe A1 (AMM 34-11-01/401).

NOTE: If the Pitot Static probe is the older 10-inch probe, it could be better to replace the probe before the relays.

B. Do this task: "Ground Test - Probe Heat System" (AMM 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30342 RIGHT AUX P/S HEAT FAIL (EIU & ADC-R)	>AIRSPEED LOW (CAUTION) HEAT P/S R AUX (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S R AUX (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

## **CORRECTIVE ACTION:**

A. Replace the right aux P/S current sense head relay R7436 and the right aux P/S current sense strut relay R7438 (WDM 30-31-21).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

04F

Page 35 Feb 15/99



B. If the problem continues, replace the right aux (lower) pitot-static probe A3 (AMM 34-11-01/401).

NOTE: If the Pitot Static probe is the older 10-inch probe, it could be

better to replace the probe before the relays.

C. Do this task: "Ground Test - Probe Heat System" (AMM 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30343 LEFT TAT HEAT FAIL (EIU & ADC-R)	HEAT L TAT (STATUS)	HEAT L TAT (ADVISORY)	

## **CORRECTIVE ACTION:**

A. 30-31-00, Fig. 103, Block 1.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30344 RIGHT TAT HEAT FAIL (EIU & ADC-R)	HEAT R TAT HEAT R TAT (STATUS) (ADVISORY)		

## **CORRECTIVE ACTION:**

A. 30-31-00, Fig. 103, Block 1.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30345 LEFT AOA HEAT FAIL (EIU & ADC-L)	>AIRSPEED LOW (CAUTION) HEAT L AOA (STATUS) RUD RATIO SNGL (ADVISORY)	ALT DISAGREE (CAUTION) HEAT L AOA (ADVISORY) RUDDER RATIO (STATUS)	FLAP LOAD RELIEF (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)

## CORRECTIVE ACTION:

A. Replace the left AOA current sense relay R7565 (WDM 30-32-11).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

03F

Page 36 Oct 10/97



- B. If the problem continues, replace the left AOA sensor B127 (AMM 34-12-03/401).
- C. Do this task: "Ground Test Probe Heat System" (AMM 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30346 RIGHT AOA HEAT FAIL (EIU & ADC-R)	>AIRSPEED LOW (CAUTION) HEAT R AOA (STATUS) RUD RATIO SNGL (ADVISORY)	ALT DISAGREE (CAUTION) HEAT R AOA (ADVISORY) RUDDER RATIO (STATUS)	FLAP LOAD RELIEF (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)

- A. Replace the right AOA current sense relay R7564 (WDM 30-32-11).
- B. If the problem continues, replace the right AOA sensor B126 (AMM 34-12-03/401).
- C. Do this task: "Ground Test Probe Heat System" (AMM 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30350 RIGHT PROBE HEAT POWER RELAY OR SYSTEM FAIL	>AIRSPEED LOW (CAUTION) HEAT R AOA (STATUS) RUD RATIO SNGL (ADVISORY)	ALT DISAGREE (CAUTION) HEAT R AOA (ADVISORY) RUDDER RATIO (STATUS)	FLAP LOAD RELIEF (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)

## **CORRECTIVE ACTION:**

- A. Replace the right pitot probe heat power relay R7424 (WDM 30-31-21).
- B. If the problem continues, do a test of the engine speed cards:Engine Speed Card Installation Task 77-12-03-404-004-J00.## Do only:"Do a test of the Engine Speed Card". Test each card, replace the card or cards that failed the test.
- C. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

03F



CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30351 LEFT PROBE HEAT POWER RELAY OR SYSTEM FAIL	>AIRSPEED LOW (CAUTION) HEAT P/S CAPT (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)	ALT DISAGREE (CAUTION) HEAT P/S CAPT (ADVISORY) RUD RATIO SNGL (ADVISORY)	FLAP LOAD RELIEF (STATUS) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)

- A. Replace the left pitot probe heat power relay R7423 (WDM 30-31-21).
- B. If the problem continues, do a test of the engine speed cards:
  Engine Speed Card Installation Task 77-12-03-404-004-J00.## Do only:
  "Do a test of the Engine Speed Card". Test each card, replace the card or cards that failed the test.
- C. Do this task: "Ground Test Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
30352 N2/N3 SPEED CARD SYS FAILED TO ACTIVATE AIRPLANE PROBE HEAT	>AIRSPEED LOW (CAUTION) HEAT P/S CAPT (STATUS) HEAT R AOA (ADVISORY) RUB RATIO SNGL (ADVISORY)	ALT DISAGREE (CAUTION) HEAT P/S CAPT (ADVISORY) IAS DISAGREE (CAUTION) RUDDER RATIO (STATUS)	FLAP LOAD RELIEF (STATUS) HEAT R AOA (STATUS) >IAS/ALT DIFF (ADVISORY) STAB SPEED TRIM (STATUS)

# **CORRECTIVE ACTION:**

A. Do a test of the engine speed cards:
Engine Speed Card Installation Task 77-12-03-404-004-J00.## Do only:
"Do a test of the Engine Speed Card". Test each card, replace the card or cards that failed the test.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

03F

Page 38 Oct 10/97



B. Do this task: "Ground Test - Probe Heat System" (Ref 30-31-00/501).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30400 FORWARD DRAIN MAST HEATER FAIL	
CORRECTIVE ACTION: A. Replace the forwar	rd drain mast M802 (MM 38-31-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30401 MID DRAIN MAST HEATER FAIL	
CORRECTIVE ACTION:  A. Replace the mid do	rain mast M800 (MM 38-31-01/401).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
30402 AFT DRAIN MAST HEATER FAIL	

# **CORRECTIVE ACTION:**

A. Replace the aft drain mast M801 (MM 38-31-01/401).

CMCS FAULT MESSAGE	POS	SIBLE FLIGHT DECK EFFECT
34633 CAPTAIN'S PITOT HEAT FAIL (ADC-L)	HEAT P/S CAPT (STATUS)	HEAT P/S CAPT (ADVISORY)

# **CORRECTIVE ACTION:**

- A. Replace left main P/S current sensing head relay, R7431 and strut relay, R7433 (WDM 30-31-11).
- B. If fault persists, replace the upper left P/S probe, A2 (MM 34-11-01/401).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

02F



CMCS FAULT MESSAGE	POSS	IBLE FLIGHT DECK EFFECT	
34634 RIGHT AUX PROBE HEAT FAIL (ADC-L)	HEAT P/S R AUX (STATUS)	HEAT P/S R AUX (ADVISORY)	

- A. Replace right aux P/S current sensing head relay, R7436 and strut relay, R7438 (WDM 30-31-12).
- B. If the problem continues, replace the lower left P/S probe, A3 (MM 34-11-01/401).

CMCS FAULT MESSAGE	PO:	SSIBLE FLIGHT DECK EFFECT	
34635 LEFT TAT PROBE HEAT FAIL (ADC-L)	HEAT L TAT (STATUS)	HEAT L TAT (ADVISORY)	

# **CORRECTIVE ACTION:**

A. 30-31-00, Fig. 103, Block 1.

34636 HEAT R TAT HEAT R TAT RIGHT TAT PROBE HEAT (STATUS) (ADVISORY) FAIL (ADC-R)	CMCS FAULT MESSAGE	P0	SSIBLE FLIGHT DECK EFFECT	
	RIGHT TAT PROBE HEAT FAIL		=	

## **CORRECTIVE ACTION:**

A. 30-31-00, Fig. 103, Block 1.

CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34637 F/O PITOT HEAT FAIL (ADC-R)	HEAT P/S F/O (STATUS)	HEAT P/S F/O (ADVISORY)	

#### **CORRECTIVE ACTION:**

- A. Replace right main P/S current sensing head relay, R7432 and strut relay, R7434 (WDM 30-31-21).
- B. If the problem continues, replace the upper right P/S probe, A4 (MM 34-11-01/401).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

02F Page 40 Jun 18/99



CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34638 LEFT AUX PROBE HEAT FAIL (ADC-R)	HEAT P/S L AUX HEAT P/S L AUX (STATUS) (ADVISORY)		

- A. Replace left aux P/S current sensing head relay, R7435 and strut relay, R7437 (WDM 30-31-11).
- B. If the problem continues, replace the lower left P/S probe, A1 (MM 34-11-01/401).

CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34639 LEFT AOA VANE HEAT FAIL (ADC-L)	HEAT L AOA HEAT L AOA (STATUS) (ADVISORY)		

# **CORRECTIVE ACTION:**

- A. Replace left AOA current sensing relay, R7565 (WDM 30-32-11).
- B. If problem continues, replace the left AOA sensor, B127 (MM 34-12-03/401).

CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34641 RIGHT TAT PROBE HEAT FAIL (ADC-C)	HEAT R TAT (STATUS)	HEAT R TAT (ADVISORY)	

#### **CORRECTIVE ACTION:**

A. 30-31-00, Fig. 103, Block 1.

EFFECTIVITY-

30-CMCS MESSAGE INDEX

02F

Page 41 Jun 18/99



CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34642 LEFT AOA VANE HEAT FAIL (ADC-C)	HEAT L AOA HEAT L AOA (STATUS) (ADVISORY)		

A. Refer to CMC Message 34639 for corrective action if message LEFT AOA VANE HEAT FAIL (ADC-L) is also displayed, else examine and repair circuit between connector DB163CA, pin E9 on the left ADC, B163 and connector DB166CA, pin E9 on the center ADC, B166 (WDM 34-12-12 and WDM 34-12-32).

CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34643 RIGHT AOA VANE HEAT FAIL (ADC-C)	HEAT R AOA (STATUS)	HEAT R AOA (ADVISORY)	

#### **CORRECTIVE ACTION:**

A. Refer to CMC Message 34651 for corrective action if message RIGHT AOA VANE HEAT FAIL (ADC-R) is also displayed, else examine and repair circuit between connector DB164CA, pin F9 on the right ADC, B164 and connector DB166CA, pin F9 on the center ADC, B166 (WDM 34-12-22 and WDM 34-12-32).

CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34644 CAPTAIN PITOT HEAT FAIL (ADC-C)	HEAT P/S CAPT HEAT P/S CAPT (STATUS) (ADVISORY)		

### **CORRECTIVE ACTION:**

ALL

A. Refer to CMC Message 34633 for corrective action if message CAPTAIN'S PITOT HEAT FAIL (ADC-L) is also displayed, else examine and repair circuit between connector DB163CA, pin E10 on the left ADC, B163 and connector DB166CA, pin E10 on the center ADC, B166 (WDM 34-12-12 and WDM 34-12-32).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

01F.1

Page 42 Oct 18/00



CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT			
34645 F/O PITOT HEAT FAIL (ADC-C)	HEAT P/S F/O HEAT P/S F/O (STATUS) (ADVISORY)			

A. Refer to CMC Message 34637 for corrective action if message F/O PITOT HEAT FAIL (ADC-R) is also displayed, else examine and repair circuit between connector DB164CA, pin F10 on the right ADC, B164 and connector DB166CA, pin F10 on the center ADC, B166 (WDM 34-12-22 and 34-12-32).

CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34646 RIGHT AUX PROBE HEAT FAIL (ADC-C)	HEAT P/S R AUX (STATUS)	HEAT P/S R AUX (ADVISORY)	

#### **CORRECTIVE ACTION:**

A. Refer to CMC Message 34634 for corrective action if message RIGHT AUX PROBE HEAT FAIL (ADC-L) is also displayed, else examine and repair circuit between connector DB163CA, pin F10 on the left ADC, B163 and connector DB166CA, pin F10 on the center ADC, B166 (WDM 34-12-12 and WDM 34-12-32).

CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT			
34647 LEFT AUX PROBE HEAT FAIL (ADC-C)	HEAT P/S L AUX HEAT P/S L AUX (STATUS) (ADVISORY)			

## **CORRECTIVE ACTION:**

A. Refer to CMC Message 34638 for corrective action if message LEFT AUX PROBE HEAT FAIL (ADC-R) is also displayed, else examine and repair circuit between connector DB164CA, pin E10 on the right ADC, B164 and connector DB166CA, pin E10 on the center ADC, B166 (WDM 34-12-22 and WDM 34-12-32).

EFFECTIVITY-

30-CMCS MESSAGE INDEX

ALL

01F.1 Page 43 0ct 18/00



CMCS FAULT MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34651 RIGHT AOA VANE HEAT FAIL (ADC-R)	HEAT R AOA HEAT R AOA (STATUS) (ADVISORY)		

- A. Refer right AOA current sensing relay, R7564 (WDM 30-32-21).
- B. If problem continues, replace right AOA sensor, B126 (MM 34-12-03/401).

EFFECTIVITY-

ALL

30-CMCS MESSAGE INDEX

01F

Page 44 Jun 18/99



### ICE AND RAIN PROTECTION - DESCRIPTION AND OPERATION

# 1. General

- The following systems are used to prevent ice formation on critical areas of the airplane and to aid the pilots when operating under ice and rain conditions: Wing Thermal Anti-Ice, Engine Nacelle Thermal Anti-Ice, Pitot-Static, Total Air Temperature Probe and Angle of Attack Sensor Anti-Ice, Flight Compartment Window Anti-Ice, Windshield Wipers, Windshield Rain Repellent, Windshield Washers, Water Line and Waste Drain Heaters, Ice Detection.
- Wing Thermal Anti-Ice System (30-11-00)
  - (1) The wing thermal anti-ice (TAI) system prevents the formation of ice on the leading edge of the wings. Heated air is supplied from the airplane bleed air manifold.
- Engine Nacelle Anti-Ice System (30-21-00)
  - The engine nacelle thermal anti-ice system prevents the formation of ice on the leading edge of the four engine inlet cowls. The heated air is supplied from the engine pneumatic systems.
- Pitot-Static, Total Air Temperature Probe and Angle of Attack Sensor Anti-Ice System (30-31-00)
  - (1) The pitot-static probes, total air temperature probes, and angle of attack sensors are electrically heated to prevent the formation of ice which would affect sensor accuracy. Probe heat is controlled automatically.
- Flight Compartment Window Anti-Ice System (30-41-00)
  - (1) The flight compartment windows are electrically heated to prevent icing on the No. 1 left and right windows and fogging on the No. 2 and 3 left and right windows. The windows are heated by an electrical resistance coating laminated into the windows.
- Windshield Wiper System (30-42-00)
  - Two windshield wipers maintain a clear area on the captain's and first officer's No. 1 windows during takeoff, approach and landing in rain or snow. Each wiper is operated by a separate system to ensure that clear vision will be maintained through one of the windows in the event of a system failure.
- Windshield Rain Repellent System (AMM 30-43-00)
  - The rain repellent system is deatcivated on some airplanes. These NOTE: airplanes have a hydrophobic coating that is applied to the No. 1 flight compartment windows.
  - (1) The rain repellent system sprays a rain repellent solution on the No. 1 flight compartment windows and is used in conjunction with the windshield wiper system to improve visibility during heavy rain. The rain repellent fluid for both windows is supplied from a common pressurized container, and is controlled independently for each window.
  - (2) For repair of flareless tube assemblies, refer to instructions in 20-11-05, Flareless Tubing Assembly.

EFFECTIVITY-ALL 30-00-00



- (3) AIRPLANES WITH HYDROPHOBIC COATING ON THE WINDSHIELD; The rain repellent system consists of a hydrophobic coating applied to the number 1 window. No pilot actions are necessary to operate the system.
- H. Windshield Washer System (30-44-00)
  - (1) The windshield washer system sprays washer fluid on the No. 1 flight compartment windows to clean them. The windshield wiper must be used when cleaning the windows with the windshield washer system. The washer fluid for both windows is supplied from the same container, but is controlled independently for each window.
  - (2) For repair of flareless tube assemblies, refer to instructions in 20-11-05, Flareless Tubing Assembly.
- I. Water Line and Waste Drain Heaters (30-71-00)
  - (1) The waste tank drain fitting and rinse fittings are electrically heated to prevent ice formation which could block the fittings.
  - (2) The waste water drain lines are electrically heated to prevent freezing of lines. The forward, center, and aft drain masts are heated to prevent ice from blocking the waste water drains.
  - (3) The water supply lines are electrically heated where they pass through the unheated sections of the airplane. The lines at the water supply tanks are also heated.
- J. Ice Detection System (30-81-00)
  - (1) The ice detection system provides flight deck indication of icing conditions and automatic activation of wing and nacelle thermal anti-ice systems.

 30-00-00



#### WING THERMAL ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

#### 1. General (Fig. 1)

- A. The wing thermal anti-ice (TAI) system prevents the formation of ice on the leading edge of the wings. The wing TAI system receives regulated hot air from the bleed air pneumatic manifold (Ref 36-00-00). The flow of hot air to the leading edge is controlled by a pneumatic valve in each wing. When the valve is open, hot air flows through ducting behind the wing leading edge. A control switch on the flight deck allows the valve to be opened or closed, or put under automatic control of the ice detection system (Ref 30-81-00).
- B. The wing anti-ice system consists of the distribution ducts, left and right control valves, the WING ANTI-ICE switch on the anti-ice rain removal module, and the wing anti-ice system relays. The system is powered by 115 volts ac from the 115 vac bus 2 and by 28 volts dc from the 28 vdc bus 2 through circuit breakers on the P6 panel.

#### 2. Wing Anti-Icing Ducts

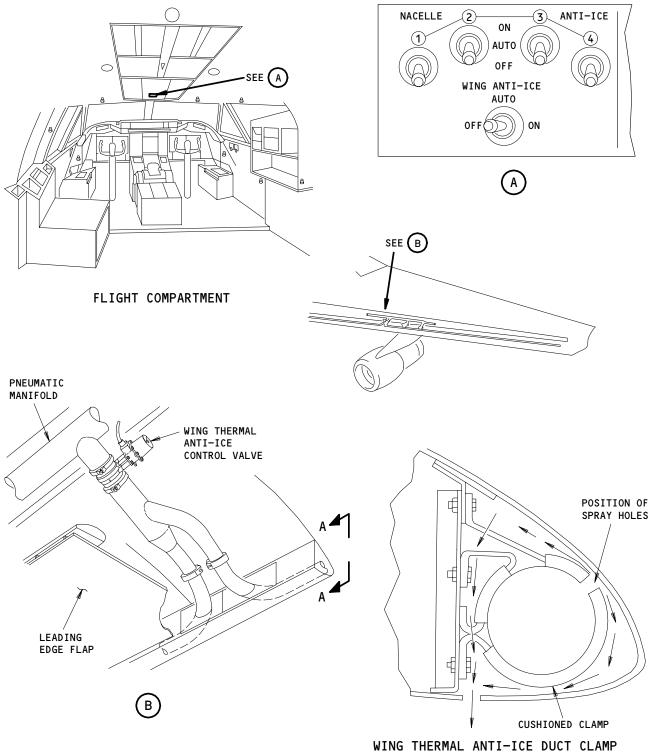
- A. The pneumatic bleed air supply is routed to the leading edge of each wing through control valves in the leading edge flap cavity near the outboard engines. The valve is joined to a Y-type coupling which connects to two elbows. The elbows direct air to the main anti-ice ducts which run inboard and outboard behind the leading edge.
- B. Each duct is rigidly mounted to the leading edge structure at the elbow and is supported within the leading edge structure by heat resistant clamps. Cushions on the clamps allow the duct to expand as it heats up. Spray holes along the front of the duct direct the heated air throughout the leading edge surface. The air then flows along the leading edge skin and is exhausted overboard through drain slots in the bottom of the leading edge.

#### 3. Wing Anti-Ice Control Valves

- A. The flow of air into the wing anti-ice ducts from the engine pneumatic system is controlled by a 3-1/2-inch shutoff valve in each wing. The butterfly type valve is driven open and closed by an internal electric motor. The valve has limit switches to prevent overtravel and valve position switches for fault indication. The valve has an external position indicator which shows the position of the valve, and a handle which allows the valve to be operated manually.
- B. The wing anti-ice valve opens and closes in less than 3 seconds. The valve operates under a normal bleed air pressure of 45 psi at a temperature of approximately 350°F, and is designed to operate in external ambient temperatures of -65 to +300°F and with ducted air temperatures of -65 to 490°F. The valve will operate in altitudes to 45,100 feet.

30-11-00





NOTE: LEFT WING TAI VALVE SHOWN, RIGHT VALVE OPPOSITE.

(EXAMPLE, ARROWS SHOW HEATED FLOW)

A-A

Wing Thermal Anti-Ice System - Component Location Figure 1

ALL

30-11-00

03

Page 2 Feb 10/94



#### 4. Wing Anti-Ice Control Switch and Relays

- A. The WING ANTI-ICE control switch is located in the anti-ice-rain removal module M7321 on the P5 pilots' overhead panel. The wing anti-ice system relays are located in the P415 panel in the main electrical equipment center.
- B. The control switch has 3 positions to place the wing anti-ice system on, off, or in automatic mode under control of the ice detection system.
- 5. Operation (Fig. 2)
  - A. Functional Description
    - (1) The wing anti-ice system is enabled at lift off. Placing the WING ANTI-ICE switch in the ON position energizes the wing anti-ice valve relay, applying 115 volts ac to the opening contacts of each valve. The valve motor drives the valve open, and also drives the limit and valve position switches. Figure 2 shows each valve in the closed position, ready to power the opening winding of the valve motor.
    - (2) When the valve is in transit, both contacts are closed. When the valve becomes fully open, the opening contacts break the circuit and the motor stops. When the control switch is placed in the off position, the wing anti-ice valve relay is de-energized, and the 115-volt ac supply is connected to the closing winding of the valve motor. The motor drives the valve closed, the closing contacts break the circuit, and the motor stops.
    - (3) When the valve opens, the green message WAI appears in two places on the main EICAS display at the base of engine N1 indicators.
    - (4) When the control switch is placed in the AUTO position, the ice detector will send a signal to open the valve when sufficient ice buildup is sensed. When icing conditions are no longer sensed, the valve is commanded to close.
    - (5) If the control switch is in the OFF position or either valve does not open for any reason, the EICAS caution message >ICING WING is displayed when the ice detection system tries to open the valve. If the switch is in the ON position, the EICAS advisory message >ANTI ICE WING is displayed when total air temperature exceeds 54° F (12° C).
  - B. Control (Fig. 1)

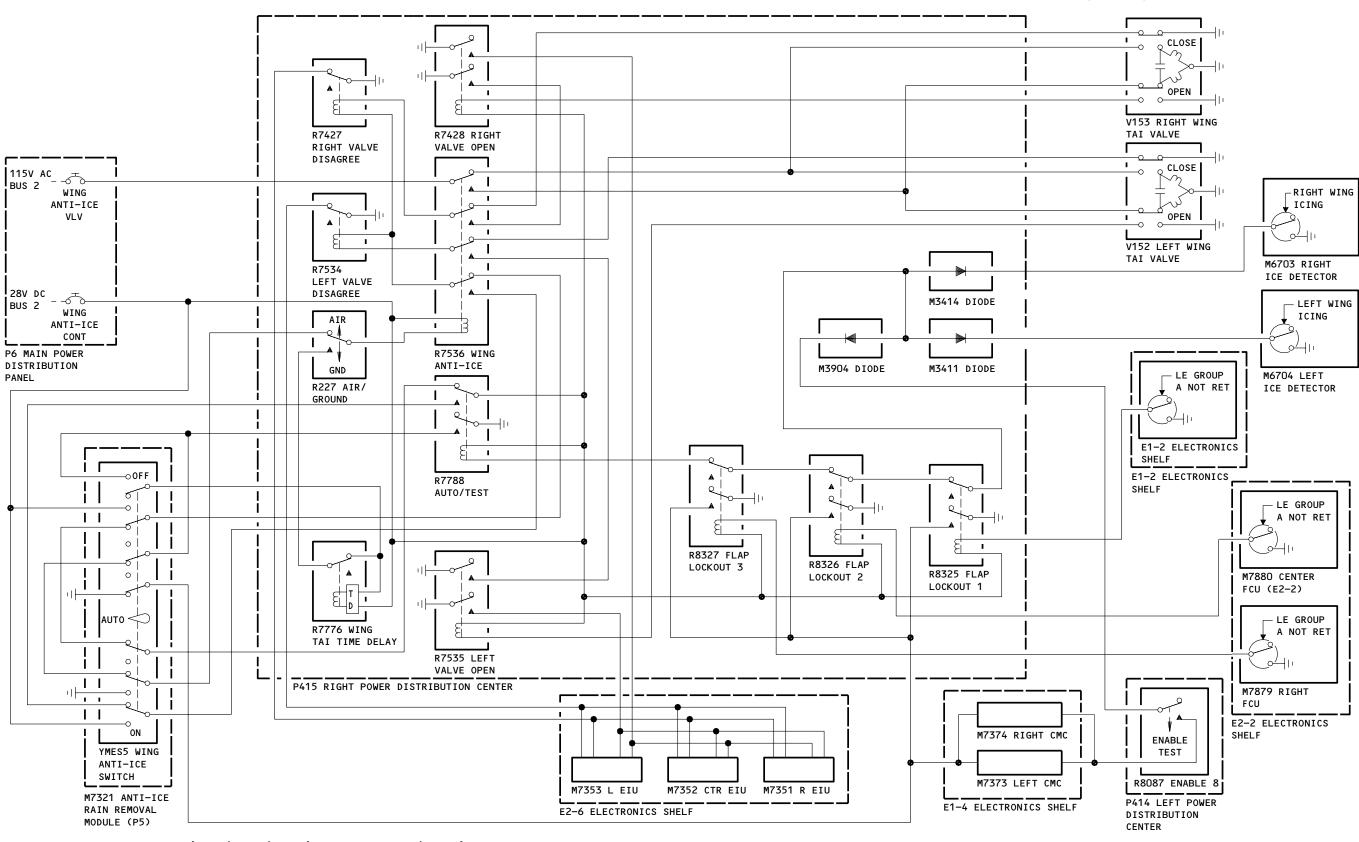
EFFECTIVITY-

- (1) To place the wing anti-ice system in automatic mode, place the WING ANTI-ICE switch on the anti-ice-rain removal module to the AUTO position. When the airplane is in the air, the wing anti-ice system will be automatically activated when icing conditions are detected. Place the control switch to the ON or OFF position to override automatic control.
- (2) A ground test may be performed by selecting the ground test of the ice detection system with the CMCS.

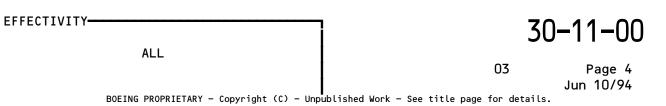
A. I	İ		30-11-L
ALL		05	Page 3
	i		Feb 10/89

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.





Wing Thermal Anti-Ice System Schematic Figure 2





## WING THERMAL ANTI-ICE SYSTEM

	COMPONENT	FIG. 102	QTY	ACCESS/AREA	AMM REFERENCE
		SHT		KEFEKENCE	
1	CIRCUIT BREAKERS - WING ANTI-ICE VLV, C66 WING ANTI-ICE CONT, C67 COMPUTER - (FIM 45-10-00/101) L CENTRAL MAINTENANCE, M7373 R CENTRAL MAINTENANCE, M7374 DIODE - (FIM 31-01-39/101) M3411 M3414	1	1 1	FLT COMPT, P6 6C8 6C9	*
	M3904  MODULE - ANTI-ICE/RAIN REMOVAL, M7321  PROBE - (FIM 30-81-00/101)  L ICE DETECTOR, M6704  R ICE DETECTOR, M6703  RELAY - (FIM 31-01-36/101)  CMC ENABLE RELAY 8, R8087  RELAY (FIM 31-01-39/101)  AIR/GROUND, R227  AUTO/TEST, R7778  FLAP LOCKOUT 1, R8325  FLAP LOCKOUT 2, R8326  FLAP LOCKOUT 3, R8327  L VALVE DISAGREE, R7534  L VALVE OPEN, R7535  R VALVE OPEN, R7428  TIME DELAY WING TAI, R7776  WING ANTI-ICE, R7536	1	1	FLT COMPT, P5	*
	SWITCH - WING ANTI-ICE CONTROL, YMLAS5  UNIT - (FIM 31-61-00/101) C EFIS/EICAS INTERFACE, M7352 L EFIS/EICAS INTERFACE, M7353 R EFIS/EICAS INTERFACE, M7351  UNIT - (FIM 27-50-00/101) C FLAP CONTROL, M7880 L FLAP CONTROL, M7881 R FLAP CONTROL, M7879	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
	VALVE - L WING ANTI-ICE, V152 VALVE - R WING ANTI-ICE, V153	1 1	1 1	L WING ABOVE LE FLAP #6 R WING ABOVE LE FLAP #21	30-11-03 30-11-03

<sup>\*</sup> SEE WDM EQUIPMENT LIST

Wing Thermal Anti-Ice System - Component Index Figure 101

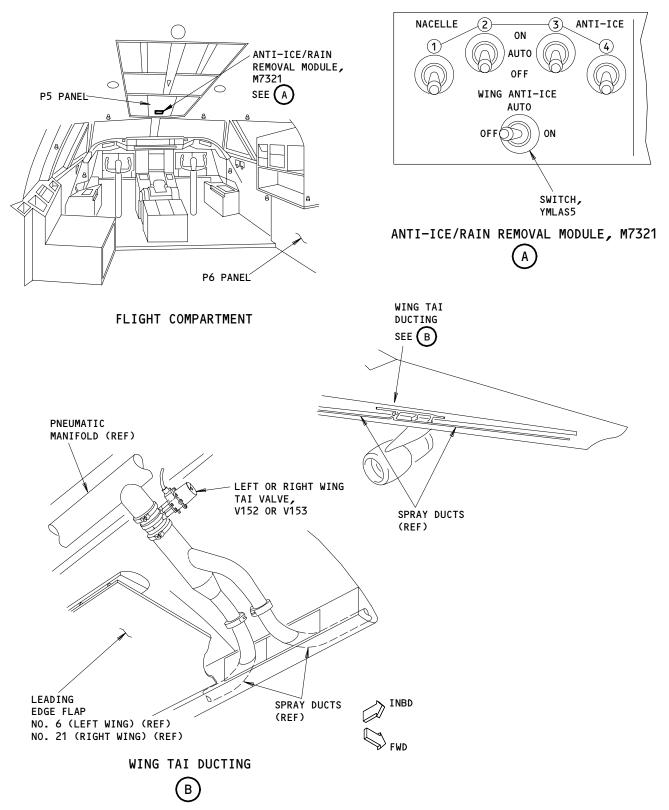
EFFECTIVITY-

30-11-00

03.1

Page 101 0ct 18/00





Wing Thermal Anti-Ice System - Component Location Figure 102

EFFECTIVITY-ALL

30-11-00



### WING THERMAL ANTI-ICE SYSTEM - ADJUSTMENT/TEST

#### 1. General

- A. There are three tasks in this subject. The first task is an operational test for the wing thermal anti-ice (TAI) system. In this test, you will set the WING ANTI-ICE switch on the overhead panel to the on and off position. You will monitor the operation of the system on the main EICAS.
- B. The second task is a CMCS ground test of the wing TAI system. In this test, you will use the CMC to do a test of the system. You will look for CMC fault messages if the test result is not PASS.
- C. The third task is a system test of the wing TAI system and its EICAS messages. In this test, you will monitor the position of the wing anti-ice valve while you operate the system. Then you do a ground test with the CMCS.

TASK 30-11-00-715-001

- 2. Operational Test Wing Thermal Anti-Ice System
  - A. References
    - (1) 24-22-00/201, Manual Control
    - (2) 32-09-02/201, Air/Ground Relay System
    - (3) SSM 30-11-01
    - (4) WDM 30-11-11
  - B. Access
    - (1) Location Zone
      221, 222 Control Cabin
  - C. Preconditions

s 865-049

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
  - (c) Air/Ground Relay System is serviceable (AMM 32-09-02/201).
- D. Procedure

s 865-002

(1) Supply electrical power (Ref 24-22-00/201).

S 865-046

(2) Make sure that there is no pneumatic power supplied to the pneumatic system (this prevents the flow of hot air through the wing leading edge during the test).

EFFECTIVITY-

30-11-00

ALL



s 045-027

WARNING: YOU MUST CAREFULLY DO THE STEPS IN THE TASK BELOW TO PREPARE THE SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE. FAILURE TO DO THE STEPS CORRECTLY CAN CAUSE THE AUTOMATIC OPERATION OF AIRPLANE SYSTEMS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Do this task: "Prepare Safety-Sensitive Systems for Air Mode Simulation" (Ref 32-09-02/201).

S 865-025

(4) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.

s 715-003

- (5) Make sure that the wing anti-ice valves open:
  - (a) Set the WING ANTI-ICE switch on the anti-ice/rain removal module (P5 panel) to the ON position.
  - (b) Make sure that the message WAI appears (in two locations on the main EICAS at the bottom of the engine N1 indicators).

s 715-004

- (6) Make sure that the wing anti-ice valves close:
  - (a) Set the WING ANTI-ICE switch to the off position.
  - (b) Make sure that the message WAI is not shown on the main EICAS.

s 865-031

(7) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.

S 445-028

(8) Do this task: "Put Safety-Sensitive Systems Back to the Condition before Air Mode Simulation" (Ref 32-09-02/201).

s 865-005

(9) Remove electrical power (Ref 24-22-00/201).

TASK 30-11-00-715-034

- 3. Ground Test Wing Thermal Anti-Ice System
  - A. General
    - (1) The ground test for the wing thermal anti-ice system commands the left and right wing TAI valves to open and close. The valves fail if they do not move to their commanded positions.
  - B. References
    - (1) 24-22-00/201, Manual Control
  - C. Access
    - (1) Location Zone

221, 222 Control Cabin

EFFECTIVITY-

30-11-00



#### D. Preconditions

s 865-050

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- E. Prepare for the Test

S 865-035

(1) Supply electrical power (Ref 24-22-00/201).

S 865-047

(2) Make sure that there is no pneumatic power supplied to the pneumatic system (this prevents the flow of hot air through the wing leading edge during the test).

S 865-036

(3) Set the WING ANTI-ICE switch on the anti-ice/rain removal module (P5 panel) to off.

s 865-038

(4) Set the GND TEST switch on the P461 overhead maintenance panel to ENABLE.

s 865-039

- (5) Prepare the CDU for the test:
  - (a) Push the MENU key on the CDU to show the MENU.
  - (b) Push the line-select key (LSK) that is adjacent to <CMC to show the CMC MENU.
  - (c) If <RETURN shows after you push the LSK, push the LSK that is adjacent to <RETURN until you see the CMC MENU.</p>
  - (d) Push the LSK that is adjacent to <GROUND TESTS to show the GROUND TESTS menu.
  - (e) Push the NEXT PAGE key until you find <30 ICE AND RAIN.
  - (f) Push the LSK that is adjacent to <30 ICE AND RAIN to show the GROUND TESTS menu for the ice and rain system.

<u>NOTE</u>: If INHIBITED shows above <WTAIS, the test will not operate.

F. Wing TAI System Ground Test

ALL

s 745-040

(1) Push the LSK that is adjacent to the <WTAIS prompt.

NOTE: IN PROGRESS will show during the test.

EFFECTIVITY-

30-11-00

**†** 



s 745-042

(2) When IN PROGRESS goes out of view, look for PASS or FAIL> adjacent to <WTAIS.

NOTE: If a PASS indication shows, no failures occurred during the test.

- (a) If FAIL> shows, look for wing anti-ice system CMCS messages:
  - 1) Push the LSK that is adjacent to FAIL> to see the GROUND TEST MSG pages for the failure.
  - 2) Push the NEXT PAGE key until you find all the GROUND TEST MSG pages.
  - 3) Make a list of all CMCS messages, CMCS message numbers, and ATA numbers that show on the GROUND TEST MSG pages.
  - 4) Go to the CMCS Message Index of the Fault Isolation Manual (FIM) to find the corrective action for each CMCS message.
- G. Put the Airplane in Its Usual Condition

S 865-044

(1) Set the GND TEST switch to NORM.

S 865-045

(2) Remove electrical power (Ref 24-22-00/201).

TASK 30-11-00-735-006

- 4. System Test Wing Thermal Anti-Ice System
  - A. References
    - (1) 24-22-00/201, Manual Control
    - (2) 27-81-00/201, Leading Edge Flaps
    - (3) 30-81-00/501, Ice Detection System
    - (4) 31-61-00/201, Integrated Display System
    - (5) 32-09-02/201, Air/Ground Relay System
    - (6) 36-00-00/201, Pneumatic System
    - (7) SSM 30-11-01
    - (8) WDM 30-11-11
  - B. Access
    - (1) Location Zone
      - 221 Control Cabin, LH
      - 222 Control Cabin, RH
      - 531 Leading Edge to Front Spar, Left Wing at Outboard Engine
      - 631 Leading Edge to Front Spar, Right Wing at Outboard Engine
  - C. Preconditions

s 865-051

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).

EFFECTIVITY-

30-11-00

ALL

)4



- (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- (c) Air/Ground Relay System is serviceable (AMM 32-09-02/201).
- D. Prepare for the Test

s 865-007

(1) Supply electrical power (Ref 24-22-00/201).

s 865-008

(2) Do this task: "Leading Edge Flap Extension" (Ref 27-81-00/201).

s 865-032

(3) Do this task: "Extended Leading Edge Flaps Deactivation and Safety Locks Installation" (Ref 27-81-00/201).

s 845-010

- (4) Make sure that there is no pressure in the bleed air duct of the applicable wing (Ref 36-00-00/201).
- E. Wing Anti-Ice System Test

s 715-011

- (1) Do this test of the system ground mode:
  - (a) Open 6C8 WING ANTI-ICE VLV and 6C9 WING ANTI-ICE CONT circuit breakers on the P6 Main Power Distribution Panel.
  - (b) Make sure that the EICAS advisory messages WAI VALVE LEFT and WAI VALVE RIGHT show.
  - (c) Set the WING ANTI-ICE switch on the anti-ice/rain removal module to the ON position.
  - (d) Make sure that the position indicator on the top of each wing anti-ice valve points to "CLOSED."
  - (e) Turn the manual override handle on each wing anti-ice valve to the "OPEN" position. Then turn it back to the "CLOSED" position.
    - 1) Make sure that each valve moves freely.

s 045-029

WARNING: YOU MUST CAREFULLY DO THE STEPS IN THE TASK BELOW TO PREPARE THE SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE. FAILURE TO DO THE STEPS CORRECTLY CAN CAUSE THE AUTOMATIC OPERATION OF AIRPLANE SYSTEMS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do this task: "Prepare Safety-Sensitive Systems for Air Mode Simulation" (Ref 32-09-02/201).

s 715-012

- (3) Do this test of valve operation and indication:
  - (a) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.

EFFECTIVITY-

30-11-00

ALL



- (b) Close 6C8 WING ANTI-ICE VLV circuit breaker on the P6 Main Power Distribution Panel.
  - 1) Make sure that the wing anti-ice valves do not move.
- (c) Close 6C9 WING ANTI-ICE CONT circuit breaker on the P6 Main Power Distribution Panel.
  - 1) Make sure that the wing anti-ice valves move to the full open position in less than 4 seconds.
- (d) Set the WING ANTI-ICE switch to the off position.
  - 1) Make sure that the wing anti-ice valves move to the fully closed position in less than 4 seconds.
  - 2) Make sure that the message WAI does not show on the main EICAS.
- (e) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
- (f) Set the WING ANTI-ICE switch to the ON position.
  - 1) Make sure that the wing anti-ice valves do not move.
- (g) Set the WING ANTI-ICE switch to the off position.

s 445-030

(4) Do this task: "Put Safety-Sensitive Systems Back to the Condition before Air Mode Simulation" (Ref 32-09-02/201).

s 865-033

(5) Do this task: "Safety Locks Removal and Extended Leading Edge Flaps Activation" (Ref 27-81-00/201).

s 865-020

(6) Do this task: "Leading Edge Flaps Retraction" (Ref 27-81-00/201).

<u>NOTE</u>: The LE flaps must be retracted for the wing anti-ice and the ice detection system CMC ground tests.

s 715-024

(7) Do this task: "Operational Test - Ice Detection System" (Ref 30-81-00/501).

s 745-014

ALL

- (8) Do a CMC ground test of the wing anti-ice system:
  - (a) Set the GND TEST switch on the P461 panel to ENABLE.
  - (b) Push the key for GROUND TESTS on the CMC main menu.
  - (c) Push the key for <ICE AND RAIN.
  - (d) Push the key for <WTAIS.
  - (e) Make sure that PASS shows on the CDU.
  - (f) Set the GND TEST switch on the P461 panel to NORM.

EFFECTIVITY-

30-11-00



F. Put the Airplane to its Initial Condition

s 865-016

(1) Erase all EICAS status messages which showed during this test (Ref 31-61-00/201).

s 865-021

(2) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY-

ALL

30-11-00



## ANTI-ICE/RAIN REMOVAL MODULE - REMOVAL/INSTALLATION

# 1. General

- A. There are two tasks in this subject. There is one task for removal and one task for installation of the anti-ice/rain removal module. The procedure has these parts:
  - Remove power from all systems which use the module
  - Remove the module
  - Install a replacement module
  - Supply power to all systems which use the module
  - Test all systems which use the module.

### TASK 30-11-01-004-003

- 2. Remove the Anti-Ice/Rain Removal Module (Fig. 401)
  - A. Access
    - (1) Location Zone

221, 222 Control Cabin

- B. Procedure
  - s 864-001
  - (1) Open these circuit breakers:
    - (a) P6 Main Power Distribution Panel
      - 1) 6B32 WINDSHIELD WASH PUMP
      - 2) 6C9 WING ANTI-ICE CONT
      - 3) 6J10 NACELLE ANTI-ICE ENG 1
      - 4) 6J11 NACELLE ANTI-ICE ENG 2
      - 5) 6J12 NACELLE ANTI-ICE ENG 3
      - 6) 6J13 NACELLE ANTI-ICE ENG 4
    - (b) P7 Overhead Circuit Breaker Panel
      - 1) 7E1 WSHLD WIPER L
      - 2) 7E2 WSHLD RAIN REPEL
      - 3) 7E25 WSHLD WIPER R
    - s 024-002

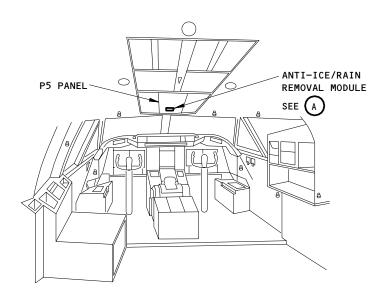
ALL

- (2) Remove the anti-ice/rain removal module:
  - (a) Remove the four screws which hold the anti-ice/rain removal module in the P5 panel.
  - (b) Remove the anti-ice/rain removal module and disconnect the electrical connectors from it.

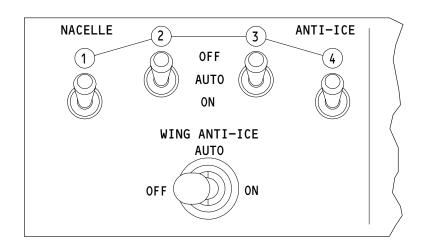
EFFECTIVITY-

30-11-01





FLIGHT COMPARTMENT



ANTI-ICE/RAIN REMOVAL MODULE

Anti-Ice/Rain Removal Module Installation Figure 401

30-11-01

03

Page 402 Jun 18/00



TASK 30-11-01-404-004

- 3. <u>Install the Anti-Ice/Rain Removal Module</u> (Fig. 401)
  - A. References
    - (1) AMM 12-16-02/301, Rain Repellent Container
    - (2) AMM 24-22-00/201, Manual Control
    - (3) 30-11-00/501, Wing Thermal Anti-Ice System
    - (4) 30-21-00/501, Engine Inlet Thermal Anti-Ice System
    - (5) 30-41-00/501, Flight Compartment Window Anti-Ice System
    - (6) 30-42-00/501, Windshield Wiper System
    - (7) 30-44-00/501, Windshield Washer System
  - B. Access
    - (1) Location Zone

221, 222 Control Cabin

- C. Procedure
  - s 424-006
  - (1) Install the anti-ice/rain removal module:
    - (a) Connect the electrical coneectors to the anti-ice/rain removal module and install the module in the P5 panel.
    - (b) Install the four screws which hold the anti-ice/rain removal module in the P5 panel.
    - S 864-005

ALL

- (2) Close these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B32 WINDSHIELD WASH PUMP
    - 2) 6C9 WING ANTI-ICE CONT
    - 3) 6J10 NACELLE ANTI-ICE ENG 1
    - 4) 6J11 NACELLE ANTI-ICE ENG 2
    - 5) 6J12 NACELLE ANTI-ICE ENG 3
    - 6) 6J13 NACELLE ANTI-ICE ENG 4
  - (b) P7 Overhead Circuit Breaker Panel
    - 1) 7E1 WSHLD WIPER L
    - 2) 7E2 WSHLD RAIN REPEL
    - 3) 7E25 WSHLD WIPER R

EFFECTIVITY-

30-11-01



s 864-013

(3) Supply electrical power (AMM 24-22-00/201).

s 714-007

(4) Do an operational test of the wing thermal anti-ice system (Ref 30-11-00/501).

s 714-008

(5) Do an operational test of the engine inlet thermal anti-ice system (Ref 30-21-00/501).

s 714-009

(6) Do an operational test of the flight compartment window anti-ice system (Ref 30-41-00/501).

s 714-010

(7) Do an operational test of the windshield wiper system (Ref 30-42-00/501).

s 714-011

- (8) Do an operational test of the windshield rain repellent system:
  - (a) Make sure that the shutoff valve is open.
  - (b) Make the windshield area wet with water.
  - (c) Push the applicable RAIN REP switch on the anti-ice/rain removal module (P5 panel) and release it.
  - (d) Make sure that rain repellent fluid is released from the spray nozzles.

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

- (e) Fully flush all rain repellent fluid from the airplane skin with a strong spray of water.
- (f) Make sure that the fluid level in the visual reservoir is above the REPLACE CAN mark.
- (g) Make sure that the pointer of the pressure gauge is in the green band.
- (h) If the pressure or the fluid level are below the minimum level, do this task: "Service the Rain Repellent Fluid Container" (AMM 12-16-02/301).

s 714-012

(9) Do an operational test of the windshield washer system (Ref 30-44-00/501).

s 864-014

ALL

(10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

EFFECTIVITY-

30-11-01



## WING ANTI-ICE VALVE - REMOVAL/INSTALLATION

# 1. General

- A. There are two tasks in this subject. There is one task for the removal and one for the installation of the wing anti-ice valve. The procedure has these parts:
  - Extension of the LE flaps and installation of safety locks
  - Removal of the wing anti-ice valve
  - Installation of the replacement valve
  - Operational test of the system.
- B. The removal and installation procedure is the same for the left or the right wing anti-ice valve.

TASK 30-11-03-004-001

- Wing Anti-Ice Valve Removal (Fig. 401)
  - A. References
    - (1) 27-81-00/201, Leading Edge Flaps
    - (2) 36-00-00/201, Pneumatic System
    - (3) SSM 30-11-01
    - (4) WDM 30-11-11
  - B. Access
    - (1) Location Zones
      - 531 Leading Edge to Front Spar, Left Wing at Outboard Engine
      - 631 Leading Edge to Front Spar, Right Wing at Outboard Engine
  - C. Procedure

s 864-002

(1) Extend the leading edge flaps (Ref 27-81-00/201).

s 494-019

(2) Install safety locks on the leading edge flaps (Ref 27-81-00/201).

s 864-004

ALL

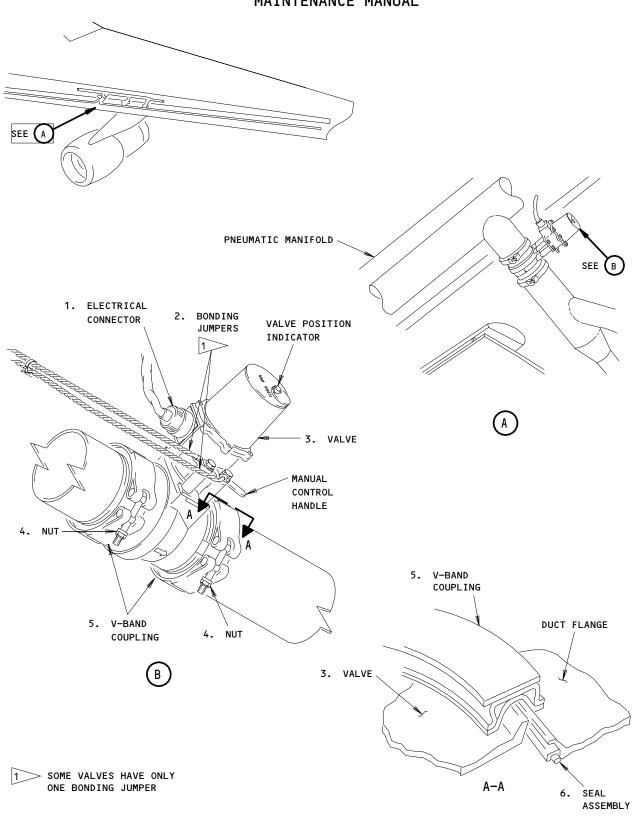
- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P6 Main Power Distribution Panel
    - 1) 6C8 WING TAI VLV

EFFECTIVITY-

30-11-03

.





Wing Anti-Ice Valve Installation Figure 401

ALL

O1 Page 402
Feb 10/94

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



2) 6C9 WING TAI CONT

s 844-005

WARNING: MAKE SURE THAT YOU RELEASE THE PRESSURE IN THE PNEUMATIC SYSTEM. IF THERE IS PRESSURE IN THE PNEUMATIC SYSTEM WHEN YOU REMOVE THE WING ANTI-ICE VALVE, THE SUDDEN FLOW OF BLEED AIR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Make sure that there is no pressure in the wing pneumatic manifold (Ref 36-00-00/201).

s 024-007

- (5) Remove the wing anti-ice valve:
  - (a) Disconnect the electrical connector DV152 (left) or DV153 (right) (1) from the valve (3).
  - (b) Disconnect the bonding jumpers (2) from the valve (3).

NOTE: Some valves have only one bonding jumper.

- (c) Remove the nut (4) from the T-bolts on the two V-band couplings (5).
- (d) Hold the valve (3).
  - 1) Loosen both V-band couplings (5).
  - 2) Move the V-band couplings (5) away from the valve (3).
- (e) Move the valve (3) out of position and remove the two seals (6).

TASK 30-11-03-404-008

3. Wing Anti-Ice Valve Installation (Fig. 401)

## A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	2 3	Jumper Assy (Bonding Jumper) Valve Assy - Air Shutoff	30-11-03	02	50
	5	(Anti-Ice Valve) Clamp (V-Band Coupling) Seal			85 75 80

- B. References
  - (1) 27-81-00/201, Leading Edge Flaps
  - (2) 30-11-00/501, Wing Thermal Anti-Ice System
  - (3) SSM 30-11-01
  - (4) WDM 30-11-11

ALL

EFFECTIVITY-

30-11-03



- C. Access
  - (1) Location Zone
    - Leading Edge to Front Spar, Left Wing at Outboard Engine
    - 631 Leading Edge to Front Spar, Right Wing at Outboard Engine
- D. Procedure
  - s 424-009
  - (1) Install the wing anti-ice valve:
    - (a) Install 2 new seals (6) and make sure that they stay in position.
    - (b) Move the valve (3) into its position.
    - (c) Support the valve (3) and install the V-band coupling (5) over the duct flanges.
    - (d) Install the nuts (4) on the V-band coupling T-bolt.
    - (e) Tighten the nuts (4).
    - (f) Connect the electrical connector DV152 (left) or DV153 (right) (1) to the valve (3).
    - (g) Connect the bonding jumpers (2) to the valve (3).

NOTE: Some valves have only one bonding jumper.

- S 864-017
- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6C8 WING TAI VLV
    - 2) 6C9 WING TAI CONT
  - s 714-012
- (3) Do this task: "Operational Test Wing Thermal Anti-Ice System" (Ref 30-11-00/501).
  - S 094-018
- (4) Remove the leading edge flap safety locks (Ref 27-81-00/201).
  - S 864-015
- (5) Retract the leading edge flaps (Ref 27-81-00/201).
  - s 864-016

ALL

(6) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY-

30-11-03



### ENGINE INLET THERMAL ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

### 1. General (Fig. 1)

- A. The engine inlet thermal anti-ice (TAI) system prevents ice formation on the four engine inlet cowls. Heated air supplied by the engine bleed air system is sprayed against the inner flow surface of the inlet cowl. The flow of heated air is regulated by a control valve in the engine strut.
- B. A duct running forward through the engine strut connects the control valve to a D-ring spray manifold in the inlet cowl leading edge. Hot bleed air flows from spray holes in the manifold and is discharged overboard through an exhaust port at the bottom rear of the inlet cowl.
- C. The engine inlet anti-ice system for each engine consists of a control switch, system relays, an anti-ice control valve, pneumatic ducting, an nose cowl pressure switch, and an engine cowl overheat switch. The system is powered by 28 volts dc from the APU battery bus through circuit breakers on the P6 panel.

### 2. Anti-Ice/Rain Removal Module

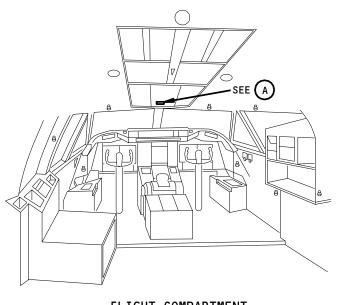
A. The four NACELLE ANTI-ICE control switches are located in the anti-ice-rain removal module M7321 on the P5 overhead panel. Each switch has 3 positions to place the corresponding engine inlet anti-ice system on, off, or in automatic mode under control of the ice detection system (Ref 30-81-00).

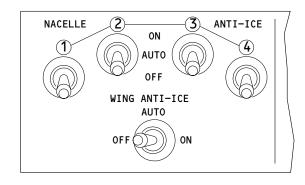
### 3. Engine Inlet Anti-Ice Valve

- A. The engine inlet anti-ice valve regulates the flow of heated air into the anti-ice duct. The 3.5-inch butterfly type valve is solenoid operated and regulates pressure from 20 to 28 psig when opened.
- B. The valve is normally closed when no power is applied. When the solenoid is energized, the butterfly is open for airflow and a pilot regulator in the valve senses the downstream (outlet) static pressure and modulates the inlet pressure admitted to the actuator piston. The piston positions the butterfly to maintain an outlet static pressure of 20-28 psig. If valve inlet pressure drops to 13-20 psig, the valve is fully open. If valve inlet pressure drops below 13 psig, the valve will close, overriding electrical control.
- C. The valve has a manual override knob and an open/close hex stud. The valve may be manually opened or closed and can be locked in either position. The override knob has a position pointer which indicates whether the valve is in normal open or closed position, or in locked open or locked closed position.

30-21-00

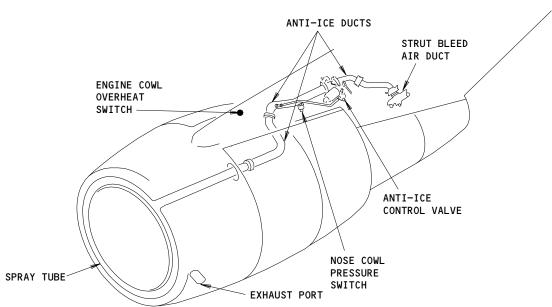






FLIGHT COMPARTMENT





Engine Inlet Thermal Anti-Ice System - Component Location Figure 1

30-21-00

02

Page 2 Oct 10/96



D. A valve position switch internal to the valve is mechanically actuated to close when the valve is open. This provides valve position information to the flight deck.

# 4. Nose Cowl Pressure Switch

A. The nose cowl pressure switch is mounted on a threaded boss on the anti-ice duct downstream of the anti-ice valve. The switch contacts close at 30 to 39 psig with increasing pressure and open at 30 psig with decreasing pressure in the ducts. When the switch closes, the EICAS status message ANTI ICE NAC 1, 2, 3, or 4 is displayed to indicate that the valve is not regulating outlet pressure below the 30 psig limit.

### 5. Engine Cowl Overheat Switch

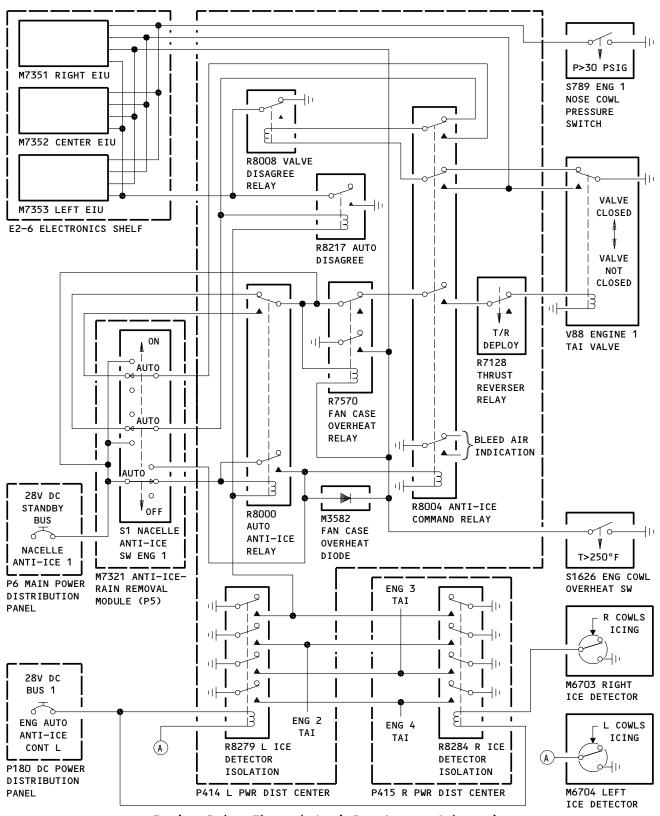
A. The engine cowl overheat switch is mounted on the fan cowl support beam. If ambient air temperature inside the cowl exceeds 250 ±5° F, the switch contacts will close, energizing and latching the fan case overtemp relay, which will close the anti-ice valve until air temperature drops below 250° F and the engine inlet TAI system is turned off and back on. When the switch closes, the EICAS advisory message NAI DUCT 1, 2, 3, or 4 LEAK is displayed.

### 6. Operation (Figs. 2 and 3)

- A. Functional Description
  - (1) The 28-volt dc APU battery bus supplies operating voltage to the control switches in the anti-ice-rain removal module. When the ice detection system activates the engine inlet anti-ice system or the control switch is in the ON position, 28 volts dc is applied to the anti-ice valve, causing the valve to open. When open, the valve regulates pressure into the anti-ice duct to 20-28 psig.
  - (2) When the valve opens, the position switch in the valve closes and the letters NAI appear in green to the left of the engine N1 indicator on the main EICAS. If valve position does not agree with the position commanded by the ice detection system or the control switch, the EICAS advisory message NAI VALVE 1, 2, 3, or 4 appears along with the status message ANTI ICE NAC 1, 2, 3, or 4.
  - (3) If pressure in the anti-ice ducts reaches 30-39 psig, the overpressure warning switch contacts close and the EICAS status message ANTI ICE NAC 1, 2, 3, or 4 is displayed. The status message will disappear when pressure in the duct drops below 30 psig.
  - (4) If ambient air temperature inside the engine cowl exceeds 250 ±5° F, the engine cowl overheat switch closes, causing the anti-ice valve to close. The system will remain off until air temperature drops below 250° F and the engine inlet TAI system is turned off and back on. When the switch closes, the EICAS advisory message NAI DUCT 1, 2, 3, or 4 LEAK is displayed.
  - (5) If any nacelle anti-ice control switch has been placed in the OFF position, or an engine anti-ice control valve does not open for any reason, the EICAS caution message >ICING NAC is displayed when the ice detector tries to activate that engine inlet anti-ice system. If any control switch has been placed in the ON position, the EICAS advisory message >ANTI-ICE NAC is displayed when total air temperature exceeds 54° F (12° C).

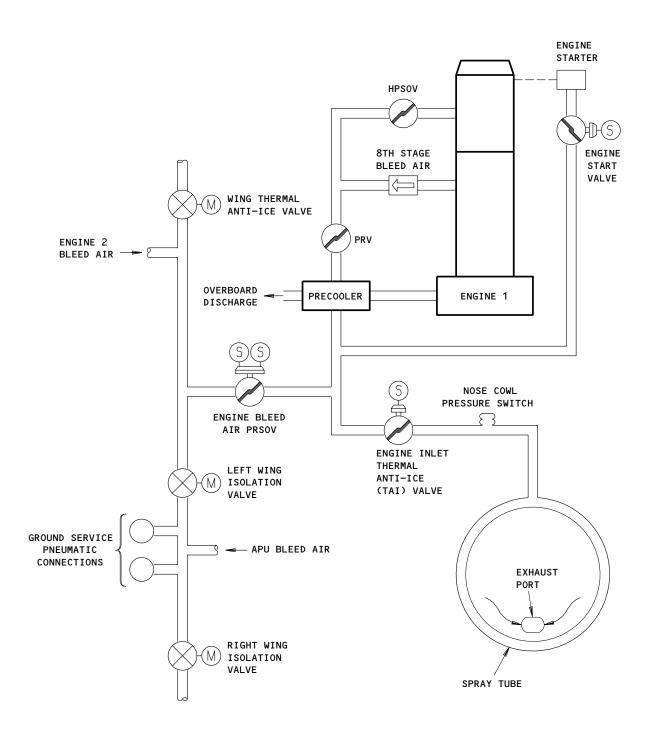
30-21-00



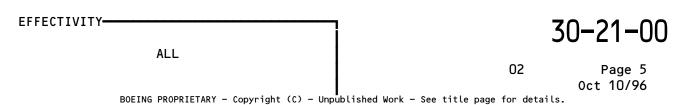


Engine Inlet Thermal Anti-Ice System Schematic Figure 2





Engine Inlet Anti-Ice System Airflow Diagram Figure 3





### B. Control

(1) To put the engine inlet anti-ice system in the automatic mode, place the four NACELLE ANTI-ICE control switches on the anti-ice-rain removal module to the AUTO position. When the airplane is in the air, the engine inlet anti-ice systems will be automatically activated when icing conditions are detected. Place the control switch to the ON or OFF position to override automatic control.

ALL

30-21-00



## ENGINE INLET THERMAL ANTI-ICE SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKERS — NACELLE ANTI-ICE ENG 1, C409 NACELLE ANTI-ICE ENG 2, C411 NACELLE ANTI-ICE ENG 3, C412 NACELLE ANTI-ICE ENG 4, C412 CIRCUIT BREAKERS — ENG AUTO ANTI-ICE CONTROL L, C10574 ENG AUTO ANTI-ICE CONTROL R, C10575 DIODE — (REF 31-01-36, FIG. 101) ENG 1 FAN CASE OVERHEAT, M3582 ENG 2 FAN CASE OVERHEAT, M3583 DIODE — (REF 31-01-39, FIG. 101) ENG 3 FAN CASE OVERHEAT, M3584 ENG 4 FAN CASE OVERHEAT, M3585 MODULE — ANTI-ICE/RAIN REMOVAL, M7321 PROBE — (REF 30-81-00, FIG. 101) L ICE DETECTOR, M6704 R ICE DETECTOR, M6704 R ICE DETECTOR, M6703 RELAY — (REF 31-01-36, FIG. 101) ENG 1 ANTI-ICE COMMAND, R8004 ENG 2 ANTI-ICE COMMAND, R8005 ENG 1 AUTO ANTI-ICE, R8001 ENG 2 AUTO ANTI-ICE, R8001 ENG 1 AUTO DISAGREE, R8217 ENG 2 FAN CASE OVERHEAT, R7570 ENG 2 FAN CASE OVERHEAT, R7570 ENG 2 FAN CASE OVERHEAT, R7571 ENG 1 THRUST REVERSER, R7128 ENG 2 THRUST REVERSER, R7128 ENG 2 VALVE DISAGREE, R8009 L ICE DETECTOR ISOLATION, R8279 RELAY — (REF 31-01-39, FIG. 101) ENG 3 ANTI-ICE COMMAND, R8006 ENG 4 ANTI-ICE COMMAND, R8007 ENG 3 AUTO ANTI-ICE, R8003 ENG 3 AUTO ANTI-ICE, R8003 ENG 4 AUTO DISAGREE, R8219 ENG 4 AUTO DISAGREE, R8220 ENG 3 FAN CASE OVERHEAT, R7572 ENG 4 FAN CASE OVERHEAT, R7573 ENG 3 THRUST REVERSER, R7131 ENG 3 VALVE DISAGREE, R8210	1 1	1 1 1 1 1 1	FLT COMPT, P6 6J10 6J11 6J12 6J13 117AL, MAIN EQUIP CTR, P180 180H15 180E16  FLT COMPT, P5	* * * * * * * *
ENG 3 VALVE DISAGREE, R8010 ENG 4 VALVE DISAGREE, R8011 R ICE DETECTOR ISOLATION, R8284				

<sup>\*</sup> SEE WDM EQUIPMENT LIST

Engine Inlet Thermal Anti-Ice System - Component Index Figure 101 (Sheet 1)

ALL

30-21-00

03

Page 101 Apr 10/89



COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SWITCH - ENG 1 ENG COWL OVERHEAT, S1626	1	1	415, ENG 1 FAN COWL SUPPORT BEAM	30-21-05
SWITCH - ENG 2 ENG COWL OVERHEAT, S1627	1	1	425, ENG 2 FAN COWL SUPPORT BEAM	30-21-05
SWITCH - ENG 3 ENG COWL OVERHEAT, S1628	1	1	435, ENG 3 FAN COWL SUPPORT BEAM	30-21-05
SWITCH - ENG 4 ENG COWL OVERHEAT, \$1629	1	1	445, ENG 4 FAN COWL SUPPORT BEAM	30-21-05
SWITCH - ENG 1 NACELLE ANTI-ICE	1	1	FLT COMPT, P5, ANTI-ICE/RAIN	*
CONTROL, YMES1			REMOVAL MODULE, M7321	
SWITCH - ENG 2 NACELLE ANTI-ICE CONTROL, YMES2	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - ENG 3 NACELLE ANTI-ICE CONTROL, YMES3	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - ENG 4 NACELLE ANTI-ICE		1	FLT COMPT, P5, ANTI-ICE/RAIN	*
CONTROL, YMES4	1		REMOVAL MODULE, M7321	
SWITCH - ENG 1 NOSE COWL PRESSURE SWITCH, S789	2	1	451AL, ENG 1 STRUT	30-21-04
SWITCH - ENG 2 NOSE COWL PRESSURE SWITCH, S790		1	461AL, ENG 2 STRUT	30-21-04
SWITCH - ENG 3 NOSE COWL PRESSURE SWITCH, S791		1	471AL, ENG 3 STRUT	30-21-04
SWITCH - ENG 4 NOSE COWL PRESSURE SWITCH, S792		1	481AL, ENG 4 STRUT	30-21-04
UNIT - (34-21-00/101)			,	
C EFIS/EICAS INTERFACE, M7352				
L EFIS/EICAS INTERFACE, M7353				
R EFIS/EICAS INTERFACE, M7351				
VALVE - ENG 1 TAI, V88	2	1	451AL, ENG 1 STRUT	30-21-03
VALVE - ENG 2 TAI, V159	2	1	461AL, ENG 2 STRUT	30-21-03
VALVE - ENG 3 TAI, V160	2	1	471AL, ENG 3 STRUT	30-21-03
VALVE - ENG 4 TAI, V161	2	1	481AL, ENG 4 STRUT	30-21-03

<sup>\*</sup> SEE WDM EQUIPMENT LIST

Engine Inlet Thermal Anti-Ice System - Component Index Figure 101 (Sheet 2)

EFFECTIVITY-

30-21-00

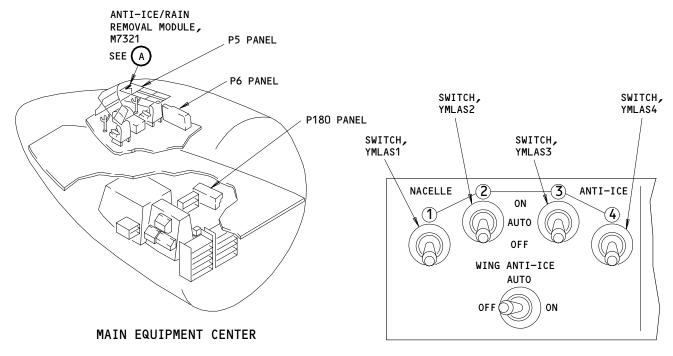
03

•

Page 102 Oct 10/96

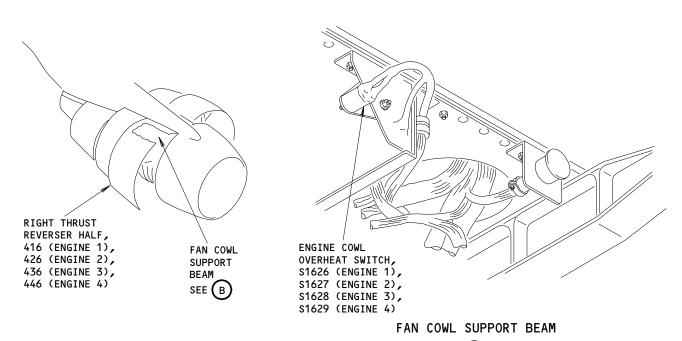
ALL





# ANTI-ICE/RAIN REMOVAL MODULE, M7321





Engine Inlet Thermal Anti-Ice System - Component Location Figure 102 (Sheet 1)

ALL

580800

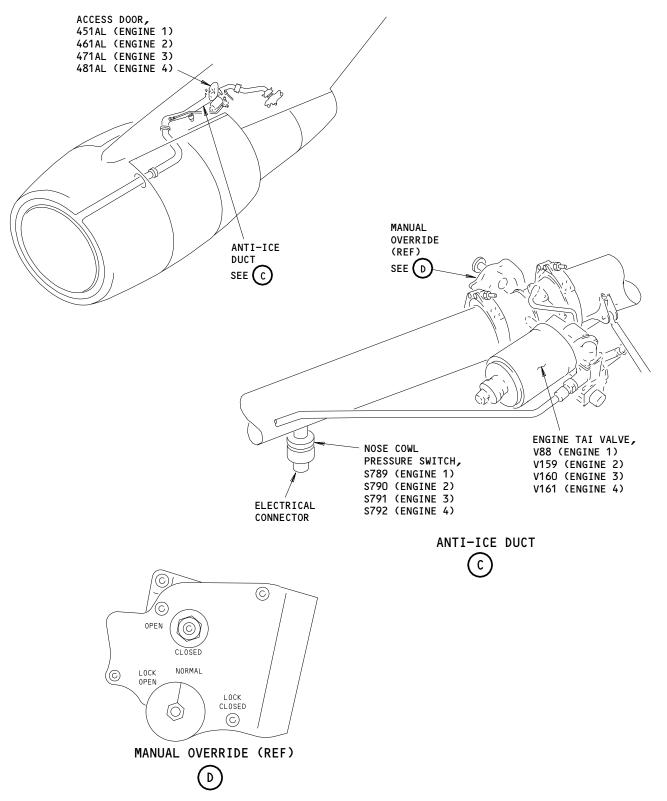
30-21-00

03

В

Page 103 Feb 10/93





ALL ALL

30-21-00

02

Page 104 Feb 15/99



### ENGINE INLET THERMAL ANTI-ICE SYSTEM - ADJUSTMENT/TEST

## 1. General

- A. There are three tasks in this subject. The first task is an operational test for the engine inlet thermal anti-ice (TAI) system. In this test, the NACELLE ANTI-ICE switches in the flight compartment are set to the on and off positions. The operation of the system is monitored on the main EICAS. Pneumatic power is necessary for this test. This test can be done while the engine operates.
- B. The second task is a duct overpressure indication test. The test is the same for any engine.
- C. The third task is a system test. The test is the same for any engine. The test has these parts:
  - Open the access door on the forward fairing of the strut or remove the forward fairing
  - Set the system control switches to the on and off positions
  - Measure voltages at the TAI valve electrical connector
  - Remove the nose cowl pressure switch
  - Open the fan cowl panels
  - Connect pins on TAI system electrical connectors together
  - Monitor EICAS messages
  - Do an operational test of the ice detection system.

#### TASK 30-21-00-715-001

## 2. <u>Operational Test - Engine Inlet Anti-Ice System</u>

- A. References
  - (1) AMM 24-22-00/201, Manual Control
  - (2) AMM 36-00-00/201, Pneumatic System
  - (3) SSM 30-21-01, 30-21-02, 30-21-03, 30-21-04
  - (4) WDM 30-21-11, 30-21-21, 30-21-31, 30-21-41
- B. Access
  - (1) Location Zone

221, 222 Control Cabin

C. Preconditions

s 865-086

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).

EFFECTIVITY-

30-21-00

ALL



(b) Pneumatic system power is on (AMM 36-00-00/201).

#### D. Procedure

s 865-002

(1) Supply electrical power (AMM 24-22-00/201).

s 865-003

(2) Supply pneumatic power (AMM 36-00-00/201).

s 715-004

CAUTION: IF THE PNEUMATIC AIR IS HOT (APPROXIMATELY 350°F), DO NOT OPEN THE ENGINE INLET ANTI-ICE VALVE FOR MORE THAN 30 SECONDS.

AFTER THE VALVE CLOSES, LET THE INLET COWL BECOME COOL. TOO MUCH HEAT CAN CAUSE DAMAGE TO THE INLET COWL.

- (3) Make sure that the anti-ice valves open:
  - (a) Set the NACELLE ANTI-ICE 1, 2, 3, and 4 switches on the anti-ice/rain removal module (P5 panel) to the ON position.
  - (b) Make sure that the word NAI shows in green to the left of each engine N1 indicator on the main EICAS.

s 715-005

- (4) Make sure that the anti-ice valves close:
  - (a) Set the NACELLE ANTI-ICE 1, 2, 3, and 4 switches to the off position.
  - (b) Make sure that NAI no longer shows.

s 865-006

(5) Remove pneumatic power (AMM 36-00-00/201).

s 865-007

(6) Remove electrical power (AMM 24-22-00/201).

TASK 30-21-00-735-065

- 3. <u>Duct Overpressure Indication Test</u>
  - A. Standard Tools and Equipment

ALL

- (1) Source of compressed air, 0-50 psig
- B. References
  - (1) AMM 24-22-00/201, Manual Control
  - (2) AMM 30-21-04/401, Nose Cowl Pressure Switch

EFFECTIVITY-

30-21-00



- (3) AMM 54-62-04/401, Forward Fairing Removal/Installation
- C. Access
  - (1) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
    - 451 Engine 1 Strut Forward Fairing, No. 3 Fairing
    - 461 Engine 2 Strut Forward Fairing, No. 3 Fairing
    - 471 Engine 3 Strut Forward Fairing, No. 3 Fairing
    - 481 Engine 4 Strut Forward Fairing, No. 3 Fairing
  - (2) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
    - 451 Engine 1 Strut Forward Fairing, No. 2 and
    - No. 3 Fairings
    - 461 Engine 2 Strut Forward Fairing, No. 2 and No. 3 Fairings
    - 471 Engine 3 Strut Forward Fairing, No. 2 and No. 3 Fairings
    - 481 Engine 4 Strut Forward Fairing, No. 2 and No. 3 Fairings
- D. Preconditions

s 865-087

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- E. Procedure

s 865-078

(1) Supply electrical power (AMM 24-22-00/201).

s 865-080

(2) Set the engine 1, 2, 3, and 4 fuel control switches on the P8 panel to the RUN position.

s 865-082

(3) Open this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

s 015-100

(4) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Open the TAI access door on the left side of the No. 3 forward fairing.

EFFECTIVITY-

30-21-00

ALL



s 045-101

(5) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Remove No. 2 and No. 3 forward fairings (Ref 54-62-04/401).

s 025-056

(6) Remove the applicable nose cowl pressure switch. (AMM 30-21-04/401):

Engine 1	Switch S789
Engine 2	Switch S790
Engine 3	Switch S791
Engine 4	Switch S792

s 435-057

(7) Connect the electrical connector to the nose cowl pressure switch again.

s 865-090

(8) Close this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

s 865-070

(9) Apply 39 to 41 PSIG air pressure to the switch with an external compressed air source.

s 715-084

(10) Make sure that the applicable EICAS status message ANTI ICE NAC 1, 2, 3, or 4 shows.

NOTE: AIRPLANES WITH GE OR PW ENGINES;

70 seconds are necessary for this message to show.

s 865-060

(11) Decrease the air pressure to 0.

s 865-092

(12) Set the engine 1, 2, 3, and 4 fuel control switches on the P8 panel to the CUTOFF position.

EFFECTIVITY---

30-21-00

ALL



s 865-091

(13) Open this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

s 035-061

(14) Remove the electrical connector from the nose cowl pressure switch.

s 425-062

(15) Install the nose cowl pressure switch (AMM 30-21-04/401).

s 865-068

(16) Close this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

s 415-102

(17) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Close the TAI access door.

s 405-103

(18) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Install No. 2 and No. 3 forward fairings (AMM 54-62-04/401).

s 865-064

(19) Remove electrical power (AMM 24-22-00/201).

TASK 30-21-00-735-008

- 4. System Test Engine Inlet Anti-Ice System
  - A. Standard Tools and Equipment
    - (1) Source of compressed air, 0-50 psig
  - B. References
    - (1) AMM 24-22-00/201, Manual Control
    - (2) AMM 30-21-04/401, Nose Cowl Pressure Switch
    - (3) AMM 30-81-00/501, Ice Detection System
    - (4) AMM 31-61-00/201, Integrated Display System

EFFECTIVITY-

30-21-00



- (5) AMM 54-62-04/401, Forward Fairing Removal/Installation
- (6) AMM 71-11-04/201, Fan Cowl
- (7) IPC 30-21-03 Fig. 2
- (8) SSM 30-21-01, 30-21-02, 30-21-03, 30-21-04
- (9) WDM 30-21-11, 30-21-21, 30-21-31, 30-21-41
- C. Access
  - (1) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
    - 451 Engine 1 Strut Forward Fairing, No. 3 Fairing
    - 461 Engine 2 Strut Forward Fairing, No. 3 Fairing
    - 471 Engine 3 Strut Forward Fairing, No. 3 Fairing
    - 481 Engine 4 Strut Forward Fairing, No. 3 Fairing
  - (2) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
    - 451 Engine 1 Strut Forward Fairing, No. 2 and
      - No. 3 Fairings
        Engine 2 Strut Forward Fairing, No. 2 and
    - 461 Engine 2 Strut Forward Fa No. 3 Fairings
    - 471 Engine 3 Strut Forward Fairing, No. 2 and No. 3 Fairings
    - 481 Engine 4 Strut Forward Fairing, No. 2 and No. 3 Fairings
- D. Preconditions
  - S 865-088
  - (1) These conditions are necessary for this task:
    - (a) Electrical power on (AMM 24-22-00/201).
    - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- E. Prepare for the Test
  - s 865-009
  - (1) Supply electrical power (AMM 24-22-00/201).

RIGHT ISOLATION VALVE

- s 865-010
- (2) Set these switches on the P5 panel to the off position:

NACELLE ANTI-ICE 1	<b>ENGINE</b>	START	VALVE	1
NACELLE ANTI-ICE 2	ENGINE	START	VALVE	2
NACELLE ANTI-ICE 3	ENGINE	START	VALVE	3
NACELLE ANTI-ICE 4	ENGINE	START	VALVE	4
AIR CONDITIONING PACK 1	ENGINE	BLEED	VALVE	1
AIR CONDITIONING PACK 2	ENGINE	BLEED	VALVE	2
AIR CONDITIONING PACK 3	ENGINE	BLEED	VALVE	3
APU VALVE	ENGINE	BLEED	VALVE	4
LEFT ISOLATION VALVE				

EFFECTIVITY-

30-21-00



s 865-069

WARNING: MAKE SURE TO OPEN ENGINE IGNITION CIRCUIT BREAKERS BEFORE YOU SET THE FUEL CONTROL SWITCH TO RUN. IF YOU DO NOT OPEN THE CIRCUIT BREAKERS, THE IGNITER PLUGS CAN AUTOMATICALLY FIRE. WITH UNBURNED FUEL IN THE COMBUSTION CHAMBER, THERE MAY BE AN INTERNAL ENGINE FIRE OR A TAILPIPE FIRE. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO THE ENGINE.

- (3) Open these circuit breakers on the P6 Main Power Distribution Panel:
  - (a) 6F1 IGN 1 ENG 1
  - (b) 6K19 IGN 2 ENG 1
  - (c) 6G19 STBY IGN ENG 1

s 865-055

(4) Set the engine 1, 2, 3, and 4 fuel control switches on the P8 panel to the RUN position.

s 865-011

(5) Open this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

s 015-104

(6) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Open the TAI access door on the left side of the No. 3 forward fairing.

s 045-105

- (7) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Remove No. 2 and No. 3 forward fairings (AMM 54-62-04/401).
- F. System Operation and Indication Test

s 035-012

(1) Disconnect the electrical connector from the applicable TAI valve:

Engine 1	Connector DV88
Engine 2	Connector DV159
Engine 3	Connector DV160
Engine 4	Connector DV161

EFFECTIVITY-

30-21-00

ALL



s 865-013

(2) Close this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1 6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

s 715-014

(3) Set the applicable NACELLE ANTI-ICE switch on the anti-ice/rain removal module (P5 panel) to the ON position.

s 765-015

(4) Measure the voltage between pin 1 (+) and pin 2 (gnd) of the TAI valve electrical connector.

NOTE: There will not be voltage at the TAI valve electrical connector until 2 seconds after the switch is turned on.

(a) Make sure that the voltage is is 28 ±3 volts dc.

s 865-016

(5) Open this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

s 765-017

- (6) Make sure that the voltage between pins 1 and 2 of the TAI valve electrical connector is  $0 \pm 3$  volts dc.
- G. Valve Position Disagreement Test

s 715-020

(1) Make sure that the applicable EICAS advisory message NAI VALVE ENG 1, 2, 3, or 4 shows.

s 865-019

(2) Close this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

s 715-018

(3) Make sure that the applicable EICAS advisory message NAI VALVE ENG 1, 2, 3, or 4 shows.

EFFECTIVITY-

30-21-00

ALL



s 485-020

(4) Connect an electrical ground to pin 5 of the TAI valve electrical connector.

s 715-021

(5) Make sure that the applicable EICAS message NAI VALVE ENG 1, 2, 3, or 4 does not show.

s 085-022

(6) Remove the ground from pin 5 of the TAI valve electrical connector.

s 865-071

(7) Set the applicable NACELLE ANTI-ICE switch to the OFF position.

s 765-024

- (8) Measure the voltage between pin 1 (+) and pin 2 (gnd) of TAI valve electrical connector.
  - (a) Make sure that the voltage is  $0 \pm 3$  volts dc.

s 485-073

(9) Connect an electrical ground to pin 3 of the TAI valve electrical connector.

s 715-075

(10) Make sure that the applicable EICAS advisory message NAI VALVE ENG 1, 2, 3, or 4 does not show.

s 715-027

(11) Make sure that NAI does not show to the left of the applicable engine N1 indicator.

s 085-028

(12) Remove the ground from pin 3 of the TAI valve electrical connector.

s 715-029

(13) Make sure that the applicable EICAS advisory message NAI VALVE ENG 1, 2, 3, or 4 shows.

s 865-030

ALL

(14) Open this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

EFFECTIVITY-

30-21-00



- H. Duct Overpressure Indication Test
  - s 025-029
  - (1) Remove the applicable nose cowl pressure switch (AMM 30-21-04/401):

Engine 1	Switch S789
Engine 2	Switch S790
Engine 3	Switch S791
Engine 4	Switch S792

- s 435-030
- (2) Connect the electrical connector to the nose cowl pressure switch again.
  - s 865-031
- (3) Apply 39 to 41 PSIG air pressure to the switch with an external compressed air source.
  - s 715-032
- (4) Make sure that the applicable EICAS status message ANTI ICE NAC 1, 2, 3, or 4 shows.
  - NOTE: AIRPLANES WITH GE OR PW ENGINES;
    70 seconds are necessary for this message to show.
  - s 845-033
- (5) Decrease the air pressure to 0.
  - s 035-034
- (6) Remove the electrical connector from the nose cowl pressure switch.
  - s 425-035
- (7) Install the nose cowl pressure switch (AMM 30-21-04/401).
- I. Engine Cowl Overheat Switch Test
  - S 865-036
  - (1) Close this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:
    - 6J10 NACELLE ANTI ICE 1
    - 6J11 NACELLE ANTI ICE 2
    - 6J12 NACELLE ANTI ICE 3
    - 6J13 NACELLE ANTI ICE 4

EFFECTIVITY-

30-21-00



s 015-037

(2) Open the fan cowl panels for the applicable engine (AMM 71-11-04/201).

s 035-038

(3) Disconnect the applicable electrical connector from the engine cowl overheat switch located on the fan cowl support beam:

Engine 1	Connector DS1626
Engine 2	Connector DS1627
Engine 3	Connector DS1628
Engine 4	Connector DS1629

s 865-039

(4) Set the applicable NACELLE ANTI ICE switch to the ON position.

s 485-040

(5) Connector a jumper from pin 1 to pin 3 on the engine cowl overheat switch electrical connector.

s 715-041

(6) Make sure that the applicable EICAS status message NAI DUCT 1, 2, 3, or 4 LEAK shows.

s 765-042

(7) Make sure that the voltage between pin 1 (+) and pin 2 (gnd) of the TAI valve electrical connector is  $0 \pm 3$  volts dc.

s 085-043

(8) Disconnect the jumper between pins 1 and 3 of the engine cowl overheat switch electrical connector.

s 765-044

(9) Make sure that the voltage between pin 1 (+) and pin 2 (gnd) of the TAI valve electrical connector is  $0 \pm 3$  volts dc.

s 865-045

(10) Set the applicable NACELLE ANTI-ICE switch to the off position and then back to the ON position.

s 765-047

(11) Make sure that the voltage between pin 1 (+) and pin 2 (gnd) of the TAI valve electrical connector is 28 ±3 volts dc.

EFFECTIVITY-

30-21-00

- J. Auto Anti-Ice Test
  - s 715-066
  - (1) Do an operational test of the ice detection system (AMM 30-81-00/501).
- K. Put the Airplane to its Initial Condition
  - S 865-067
  - (1) Close these circuit breakers on the P6 Main Power Distribution Panel:
    - (a) 6F1 IGN 1 ENG 1
    - (b) 6K19 IGN 2 ENG 1
    - (c) 6G19 STBY IGN ENG 1
    - s 865-048
  - (2) Set the applicable NACELLE ANTI-ICE switch to the off position.
    - S 865-049
  - (3) Open this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:
    - 6J10 NACELLE ANTI ICE 1
    - 6J11 NACELLE ANTI ICE 2
    - 6J12 NACELLE ANTI ICE 3
    - 6J13 NACELLE ANTI ICE 4
    - s 435-050
  - (4) Connect the electrical connector to the TAI valve.
    - s 435-051
  - (5) Connect the electrical connector to the engine cowl overheat switch.
    - s 865-077
  - (6) Close this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:
    - 6J10 NACELLE ANTI ICE 1
    - 6J11 NACELLE ANTI ICE 2
    - 6J12 NACELLE ANTI ICE 3
    - 6J13 NACELLE ANTI ICE 4
    - s 415-048

ALL

(7) Close the fan cowl panels (AMM 71-11-04/201).

EFFECTIVITY-

30-21-00



s 415-106

(8) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Close the TAI access door.

s 405-107

(9) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Install No. 2 and No. 3 forward fairings (AMM 54-62-04/401).

s 865-079

(10) Erase all EICAS status messages which were shown during the test (AMM 31-61-00/201).

s 865-081

(11) Remove electrical power (AMM 24-22-00/201).

EFFECTIVITY-

30-21-00

ALL

Page 513 Feb 18/00



## ENGINE INLET ANTI-ICE VALVE - REMOVAL/INSTALLATION

#### 1. General

- A. There are two tasks in this subject. There is one task for removal and there is one task for installation of the engine inlet thermal anti-ice (TAI) valve. The procedure has these parts:
  - Depressurization of the pneumatic system
  - Access of the TAI valve through the access door on the forward fairing of the engine strut or by removing the forward fairing
  - Removal of the valve
  - Installation of a replacement valve
  - Operational test of the valve.
- B. The procedure is the same for each engine.

TASK 30-21-03-004-001

- Engine Inlet Anti-Ice Valve Removal (Fig. 401)
  - A. References
    - (1) AMM 36-00-00/201, Pneumatic System
    - (2) AMM 54-62-04/401, Forward Fairing Removal/Installation
    - (3) SSM 30-21-01, 30-21-02, 30-21-03, 30-21-04
    - (4) WDM 30-21-11, 30-21-21, 30-21-31, 30-21-41
  - B. Access
    - (1) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
      - 451 Engine 1 Strut Forward Fairing, No. 3 Fairing
      - 461 Engine 2 Strut Forward Fairing, No. 3 Fairing
      - 471 Engine 3 Strut Forward Fairing, No. 3 Fairing
      - 481 Engine 4 Strut Forward Fairing, No. 3 Fairing
    - (2) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
      - 451 Engine 1 Strut Forward Fairing, No. 2 and No. 3 Fairings
      - 461 Engine 2 Strut Forward Fairing, No. 2 and No. 3 Fairings
      - 471 Engine 3 Strut Forward Fairing, No. 2 and No. 3 Fairings
      - 481 Engine 4 Strut Forward Fairing, No. 2 and No. 3 Fairings
  - C. Procedure

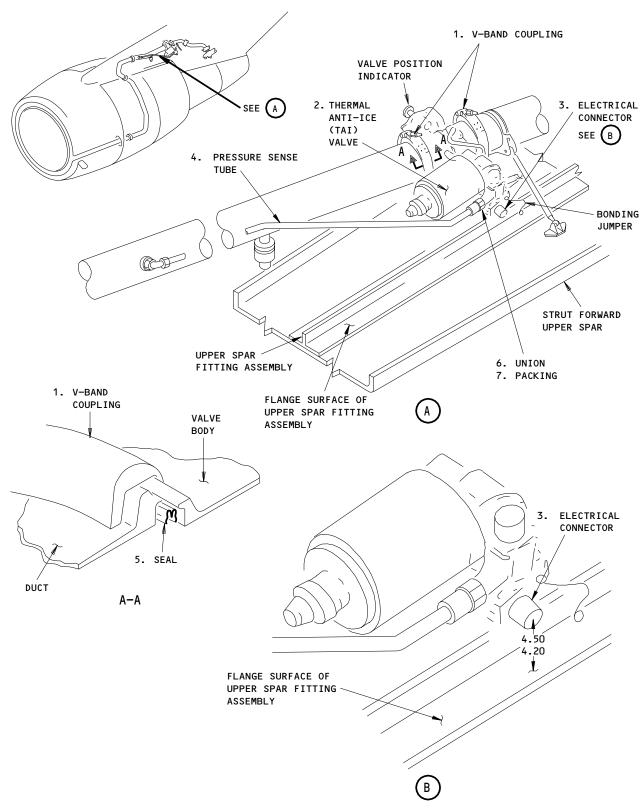
s 864-002

(1) Set the applicable NACELLE ANTI-ICE switch on the anti-ice/rain removal module (P5 panel) to the off position.

EFFECTIVITY

30-21-03





Engine Inlet Thermal Anti-Ice Valve Installation Figure 401

ALL

O1 Page 402
Jun 10/95

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



#### s 864-003

- (2) Open this circuit breaker for the applicable engine and attach a DO-NOT-CLOSE tag:
  - (a) P6 Main Power Distribution Panel
    - 1) 6J10 NACELLE ANTI-ICE 1
    - 2) 6J11 NACELLE ANTI-ICE 2
    - 3) 6J12 NACELLE ANTI-ICE 3
    - 4) 6J13 NACELLE ANTI-ICE 4

#### s 864-004

(3) Make sure that there is no pressure in the pneumatic system (AMM 36-00-00/201).

#### s 014-005

(4) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Open the access door on the No. 3 forward fairing of the engine strut.

#### S 044-026

(5) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Remove No. 2 and No. 3 forward fairings of the engine strut (AMM 54-62-04/401).

#### s 034-007

(6) Remove the electrical connector (3) from the applicable anti-ice valve (2):

Engine 1	DV88
Engine 2	DV159
Engine 3	DV160
Engine 4	DV161

### s 024-009

- (7) Remove the valve:
  - (a) Disconnect the bonding jumper.
  - (b) Disconnect the pressure sense tube (4) at the union (6).
  - (c) Remove the union (5) from the valve (2).
  - (d) Discard the packing (7) on the union (6).
  - (e) Remove the couplings (1) which attach the valve (2) to the duct.
  - (f) Remove the valve (2) and the seals (5).

EFFECTIVITY-

30-21-03



#### TASK 30-21-03-404-010

### 3. Engine Inlet Anti-Ice Valve Installation (Fig. 401)

#### A. Parts

АММ			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1 2 5 6 7	Coupling Valve Seal Union Packing	30-21-03	02	5 15 10 50 60

- B. References
  - (1) AMM 24-22-00/201, Manual Control
  - (2) AMM 36-00-00/201, Pneumatic System
  - (3) AMM 36-11-04/201, Engine Bleed Air Pressure Regulating and Shutoff Valve
  - (4) AMM 54-62-04/401, Forward Fairing Removal/Installation
  - (5) SSM 30-21-01
  - (6) WDM 30-21-11
- C. Access
  - (1) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
    - 451 Engine 1 Strut Forward Fairing, No. 3 Fairing
    - 461 Engine 2 Strut Forward Fairing, No. 3 Fairing
    - 471 Engine 3 Strut Forward Fairing, No. 3 Fairing
    - 481 Engine 4 Strut Forward Fairing, No. 3 Fairing
  - (2) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
    - 451 Engine 1 Strut Forward Fairing, No. 2 and No. 3 Fairings
    - 461 Engine 2 Strut Forward Fairing, No. 2 and
      - No. 3 Fairings
    - 471 Engine 3 Strut Forward Fairing, No. 2 and
      - No. 3 Fairings
    - 481 Engine 4 Strut Forward Fairing, No. 2 and No. 3 Fairings
- D. Valve Installation

s 424-011

(1) Install the valve:

ALL

(a) Set the anti-ice valve (2) in the duct and install the couplings (1) with the seals (5).

EFFECTIVITY-

30-21-03



CAUTION: MAKE SURE THAT THE VALVE IS INSTALLED AS SPECIFIED IN THE STEP THAT FOLLOWS. IF THE VALVE IS NOT INSTALLED CORRECTLY, THE ELECTRICAL CONNECTOR CAN TOUCH THE HYDRAULIC LINE AND CASUE DAMAGE TO IT.

- (b) Turn the valve so that center of the electrical connector on the valve is 4.20 to 4.50 inches from the flange surface of the upper spar fitting assembly (Fig. 401).
  - 1) Tighten the couplings to 95-110 pound-inches torque.
- (c) Install packing (7) on each end of the union (6).
- (d) Install the union (6) on the valve (2).
- (e) Connect the pressure sense tube (4) to the union (6).
- (f) Connect the bonding jumper.

s 434-012

- (2) Install the electrical connector (3).
- E. Valve Operation and Air Leak Test

S 864-014

- (1) Remove the DO-NOT-CLOSE tag and close this circuit breaker for the applicable engine:
  - (a) P6 Main Power Distribution Panel
    - 1) 6J10 NACELLE ANTI-ICE 1
    - 2) 6J11 NACELLE ANTI-ICE 2
    - 3) 6J12 NACELLE ANTI-ICE 3
    - 4) 6J13 NACELLE ANTI-ICE 4

S 864-015

(2) Supply electrical power (AMM 24-22-00/201).

s 864-024

CAUTION: IF THE PNEUMATIC AIR IS HOT (APPROXIMATELY 350°F), DO NOT OPEN THE ENGINE INLET ANTI-ICE VALVE FOR MORE THAN 30 SECONDS.

AFTER THE VALVE CLOSES, LET THE INLET COWL BECOME COOL. TOO MUCH HEAT CAN CAUSE DAMAGE TO THE INLET COWL.

(3) Supply pneumatic power (AMM 36-00-00/201).

s 984-017

(4) Manually open the PRSOV (AMM 36-11-04/201).

S 864-018

- (5) Push the applicable NACELLE ANTI-ICE switch on the anti-ice/rain removal module to ON.
  - (a) Make sure that the position indicator on the valve moves from CLOSED to OPEN.

EFFECTIVITY-

30-21-03



s 794-019

- (6) Make sure that there is not too much air leakage from the valve.
  - (a) Diffuse leakage is permitted.
  - (b) Jet blast leakage is not permitted.

s 414-020

(7) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Close the access door on the fairing.

s 404-027

(8) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Install No. 2 and No. 3 forward fairings of the engine strut (AMM 54-62-04/401).

s 864-022

(9) Remove pneumatic power (AMM 36-00-00/201).

S 864-023

(10) Remove electrical power (AMM 24-22-00/201).

EFFECTIVITY-

ALL

30-21-03



### ENGINE INLET ANTI-ICE NOSE COWL PRESSURE SWITCH - REMOVAL/INSTALLATION

#### 1. General

- A. There are two tasks in this subject. There is one task for removal and there is one task for installation of the engine inlet thermal anti-ice (TAI) nose cowl pressure switch.
- B. The procedure is the same for each engine.

#### TASK 30-21-04-004-001

- Remove the Nose Cowl Pressure Switch (Fig. 401)
  - A. References
    - (1) 36-00-00/201, Pneumatic System
    - (2) 54-62-04/401, Forward Fairing Removal/Installation
    - (3) SSM 30-21-01, 30-21-02, 30-21-03, 30-21-04
    - (4) WDM 30-21-11, 30-21-21, 30-21-31, 30-21-41
  - B. Access
    - (1) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
      - 451 Engine 1 Strut Forward Fairing, No. 3 Fairing
      - 461 Engine 2 Strut Forward Fairing, No. 3 Fairing
      - 471 Engine 3 Strut Forward Fairing, No. 3 Fairing
      - 481 Engine 4 Strut Forward Fairing, No. 3 Fairing
    - (2) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Location Zone
      - 451 Engine 1 Strut Forward Fairing, No. 2 and No. 3 Fairings
      - 461 Engine 2 Strut Forward Fairing, No. 2 and No. 3 Fairings
      - 471 Engine 3 Strut Forward Fairing, No. 2 and
        - No. 3 Fairings
      - 481 Engine 4 Strut Forward Fairing, No. 2 and No. 3 Fairings
  - C. Procedure

s 844-002

(1) Make sure that there is no pressure in the pneumatic system (Ref 36-00-00/201).

S 864-026

(2) Open this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

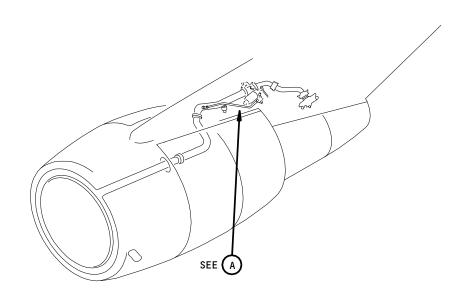
6J12 NACELLE ANTI ICE 3

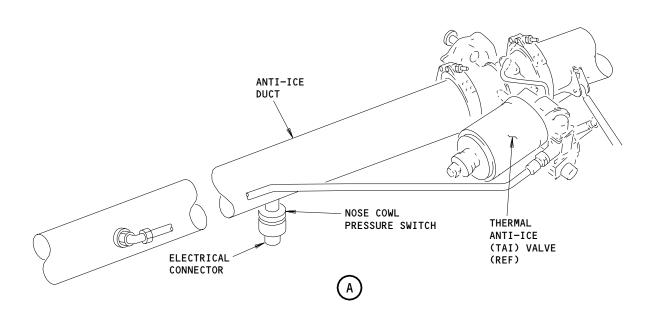
6J13 NACELLE ANTI ICE 4

EFFECTIVITY-

30-21-04







Nose Cowl Pressure Switch Installation Figure 401

ALL

O2 Page 402
Oct 10/96

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



s 014-054

(3) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING;
Open the TAI access door on the left side of the No. 3 forward fairing.

s 044-055

(4) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Remove No. 2 and No. 3 forward fairings (Ref 54-62-04/401).

s 034-004

(5) Remove the applicable electrical connector from the switch:

Engine 1	Connector DS789
Engine 2	Connector DS790
Engine 3	Connector DS791
Engine 4	Connector DS792

s 024-005

(6) Unscrew the switch from the anti-ice duct and remove it with the packing.

TASK 30-21-04-404-006

- 3. Install the Nose Cowl Pressure Switch (Fig. 401)
  - A. References
    - (1) IPC 30-21-04 Fig. 2
    - (2) SSM 30-21-01, 30-21-02, 30-21-03, 30-21-04
    - (3) WDM 30-21-11, 30-21-21, 30-21-31, 30-21-41
  - B. Access
    - (1) Location Zone

451 Engine 1 - Strut Forward Fairing, No. 3 Fairing 461 Engine 2 - Strut Forward Fairing, No. 3 Fairing 471 Engine 3 - Strut Forward Fairing, No. 3 Fairing 481 Engine 4 - Strut Forward Fairing, No. 3 Fairing

C. Installation Procedure

s 424-007

ALL

(1) Install the nose cowl pressure switch with a new packing in the anti-ice duct.

EFFECTIVITY-

30-21-04



s 434-008

(2) Torque the switch to 270 ±13 pound-inches.

s 434-009

(3) Install lockwire on the switch.

s 434-010

(4) Install the electrical connector.

s 414-056

(5) AIRPLANES WITH ACCESS DOOR ON THE FORWARD FAIRING; Close the TAI access door.

s 404-057

(6) AIRPLANES WITHOUT ACCESS DOOR ON THE FORWARD FAIRING; Install No. 2 and No. 3 forward fairings (Ref 54-62-04/401).

s 864-027

(7) Close this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:

6J10 NACELLE ANTI ICE 1

6J11 NACELLE ANTI ICE 2

6J12 NACELLE ANTI ICE 3

6J13 NACELLE ANTI ICE 4

EFFECTIVITY-

ALL

30-21-04



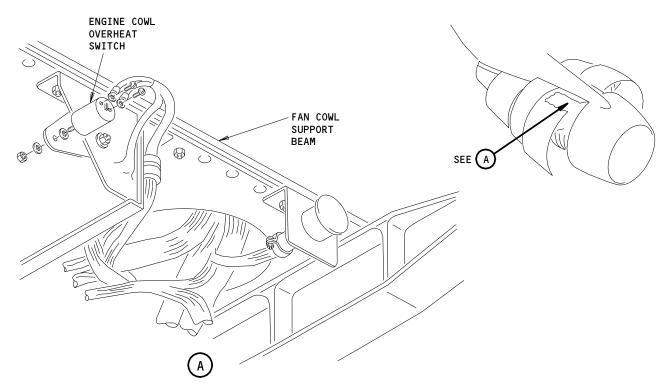
## ENGINE COWL OVERHEAT SWITCH - REMOVAL/INSTALLATION

#### 1. General

- A. There are two tasks in this subject. There is one task for the removal for the installation of the engine inlet thermal anti-ice (TAI) cowl overheat switch. To remove the switch, it is first necessary to remove the sealant from the switch.
- The procedure is the same for each engine.

TASK 30-21-05-004-001

- 2. Engine Cowl Overheat Switch Removal (Fig. 401)
  - References
    - (1) SSM 30-21-01, 30-21-02, 30-21-03, 30-21-04
    - WDM 30-21-12, 30-21-22, 30-21-32, 30-21-42



Engine Cowl Overheat Switch Installation Figure 401

EFFECTIVITY-ALL

30-21-05

03

Page 401 Feb 10/93



- B. Access
  - (1) Location Zone
    - 451 Engine 1 Strut Forward Fairing, Fan Cowl Support Beam
    - 461 Engine 2 Strut Forward Fairing, Fan Cowl Support Beam
    - 471 Engine 3 Strut Forward Fairing, Fan Cowl Support Beam
    - 481 Engine 4 Strut Forward Fairing, Fan Cowl Support Beam
  - (2) Access Panel
    - 414 Engine 1 Right Fan Cowl Panel
    - 424 Engine 2 Right Fan Cowl Panel
    - 434 Engine 3 Right Fan Cowl Panel
    - 444 Engine 4 Right Fan Cowl Panel
- C. Procedure
  - s 864-002
  - (1) Set the applicable NACELLE ANTI-ICE switch on the anti-ice/rain removal module (P5 panel) to the off position.
    - s 864-003
  - (2) Open this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:
    - 6J10 NACELLE ANTI-ICE 1
    - 6J11 NACELLE ANTI-ICE 2
    - 6J12 NACELLE ANTI-ICE 3
    - 6J13 NACELLE ANTI-ICE 4
    - s 014-004
  - (3) Open the right fan cowl panel 414, 424, 434, or 444 for the applicable engine.
    - s 024-005
  - (4) Remove the engine cowl overheat switch:
    - (a) Remove the sealant from the switch.
    - (b) Disconnect the 2 electrical terminals.
    - (c) Remove the nut, the 2 washers, and the switch.
- TASK 30-21-05-404-006
- Engine Cowl Overheat Switch Installation (Fig. 401)
  - A. Consumable Materials
    - (1) A00247 Sealant Chromate Type BMS 5-95
  - B. References
    - (1) IPC 26-12-00 Fig. 1

ALL

- (2) SSM 30-21-01, 30-21-02, 30-21-03, 30-21-04
- (3) WDM 30-21-12, 30-21-22, 30-21-32, 30-21-42

EFFECTIVITY-

30-21-05



- C. Access
  - (1) Location Zone

Engine 1 - Strut Forward Fairing, Fan Cowl Support Beam Engine 2 - Strut Forward Fairing, Fan Cowl Support Beam

471 Engine 3 - Strut Forward Fairing, Fan Cowl Support Beam

481 Engine 4 - Strut Forward Fairing, Fan Cowl Support Beam

(2) Access Panel

414 Engine 1 - Right Fan Cowl Panel

424 Engine 2 - Right Fan Cowl Panel

434 Engine 3 - Right Fan Cowl Panel

444 Engine 4 - Right Fan Cowl Panel

- D. Procedure
  - s 424-007
  - (1) Install the engine cowl overheat switch with the 2 washers and the nut.
    - s 434-008
  - (2) Install the 2 wire terminals on the switch.
    - s 394-009
  - (3) Apply sealant around the terminal connections.
    - s 414-012
  - (4) Close the right fan cowl panel.
    - s 864-013
  - (5) Close this circuit breaker on the P6 Main Power Distribution Panel for the applicable engine:
    - 6J10 NACELLE ANTI-ICE 1
    - 6J11 NACELLE ANTI-ICE 2
    - 6J12 NACELLE ANTI-ICE 3
    - 6J13 NACELLE ANTI-ICE 4

EFFECTIVITY-

30-21-05



# PITOT STATIC, TOTAL AIR TEMPERATURE PROBE AND ANGLE OF ATTACK SENSOR ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

## 1. General (Fig. 1)

- A. Electric heaters are built into the four pitot-static probes, two total air temperature (TAT) probes, and two angle of attack (AOA) sensor vanes to prevent ice formation. The heaters operate automatically.
- B. The Pitot-Static/TAT/AOA Anti-Ice System consists of dual heaters in each pitot-static probe, a heater in each TAT probe, a heater in each AOA sensor vane, and the anti-icing system relays. The heaters are powered by 115 volts ac through circuit breakers on the P6 panel. System relays are powered by 28 volts dc through circuit breakers on the P6 panel.
- C. The Pitot-Static/TAT/AOA Anti-Ice System provides inputs to the EIUs for EICAS fault indication. There is a current sensing relay in line with each heater which can provide a fault signal to the EIUs. If a heater loses its 115 volts ac power source or becomes open-circuited, an advisory message will be displayed on EICAS.
- D. The system is connected to the Central Maintenance Computer System (CMCS) for ground testing purposes. During a ground test, any faults that exist with the heaters will be displayed on EICAS.

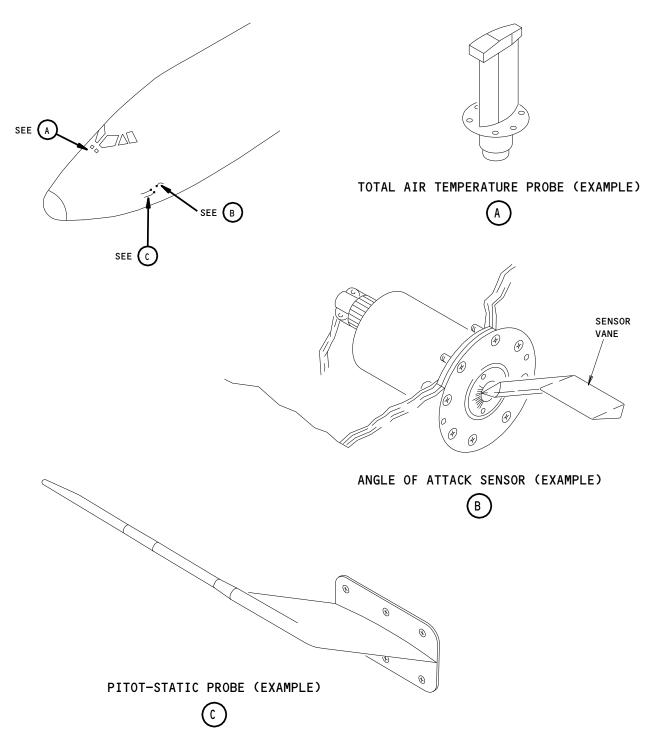
## 2. Operation (Fig. 2)

- A. Functional Description
  - (1) When the N2 tachometer for any engine is greater than 50%, the AOA sensor heaters and the pitot-static probe strut heaters energize, while the pitot-static probe head heaters energize in their low heat mode. At lift-off, the TAT probe heaters energize and the pitot-static probe head heaters switch to their high heat mode. All probe heaters are self-regulating.
- B. Control
  - (1) Operation of the Pitot-Static/TAT/AOA Anti-Ice System is automatic. No control functions are exercised.

ALL

30-31-00





NOTE: LEFT SIDE COMPONENTS SHOWN, RIGHT SIDE OPPOSITE.

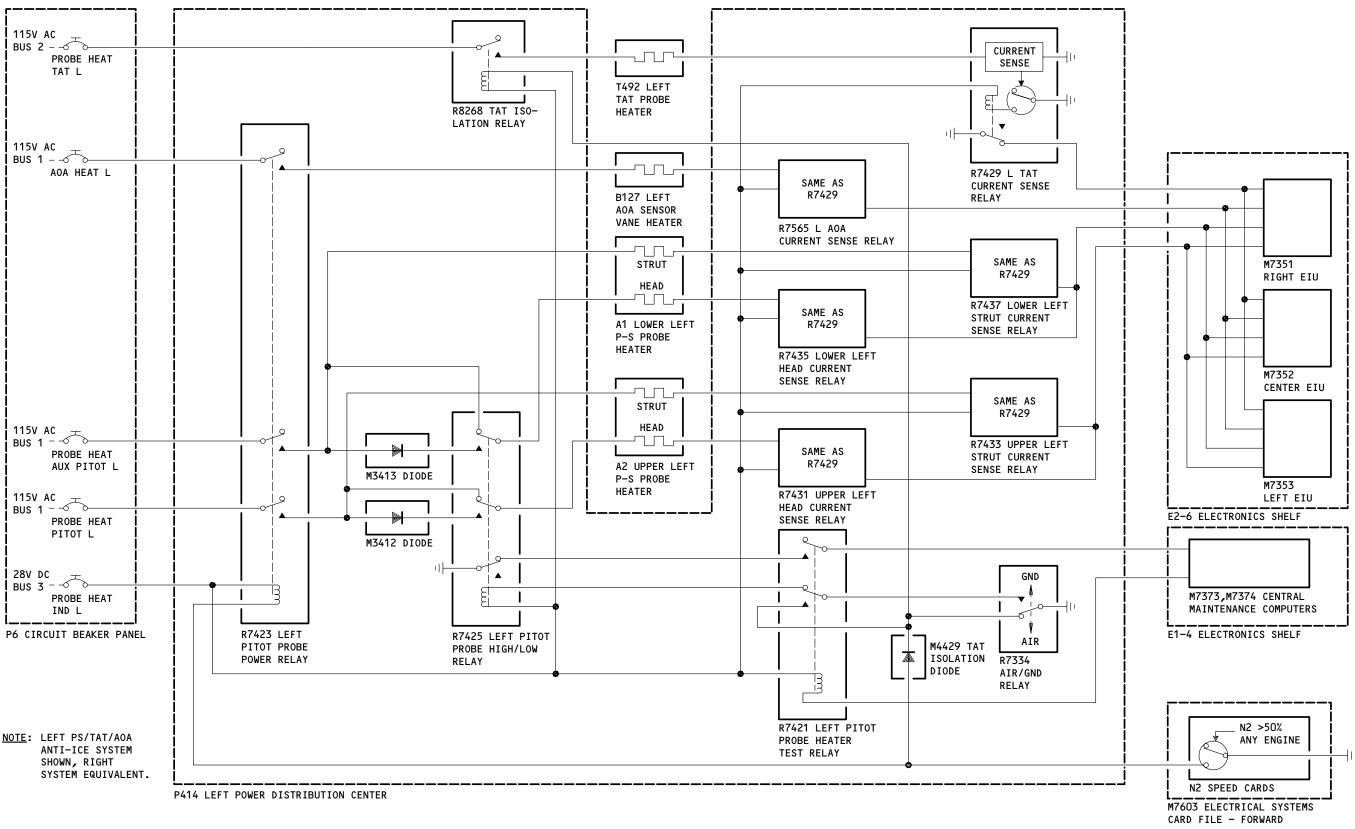
Pitot-Static/TAT/AOA Anti-Ice System - Component Location Figure 1

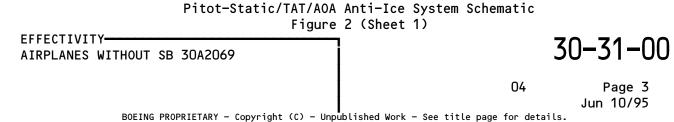
ALL

O1 Page 2
Feb 10/94

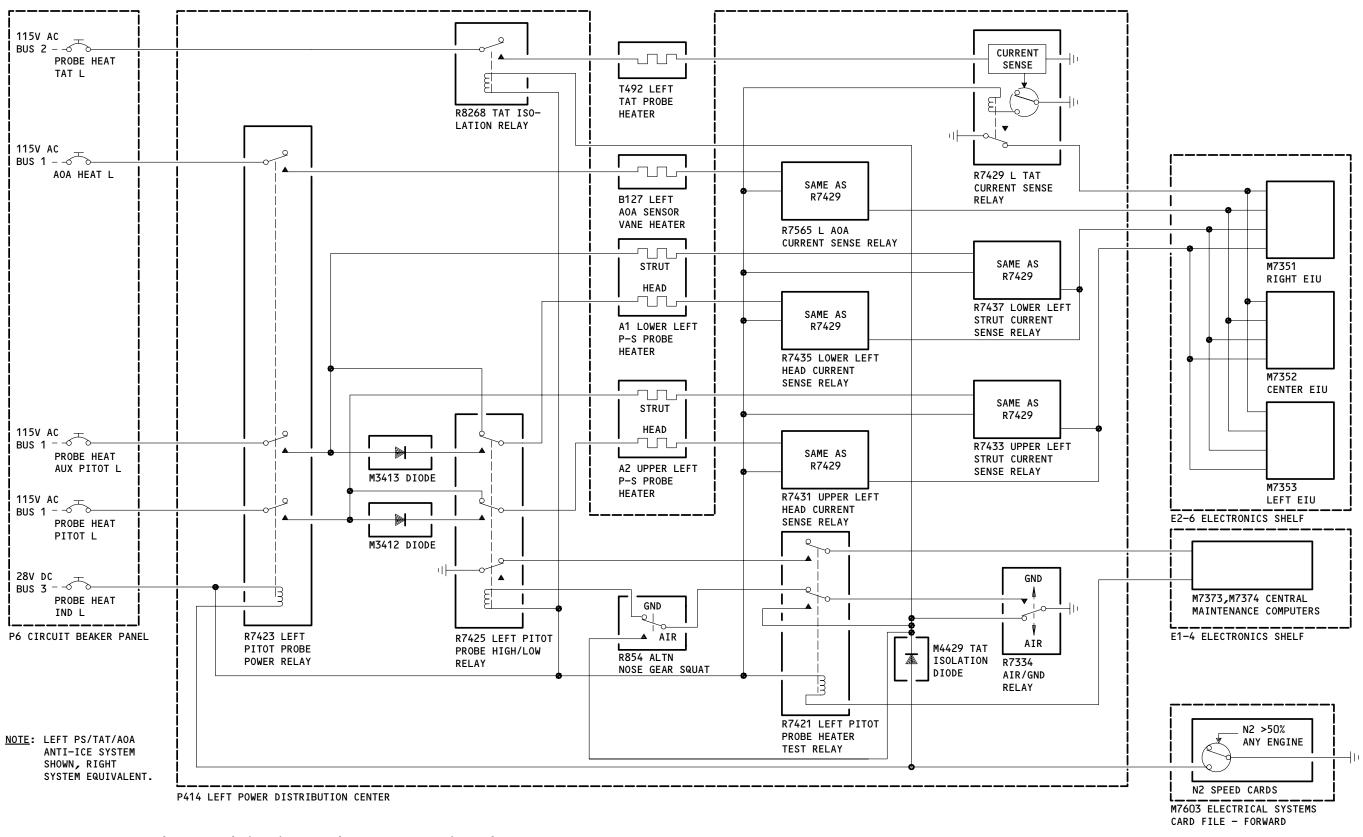
BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



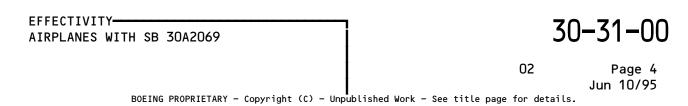








Pitot-Static/TAT/AOA Anti-Ice System Schematic Figure 2 (Sheet 2)





## PITOT-STATIC/TAT/AOA ANTI-ICE SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CARD — (FIM 77-00-00/101) ENG 1 N2 SPEED, YMLA1 ENG 2 N2 SPEED, YMLA3 ENG 3 N2 SPEED, YMLA5 ENG 4 N2 SPEED, YMLA7 CIRCUIT BREAKERS — L AOA HEAT, C10262 R AOA HEAT, C10261 L PROBE HEAT AUX PITOT, C580 R PROBE HEAT AUX PITOT, C456 L PROBE HEAT IND, C10137 R PROBE HEAT IND, C10137 R PROBE HEAT IND, C10138 L PROBE HEAT TAT, C59 R PROBE HEAT TAT, C59 R PROBE HEAT TAT, C59 R PROBE HEAT TAT, C459 COMPUTER — (FIM 45-10-00/101) L CENTRAL MAINTENANCE, M7373 R CENTRAL MAINTENANCE, M7374 DIODE — (FIM 31-01-36/101) M3412 M3413 M4429 DIODE — (FIM 31-01-39/101) L AUX PITOT STATIC, A1 R AUX PITOT STATIC, A2 PROBE — (FIM 34-11-00/101) L TOTAL AIR TEMPERATURE, T492 R TOTAL AIR TEMPERATURE, T492 R TOTAL AIR TEMPERATURE, T493 RELAY — (FIM 31-01-36/101) AIR/GROUND, R7334 L AOA CURRENT SENSE, R7565 L AUX P/S CURRENT SENSE HEAT, R7437 L MAIN P/S CURRENT SENSE HEAT, R7437 L MAIN P/S CURRENT SENSE STRUT, R7437 L MAIN P/S CURRENT SENSE STRUT, R7433 L PITOT PROBE HEATER TEST, R7421 L PITOT PROBE HEATER TEST, R7421 L PITOT PROBE HEATER TEST, R7429 L TAT CURRENT SENSE, R75429 L TAT POWER, R8268	1	1 1 1 1 1 1 1 1 1 1 1 1	FLT COMPT, P6 6C33 6C34 6D32 6D33 6D34 6D35 6D30 6D31 6D28 6D29	****

<sup>\*</sup> SEE WDM EQUIPMENT LIST

Pitot-Static/TAT/AOA Anti-Ice System - Component Index Figure 101 (Sheet 1)

ALL ALL

30-31-00

01.1

Page 101 0ct 18/00



COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
RELAY - (FIM 31-01-39/101)  AIR/GROUND, R330  ALTN NOSE GR SQUAT, R854 PRI NOSE GR SQUAT, R853 R AOA CURRENT SENSE, R7564 R AUX P/S CURRENT SENSE HEAD, R7436 R AUX P/S CURRENT SENSE HEAD, R7432 R MAIN P/S CURRENT SENSE HEAD, R7432 R MAIN P/S CURRENT SENSE STRUT, R7434 R PITOT PROBE HEATER TEST, R7422 R PITOT PROBE HIGH/LOW, R7426 R PITOT PROBE HIGH/LOW, R7426 R PITOT PROBE POWER, R7424 R TAT CURRENT SENSE, R7430 R TAT POWER, R8269 SENSOR - (FIM 34-12-00/101) ALTN NOSE GR SQUAT, S801 L AOA, B127 PRI NOSE GR SQUAT, S800 R AOA, B126 UNIT - (FIM 31-61-00/101) C EFIS/EICAS INTERFACE, M7351 L EFIS/EICAS INTERFACE, M7353 R EFIS/EICAS INTERFACE, M7352				

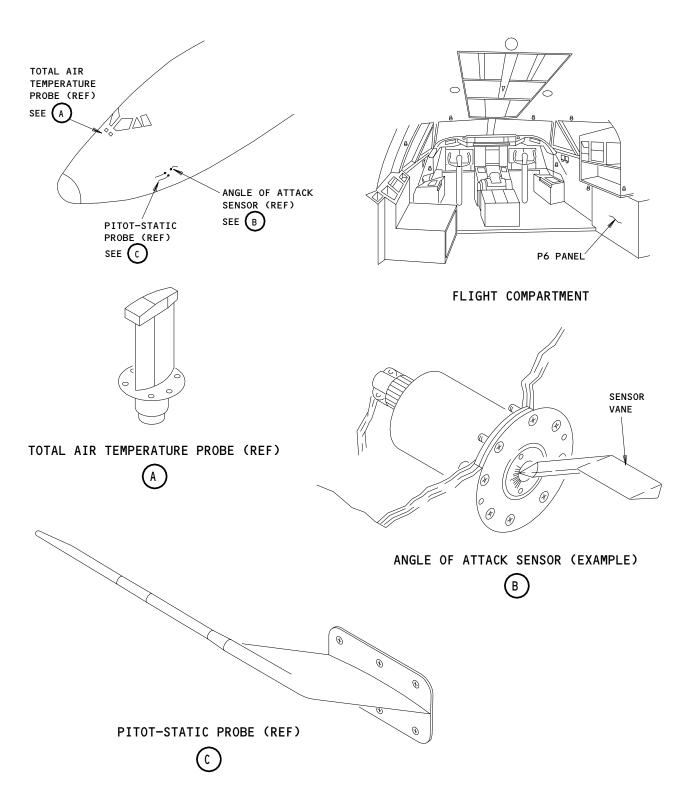
<sup>\*</sup> SEE WDM EQUIPMENT LIST

Pitot-Static/TAT/AOA Anti-Ice System - Component Index Figure 101 (Sheet 2)

30-31-00

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.





Pitot-Static/TAT/AOA Anti-Ice System - Component Location Figure 102

ALL

O1 Page 103
Jun 10/96

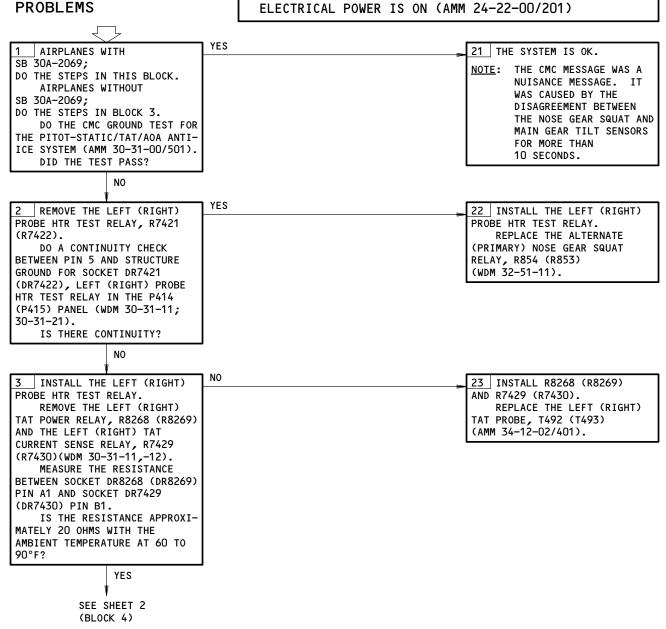
BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.

### **PREREQUISITES**

TAT PROBE HEAT

MAKE SURE THESE CIRCUIT BREAKERS ARE CLOSED: 6D28,6D29,6D34,6D35

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION: ELECTRICAL POWER IS ON (AMM 24-22-00/201)

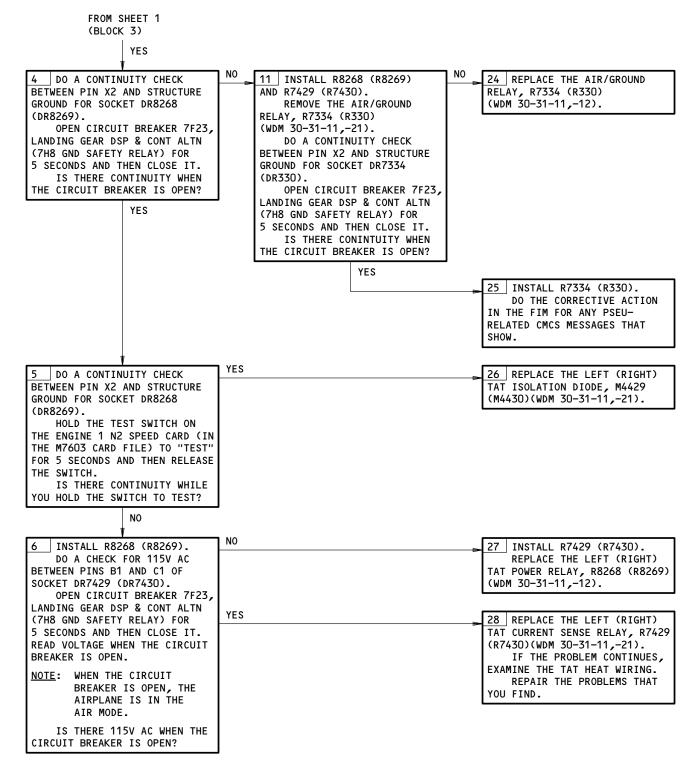


TAT Probe Heat Problems Figure 103 (Sheet 1)

ALL

O1 Page 104
Jun 10/96

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



TAT Probe Heat Problems Figure 103 (Sheet 2)

ALL

O1 Page 105
Jun 10/96

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.

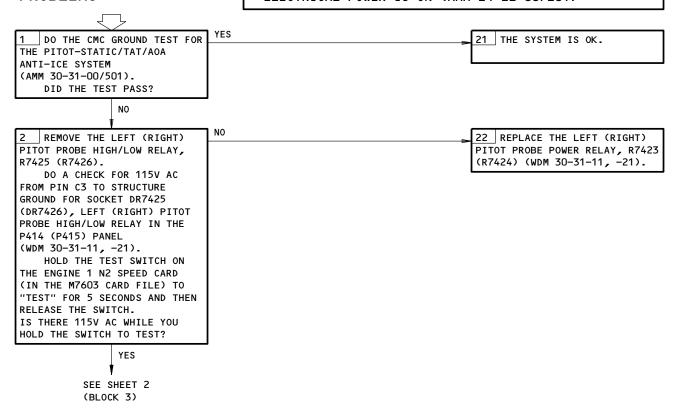


**PREREQUISITES** 

## CAPT (F/O) PITOT STATIC PROBE HEAT PROBLEMS

MAKE SURE THESE CIRCUIT BREAKERS ARE CLOSED: 6D30, 6D31, 6D34, 6D35

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION: ELECTRICAL POWER IS ON (AMM 24-22-00/201)



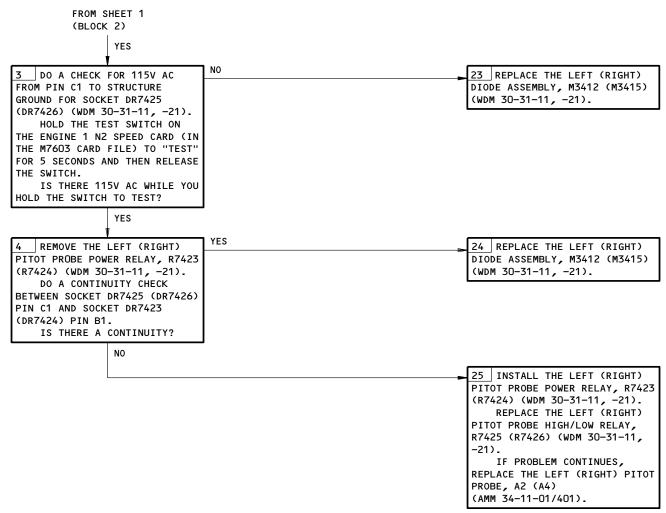
CAPT (F/O) Pitot Static Probe Heat Problems Figure 104 (Sheet 1)

ALL

O1 Page 106
Jun 18/99

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.





## CAPT (F/O) Pitot Static Probe Heat Problems Figure 104 (Sheet 2)

ALL

O1 Page 107

Jun 18/99

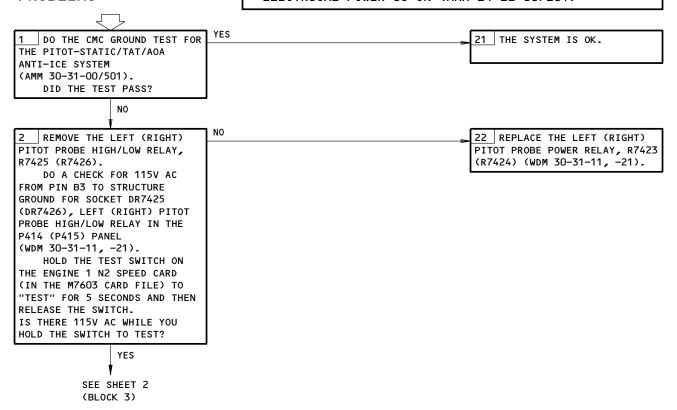
BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.

**PREREQUISITES** 

## AUX PITOT STATIC PROBE HEAT **PROBLEMS**

MAKE SURE THESE CIRCUIT BREAKERS ARE CLOSED: 6D32, 6D33, 6D34, 6D35

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION: ELECTRICAL POWER IS ON (AMM 24-22-00/201)

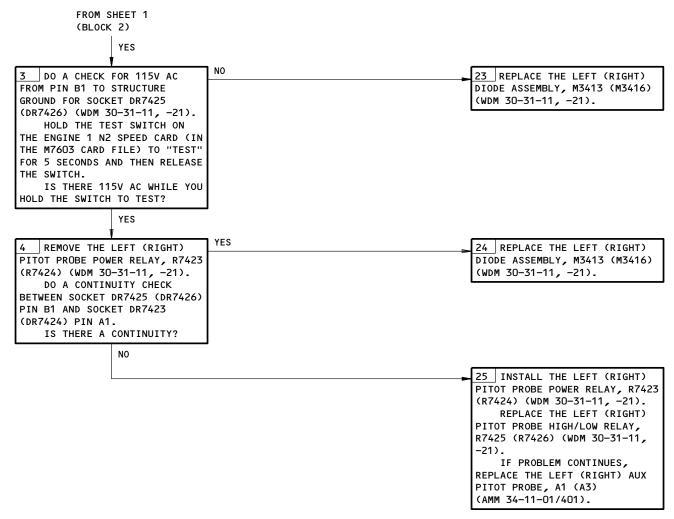


AUX Pitot Static Probe Heat Problems Figure 105 (Sheet 1)

EFFECTIVITY-ALL

30-31-00





## AUX Pitot Static Probe Heat Problems Figure 105 (Sheet 2)

ALL

O1 Page 109
Oct 18/99

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



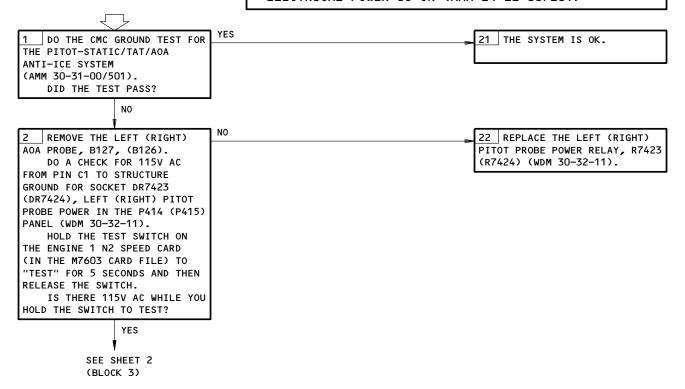
## AOA PROBE HEAT

**PROBLEMS** 

PREREQUISITES

MAKE SURE THESE CIRCUIT BREAKERS ARE CLOSED: 6C33, 6C34, 6D34, 6D35

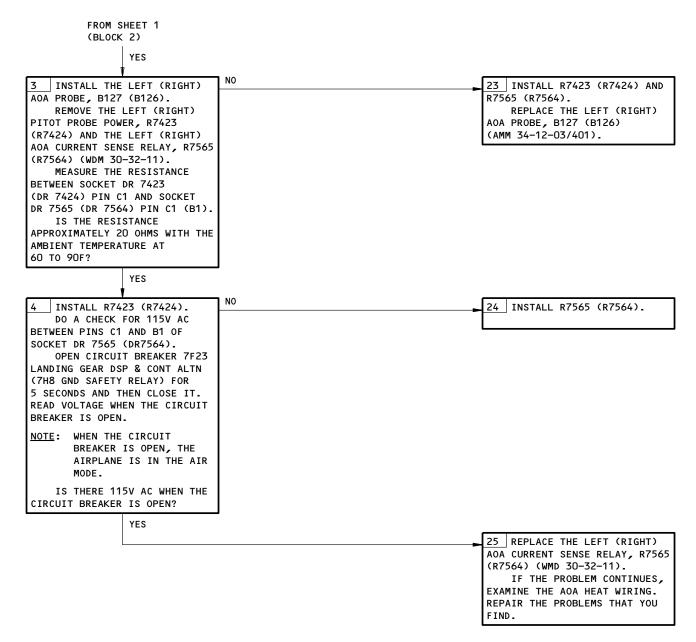
MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION: ELECTRICAL POWER IS ON (AMM 24-22-00/201)



AOA Probe Heat Problems Figure 106 (Sheet 1)

K60462

30-31-00



AOA Probe Heat Problems Figure 106 (Sheet 2)

ALL

O1 Page 111
Oct 18/99

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



# PITOT STATIC, TOTAL AIR TEMPERATURE PROBE AND ANGLE OF ATTACK SENSOR ANTI-ICE SYSTEM - FAULT ISOLATION

- 1. Mutiple Probe Heat Problems Fault Isolation
  - A. Initial Evaluation
    - (1) Start the No. 1 engine (AMM 71-00-00/201).
      - (a) If multiple probe heat messages show, then do the Fault Isolation Procedure below.
      - (b) If a single probe heat message shows, then do the fault isolation procedure for that fault.
      - (c) If no messages show, then there was an intermittent fault.
    - (2) Stop the No. 1 engine (AMM 71-00-00/201).
  - B. Fault Isolation
    - (1) Replace the applicable control relay (WDM 30-31-11, -12).
      - (a) Start the No. 1 engine (AMM 71-00-00/201).
        - 1) If multiple probe heat messages show, then continue.
        - 2) If a single probe heat message shows, then do the fault isolation procedure for that fault.
        - 3) If no messages show, then you fixed the fault.
      - (b) Stop the No. 1 engine (AMM 71-00-00/201).
    - (2) Replace the engine speed card, A1 for engine 1 in the forward electrical system card file, M7603.
      - (a) Start the No. 1 engine (AMM 71-00-00/201).
        - 1) If multiple probe heat messages show, then continue.
        - 2) If a single probe heat message shows, then do the fault isolation procedure for that fault.
        - 3) If no messages show, then you fixed the fault.
      - (b) Stop the No. 1 engine (AMM 71-00-00/201).
    - (3) Do this check of the control wiring:
      - (a) Remove the engine speed card, A1 for engine 1 from the forward electrical systems card file, M7603.
      - (b) Remove the left pitot probe power relay, R7423 from the P414 left power distribution center panel.
      - (c) Remove the right pitot probe power relay, R7424 from the P415 right power distribution center panel.
      - (d) Do a wiring check between these pins of connector XA1 at the forward electrical systems card file, M7603 and connector DR7423 at the P414 left power distribution center panel (WDM 30-31-11):

XA1 DR7423 57 ---- X2

ALL

EFFECTIVITY-

30-31-00



(e) Do a wiring check between these pins of connector XA1 at the forward electrical systems card file, M7603 and connector DR7424 at the P415 right power distribution center panel (WDM 30-31-12):

XA1 DR7424 57 ---- X2

- (f) If you find a problem with the wiring, then do these steps:
  - 1) Repair the wiring.
  - 2) Re-install the engine speed card, A1 for engine 1.
  - 3) Re-install the left pitot probe power relay, R7423.
  - 4) Re-install the right pitot probe power relay, R7424.
  - 5) Start the No. 1 engine (AMM 71-00-00/201).
    - a) If multiple probe heat messages show, then continue.
    - b) If a single probe heat message shows, then do the fault isolation procedure for that fault.
    - c) If no messages show, then you fixed the fault.
  - 6) Stop the No. 1 engine (AMM 71-00-00/201).

EFFECTIVITY-

30-31-00

ALL



# PITOT-STATIC, TOTAL AIR TEMPERATURE PROBE AND ANGLE OF ATTACK SENSOR ANTI-ICE SYSTEM - ADJUSTMENT/TEST

### 1. General

- A. There are three tasks in this subject. The first task is an operational test for the Pitot-Static/TAT/AOA Anti-Ice System. In this procedure, EICAS messages are monitored when the system is operated.
- B. The second task is a CMCS ground test of the probe heat system. In this test, you will use the CMC to do a test of the system. You will look for CMC fault messages if the test result is not PASS.
- C. The third task is a system test of the operation and the failure indication of each probe heater. The test has these parts:
  - Energize the system
  - Feel near the probes to make sure that they become hot
  - Look to see that EICAS messages show at the correct times

During the test, it is necessary to remove and install relays in the P414 and P415 panels. It is also necessary to set the N2 speed cards in the electrical systems card file to the test mode.

D. Keep the time for which probe heat is applied to a minimum. There may be probe damage if heat is applied for too long.

NOTE: A black oxide heat discoloration shows on the forward end of the pitot tubes when the heater is operated on the ground. This does not mean that the probes are damaged.

TASK 30-31-00-715-001

#### Operational Test - Pitot-Static/TAT/AOA Anti-Ice System

- A. References
  - (1) 24-22-00/201, Manual Control
  - (2) 29-11-00/201, Main Hydraulic Supply System
  - (3) 31-61-00/201, Integrated Display System
  - (4) 32-09-02/201, Air/Ground Relay System
  - (5) 32-21-00/1, Nose Gear

ALL

- (6) SSM 30-31-01, 30-32-01, 30-33-01
- (7) WDM 30-31-11, 30-31-21, 30-32-11

EFFECTIVITY-

30-31-00



#### B. Access

- (1) Location Zone
  - 221 Control Cabin, LH
  - 222 Control Cabin, RH
  - 211 Passenger Cabin, Nose to First Door Upper Left P/S
    Probe and Left TAT Probe
  - 212 Passenger Cabin, Nose to First Door Upper Right P/S
    Probe and Right TAT Probe
  - 115 Area between Nose Gear Well and Fuselage Lower Left P/S Probe and Left AOA Sensor Vane
  - 116 Area between Nose Gear Well and Fuselage Lower Right P/S Probe and Right AOA Sensor Vane
  - 117 Electrical and Electronics Compartment P414 Left Power Distribution Center
  - 118 Electrical and Electronics Compartment P415 Right Power Distribution Center
  - 715 Nose Landing Gear

### C. Preconditions

s 865-097

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
  - (c) Air/Ground Relay System is serviceable (AMM 32-09-02/201).
- D. Procedure

s 865-002

(1) Supply electrical power (Ref 24-22-00/201).

s 015-005

(2) Remove any covers from the pitot-static and the temperature probes.

S 865-064

WARNING: MAKE SURE TO OPEN ENGINE IGNITION CIRCUIT BREAKERS BEFORE YOU SET THE FUEL CONTROL SWITCH TO RUN. IF YOU DO NOT OPEN THE CIRCUIT BREAKERS, THE IGNITER PLUGS CAN AUTOMATICALLY FIRE. WITH UNBURNED FUEL IN THE COMBUSTION CHAMBER, THERE MAY BE AN INTERNAL ENGINE FIRE OR A TAILPIPE FIRE. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO THE ENGINE.

- (3) Open these circuit breakers on the P6 Main Power Distribution Panel:
  - (a) 6F1 IGN 1 ENG 1
  - (b) 6K19 IGN 2 ENG 1

ALL

(c) 6G19 STBY IGN ENG 1

EFFECTIVITY-

30-31-00



S 865-059

(4) Set the FUEL CONTROL 1 switch on the P8 control stand to RUN.

NOTE: No probe heat EICAS messages will show until approximately five minutes after the FUEL CONTROL 1 switch is set to RUN.

s 045-055

WARNING: YOU MUST CAREFULLY DO THE STEPS IN THE TASK BELOW TO PREPARE THE SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE. FAILURE TO DO THE STEPS CORRECTLY CAN CAUSE THE AUTOMATIC OPERATION OF AIRPLANE SYSTEMS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Do this task: "Prepare Safety-Sensitive Systems for Air Mode Simulation" (Ref 32-09-02/201).

S 865-082

- (6) Close these circuit breakers:
  - (a) P6 Panel
    - 1) 6C33 AOA HEAT L
    - 2) 6C34 AOA HEAT R
    - 3) 6D32 PROBE HEAT AUX PITOT L
    - 4) 6D33 PROBE HEAT AUX PITOT R
    - 5) 6D34 PROBE HEAT IND L
    - 6) 6D35 PROBE HEAT IND R
    - 7) 6D30 PROBE HEAT PITOT L
    - 8) 6D31 PROBE HEAT PITOT R
    - 9) 6D28 PROBE HEAT TAT L
    - 10) 6D29 PROBE HEAT TAT R
  - (b) P7 Panel
    - 7F22 LANDING GEAR DSP CONT PRI

s 715-006

(7) Make sure that these EICAS advisory messages show:

HEAT P/S CAPT HEAT P/S F/O HEAT P/S L AUX HEAT P/S R AUX HEAT L AOA HEAT R AOA

s 865-007

(8) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.

EFFECTIVITY---

30-31-00

ALL



(9) Make sure that these EICAS advisory messages do not show:

HEAT CAPT P/S HEAT P/S L AUX **HEAT R TAT** HEAT L AOA

s 715-080

(10) Make sure that the EICAS advisory message HEAT L TAT shows.

s 865-009

(11) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.

s 865-010

(12) Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.

s 715-011

(13) Make sure that these EICAS advisory messages do not show:

HEAT F/O P/S HEAT P/S R AUX **HEAT L TAT** HEAT R AOA

s 715-081

(14) Make sure that the EICAS advisory message HEAT R TAT shows.

(15) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.

s 865-092

ALL

(16) Install actuators at the nose gear squat switches, S800 and S801.

EFFECTIVITY-

30-31-00

02.101



(17) Pressurize hydraulic system No. 1 and 4 (AMM 29-11-00/201).

s 715-093

(18) Make sure that these EICAS advisory messages do not show:

HEAT R TAT

s 715-103

(19) Remove pressure from hydraulic system No. 1 and 4 if it is not necessary (AMM 29-11-00/201).

s 865-095

(20) Remove the actuators from switches S800 and S801.

s 445-056

(21) Do this task: "Put Safety-Sensitive Systems Back to the Condition before Air Mode Simulation" (Ref 32-09-02/201).

s 415-013

(22) Install covers on probes after they become cool.

s 865-061

(23) Set the FUEL CONTROL 1 switch on the P8 control stand to CUTOFF.

s 865-060

- (24) Close the following circuit breakers on the P6 Main Power Distribution Panel:
  - (a) 6F1 IGN 1 ENG 1
  - (b) 6K19 IGN 2 ENG 1
  - (c) 6G19 STBY IGN ENG 1

s 865-014

ALL

(25) Remove electrical power (Ref 24-22-00/201).

TASK 30-31-00-715-083

- 3. Ground Test Pitot-Static/TAT/AOA Anti-Ice System
  - A. General
    - (1) This test does a check of the air mode operation of the probe heaters only.
    - (2) This test does not do a check of the ground mode operation of the probe heaters.
  - B. Equipment
    - (1) Digital Multimeter, Fluke Model 77 or equivalent

<u>NOTE</u>: This is used for alternative voltage measurements when you do a check of the probe heat diode assembly.

EFFECTIVITY-

30-31-00

n:



- C. References
  - (1) 24-22-00/201, Manual Control
- D. Access
  - (1) Location Zone

221, 222 Control Cabin

E. Preconditions

S 865-098

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- F. Prepare for the Test

S 865-084

(1) Supply electrical power (Ref 24-22-00/201).

s 865-086

(2) Set the GND TEST switch on the P461 overhead maintenance panel to ENABLE.

S 865-087

- (3) Prepare the CDU for the test:
  - (a) Push the MENU key on the CDU to show the MENU.
  - (b) Push the line-select key (LSK) that is adjacent to <CMC to show the CMC MENU.
  - (c) If <RETURN shows after you push the LSK, push the LSK that is adjacent to <RETURN until you see the CMC MENU.
  - (d) Push the LSK that is adjacent to <GROUND TESTS to show the GROUND TESTS menu.
  - (e) Push the NEXT PAGE key until you find <30 ICE AND RAIN.
  - (f) Push the LSK that is adjacent to <30 ICE AND RAIN to show the GROUND TESTS menu for the ice and rain system.

NOTE: If INHIBITED shows above the applicable prompt (<PROBE HEAT L or <PROBE HEAT R), the test will not operate.

EFFECTIVITY-

ALL

30-31-00



G. Probe Heat System Ground Test

s 745-088

(1) Push the LSK that is adjacent to the applicable prompt (<PROBE HEAT L or <PROBE HEAT R).</p>

NOTE: IN PROGRESS will show during the test.

s 745-089

(2) When IN PROGRESS goes out of view, look for PASS or FAIL> adjacent to the applicable prompt (<PROBE HEAT L or <PROBE HEAT R).

NOTE: If a PASS indication shows, no failures occurred during the test. Make sure there is continuity through the diode for the left and right of the pitot and AUX probe heat.

- (a) If PASS> shows, do these steps to check for continuity through the diode:
  - 1) Open the following circuit breakers on the P6 Main Power Distribution Panel:
    - a) 6D30 PROBE HEAT PITOT L
    - b) 6D31 PROBE HEAT PITOT R
    - c) 6D32 PROBE HEAT AUX PITOT L
    - d) 6D33 PROBE HEAT AUX PITOT R
    - e) 6D34 PROBE HEAT IND L
    - f) 6D35 PROBE HEAT IND R
  - 2) Remove the RELAY PITOT PROBE HI/LOW LEFT (RIGHT), R7425 (R7426) from the P414 (P415) Power Distribution Center.
  - 3) Close the following circuit breakers on the P6 Main Power Distribution Panel:
    - a) 6D30 PROBE HEAT PITOT L
    - b) 6D31 PROBE HEAT PITOT R
    - c) 6D32 PROBE HEAT AUX PITOT L
    - d) 6D33 PROBE HEAT AUX PITOT R
    - e) 6D34 PROBE HEAT IND L

EFFECTIVITY-

ALL

30-31-00

Page 507 0ct 18/99



- f) 6D35 PROBE HEAT IND R
- 4) Set the S1 switch on the YMLAOO1 ENG1 N2 speed card in the forward electrical system card file to TEST.
- 5) Measure the voltage at Pin C1 and Pin B1 of the left (right) Relay socket DR7425 (DR7426).
- 6) Make sure the voltage measurement is from 110 to 115 volts, with a digital multimeter on the AC scale.
- 7) If the voltage measurement is not from 110 to 115 volts, replace the appropriate Diode Assembly (M3412 (M3415) for left (right) pitot and M3413 (M3416) for left (right) AUX probe heat).
- 8) Open the following circuit breakers:
  - a) 6D30 PROBE HEAT PITOT L
  - b) 6D31 PROBE HEAT PITOT R
  - c) 6D32 PROBE HEAT AUX PITOT L
  - d) 6D33 PROBE HEAT AUX PITOT R
  - e) 6D34 PROBE HEAT IND L
  - f) 6D35 PROBE HEAT IND R
- 9) Install the RELAY PITOT PROBE HI/LOW LEFT (RIGHT), R7425 (R7426) in the P414 (P415) Power Distribution Center.
- 10) Close the following circuit breakers:
  - a) 6D30 PROBE HEAT PITOT L
  - b) 6D31 PROBE HEAT PITOT R
  - c) 6D32 PROBE HEAT AUX PITOT L
  - d) 6D33 PROBE HEAT AUX PITOT R
  - e) 6D34 PROBE HEAT IND L
  - f) 6D35 PROBE HEAT IND R
- (b) If FAIL> shows, look for probe heat system CMCS messages:
  - Push the LSK that is adjacent to FAIL> to see the GROUND TEST MSG pages for the failure.
  - 2) Push the NEXT PAGE key until you find all the GROUND TEST MSG pages.
  - 3) Make a list of all CMCS messages, CMCS message numbers, and ATA numbers that show on the GROUND TEST MSG pages.
  - 4) Go to the CMCS Message Index of the Fault Isolation Manual (FIM) to find the corrective action for each CMCS message.
- H. Put the Airplane in Its Usual Condition

s 865-090

ALL

(1) Set the GND TEST switch to NORM.

EFFECTIVITY-

30-31-00



s 865-091

(2) Remove electrical power (Ref 24-22-00/201).

TASK 30-31-00-735-015

- 4. System Test Pitot-Static/TAT/AOA Anti-Ice System
  - A. Equipment
    - (1) Digital Multimeter, Fluke Model 77 or equivalent

<u>NOTE</u>: This is used for alternative voltage measurements when you do a check of the probe heater operation.

- B. References
  - (1) 24-22-00/201 Manual Control
  - (2) 31-61-00/201, Integrated Display System
  - (3) 32-09-02/201, Air/Ground Relay System
  - (4) SSM 30-31-01, 30-32-01, 30-33-01
  - (5) WDM 30-31-11, 30-31-21, 30-31-32
- C. Access
  - (1) Location Zone
    - 221 Control Cabin, LH
    - 222 Control Cabin, RH
    - 211 Passenger Cabin, Nose to First Door Upper Left P/S Probe and Left TAT Probe
    - 212 Passenger Cabin, Nose to First Door Upper Right P/S
      Probe and Right TAT Probe
    - 115 Area between Nose Gear Well and Fuselage Lower Left P/S Probe and Left AOA Sensor Vane
    - 116 Area between Nose Gear Well and Fuselage Lower Right P/S Probe and Right AOA Sensor Vane
    - 117 Electrical and Electronics Compartment P414 Main Power Distribution Panel
    - 118 Electrical and Electronics Compartment P415 Main Power Distribution Panel

EFFECTIVITY-

30-31-00

ALL



#### D. Preconditions

- s 865-099
- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
  - (c) Air/Ground Relay System is serviceable (AMM 32-09-02/201).
- E. Prepare for Test
  - s 865-016
  - (1) Supply electrical power (Ref 24-22-00/201).
    - s 015-017
  - (2) Remove any covers from the pitot-static and the temperature probes.
    - S 865-062
  - MAKE SURE TO OPEN ENGINE IGNITION CIRCUIT BREAKERS BEFORE YOU WARNING: SET THE FUEL CONTROL SWITCH TO RUN. IF YOU DO NOT OPEN THE CIRCUIT BREAKERS, THE IGNITER PLUGS CAN AUTOMATICALLY FIRE. WITH UNBURNED FUEL IN THE COMBUSTION CHAMBER, THERE MAY BE AN INTERNAL ENGINE FIRE OR A TAILPIPE FIRE. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO THE ENGINE.
  - (3) Open the following circuit breakers on the P6 Main Power Distribution Panel:
    - (a) 6F1 IGN 1 ENG 1
    - (b) 6K19 IGN 2 ENG 1
    - STBY IGN ENG 1 (c) 6G19
    - s 865-101

ALL

(4) Set the FUEL CONTROL 1 switch on the P8 control stand to RUN.

NOTE: No probe heat EICAS messages will show until approximately five minutes after the FUEL CONTROL 1 switch is set to RUN.

EFFECTIVITY-

30-31-00



s 045-058

WARNING: YOU MUST CAREFULLY DO THE STEPS IN THE TASK BELOW TO PREPARE THE SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE. FAILURE TO DO THE STEPS CORRECTLY CAN CAUSE THE AUTOMATIC OPERATION OF AIRPLANE SYSTEMS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Do this task: "Prepare Safety-Sensitive Systems for Air Mode Simulation" (Ref 32-09-02/201).

s 865-019

- (6) Make sure that these circuit breakers are open:
  - (a) P6 Main Power Distribution Panel
    - 1) 6D35 PROBE HEAT IND R
    - 2) 6D31 PROBE HEAT PITOT R
    - 3) 6D32 PROBE HEAT AUX PITOT L
    - 4) 6D33 PROBE HEAT AUX PITOT R
    - 5) 6D28 PROBE HEAT TAT L
    - 6) 6D29 PROBE HEAT TAT R
    - 7) 6C33 AOA HEAT L
    - 8) 6C34 AOA HEAT R
- F. Upper Left Pitot Probe Heat System Test

s 715-021

- (1) Make sure that the upper left pitot probe heaters operate:
  - (a) Close 6D34 PROBE HEAT IND L and 6D30 PROBE HEAT PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (b) Make sure that the EICAS advisory message HEAT P/S CAPT shows.
  - (c) Make sure that the upper left pitot probe temperature does not increase.
  - (d) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (e) Make sure that the EICAS advisory message HEAT P/S CAPT does not show.
  - (f) Make sure that the upper left pitot probe temperature increases.
  - (g) Close 7F23 LANDING GEAR DISP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (h) Make sure that the EICAS advisory message HEAT P/S CAPT shows.

EFFECTIVITY-

30-31-00



- (2) Make sure that the upper left pitot probe head heater operates:
  - (a) Open 6D34 PROBE HEAT IND L and 6D30 PROBE HEAT PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (b) Remove relay R7433 from the P414 Left Power Distribution Center.
  - (c) Close 6D34 PROBE HEAT IND L and 6D30 PROBE HEAT PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (d) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (e) Make sure that the EICAS advisory message HEAT P/S CAPT does not show.
  - (f) Make sure that the upper left pitot probe head temperature increases.
  - (g) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (h) Open 6D34 PROBE HEAT IND L and 6D30 PROBE HEAT PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (i) Install relay R7433 in the P414 Left Power Distribution Center.

#### s 715-023

- (3) Make sure that the upper left pitot probe strut heater operates:
  - (a) Remove relay R7431 from the P414 Left Power Distribution Center.
  - (b) Close 6D34 PROBE HEAT IND L and 6D30 PROBE HEAT PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (c) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT P/S CAPT does not show.
  - (e) Make sure that the upper left pitot probe strut temperature increases.
  - (f) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (g) Open 6D34 PROBE HEAT IND L and 6D30 PROBE HEAT PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (h) Install relay R7431 in the P414 Left Power Distribution Center.

#### s 715-024

ALL

- (4) Make sure that the upper left pitot probe heater operates on the ground with an engine on signal:
  - (a) Remove relay R7433 from the P414 Left Power Distribution Center.
  - (b) Close 6D34 PROBE HEAT IND L and 6D30 PROBE HEAT PITOT L circuit breakers on the P6 Main Power Distribution Panel.

EFFECTIVITY-

30-31-00



- (c) Set the S1 switch on the YMLAOO1 ENG 1 N2 speed card in the forward electrical systems card file to TEST.
- (d) Make sure that the EICAS advisory message HEAT P/S CAPT does not show.
- (e) Make sure that the upper left pitot probe head temperature increases at a lower rate.
- (f) Set the S1 switch on the YMLAOO1 ENG 1 N2 speed card to NORMAL.
- (g) Alternative steps to do a check of the probe heater operation:
  - 1) Set the S1 switch on the YMLA 001 ENG 1 N2 Speed Card to TEST.
  - 2) Measure the voltage at Pin B1 of Relay socket DR7431.
  - 3) Make sure the voltage measurement is from 60 to 65 volts, with a digital multimeter on the AC scale.
  - 4) Set the S1 switch on the YMLA 001 ENG 1 N2 Speed Card to NORMAL.
- (h) Open 6D34 PROBE HEAT IND L and 6D30 PROBE HEAT PITOT L circuit breakers on the P6 Main Power Distribution Panel.
- (i) Install relay R7433 in P414 Left Power Distribution Center.
- G. Lower Left Pitot Probe System Test

#### S 865-025

(1) Close 6D34 PROBE HEAT IND L and 6D32 PROBE HEAT AUX PITOT L circuit breakers on the P6 Main Power Distribution Panel.

#### s 715-026

- (2) Make sure that the lower left pitot probe heaters operate:
  - (a) Make sure that the EICAS advisory message HEAT P/S L AUX shows.
  - (b) Make sure that the lower left pitot probe temperature does not increase.
  - (c) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT P/S L AUX does not show.
  - (e) Make sure that the lower left pitot probe temperature increases.
  - (f) Close 7F23 LANDING GEAR DISP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (g) Make sure that the EICAS advisory message HEAT P/S L AUX shows.

#### s 715-027

- (3) Make sure that the lower left pitot probe head heater operates:
  - (a) Open 6D34 PROBE HEAT IND L and 6D32 PROBE HEAT AUX PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (b) Remove relay R7437 from the P414 Left Power Distribution Center.
  - (c) Close 6D34 PROBE HEAT IND L and 6D32 PROBE HEAT AUX PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (d) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (e) Make sure that the EICAS advisory message HEAT P/S L AUX does not show.

EFFECTIVITY-

30-31-00



- (f) Make sure that the lower left pitot probe head temperature increases.
- (g) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
- (h) Open 6D34 PROBE HEAT IND L and 6D32 PROBE HEAT AUX PITOT L circuit breakers on the P6 Main Power Distribution Panel.
- (i) Install relay R7437 in the P414 Left Power Distribution Center.

- (4) Make sure that the lower left pitot probe strut heater operates:
  - (a) Remove relay R7435 from the P414 Left Power Distribution Center.
  - (b) Close 6D34 PROBE HEAT IND L and 6D32 PROBE HEAT AUX PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (c) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT P/S L AUX does not show.
  - (e) Make sure that the lower left pitot probe strut temperature increases.
  - (f) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (g) Open 6D34 PROBE HEAT IND L and 6D32 PROBE HEAT AUX PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (h) Install relay R7435 in the P414 Left Power Distribution Center.

#### s 715-029

ALL

- (5) Make sure that the lower left pitot probe heater operates on the ground with an engine on signal:
  - (a) Remove relay R7437 from the P414 Left Power Distribution Center.
  - (b) Close 6D34 PROBE HEAT IND L and 6D32 PROBE HEAT AUX PITOT L circuit breakers on the P6 Main Power Distribution Panel.
  - (c) Set the S1 switch on the YMLAOO3 ENG 2 N2 speed card in the forward electrical systems card file to TEST.
  - (d) Make sure that the EICAS advisory message HEAT P/S L AUX does not show.
  - (e) Make sure that the lower left pitot probe head temperature increases at a lower rate.

EFFECTIVITY-

30-31-00



- (f) Set the S1 switch on the YMLAOO3 ENG 2 N2 speed card to NORMAL.
- (g) Alternative steps to do a check of the probe heater operation:
  - Set the S1 switch on the YMLA 003 ENG 1 N2 Speed Card to TEST.
  - 2) Measure the voltage at Pin B1 of Relay socket DR7437.
  - 3) Make sure the voltage measurement is from 60 to 65 volts, with a digital multimeter on the AC scale.
  - Set the S1 switch on the YMLA 003 ENG 1 N2 Speed Card to NORMAL.
- (h) Open 6D34 PROBE HEAT IND L and 6D32 PROBE HEAT AUX PITOT L circuit breakers on the P6 Main Power Distribution Panel.
- (i) Install relay R7437 in the P414 Main Power Distribution Panel.
- H. Upper Right Pitot Probe Heat Test

#### s 865-030

(1) Close 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT PITOT R circuit breakers on the P6 Main Power Distribution Panel.

#### s 715-031

- (2) Make sure that the upper right pitot probe heaters operate:
  - (a) Make sure that the EICAS advisory message HEAT P/S F/O shows.
  - (b) Make sure that the upper right pitot probe temperature does not increase.
  - (c) Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT P/S F/O does not show.
  - (e) Make sure that the upper right pitot probe temperature increases.
  - (f) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (g) Make sure that the EICAS advisory message HEAT P/S F/O shows.

#### s 715-032

ALL

- (3) Make sure that the upper right pitot probe head heater operates:
  - (a) Open 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT PITOT R circuit breakers on the P6 Main Power Distribution Panel.

EFFECTIVITY-

30-31-00



- (b) Remove relay R7434 from the P415 Right Power Distribution Center.
- (c) Close 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT PITOT R circuit breakers on the P6 Main Power Distribution Panel.
- (d) Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
- (e) Make sure that the EICAS advisory message HEAT P/S F/O does not
- (f) Make sure that the upper right pitot probe head temperature increases.
- (g) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
- (h) Open 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT PITOT R circuit breakers on the P6 Main Power Distribution Panel.
- (i) Install relay R7434 in the P415 Right Power Distribution Center.

- (4) Make sure that the upper right pitot probe strut heater operates:
  - (a) Remove relay R7432 from the P415 Right Power Distribution Center.
  - (b) Close 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (c) Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT P/S F/O does not show.
  - (e) Make sure that the upper right pitot probe strut temperature increases.
  - (f) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (g) Open 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (h) Install relay R7432 in the P415 Right Power Distribution Center.

EFFECTIVITY-

ALL

30-31-00



- (5) Make sure that the upper right pitot probe heater operates on the ground with an engine on signal:
  - (a) Remove relay R7434 from the P415 Right Power Distribution Center.
  - (b) Close 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (c) Set the S2 switch on the YMLAOO5 ENG 3 N2 speed card in the forward electrical systems card file to TEST.
  - (d) Make sure that the EICAS advisory message HEAT P/S F/O does not show.
  - (e) Make sure that the upper right pitot probe head temperature increases at a lower rate.
  - (f) Set the S2 switch on the YMLAOO5 ENG 3 N2 speed card to NORMAL.
  - (g) Alternative steps to do a check of the probe heater operation:
    - 1) Set the S2 switch on the YMLA 005 ENG 1 N2 Speed Card to TEST.
    - 2) Measure the voltage at Pin B1 of Relay socket DR7432.
    - 3) Make sure the voltage measurement is from 60 to 65 volts, with a digital multimeter on the AC scale.
    - 4) Set the S2 switch on the YMLA 005 ENG 1 N2 Speed Card to NORMAL.
  - (h) Open 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (i) Install relay R7434 in the P415 Right Power Distribution Center.
- I. Lower Right Pitot Probe Heat Test

#### s 865-035

(1) Close 6D35 PROBE HEAT IND R and 6D33 PROBE HEAT AUX PITOT R circuit breakers on the P6 Main Power Distribution Panel.

#### s 715-036

- (2) Make sure that the lower right pitot probe heaters operate:
  - (a) Make sure that the EICAS advisory message HEAT P/S R AUX shows.
  - (b) Make sure that the lower right pitot probe temperature does not increase.
  - (c) Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT P/S R AUX does not show.
  - (e) Make sure that the lower right pitot probe temperature increases.

EFFECTIVITY-

30-31-00



- (f) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
- (g) Make sure that the EICAS advisory message HEAT P/S R AUX shows.

- (3) Make sure that the lower right pitot probe head heater operates:
  - (a) Open 6D35 PROBE HEAT IND R and 6D33 PROBE HEAT AUX PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (b) Remove relay R7438 from the P415 Right Power Distribution Center.
  - (c) Close 6D35 PROBE HEAT IND R and 6D31 PROBE HEAT AUX PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (d) Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (e) Make sure that the EICAS advisory message HEAT P/S R AUX do not show.
  - (f) Make sure that the lower right pitot probe head temperature increases.
  - (g) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (h) Open 6D35 PROBE HEAT IND R and 6D33 PROBE HEAT AUX PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (i) Install relay R7438 in the P415 Right Power Distribution Center.

#### s 715-038

ALL

- (4) Make sure that the lower right pitot probe strut heater operates:
  - (a) Remove relay R7436 from the P415 Right Power Distribution Center.
  - (b) Close 6D35 PROBE HEAT IND R and 6D33 PROBE HEAT AUX PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (c) Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT P/S R AUX does not show.

EFFECTIVITY-

30-31-00



- (e) Make sure that the lower right pitot probe strut temperature increases.
- (f) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
- (g) Open 6D35 PROBE HEAT IND R and 6D33 PROBE HEAT AUX PITOT R circuit breakers on the P6 Main Power Distribution Panel.
- (h) Install relay R7436 in the P415 Right Power Distribution Center.

- (5) Make sure that the lower right pitot probe heat operates on the ground with an engine on signal:
  - (a) Remove relay R7438 from the P415 Right Power Distribution Center.
  - (b) Close 6D35 PROBE HEAT IND R and 6D33 PROBE HEAT AUX PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (c) Set the S2 switch on the YMLAOO7 ENG 4 N2 speed card in the forward electrical systems card file to TEST.
  - (d) Make sure that the EICAS advisory message HEAT P/S R AUX does not show.
  - (e) Make sure that the lower right pitot probe head temperature increases at a lower rate.
  - (f) Set the S2 switch on the YMLAOO7 ENG 4 N2 speed card to NORMAL.
  - (g) Alternative steps to do a check of the probe heater operation:
    - 1) Set the S2 switch on the YMLA 007 ENG 1 N2 Speed Card to TEST.
    - 2) Measure the voltage at Pin B1 of Relay socket DR7436.
    - 3) Make sure the voltage measurement is from 60 to 65 volts, with a digital multimeter on the AC scale.
    - 4) Set the S2 switch on the YMLA 007 ENG 1 N2 Speed Card to NORMAL.
  - (h) Open 6D35 PROBE HEAT IND R and 6D33 PROBE HEAT AUX PITOT R circuit breakers on the P6 Main Power Distribution Panel.
  - (i) Install relay R7438 in the P415 Right Power Distribution Center.
- J. Left TAT Probe Heat Test

s 865-040

(1) Close 6D34 PROBE HEAT IND L and 6D28 PROBE HEAT TAT L circuit breakers on the P6 Main Power Distribution Panel.

s 715-041

- (2) Make sure that the left TAT probe heater operates:
  - (a) Make sure that the EICAS advisory message HEAT L TAT does not show.

EFFECTIVITY-

30-31-00



- Make sure that the left TAT probe temperature does not increase.
- Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
- Make sure that the EICAS advisory message HEAT L TAT shows. (d)
- (e) Make sure that the left TAT probe temperature increases.
- (f) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker panel.

S 865-042

- (3) Open 6D34 PROBE HEAT IND L and 6D28 PROBE HEAT TAT L circuit breakers on the P6 Main Power Distribution Panel.
- Right TAT Probe Heat Test

S 865-043

Close 6D35 PROBE HEAT IND R and 6D29 PROBE HEAT TAT R circuit (1) breakers on the P6 Main Power Distribution Panel.

s 715-044

- (2) Make sure that the right TAT probe heater operates:
  - Make sure that the EICAS advisory message HEAT R TAT does not
  - (b) Make sure that the right TAT probe temperature does not increase.
  - Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - Make sure that the EICAS advisory message HEAT R TAT shows. (d)
  - (e) Make sure that the right TAT probe temperature increases.
  - (f) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.

S 865-045

- (3) Open 6D35 PROBE HEAT IND R circuit breaker on the P6 Main Power Distribution Panel.
- L. Left AOA Probe Heat Test

S 865-046

ALL

(1) Close 6D34 PROBE HEAT IND L and 6C33 AOA HEAT L circuit breakers on the P6 Main Power Distribution panel.

EFFECTIVITY-

30-31-00



s 715-047

- (2) Make sure that the left AOA sensor vane heater operates:
  - (a) Make sure that the EICAS advisory message HEAT L AOA shows.
  - (b) Make sure that the left AOA vane temperature does not increase.
  - (c) Open 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT L AOA does not show.
  - (e) Make sure that the left AOA vane temperature increases.
  - (f) Close 7F23 LANDING GEAR DSP & CONT ALTN circuit breaker on the P7 Overhead Circuit Breaker Panel.

S 865-048

- (3) Open 6D34 PROBE HEAT IND L and 6C33 AOA HEAT L circuit breakers on the P6 Main Power Distribution Panel.
- M. Right AOA Probe Heat Test

S 865-049

(1) Close 6D35 PROBE HEAT IND R and 6C34 AOA HEAT R circuit breakers on the P6 Main Power Distribution Panel.

s 715-050

- (2) Make sure that the right AOA sensor vane heater operates:
  - (a) Make sure that the EICAS advisory message HEAT R AOA shows.
  - (b) Make sure that the right AOA vane temperature does not increase.
  - (c) Open 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
  - (d) Make sure that the EICAS advisory message HEAT R AOA does not show.
  - (e) Make sure that the right AOA vane temperature increases.
  - (f) Close 7H8 GND SAFETY RELAY circuit breaker on the P7 Overhead Circuit Breaker Panel.
- N. Put the Airplane to its Initial Condition

S 865-063

(1) Set the FUEL CONTROL 1 switch on the P8 control stand to CUTOFF.

EFFECTIVITY-

30-31-00



s 865-079

- (2) Close these circuit breakers on the P6 Main Power Distribution Panel:
  - (a) 6F1 IGN 1 ENG 1
  - (b) 6K19 IGN 2 ENG 1
  - (c) 6G19 STBY IGN ENG 1

S 445-057

(3) Do this task: "Put Safety-Sensitive Systems Back to the Condition before Air Mode Simulation" (Ref 32-09-02/201).

s 865-051

- (4) Close these circuit breakers on the P6 Main Power Distribution Panel:
  - (a) 6D34 PROBE HEAT IND L
  - (b) 6D30 PROBE HEAT PITOT L
  - (c) 6D31 PROBE HEAT PITOT R
  - (d) 6D32 PROBE HEAT AUX PITOT L
  - (e) 6D33 PROBE HEAT AUX PITOT R
  - (f) 6D28 PROBE HEAT TAT L
  - (g) 6D29 PROBE HEAT TAT R
  - (h) 6C33 AOA HEAT L

S 865-053

(5) Remove electrical power (Ref 24-22-00/201).

S 415-054

(6) Install protective covers on probes after they become cool.

EFFECTIVITY-

30-31-00

ALL



## WINDOWS AND WINDSHIELD

	COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
	ARM - WIPER BLADE - WIPER CARD - (FIM 31-51-00/101) SIGNAL COLLECTION TAIL ID, YMXA17 CIRCUIT BREAKER - WINDOW HEAT 1L, C1503 WINDOW HEAT 1R, C1504 WINDOW HEAT 2L&3R IND, C10105 WINDOW HEAT 2L&3R PWR, C68 WINDOW HEAT 2R&3L IND, C10104 WINDOW HEAT 2R&3L IND, C10104 WINDOW HEAT 2R&3L PWR, C69 WINDSHIELD WASH PUMP, C940 CIRCUIT BREAKER - WSHLD RAIN REPEL, C57 WSHLD WASH, C54 WSHLD WIPER L, C55 WSHLD WIPER R, C56 CIRCUIT BREAKER - WDO HEAT CONT 1L, C439 WDO HEAT CONT 1R, C435	1 1	2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	FWD FUSELAGE FWD FUSELAGE  FLT COMPT, P6 6834 6817 6E29 6E28 6C31 6C30 6B32 FLT COMPT, P7 7E2 7E26 7E1 7E25 117AL, MAIN EQUIP CTR, P180 180H26 180H12	30-42-02 30-42-01 *     *
1	COMPUTER - (FIM 45-10-00/101)  L CENTRAL MAINTENANCE, M7373  R CENTRAL MAINTENANCE, M7374  CONTAINER - RAIN REPELLENT FLUID  FITTING - NOZZLE  GAUGE - PRESSURE  MODULE - ANTI-ICE/RAIN REMOVAL, M7321  MOTOR - L WINDSHIELD WIPER, M18  MOTOR - R WINDSHIELD WIPER, M17  NOZZLE - RAIN REPEL/WSHLD WASH  PUMP - WINDSHIELD WASHER, M13  RELAY - (FIM 31-01-36/101)  CMC ENABLE RELAY 3, R8055  WDO 2R&3L PWR OFF, R7569  WDO 2R CURRENT SENSE, R7338  WDO 2R PWR DEMAND, R7342  WDO 3L CURRENT SENSE, R7337  WDO 3L PWR DEMAND, R7341  RELAY - (FIM 31-01-39/101)  AIR/GROUND, R227  WDO 2L&3R PWR OFF, R7568  WDO 2L CURRENT SENSE, R7339  WDO 2L PWR DEMAND, R7343  WDO 3R CURRENT SENSE, R7339  WDO 3L PWR DEMAND, R7343  WDO 3R CURRENT SENSE, R7340  WDO 3R PWR DEMAND, R7344	3 3 2 3 1 2 2 2 2 3 3	1 1 2 1 1 1 1 2 1	FLT COMPT, L AFT CLOSET FLT COMPT, LOWER L SIDEWALL FWD FUSELAGE FLT COMPT, P5 FWD FUSELAGE FWD FUSELAGE FWD FUSELAGE FWD FUSELAGE FLT COMPT, LOWER L SIDEWALL	30-43-00 * 30-42-03 30-42-03 30-43-00 30-44-01

\* SEE THE WDM EQUIPMENT LIST

1 NOT INSTALLED ON ALL AIRPLANES

Windows and Windshield - Component Index Figure 101 (Sheet 1)

EFFECTIVITY-

30-40-00

ALL

01.1 Page 101 Oct 18/00



## WINDOWS AND WINDSHIELD

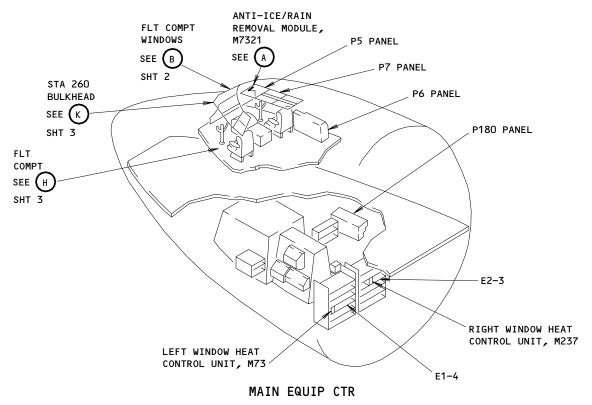
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
RESERVOIR - VISUAL SWITCH - RAIN REP L, YMES10 1	3 1	1	FLT COMPT, L AFT CLOSET FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - RAIN REP R, YMES11	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - WINDOW HEAT L, YMES12	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - WINDOW HEAT R, YMES13	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - WINDSHIELD WASHER L, YMES7	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - WINDSHIELD WASHER R, YMES8	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - WINDSHIELD WIPER L, YMES6	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
SWITCH - WINDSHIELD WIPER R, YMES9	1	1	FLT COMPT, P5, ANTI-ICE/RAIN REMOVAL MODULE, M7321	*
THERMOSTAT - WDO 2L CONT, S760	2	1	FLT COMPT, WINDOW 2L	
THERMOSTAT - WDO 2L OVHT, S1027	2	1	FLT COMPT, WINDOW 2L	
THERMOSTAT - WDO 2R CONT, S761 THERMOSTAT - WDO 2R OVHT, S1028	2 2	1 1	FLT COMPT, WINDOW 2R FLT COMPT, WINDOW 2R	
THERMOSTAT - WDO 2K OVHT, 31028	2		FLT COMPT, WINDOW 2K	
THERMOSTAT - WDO 3L OVHT, \$1026	2	1	FLT COMPT, WINDOW 3L	
THERMOSTAT - WDO 3R CONT, S762	2	1	FLT COMPT, WINDOW 3R	
THERMOSTAT - WDO 3R OVHT, S1029	2	1	FLT COMPT, WINDOW 3R	
UNIT - (FIM 31-61-00/101)			,	
C EFIS/EICAS INTERFACE, M7352 L EFIS/EICAS INTERFACE, M7353 R EFIS/EICAS INTERFACE, M7351				
UNIT - L WINDOW HEAT CONTROL, M73	1	1	117AL, MAIN EQUIP CTR, E1-4	30-41-01
UNIT - R WINDOW HEAT CONTROL, M237	1 1	1	117AL, MAIN EQUIP CTR, E2-3	30-41-01
VALVE - L RAIN REPELLENT, V31 1	3	1	FLT COMPT, STA 260 BULKHEAD	30-43-00
VALVE - R RAIN REPELLENT, V32 1	3	1	FLT COMPT, STA 260 BULKHEAD	30-43-00
VALVE - L WINDSHIELD WASHER SOLENOID, V34	3 3	1 1	FLT COMPT, LOWER L SIDEWALL	30-44-01
VALVE - R WINDSHIELD WASHER SOLENOID, V34 WINDOW - (FIM 56-00-00/101)	3	'	FLT COMPT, LOWER L SIDEWALL	30-44-01
NO. 1 LEFT, A15				
NO. 1 RIGHT, A14				
NO. 2 LEFT, A11				
NO. 2 RIGHT, A12				
NO. 3 LEFT, A13				
NO. 3 RIGHT, A10				

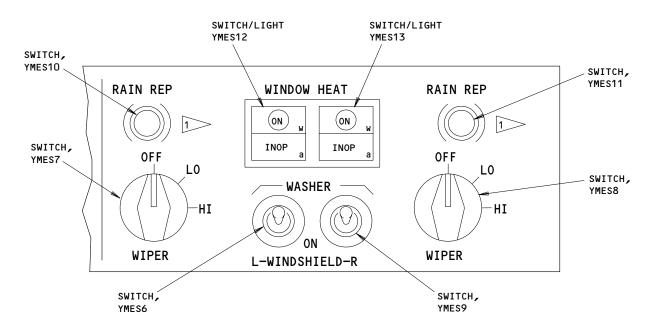
<sup>\*</sup> SEE THE WDM EQUIPMENT LIST

Windows and Windshield - Component Index Figure 101 (Sheet 2)

EFFECTIVITY-ALL 30-40-00







ANTI-ICE/RAIN REMOVAL MODULE, M7321

1 NOT INSTALLED ON ALL AIRPLANES

A

Windows and Windshield - Component Location Figure 102 (Sheet 1)

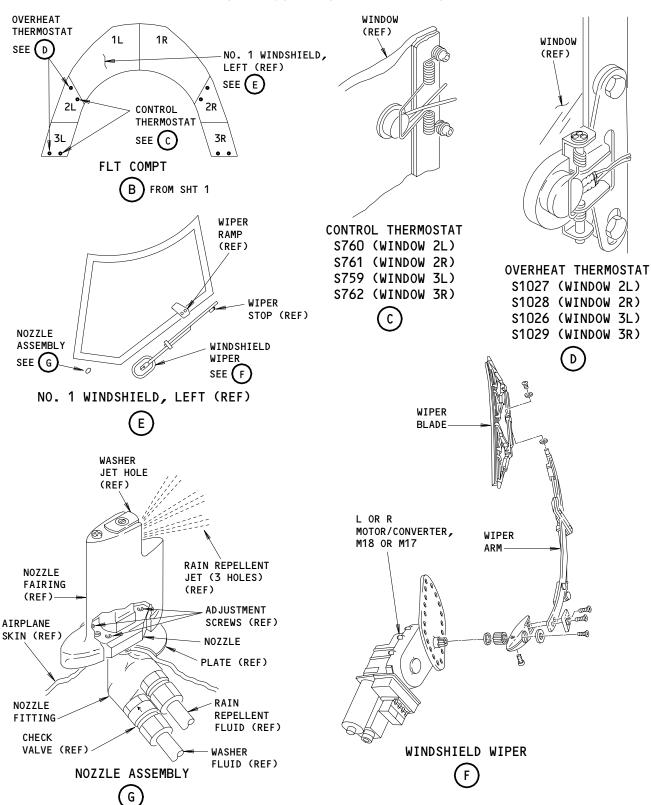
30-40-00

02

Page 103 Jun 10/97



## FAULT ISOLATION/MAINT MANUAL

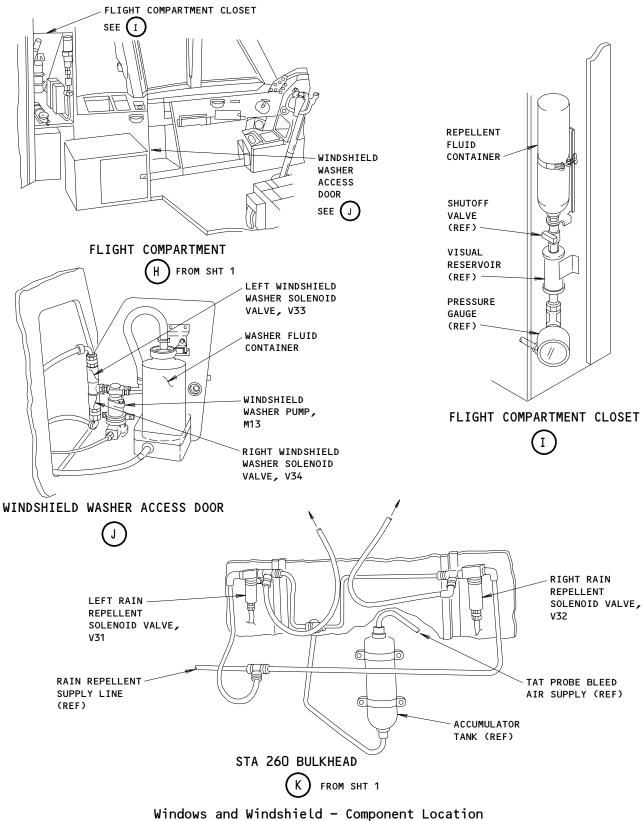


Windows and Windshield - Component Location Figure 102 (Sheet 2)

ALL

O1 Page 104
Oct 10/88





Windows and Windshield - Component Location Figure 102 (Sheet 3)

ALL

O1 Page 105
Oct 10/97

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



### WINDOWS AND WINDSHIELD - FAULT ISOLATION

### 1. General

- A. Windows and windshield fault isolation involves making voltage and continuity measurements at several points in the side window heat and windshield washer control circuits.
- B. Fault isolation requires application of electrical power.

#### 2. Fault Isolation Tips

A. Side window heat control thermostats must be cooled for fault isolation. Cooling may be achieved by holding dry ice against the thermostat. Alternatively, cooling may be achieved by spraying the thermostat with Freon freeze spray for 1 second, waiting 5 seconds for frost to form, and repeating several times.

## 3. Fault Isolation Procedures

FIGURE	TITLE
Fig. 103	Side Window Heat Problems
Fig. 104 Windshield Washer Inop	

30-40-00

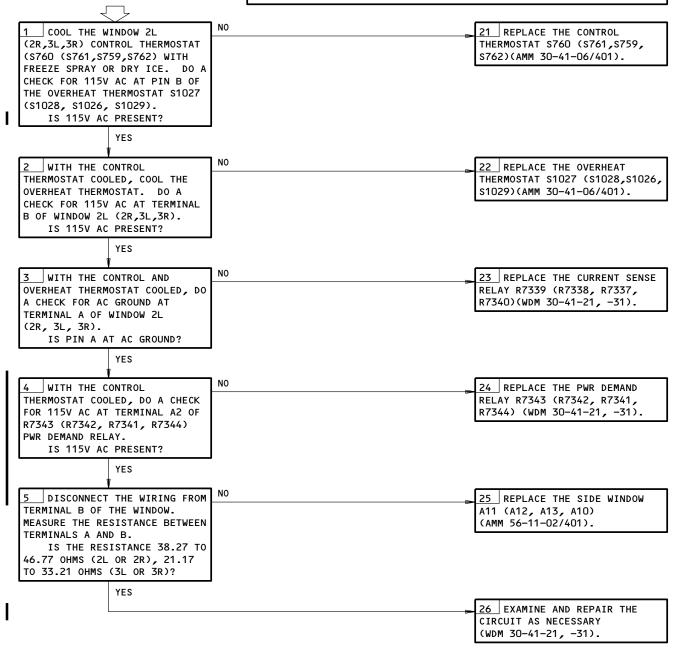


## **PREREQUISITES**

MAKE SURE THESE CIRCUIT BREAKERS ARE CLOSED: 6C30, 6C31, 6E28, 6E29

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION: ELECTRICAL POWER IS ON (AMM 24-22-00/201)

# SIDE WINDOW HEAT PROBLEMS



Side Window Heat Problems Figure 103

ALL

O1.1 Page 107
Oct 18/00

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.

# WINDSHIELD WASHER INOP

**PREREQUISITES** 

ELECTRICAL POWER (MM 24-22-00/201)

CB'S: 6B32,7E26

NO CHECK THAT FLUID LEVEL IN 21 RECONNECT DM13 TO PUMP WASHER FLUID CONTAINER IS AND REPLACE L (R) WASHER ABOVE LOW LEVEL MARK. OPEN SWITCH YMES7 (YMES8) WINDSHIELD WASHER ACCESS DOOR (WDM 30-43-11). AND DISCONNECT CONNECTOR DM13 FROM PUMP M13. HOLD L (R) WASHER SWITCH (P5) TO ON AND CHECK FOR 115 VAC AT PINS 1, 2, AND 3 OF DM13 (WDM 30-43-11).IS 115 VAC PRESENT? YES 2 RECONNECT DM13 TO PUMP. 22 REPLACE WINDSHIELD WASHER PRESS L (R) WASHER SWITCH TO PUMP M13 (MM 30-44-01/401). ON AND LISTEN FOR PUMP OPERA-TION. DID PUMP OPERATE WHILE SWITCH WAS PRESSED? YES YES 23 INSTALL ANTI-ICE/RAIN REMOVE ANTI-ICE/RAIN REMOVAL MODULE M7321 FROM P5. REMOVAL MODULE M7321 AND HOLD L (R) WASHER SWITCH TO REPLACE L (R) WINDSHIELD ON AND CHECK CONTINUITY WASHER SOLENOID VALVE V33 BETWEEN PIN 32 OF DM7321C AND (V34)(MM 30-44-01/401).PIN 22 OF DM7321A (PIN 32 OF DM7321C AND PIN 21 OF DM7321C). IS THERE CONTINUITY? NO 24 REPLACE L (R) WASHER SWITCH YMES7 (YMES8) (WDM 30-43-11) AND INSTALL ANTI-ICE/RAIN REMOVAL MODULE

> Windshield Washer Inop Figure 104

M7321.



TEMPE	RATURE			
°F	°C	LOW	NORMAL	HIGH
-75.0	-59.4	47279	52609	58499
-70.0	-56.7	37533	41627	46135
-65.0	-53.8	29971	33133	36603
-60.0	-51.1	24068	26523	29210
-55.0	-48.3	19432	21349	23440
-50.0	-45.6	15772	17276	18911
-45.0	-42.8	12865	14051	15337
-40.0	-40.0	10545	11485	12500
-35.0	-37.2	8684.5	9432.0	10237
-30.0	-34.4	7184.3	7781.6	8422.8
-25.0	-31.7	5969.3	6448.5	6961.4
-20 0	-28.9	4980.7	5366.6	5778.5
-15.0	-26.1	4172.8	4484.7	4816.7
-10.0	-23.3	3509.7	3762.8	4031.3
- 5.0	-20.6	2963.3	3169.2	3387.2
0.0	-17.8	2511.1	2679.3	2856.8
5.0	-15.0	2135.6	2273.3	2418.3
10.0	-12.2	1822.5	1935.6	2054.4
15.0	- 9.4	1560.4	1653.7	1751.3
20.0	- 6.7	1340.4	1417.4	1497.8
25.0	- 3.9	1155.1	1218.8	1285.2
30.0	- 1.1	998.36	1051.3	1106.2
35.0	1.7	865.46	909.46	955.04
40.0	4.4	752.40	789.06	826.96
45.0	7.2	655.93	686.54	718.10
50.0	10.0	573.36	598.97	625.30
55.0	12.8	502.51	523.96	545.96
60.0	15.6	441.52	459.52	477.93
65.0	18.3	388.90	404.02	419.44
70.0	21.1	343.37	356.08	369.02
75.0	23.9	303.88	314.58	325.44
80.0	26.7	269.54	278.55	287.67
85.0	29.4	239.60	247.20	254.87
90.0	32.2	213.45	219.85	226.30
95.0	35.0	190.55	195.95	201.36

Window Heat Control Sensor Resistance Table Figure 105 (Sheet 1)

30-40-00



TEMPERATURE				
°F	°C	LOW	NORMAL	
100.0	37.8	170.45	175.00	179.55
105.0	40.6	152.77	156.61	160.43
110.0	43.3	137.19	140.42	143.62
115.0	46.1	123.43	126.14	128.83
120.0	48.9	111.25	113.53	115.77
125.0	51.7	100.46	102.36	104.23
130.0	54.4	90.862	92.452	94.006
135.0	57.2	82.324	83.646	84.932
140.0	60.0	74.711	75.806	76.864
145.0	62.8	67.911	68.812	69.678
150.0	65.6	61.827	62.563	63.265
155.0	68.3	56.373	56.969	57.533
160.0	71.1	51.478	51.954	52.400
165.0	73.9	47.076	47.451	47.797
170.0	76.7	43.111	43.400	43.662

(CONTINUED)

Window Heat Control Sensor Resistance Table Figure 105 (Sheet 2)

30-40-00

01

Page 110 Jun 10/96



TEMPE	TEMPERATURE		Non	
°F	°C	LOW	NORMAL	HIGH
-70.0	-56.7	43423	59466	81305
-60.0	-51.1	28299	37890	50651
-50.0	-45.6	18831	24679	32292
-40.0	-40.0	12777	16407	21033
-30.0	-34.4	8827	11116	13976
-20.0	-28.9	6202	7666	9461
-10.0	-23.3	4426	5375	6517
0.0	-17.8	3205	3827	4562
10.0	-12.2	2353	2765	3242
20.0	- 6.7	1750	2024	2338
30.0	- 1.1	1318	1501	1708
40.0	4.4	1003	1127	1264
50.0	10.0	772	855	946
60.0	15.6	600	656	716
70.0	21.1	471	508	548
80.0	26.7	373	397	423
90.0	32.2	298	314	330
100.0	37.8	240	250	260
110.0	43.3	192	200	208
120.0	48.9	155	162	168
130.0	54.4	126	132	137
140.0	60.0	103	108	112
150.0	65.6	85	89	93
160.0	71.1	71	74	77
170.0	76.7	59	62	64
180.0	82.2	50	52	54
190.0	87.8	42	44	46
200.0	93.3	35	37	39

Window Heat Control Sensor Resistance Table Figure 105 (Sheet 3)

 30-40-00



## FLIGHT COMPARTMENT WINDOW ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION

#### 1. General (Fig. 1)

- The flight compartment windows are electrically heated to provide Α. anti-icing for the No. 1 front windows and to provide defogging for the No. 2 and 3 side windows. Heat applied to the windows also increases their impact strength.
- Anti-icing heat is applied to each No. 1 window (windshield) by separate window heat control units when activated from the flight deck. Defogging heat is applied to the four side windows by separate on-off control thermostats installed on the inside surface of each windowpane. No. 2 and 3 window heat is enabled whenever airplane electrical power is on.
- C. The flight compartment window anti-icing system consists of two control switches in the anti-ice-rain removal module, located in the P5 panel, two window heat controllers located in the main electrical equipment center, heating elements (conductive coating) and sensors laminated in the No. 1 windows, heating elements laminated in the No. 2 and 3 windows, and control and overheat thermostats and relays for the No. 2 and 3 windows.
- D. Line-to-line power (200 volts) for the No. 1 window heaters, control circuits, and fault indication is from the 115-volt ac bus 4 for the left window and bus 2 for the right window. BITE power for the left window heat control unit is from the 28-volt dc bus 3 and for the right unit from 28-volt dc bus 1. Power for the No. 2L and 3R window heaters is from the 115-volt ac bus 2 for the heaters and from the 28-volt dc bus 2 for fault indication. Power for the No. 3L and 2R window heaters is from the 115-volt ac bus 3 for the heaters and from the 28-volt dc bus 3 for fault indication.

#### 2. Anti-Ice-Rain Removal Module

The anti-ice-rain removal module M7321 on the P5 overhead panel contains two switches which control operation and provide fault indication for the No. 1 windows. Each switch has an ON indicator and an INOP fault light. When the switch is pressed the white ON indicator appears and the heating process for the corresponding No. 1 window is started. The amber INOP light is on when there is no power supplied to the No. 1 window or when a system fault is detected.

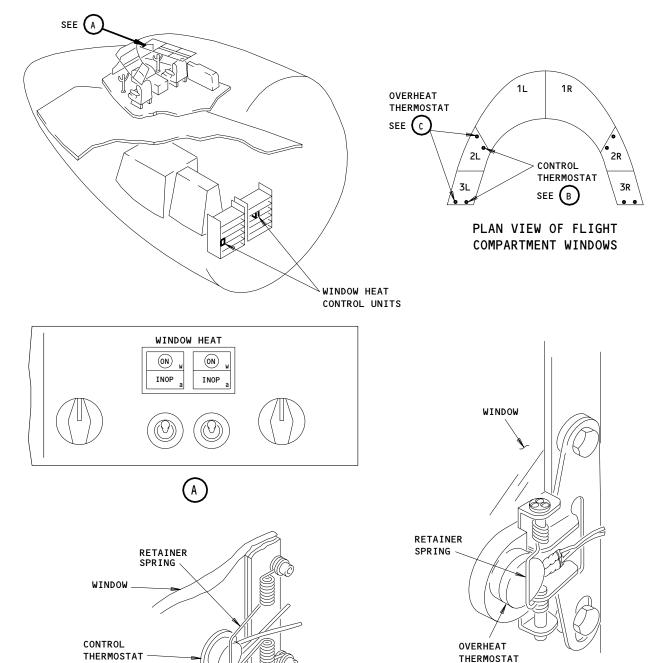
## 3. No. 1 Window Heat Control Units

- A. The two window heat control units proportionally regulate the heat applied to each No. 1 window. Unit M73 controls the left window heat and is located on the E1-4 electronics shelf. Unit M237 controls the right window heat and is located on the E2-3 shelf.
- B. Each unit controls the power delivered to the window by SCR phase angle switching of the 200-volt line-to-line input voltage. The thermistor sensor in the window provides temperature information to the control unit. Using this information, the control unit applies the power necessary to maintain the window in the required temperature range.

EFFECTIVITY-ALL

30-41-00





NOTE: LEFT SIDE WINDOWS THERMOSTATS SHOWN, RIGHT SIDE WINDOWS THERMOSTATS SIMILAR

Flight Compartment Window Anti-Ice System Component Location Figure 1

ALL

O1 Page 2
Jun 10/97

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.

B



- C. When window heat is activated from the flight deck, the control unit gradually applies increasing power over a 6-minute period, stopping when full power is reached or when window operating temperature is attained.
- D. Each window heat control unit continuously monitors system operation. The control unit watches for power source failures, open or short circuits in the heater or sensor, and faults on the ARINC 429 data bus between the control unit and the EIUs. Any failure will remove power from the window, turn on the INOP light in the WINDOW HEAT switch, and cause an EICAS advisory message to be displayed.
- E. A ground test can be performed with the CMC. Conclusion of the test is indicated by momentary illumination of the INOP light. If a failure is found during the ground test, a specific fault message will be displayed on the CDU and the window heat control unit must be reset by pressing the control switch off then ON.

NOTE: To do a CMC ground test, the airplane must be on the ground and the TEST ENABLE switch (P461 overhead maintenance panel) must be in the TEST position.

F. Each window heat control unit has an input from the air/ground relay system. The control unit uses the air/ground status to allow a CMC ground test of the window heat system only when the airplane is on the ground. When the airplane is in the air, the control unit inhibits the CMC ground test.

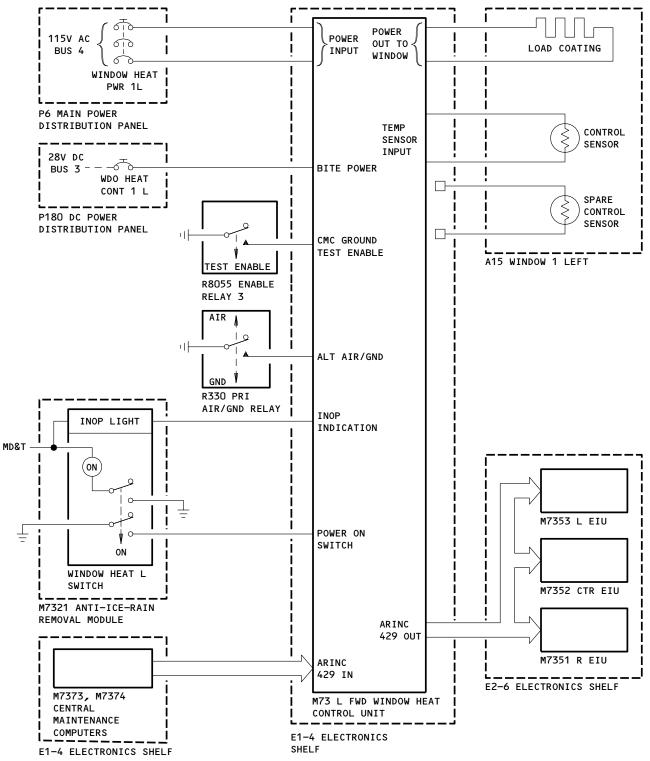
## 4. No. 1 Left and Right Windows

- A. The No. 1 windows are located directly in front of the pilots. The heating element in each window is a conductive coating material laminated between the outer layer of hardened glass and the first inner layer of plastic. Two thermistor control sensors are also laminated in each window. One of the sensors is a spare which can be connected if the original sensor fails.
- 5. No. 2 and 3 Windows, Thermostats and Relays
  - A. The No. 2 and 3 windows are located to the sides of the pilots. The heating element for each window is a conductive coating material laminated inside the window. The control thermostat for each window is installed on the inside surface of the windowpane and is held in place by a rat-trap type spring. The overheat thermostat for each of these windows is held against the inside surface of the window by a spring retainer. The relays which control the thermostats and which sense system faults are located in the P414 circuit breaker relay panel in the main electrical equipment center.
- 6. <u>Operation</u> (Fig. 2, 3)

ALL

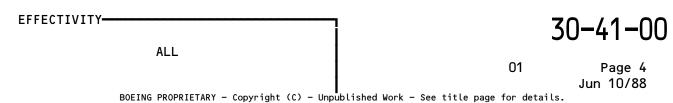
30-41-00



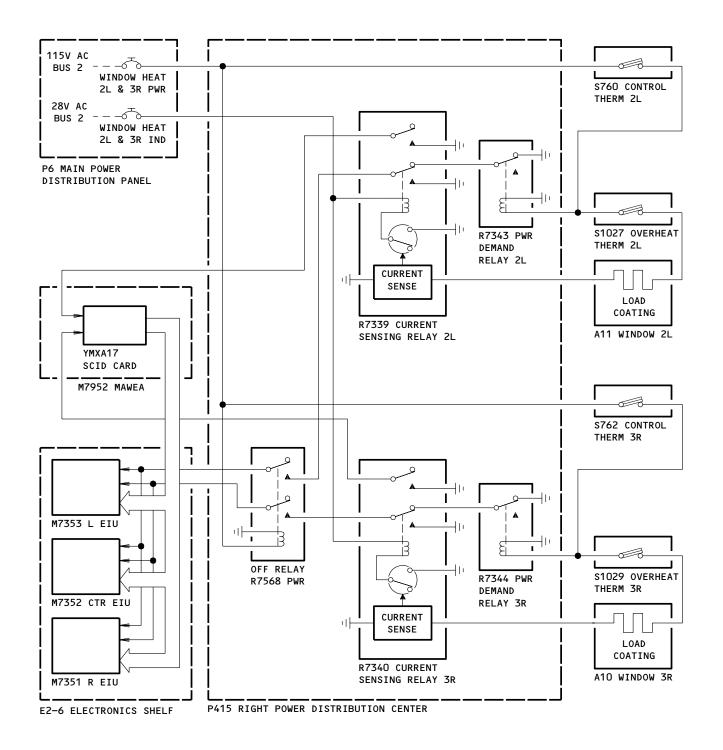


NOTE: NO. 1 LEFT WINDOW HEAT SYSTEM SHOWN, NO. 1 RIGHT SYSTEM SIMILAR.

No. 1 Window Heat System Schematic Figure 2

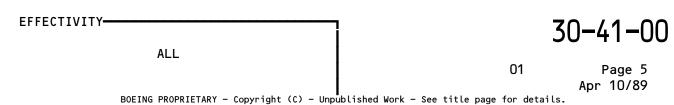






NOTE: NO. 2L AND 3R WINDOW HEAT SYSTEM SHOWN, NO. 2R AND 3L SYSTEM SIMILAR.

No. 2 and No. 3 Window Heat System Schematic Figure 3





#### A. Functional Description

- (1) No. 1 Left and Right Window Heat (Fig. 2)
  - (a) Heating of the No. 1 windows begins when the WINDOW HEAT switches on the P5 panel are turned on. To prevent mechanical shock to a cold window, each window heat control unit increases power gradually until full power or full temperature is reached. After this ramp warmup, the control unit operates in its proportional heat mode. In this mode the control unit regulates window temperature by applying an amount of power proportional to the difference between actual window temperature and desired operating temperature.
  - (b) The electrical resistance of the thermistor sensor decreases as window temperature is raised. The control unit continuously monitors thermistor resistance to determine how much power to apply to the window heater.
- (2) No. 2 and 3 Left and Right Window Heat (Fig. 3).
  - (a) Heating of the No. 2 and 3 left and right windows is enabled whenever airplane electrical power is available. The window temperature is controlled by a thermostat mounted on the window. Each thermostat controls the temperature of its window by cycling open and closed. The control thermostat opens at 95-101°F (35-38°C) and closes at 87-93°F (30-33.5°C).
  - (b) In case of a malfunction of the control thermostat, the overheat thermostat will open at 118-125°F (47-51.5°C) and will close at 105-112°F (40-44°C).

#### B. Control

- (1) To activate the No. 1 window heat system, press the WINDOW HEAT L and R switches on the anti-ice-rain removal module so that the white ON indicator appears. To deactivate the No. 1 window heat system, press the switches again. The ON indicator will disappear.
- (2) Operation of the No. 2 and 3 window heaters is automatic. No control functions are exercised.

EFFECTIVITY-

30-41-00

ALL



## FLIGHT COMPARTMENT WINDOW ANTI-ICE SYSTEM - ADJUSTMENT/TEST

#### 1. General

- A. There are two tasks in this subject. The first task is an operational test for the No. 1 flight compartment window anti-ice system. The procedure for this is to do a CMC ground test.
- B. The second task is a system test of the flight compartment window anti-ice system. The test has these parts:
  - Do a CMC ground test on each window heat control unit
  - Monitor CMC maintenance messages during a sensor failure
  - Remove and install relays from the P414 panel
  - Install jumper wires at the relay sockets
  - Monitor EICAS messages
  - Look at CMC input monitoring displays.
- C. The test for the No. 1 window heat systems must be done when the outside ambient air temperature is below 85° F (29° C). The window heat control units do not apply power to the No. 1 windows when the window temperature is above approximately 85°F (29°C).
- D. The test for the No. 2 and No. 3 window heat systems must be done when the outside ambient air temperature is below 86° F (30° C). The control thermostats do not apply power to the No. 2 and No. 3 windows when the window temperature is above approximately 86°F (30°C).

#### TASK 30-41-00-715-025

## 2. Operational Test - Flight Compartment Window Anti-Ice System

- A. General
  - (1) This ground test commands the window heat controller to heat the flight deck windows and does a check for a rise in window temperature.
- B. References
  - (1) 24-22-00/201, Manual Control
- C. Access
  - (1) Location Zone

221, 222 Control Cabin

EFFECTIVITY—

30-41-00



#### D. Preconditions

S 865-046

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- E. Prepare for the Test

s 865-044

(1) Supply electrical power (Ref 24-22-00/201).

s 865-027

(2) Push the applicable WINDOW HEAT switch on the anti-ice/rain removal module (P5 panel) to ON.

S 865-028

(3) Set the GND TEST switch on the P461 overhead maintenance panel to ENABLE.

s 865-029

- (4) Prepare the CDU for the test:
  - (a) Push the MENU key on the CDU to show the MENU.
    - (b) Push the line-select key (LSK) that is adjacent to <CMC to show the CMC MENU.
    - (c) If <RETURN shows after you push the LSK, push the LSK that is adjacent to <RETURN until you see the CMC MENU.
    - (d) Push the LSK that is adjacent to <GROUND TESTS to show the GROUND TESTS menu.
    - (e) Push the NEXT PAGE key until you find <30 ICE AND RAIN.
    - (f) Push the LSK that is adjacent to <30 ICE AND RAIN to show the GROUND TESTS menu for the ice and rain system.

NOTE: If INHIBITED shows above the applicable prompt (<WINDOW HEAT 1L or <WINDOW HEAT-1R), the test will not operate.

F. Window Anti-Ice System Ground Test

s 745-030

(1) Push the LSK that is adjacent to the applicable prompt (<WINDOW HEAT-1L or WINDOW HEAT-1R).

NOTE: IN PROGRESS will show during the test.

(a) Make sure that the INOP light in the applicable WINDOW HEAT switch comes on in 12 seconds or less.

EFFECTIVITY-

30-41-00

ALL



s 745-031

(2) When IN PROGRESS goes out of view, look for PASS or FAIL> adjacent to the applicable prompt (<WINDOW HEAT-1L or <WINDOW HEAT-1R).

NOTE: If a PASS indication shows, no failures occurred during the test.

- (a) If FAIL> shows, look for No. 1 window anti-ice system CMCS messages:
  - 1) Push the LSK that is adjacent to FAIL> to see the GROUND TEST MSG pages for the failure.
  - 2) Push the NEXT PAGE key until you find all the GROUND TEST MSG pages.
  - 3) Make a list of all CMCS messages, CMCS message numbers, and ATA numbers that show on the GROUND TEST MSG pages.
  - 4) Go to the CMCS Message Index of the Fault Isolation Manual (FIM) to find the corrective action for each CMCS message.
- G. Put the Airplane in Its Usual Condition

S 865-034

(1) Push the applicable WINDOW HEAT switch on the anti-ice/rain removal module (P5 panel) to off.

s 865-032

(2) Set the GND TEST switch to NORM.

s 865-033

(3) Remove electrical power (Ref 24-22-00/201).

TASK 30-41-00-735-010

- 3. System Test Flight Compartment Window Anti-Ice System
  - A. References
    - (1) 24-22-00/201, Manual Control
    - (2) 31-61-00/201, Integrated Display System
    - (3) 30-41-00/501, Flight Compartment Window Anti-Ice System
    - (4) SSM 30-41-01, 30-41-02, 30-41-03
    - (5) WDM 30-41-11, 30-41-12, 30-41-21, 30-41-31
  - B. Access
    - (1) Location Zone

ALL

- 221 Control Cabin, LH
- 222 Control Cabin, RH
- 117 Electrical and Electronics Compartment, LH P414 Left
  Power Distribution Center
- 118 Electrical and Electronics Compartment, RH P415 Right Power Distribution Center

EFFECTIVITY-

30-41-00

01.1

Page 503 Oct 18/00



#### C. Preconditions

S 865-047

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- D. Prepare for Test

s 865-011

(1) Supply electrical power (Ref 24-22-00/201).

S 865-014

- (2) Set the GND TEST switch on the P461 panel to ENABLE.
- E. No. 1 Left Window Heat System Test

NOTE: Do not do this test when the outside ambient temperature is above  $85^{\circ}$  F (29° C).

s 715-016

- (1) Push the left WINDOW HEAT switch on the anti-ice/rain removal module (P5 panel) to ON.
  - (a) Make sure that the INOP light in the switch goes off.

s 745-017

- (2) Do a CMC ground test of the No. 1 left window heat system (AMM 30-41-00/501):
  - (a) Select <GROUND TESTS from the CMC main menu.
  - (b) Select <30 ICE AND RAIN from the ground tests menu.
  - (c) Select <WINDOW HEAT-1L from the ice and rain menu.
    - 1) Make sure that TEST IN PROGRESS shows on the CDU.
    - 2) Make sure that the INOP light in the left WINDOW HEAT switch comes on in 12 seconds or less.
    - 3) Make sure that PASS shows on the CDU.
  - (d) Push the left window heat switch to the off position.
    - 1) Make sure that the INOP light in the switch comes on.

s 745-018

- (3) Make sure that there is indication for a shorted sensor:
  - (a) Open 6B34 WINDOW HEAT 1L circuit breaker on the P6 Main Power Distribution Panel and 180H26 WD0 HEAT CONT 1L circuit breaker on the P180 DC Power Distribution Panel.

EFFECTIVITY-

30-41-00

ALL

01.1



WARNING: DO NOT CONNECT JUMPER TO CONNECTORS D401, D403, D405, OR D419. THIS WILL CAUSE ELECTRICAL ARCS WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (b) Install a jumper between connectors D411 and D413 of the No. 1 left window.
- (c) Close 6B34 WINDOW HEAT 1L circuit breaker on the P6 Main Power Distribution Panel and 180H26 WD0 HEAT CONT 1L circuit breaker on the P180 DC Power Distribution Panel.
- (d) Push the left WINDOW HEAT switch to the ON position.
  - Make sure that the INOP light in the switch comes on within 5 seconds.
- (e) Select EXISTING FAULTS, chapter 30 and check that FORWARD WINDOW HEAT SENSOR - L shows on the CDU.
- (f) Make sure that the EICAS advisory message HEAT WINDOW L shows.
- (g) Open 6B34 WINDOW HEAT 1L circuit breaker on the P6 Main Power Distribution Panel and 180H26 WD0 HEAT CONT 1L circuit breaker on the P180 DC Power Distribution Panel.
- (h) Remove the jumper between connectors D411 and D413 of the left forward window.
- (i) Close 6B34 WINDOW HEAT 1L circuit breaker on the P6 Main Power Distribution Panel and 180H26 WD0 HEAT CONT 1L circuit breaker on the P180 DC Distribution Panel.
- F. No. 1 Right Window Heat System Test

NOTE: Do not do this test when the outside ambient temperature is above  $85^{\circ}$  F (29 $^{\circ}$  C).

s 715-022

ALL

- (1) Push the right WINDOW HEAT switch on the anti-ice/rain removal module (P5 panel) to ON.
  - (a) Make sure that the INOP light in the switch goes off.

EFFECTIVITY-

30-41-00



#### s 745-023

- (2) Do a CMC ground test of the No. 1 right window heat system (AMM 30-41-00/501):
  - (a) Select <GROUND TESTS from the CMC main menu.
  - (b) Select <30 ICE AND RAIN from the ground tests menu.
  - (c) Select <WINDOW HEAT-1R from the ice and rain menu.
    - 1) Make sure that TEST IN PROGRESS shows on the CDU.
    - Make sure that the INOP light in the right WINDOW HEAT switch comes on in 12 seconds or less.
    - 3) Make sure that PASS shows on the CDU for the right window heat control unit.
  - (d) Push the right window heat switch to the off position.
    - 1) Make sure that the INOP light in the switch comes on.

#### s 745-024

- (3) Make sure that there indication of a shorted sensor:
  - (a) Open 6B17 WINDOW HEAT 1R circuit breaker on the P6 Main Power Distribution Panel and 18OH12 WDO HEAT CONT 1R circuit breaker on the P180 DC Power Distribution Panel.

WARNING: DO NOT CONNECT JUMPER TO CONNECTORS D400, D402, D404, OR D418. THIS WILL CAUSE ELECTRICAL ARCS WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (b) Install a jumper between connectors D410 and D412 of the No. 1 right window.
- (c) Close 6B17 WINDOW HEAT 1R circuit breaker on the P6 Main Power Distribution Panel and 18OH12 WDO HEAT CONT 1R circuit breaker on the P18O DC Power Distribution Panel.
- (d) Push the right WINDOW HEAT switch to the ON position.
  - 1) Make sure that the INOP light in the switch comes on within 5 seconds.
- (e) Select EXISTING FAULTS, chapter 30 and make sure that FORWARD WINDOW HEAT SENSOR R shows on the CDU.

EFFECTIVITY-

30-41-00

01.1



- (f) Make sure that the EICAS advisory message HEAT WINDOW R shows.
- (g) Open 6B17 WINDOW HEAT 1R circuit breaker on the P6 Main Power Distribution Panel and 180H12 WDO HEAT CONT 1R circuit breaker on the P180 DC Power Distribution Panel.
- (h) Remove the jumper between connectors D410 and D412 of the right forward window.
- (i) Close 6B17 WINDOW HEAT 1R circuit breaker on the P6 Main Power Distribution Panel and 180H12 WD0 HEAT CONT 1R circuit breaker on the P180 DC Power Distribution Panel.

#### s 865-043

- (4) Set the GND TEST switch on the P461 panel to NORM.
- G. No. 2L and No. 3R Window Heat System Test

NOTE: Do not do this test when the outside ambient temperature is above 86° F (30° C). If the EICAS message or CMCS input monitoring bit does not show, the window may be at its operation temperature. If this occurs, let the window become cool. To do this, open 6E28 WINDOW HEAT 2L&3R PWR circuit breaker or apply freeze spray to the control thermostat until it closes. Do not apply freeze spray to the overheat thermostat.

#### s 715-035

- (1) Do a test of the No. 2L window heat circuit:
  - (a) Open 6E28 WINDOW HEAT 2L&3R PWR and 6E29 WINDOW HEAT 2L&3R IND circuit breakers on the P6 Main Power Distribution Panel.
    - Make sure that the EICAS status message WINDOW HEAT 2L shows.
  - (b) Remove the relay R7568 from the P415 Right Power Distribution Center.
  - (c) Install a jumper between pins A1 and A2 of DR7568.
    - Make sure that the EICAS ststus message WINDOW HEAT 2L does not show.
  - (d) Close 6E28 WINDOW HEAT 2L&3R PWR circuit breaker on the P6 Main Power Distribution Panel.
    - Make sure that the EICAS status message WINDOW HEAT 2L shows.

EFFECTIVITY-

ALL

30-41-00



- (e) Open 6E28 WINDOW HEAT 2L&3R PWR circuit breaker on the P6 Main Power Distribution Panel.
- (f) Remove the jumper from pins A1 and A2 of DR7568.

#### s 715-037

- (2) Do a test of the No. 3R window heat circuit:
  - (a) Put C/26/002/11 into the CMCS INPUT MONITORING screen and make sure that bit 20 is a 1.
  - (b) Install a jumper between pins B1 and B2 of DR7568.
    - 1) Put C/26/002/11 into the CMCS INPUT MONITORING screen and make sure that bit 20 is a 0.
  - (c) Close 6E28 WINDOW HEAT 2L&3R PWR circuit breaker on the P6 Main Power Distribution Panel.
    - 1) Put C/26/002/11 into the CMCS INPUT MONITORING screen and Make sure that bit 20 is a 1.
  - (d) Open 6E28 WINDOW HEAT 2L&3R PWR circuit breaker on the P6 Main Power Distribution Panel.
  - (e) Remove the jumper from pins B1 and B2 of DR7568.
  - (f) Install the relay R7568 in the P415 Right Power Distribution Center.

## s 715-038

- (3) Do a test of the 2L&3R power off relay:
  - (a) Close 6E28 WINDOW HEAT 2L&3R PWR and 6E29 WINDOW HEAT 2L&3R IND circuit breakers on the P6 Main Power Distribution Panel.
    - Make sure that the EICAS status message WINDOW HEAT 2L does not show.
    - 2) Put C/26/002/11 into the CMCS INPUT MONITORING screen and Make sure that bit 20 is a 0.
  - (b) Open 6E28 WINDOW HEAT 2L&3R PWR circuit breaker on the P6 Main Power Distribution Panel.
    - Make sure that the EICAS status message WINDOW HEAT 2L shows.
    - 2) Put C/26/002/11 into the CMCS INPUT MONITORING screen and make sure that bit 20 is a 1.

EFFECTIVITY-

30-41-00



- (c) Close 6E28 WINDOW HEAT 2L&3R PWR circuit breaker on the P6 Main Power Distribution Panel.
  - Make sure that the EICAS status message WINDOW HEAT 2L does not show.
  - 2) Put C/26/002/11 into the CMCS INPUT MONITORING screen and make sure that bit 20 is a 0.
- (d) Open 6E29 WINDOW HEAT 2L&3R IND circuit breaker on the P6 Main Power Distribution Panel.
  - Make sure that the EICAS status message WINDOW HEAT 2L shows.

NOTE: A delay of about 60 seconds can occur before the message shows.

- 2) Put C/26/002/11 into the CMCS INPUT MONITORING screen and make sure that bit 20 is a 1.
- (e) Close 6E29 WINDOW HEAT 2L&3R IND circuit breaker on the P6 Main Power Distribution Panel.
  - Make sure that the EICAS status message WINDOW HEAT 2L does not show.
  - 2) Put C/26/002/11 into the CMCS INPUT MONITORING screen and make sure that bit 20 is a O.
- H. No. 2R and No. 3L Window Heat System Test

NOTE: Do not do this test when the outside ambient temperature is above 86° F (30° C). If the EICAS message or CMCS input monitoring bit does not show, the window may be at its operation temperature. If this occurs, let the window become cool. To do this, open 6E30 WINDOW HEAT 2R&3L PWR circuit breaker or apply freeze spray to the control thermostat until it closes. Do not apply freeze spray to the overheat thermostat.

s 715-036

- (1) Do a test of the No. 2R window heat circuit:
  - (a) Open 6E30 WINDOW HEAT 2R&3L PWR and 6E31 WINDOW HEAT 2R&3L IND circuit breakers on the P6 Main Power Distribution Panel.
    - Make sure that the EICAS status message WINDOW HEAT 2R shows.
  - (b) Remove the relay R7569 from the P414 Left Power Distribution Center.

EFFECTIVITY-

30-41-00



- (c) Install a jumper between terminals B1 and B2 of DR7569.
  - Make sure that the EICAS status message WINDOW HEAT 2R does not show.
- (d) Close 6E30 WINDOW HEAT 2R&3L PWR circuit breaker on the P6 Main Power Distribution Panel.
  - Make sure that the EICAS status message WINDOW HEAT 2R shows.
- (e) Open 6E30 WINDOW HEAT 2R&3L PWR circuit breaker on the P6 Main Power Distribution Panel.
- (f) Remove the jumper from pins B1 and B2 of DR7569.

#### s 715-039

- (2) Do a test of the No. 3L window heat circuit:
  - (a) Put C/26/006/00 into the CMCS INPUT MONITORING screen and make sure that bit 14 is a 1.
  - (b) Install a jumper between pins A1 and A2 of DR7569.
    - 1) Put C/26/006/00 into the CMCS INPUT MONITORING screen and make sure that bit 14 is a 0.
  - (c) Close 6E30 WINDOW HEAT 2R&3L PWR circuit breaker on the P6 Main Power Distribution Panel.
    - 1) Put C/26/006/00 into the CMCS INPUT MONITORING screen and make sure that bit 14 is a 1.
  - (d) Open 6E30 WINDOW HEAT 2R&3L PWR circuit breaker on the P6 Main Power Distribution Panel.
  - (e) Remove the jumper from pins A1 and A2 of DR7569.
  - (f) Install the relay R7569 in the P414 Left Power Distribution Center.

## s 715-040

ALL

- (3) Do a test of the 2R&3L power off relay:
  - (a) Close 6E30 WINDOW HEAT 2R&3L PWR and 6E31 WINDOW HEAT 2R&3L IND circuit breakers on the P6 Main Power Distribution Panel.
    - Make sure that the EICAS status message WINDOW HEAT 2R does not show.
    - 2) Put C/26/006/00 into the CMCS INPUT MONITORING screen and make sure that bit 14 is a 0.

EFFECTIVITY-

30-41-00



- (b) Open 6E30 WINDOW HEAT 2R&3L PWR circuit breaker on the P6 Main Power Distribution Panel.
  - Make sure that the EICAS status message WINDOW HEAT 2R shows.
  - 2) Put C/26/006/00 into the CMCS INPUT MONITORING screen and make sure that bit 14 is a 1.
- (c) Close 6E30 WINDOW HEAT 2R&3L PWR circuit breaker on the P6 Main Power Distribution Panel.
  - Make sure that the EICAS status message WINDOW HEAT 2R does not show.
  - 2) Put C/26/006/00 into the CMCS INPUT MONITORING screen and make sure that bit 14 is a 0.
- (d) Open 6E31 WINDOW HEAT 2R&3L IND circuit breaker on the P6 Main Power Distribution Panel.
  - Make sure that the EICAS status message WINDOW HEAT 2R shows.

NOTE: A delay of about 60 seconds can occur before the message shows.

- 2) Put C/26/006/00 into the CMCS INPUT MONITORING screen and make sure that bit 14 is a 1.
- (e) Close 6E31 WINDOW HEAT 2R&3L IND circuit breaker on the P6 Main Power Distribution Panel.
  - Make sure that the EICAS status message WINDOW HEAT 2R does not show.
  - 2) Put C/26/006/00 into the CMCS INPUT MONITORING screen and make sure that bit 14 is a 0.

s 865-041

(4) Erase any EICAS status messages which showed during the test (Ref 31-61-00/201).

s 865-042

ALL

(5) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY-

30-41-00



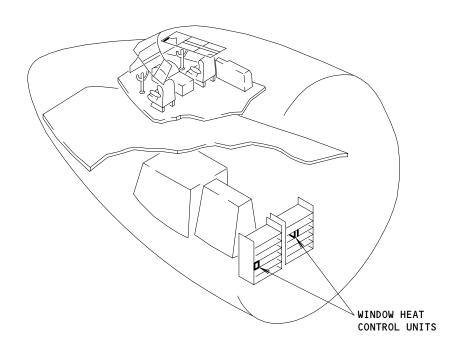
## WINDOW HEAT CONTROL UNIT - REMOVAL/INSTALLATION

#### 1. General

- Α. There are two tasks in this subject. There is one task for removal and there is one task for installation of the window heat control unit. The left window heat control unit is located on the E1-3 shelf The right window heat control unit is located on the E2-4 shelf. The procedure has these parts:
  - Look for stored shop faults with the CMCS (this is optional)
  - Remove power from the window heat control unit
  - Remove the window heat control unit
  - Install the replacement window heat control unit
  - Do a CMC ground test.

## TASK 30-41-01-004-001

- 2. Remove the Window Heat Control Unit (Fig. 401)
  - References
    - (1) 45-10-00/201, Central Maintenance Computer System
    - (2) SSM 30-41-01, 30-41-02
    - (3) WDM 30-41-11, 30-41-12



Window Heat Control Unit Installation Figure 401

EFFECTIVITY-ALL

30-41-01

01.1

Page 401 Oct 18/00



- B. Access
  - (1) Location Zone

117 Main Equipment Center, LH

118 Main Equipment Center, RH

C. Record of Shop Faults (Optional)

S 864-026

(1) Supply electrical power (Ref 24-22-00/201).

s 864-027

(2) Get access to SHOP FAULTS from the CMC main menu (AMM 45-10-00/201).

s 974-028

- (3) Make a record of shop faults for the left or right window heat control unit:
  - (a) Select <30 ICE AND RAIN from the shop faults menu.
  - (b) Select WINDOW HEAT-L or WINDOW HEAT-R for the left or right window heat control unit.

NOTE: Window Heat Control Unit S283U003-4:
In the SHOP FAULTS DATA page for the WHCU-L or WHCU-R,
it is necessary to wait 6 seconds between each push of
the NEXT PAGE or PREV PAGE key.

(c) Make a record of any shop faults which show.

S 864-029

- (4) Remove electrical power (Ref 24-22-00/201).
- D. Removal Procedure

s 864-002

- (1) Open these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L
    - 2) 6B17 WINDOW HEAT 1R
  - (b) P180 DC Power Distribution Panel
    - 1) 180H26 WINDOW HEAT CONT 1L
    - 2) 180H12 WINDOW HEAT CONT 1R

s 024-003

(2) Remove the window heat control unit from the shelf.

TASK 30-41-01-404-004

- 3. <u>Install the Window Heat Control</u> Unit (Fig. 401)
  - A. References
    - (1) 24-22-00/201, Manual Control
    - (2) 30-41-00/501, Flight Compartment Window Anti-Ice System
    - (3) SSM 30-41-01, 30-41-02
    - (4) WDM 30-41-11, 30-41-12

EFFECTIVITY-

30-41-01

ALL

01.1



- B. Access
  - (1) Location Zone

117 Main Equipment Center, LH

118 Main Equipment Center, RH

C. Installation Procedure

s 424-005

(1) Install the window heat control unit on the shelf.

s 864-006

- (2) Close these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L
    - 2) 6B17 WINDOW HEAT 1R
  - (b) P180 DC Power Distribution Panel
    - 1) 180H26 WINDOW HEAT CONT 1L
    - 2) 180H12 WINDOW HEAT CONT 1R
- D. Window Heat Control Unit Ground Test

s 864-009

(1) Supply electrical power (Ref 24-22-00/201).

s 864-005

(2) Set the GND TEST switch on the P461 panel to ENABLE.

s 744-009

- (3) Do a ground test of the window heat control unit (AMM 30-41-00/501):
  - (a) Press the left or right WINDOW HEAT switch on the anti-ice/rain removal module (P5 panel) to the ON position.
  - (b) Select <GROUND TESTS from the CMC main menu.
  - (c) Select <30 ICE AND RAIN from the ground tests menu.
  - (d) Select <WINDOW HEAT-1L OR <WINDOW HEAT-1R from the ice and rain menu.
    - 1) Make sure that TEST IN PROGRESS shows on the CDU.
    - Make sure that the INOP light in the left or right WINDOW HEAT switch comes on in 12 seconds or less.
    - 3) Make sure that PASS shows on the CDU.
  - (e) Push the left WINDOW HEAT switch to the off position.

EFFECTIVITY-

30-41-01

ALL

01.1



s 864-008

(4) Set the GND TEST switch on the P461 panel to NORM.

s 864-010

(5) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY-

ALL

30-41-01

i



## CONTROL AND OVERHEAT THERMOSTATS - REMOVAL/INSTALLATION

#### 1. General

A. This subject contains four tasks. The first two tasks are the removal and installation of the control thermostat for the No. 2 or No. 3 window. The second two tasks are the removal and installation of the overheat thermostat for the No. 2 or No. 3 window. In this procedure, you will open circuit breakers, disconnect the thermostat to be replaced, and install a replacement thermostat.

TASK 30-41-06-004-001

- 2. Control Thermostat Removal (Fig. 401)
  - A. References
    - (1) 56-11-02/401, No. 2 and 3 Windows
    - (2) IPC 30-41-06 Fig. 1
    - (3) SSM 30-41-01, 30-41-02
    - (4) WDM 30-41-21, 30-41-31
  - B. Access
    - (1) Location Zone

221 Control Cabin, RH - No. 2 and 3 Left Side Windows 222 Control Cabin, LH - No. 2 and 3 Right Side Windows

#### C. Procedure

s 864-002

(1) Open 6E28 WINDOW HEAT PWR 2L&3R and 6E30 WINDOW HEAT PWR 2R&3L circuit breakers on the P6 Main Power Distribution Panel.

s 034-003

(2) Lift the retainer and move the thermostat away from the windowpane:

Window 2L	Control Thermostat S760
Window 3L	Control Thermostat S759
Window 2R	Control Thermostat S761
Window 3R	Control Thermostat S762

s 024-004

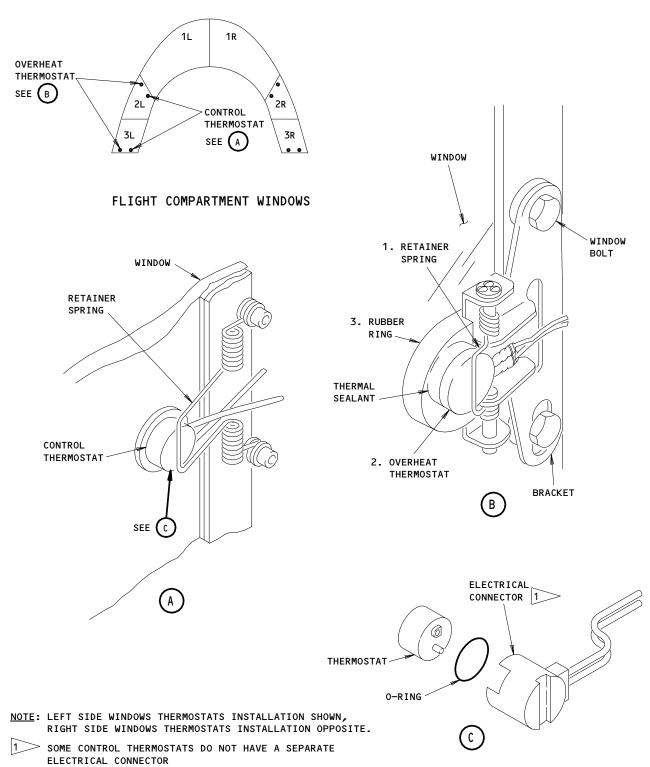
(3) Move the thermostat to one side and carefully lower the spring.

s 034-005

(4) Disconnect the wiring at the thermostat.

30-41-06





# Control and Overheat Thermostats Installation Figure 401

ALL

O1 Page 402
Oct 10/96

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



s 214-006

- (5) Make sure that the retainer is in good condition.
  - (a) If the retainer is not in good condition, replace the retainer (Ref 56-11-02/401).

TASK 30-41-06-404-007

- 3. Control Thermostat Installation (Fig. 401)
  - A. Consumable Materials
    - (1) A00062 Sealant, Thermal Wakefield No. 120 or Dow Corning DC340
  - B. References
    - (1) IPC 30-41-06 Fig. 1
    - (2) SSM 30-41-01, 30-41-02
    - (3) WDM 30-41-21, 30-41-31
  - C. Access
    - (1) Location Zone

221 Control Cabin, RH - No. 2 and 3 Left Side Windows 222 Control Cabin, LH - No. 2 and 3 Right Side Windows

D. Procedure

s 434-009

(1) Connect the wiring at the thermostat.

s 434-010

(2) Lift the retainer spring.

s 344-026

(3) Apply a thin coat of thermal sealant to the window surface area under the thermostat.

s 424-011

(4) Hold the thermostat in place against the window and lower the retainer spring. Put the end of the spring in the slot on the thermostat.

S 864-012

(5) Close 6E28 WINDOW HEAT PWR 2L & 3R and 6E30 WINDOW HEAT PWR 3L & 2R circuit breakers on the P6 Main Power Distribution Panel.

TASK 30-41-06-004-013

- 4. Overheat Thermostat Removal (Fig. 401)
  - A. References
    - (1) 56-11-02/401, No. 2 and 3 Windows
    - (2) IPC 30-41-06 Fig. 2
    - (3) SSM 30-41-01, 30-41-02
    - (4) WDM 30-41-21, 30-41-31

EFFECTIVITY-

30-41-06

ALL



- B. Access
  - (1) Location Zone

221 Control Cabin, RH - No. 2 and 3 Left Side Windows

222 Control Cabin, LH - No. 2 and 3 Right Side Windows

C. Procedure

S 864-014

(1) Open 6E28 WINDOW HEAT PWR 2L&3R and 6E30 WINDOW HEAT PWR 2R&3L circuit breakers on the P6 Main Power Distribution Panel.

s 024-015

(2) Lift the retainer spring (1) and remove the thermostat (2) from the rubber ring (3):

Window 2L	Overheat Thermostat	s1027
Window 3L	Overheat Thermostat	s1026
Window 2R	Overheat Thermostat	s1028
Window 3R	Overheat Thermostat	s1029

s 034-016

(3) Disconnect the wiring from the thermostat (2).

s 434-017

(4) Lower the spring (1) against the windowpane.

TASK 30-41-06-404-018

- Overheat Thermostat Installation (Fig. 401)
  - A. Consumable Materials
    - (1) A00062 Sealant, Thermal Wakefield No. 120 or Dow Corning DC340
  - В. Parts

АММ			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1 2 3	Spring Switch - Thrm (Thermostat) Retainer (Rubber Ring)	30-41-06	02	50 65 60

- References
  - (1) 56-11-02/401, No. 2 and 3 Windows
  - (2) SSM 30-41-01, 30-41-02
  - (3) WDM 30-41-21, 30-41-31

EFFECTIVITY-

30-41-06

ALL



- D. Access
  - (1) Location Zone

221 Control Cabin, RH - No. 2 and 3 Left Side Windows

222 Control Cabin, LH - No. 2 and 3 Right Side Windows

E. Procedure

s 434-019

- (1) Make sure that the thermostat retainer will hold the thermostat at the hot spot area near the red dot in the window.
  - (a) If the retainer is not in the nearest position to the red dot, do these steps:
    - 1) Remove the 2 window bolts which hold the retainer bracket.
    - 2) Move the bracket to the nearest position to the red dot.
    - 3) Install the bolts.

s 434-020

(2) Connect the wiring to the thermostat (2).

s 034-021

(3) Lift the retainer spring (1) from the windowpane.

s 344-025

(4) Apply a thin coat of thermal sealant to the window surface area under the thermostat.

s 424-023

(5) Hold the thermostat (2) in location against the windowpane and lower the spring (1) against the thermostat.

s 864-024

ALL

(6) Close 6E28 WINDOW HEAT PWR 2L&3R and 6E30 WINDOW HEAT PWR 2R&3L circuit breakers on the P6 Main Power Distribution Panel.

EFFECTIVITY-

30-41-06

t



# OVERHEAT THERMOSTAT RETAINER - REPAIRS

## 1. General

A. This task is a procedure to repair the bonded overheat thermostat bracket retainer if it is loose or disconnected. In this procedure, you will clean and paint the bracket and join the parts with adhesive.

TASK 30-41-07-308-001

- 2. Overheat Thermostat Retainer Repair
  - A. Consumable Materials
    - (1) A00303 Adhesive RTV 174
    - (2) G00034 Cheesecloth, dry and lint-free
    - (3) G00383 Paper, Abrasive Aluminum Oxide, 240 grit or finer
    - (4) A00168 Silicone Primer RTV 1200
    - (5) B00148 Solvent Methyl Ethyl Ketone (MEK), TT-M-261

B00312 Wool - Aluminum

- B. References
  - (1) IPC 30-41-06 Fig. 2
  - (2) SSM 30-41-01, 30-41-02
  - (3) WDM 30-41-21, 30-41-31
- C. Access
  - (1) Location Zone

221 Control Cabin, LH - No. 2 and 3 Left Side Windows 222 Control Cabin, RH - No. 2 and 3 Right Side Windows

D. Procedure

s 118-006

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. SOLVENTS MAY BE FLAMMABLE OR HARMFUL TO THE ENVIRONMENT. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

(1) Use solvent, Series 84 (AMM 20-30-84) to clean the surface of the bracket which will touch the rubber retainer.

s 138-003

(2) Use aluminum wool or aluminum oxide to make the surface of bracket rough.

EFFECTIVITY-

30-41-07

ALL



s 118-007

(3) Clean the bracket with solvent, Series 84 (AMM 20-30-84) .

NOTE: Use clean cheesecloth to apply the solvent and then to make the surface dry. Do not let the solvent dry on the surface. Do the procedure more until the surfaces are completely clean.

s 378-004

(4) Apply primer to those bracket surfaces which will touch the retainer. Let the primer air-dry for a minimum of 60 minutes or maximum of 4 hours.

s 348-005

(5) Apply a uniform layer of adhesive over the bracket bonding surface and bond the parts immediately (apply sufficient pressure to make sure that there is complete contact).

<u>NOTE</u>: Exposure to air for more than a few minutes will cause adhesive to form a skin which interferes with adhesion.

(a) Let the adhesive dry under contact pressure for a minimum of 24 hours at 70 to 80°F. A minimum of 20% relative humidity is necessary.

EFFECTIVITY-

ALL

30-41-07



#### WINDSHIELD WIPER SYSTEM - DESCRIPTION AND OPERATION

# 1. General (Fig. 1)

- A. Two windshield wipers maintain a clear area on the captain's and first officer's No. 1 windows during takeoff, approach and landing in rain or snow. Each wiper is operated by a separate system to maintain clear vision through one of the windows in the event of a system failure. The windows may also be kept clear in heavy rain by using the rain repellent system (Ref 30-43-00) in conjunction with the windshield wiper.
- B. Two wiper speeds may be selected. The low wiper speed is 190 ±19 strokes per minute. The high wiper speed is 250 ±25 strokes per minute. The wiper blades clear a 22 inch wide path through an arc of 69 degrees.
- C. Each windshield wiper system consists of a drive motor/converter, a wiper arm assembly consisting of a wiper arm and a wiper blade, and a control switch located in the anti-ice-rain removal module M7321 on the P5 overhead panel. The systems are powered by 28 volts dc through circuit breakers on the P7 panel. Left system power is from the 28 volts dc bus 3 and right system power is from the 28 volts dc bus 4.

#### 2. Motor-Converter Assembly

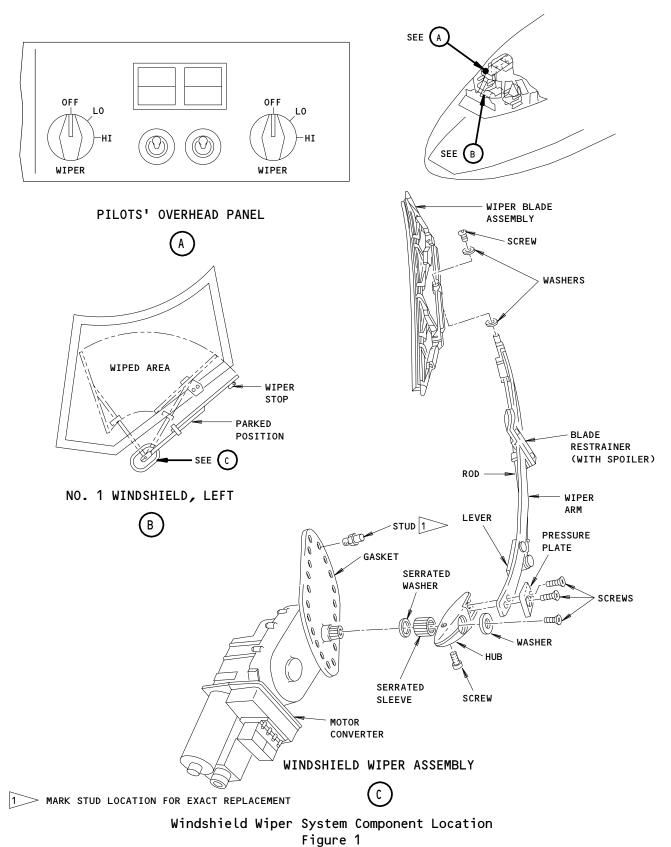
A. The wiper arm for each system is driven by a motor-converter assembly (M17 - right, M18 - left). Each assembly is mounted on an integral access plate near its respective window. The left and right assemblies are identical except that they are mirror images of each other. Each assembly includes a motor, a converter, a cam-actuated parking switch, two relays, and a brake solenoid and brake. The converter reduces the speed of the motor and changes the rotary motion into oscillatory motor of the wiper arm.

## Operation (Fig. 2)

- A. Functional Description
  - (1) Each windshield wiper is controlled with the WIPER control switch located in the anti-ice/rain removal module on the P5 panel.
    - (a) When the LO position of the switch is selected, relay 1 in the motor is energized, which applies power to motor fields 1 and 2 in series. As the wiper leaves the park position, the internal park switch is closed. The motor operates at approximately 190 strokes per minute.
    - (b) When the HI position is selected, both relays 1 and 2 are energized, which applies power to motor fields 1 and 2 in parallel. The motor operates at approximately 250 strokes per minute.

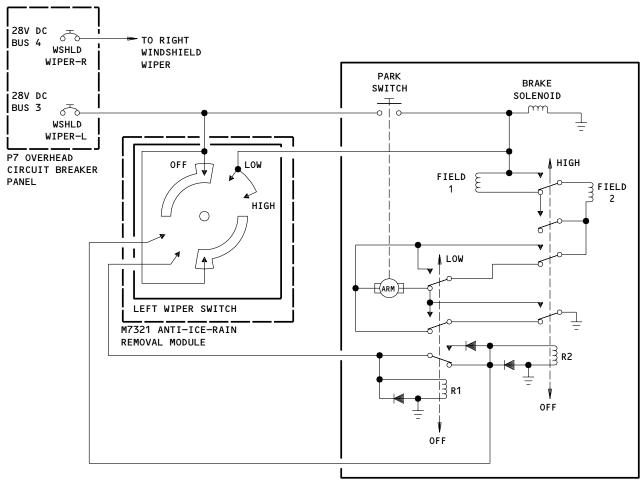
30-42-00





EFFECTIVITY-





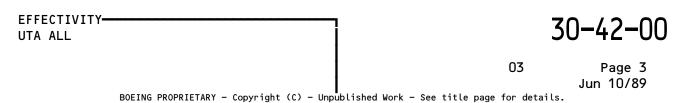
M18 LEFT WINDSHIELD WIPER MOTOR

NOTE: OFF - R1 & R2 DE-ENERGIZED

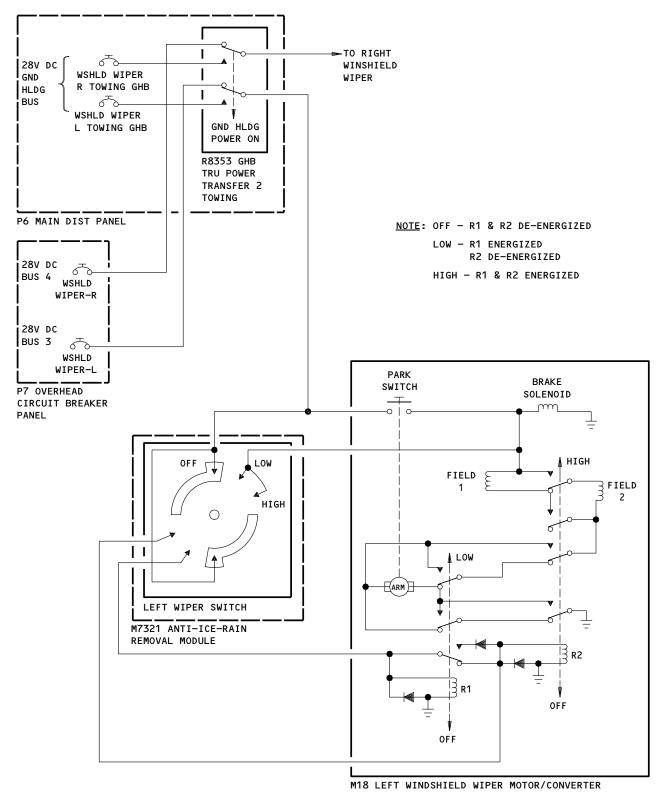
LOW - R1 ENERGIZED R2 DE-ENERGIZED

HIGH - R1 & R2 ENERGIZED

# Windshield Wiper System Schematic Figure 2 (Sheet 1)







Windshield Wiper System Schematic Figure 2 (Sheet 2)



- (c) When the OFF position is selected, power is still supplied to the motor through the internal park switch. Both relays 1 and 2 are de-energized and the motor reverses its direction. When the motor reaches its park position, the park switch opens, removing motor power and releasing the brake solenoid which stops the motor.
- (2) When the wipers are turned on, friction of the wiper blade on the windshield moves the blade from its parked position parallel to the wiper arm to the wiping position at 20° to the arm. As the wiping position is reached, a spring-loaded unlatch mechanism on the arm locks to fix the blade in the wiping position. When the wipers are turned off, the arm sweeps into the parked position and a lever on the arm contacts the trip stud on the airplane. This unlatches the blade from the arm and allows the blade to pivot and assume the proper parked position.
- (3) When the wiper blade is in the parked position it should be free to move 1/8 to 1/4 inch from the stop by applying finger pressure. This takes up gear backlash.
- (4) A small spoiler is attached to the blade retaining clip to provide positive blade pressure for adequate wiping at high flight speeds. The blade retainer clip is fastened to the wiper arm and holds the blade tip to prevent lifting in flight when the system is not operating.

## B. Control

(1) To operate the windshield wipers, set the left and right WIPER control switches to the desired speed position, LO or HI. To stop the windshield wipers, set the control switches to OFF.

30-42-00



# WINDSHIELD WIPER SYSTEM - ADJUSTMENT/TEST

#### 1. General

- A. This task is an operational test of the windshield wiper system. During this procedure you must apply water to the windshield. For the test you will make sure that the wipers operate at the LO and HI speeds and then move to the park position. The left and right windshield wipers operate independently. You can do a check of their operation separately or together.
- B. There are no adjustments for the windshield wiper system in this procedure. Adjustment of the park position of the wiper arm is in 30-42-02/401.

TASK 30-42-00-715-001

- 2. Operational Test Windshield Wiper System
  - A. Standard Tools and Equipment
    - (1) Water spray clean (to make windshield wet)
  - B. References
    - (1) 24-22-00/201, Manual Control
    - (2) SSM 30-42-01
    - (3) WDM 30-42-11
  - C. Access
    - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 1 Right Window

D. Preconditions

s 865-008

- (1) These conditions are necessary for this task: (a) Electrical power on (AMM 24-22-00/201).
- E. Procedure

s 865-002

(1) Supply electrical power (Ref 24-22-00/201).

S 645-003

CAUTION: YOU MUST SUPPLY WATER TO THE WINDSHIELD BEFORE YOU OPERATE THE WIPERS. OPERATION OF THE WIPERS WITHOUT WATER CAN CAUSE DAMAGE TO THE WINDSHIELD.

(2) Apply a spray of clean water or windshield washer fluid to the windshield.

NOTE: Continue to apply the water when the wiper is in motion.

EFFECTIVITY-

30-42-00

ALL



# s 715-004

- (3) Make sure the left windshield wiper operates:
  - (a) Set the left windshield WIPER switch to LO.
    - 1) Make sure that the wiper blade operates at 171 to 209 strokes per minute.
    - 2) Make sure that the wiper blade moves freely and smoothly.
    - 3) Make sure that the wiper blade does not contact the windshield seal.
  - (b) Set the left windshield WIPER switch to HI.
    - 1) Make sure that the wiper blade operates at 225 to 275 strokes per minute.
    - 2) Make sure that the wiper blade moves freely and smoothly.
    - Make sure that the wiper blade does not contact the windshield seal.
  - (c) Set the left windshield WIPER switch to OFF.

CAUTION: MAKE SURE THAT THE WIPER BLADE IS PARALLEL TO THE WIPER ARM WHEN IT PARKS. IF THE WIPER BLADE IS NOT PARALLEL, IT CAN LIFT AWAY FROM THE WINDSHIELD IN FLIGHT.

1) Make sure that the wiper blade moves to the park position off the windshield glass and against the stop.

NOTE: The blade should turn and align with the wiper arm.

#### s 715-005

- (4) Make sure the right windshield wiper operates:
  - (a) Set the right windshield WIPER switch to LO.
    - 1) Make sure that the wiper blade operates at 171 to 209 strokes per minute.
    - 2) Make sure that the wiper blade moves freely and smoothly.
    - Make sure that the wiper blade does not contact the windshield seal.
  - (b) Set the right windshield WIPER switch to HI.
    - 1) Make sure that the wiper blade operates at 225 to 275 strokes per minute.
    - 2) Make sure that the wiper blade moves freely and smoothly.
    - Make sure that the wiper blade does not contact the windshield seal.
  - (c) Set the right windshield WIPER switch to OFF.

EFFECTIVITY-

30-42-00

ALL



CAUTION: MAKE SURE THAT THE WIPER BLADE IS PARALLEL TO THE

WIPER ARM WHEN IT PARKS. IF THE WIPER BLADE IS NOT PARALLEL, IT CAN LIFT AWAY FROM THE WINDSHIELD IN

FLIGHT.

1) Make sure that the wiper blade moves to the park position off the windshield glass and against the stop.

NOTE: The blade should turn and align with the wiper arm.

s 865-006

(5) Remove electrical power (Ref 24-22-00/201).

30-42-00

01

Page 503 Feb 10/97



# WINDSHIELD WIPER BLADE - REMOVAL/INSTALLATION

### 1. General

- A. This subject has two tasks, one for the removal and one for the installation of the windshield wiper blade. In this procedure, you will put a pad under the wiper arm, unfasten and remove the wiper blade, and install the replacement blade.
- B. The same procedure is for the left or right wiper blades. No adjustment is necessary after installation of the wiper blade.

TASK 30-42-01-004-001

- 2. Windshield Wiper Blade Removal (Fig. 401)
  - A. Consumable Materials
    - (1) G00507 Cloth Lint Free (to protect windshield from wiper arm)
  - B. References
    - (1) SSM 30-42-01
    - (2) WDM 30-42-11
  - C. Access
    - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 1 Right Window

D. Procedure

s 284-002

(1) Make sure that the windshield wiper arms are in the parked position.

s 864-003

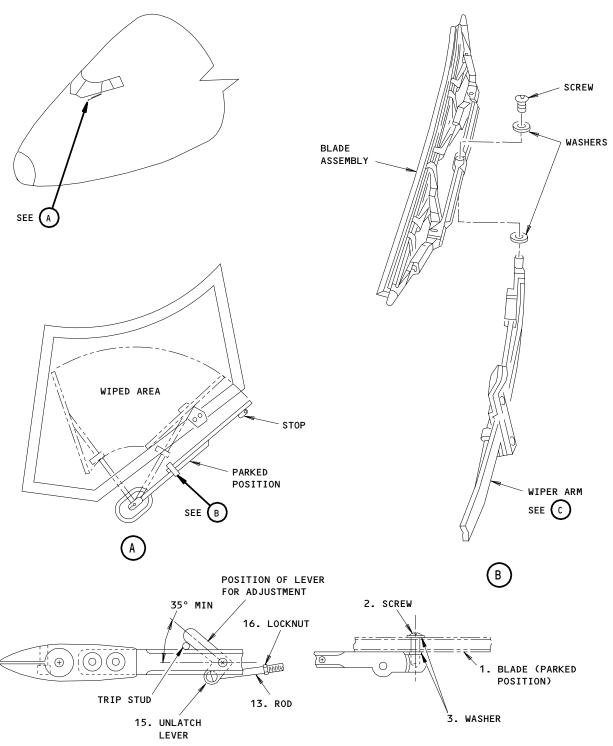
WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS IN THIS STEP. YOU CAN GET AN ELECTRICAL SHOCK IF YOU TOUCH THE WINDSHIELD WHEN THE WINDOW HEAT POWER IS ON.

- (2) Open these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E1 WSHLD WIPER L
    - 2) 7E25 WSHLD WIPER R
  - (b) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (c) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R

EFFECTIVITY-

30-42-01





# WIPER ARM UNLATCH LEVER MECHANISM - PARKED POSITION

 $\bigcirc$ 

Wiper Blade Installation Figure 401

ALL

O1 Page 402
Oct 10/95

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



S 954-004

(3) Put cloth pad between the wiper arm and the airplane structure to prevent scratches in the surface when you remove the blade.

s 024-015

CAUTION: DO NOT LIFT THE ARM ASSEMBLY MORE THAN 0.5 INCHES. YOU CAN CAUSE DAMAGE TO THE ARM ASSEMBLY AND MAKE IT UNSERVICEABLE.

(4) Remove the screw, washers, and wiper blade, and lower the arm onto the cloth pad.

TASK 30-42-01-404-006

- 3. Windshield Wiper Blade Installation (Fig. 401)
  - A. References
    - (1) IPC 30-42-01 Fig. 1
    - (2) SSM 30-42-01
    - (3) WDM 30-42-11
  - B. Access
    - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 1 Right Window

C. Procedure

s 424-017

(1) Hold the wiper blade in location, install the two washers (one on each side of the blade), and tighten the screw.

NOTE: Reuse of wiper blade attach screw is not recommended.

s 954-008

(2) Remove the cloth pad.

s 714-009

(3) Make sure that the blade turns freely.

EFFECTIVITY-

30-42-01

ALL

01.101



s 864-013

CAUTION: THE WIPER BLADE MUST BE PARALLEL TO THE WIPER ARM WHEN IN THE PARKED POSITION. IF IT IS NOT PARALLEL, THE WIPER BLADE WILL LIFT DURING FLIGHT.

(4) Align the blade with the arm.

S 864-014

(5) Make sure the unlatch lever is in the parked position.

S 864-011

(6) Lower the wiper blade against the airplane structure inboard of the stop.

s 864-012

- (7) Close these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E1 WSHLD WIPER L
    - 2) 7E25 WSHLD WIPER R
  - (b) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (c) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R

EFFECTIVITY-

30-42-01



# WINDSHIELD WIPER ARM - REMOVAL/INSTALLATION

#### 1. General

- A. This subject contains two tasks, one for removal and one for installation of the windshield wiper arm. The procedure has these parts:
  - (1) Put a pad between the wiper arm and the windshield.
  - (2) Removal of the the wiper arm.
  - (3) Installation of the replacement arm.
  - (4) Test of wiper operation (with water to protect windshield).
  - (5) Adjustment of wiper arm if necessary.
- B. The windshield wiper arm is attached to the motor-converter shaft through an adjustment bushing.

TASK 30-42-02-004-001

- 2. Windshield Wiper Arm Removal (Fig. 401).
  - A. Standard Tools and Equipment
    - (1) Sealant cutting tool hardwood or plexiglass
  - B. Consumable Materials
    - (1) G00507 Cloth Lint Free (to protect windshield from wiper arm)
  - C. References
    - (1) IPC 30-42-01 Fig. 1
    - (2) SSM 30-42-01
    - (3) WDM 30-42-11
  - D. Access
    - (1) Location Zone

221 Control Cabin, LH - Outside No. 1 Left Window

222 Control Cabin, RH - Outside No. 1 Right Window

E. Prepare for Removal

S 284-002

(1) Make sure that the wipers are in the parked position off the windshield.

s 864-003

WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS BELOW. IF YOU DO NOT OPEN THESE CIRCUIT BREAKERS, YOU CAN GET A DANGEROUS ELECTRICAL SHOCK WHEN YOU TOUCH THE WINDSHIELD.

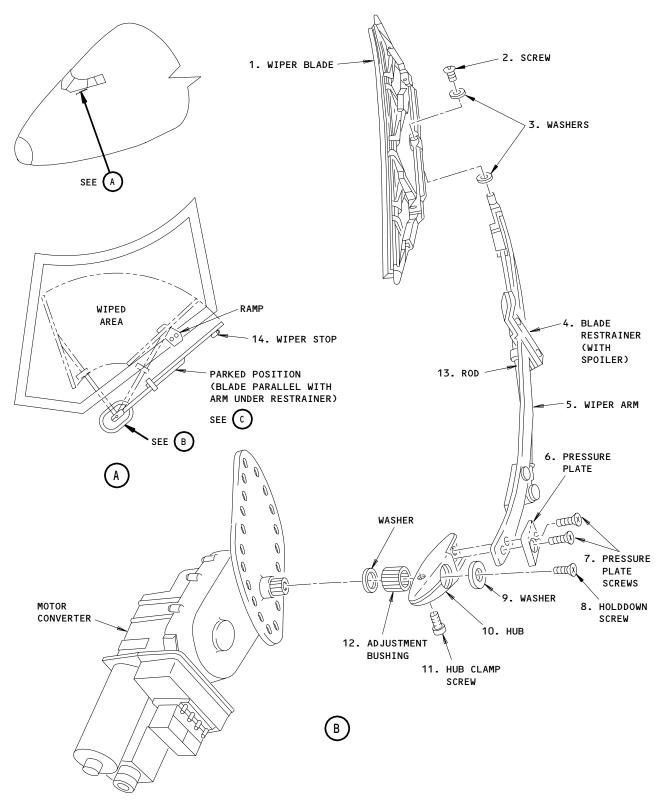
- (2) Open these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E1 WSHLD WIPER L
    - 2) 7E25 WSHLD WIPER R
  - (b) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (c) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L

EFFECTIVITY-

30-42-02

ALL





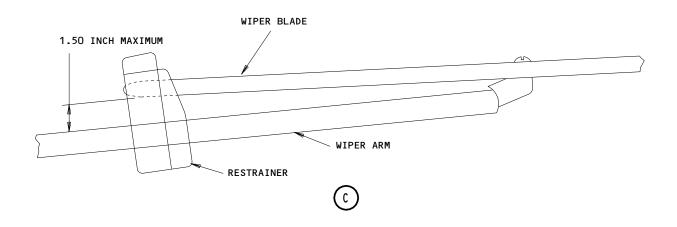
Wiper Arm Installation Figure 401 (Sheet 1)

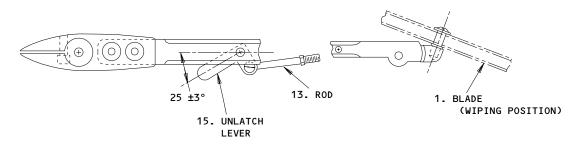
ALL

O1 Page 402
Feb 10/94

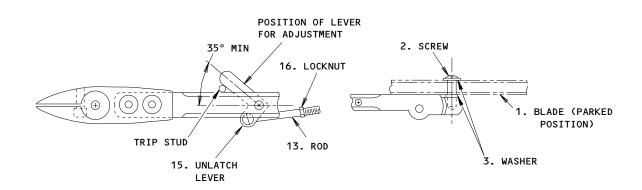
BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.







WIPER ARM UNLATCH LEVER MECHANISM - WIPING POSITION



WIPER ARM UNLATCH LEVER MECHANISM - PARKED POSITION

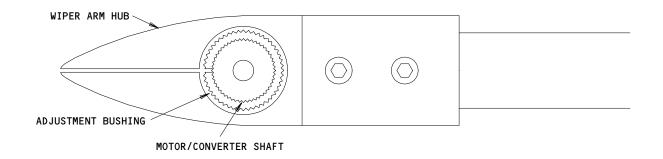
Wiper Arm Installation Figure 401 (Sheet 2)

ALL

O1 Page 403
Oct 10/95

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.





ADJUSTMENT BUSHING AND WIPER HUB ADJUSTMENT	APPROXIMATE MOVEMENT AT THE OUTBOARD BLADE TIP
MOVE THE ADJUSTMENT BUSHING AND THE WIPER ARM HUB TOGETHER ONE TOOTH ON THE SHAFT. DO NOT LET THE MOTOR CONVERTER SHAFT MOVE.	4.76 INCHES
MOVE THE WIPER ARM HUB ONE TOOTH IN RELATION TO THE BUSHING. DO NOT LET THE MOTOR CON-VERTER SHAFT AND THE ADJUSTMENT BUSHING MOVE.	4.67 INCHES
MOVE THE ADJUSTMENT BUSHING ONE TOOTH CLOCKWISE.     MOVE THE WIPER ARM HUB ONE TOOTH COUNTER-CLOCKWISE.	0.09 INCHES CLOCKWISE
MOVE THE ADJUSTMENT BUSHING ONE TOOTH COUNTERCLOCKWISE.     MOVE THE WIPER ARM HUB COUNTERCLOCKWISE ONE TOOTH ON THE ADJUSTMENT BUSHING.	0.09 INCHES COUNTERCLOCKWISE

Wiper Arm Installation Figure 401 (Sheet 3)

30-42-02

01

Page 404 Oct 10/95



#### 2) 180H12 WDO HEAT CONT 1R

F. Wiper Arm Removal Procedure

s 144-004

(1) Remove the sealant from the heads of all screws (7, 8, 11) on the hub with a cutting tool.

NOTE: It is not necessary to remove sealant from screws (8,11) if only the wiper arm is removed.

s 954-005

(2) Put a cloth pad between the wiper arm (5) and the airplane structure (this will to prevent the arm from scratching the surfaces when the blade is removed).

NOTE: It is possible to remove the arm and the blade together.

s 034-006

- (3) Remove the screw (2), the washer (3), the wiper blade (1), and the washer (3).
  - (a) Lower the wiper arm (5) onto the cloth pad.

s 024-007

(4) Remove the pressure plate screws (7) and remove the pressure plate (6) and the wiper arm (5).

NOTE: If hub is not damaged, wiper arm replacement can be simplified if you do not remove the hub assembly. If this procedure is followed, omit the removal and installation of the hub assembly.

s 424-035

- (5) Remove the wiper arm hub (10) if it is necessary:
  - (a) Loosen the hub clamp screw (11).
  - (b) Remove the hub holddown screw (8) and the washer (9).
  - (c) Pull the windshield wiper hub (10) off the motor/converter shaft.

TASK 30-42-02-404-011

- 3. Windshield Wiper Arm Installation (Fig. 401).
  - A. Standard Tools and Equipment
    - (1) Water spray clean (to make the windshield wet during wiper operation)
    - (2) Sealing gun 6-inch length cartridge, Semco Research or equivalent
  - B. Consumable Materials
    - (1) A00247 Sealant BMS 5-95, Class B
    - (2) B00083 Cleaner Aliphatic Naphtha, TT-N-95
    - (3) D00013 Grease MIL-G-23827

EFFECTIVITY-

30-42-02

ALL



#### (4) G00371 Brush - Soft Bristle

#### C. Parts

АММ			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1 5 5	Wiper Blade Wiper Arm Assembly - left Wiper Arm Assembly - right	30-42-01	01	30 35 40

- D. References
  - (1) 24-22-00/201, Manual Control
  - (2) SSM 30-42-01
  - (3) WDM 30-42-11
- E. Access
  - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 1 Right Window

F. Install Wiper Arm

s 864-036

(1) Close 7E1 WSHLD WIPER L and 7E25 WSHLD WIPER R circuit breakers on the P7 Overhead Circuit Breaker Panel.

s 864-037

(2) Set the applicable WIPER switch on the anti-ice/rain removal module to LO and then to OFF (so that the motor/converter shaft is in the park position).

s 864-038

(3) Open 7E1 WSHLD WIPER L and 7E25 WSHLD WIPER R circuit breakers on the P7 Overhead Circuit Breaker Panel.

s 434-046

CAUTION: USE ONLY SCREWS WHICH HAVE THE NYLON LOCKING FEATURE TO ATTACH THE WIPER BLADE. IT IS POSSIBLE THAT OTHER SCREWS WILL BECOME LOOSE. THIS CAN CAUSE A LOSS OF THE BLADE AND DAMAGE TO THE WINDSHIELD.

(4) Install the wiper blade (1) with 2 washers (3) and screw (2).

NOTE: Reuse of wiper blade attach screws, wiper arm pressure plate screws, holddown screw and hub clamp screw is not recommended.

EFFECTIVITY-

30-42-02

ALL



s 714-045

(5) Make sure that the wiper blade turns freely at its attachment point.

S 424-044

- (6) Attach the wiper arm:
  - (a) Position the wiper arm (5) in the hub (10).
  - (b) Install the pressure plate (6) and the screws (7). Do not tighten the screws (7).

S 424-042

- (7) If the wiper arm hub (10) was removed from the motor/converter, install the hub/arm/blade assembly:
  - (a) Apply grease to the serrations on the hub (10) and the motor/converter shaft.
  - (b) Turn the unlatch lever (15) and align the wiper blade (1) parallel with the wiper arm (5) with the blade under the restrainer (4).
  - (c) Install the hub (10) onto the motor/converter shaft (the shaft is at the parked position).
  - (d) You may need to move the adjustment bushing (12) to put the wiper arm (5) in the parked position (figure 401).
    - Make sure that the backlash of the motor/converter goes away when you apply light finger pressure on the wiper arm toward the windshield.
    - 2) Make sure that the wiper blade (1) touches the wiper stop (14).
  - (e) Install the washer (9) and the holddown screw (8).
  - (f) Tighten the hub clamp screw (11).
- G. Wiper Operation Check and Adjustment

s 434-025

ALL

- (1) Place the unlatch lever (15) on the top side of the wiper blade release stud.
  - (a) Tighten the pressure plate screws (7).

EFFECTIVITY-

30-42-02



s 224-040

- (2) Make sure that the angles between the wiper arm and the wiper blade are correct:
  - (a) Make sure that the angle between the unlatch lever (15) and the wiper arm (5) centerline is  $25 \pm 3$  degrees.
  - (b) If the angle is not correct, adjust the rod:
    - 1) Loosen the locknut (16) on the rod (13).
    - 2) Turn the rod to get the proper angle.
    - 3) Tighten the locknut.
  - (c) Move the unlatch lever (15) to the opposite side of the wiper arm (5) until the lever stops.
  - (d) Make sure that the angle between the unlatch lever (15) and the wiper arm centerline is 35 degrees minimum.

S 864-026

(3) Close 7E1 WSHLD WIPER L and 7E25 WSHLD WIPER R circuit breakers on the P7 Overhead Circuit Breaker Panel.

NOTE: If the hub assembly was not replaced, then only the "wiper arm to wiper blade angle" of the "wiper Operation Check and Adjustment" needs to be completed.

s 864-027

(4) Provide electrical power (Ref 24-22-00/201).

s 714-028

(5) Make sure the wiper operates correctly:

<u>CAUTION</u>: MAKE SURE TO APPLY WATER TO THE WINDSHIELD. WIPER OPERATION WILL CAUSE DAMAGE TO A DRY WINDSHIELD.

- (a) Apply water to the windshield.
- (b) Set the WIPER switch on the anti-ice/rain removal module to LO.
- (c) See that the wiper operates smoothly and does not overlap the window seal strips.

NOTE: It is satisfactory for the blade to touch the extreme outboard or inboard limit of the wiper sweep pattern if you apply a large amount of water to the windshield.

- (d) Set the WIPER switch to OFF.
- (e) Make sure that the wiper returns to the parked position with the wiper blade (1) under the restrainer (4).
- (f) Make sure that the distance between the inboard side of the wiper arm and the outboard side of the wiper blade is not more than 1.50 inches (figure 401).
- (g) Set the WIPER switch to HI.
- (h) Make sure that the wiper moves smoothly and freely.

EFFECTIVITY-

30-42-02

ALL



- (i) Set the WIPER switch to OFF.
- (j) Make sure that the wiper returns to the parked position.
- (k) Make sure that the distance between the inboard side of the wiper arm and the outboard side of the wiper blade is not more than 1.50 inches.

CAUTION: THE WIPER BLADE MUST BE PARALLEL TO THE WIPER ARM WHEN IN THE PARKED POSITION. IF IT IS NOT PARALLEL, THE WIPER BLADE WILL LIFT DURING FLIGHT.

(l) Make sure that the wiper moves to the parked position with the wiper blade under the restrainer (4).

s 824-029

(6) If the wiper blade movement is not centered on the windshield or if the wiper blade does not move parallel to the wiper arm so the outboard tip of the blade touches the wiper stop (14) when parked, adjust the assembly:

NOTE: Correct park adjustment is necessary for correct wiper operation. You must adjust the wiper arm if the hub is not in the correct position on the motor/converter shaft.

- (a) Find the number of teeth which the adjustment bushing (12) must move for the correct park position and scan pattern (Fig 401).
- (b) Mark a line on the hub (10), adjustment bushing (12), and the motor/converter shaft.
- (c) Remove the hub and the bushing from the shaft and rotate the bushing in the applicable direction.
- (d) Set the wiper blade parallel to the wiper arm assembly.
- (e) Align the wiper blade (1) parallel with the wiper arm (5) with the blade under the restrainer (4).
- (f) Install the hub (10) onto the motor/converter shaft (the shaft is at the parked position).
  - Make sure that the backlash of the motor/converter goes away when you apply light finger pressure on the arm toward the windshield.
  - 2) Make sure that the blade (1) touches the wiper stop (14).
- (g) Install the washer (9) and the holddown screw (8).
- (h) Tighten the hub clamp screw (11).
- H. Put the Airplane to the Usual Condition

s 864-030

(1) Open 7E1 WSHLD WIPER L and 7E25 WSHLD WIPER R circuit breakers on the P7 overhead circuit breaker panel.

EFFECTIVITY-

30-42-02



s 114-031

(2) Clean the screw heads and slots on the hub (10).

NOTE: Use a small brush to apply aliphatic naphtha for cleaning.

Rub the naphtha off with a clean cloth before it becomes dry.

s 344-032

(3) Use the sealing gun to fill the screw slots and the clamp slit in the wiper arm hub (10) with sealant (use a spatula to get a smooth surface on the sealant).

S 864-033

- (4) Close these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E1 WSHLD WIPER L
    - 2) 7E25 WSHLD WIPER R
  - (b) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (c) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R

s 864-034

(5) Remove electrical power if it not necessary (Ref 24-22-00/201).

EFFECTIVITY-

30-42-02



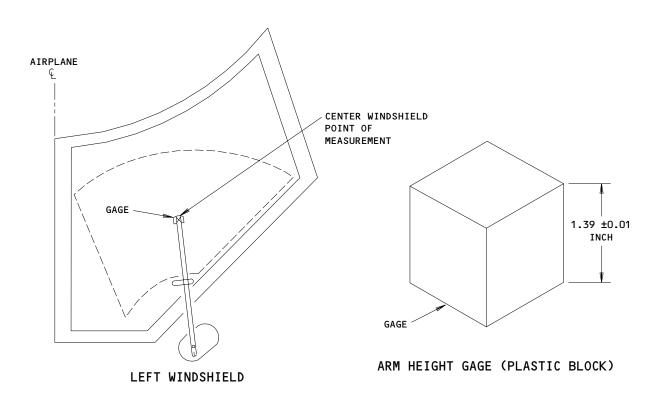
### <u>WINDSHIELD WIPER ARM - INSPECTION/CHECK</u>

# 1. General

- A. This task is an inspection/check for the windshield wiper arm. In this procedure, you will use a gage block to measure the pressure of the arm against the windshield.
- B. It is possible that incorrect wiper arm pressure on the wiper blade will cause poor operation of the arm or will cause it to lift in flight. The windshield wiper arms apply approximately 10 pounds of pressure to the blade at the center of the travel and 5 pounds of pressure at the parked position. The wiper arm tension is not adjustable. Replace the arm if the force is not correct.

TASK 30-42-02-206-001

- Inspection/Check Windshield Wiper Arm (Fig. 601)
  - A. Special Tools and Equipment
    - (1) G30001-1 Block Height Gage, Wiper Arm (plastic)
  - B. Standard Tools and Equipment
    - (1) Clean water spray (to make the windshield wet)
    - (2) Spring scale 1 to 12 pounds or equivalent
  - C. Consumable Materials
    - (1) G00507 Cloth Lint Free (to prevent damage from the wiper arm)



Windshield Wiper Arm Pressure Check Figure 601

ALL

O1 Page 601
Feb 18/00

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



- D. References
  - (1) 24-22-00/201, Manual Control
  - (2) 30-42-01/401, Windshield Wiper Blade
  - (3) 30-42-02/401, Windshield Wiper Arm
  - (4) SSM 30-42-01
  - (5) WDM 30-42-11
- E. Access
  - (1) Location Zone

Control Cabin, LH - Outside of No. 1L Window
 Control Cabin, RH - Outside of No. 1R Window

- F. Procedure
  - S 866-015

WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS IN THIS STEP. YOU CAN GET AN ELECTRICAL SHOCK IF YOU TOUCH THE WINDSHIELD WHEN THE WINDOW HEAT POWER IS ON.

- (1) Open these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (b) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R

s 866-003

(2) Supply electrical power (Ref 24-22-00/201).

s 646-004

CAUTION: MAKE SURE TO APPLY WATER TO THE WINDSHIELD BEFORE YOU OPERATE THE WIPERS. OPERATION OF THE WIPERS WITHOUT WATER CAN CAUSE DAMAGE TO THE WINDSHIELD.

(3) Apply water to the windshield.

s 866-005

(4) Set the windshield wiper switch on the P5 overhead panel to L0.

s 866-006

(5) Open 7E1 WSHLD WIPER L or 7E25 WSHLD WIPER R circuit breaker on the Overhead Circuit Breaker Panel to stop the wiper in approximately the center of windshield.

EFFECTIVITY-

30-42-02

ALL



s 026-007

(6) Do this task: "Wiper Blade Removal" (Ref 30-42-01/401).

s 226-016

- (7) Do a check of the wiper arm tension:
  - (a) Put the arm height gage under the end of the wiper arm.
  - (b) Adjust the gage until the wiper arm is on the 1.39-inch dimension (Fig. 601).
  - (c) Attach a scale to the end of the wiper arm.
  - (d) Slowly lift the wiper arm perpendicular to the windshield until it is clear of the gage.
  - (e) Make sure that the scale shows 9 to 11 pounds.
    - 1) If the scale does not show the correct value, replace the wiper arm (Ref 30-42-02/401).
  - (f) Remove the scale from the wiper arm.

s 426-011

(8) Do this task: "Wiper Blade Installation" (Ref 30-42-01/401).

s 716-012

(9) Make sure that the wiper operates:

CAUTION: MAKE SURE TO APPLY WATER TO THE WINDSHIELD BEFORE YOU OPERATE THE WIPERS. OPERATION OF THE WIPERS WITHOUT WATER CAN CAUSE DAMAGE TO THE WINDSHIELD.

- (a) Apply water to the windshield.
- (b) Close 7E1 WSHLD WIPER L or 7E25 WSHLD WIPER R circuit breaker on the P7 Overhead Circuit Breaker Panel.
- (c) Make sure that the wiper operates at low speed.
- (d) Set the windshield wiper switch to OFF.
- (e) Make sure that the wiper blade moves to the parked position.

s 866-013

ALL

- (10) Close these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (b) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R

EFFECTIVITY-

30-42-02



S 866-014 (11) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY-

ALL

30-42-02

01

Page 604 Jun 10/91



# MOTOR-CONVERTER - REMOVAL/INSTALLATION

#### 1. General

- A. This subject has two tasks, one for removal and one for installation of the windshield wiper motor-converter. In this procedure, you will remove the wiper arm, remove the motor-converter, and install a replacement unit. The procedure is the same for the left or right motor-converter.
- B. The windshield wiper motor-converter is on an integral access plate located at the flight compartment No. 1 window. The access plate fits into an opening in the airplane skin. You will remove the motor-converter assembly from outside the airplane.

TASK 30-42-03-004-017

- 2. Motor-Converter Removal (Fig. 401)
  - A. Standard Tools and Equipment
    - (1) Sealant cutting tool hardwood or plexiglass
  - B. References
    - (1) SSM 30-42-01
    - (2) WDM 30-42-11
  - C. Access
    - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 2 Right Window

D. Procedure

s 864-018

WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS IN THIS STEP. YOU CAN GET AN ELECTRICAL SHOCK IF YOU TOUCH THE WINDSHIELD WHEN THE WINDOW HEAT POWER IS ON.

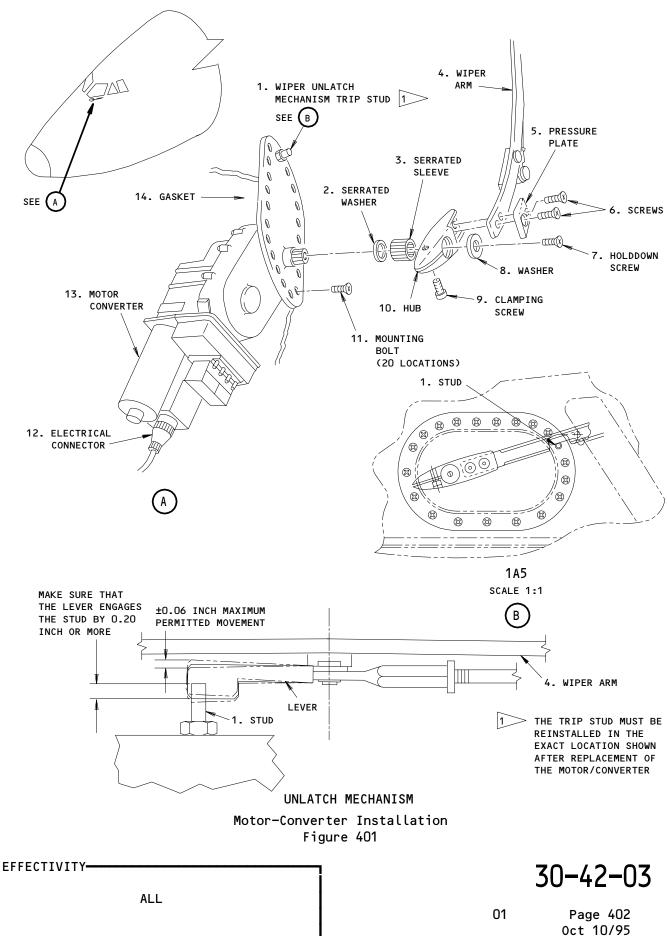
- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E1 WSHLD WIPER L
    - 2) 7E25 WSHLD WIPER R
  - (b) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (c) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R

EFFECTIVITY-

30-42-03

ALL





BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



s 144-002

- (2) Use a sealant cutting tool to remove the sealant from the heads of these screws (Fig. 401):
  - (a) The two screws (6) which hold the wiper arm (4) to the hub (10)
  - (b) Clamping screw (9)
  - (c) Holddown screw (7).

s 034-019

(3) Remove the two screws (6) and the pressure plate (5), and remove the wiper arm (4) from the hub (10).

NOTE: You can use the hub as a handle during removal and installation of the motor-converter.

s 934-004

(4) Make a mark of the location of the trip stud (1).

s 024-005

- (5) Remove the motor-converter:
  - (a) Remove the mounting bolts (11).
  - (b) Hold the hub, and lift the motor-converter (M18 (left), (M17 right) (13) to remove it from the airplane.

NOTE: It is possible that you will need to hold the motor-converter at an angle to remove it.

- (c) Disconnect the electrical connector DM18 (left) or DM17 (right) (12).
- (d) Loosen the clamping screw (9).
- (e) Remove the holddown screw (7) and the washer (8).
- (f) Remove the wiper arm hub (10), serrated washer (2), and serrated sleeve (3) from the motor-converter (13) shaft.

TASK 30-42-03-404-020

- 3. Motor-Converter Installation (Fig. 401)
  - A. Standard Tools and Equipment
    - (1) Sealant cutting tool hardwood or plexiglass
    - (2) Sealing gun 6-inch length cartridge, Semco Research or equivalent
    - (3) Spatula
  - B. Consumable Materials
    - (1) G00371 Brush Soft Bristle
    - (2) B00083 Cleaner Aliphatic Naphtha, TT-N-95
    - (3) G00507 Cloth Lint-Free
    - (4) A00311 Rubber Cement BF Goodrich No. 4 or equivalent
    - (5) A00247 Sealant BMS 5-95, Class B

EFFECTIVITY-

30-42-03

ALL



#### C. Parts

АММ			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Stud (Wiper Unlatch Mechanism Trip Stud)	30-42-01	01	45
	5	Wiper Arm Assembly - left			35
	5	Wiper Arm Assembly - right			40
	11	Bolt (Mounting Screw)			50
	13	Converter Assy - Motor			55
	14	Gasket			60

- D. References
  - (1) 24-22-00/201, Manual Control
  - (2) 30-42-02/401, Wiper Arm
  - (3) 30-42-00/501, Windshield Wiper System
  - (4) SSM 30-42-01
  - (5) WDM 30-42-11
- E. Access
  - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 2 Right Window

### F. Installation Procedure

s 144-006

(1) Use a sealant cutting tool to remove the aerodynamic smoother from the access opening and the skin.

s 114-007

- (2) Use a small varnish brush to apply fresh aliphatic naphtha to clean the access opening.
  - (a) Rub the cleaner off with a clean cloth before it becomes dry.

s 424-008

- (3) Install the motor-converter:
  - (a) Install the serrated washer (2), serrated sleeve (3), wiper arm hub (10), washer (8), and holddown screw (7) on the shaft of the motor-converter (13).
  - (b) Bond the gasket (14) to the motor-converter (13) with rubber cement.
  - (c) Connect electrical connector DM18 (left) or DM17 (right) (12) to the motor-converter (13).

EFFECTIVITY-

30-42-03



(d) Hold wiper arm hub (10), and install the motor-converter (13) into the access opening.

NOTE: It is possible that you will need to hold the motor-converter at an angle to install it.

(e) Install the mounting bolts (11).

CAUTION: MAKE SURE TO INSTALL THE TRIP STUD IN THE CORRECT LOCATION. AN INCORRECTLY LOCATED TRIP STUD CAN CAUSE MOTOR-CONVERTER DAMAGE OR UNSATISFACTORY OPERATION.

(f) Install the trip stud (1) in the specified location (Fig. 401, Sheet 2).

s 394-021

- (4) Apply sealant:
  - (a) Use a sealing gun to fill the joint between the airplane skin and the access plate with sealant.
  - (b) Use a spatula to obtain a smooth surface on the sealant and to remove excess sealant.

s 034-009

- (5) Remove the wiper arm hub (10) from the motor-converter (13).
- G. Airplane to Its Usual Condition

s 864-010

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E1 WSHLD WIPER L
    - 2) 7E25 WSHLD WIPER R

s 864-011

(2) Supply electrical power (Ref 24-22-00/201).

S 864-012

(3) Set the WIPER switch on the anti-ice/rain removal module to LO for a short time, and then set it to OFF.

NOTE: This will to move the shaft to the parked position.

s 434-013

ALL

(4) Assemble the wiper arm (4) and the wiper arm hub (10).

EFFECTIVITY-

30-42-03

.



s 434-016

(5) Do this task: "Wiper Arm Installation" (Ref 30-42-02/401).

s 714-014

(6) Do this task for the applicable wiper system: "Operational Test - Windshield Wiper System" (Ref 30-42-00/501).

s 864-015

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (b) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R

s 864-022

(8) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY-

30-42-03

03



## WINDSHIELD RAIN REPELLENT SYSTEM - DESCRIPTION AND OPERATION

## 1. General (Fig. 1)

A. The rain repellent system is used together with the windshield wiper system to improve visibility through the pilots' windshields during heavy rain.

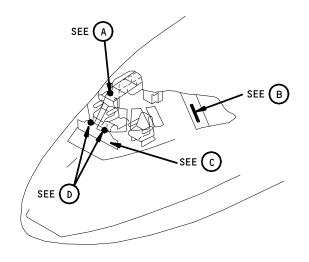
<u>NOTE</u>: The rain repellent system is deatcivated on some airplanes. These airplanes can have a hydrophobic coating that is applied to the No. 1 flight compartment windows.

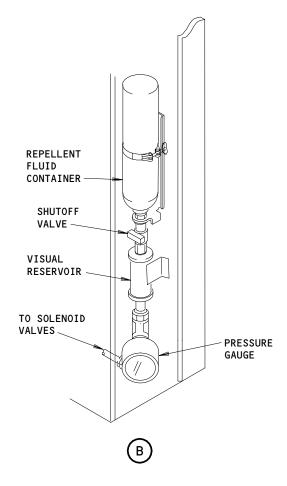
B. The system is controlled independently for each window by two pushbutton switches located on the overhead panel. Each time the left or right switch is pressed approximately 10cc of rain repellent fluid is sprayed onto the window. The fluid is spread over the window by airflow and rain, but spreading is improved by the motion of the wiper blades. Repeated application of fluid is required to maintain repellent effectiveness, especially in heavy rain.

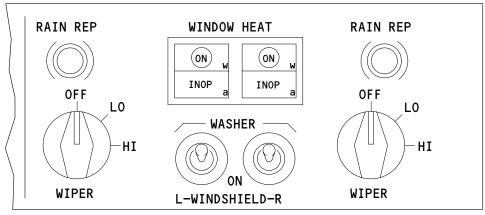
NOTE: The rain repellent system should not be operated on dry windows, as heavy undiluted fluid will restrict window visibility. In the event of inadvertent dry window application, do not operate the windshield wipers as this tends to increase smearing. Also, the rain repellent residues caused by application in dry weather or very light rain may cause staining of the airplane skin. To prevent this, any concentrated repellent or residue should be removed by washing at the earliest opportunity, preferably within a few minutes after exposure. Repellent residues allowed to dry or cure on the surface require polishing with an approved polish to remove the stain. Recommended types of cleaning agents are: approved aluminum polish for airplane skin. For "baked-on" residue on glass, use Ardrox 275-G Rain Repellent Remover Pads.

C. The rain repellent system consists of a pressurized container of rain repellent fluid, a container receptacle, a visual reservoir, pressure gauge, two timed solenoid valves, two nozzles, plumbing, and two pushbutton switches. The container, receptacle, pressure gauge, and reservoir are mounted in the left side closet of the flight deck. The solenoid valves are mounted on the bulkhead forward of the pilots' center instrument panel. The spray nozzles are mounted in the airplane skin below the No. 1 windows inboard of the windshield wiper. The solenoids are powered through the RAIN REPEL circuit breaker on the P7 panel from the 28 volt dc bus 3.









 $\bigcirc$ 

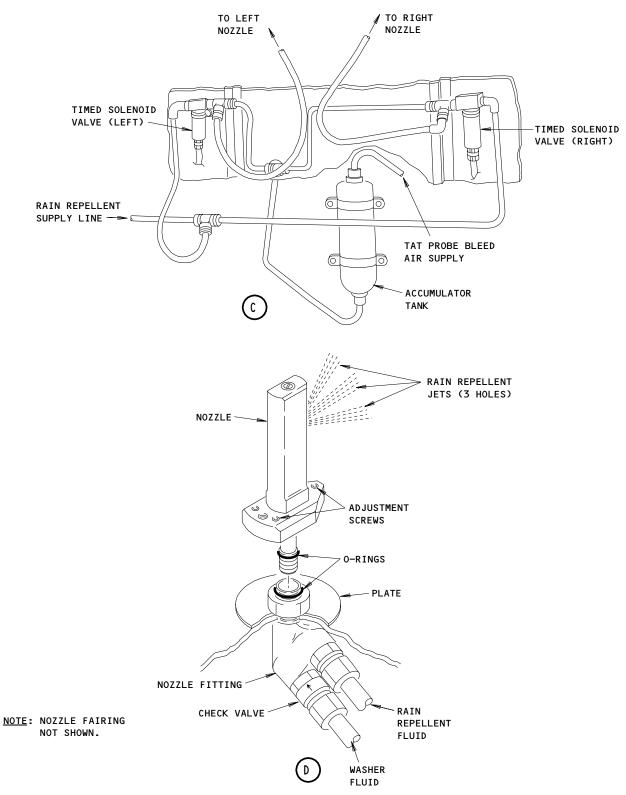
Windshield Rain Repellent System Component Location Figure 1 (Sheet 1)

30-43-00

01

Page 2 Jun 10/97





Winshield Rain Repellent System Component Location Figure 1 (Sheet 2)

AIRPLANES WITHOUT A DEACTIVATED RAIN
REPELLENT SYSTEM

03 Page 3
Jun 10/97

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



- D. AIRPLANES WITH HYDROPHOBIC COATING ON THE WINDSHIELD; The rain repellent system consists of a hydrophobic coating applied to the number 1 window. No pilot actions are necessary to operate the system.
  - (1) Periodic maintenance is necessary to test and restore the coating on the windshield surface. A reference to the kit and procedures for this is in AMM 30-43-00/201.

## 2. Container and Receptacle

- A. Type 3 rain repellent fluid is packaged in a pressurized disposable-type container which is replaced when empty. Each container has a self-sealing valve with a threaded boss for attaching the container to the system receptacle. The container has a capacity of 17.0 fluid ounces and is pressurized to 100 psi.
- B. Contact with the rain repellent fluid can cause irritation of the skin or eyes. Precautions should be taken to prevent contact with the skin or eyes and to avoid breathing the fluid vapors.
- C. The fluid in rain repellent container P/N 65-38196-5 has a citrus scent.
- D. The system receptacle has a valve actuation pin which opens the container valve when the container is screwed on to the receptacle. As the pin enters the valve assembly, it is sealed by an O-ring in the valve before the valve is opened to prevent fluid leakage. The pin is hollow and has inlet ports near the tip of the pin to allow fluid to enter the system from the container.

## 3. <u>Visual Reservoir and Plumbing</u>

- A. The container receptacle is connected through a shutoff valve to a translucent fluid reservoir mounted below the receptacle. The container, receptacle and reservoir are all supported by a bracket in the left side closet of the flight deck. The reservoir contains a red float which is visible through the side of the reservoir. A level indicator indicates the fluid level at which the container should be replaced. When the level of the fluid is at the container replacement level, approximately five individual repellent applications of fluid are left in the reservoir and plumbing leading to the spray nozzles.
- B. The reservoir is connected to a system pressure gage directly below it. The gage indicates acceptable operating pressure when the pointer shows in the green band. When the pointer shows in the yellow band, the system pressure is too low for satisfactory operation and the container should be replaced regardless of the fluid level indicated in the visual reservoir. The gage provides an indication that the container has lost charging pressure or is nearly discharged.
- C. A rain repellent fluid supply line is routed along the flight compartment sidewall from the pressure gage to a tee connection. The tee is connected by stainless steel tubing to a solenoid control valve for each window.

#### 4. Valves and Nozzles

A. The rain repellent valves are 28-volt dc solenoid operated valves which open when energized. The valves control the flow of repellent fluid released to the nozzles. A timer on each valve regulates the time that the valve remains open for its operational cycle.

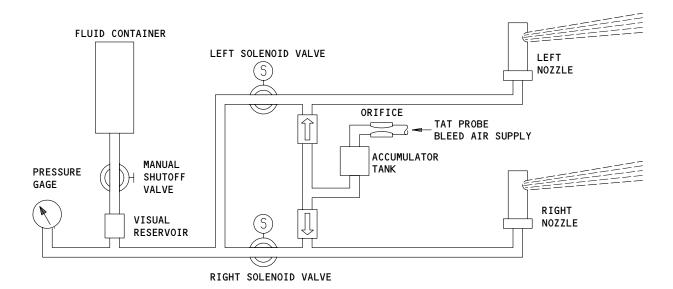
ALL



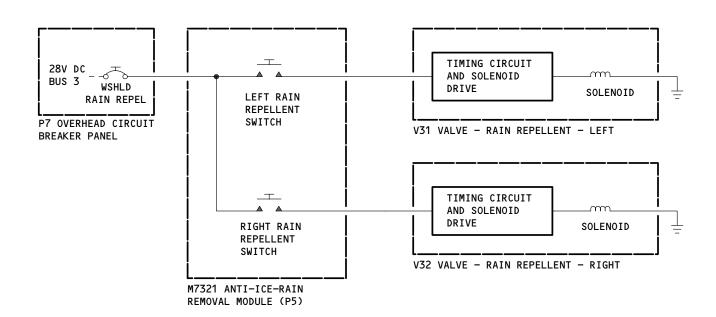
- B. The nozzles are mounted externally near the base of each No. 1 window inboard of the wiper drive shaft. Each nozzle has four holes. Three holes are used to apply rain repellent fluid on the window. The other hole is used to apply windshield washer fluid. The two supply lines in the nozzle are concentric, separated by 0-rings. A fairing is installed over the nozzles.
- C. When the rain repellent system is not in use, the nozzles are kept clear with air pressure from the aspirated TAT probe bleed air supply. The bleed air supply is joined to the solenoid valve output lines with check valves so that the air flow stops when rain repellent fluid is being applied. An accumulator tank prevents any fluid from backing up into the bleed air supply in case of a check valve failure.
- 5. Operation (Fig. 2)
  - A. Functional Description (Fig. 2)
    - (1) Bleed air supplied to the aspirated TAT probes is also passed through the rain repellent nozzles to purge them of repellent fluid when the rain repellent system is not in operation. When the control switch is pressed, the rain repellent solenoid valve opens for approximately 0.4 seconds. This allows the fluid under pressure to flow from the container through the supply lines and out the nozzle. The fluid pressure closes a check valve which cuts off the bleed air. When the timer shuts off after 0.4 seconds, the solenoid valve will close and the flow of fluid stops. The flow of bleed air then resumes, purging the nozzle of any remaining repellent fluid.
  - B. Control
    - (1) The rain repellent system is ready for use when the pressurized fluid container is installed in the receptacle, the shutoff valve is in the open position, and 28-volt dc power is available on the dc bus 3. To apply rain repellent, press and hold the left or right RAIN REP switch on the anti-ice-rain removal module until fluid stops flowing from the nozzle. The solenoid timer will de-energize the solenoid in approximately 0.4 second.

ALL ALL



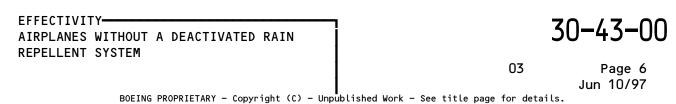


FLUID FLOW SCHEMATIC



**ELECTRICAL SCHEMATIC** 

# Windshield Rain Repellent System Schematics Figure 2





## WINDSHIELD RAIN REPELLENT SYSTEM - MAINTENANCE PRACTICES

#### 1. General

- A. This subject has seven tasks. The tasks are:
  - Removal and installation of the windshield rain repellent system.
  - Removal and installation of the nozzle fitting.
  - Removal and installation of the solenoid valve.
  - Flush the rain repellent system.
- B. For the removal and installation of the nozzle, you will remove the nozzle, install a replacement nozzle, and adjust the nozzle.
- C. For the removal and installation of the nozzle fitting, you will remove the PFD and ND Integrated Display Units, remove the nozzle, remove the nozzle fitting, and install a replacement fitting.
- D. For the removal and installation of the solenoid valve, you will depressurize the rain repellent system, remove the PFD and ND Integrated Display Units, remove the solenoid valve, install a replacement valve, and make sure that the system has no leaks.
- E. To flush the rain repellent system, you will connect a pressure tank tool to the rain repellent system, operate the rain repellent control switch, and flush the system with dry air.

TASK 30-43-00-002-001-001

- 2. Nozzle Removal (Fig. 201)
  - A. Consumable Materials
    - (1) B00184 Solvent BMS 11-7
  - B. References
    - (1) IPC 30-43-01 Fig. 1
    - (2) SSM 30-42-01
    - (3) WDM 30-43-11
  - C. Access
    - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 1 Right Window

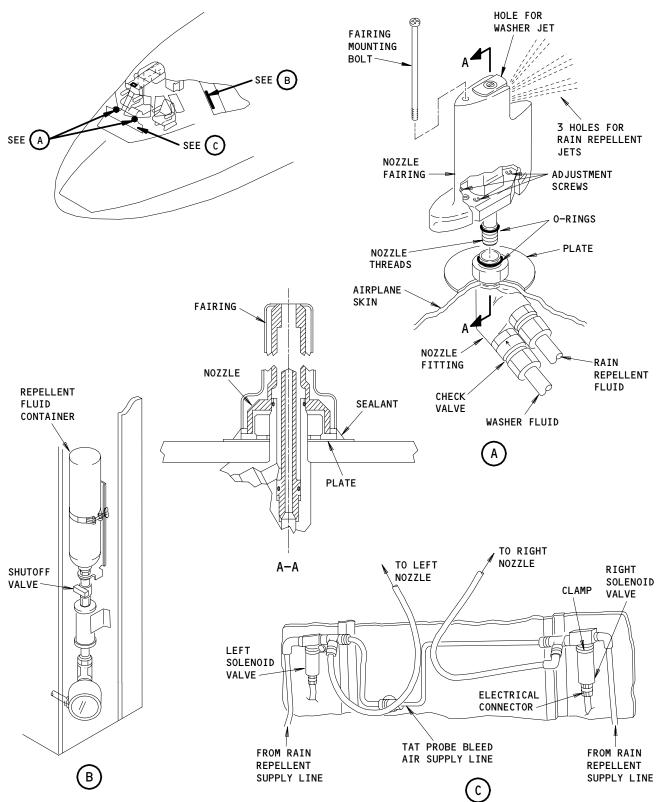
D. Procedure

s 862-002-001

WARNING: MAKE SURE TO OPEN THE WINDOW HEAT CIRCUIT BREAKERS. YOU CAN GET AN ELECTRICAL SHOCK IF YOU TOUCH THE WINDSHIELD WHEN THE WINDOW HEAT POWER IS ON.

- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E2 WSHLD RAIN REPEL





Rain Repellent Components Installation Figure 201

EFFECTIVITY
AIRPLANES WITH RAIN REPELLENT SYSTEM

O2

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



- 2) 7E26 WSHLD WASH
- (b) P6 Main Power Distribution Panel
  - WINDOW HEAT 1L PWR 1) 6B34
  - 2) 6B17 WINDOW HEAT 1R PWR
- (c) P180 DC Power Distribution Panel
  - 1) 180H26 WDO HEAT CONT 1L
  - 2) 180H12 WDO HEAT CONT 1R

s 032-003-001

(2) Remove the mounting screw from the nozzle fairing and remove the fairing.

s 162-004-001

(3) Remove the sealant from the fairing and the plate.

s 112-005-001

(4) Clean the surfaces of the nozzle fairing and the plate with solvent.

s 022-006-001

(5) Remove the nozzle:

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

- (a) Loosen the three adjustment screws at the bottom of the nozzle.
- (b) Turn the nozzle assembly counterclockwise by hand to remove it from the fitting attached to the airplane structure.
- (c) Remove the nozzle assembly. Discard the 2 O-rings.

TASK 30-43-00-402-007-001

- 3. Nozzle Installation (Fig. 201)
  - A. Consumable Materials
    - (1) G00507 Cloth Lint Free (to clean the nozzle fitting)
    - (2) A00247 Sealant BMS 5-95, Class B
    - (3) B00184 Solvent BMS 11-7

CONFIG



- B. References
  - (1) AMM 24-22-00/201, Manual Control
  - (2) IPC 30-43-01 Fig. 1
  - (3) SSM 30-42-01
  - (4) WDM 30-43-11
- C. Access
  - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 1 Right Window

D. Procedure

s 422-008-001

- (1) Install the nozzle:
  - (a) Clean the fluid out of the nozzle fitting with a lint-free
  - (b) Make the new 0-rings wet with water and install them on the nozzle shaft and the nozzle fitting.
  - (c) Use your hand to turn the nozzle assembly clockwise 6 to 7 turns in the fitting.
  - (d) Point the nozzle approximately toward the center of the No. 1 window.
  - (e) Turn the three alignment screws clockwise until they touch the plate (do not tighten them).

s 862-009-001

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E2 WSHLD RAIN REPEL
    - 2) 7E26 WSHLD WASH

s 862-010-001

(3) Supply electrical power (AMM 24-22-00/201).

s 822-011-001

- (4) Adjust the nozzle:
  - WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.
  - (a) Push the WASHER switch to apply washer fluid to the windshield.

CONFIG



(b) Adjust the three alignment screws to make the washer fluid hit the windshield 18 to 20 inches from the nozzle hole and 14 to 16 inches from the wiper blade release stud (Fig. 201A).

NOTE: The washer jet pattern shows the correct nozzle adjustment. The rain repellent fluid will hit the windshield correctly if the washer fluid pattern is correct.

DO NOT TIGHTEN THE ADJUSTMENT SCREWS TOO MUCH. IF YOU CAUTION: MAKE THE SCREWS TOO TIGHT, IT IS POSSIBLE THAT YOU WILL DAMAGE THEM.

(c) Tighten the adjustment screws from 1.0 to 1.5 pound-inches to lock the nozzle in position.

s 112-012-001

(5) Clean the plate and the nozzle mating surfaces with solvent.

s 432-013-001

(6) Put the fairing over the nozzle and install the mounting bolt.

s 392-014-001

(7) Apply sealant around the bottom of the fairing to make a fillet (Section A-A).

s 862-015-001

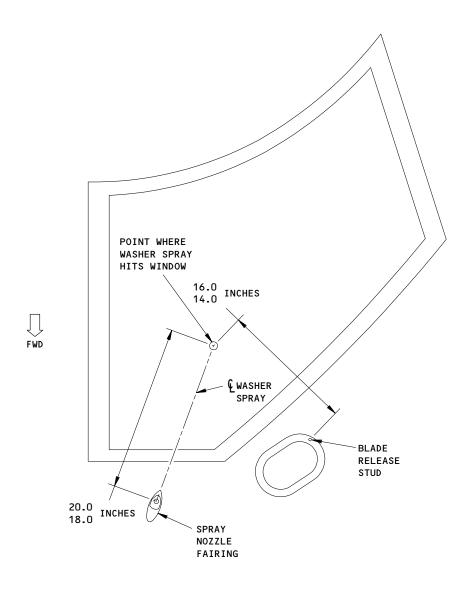
- Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (b) P180 DC Power Distribution Panel
    - 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R

s 862-016-001

(9) Remove electrical power (AMM 24-22-00/201).

CONFIG





WINDSHIELD (LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

Washer Fluid Spray Pattern Figure 201A

AIRPLANES WITH RAIN REPELLENT SYSTEM

30-43-00 CONFIG 1



TASK 30-43-00-002-017-001

- 4. <u>Nozzle Fitting Removal</u> (Fig. 201)
  - A. Consumable Materials
    - (1) G00507 Cloth Lint Free (to catch repellent fluid drops)
    - (2) G00040 Cord Nylon (to hold the nozzle fitting and supply hoses)
  - B. References
    - (1) IPC 30-43-00 Fig. 5
    - (2) AMM 31-61-02/401, Integrated Display Unit
    - (3) SSM 30-42-01
    - (4) WDM 30-43-11
  - C. Access
    - (1) Location Zone
      - 221 Control Cabin, LH Captain's Instrument Panel and
         Outside No. 1 Left Window
      - 222 Control Cabin, RH First Officer's Instrument Panel and Outside No. 1 Right Window
  - D. Procedure
    - s 862-018-001
    - (1) Set the rain repellent shutoff valve to the closed (horizontal) position.
      - s 862-105-001
    - WARNING: MAKE SURE TO OPEN THE WINDOW HEAT CIRCUIT BREAKERS. YOU CAN GET AN ELECTRICAL SHOCK IF YOU TOUCH THE WINDSHIELD WHEN THE WINDOW HEAT POWER IS ON.
    - WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS FOR THE CAPTAIN'S AND THE FIRST OFFICER'S SEATS BEFORE YOU DO WORK AROUND THEM. A FAILURE TO OPEN THE CIRCUIT BREAKERS CAN CAUSE THE SEATS TO MOVE ACCIDENTALLY. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.
    - (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
      - (a) P7 Overhead Circuit Breaker Panel
        - 1) 7E2 WSHLD RAIN REPEL
        - 2) 7E26 WSHLD WASH
      - (b) P6 Main Power Distribution Panel
        - 1) 6B32 WINDSHIELD WASH PUMP
        - 2) 6B34 WINDOW HEAT 1L PWR
        - 3) 6B17 WINDOW HEAT 1R PWR
      - (c) P180 DC Power Distribution Panel
        - 1) 180H26 WDO HEAT CONT 1L
        - 2) 180H12 WDO HEAT CONT 1R
      - (d) P414 Left Power Distribution Center
        - 1) 414D8 CAPT PWR SEAT
      - (e) P415 Right Power Distribution Center
        - 1) 415H32 F-0 PWR SEAT

EFFECTIVITY-

AIRPLANES WITH RAIN REPELLENT SYSTEM



s 012-020-001

(3) Do this task for the PFD and ND on the captain's or the first officer's P2 panel: "Integrated Display Unit Removal" (AMM 31-61-02/401).

s 012-021-001

(4) Remove the captain's or first officer's P2-3 and P2-4 panels.

s 012-022-001

(5) Remove the captain's or first officer's IDU enclosure.

s 032-023-001

(6) Do this task: "Nozzle Removal"

NOTE: This task is in this procedure.

s 022-024-001

- (7) Remove the nozzle fitting:
  - (a) Attach a nylon cord around the 0-ring groove on the nozzle fitting.
  - (b) Carefully remove the nut from the nozzle fitting.
  - (c) Lower the nozzle fitting until it hangs from the fluid supply hoses.

NOTE: Let the nut go up the cord and let the excess cord hang out of the nozzle fitting hole in the airplane skin.

- CAUTION: MAKE SURE TO IDENTIFY THE TWO HOSES WHICH CONNECT TO THE NOZZLE FITTING. THE UPPER HOSE IS FOR THE RAIN REPELLENT FLUID. IF YOU DO NOT CONNECT THE HOSES CORRECTLY, THE SYSTEM WILL NOT OPERATE CORRECTLY.
- (d) Make a mark on the hose which connects to the upper port of the nozzle fitting (this identifies it as the hose for the rain repellent fluid).
- (e) Disconnect the supply hoses from the nozzle fitting (use a cloth to catch the supply hose fluids which are caught in the hoses).

CAUTION: DO NOT PULL THE LOOSE END OF THE CORD THROUGH THE NOZZLE FITTING HOLE IN THE AIRPLANE SKIN. IF YOU PULL THE END OF THE STRING THROUGH THE HOLE, THE NOZZLE FITTING WILL NOT BE EASY TO INSTALL.

(f) Remove the nozzle fitting. Discard the packings.



TASK 30-43-00-402-025-001

- 5. Nozzle Fitting Installation (Fig. 201)
  - A. References
    - (1) AMM 31-61-02/401, Integrated Display Unit
    - (2) IPC 30-43-00 Fig. 5
    - (3) SSM 30-42-01
    - (4) WDM 30-43-11
  - B. Access
    - (1) Location Zone

221 Control Cabin, LH - Captain's Instrument Panel and Outside No. 1 Left Window

222 Control Cabin, RH - First Officer's Instrument Panel and Outside No. 1 Right Window

C. Procedure

s 422-026-001

- (1) Install the nozzle fitting:
  - (a) Install new packings in the nozzle fitting.

CAUTION: MAKE SURE TO CORRECTLY INSTALL THE TWO HOSES WHICH CONNECT TO THE NOZZLE FITTING. THE UPPER HOSE IS FOR THE RAIN REPELLENT FLUID. IF YOU DO NOT CONNECT THE HOSES CORRECTLY, THE SYSTEM WILL NOT OPERATE CORRECTLY.

(b) Install the supply hose assemblies.

<u>NOTE</u>: You must install the hoses at the correct angle to make sure that they will not twist when you install the nozzle fitting.

- (c) Attach a nylon cord around the 0-ring groove on the nozzle fitting.
- (d) Carefully pull the nozzle fitting up through the hole in the airplane skin with the nylon cord.
- (e) Install the nut on the nozzle fitting.
- (f) Remove the nylon cord from the nozzle fitting.

s 432-027-001

(2) Do this task: Nozzle Installation.

NOTE: This task is in this procedure.

s 862-028-001

(3) Set the rain repellent shutoff valve to the open (vertical) position.



s 792-029-001

(4) Make sure that there are no visible leaks where the supply hoses attach to the nozzle fitting.

NOTE: The fluid in rain repellent container P/N 65-38196-5 has a citrus scent. This can help you to know if there is a leak.

s 412-030-001

(5) Install the captain's or first officer's EFIS enclosure.

s 412-031-001

(6) Install the captain's or first officer's P2-3 and P2-4 panels.

s 412-032-001

(7) Do this task for the PFD and ND on the captain's or the first officer's P2 panel: "Integrated Display Unit Installation" (AMM 31-61-02/401).

s 862-033-001

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E2 WSHLD RAIN REPEL
    - 2) 7E26 WSHLD WASH
  - (b) P6 Main Power Distribution Panel
    - 1) 6B32 WINDSHIELD WASH PUMP
    - 2) 6B34 WINDOW HEAT 1L PWR
    - 3) 6B17 WINDOW HEAT 1R PWR
  - (c) P180 DC Power Distribution Panel
    - 1) 180H26 WDO HEAT CONT 1L
    - 2) 180H12 WDO HEAT CONT 1R
  - (d) P414 Left Power Distribution Center
    - 1) 414D8 CAPT PWR SEAT
  - (e) P415 Right Power Distribution Center
    - 1) 415H32 F-0 PWR SEAT

TASK 30-43-00-002-034-001

- 6. <u>Solenoid Valve Removal</u> (Fig. 201)
  - A. Consumable Materials
    - (1) G00507 Cloth Lint Free (to catch repellent fluid drops)
  - B. References
    - (1) AMM 30-42-03/401, Motor-Converter
    - (2) AMM 31-61-02/401, Integrated Display Unit
    - (3) IPC 30-43-00 Fig. 5
    - (4) SSM 30-42-01
    - (5) WDM 30-43-11

EFFECTIVITY-

AIRPLANES WITH RAIN REPELLENT SYSTEM



- C. Access
  - (1) Location Zone

221 Control Cabin, LH - Captain's Instrument Panel

222 Control Cabin, RH - First Officer's Instrument Panel

D. Procedure

s 862-035-001

WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS FOR THE CAPTAIN'S AND THE FIRST OFFICER'S SEATS BEFORE YOU DO WORK AROUND THEM. A FAILURE TO OPEN THE CIRCUIT BREAKERS CAN CAUSE THE SEATS TO MOVE ACCIDENTALLY. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E2 WSHLD RAIN REPEL
  - (b) P414 Left Power Distribution Center1) 414D8 CAPT PWR SEAT
  - (c) P415 Right Power Distribution Center
    1) 415H32 F-0 PWR SEAT
  - s 862-037-001
- (2) Set the shutoff valve below the rain repellent container to the horizontal (closed) postion.
  - s 432-038-001
- (3) Remove the rain repellent container.
  - s 952-039-001
- (4) Cover the seat of the rain repellent valve with a cloth to catch the fluid.
  - s 862-040-001
- CAUTION: OPEN THE SHUTOFF VALVE SLOWLY. THE RAIN REPELLENT LINES ARE UNDER PRESSURE. THE RAIN REPELLENT FLUID WILL COME OUT OF THE LINES SUDDENLY IF YOU OPEN THE VALVE QUICKLY.
- (5) Set the shutoff valve to the vertical (open) position.
  - s 012-041-001
- (6) Do this task for the PFD and ND on the captain's or the first officer's P2 panel: "Integrated Display Unit Removal" (AMM 31-61-02/401).
  - s 012-042-001
- (7) Remove the captains's or first officer's P2-3 and P2-4 panels.



s 012-043-001

(8) Remove the captain's or first officer's EFIS enclosure.

s 012-044-001

(9) Do this task for the left or right windshield wiper motor-converter: Motor/Converter Removal (AMM 30-42-03/401).

s 022-045-001

- (10) Remove the solenoid valve:
  - (a) Make a note on each tube which connects to the solenoid valve (this is to identify it for installation at the correct port on the valve).
  - (b) Put a cloth under the solenoid valve to catch drops of rain repellent fluid.
  - (c) Disconnect the electrical connector DV31 (left) or DV32 (right).

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

- (d) Disconnect the 3 tubes from the solenoid valve.
- (e) Loosen the two screws at the clamp and remove the solenoid valve.

TASK 30-43-00-402-046-001

- 7. Solenoid Valve Installation (Fig. 201)
  - A. References
    - (1) AMM 24-22-00/201, Manual Control
    - (2) AMM 30-42-03/401, Motor-Converter
    - (3) AMM 31-61-02/401, Integrated Display Unit
    - (4) IPC 30-43-00 Fig. 5
    - (5) SSM 30-42-01
    - (6) WDM 30-43-11
  - B. Access
    - (1) Location Zone

221 Control Cabin, LH - Captain's Instrument Panel

222 Control Cabin, RH - First Officer's Instrument Panel

C. Procedure

s 422-047-001

- (1) Install the solenoid valve:
  - (a) Install the solenoid valve in the clamp.

EFFECTIVITY-

AIRPLANES WITH RAIN REPELLENT SYSTEM



(b) Connect the 3 tubes to the solenoid valve.

NOTE: Look at the notes you made on the tubes during the valve removal procedure to identify them. Make sure that you connect each tube to the correct port on the valve.

- (c) Tighten the screws at the clamp.
- (d) Connect the electrical connector to the solenoid valve.

s 862-049-001

(2) Turn the rain repellent shutoff valve to the horizontal (closed) position.

s 952-050-001

(3) Cover the seat of the rain repellent valve with a cloth to catch the fluid.

s 432-051-001

(4) Install the rain repellent container.

s 862-052-001

(5) Turn the shutoff valve to the vertical (open) position.

s 862-053-001

(6) Make sure that the pressure gauge pointer is in the green band.

s 862-054-001

- (7) Remove the DO-NOT-CLOSE tag and close this circuit breaker:
  (a) P7 Overhead Circuit Breaker Panel
  - 7E2 WSHLD RAIN REPEL

s 112-055-001

(8) Apply water or washer fluid to the windshield.

s 862-056-001

CAUTION: MAKE SURE THAT THE WINDOW IS WET BEFORE YOU PRESS THE RAIN REPELLENT SWITCH. IF YOU APPLY FLUID TO A DRY WINDSHIELD, YOU WILL NOT BE ABLE TO REMOVE THE FLUID EASILY.

(9) Push and release the applicable RAIN REP switch on the P5 overhead panel until fluid flows from the nozzle continuously.

s 792-057-001

(10) Make sure that there are no leaks from the fluid connections at the solenoid valve.

NOTE: The fluid in rain repellent container P/N 65-38196-5 has a citrus scent. This can help you to know if there is a leak.



s 092-058-001

(11) Remove the cloth which is under the solenoid valve.

s 412-059-001

(12) Do this task for the applicable wiper motor-converter: Motor-Converter Installation (AMM 30-42-03/401).

s 412-060-001

(13) Install the captain's or first officer's EFIS enclosure.

s 412-061-001

(14) Install the pilot's or first officer's P2-3 and P2-4 panels.

s 412-062-001

(15) Do this task for the PFD and ND on the captain's or the first officer's P2 panel: Integrated Display Unit Installation (AMM 31-61-02/401).

s 862-063-001

(16) Remove electrical power (AMM 24-22-00/201).

s 862-064-001

- (17) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P414 Left Power Distribution Center
    - 1) 414D8 CAPT PWR SEAT
  - (b) P415 Left Power Distribution Center
    - 1) 415H32 F-0 PWR SEAT

TASK 30-43-00-102-065-001

- 8. Flush the Rain Repellent System (Fig. 201)
  - A. Standard Tools and Equipment
    - (1) Source of compressed dry air at 70  $\pm 2$  psig filtered through a 30-micron maximum filter
  - B. Special Tools and Equipment
    - (1) Tool B30002, Rain Repellent System Test Equipment
  - C. Consumable Materials
    - (1) G00624 Bag Plastic (2 are necessary)
    - (2) B00036 Solvent FREON 113
    - (3) B00037 Solvent FREON TF (alternate)
    - (4) B00090 Solvent Tricloroethane 1,1,1 MIL-T-81533A (alternate)
  - D. References
    - (1) AMM 12-16-02/301 Rain Repellent Container
    - (2) AMM 12-25-01/301, Airplane Servicing (Clean and Polish)
    - (3) AMM 24-22-00/201, Manual Control
    - (4) AMM 36-00-00/201, Pneumatic General
    - (5) SSM 30-43-01
    - (6) WDM 30-43-11

EFFECTIVITY-

AIRPLANES WITH RAIN REPELLENT SYSTEM



- E. Access
  - (1) Location Zone

221, 222 Control Cabin

- F. Procedure
  - s 862-089-001
  - (1) Supply electrical power (AMM 24-22-00/201).
    - s 862-090-001
  - (2) Supply pneumatic power (AMM 36-00-00/201).
    - s 952-091-001

DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. WARNING: THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

Install a fluid-tight clear plastic bag around each nozzle to catch fluid.

NOTE: Make sure that the bags will let air flow out of the nozzles.

- s 862-092-001
- (4) Set the rain repellent shutoff valve to the closed (horizontal) position.
  - s 032-093-001
- (5) Remove the rain repellent container (AMM 12-16-02/301).
  - s 862-094-001
- (6) Push the left and right RAIN REP switches (P5 overhead panel) as many times as necessary to release the pressure in the rain repellent system plumbing.
  - s 492-095-001
- Connect the pressure tank tool:
  - (a) Make sure that all toggle valves on the pressure tank tool are closed.
  - (b) Add solvent to the pressure tank tool and close the fill cap.
  - (c) Connect the OUTLET port of the pressure tank tool to the rain repellent container receptacle.
  - (d) Connect an air supply to the AIR IN port on the pressure tank tool.
  - (e) Set the air supply to 70 ±2 psi.
  - (f) Set the rain repellent shutoff valve to the open (vertical)
  - (g) Open the INLET and OUTLET toggle valves on the pressure tank tool.

EFFECTIVITY-AIRPLANES WITH RAIN REPELLENT SYSTEM



#### s 172-096-001

- (8) Flush the rain repellent plumbing with solvent:
  - (a) Push and release the left RAIN REP switch until you see solvent flow equally from all 3 holes at the left nozzle.
  - (b) Push and release the right RAIN REP switch until you see solvent flow equally from all 3 holes at the right nozzle.

#### s 172-097-001

- (9) Flush the rain repellent plumbing with air:
  - (a) Close the INLET and OUTLET toggle valves on the tool.
  - (b) Open the TANK BYPASS toggle valve on the tool.
  - (c) Push the left and right RAIN REP switches until fluid no longer flows from the nozzles.

#### s 092-098-001

- (10) Remove the pressure tank tool:
  - (a) Decrease the air supply to O psi.
  - (b) Set the rain repellent shutoff valve to the closed (horizontal) position.
  - (c) Remove the air supply from the AIR IN port on the tool.
  - (d) Disconnect the OUTLET port of the pressure tank tool from the rain repellent container receptacle.

#### s 432-099-001

- (11) Fill the rain repellent lines with fluid:
  - (a) Install the container of rain repellent fluid (AMM 12-16-02/301).
  - (b) Set the rain repellent shutoff valve to the open (vertical) position.
  - (c) Push the left and right RAIN REP switches until fluid flows continuously from the nozzles.

NOTE: Do not let the fluid level become less than the replacement level on the sight gage.

## s 952-100-001

- (12) Remove the plastic bag, and be careful to not let fluid fall on the airplane skin.
  - (a) Wash the airplane skin if rain repellent fluid touches it (AMM 12-25-01/301).

#### s 862-101-001

(13) Remove pneumatic power (AMM 36-00-00/201).

## s 862-102-001

(14) Remove electrical power (AMM 24-22-00/201).

EFFECTIVITY-

AIRPLANES WITH RAIN REPELLENT SYSTEM



## WINDSHIELD RAIN REPELLENT SYSTEM - MAINTENANCE PRACTICES

#### 1. General

- A. This procedure lists the equipment necessary to test and reapply the hydrophobic coating.
- B. A vendor kit is necessary to do this procedure.

TASK 30-43-00-302-001-002

- 2. Hydrophobic Coating Maintenance Practices
  - A. General
    - (1) The maintenance procedures for the hydrophobic coating are contained in the Master Kit listed below.
  - B. References

NOTE: These references are in the Master Kit.

(1) Maintenance Assessment, Aplication Procedures for Boeing Aircraft Models

(P/N DSS 1022)

- (2) Coating-Efficiency Assessment Video Tape (P/N DSS 1023)
- (3) Re-application and First Time Application Video Tape (P/N DSS 1024)
- C. Equipment
  - (1) Master Kit Complete
     (P/N DSS 1020)

PPG Industries, Inc Aircraft Products Sales P.O Box 040004 Huntsville, AL. 35804 USA FAX 205-851-8822

- (2) Stand 15 feet minimum
- D. Prepare for the Test/Re-application

s 862-002-002

WARNING: BEFORE YOU DO MAINTENANCE ON THE WINDSHIELD, OPEN THE WINDOW HEAT CIRCUIT BREAKERS. IF YOU DO NOT OPEN THESE CIRCUIT BREAKERS DURING MAINTENANCE, YOU CAN GET AN ELECTRICAL SHOCK WHEN YOU TOUCH THE WINDOW.

- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E2 WSHLD RAIN REPEL

EFFECTIVITY-

AIRPLANES WITH HYDROPHOBIC COATING ON THE NUMBER 1 WINDOWS

30-43-00

Jun 10/94



- 2) 7E26 WSHLD WASH
- (b) P6 Main Power Distribution Panel
  - 1) 6B34 WINDOW HEAT 1L PWR
  - 2) 6B17 WINDOW HEAT 1R PWR
- (c) P180 DC Power Distribution Panel
  - 1) 180H26 WDO HEAT CONT 1L
  - 2) 180H12 WDO HEAT CONT 1R
- E. Procedures

NOTE: Use the procedure in the master kit to do these maintenance tasks:

- s 162-003-002
- (1) Cleaning Procedure
  - s 212-004-002
- (2) Coating Efficiency Assessment
  - s 352-005-002
- (3) Coating Application
- F. Return the Airplane to Its Usual Condition
  - s 862-007-002
  - (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
    - (a) P6 Main Power Distribution Panel
      - 1) 6B34 WINDOW HEAT 1L PWR
      - 2) 6B17 WINDOW HEAT 1R PWR
    - (b) P180 DC Power Distribution Panel
      - 1) 180H26 WDO HEAT CONT 1L
      - 2) 180H12 WDO HEAT CONT 1R

Jun 10/94



## WINDSHIELD RAIN REPELLENT SYSTEM - ADJUSTMENT/TEST

## 1. General

- A. This task is a system test which verifies operation of the rain repellent system. The procedure consists of wetting the windshield, activating the rain repellent system, and observing the nozzle jets for proper operation.
- B. The left and right rain repellent systems operate independently from a common pressurized source of rain repellent fluid. They may be tested separately or together.
- C. The rain repellent system should not be operated on dry windows because heavy undiluted solution will restrict window visibility. In the event of inadvertent dry window application, do not operate the windshield wipers as this tends to increase smearing. Also the rain repellent residues caused by application in dry weather or very light rain may cause staining of the airplane skin. To prevent this, any concentrated repellent or residue should be removed by a thorough washing at the earliest opportunity, preferably within a few minutes after exposure. Repellent residues allowed to dry on the surface require polishing with an approved cleaner to remove the stain. Recommended types of cleaning agents are: Stoddard Solvent for paint, Bon Ami cleaner for glass, and an approved aluminum polish for skin. For "baked-on" residue on glass, use Ardrox 275-G Rain Repellent Remover Pads.
- D. In cases of heavy concentration of dried rain repellent on windshield, use rain repellent as a solvent with a damp cloth and water. Then rinse with clear water. Rain repellent may be applied from rain repellent system.
- E. Contact with the rain repellent fluid can cause irritation of the skin or eyes. Precautions should be taken to prevent contact with the skin or eyes and to avoid breathing the fluid vapors.

TASK 30-43-00-735-001

#### 2. System Test - Rain Repellent System

- A. Standard Tools and Equipment
  - (1) New container of rain repellent
  - (2) Clean water spray (to remove repellent fluid from airplane skin)
- B. References
  - (1) 12-16-02/301, Rain Repellent Container
  - (2) 24-22-00/201, Manual Control



- (3) 30-43-01/701, Nozzle
- (4) SSM 30-43-01
- (5) WDM 30-43-11
- C. Access
  - (1) Location Zone

Control Cabin, LH and Outside No. 1 Left WindowControl Cabin, RH and Outside No. 1 Right Window

D. Preconditions

s 865-011

- (1) These conditions are necessary for this task: (a) Electrical power on (AMM 24-22-00/201).
- E. Procedure

s 865-002

(1) Supply electrical power (Ref 24-22-00/201).

s 615-003

- (2) Prepare the rain repellent fluid container:
  - (a) Make sure that the fluid level in the visual reservoir is above the REPLACE CAN mark.
  - (b) Make sure that the pointer of the pressure gauge is above the green band.
  - (c) Make sure that the shutoff valve is open.
  - (d) If fluid level or pressure is low, do this task: "Service the Rain Repellent Container" (Ref 12-16-02/301).

s 715-004

- (3) Make sure that there is correct fluid spray:
  - (a) Make the windshield area wet with water.
  - (b) Push the applicable RAIN REP switch on the anti-ice/rain removal module (P5 panel) and release it.

WARNING: DO NOT LET THE RAIN REPELLENT FLUID TOUCH YOUR SKIN OR EYES. THE FLUID CAN CAUSE IRRITATION. DO NOT BREATHE THE FUMES. IF THE FLUID TOUCHES YOU, WASH YOUR SKIN OR EYES WITH WATER.

- (c) See if there are air bubbles in the fluid which comes out of the nozzle.
  - 1) If there are air bubbles, continue to operate the RAIN REP switch until there are no bubbles in the fluid.
- (d) Make sure that rain repellent fluid from the 3 holes in the nozzle hits the windshield.
- (e) Make sure that the flows of fluid from the 3 holes are approximately equal.
- (f) Make sure that the two inboard flows of fluid hit the windshield in the lower part of the wiper travel area.



- (g) Make sure that the outboard flow hits the lower edge of the windshield or the windshield frame.
  - 1) If the flows of fluid do not hit correctly, do this task: "Clean Nozzle" (Ref 30-43-01/701).
- (h) Push and hold the RAIN REP switch for 3 seconds.
  - 1) Make sure that the flow of fluid stops approximately 0.5 seconds after you push the RAIN REP switch.

#### s 225-005

- (4) Do a check of the fluid quantity which the system applies:
  - (a) Move the shutoff valve below the rain repellent container to OFF.
  - (b) Release the clamp and remove the container from the seat.
  - (c) Weigh the container and make a record of the weight in grams.
  - (d) If the weight is less than 320 grams, do this task: "Service the Rain Repellent Container" (Ref 12-16-02/301).
  - (e) Install the container on the seat and tighten the clamp.
  - (f) Turn the shutoff valve to ON.
  - (g) Do these two steps five times:
    - 1) Push and hold the RAIN REP switch and for 5 seconds.
    - 2) Make sure that fluid flow from the nozzle stops in less than 5 seconds.
  - (h) Turn the shutoff valve to OFF.
  - (i) Release the clamp and remove the container from the seat.
  - (j) Make sure that the decrease in weight since the initial measurement is 40 to 110 grams.
  - (k) If the decrease in weight weight loss was not in the specified range do this step:
    - 1) Adjust the adjustment screw on the left solenoid timer to change the amount of fluid which the system applies.

NOTE: Adjust the screw for longer time to apply more fluid, or adjust for shorter time to apply less fluid.

F. Airplane to Its Usual Condition

s 865-006

(1) Remove electrical power (Ref 24-22-00/201).

s 115-007

(2) Fully flush all rain repellent fluid from the airplane skin with a strong spray of water.



s 615-008

(3) Make sure that the fluid level in the visual reservoir is above the REPLACE CAN mark.

s 615-009

- (4) Make sure that the pointer of the pressure gauge is in the green band.
  - (a) If the pressure or the fluid level are below the minimum level, do this task: "Service the Rain Repellent Fluid Container" (AMM 12-16-02/301).

NOTE: Retest date on Type 3 repellent cans is not to be used as a rejection or removal date. Rain repellent characteristics do not diminish with time. No shelf or service life limit has been established.



#### NOZZLE - CLEANING/PAINTING

#### 1. General

- A. This procedure has these tasks to clean the spray nozzles located at the bottom of the windshields:
  - (1) Remove the nozzle.
  - (2) Clean the nozzle spray holes.
  - (3) Blow out unwanted material.
  - (4) Install the nozzle.
  - (5) Operational test of the windshield washer system.
  - (6) AIRPLANES WITH RAIN REPELLENT SYSTEM;
    Operational test of the rain repellent system.

TASK 30-43-01-107-001

## 2. Clean Nozzle

- A. Standard Tools and Equipment
  - (1) Wire 0.031-inch diameter (to clean nozzle spray holes)
  - (2) Source of compressed air
- B. References
  - (1) AIRPLANES WITH RAIN REPELLENT SYSTEM; 30-43-00/201, Windshield Rain Repellent System 30-43-00/501, Windshield Rain Repellent System
  - (2) AIRPLANES WITHOUT RAIN REPELLENT SYSTEM; 30-44-02/401, Windshield Washer Nozzle System
  - (3) 30-44-00/501, Windshield Washer System
  - (4) IPC 30-43-00 Fig. 5
- C. Access
  - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 1 Right Window

### D. Procedure

s 027-009

(1) AIRPLANES WITH RAIN REPELLENT SYSTEM; Do this task: "Nozzle Removal" (Ref 30-43-00/201).

EFFECTIVITY-

30-43-01

ALL

01



s 027-010

(2) AIRPLANES WITHOUT RAIN REPELLENT SYSTEM;
Do this task: "Nozzle Removal" (Ref 30-44-02/401).

s 147-003

(3) Clean the nozzle spray holes with 0.031-inch diameter wire.

s 167-004

(4) Blow out all unwanted material with compressed air.

s 427-011

(5) AIRPLANES WITH RAIN REPELLENT SYSTEM;
Do this task: "Nozzle Installation" (Ref 30-43-00/201).

s 427-012

(6) AIRPLANES WITHOUT RAIN REPELLENT SYSTEM;
Do this task: "Nozzle Installation" (Ref 30-44-02/401).

s 717-006

(7) Do this task: "Operational Test - Windshield Washer System" (Ref 30-44-00/501).

s 717-007

(8) AIRPLANES WITH RAIN REPELLENT SYSTEM;
 Do this task: "Operational Test - Rain Repellent System"
 (Ref 30-43-00/501).

EFFECTIVITY-



## WINDSHIELD WASHER SYSTEM - DESCRIPTION AND OPERATION

# 1. General (Fig. 1)

- A. The windshield washer system sprays washing fluid on the pilots' No. 1 windows. The windshield washer system consists of a washer fluid container, a pump, two solenoid valves, two nozzles and two control switches on the anti-ice-rain removal module. The pump motor is powered by 3-phase 115/200 volts ac from ac bus 4. The solenoids are powered by 28 volts dc from dc bus 4. The windshield wiper must be used when cleaning the windshield with the windshield washer system.
- B. All components of the windshield washer system except the nozzles and control switches are mounted inside the windshield washer access door on the captain's sidewall below the No. 3L window. The container is visible through an opening in the access door. A fluid level mark on the outside of the door indicates the refill level. When this level is reached, 100 cc of fluid remains.

## 2. <u>Container and Receptacle</u>

A. The container is a narrow mouth plastic bottle. It is mounted vertically and screws into a cap (receptacle) containing the fluid pickup tube. The capacity of the container is 1 quart. The container rests on a drip tray so that any spillage from the bottle or from the pump overflow port drains through the airplane drip shield.

## 3. Pump

A. The window washer pump M13 is a gear type pump driven by a 0.02 hp 3-phase motor. The pump is rated at 26 psi at 7200 rpm. A pressure relief valve on the pump will open at 60 psi.

#### 4. <u>Valves</u>

A. The solenoid valves (V33 - left, V34 - right) are electrically operated 28-volt dc valves which are normally closed. The valves control the flow of the washer fluid to the nozzles.

# 5. Nozzles

A. The nozzles are mounted externally at the base of the No. 1 windows approximately 14 inches inboard of the windshield wiper shaft. Each nozzle has four spray holes. One hole is used to apply washer fluid on the window. The other three holes are used to apply rain repellent fluid. The two supply lines are concentric within the nozzle and separated by 0-rings.

## 6. Operation (Fig. 2)

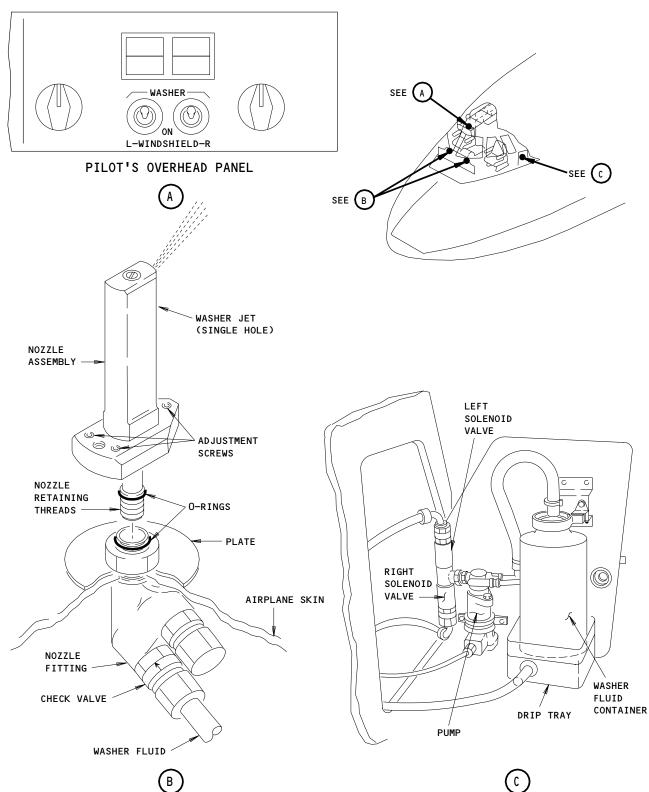
A. Functional Description

ALL ALL

30-44-00

01





Windshield Washer System Component Location Figure 1

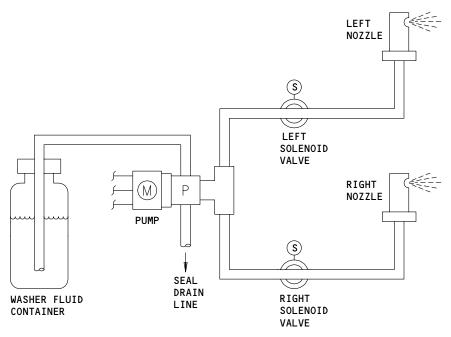
ALL

O1 Page 2

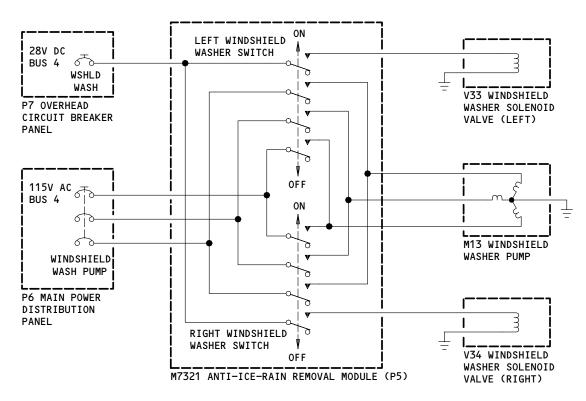
Jun 10/97

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.

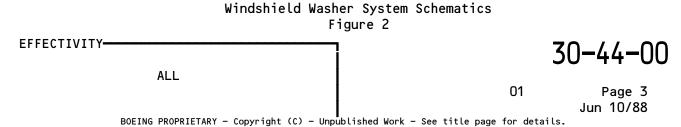




FLUID FLOW SCHEMATIC



**ELECTRICAL SCHEMATIC** 





(1) Washer fluid is applied to either No. 1 window by pressing the left or right WASHER switch on the anti-ice-rain removal module M7321 on the P5 pilots' overhead panel. This switches 115-volt 3-phase power to the pump motor. At the same time, 28 volts dc is applied to the solenoid valve for the selected window. The pump pumps the washer fluid out of the container, through the solenoid valve, to the spray nozzle. The liquid is applied to the selected window through the upper hole in the spray nozzle. The windshield wiper must be used with the windshield washer system to thoroughly clean the required area.

## B. Control

<u>CAUTION</u>: DO NOT OPERATE WINDSHIELD WIPERS ON A DRY WINDSHIELD AS WINDSHIELD MAY BE DAMAGED.

(1) To operate the windshield washer, push the left or right WASHER switch on the anti-ice-rain removal module (P5 panel) to the ON position. Hold the switch for approximately 2 seconds. This applies about 20cc of washer fluid on the windshield. Set the WIPER switch to LO and press the WASHER switch for 2 more seconds. Allow the windshield wiper to operate until wiped area is nearly dry. Repeat this procedure as required until windshield is clean.

30-44-00

01



## WINDSHIELD WASHER SYSTEM - ADJUSTMENT/TEST

#### 1. General

- A. This task is an operational test of the windshield washer system. In this procedure, you will make sure that the left and right windshield washers give a spray of fluid correctly onto the windshield.
- B. The left and right windshield washer systems operate independently from the same source of washer fluid. You can do a test of each system separately or together.
- C. When you do this test, the outside ambient air temperature must be  $38^{\circ}$  to  $120^{\circ}$  F.

TASK 30-44-00-715-001

- 2. Operational Test Windshield Washer System
  - A. References
    - (1) 12-16-01/301, Windshield Washer System
    - (2) 24-22-00/201, Manual Control
    - (3) 30-43-00/201, Windshield Rain Repellent System
    - (4) SSM 30-42-01
    - (5) WDM 30-44-11
  - B. Access
    - (1) Location Zone

221, 222 Control Cabin

C. Preconditions

s 865-007

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Windshield wiper system is serviceable (AMM 30-42-00/501).
- D. Procedure

s 865-002

(1) Supply electrical power (Ref 24-22-00/201).

s 615-003

- (2) Look at the level of the windshield washer fluid in the windshield washer bottle.
  - (a) If the bottle is less than half full, fill the bottle (Ref 12-16-01/301).

s 715-004

- (3) Do a test of the washer operation:
  - (a) Push the applicable WASHER switch on the anti-ice/rain removal module (P5 panel) to ON.

EFFECTIVITY-

30-44-00

ALL



- (b) Continue to operate the washer until there are no air bubbles in the fluid which comes out of the nozzle.
- (c) Make sure that the washer fluid hits the left windshield 18 to 20 inches from the nozzle and 14 to 16 inches from the wiper blade trip stud (Fig. 501).
  - 1) If the stream of fluid does not hit the correct area, adjust the nozzle (Ref 30-43-00/201).
- (d) Make sure that the windshield washer system applies fluid continuously while you push the WASHER switch for 3 seconds.
- (e) Turn the applicable WIPER switch to LO.
- (f) Make sure that the fluid hits on the two sides of the wiper as the wiper scans.
- (g) Let the wiper operate until the windshield is almost dry.

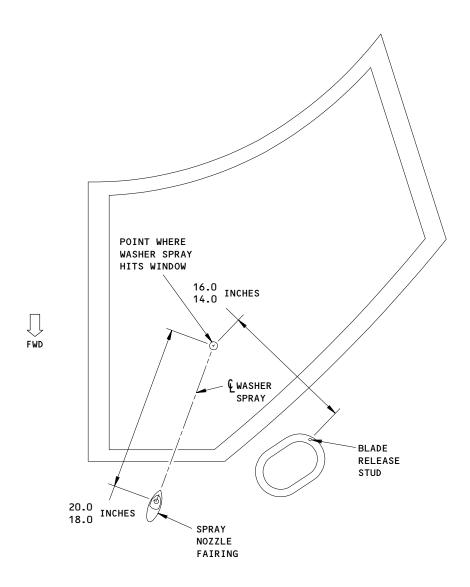
s 865-005

(4) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY-

30-44-00





WINDSHIELD (LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

Washer Fluid Spray Pattern Figure 501

EFFECTIVITY ALL

30-44-00

01

Page 503 Jun 15/98



## WINDSHIELD WASHER SOLENOID VALVE AND PUMP - REMOVAL/INSTALLATION

#### 1. General

- A. There are four tasks in this subject. The first two tasks are the removal and the installation of the windshield washer system solenoid valve. In this procedure, you will get access to the valve, remove the valve, install a replacement, and make sure the valve operates. The procedure is the same for the left or the right valve.
- B. The second two tasks are the removal and the installation of the windshield washer pump. In this procedure, you will get access to the pump, remove the pump, install the replacement pump, and make sure that the pump operates.

TASK 30-44-01-004-001

- 2. Windshield Washer Solenoid Removal (Fig. 401)
  - A. References
    - (1) IPC 30-44-01 Fig. 1
    - (2) SSM 30-42-01
    - (3) SWPM 20-30-12
    - (4) WDM 30-44-11
  - B. Access
    - (1) Location Zone

221 Control Cabin, LH - Windshield Washer Access Door

C. Procedure

S 864-045

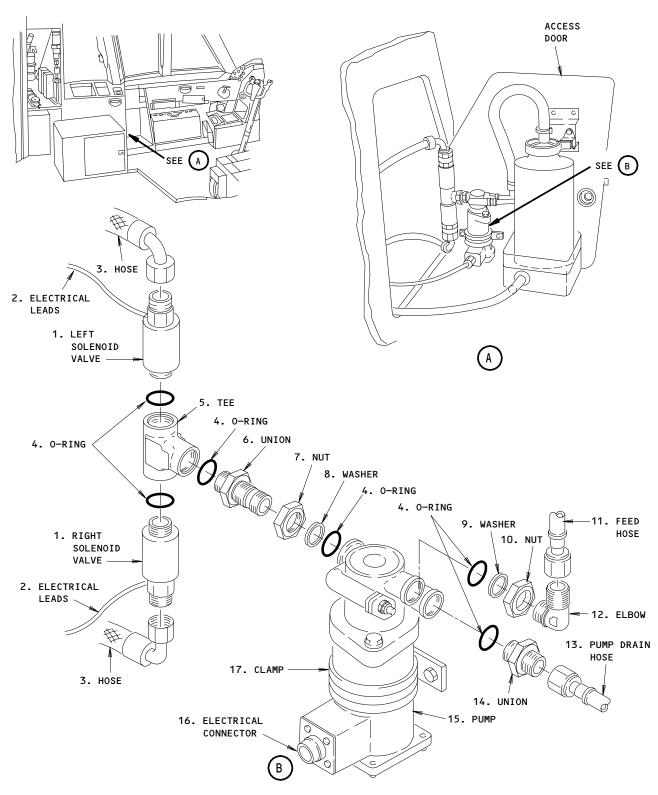
- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B32 WINDSHIELD WASH PUMP
  - (b) P7 Overhead Circuit Breaker Panel
    - 1) 7E26 WSHLD WASH

S 864-043

WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS FOR THE CAPTAIN'S AND THE FIRST OFFICER'S SEATS BEFORE YOU DO WORK AROUND THEM. A FAILURE TO OPEN THE CIRCUIT BREAKERS CAN CAUSE THE SEATS TO MOVE ACCIDENTALLY. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

EFFECTIVITY-





Solenoid Valve and Pump Installation Figure 401

ALL

O1 Page 402

Jun 10/88

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



(2) Open these circuit breakers and attach DO-NOT-CLOSE tags:

(a) P414 Left Power Distribution Center

1) 414D8 CAPT PWR SEAT

(b) P415 Right Power Distribution Center

1) 415H32 F-0 PWR SEAT

s 014-004

(3) Open the windshield washer access door to get access to the solenoid valve V33 (left) or V34 (right) (1).

s 034-005

(4) Cut the solenoid valve electrical leads (2) (SWPM 20-30-12).

NOTE: You will subsequently make a splice with these wires.

s 034-038

WARNING: DO NOT LET THE WASHER FLUID TOUCH YOUR EYES OR STAY ON YOUR SKIN. THE WASHER FLUID CAN CAUSE EYE AND SKIN IRRITATION.

(5) Disconnect the output hose (3).

s 024-008

(6) Remove the solenoid valve (1).

s 034-009

(7) Remove the 0-ring (4) from the valve (1). Discard the 0-ring.

TASK 30-44-01-404-010

3. Windshield Washer Solenoid Valve Installation (Fig. 401)

### A. Parts

АММ			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1 3 4 5	Valve (Solenoid Valve) Tubing Assembly (Output Hose) Packing (O-ring) Tee	30-44-01	01	350 105 335 330

### B. References

- (1) 24-22-00/201, Manual Control
- (2) SSM 30-42-01

EFFECTIVITY-

30-44-01

ALL



- (3) SWPM 20-30-12
- (4) WDM 30-44-11
- C. Access
  - (1) Location Zone

221 Control Cabin, LH

D. Procedure

s 434-011

(1) Install a new 0-ring (4) on the solenoid valve (1).

s 424-012

(2) Install the solenoid valve (1) in the tee (5) with not more than 9 pound-feet of torque.

s 434-013

(3) Connect the output hose (3).

s 434-014

(4) Make a splice of the solenoid valve electrical leads (2) to the wire bundle (SWPM 20-30-12).

s 864-015

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B32 WINDSHIELD WASH PUMP
  - (b) P7 Overhead Circuit Breaker Panel
    - 1) 7E26 WSHLD WASH

s 864-016

(6) Supply electrical power (Ref 24-22-00/201).

s 714-017

- (7) Do a check of the washer operation:
  - (a) Push and hold the applicable WASHER switch on the anti-ice/rain removal module to ON.
  - (b) Make sure that washer fluid hits the windshield.
  - (c) Release the WASHER switch.
  - (d) Set the applicable WIPER switch to LO.
  - (e) Set the WIPER switch to OFF when the windshield is almost dry.

s 864-018

(8) Remove electrical power (Ref 24-22-00/201).

S 864-035

- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P414 Left Power Distribution Center
    - 1) 414D8 CAPT PWR SEAT

EFFECTIVITY-

30-44-01

ALL



(b) P415 Right Power Distribution Center1) 415H32 F-O PWR SEAT

s 414-019

(10) Close the windshield washer access door.

TASK 30-44-01-004-020

- 4. Windshield Washer Pump Removal (Fig. 401)
  - A. References
    - (1) IPC 30-44-01 Fig. 1
    - (2) SSM 30-42-01
    - (3) WDM 30-44-11
  - B. Access
    - (1) Location Zone

221 Control Cabin, LH

- C. Procedure
  - S 864-041
  - (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
    - (a) P6 Main Power Distribution Panel
      - 1) 6B32 WINDSHIELD WASH PUMP
    - (b) P7 Overhead Circuit Breaker Panel
      - 1) 7E26 WSHLD WASH

s 864-046

WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS FOR THE CAPTAIN'S AND THE FIRST OFFICER'S SEATS BEFORE YOU DO WORK AROUND THEM. A FAILURE TO OPEN THE CIRCUIT BREAKERS CAN CAUSE THE SEATS TO MOVE ACCIDENTALLY. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P414 Left Power Distribution Center
    - 1) 414D8 CAPT PWR SEAT
  - (b) P415 Right Power Distribution Center
    - 1) 415H32 F-0 PWR SEAT

s 014-022

(3) Open the access door to get access to the windshield washer pump M13 (5).

s 024-023

- (4) Remove the pump:
  - (a) Disconnect the electrical connector DM13 (6).
  - (b) Remove the output hoses (3) from the solenoid valves (1).
  - (c) Remove the fasteners which hold the clamp (17) to the access door.

EFFECTIVITY-

30-44-01

ALL



(d) Loosen the nut (7) and remove the assembly of the valves (1), tee (5), union (6), nut (7), and washer (8) from the pump (15).

NOTE: Let the electrical leads (2) twist along their length until the assembly is clear of the pump.

- (e) Disconnect the feed hose (11) and the pump drain hose (13) from the pump (15).
- (f) Remove the elbow (12), nut (10), washer (9), and union (14) from the pump (15).
- (g) Remove the O-rings (4) from the pump (15). Discard the O-rings.

TASK 30-44-01-404-025

- 5. Windshield Washer Pump Installation (Fig. 401)
  - A. Parts

АММ			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1 3 4 5 6 7 8 9 10 11 12 13 14 15	Valve (Solenoid Valve) Tubing Assembly (Output Hose) Packing (O-ring) Tee Union Nut Washer Washer Nut Tubing Assembly (Feed Hose) Elbow Tubing Assembly (Pump Drain Hose) Union Pump Clamp	30-44-01	01	240 105 200 195 185 205 215 215 210 135 190 150 180 315 50

- B. References
  - (1) 24-22-00/201, Manual Control
  - (2) SSM 30-42-01
  - (3) WDM 30-44-11
- C. Access
  - (1) Location Zone

221 Control Cabin, LH

D. Procedure

s 424-026

- (1) Install the pump:
  - (a) Install new 0-rings (4), the union (14), washer (9), nut (10), and elbow (12) on the pump (15).

EFFECTIVITY-

30-44-01

ALL



- (b) Connect the pump drain hose (13) and the feed hose (11) to the pump.
- (c) Install the assembly of the valves (1), tee (5), union (6), nut (7), and washer (8) with a new 0-ring (4) on the pump (15). Tighten the nut (7).
- (d) Attach the pump (15) to the door with the clamp (17).
- (e) Connect the output hoses (3) to the solenoid valves (1).

s 434-027

(2) Connect the electrical connector DM13 (16) to the pump (15).

s 414-028

(3) Close the windshield washer access door.

S 864-029

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P6 Main Power Distribution Panel
    - 1) 6B32 WINDSHIELD WASH PUMP
  - (b) P7 Overhead Circuit Breaker Panel
    - 1) 7E26 WSHLD WASH

s 714-030

- (5) Do a check of the pump operation:
  - (a) Supply electrical power (Ref 24-22-00/201).
  - (b) Push and hold the left or right WASHER switch on the anti-ice/rain removal module to the ON position.
  - (c) Make sure that a strong, stable flow of washer fluid hits the windshield.
  - (d) Release the WASHER switch.
  - (e) Set the applicable WIPER switch to LO.
  - (f) Set the WIPER switch to OFF when the windshield is almost dry.

s 864-031

(6) Remove electrical power (Ref 24-22-00/201).

s 864-034

ALL

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P414 Left Power Distribution Center
    - 1) 414D8 CAPT PWR SEAT

EFFECTIVITY-



(b) P415 Right Power Distribution Center
1) 415H32 F-0 PWR SEAT

EFFECTIVITY-

ALL

30-44-01

02

Page 408 Jun 10/91



# WINDSHIELD WASHER NOZZLE SYSTEM - REMOVAL/INSTALLATION

### 1. General

- A. This subject has four tasks. The tasks are:
  - removal and installation of the windshield washer nozzle system
  - removal and installation of the nozzle fitting
- B. For the removal and installation of the nozzle, you will remove the nozzle, install a replacement nozzle, and adjust the nozzle.
- C. For the removal and installation of the nozzle fitting, you will remove the PFD and ND Integrated Display Units, remove the nozzle fitting, and install a replacement fitting.

TASK 30-44-02-004-001

- 2. Nozzle Removal (Fig. 401)
  - A. Consumable Materials
    - (1) B00184 Solvent BMS 11-7
  - B. References
    - (1) IPC 30-43-01 Fig. 1
    - (2) SSM 30-42-01
    - (3) WDM 30-43-11
  - C. Access
    - (1) Location Zone

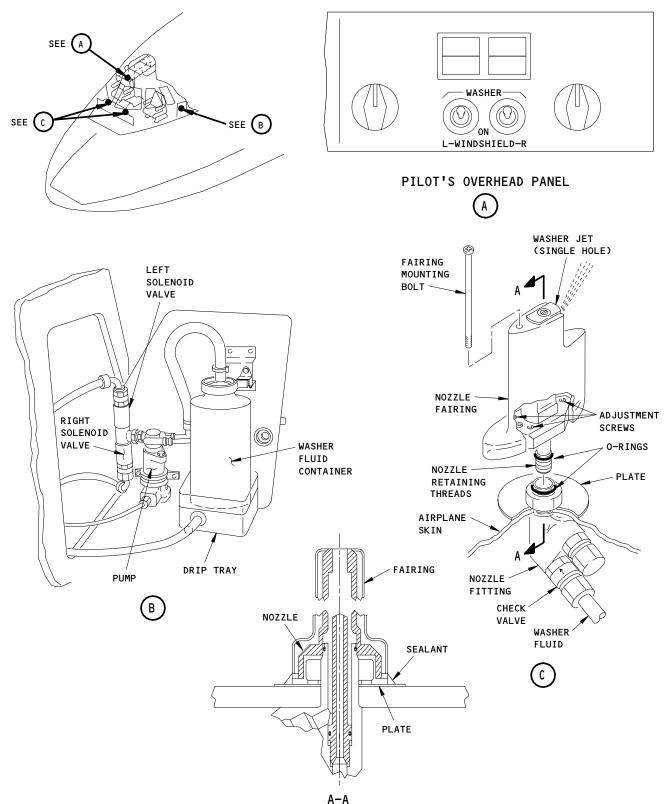
Control Cabin, LH - Outside No. 1 Left Window
 Control Cabin, RH - Outside No. 1 Right Window

D. Procedure

s 864-002

- WARNING: MAKE SURE TO OPEN THE WINDOW HEAT CIRCUIT BREAKERS. YOU CAN GET AN ELECTRICAL SHOCK IF YOU TOUCH THE WINDSHIELD WHEN THE WINDOW HEAT POWER IS ON.
- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E26 WSHLD WASH
  - (b) P6 Main Power Distribution Panel
    - 1) 6B34 WINDOW HEAT 1L PWR
    - 2) 6B17 WINDOW HEAT 1R PWR
  - (c) P180 DC Power Distribution Panel
    1) 180H26 WD0 HEAT CONT 1L





Windshield Washer Nozzle Components Installation Figure 401

K27151

30-44-02

01

Page 402 Jun 18/99



#### 2) 180H12 WDO HEAT CONT 1R

s 034-003

Remove the mounting screw from the nozzle fairing and remove the fairing.

s 164-004

(3) Remove the sealant from the fairing and the plate.

s 114-005

(4) Clean the surfaces of the nozzle fairing and the plate with solvent.

s 024-006

- (5) Remove the nozzle:
  - (a) Loosen the three adjustment screws at the bottom of the nozzle.
  - (b) Turn the nozzle assembly counterclockwise by hand to remove it from the fitting attached to the airplane structure.
  - (c) Remove the nozzle assembly. Discard the 2 O-rings.

TASK 30-44-02-404-007

- 3. Nozzle Installation (Fig. 401)
  - A. Consumable Materials
    - (1) G00507 Cloth Lint Free (to clean the nozzle fitting)
    - A00247 Sealant BMS 5-95, Class B
    - (3) B00184 Solvent BMS 11-7
  - References
    - (1) AMM 24-22-00/201, Manual Control
    - (2) IPC 30-43-01 Fig. 1
    - (3) SSM 30-42-01
    - (4) WDM 30-43-11
  - C. Access
    - (1) Location Zone

Control Cabin, LH - Outside No. 1 Left Window 221

222 Control Cabin, RH - Outside No. 1 Right Window

D. Procedure

s 424-008

- Install the nozzle:
  - (a) Clean the fluid out of the nozzle fitting with a lint-free cloth.
  - Make the new O-rings wet with water and install them on the nozzle shaft and the nozzle fitting.
  - (c) Use your hand to turn the nozzle assembly clockwise 6 to 7 turns in the fitting.

EFFECTIVITY-AIRPLANES WITHOUT RAIN REPELLENT SYSTEM



- (d) Point the nozzle approximately toward the center of the No. 1 window.
- (e) Turn the three alignment screws clockwise until they touch the plate (do not tighten them).

s 864-009

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P7 Overhead Circuit Breaker Panel

1) 7E26 WSHLD WASH

s 864-010

(3) Supply electrical power (AMM 24-22-00/201).

s 824-011

- (4) Adjust the nozzle:
  - (a) Push the WASHER switch to apply washer fluid to the windshield.
  - (b) Adjust the three alignment screws to make the washer fluid hit the windshield 18 to 20 inches from the nozzle hole and 14 to 16 inches from the wiper blade release stud (Fig. 402).

NOTE: The washer jet pattern shows the correct nozzle adjustment. The washer fluid will hit the windshield correctly if the washer fluid pattern is correct.

CAUTION: DO NOT TIGHTEN THE ADJUSTMENT SCREWS TOO MUCH. IF YOU MAKE THE SCREWS TOO TIGHT, IT IS POSSIBLE THAT YOU WILL DAMAGE THEM.

(c) Tighten the adjustment screws from 1.0 to 1.5 pound-inches to lock the nozzle in position.

s 114-012

(5) Clean the plate and the nozzle mating surfaces with solvent.

s 434-013

(6) Put the fairing over the nozzle and install the mounting bolt.

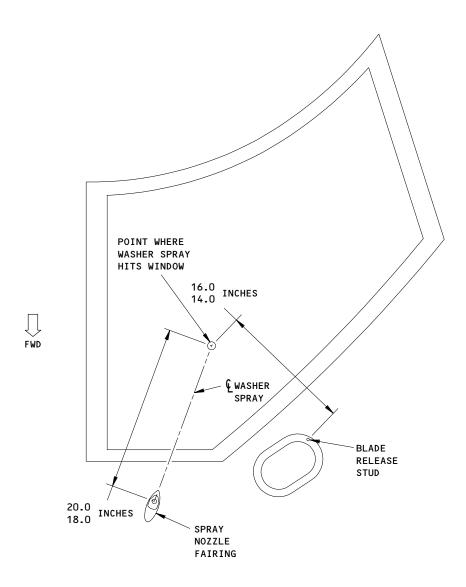
s 394-014

(7) Apply sealant around the bottom of the fairing to make a fillet (Fig. 401, Section B-B).

s 864-015

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  (a) P6 Main Power Distribution Panel
  - 1) 6B34 WINDOW HEAT 1L PWR





WINDSHIELD (LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

Washer Fluid Spray Pattern Figure 402

30-44-02

01

Page 405 Jun 18/99



- 2) 6B17 WINDOW HEAT 1R PWR
- (b) P180 DC Power Distribution Panel
  - 1) 180H26 WDO HEAT CONT 1L
  - 2) 180H12 WDO HEAT CONT 1R

S 864-016

(9) Remove electrical power (AMM 24-22-00/201).

TASK 30-44-02-004-017

- 4. Nozzle Fitting Removal (Fig. 401)
  - A. Consumable Materials
    - (1) G00507 Cloth Lint Free (to catch repellent fluid drops)
    - (2) G00040 Cord Nylon (to hold the nozzle fitting and supply hoses)
  - B. References
    - (1) IPC 30-43-00 Fig. 5
    - (2) AMM 31-61-02/401, Integrated Display Unit
    - (3) SSM 30-42-01
    - (4) WDM 30-43-11
  - C. Access
    - (1) Location Zone
      - 221 Control Cabin, LH Captain's Instrument Panel and Outside No. 1 Left Window
      - 222 Control Cabin, RH First Officer's Instrument Panel and Outside No. 1 Right Window
  - D. Procedure

s 864-020

WARNING: MAKE SURE TO OPEN THE WINDOW HEAT CIRCUIT BREAKERS. YOU CAN GET AN ELECTRICAL SHOCK IF YOU TOUCH THE WINDSHIELD WHEN THE

WINDOW HEAT POWER IS ON.

WARNING: MAKE SURE TO OPEN THE CIRCUIT BREAKERS FOR THE CAPTAIN'S AND THE FIRST OFFICER'S SEATS BEFORE YOU DO WORK AROUND THEM. A FAILURE TO OPEN THE CIRCUIT BREAKERS CAN CAUSE THE SEATS TO MOVE ACCIDENTALLY. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E26 WSHLD WASH



- (b) P6 Main Power Distribution Panel
  - 1) 6B32 WINDSHIELD WASH PUMP
  - 2) 6B34 WINDOW HEAT 1L PWR
  - 3) 6B17 WINDOW HEAT 1R PWR
- (c) P180 DC Power Distribution Panel
  - 1) 180H26 WDO HEAT CONT 1L
  - 2) 180H12 WDO HEAT CONT 1R
- (d) P414 Left Power Distribution Center
  - 1) 414D8 CAPT PWR SEAT
- (e) P415 Right Power Distribution Center
  - 1) 415H32 F-0 PWR SEAT

s 014-021

(2) Do this task for the PFD and ND on the captain's or the first officer's P2 panel: "Integrated Display Unit Removal" (AMM 31-61-02/401).

s 014-022

(3) Remove the captain's or first officer's P2-3 and P2-4 panels.

s 014-023

(4) Remove the captain's or first officer's IDU enclosure.

s 034-024

(5) Do this task: "Nozzle Removal"

NOTE: This task is in this procedure.

S 024-025

- (6) Remove the nozzle fitting:
  - (a) Attach a nylon cord around the 0-ring groove on the nozzle fitting.
  - (b) Carefully remove the nut from the nozzle fitting.
  - (c) Lower the nozzle fitting until it hangs from the fluid supply hoses.

NOTE: Let the nut go up the cord and let the excess cord hang out of the nozzle fitting hole in the airplane skin.



(d) Disconnect the supply hoses from the nozzle fitting (use a cloth to catch the supply hose fluids which are caught in the hoses).

CAUTION: DO NOT PULL THE LOOSE END OF THE CORD THROUGH THE NOZZLE FITTING HOLE IN THE AIRPLANE SKIN. IF YOU PULL THE END OF THE STRING THROUGH THE HOLE, THE NOZZLE FITTING WILL NOT BE EASY TO INSTALL.

(e) Remove the nozzle fitting. Discard the packings.

TASK 30-44-02-404-089

- 5. Nozzle Fitting Installation (Fig. 401)
  - A. References
    - (1) AMM 31-61-02/401, Integrated Display Unit
    - (2) IPC 30-43-00 Fig. 5
    - (3) SSM 30-42-01
    - (4) WDM 30-43-11
  - B. Access
    - (1) Location Zone

Control Cabin, LH - Captain's Instrument Panel and
 Outside No. 1 Left Window
 Control Cabin, RH - First Officer's Instrument Panel and
 Outside No. 1 Right Window

### C. Procedure

s 424-090

- (1) Install the nozzle fitting:
  - (a) Install new packings in the nozzle fitting.
  - (b) Install the supply hose assemblies.

NOTE: You must install the hoses at the correct angle to make sure that they will not twist when you install the nozzle fitting.



- (c) Attach a nylon cord around the O-ring groove on the nozzle fitting.
- (d) Carefully pull the nozzle fitting up through the hole in the airplane skin with the nylon cord.
- (e) Install the nut on the nozzle fitting.
- (f) Remove the nylon cord from the nozzle fitting.

s 434-091

(2) Do this task: Nozzle Installation.

NOTE: This task is in this procedure.

s 794-093

(3) Make sure that there are no visible leaks where the supply hoses attach to the nozzle fitting.

s 414-094

(4) Install the captain's or first officer's EFIS enclosure.

s 414-095

(5) Install the captain's or first officer's P2-3 and P2-4 panels.

s 414-096

(6) Do this task for the PFD and ND on the captain's or the first officer's P2 panel: "Integrated Display Unit Installation" (AMM 31-61-02/401).

S 864-097

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7E26 WSHLD WASH
  - (b) P6 Main Power Distribution Panel
    - 1) 6B32 WINDSHIELD WASH PUMP
    - 2) 6B34 WINDOW HEAT 1L PWR



- 3) 6B17 WINDOW HEAT 1R PWR
- (c) P180 DC Power Distribution Panel
  - 1) 180H26 WDO HEAT CONT 1L
  - 2) 180H12 WDO HEAT CONT 1R
- (d) P414 Left Power Distribution Center
  - 1) 414D8 CAPT PWR SEAT
- (e) P415 Right Power Distribution Center
  - 1) 415H32 F-0 PWR SEAT



## WATER LINE AND WASTE DRAIN HEATERS - DESCRIPTION AND OPERATION

### 1. General (Fig. 1)

- A. Electric heaters prevent the formation of ice in the water supply lines, waste water drain lines, drain masts, and waste tank service fittings in the unheated areas of the airplane. The heater types used are: integrally heated water supply hoses, inline water supply line heaters, ribbon heaters which are wrapped around drain lines, integrally heated drain masts, blanket heaters, and a drain gasket heater and heated flush fittings for the toilet drain servicing assembly.
- B. When airplane electrical power is on, 115 volts ac is supplied to the water and drain heaters. Thermostats are provided in heater circuits where excessive heating is undesirable. The drain cap gasket heater has a low wattage output and continuous operation will not cause overheating. When the airplane is in the air, the drain mast heaters are supplied with 115 volts ac. On the ground, the ground safety relay transfers the drain mast heaters to 42.5 volts ac (Fig. 2).

## 2. Water Supply Line Heaters

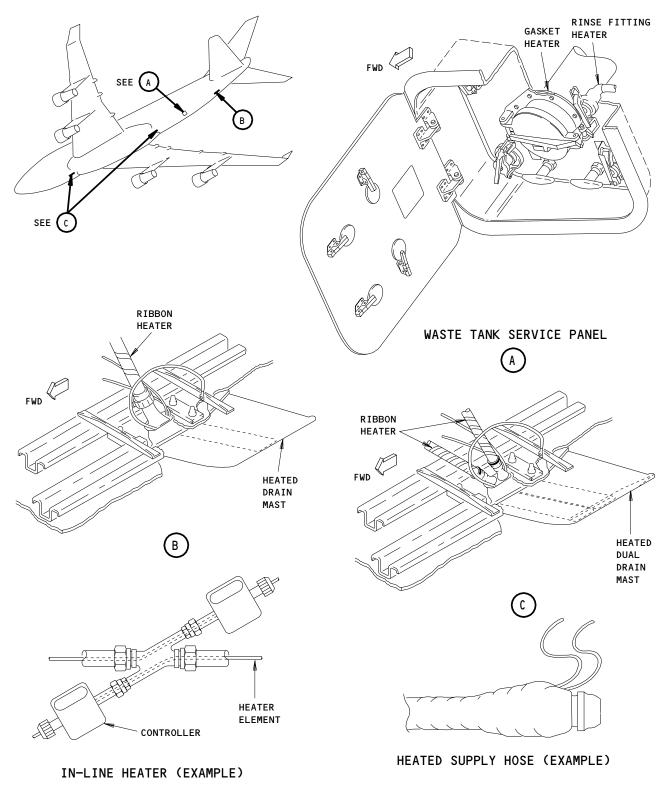
A. The potable waterlines distribute water from water storage tanks in the aft bulkhead of the forward cargo compartment to the galleys and lavatories. Potable water supply lines are kept free of ice by inline heaters and integrally heated hoses.

## 3. Waste Water Heaters

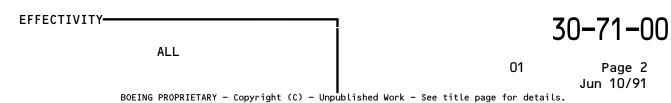
- A. The waste water system gathers waste water from the washbasins and galley drains and dumps it overboard through the drain masts. There are three waste water drain systems, each terminating in a heated drain mast.
- B. The waste water drain lines to the drain masts are heated where they pass through the unheated section of the airplane. The 115-volt ac ground handling bus supplies power to these heaters at all times. Drain line heaters are the ribbon type and are controlled by thermostats. Some ribbon heaters have built-in thermostats.
- C. The forward, center, and aft waste water drain masts are electrically heated to prevent ice formation. The heating elements to these drain masts are integral to the mast (Ref 38-31-00). The drain mast heaters do not have a thermostat. However, the power to the drain mast heaters is reduced from 115 volts ac in the air to 42.5 volts ac when the airplane is on the ground.

30-71-00

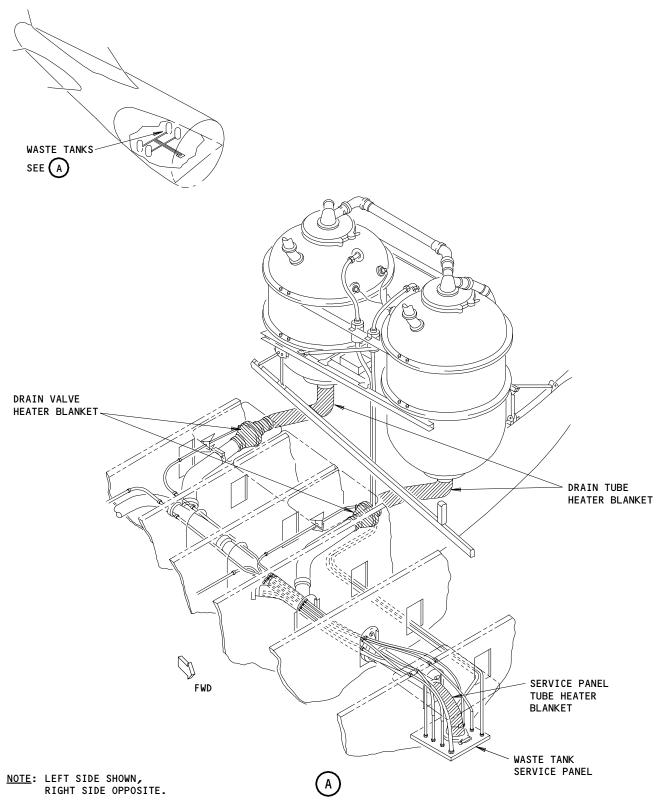




Water Line and Waste Drain Heaters Component Location Figure 1 (Sheet 1)







Water Line and Waste Drain Heaters Component Location Figure 1 (Sheet 2)

ALL

O2

Page 3

Jun 10/91

BOEING PROPRIETARY - Copyright (c) - Unpublished Work - See title page for details.



### 4. Waste Tank Drain Heaters

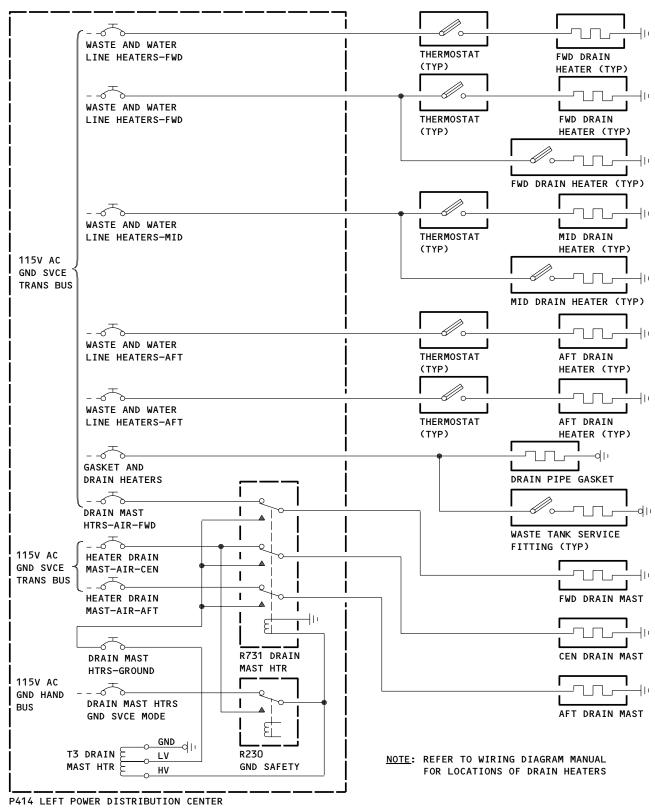
- A. Formation of ice on the waste tank drain tubes is prevented by heater blankets which enclose the tubes. The heater blankets are installed on the drain tubes between the waste tanks and the drain valves and a separate blanket is installed on each drain valve. A heater blanket is also installed on the drain tube where it meets the waste tank service panel.
- B. Formation of ice in the toilet drain servicing cap is prevented by a gasket-type electrical heating element placed between the drain cap flange and the service panel structure. This is a low wattage heater and has no thermostat. It is on as long as power is available. The four waste tank flush fittings at the service panel are enclosed by heaters with thermostats built into them.
- 5. Operation (Figs. 2 and 3)
  - A. Functional Description

WARNING: OPEN DRAIN MAST HEATER CIRCUIT BREAKERS ON P414 PANEL WITH EXTERNAL POWER IN GROUND SERVICE POSITION TO PREVENT BURNS TO PERSONNEL OR OVERHEATING DRAIN MASTS.

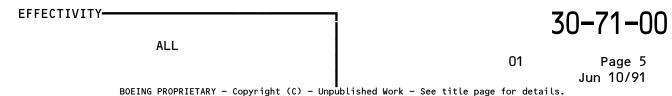
- (1) 115 volts ac is supplied to the potable water line heaters, waste water drain heaters, and toilet service panel heaters. The heat system is on whenever airplane ac power is supplied. The drain mast, waste drain, and water supply line heater circuit breakers on the P414 Left Power Distribution Center provide circuit protection. Thermostats turn each heater on when the temperature drops to a threshhold level. When the airplane is on the ground, the drain mast heaters are switched from 115 to 42.5 volts ac.
- B. Control
  - (1) Operation of the water and waste line heaters is automatic. No control functions are exercised.

 30-71-00

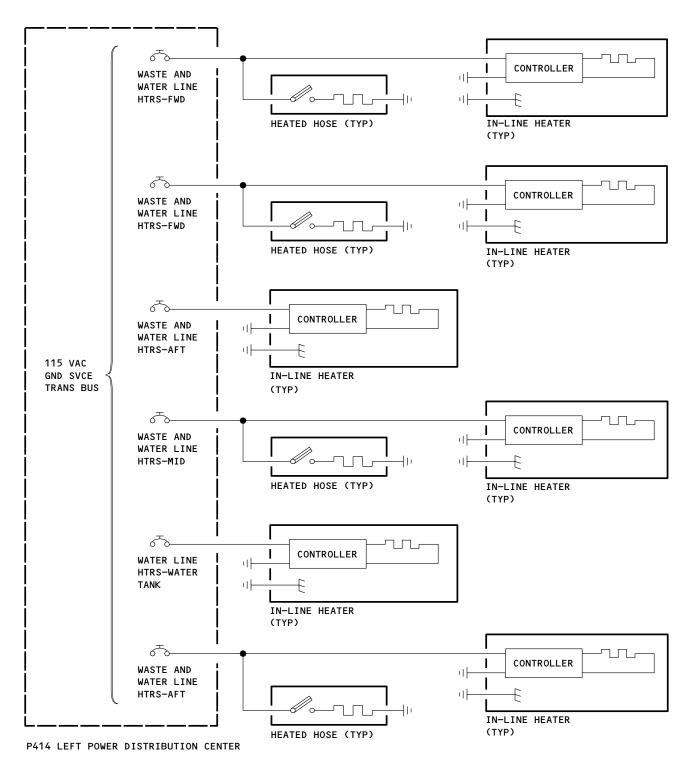




Drain Heaters Simplified Schematic Figure 2

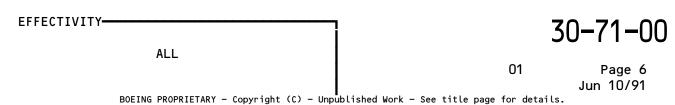






NOTE: REFER TO WIRING DIAGRAM MANUAL FOR LOCATIONS OF WATER LINE HEATERS

Water Supply Line Heaters Simplified Schematic Figure 3





### WATER LINE AND WASTE DRAIN HEATERS - ADJUSTMENT/TEST

### 1. General

- A. This task is an operational test of the water supply and drain heaters.
  - (1) These tests are included in the operational test and can be done together or independently:
    - (a) Drain Mast Heaters Ground Mode Test
    - (b) Drain Mast Heaters Air Mode Test
    - (c) Ribbon Heaters Test
    - (d) Heated Supply Hose Test
    - (e) In-Line Heaters Test
    - (f) Test of the Blanket Heater for the Waste Tank Drain Line
    - (g) Transfer Relay Air Mode Test

### TASK 30-71-00-715-001

## 2. Operational Test - Water Line and Waste Drain Heaters

- A. Standard Tools and Equipment
  - (1) Clamp-on AC Ammeter
- B. Consumable Materials
  - (1) B00749 Freon Freeze Spray
  - (2) G00829 Dry Ice
- C. References
  - (1) 24-22-00/201, Manual Control
  - (2) 25-52-01/401, Containerized Cargo Compartment Ceiling and Sidewall Lining
  - (3) 32-09-02/201, Air/Ground Relay System
  - (4) SSM 30-71-01
  - (5) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14
- D. Access
  - (1) Location Zone

125 thru 152 - Lower Lobe (Refer to WDM for heater locations)

### E. Preconditions

s 865-079

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).

EFFECTIVITY-

30-71-00



- (b) Air/ground relay system is serviceable (AMM 32-09-02/201).
- F. Drain Mast Heaters Ground Mode Test

s 865-002

(1) Supply electrical power (Ref 24-22-00/201).

s 865-003

- (2) Make sure that these circuit breakers on the P414 Left Power Distribution Center are closed:
  - (a) 414L22 DRAIN MAST HTR AIR FWD
  - (b) 414L23 DRAIN MAST HTR AIR CTR
  - (c) 414L24 DRAIN MAST HTR AIR AFT
  - (d) 414M32 DRAIN MAST HTR GND MODE
  - (e) 414C21 DRAIN MAST HTRS GND SVCE MODE

s 285-004

WARNING: DO NOT TOUCH THE DRAIN MAST. WHEN THE DRAIN MAST HEATER OPERATES, THE DRAIN MAST IS SUFFICIENTLY HOT TO BURN YOU.

(3) Make sure that the forward, center, and aft drain masts become warm.

NOTE: Hold your hand near the drain mast when it is necessary to monitor its temperature during this procedure. Do not touch the drain mast.

s 865-006

(4) Open 414M32 DRAIN MAST HTRS GND MODE circuit breaker on the P414 Left Power Distribution Center.

s 755-007

(5) Make sure that the forward, center, and aft drain masts start to become cool.

s 865-008

(6) Close 414M32 DRAIN MAST HTRS GND MODE circuit breaker on the P414 Left Power Distribution Center.

s 755-009

(7) Make sure that the forward, center, and aft drain masts become warm.

s 865-010

CAUTION: DO NOT LET THE CIRCUIT BREAKER IN THE STEP THAT FOLLOWS BE CLOSED FOR MORE THAN 5 MINUTES. THERE CAN BE DAMAGE TO THE FORWARD AND AFT DRAIN MASTS IF YOU CLOSE THE CIRCUIT BREAKER FOR TOO LONG.

(8) Open 414L23 DRAIN MAST HTR AIR CTR circuit breaker on the P414 Left Power Distribution Center.

EFFECTIVITY-

30-71-00

ALL



s 755-011

(9) Make sure that the center drain mast starts to become cool.

s 865-012

- (10) Close 414L23 DRAIN MAST HTR AIR CTR circuit breaker on the P414 Left Power Distribution Center.
- G. Drain Mast Heaters Air Mode Test

s 045-050

WARNING: YOU MUST CAREFULLY DO THE STEPS IN THE TASK BELOW TO PREPARE THE SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE. FAILURE TO DO THE STEPS CORRECTLY CAN CAUSE THE AUTOMATIC OPERATION OF AIRPLANE SYSTEMS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this task: "Prepare Safety-Sensitive Systems for Air Mode Simulation" (Ref 32-09-02/201).

s 865-014

- (2) Open these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7F22 LANDING GEAR DSP & CONT PRI
    - 2) 7F23 LANDING GEAR DSP & CONT ALTN
  - (b) P180 DC Power Distribution Panel
    - 1) 180J12 GND PWR SENSE

s 755-015

(3) Make sure that the forward, center, and aft drain masts become warm.

s 865-016

(4) Open 414M32 DRAIN MAST HTRS GND MODE circuit breaker on the P414 Left Power Distribution Center.

s 755-017

(5) Make sure that the forward, center, and aft drain masts start to become cool.

s 865-018

CAUTION: DO THE SUBSEQUENT 4 STEPS IN LESS THAN 5 MINUTES. THERE CAN BE DAMAGE TO THE DRAIN MASTS IF THEY OPERATE IN HIGH POWER MODE FOR TOO LONG.

(6) Close 414M32 DRAIN MAST HTRS GND MODE circuit breaker on the P414 Left Power Distribution Center.

s 865-019

(7) Open 414C21 DRAIN MAST HTRS GND SVCE MODE circuit breaker on the P414 Left Power Distribution Center.

EFFECTIVITY-

30-71-00

ALL



s 755-020

(8) Make sure that the forward, center, and aft drain masts quickly become hot.

s 865-021

- (9) Open these circuit breakers on the P414 Left Power Distribution Center:
  - (a) 414L22 DRAIN MAST HTR AIR FWD
  - (b) 414L23 DRAIN MAST HTR AIR CTR
  - (c) 414L24 DRAIN MAST HTR AIR AFT

s 755-022

(10) Make sure that the forward, center, and aft drain masts start to cool.

s 865-023

- (11) Close these circuit breakers on the P414 Left Power Distribution Center in this sequence:
  - (a) 414C21 DRAIN MAST HTRS GND SVCE MODE
  - (b) 414L22 DRAIN MAST HTR AIR FWD
  - (c) 414L23 DRAIN MAST HTR AIR CTR
  - (d) 414L24 DRAIN MAST HTR AIR AFT

s 755-024

(12) Make sure that the forward, center, and aft drain masts become warm.

s 865-025

- (13) Close these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7F22 LANDING GEAR DSP & CONT PRI
    - 2) 7F23 LANDING GEAR DSP & CONT ALTN
  - (b) P180 DC Power Distribution Panel
    - 1) 180J12 GND PWR SENSE

S 445-026

- (14) Do this task: "Put Safety-Sensitive Systems Back to the Condition before Air Mode Simulation" (Ref 32-09-02/201).
- H. Ribbon Heaters Test

s 015-027

(1) Remove the applicable floor panels from the cargo compartment to get access to the ribbon heater thermostat.

EFFECTIVITY-

30-71-00



s 485-000

(2) Connect a clamp-on ammeter around one of the two heater lead wires.

s 715-027

- (3) Do a check of ribbon heater operation:
  - (a) Make the heater thermostat cool with dry ice or freon spray.

NOTE: To use the freon spray, apply the spray to the thermostat for 2 seconds. After 5 seconds apply the spray again. Do this procedure as many times as necessary to make the thermostat sufficiently cool.

- (b) Make sure that the current is 0.075 amps or more.
- (c) As an alternative method to the current measurement, feel the ribbon heater with your hand to make sure that it is warm.

s 085-028

(4) Remove the clamp-on ammeter.

s 415-031

- (5) Install the floor panels in the cargo compartment.
- I. Heated Supply Hose Test

s 015-032

(1) Remove the applicable cargo liners or floor panels to get access to the thermostat of the heated supply hose (Ref 25-52-01/401).

s 485-030

(2) Connect a clamp-on ammeter around one of the two heater lead wires.

s 715-029

- (3) Do a check of the heated supply hose:
  - (a) Make the thermostat cool with dry ice or freon coolant (the thermostat is located adjacent to the terminal end of the hose).

NOTE: To use the freon spray, apply the spray to the thermostat for 2 seconds. After 5 seconds apply the spray again. Do this procedure as many times as necessary to make the thermostat sufficiently cool.

- (b) Make sure that the current is 0.25 amps or more.
- (c) As an alternative method to the current measurement, feel the heated supply hose with your hand to make sure that it is warm.

s 085-031

(4) Remove the clamp-on ammeter.

EFFECTIVITY-

30-71-00

ALL



s 415-036

(5) Install the cargo liners or floor panels (Ref 25-52-01/401).

J. In-Line Heaters Test

s 015-037

(1) Remove the applicable cargo liners or floor panels to get access to the in-line heater (Ref 25-52-01/401).

s 485-032

(2) Connect a clamp-on ammeter around one of the two heater power wires.

s 715-033

- (3) Do a check of in-line heater operation:
  - (a) Make the heater thermostat cool with dry ice or freon spray (the thermostat is in the thin tube between the controller body and the B-nut).

NOTE: AIRPLANES WITH SB 30-2057;
The thermostat for some in-line heaters is located separate from the controller.

NOTE: To use the freon spray, apply the spray to the thermostat for two seconds. after 5 seconds apply the spray again. Do this procedure as many times as necessary to make the thermostat sufficiently cool.

- (b) Make sure that the current is 0.6 amps or more.
- (c) Move the clamp-on ammeter to the ground wire.
- (d) Make sure that the current in the ground wire is the same as that found in the power wire.

s 085-040

(4) Remove the clamp-on ammeter.

s 415-041

(5) Install the cargo liners or floor panels (Ref 25-52-01/401).

EFFECTIVITY-

30-71-00

ALL



K. Test of the Blanket Heater for the Waste Tank Drain Line

s 015-066

(1) Remove the applicable cargo liners or floor panels to get access to the waste tank blanket heaters (AMM 25-52-01/401).

s 485-067

(2) Connect a clamp-on ammeter around one of the two heater power wires.

s 715-068

- (3) Do a check of waste tank blanket heater operation:
  - (a) Make the heater thermostat cool with dry ice or freon spray.

NOTE: To use the freon spray, apply the spray to the thermostat for 2 seconds. After 5 seconds apply the spray again. Do this procedure as many times as necessary to make the thermostat sufficiently cool.

- (b) Make sure that you find the current shown below:
  - 1) For the valve heater blankets: 0.09 0.13 amps
  - 2) For the service panel tube heaters: 0.11 0.14 amps
  - 3) For the forward and aft tube blanket heaters: 0.16 0.24 amps

s 085-069

(4) Remove the clamp-on ammeter.

s 415-070

- (5) Install the cargo liners or floor panels (AMM 25-52-01/401).
- L. Transfer Relay Air Mode Test

s 865-042

(1) Open 414A24 WASTE & WATER LINE HTR MN PWR (gnd) circuit breaker on the P414 Left Power Distribution Center.

s 015-043

(2) Remove the applicable cargo liners or floor panels to get access to the thermostat of a <u>forward</u> in-line heater (Ref 25-52-01/401).

s 485-034

(3) Connect a clamp-on ammeter around one of the two heater lead wires.

EFFECTIVITY-

30-71-00



s 715-035

- (4) Do a test of the in-line heater air mode:
  - (a) Make the heater thermostat cool with dry ice or freon spray (the thermostat is in the thin tube between the controller body and the B-nut).

NOTE: To use the freon spray, apply the spray to the thermostat for 2 seconds. After 5 seconds apply the spray again. Do this procedure as many times as necessary to make the thermostat sufficiently cool.

- (b) Make sure that the current is 0.6 amps or more.
- (c) Move the clamp-on ammeter to the ground wire.
- (d) Make sure that the current in the ground wire is the same as that found in the power wire.

s 085-036

(5) Remove the clamp-on ammeter.

S 415-048

(6) Install the cargo liners or floor panels (Ref 25-52-01/401).

s 715-046

(7) Do the same test procedure for a mid or water tank in-line heater.

s 715-047

(8) Do the same test procedure for an aft in-line heater.

s 865-049

(9) Close 414A24 WASTE & WATER LINE HTR MN PWR (gnd) circuit breaker on the P414 Left Power Distribution Center.

EFFECTIVITY-

30-71-00

ALL



## RIBBON HEATERS - REMOVAL/INSTALLATION

#### 1. General

- A. This subject has two tasks, one for the removal and one for the installation of the water line and waste drain ribbon heaters. In this procedure, you will get access to the heater, cut the electrical leads, remove tape from the heater, install the replacement heater, and make splices at the new heater wires.
- B. The procedure for individual water line ribbon heaters are the same except for the number of inches between the turns on the hoses.

TASK 30-71-01-004-001

- 2. <u>Ribbon Heater Removal</u> (Fig. 401)
  - A. References
    - (1) SSM 30-71-01
    - (2) SWPM 20-30-12
    - (3) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14
  - B. Access
    - (1) Location Zone

125 thru 152 Lower Lobe (Refer to WDM for heater locations)

- C. Procedure
  - s 864-002
  - (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
    - (a) P414 Left Power Distribution Center
      - 1) 414A24 WASTE AND WATER LINE HTR MN PWR
      - 2) 414D5 WASTE AND WATER LINE HTR MN PWR
      - 3) 414L22 DRAIN MAST HTR AIR FWD
      - 4) 414L23 DRAIN MAST HTR AIR CTR
      - 5) 414L24 DRAIN MAST HTR AIR AFT
      - 6) 414C21 DRAIN MAST HTRS GND SVCE MODE

s 014-003

(2) Remove floor or sidewall panels to get access to the applicable ribbon heater.

s 034-004

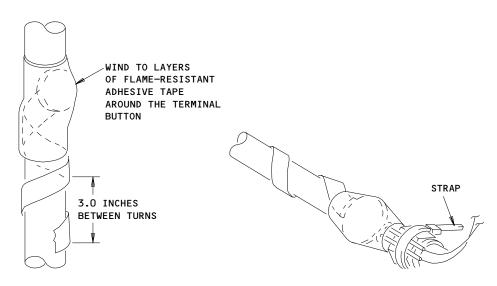
(3) Cut the ribbon heater electrical leads (SWPM 20-30-12).

<u>NOTE</u>: Let the cut electrical leads stay where they are. This will help you to find the splice. Remove them when you make a splice with the new leads.

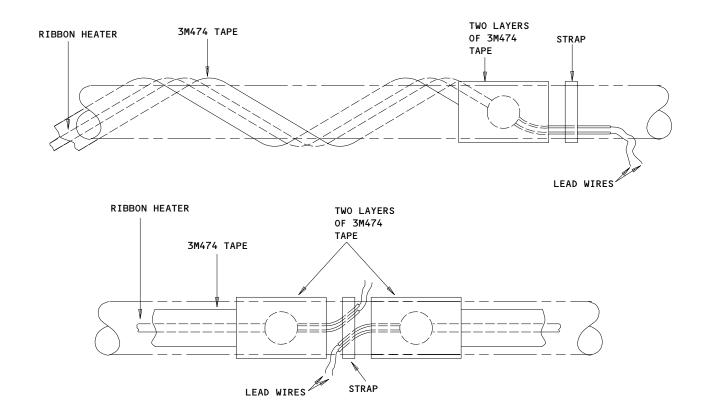
EFFECTIVITY-

30-71-01

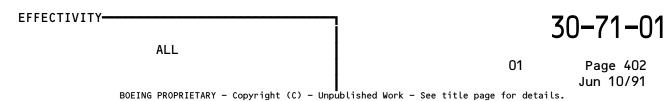




## RIBBON HEATER INSTALLATION (EXAMPLE)



Ribbon Heater Installation Figure 401





s 034-005

(4) Remove the tape which holds the heater to the water or drain line.

s 024-012

(5) Remove the ribbon heater from the water or drain line.

TASK 30-71-01-404-006

- 3. Ribbon Heater Installation (Fig. 401)
  - A. Consumable Materials
    - (1) G00646, Strap Tie Down
    - (2) G00134 Tape Adhesive, Flame-Resistant, 1.5-inch wide
  - B. References
    - (1) 30-71-00/501, Water Line and Waste Drain Heaters
    - (2) IPC 30-71-01 Fig. 2
    - (3) SSM 30-71-01
    - (4) SWPM 20-30-12
    - (5) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14
  - C. Access
    - (1) Location Zone

125 thru 152 Lower Lobe (Refer to WDM for heater locations)

D. Procedure

S 424-007

<u>CAUTION</u>: INCORRECT INSTALLATION OF RIBBON HEATERS AND INSULATION CAN CAUSE HEATER FAILURE OR DAMAGE.

DO NOT LET RIBBON HEATERS HAVE AN OVERLAP.

DO NOT INSTALL CLAMPS OR STRAPS FROM PLUMBING INSTALLATIONS OVER RIBBON HEATERS.

SUPPLY 1.0 INCH MINIMUM CLEARANCE BETWEEN THE RIBBON HEATERS AND THE INSULATION. DO NOT INSTALL INSULATION BLANKETS OVER RIBBON HEATERS.

ATTACH RIBBON HEATER TERMINAL BUTTONS WITH TWO LOOPS OF FLAME-RESISTANT ADHESIVE TAPE.

ATTACH ELECTRICAL LEAD WIRES WITH A STRAP.

IF THE HEATER IS TOO LONG, INCREASE THE NUMBER OF WRAPS, BUT DO NOT LET THE HEATERS HAVE AN OVERLAP.

- (1) Install the ribbon heater:
  - (a) Put the ribbon heater in position on the water or drain line.

EFFECTIVITY-

30-71-01

ALL



- (b) Attach one end of the heater with two loops of tape (Fig. 401).
- (c) Make wraps of the heater around the water or drain line with 3.0 inches between subsequent wraps.
- (d) Put tape continuously along the length of the heater. Attach the end with 2 wraps of flame resistant adhesive tape.
- (e) Find the splice area and make a splice of the electrical leads (SWPM 20-30-12).
- (f) Attach the lead wires with a strap.

## s 864-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P414 Left Power Distribution Center
    - 1) 414A24 WASTE AND WATER LINE HTR MN PWR
    - 2) 414D5 WASTE AND WATER LINE HTR MN PWR
    - 3) 414L22 DRAIN MAST HTR AIR FWD
    - 4) 414L23 DRAIN MAST HTR AIR CTR
    - 5) 414L24 DRAIN MAST HTR AIR AFT
    - 6) 414C21 DRAIN MAST HTRS GND SVCE MODE

## s 714-009

(3) Do a test of the ribbon heater operation (Ref 30-71-00/501).

#### s 414-011

(4) Install the floor or sidewall panels which you removed for access.

## s 864-010

(5) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY-

30-71-01



## HEATED SUPPLY HOSE - REMOVAL/INSTALLATION

## 1. General

- A. This subject has two tasks, one for the removal and one for the installation of the heated supply hose which supplies potable water. In this procedure, you will get access to the hose, cut the electrical leads, remove the hose, and make a splice to install the replacement hose.
- B. The removal and installation procedures for all heated supply hoses are the same.

TASK 30-71-02-004-001

- 2. <u>Heated Supply Hose Removal</u>
  - A. References
    - (1) 38-15-00/201, Water System Pressurization
    - (2) SSM 30-71-01
    - (3) SWPM 20-30-12
    - (4) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14
  - B. Access
    - (1) Location Zone

125 thru 152 Lower Lobe (Refer to WDM for heater locations)

C. Procedure

s 864-002

(1) Open 414A24 WASTE & WATER LINE HTR MN PWR and 414D5 WASTE & WATER LINE HTR MN PWR circuit breakers on the P414 Left Power Distribution Center.

s 844-003

(2) Do this task: "Depressurize Water System" (Ref 38-15-00/201).

s 014-004

(3) Get access to the applicable heated supply hose.

s 034-016

(4) Cut the electrical leads on the heated supply hose (SWPM 20-30-12).

NOTE: Let the cut electrical leads stay where they are. This will help you to find the splice. Remove them when you make a splice with the new leads.

s 034-006

(5) Release the clamps along the length of the heated supply hose.

s 024-007

(6) Remove the heated supply hose.

EFFECTIVITY-

30-71-02

ALL



TASK 30-71-02-404-008

- 3. <u>Heated Supply Hose Installation</u>
  - A. References
    - (1) 24-22-00/201, Manual Control
    - (2) 30-71-00/501, Water Line and Waste Drain Heaters
    - (3) 38-15-00/201, Water System Pressurization
    - (4) IPC 30-71-02 Fig. 1
    - (5) SSM 30-71-01
    - (6) SWPM 20-30-12
    - (7) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14
  - B. Access
    - (1) Location Zone

125 thru 152 Lower Lobe (Refer to WDM for heater locations)

- C. Procedure
  - s 424-009
  - (1) Install the heated supply hose with its clamps.
    - s 434-017
  - (2) Find the splice area and make a splice of the electrical leads (SWPM 20-30-12).
    - s 864-011
  - (3) Close 414A24 WASTE & WATER LINE HTR MN PWR and 414D5 WASTE & WATER LINE HTR MN PWR circuit breakers on the P414 Left Power Distribution Center.
    - s 864-012
  - (4) Do this task: "Pressurize Water System" (Ref 38-15-00/201).
    - s 714-013
  - (5) Do a test of the heated supply hose (Ref 30-71-00/501).
    - s 864-014
  - (6) Remove electrical power (Ref 24-22-00/201).
    - s 414-015

ALL

(7) Reinstall the floor panel, sidewall panel, or cargo liner.

EFFECTIVITY-

30-71-02

**†** 



## WASTE TANK RINSE FITTING HEATERS - REMOVAL/INSTALLATION

## 1. General

- A. There are heaters at the waste tank rinse fittings which prevent ice inside the lines. The heaters are located on the rinse line tubing nuts, inside the fuselage at the waste service panel.
- B. This subject has two tasks, one for the removal and one for the installation of the rinse fitting heater. In this procedure, you will get access to the heater, cut the electrical leads, remove the heater, and install a replacement unit. The procedure is the same for each of the four heaters.

TASK 30-71-03-004-001

- 2. Waste Tank Rinse Fitting Heater Removal (Fig. 401)
  - A. References
    - (1) SSM 30-71-01
    - (2) SWPM 20-30-12
    - (3) WDM 30-71-14
  - B. Access
    - (1) Location Zone

147, 148 Area below Bulk Cargo Compartment - Waste Tank Service Panel

#### C. Procedure

s 864-002

- (1) Open this circuit breaker:
  - (a) P414 Left Power Distribution Center
    - 1) 414L25 GSKT & TANK HTRS

s 014-003

(2) Remove the bulk cargo compartment floor panel at STA 2010, BL 0 to get access to the waste tank service panel from above.

s 034-004

(3) Cut the electrical leads near the rinse fitting heater (SWPM 20-30-12).

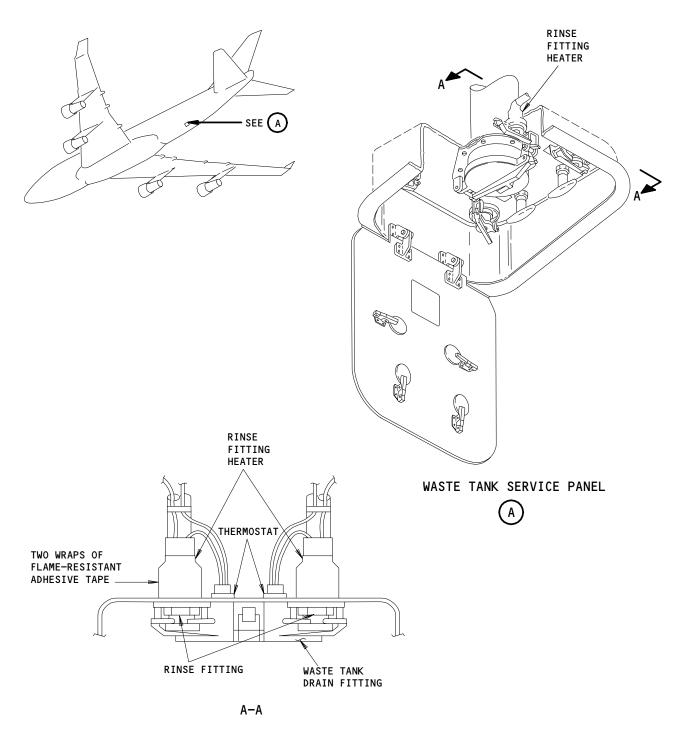
NOTE: You can let the electrical leads stay until you install the the replacement heater. This will make it easier for you to find the wires.

EFFECTIVITY-

30-71-03

ALL





NOTE: THERE ARE 4 RINSE FITTING HEATERS AT THE WASTE TANK SERVICE PANEL.

# Waste Tank Rinse Fitting Heaters Installation Figure 401

ALL

O1 Page 402
Jun 10/91

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



s 034-005

(4) Remove the thermostat from the surface of the pan.

s 034-006

(5) Remove the tie-down strap to move the electrical leads away from the rinse line.

s 034-007

(6) Remove the adhesive tape from the rinse fitting heater.

s 024-008

(7) Remove the rinse fitting heater.

TASK 30-71-03-404-009

- 3. Waste Tank Rinse Fitting Heater Installation (Fig. 401)
  - A. Consumable Materials
    - (1) A00028 Adhesive BAC 5010 Type 70
    - (2) B00148 Solvent Methyl Ethyl Ketone (MEK), TT-M-261
    - (3) G00000 Strap, Tie-Down
    - (4) GOO134 Tape Adhesive, Flame Resistant 1.5-inch wide
  - B. References
    - (1) 24-22-00/201, Manual Control
    - (2) IPC 38-32-00 Fig. 3
    - (3) SSM 30-71-01
    - (4) SWPM 20-30-12 (Standard Wiring Practices)
    - (5) WDM 30-71-14
  - C. Access
    - (1) Location Zone

147, 148 Area below Bulk Cargo Compartment - Waste Tank Service Panel

D. Installation Procedure

s 424-010

CAUTION: DO NOT BEND THE HEATER MORE THAN NECESSARY TO INSTALL IT ON THE RINSE LINE. YOU CAN CAUSE DAMAGE TO THE HEATER IF YOU BEND IT TOO MUCH.

(1) Carefully open the rinse fitting heater and install it on the rinse line.

s 434-011

(2) Attach the heater with two wraps of flame-resistant adhesive tape.

NOTE: Do not apply tape over the electrical leads.

EFFECTIVITY-

30-71-03

ALL



s 114-021

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. SOLVENTS MAY BE FLAMMABLE OR HARMFUL TO THE ENVIRONMENT. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

(3) Clean the mating surface with solvent, Series 89 (AMM 20-30-89).

s 344-013

(4) Bond the thermostat to the pan surface with adhesive.

NOTE: Do not install the thermostat on rivet heads. Make sure that all of the the thermostat surface touches the pan surface.

S 034-022

(5) Remove the old electrical leads from the splice.

S 434-014

(6) Make a splice of the new electrical leads (SWPM 20-30-12).

s 434-015

- (7) Attach the leads to the rinse line with a tie-down strap.
- E. Rinse Fitting Heater Test

S 864-016

- (1) Close this circuit breaker:
  - (a) P414 Left Power Distribution Center
    - 1) 414L25 GSKT & TANK HTRS

s 864-017

(2) Supply electrical power (Ref 24-22-00/201).

S 284-018

(3) Touch the rinse fitting heater to make sure that it becomes warm.

s 864-019

(4) Remove electrical power (Ref 24-22-00/201).

s 414-020

(5) Install the floor panel in the bulk cargo compartment.

EFFECTIVITY-

30-71-03

ALL



## WASTE TANK DRAIN HEATER BLANKET - REMOVAL/INSTALLATION

## 1. General

A. This subject has two tasks, one for the removal and one for the installation of the blanket heaters at the waste tank drain tubes. In this procedure, you will get access to the heater, remove the heater, install a replacement unit, and do a check of heater operation.

TASK 30-71-04-004-011

- 2. Waste Tank Drain Blanket Heater Removal (Fig. 401)
  - A. References
    - (1) SSM 30-71-04
    - (2) SWPM 20-30-12
    - (3) WDM 30-71-16
  - B. Access
    - (1) Location Zone

147, 148 Area below Bulk Cargo Compartment Waste Tank Service Panel

C. Procedure

S 864-001

- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P84 Aft Center Miscellaneous Circuit Breaker Panel
    - 1) LEFT WASTE TANK HEATERS
    - 2) RIGHT WASTE TANK HEATERS

s 014-002

(2) Remove the bulk cargo compartment floor panels to get access to the applicable blanket heater.

s 034-003

(3) Cut the blanket heater electrical leads (SWPM 20-30-12).

NOTE: Let the cut electrical leads stay where they are. This will help you to find the splice. Remove them when you make a splice with the new leads.

s 034-004

(4) Loosen the velcro which holds the blanket heater tight on the applicable drain tube or drain valve.

s 024-005

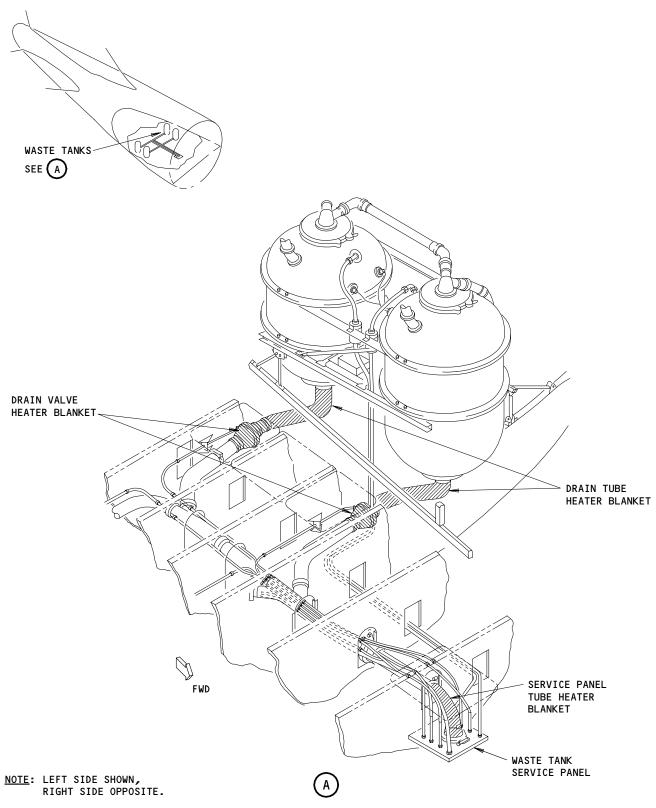
(5) Remove the blanket heater from the drain tube or the drain valve.

EFFECTIVITY-

30-71-04

ALL





Waste Tank Drain Heater Blanket Installation Figure 401

ALL

O2 Page 402

Jun 10/91

BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



TASK 30-71-04-404-012

- 3. <u>Waste Tank Drain Blanket Heater Installation</u> (Fig. 401)
  - A. References
    - (1) AMM 24-22-00/201, Manual Control
    - (2) AMM 30-71-00/501, Water and Drain Line Heaters
    - (3) IPC 30-71-01 Fig. 1
    - (4) SSM 30-71-04
    - (5) SWPM 20-30-12 (Standard Wiring Practices)
    - (6) WDM 30-71-16
  - B. Access
    - (1) Location Zone

147,148 Area below Bulk Cargo Compartment Waste Tank Service Panel

C. Procedure

s 424-006

(1) Install the heater blanket around the applicable drain tube or drain valve.

s 434-007

(2) Make the heater blanket tight around the drain tube or drain valve with the attached velcro.

NOTE: The heater blanket installed on the drain valve must permit the valve handle to operate freely.

s 034-008

(3) Make a splice of the electrical leads (SWPM 20-30-12).

s 864-009

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P84 Aft Center Miscellaneous Circuit Breaker Panel
    - 1) LEFT WASTE TANK HEATERS
    - 2) RIGHT WASTE TANK HEATERS

s 714-014

- (5) Do a test of the heater blanket.
  - (a) Supply electrical power (AMM 24-22-00/201).

EFFECTIVITY-

30-71-04

ALL



- (b) Do a test of the heater blanket for the waste tank drain (AMM 30-71-00/501).
- (c) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

EFFECTIVITY-

ALL

30-71-04

02

Page 404 Feb 10/95



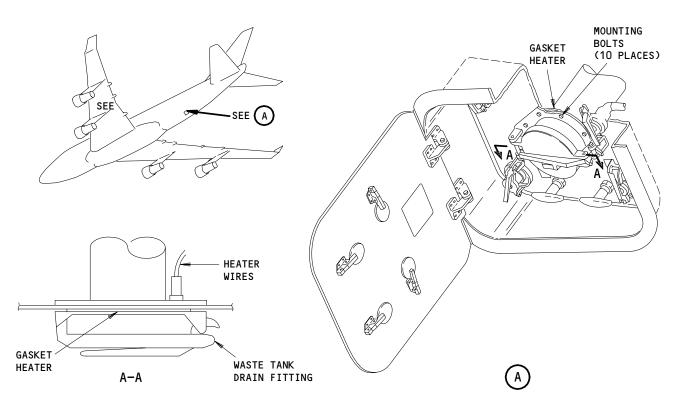
## WASTE TANK DRAIN FITTING GASKET HEATER - REMOVAL/INSTALLATION

## 1. <u>General</u>

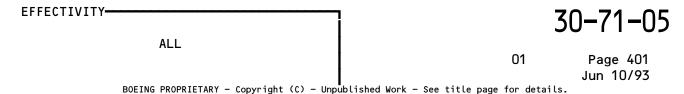
A. This subject has two tasks, one for the removal and one for the installation of the waste tank drain fitting gasket heater. In this procedure, you will remove the drain cap, cut the gasket heater wires, remove the heater, and install a replacement unit.

TASK 30-71-05-004-001

- 2. Waste Tank Drain Fitting Gasket Heater Removal (Fig. 401)
  - A. References
    - (1) IPC 38-32-00 Fig. 1
    - (2) SSM 30-71-01



Waste Tank Drain Fitting Gasket Heater Installation Figure 401





- (3) SWPM 20-30-12
- (4) WDM 30-71-14
- В. Access
  - (1) Location Zone

147, 148

Area below Bulk Cargo Compartment - Waste Tank Service Panel

(2) Access Panel

147AL Aft Lavatory Service Door

C. Procedure

s 614-002

Make sure that the waste tanks and the waste drain are clean and empty.

S 864-003

(2) Open 414L25 GSKT & TANK DRAIN HTRS circuit breaker on the P414 Left Power Distribution Center.

s 014-004

Remove the floor panel at STA 2010, BL 0 in the bulk cargo compartment to get access to the area above the waste tank service panel.

s 034-005

(4) Remove the clamp which attaches the drain cap assembly to the waste tank drain tube.

s 014-006

(5) Open the aft lavatory service panel door 147AL.

s 014-007

Release the waste tank drain cap to get access to all mounting bolts.

s 024-008

- Remove the gasket heater:
  - (a) Remove the 8 mounting bolts.
  - (b) Remove the waste tank drain cap assembly.
  - (c) Cut the electrical lead wires at the heating gasket (SWPM 20-30-12).

NOTE: Let the cut electrical leads stay where they are. This will help you to find the splice. Remove them when you make a splice with the new leads.

(d) Remove the heating gasket.

EFFECTIVITY-

30-71-05

ALL



TASK 30-71-05-404-009

- Waste Tank Drain Gasket Heater Installation (Fig. 401)
  - A. Consumable Materials
    - (1) A00247 Sealant BMS 5-95
    - (2) B00148 Solvent Methyl Ethyl Ketone (MEK), TT-M-261
  - B. References
    - (1) 24-22-00/201 Manual Control
    - (2) IPC 38-32-00 Fig. 1
    - (3) SSM 30-71-01
    - (4) SWPM 20-30-12
    - (5) WDM 30-71-14
  - C. Access
    - (1) Location Zone

147, 148 Area below Bulk Cargo Compartment - Waste Tank Service Panel

(2) Access Panel

147AL Aft Lavatory Service Door

D. Installation Procedure

s 424-010

(1) Put the heating gasket in position and make sure that no part of the lead wires stay out.

s 114-023

WARNING: DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. SOLVENTS MAY BE FLAMMABLE OR HARMFUL TO THE ENVIRONMENT. REFER TO PRODUCT MATERIALS SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

(2) Clean the mounting bolts with solvent, Series 82 (AMM 20-30-82).

s 624-012

(3) Put the bolts momentarily in sealant immediately before installation.

s 424-013

(4) Install the drain cap assembly and heating gasket with the mounting bolts.

s 434-014

(5) Install the clamp which attaches the drain cap assembly to the waste tank drain tube.

EFFECTIVITY-

30-71-05

ALL



s 434-016

- (6) Find the splice area and make a splice of the electrical leads (SWPM 20-30-12).
- E. Gasket Heater Test

s 864-017

(1) Close 414L25 GSKT & TANK DRAIN HTRS circuit breaker on the P414 Left Power Distribution Center.

s 864-018

(2) Supply electrical power (Ref 24-22-00/201).

s 284-019

(3) Feel the gasket heater to make sure that it becomes warm.

s 864-020

(4) Remove electrical power (Ref 24-22-00/201).

s 414-021

(5) Close and latch the waste tank drain cap and close waste tank service panel door.

S 414-022

(6) Install the bulk cargo compartment floor panel.

EFFECTIVITY-

30-71-05

ALL



## THERMOSTATS - REMOVAL/INSTALLATION

## 1. General

- A. This subect has two tasks, one for the removal and one for the installation of the water and drain line heater thermostats. In this procedure, you will get access to the thermostat, cut the electrical leads, remove the thermostat, make a splice in a replacement unit, and do a check of the thermostat operation.
- B. The removal and installation is the same for all thermostats.

TASK 30-71-06-004-001

- 2. Thermostat Removal
  - A. References
    - (1) SSM 30-71-01
    - (2) SWPM 20-30-12
    - (3) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14
  - B. Access
    - (1) Location Zone

125 thru 152 Lower Lobe (Refer to WDM for thermostat locations)

C. Procedure

s 864-002

- (1) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P414 Left Power Distribution Center
    - 1) 414A24 WASTE & WATER LINE HTR MN PWR
    - 2) 414D5 WASTE & WATER LINE HTR MN PWR

s 014-003

(2) Get access to the thermostat.

s 034-004

(3) Cut the electrical leads of the thermostat (SWPM 20-30-12).

<u>NOTE</u>: Let the cut electrical leads stay where they are. This will help you to find the splice. Remove them when you make a splice with the new leads.

s 034-005

(4) Remove the locknut.

ALL

EFFECTIVITY-

30-71-06

•



s 024-006

(5) Remove the thermostat.

TASK 30-71-06-404-007

- 3. Thermostat Installation
  - A. References
    - (1) IPC 30-71-06 Fig. 1
    - (2) 30-71-00/501, Water Line and Waste Drain Heaters
    - (3) SSM 30-71-01
    - (4) SWPM 20-30-12
    - (5) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14
  - B. Access
    - (1) Location Zone

125 thru 152 Lower Lobe (Refer to WDM for thermostat locations)

C. Procedure

s 424-008

(1) Hold the thermostat in its position and install the locknut.

s 434-009

(2) Find the splice area and make a splice of the electrical leads (SWPM 20-30-12).

s 864-011

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P414 Left Power Distribution Center
    - 1) 414A24 WASTE & WATER LINE HTR MN PWR
    - 2) 414D5 WASTE & WATER LINE HTR MN PWR

s 714-012

(4) Do a test of the heater which the thermostat controls (Ref 30-71-00/501).

s 414-013

ALL

(5) Install the floor panels which you removed for access.

EFFECTIVITY-

30-71-06



## IN-LINE HEATERS - REMOVAL/INSTALLATION

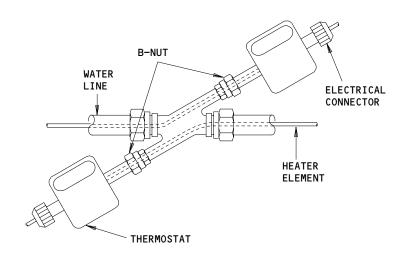
## 1. General

- A. This subject has two tasks, one for the removal and one for the installation of the in-line water supply line heaters. In this procedure, you will get access to the heater, loosen and remove the heater, and install a replacement unit.
- B. It is necessary to drain the potable water system before you replace an in-line heater.

TASK 30-71-07-004-001

- 2. <u>In-Line Heater Removal</u> (Fig. 401)
  - A. References
    - (1) AMM 12-14-01/301, Water System Servicing
    - (2) AMM 25-52-01/401, Containerized Cargo Compartment Ceiling and Sidewall Lining
    - (3) SSM 30-71-01
    - (4) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14
  - B. Access
    - (1) Location Zone

125 thru 152 Lower Lobe (Refer to WDM for heater locations)



## EXAMPLE IN-LINE HEATER INSTALLATION

In-Line Heater Installation Figure 401

30-71-07

01

Page 401 Feb 18/00



#### C. Procedure

s 864-002

- (1) Open these circuit breakers:
  - (a) P414 Left Power Distribution Center
    - 1) 414A24 WASTE & WATER LINE HTR MN PWR
    - 2) 414D5 WASTE & WATER LINE HTR MN PWR

s 684-003

(2) Do this task: "Water System Servicing (Drain)" (AMM 12-14-01/301).

NOTE: Make sure that you release the pressure in the water system.

s 014-004

(3) Remove the cargo liners or floor panels as necessary to access the in-line heater (AMM 25-52-01/401).

s 034-005

(4) Disconnect the electrical connector from the in-line heater.

s 034-006

(5) Loosen the B-nut on the in-line heater.

s 024-007

(6) Pull the in-line heater out of the water line.

TASK 30-71-07-404-008

3. <u>In-Line Heater Installation</u> (Fig. 401)

ALL

- A. References
  - (1) AMM 12-14-01/301, Water System Servicing
  - (2) AMM 24-22-00/201, Manual Control
  - (3) AMM 25-52-01/401, Containerized Cargo Compartment Ceiling and Sidewall Lining
  - (4) AMM 30-71-00/501, Water Line and Waste Drain Heaters

EFFECTIVITY-

30-71-07



- (5) AMM 38-10-00/201, Potable Water System
- (6) AMM 38-15-00/201, Water System Pressurization
- (7) IPC 30-71-07 Fig. 1
- (8) SSM 30-71-01, 30-71-02, 30-71-03
- (9) WDM 30-71-11, 30-71-12, 30-71-13, 30-71-14, 30-71-15
- B. Access
  - (1) Location Zone

125 thru 152 Lower Lobe (Refer to WDM for heater locations)

- C. Procedure
  - s 424-009
  - (1) Put the in-line heater into the water line.
    - s 434-010
  - (2) Tighten the B-nut.
    - s 434-011
  - (3) Install the electrical connector.
    - s 614-004
  - (4) Do this task: "Water System Servicing (Fill)" (AMM 12-14-01/301).
    - s 864-012
  - (5) Supply electrical power (AMM 24-22-00/201).
    - s 864-013
  - (6) Do this task: "Pressurize Water System" (AMM 38-15-00/201).
    - s 794-005
  - (7) Make sure that there are no leaks in the water lines that you opened.
    - s 864-017
  - (8) Close these circuit breakers:
    - (a) P414 Left Power Distribution Center
      - 1) 414A24 WASTE & WATER LINE HTR MN PWR
      - 2) 414D5 WASTE & WATER LINE HTR MN PWR

EFFECTIVITY-

30-71-07



s 714-014

(9) Do a test of the in-line heater (AMM 30-71-00/501).

s 414-015

(10) Install the cargo liners or floor panels which you removed (AMM 25-52-01/401).

s 114-006

(11) Do this task: "Potable Water System Cleaning (with Disinfectant)" (AMM 38-10-00/201).

s 864-016

(12) Remove electrical power (AMM 24-22-00/201).

EFFECTIVITY-

30-71-07

ALL



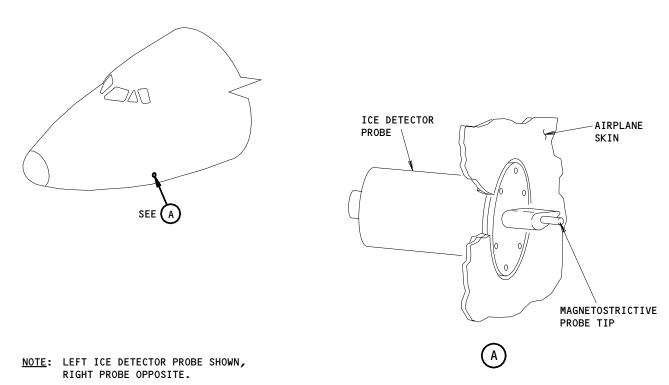
## ICE DETECTION SYSTEM - DESCRIPTION AND OPERATION

## 1. General (Fig. 1)

A. Two independent ice detection systems provide flight deck indication of icing conditions and automatic activation of wing and engine inlet thermal anti-ice systems. Components used by the ice detection systems are the two ice detector probes, the wing and nacelle anti-ice control switches on the anti-ice/rain removal module, and the EIU's and EICAS display. The left ice detection system is powered by 115 volts ac from the 115 vac bus 1 and the right system from the 115 vac bus 3.

## 2. Ice Detector Probe

- A. The ice detector probes are located on the lower front part of the fuselage just aft and below the pitot static probes.
- B. The ice detector probe contains a magnetostrictive sensing element, a heater, and control cards. The sensing element is part of an electromechanical resonant circuit which oscillates at approximately 40 kHz. Ice buildup on the outer end of the sensing element lowers the resonant frequency by increasing the effective weight of the element. After a specific amount of ice has accumulated, the heater is activated to melt the ice and return the resonant frequency to its initial value.
- C. If the heater cannot melt the ice after 25 seconds, or if the internal temperature of the ice detector exceeds 300° F, the heater and the detector outputs are automatically deactivated.



Ice Detection System - Component Location
Figure 1

ALL

08 Page 1
Feb 10/94

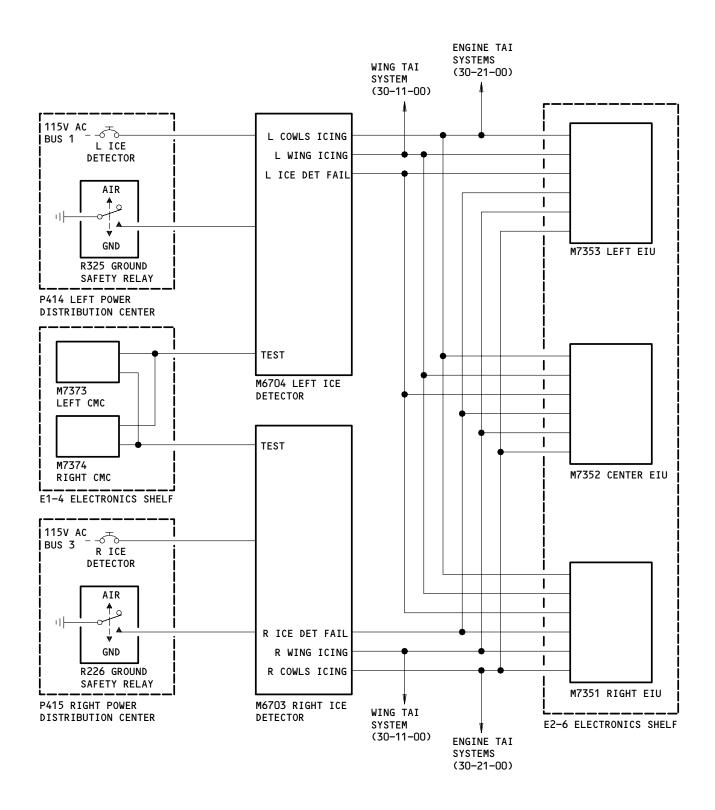
BOEING PROPRIETARY - Copyright (C) - Unpublished Work - See title page for details.



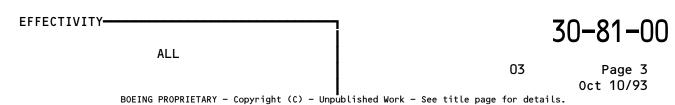
- D. Each ice detector provides an output to activate the corresponding left or right side engine anti-ice systems, and a separate output to activate the wing anti-ice system at a different level of ice buildup than the engine systems. Computations for identifying icing conditions and for activating anti-ice systems are performed in the ice detector.
- 3. Anti-Ice/Rain Removal Module
  - A. The anti-ice/rain removal module is located on the P5 pilots' overhead panel (Ref 30-11-00, 30-21-00). The module includes four NACELLE ANTI-ICE switches and one WING ANTI-ICE switch. Each switch has 3 positions to place the corresponding anti-ice system on, off, or in automatic mode under control of the ice detection system.
- 4. Operation (Fig. 2)
  - A. Functional Description
    - (1) As ice builds up on the ice detector sensor element during flight, the resonant frequency of the sensing element decreases. When a 0.02 ±0.005 inch ice layer accumulates, the heater turns on to melt the ice. When the resonant frequency returns to its initial value, the heater turns off, normally 7-8 seconds after it turns on. This process is repeated as long as icing conditions exist. The ice detector keeps count of the number of icing/de-icing cycles of the sensor element.
    - (2) When 2 consecutive probe icing/de-icing cycles are counted, the detector outputs a signal to activate the engine anti-ice system for 180 ±10 seconds. If an additional icing/de-icing cycle occurs during this time interval, the 180-second engine anti-ice activation period is begun again.
      - (a) If it takes more than 15 seconds to melt the ice on the first icing/de-icing cycle, the ice detector will activate the engine anti-ice system for 180 ±10 seconds without waiting for a second cycle.
    - (3) When 10 consecutive probe icing/de-icing cycles are counted, the detector outputs a signal to activate the wing anti-ice system for 180 ±10 seconds. If an additional icing/de-icing cycle occurs during this time interval, the 180-second wing anti-ice activation period is begun again.
    - (4) If the wing anti-ice control switch has been placed in the OFF position, or a wing anti-ice valve does not open for any other reason, the EICAS advisory message >ICING WING is displayed when the ice detector tries to activate the wing anti-ice system.
    - (5) If any nacelle anti-ice control switch has been placed in the OFF position, or an engine anti-ice control valve does not open for any reason, the EICAS caution message >ICING NAC is displayed when the ice detector tries to activate that engine inlet anti-ice system.
    - (6) If any wing or nacelle anti-ice control switch has been placed in the ON position, the corresponding EICAS advisory message >ANTI-ICE WING or >ANTI-ICE NAC is displayed when total air temperature exceeds 54° F (12° C). If an ice detector probe fails, the EICAS status message ICE DETECTOR L or ICE DETECTOR R is displayed. If both ice detector probes fail, the EICAS advisory message >ICE DETECTORS is also displayed.

30-81-00





Ice Detection System Schematic Figure 2





(7) When the airplane is on the ground, the icing/de-icing cycle count is also held at zero so that there is no automatic activation of anti-ice systems. However, the ice detector heater is still enabled on the ground. A ground test of the ice detection system may be performed with the CMCS.

#### B. Control

- (1) To activate the ice detection system, place the WING ANTI-ICE and NACELLE ANTI-ICE switches on the anti-ice-rain removal module in the AUTO position. When the airplane is in the air, the wing and nacelle TAI systems will be automatically activated when icing conditions are detected.
- (2) Flight deck indication of icing conditions is performed automatically by the ice detection system.

 30-81-00



## ICE DETECTION SYSTEM

	COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
I	CIRCUIT BREAKER - L ICE DETECTOR, C10395  CIRCUIT BREAKER - R ICE DETECTOR, C10396  COMPUTER - (FIM 45-10-00/101) L CENTRAL MAINTENANCE, M7373 R CENTRAL MAINTENANCE, M7374  PROBE - L ICE DETECTOR, M6704  PROBE - R ICE DETECTOR, M6703  RELAY - (FIM 31-01-36/101) AIR/GROUND, R325  RELAY - (FIM 31-01-39/101) AIR/GROUND, R226  UNIT - (FIM 31-61-00/101) C EFIS/EICAS INTERFACE, M7353 R EFIS/EICAS INTERFACE, M7351	1 1 1	1 1 1 1 1	117AL, MAIN EQUIP CTR, P414 414L10 117AL, MAIN EQUIP CTR, P414 415L33  L SIDE FWD FUSELAGE R SIDE FWD FUSELAGE	* * 30-81-01 30-81-01

<sup>\*</sup> SEE THE WDM EQUIPMENT LIST

Ice Detection System - Component Index Figure 101

EFFECTIVITY-

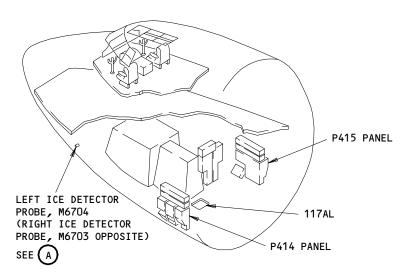
30-81-00

ALL

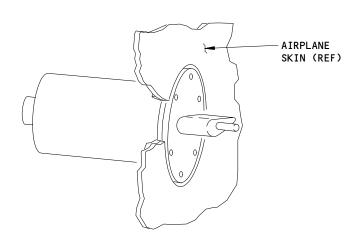
01.1

Page 101 0ct 18/00





MAIN EQUIPMENT CENTER



LEFT (RIGHT) ICE DETECTOR PROBE, M6704 (M6703)



Ice Detection System - Component Location Figure 102

EFFECTIVITY-ALL

30-81-00

01

Page 102 Oct 10/94



## ICE DETECTION SYSTEM - ADJUSTMENT/TEST

#### 1. General

- A. This procedure contains two tasks. The first task is a ground test of the ice detection system. You will use the CMCS to do the ground test.
- B. The second task is an operational test of the ice detection system. In the operational test, you will first do the ground test with the CMCS. Then you will apply pressure to the tip of the ice detector probe to supply a signal equivalent to ice on the tip.
- C. There is no adjustment for the ice detection system.

TASK 30-81-00-715-001

- 2. Ground Test Ice Detection System
  - A. General
    - (1) This ground test does a check of the ice detector operation.
    - (2) This ground test does not do a check of the wing thermal anti-ice system or the engine inlet thermal anti-ice system.
  - B. References
    - (1) 24-22-00/201, Manual Control
  - C. Access
    - (1) Location Zone

221, 222 Control Cabin

D. Preconditions

s 865-052

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).
  - (b) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- E. Prepare for the Test

s 865-002

(1) Supply electrical power (Ref 24-22-00/201).

s 865-006

(2) Set the WING ANTI-ICE switch and the NACELLE ANTI-ICE 1, 2, 3, and 4 switches on the anti-ice/rain removal module (P5 panel) to OFF.

s 865-039

(3) Set the GND TEST switch on the P461 overhead maintenance panel to ENABLE.

s 865-040

ALL

- (4) Prepare the CDU for the test:
  - (a) Push the MENU key on the CDU to show the MENU.
  - (b) Push the line-select key (LSK) that is adjacent to <CMC to show the CMC MENU.

EFFECTIVITY-

30-81-00

**†** 



- (c) If <RETURN shows after you push the LSK, push the LSK that is adjacent to <RETURN until you see the CMC MENU.
- (d) Push the LSK that is adjacent to <GROUND TESTS to show the GROUND TESTS menu.
- (e) Push the NEXT PAGE key until you find <30 ICE AND RAIN.
- (f) Push the LSK that is adjacent to <30 ICE AND RAIN to show the GROUND TESTS menu for the ice and rain system.

NOTE: If INHIBITED shows above <ICE DETECTOR-L or <ICE DETECTOR-R, the test will not operate.

- (g) If INHIBITED shows above <ICE DETECTOR-L or <ICE DETECTOR-R:
  - 1) Push the LSK that is adjacent to the test prompt.
  - Do the steps which show on the CDU (push the NEXT PAGE key to see subsequent pages).
  - 3) Push the LSK that is adjacent to <RETURN to show the ground test menu again.
- F. Ice Detection System Ground Test

s 745-043

(1) Push the LSK that is adjacent to the applicable prompt, <ICE DETECTOR-L or <ICE DETECTOR-R.</p>

NOTE: IN PROGRESS will show during the test.

s 745-045

(2) When IN PROGRESS goes out of view, look for PASS or FAIL> adjacent to <ICE DETECTOR-L or <ICE DETECTOR-R.

<u>NOTE</u>: If a PASS indication shows, no failures occurred during the test.

- (a) If FAIL> shows:
  - Push the LSK that is adjacent to FAIL> to see the GROUND TEST MSG pages for the failure.

EFFECTIVITY-

30-81-00

80

ALL



- Push the NEXT PAGE key until you find all the GROUND TEST MSG pages.
- 3) Make a list of all CMCS messages, CMCS message numbers, and ATA numbers that show on the GROUND TEST MSG pages.
- 4) Go to the CMCS Message Index of the Fault Isolation Manual (FIM) to find the corrective action for each CMCS message.
- G. Put the Airplane in Its Usual Condition

S 865-041

(1) Set the GND TEST switch to NORM.

s 865-038

(2) Remove electrical power (Ref 24-22-00/201).

TASK 30-81-00-715-050

## 3. Operational Test - Ice Detection System

- A. General
  - (1) In this task you will apply pressure to the tip of the ice detector probe to supply a signal equivalent to ice on the tip.
  - (2) If you want to do the CMC ground test of the ice detection system again after this operational test, you must let the ice detector cool for approximately 5 minutes after the operational test.
- B. Standard Tools and Equipment
  - (1) Glove Heat Resistant
- C. References
  - (1) 24-22-00/201, Manual Control
  - (2) 32-09-02/201, Air/Ground Relay System
- D. Access
  - (1) Location Zone
    - 221 Control Cabin, LH
    - 222 Control Cabin, RH
    - 115 Area between Nose Gear Well and Fuselage, LH
    - 116 Area between Nose Gear Well and Fuselage, RH
- E. Preconditions

S 865-053

- (1) These conditions are necessary for this task:
  - (a) Electrical power on (AMM 24-22-00/201).

EFFECTIVITY-

30-81-00



- (b) Wing anti-ice system is serviceable (AMM 30-11-00/501).
- (c) Engine anti-ice system is serviceable (AMM 30-21-00/501).
- (d) Integrated Display System (IDS) is serviceable (AMM 31-61-00/501).
- (e) Air/ground relay system is serviceable (AMM 32-09-02/201).
- F. Procedure

NOTE: The engines must not be in operation during this test.

s 865-037

(1) Supply electrical power (Ref 24-22-00/201).

s 745-047

(2) Do this task for the left ice detector probe: Ground Test - Ice Detection System.

s 745-048

(3) Do this task for the right ice detector probe: Ground Test - Ice Detection System.

s 285-036

(4) Hold your hand adjacent to each ice detector probe to make sure that it is not hot.

s 865-034

(5) Set the WING ANTI-ICE switch and the NACELLE ANTI-ICE 1, 2, 3, and 4 switches on the anti-ice/rain removal module (P5 panel) to OFF.

s 045-031

WARNING: YOU MUST CAREFULLY DO THE STEPS IN THE TASK BELOW TO PREPARE THE SAFETY—SENSITIVE SYSTEMS FOR THE AIR MODE. FAILURE TO DO THE STEPS CORRECTLY CAN CAUSE THE AUTOMATIC OPERATION OF AIRPLANE SYSTEMS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Do this task: "Prepare Safety-Sensitive Systems for Air Mode Simulation" (AMM 32-09-02/201).

NOTE: The EICAS advisory message ICE DETECTOR and status messages ICE DETECTOR L and ICE DETECTOR R will show when the airplane is in the air mode.

S 865-023

- (7) Open these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7F23 LANDING GEAR DSP & CONT ALTN
    - 2) 7H8 GND SAFETY RELAY

EFFECTIVITY-

30-81-00

ALL



s 715-024

(8) Do a check of the control of the engine anti-ice systems by the left ice detector:

NOTE: Use a wet cloth or a piece of ice to cool the probe strut (not the probe tip) while you do this test. This helps to increase the life of the probe.

WARNING: YOU MUST USE A HEAT-RESISTANT GLOVE WHEN YOU OPERATE THE ICE DETECTOR. THE ICE DETECTOR QUICKLY BECOMES VERY HOT AND CAN BURN YOU.

- (a) Put on a heat-resistant glove.
- (b) Apply pressure to the probe tip with your thumb and forefinger for one to two seconds.
- (c) Release the probe tip for 10 to 15 seconds.
- (d) Apply pressure to the probe tip for one to two seconds.
- (e) Release the probe tip.
- (f) Make sure that the EICAS caution message >ICING NAC shows for approximately 180 seconds.

s 715-030

(9) Do a check of the control of the engine anti-ice systems by the right ice detector:

NOTE: Use a wet cloth or a piece of ice to cool the probe strut (not the probe tip) while you do this test. This helps to increase the life of the probe.

WARNING: YOU MUST USE A HEAT-RESISTANT GLOVE WHEN YOU OPERATE THE ICE DETECTOR. THE ICE DETECTOR QUICKLY BECOMES VERY HOT AND CAN BURN YOU.

- (a) With a heat-resistant glove, apply pressure to the probe tip with your thumb and forefinger for one to two seconds.
- (b) Release the probe tip for 10 to 15 seconds.
- (c) Apply pressure to the probe tip for one to two seconds.
- (d) Release the probe tip.
- (e) Make sure that the EICAS caution message >ICING NAC shows for approximately 180 seconds.

s 865-028

- (10) Close these circuit breakers:
  - (a) P7 Overhead Circuit Breaker Panel
    - 1) 7F23 LANDING GEAR DSP & CONT ALTN
    - 2) 7H8 GND SAFETY RELAY

EFFECTIVITY-

30-81-00

ALL



s 445-027

(11) Do this task: "Put Safety-Sensitive Systems Back to the Condition before Air Mode Simulation" (Ref 32-09-02/201).

s 865-021

(12) Remove electrical power (Ref 24-22-00/201).

EFFECTIVITY

ALL

30-81-00



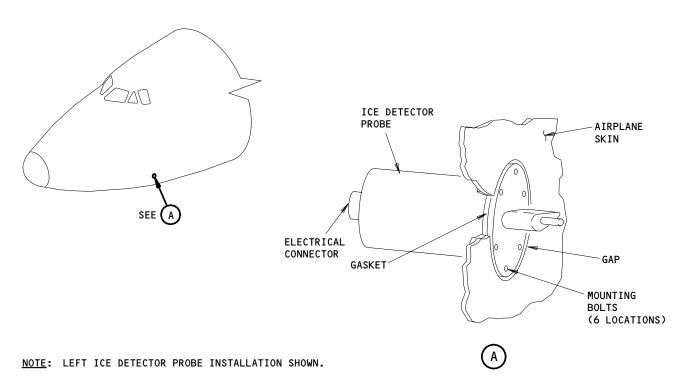
## ICE DETECTOR PROBE - REMOVAL/INSTALLATION

## 1. General

- A. This subject contains two tasks, one for the removal and one for the installation of the ice detector probe. In this procedure, you will remove the probe, install a replacement unit, and do an operational test of the ice detection system.
- B. The removal and installation procedure is the same for the left and right ice detector probes.

## TASK 30-81-01-004-001

- 2. <u>Ice Detector Probe Removal</u> (Fig. 401)
  - A. Standard Tools and Equipment
    - (1) Sealant Cutting Tool hardwood or plexiglass
  - B. References
    - (1) SSM 30-81-01
    - (2) WDM 30-81-11
  - C. Access
    - (1) Location Zone
      - 115 Area between Nose Gear Well and Fuselage, LH
      - 116 Area between Nose Gear Well and Fuselage, RH



Ice Detector Probe Installation Figure 401

30-81-01

80

Page 401 Feb 10/94



#### D. Procedure

S 864-002

- (1) Open these circuit breakers:
  - (a) P414 Left Power Distribution Center
    - 1) 414L10 L ICE DETECTOR
  - (b) P415 Right Power Distribution Center
    - 1) 415L33 R ICE DETECTOR

## E. Procedure

s 144-004

WARNING: BEFORE YOU TOUCH THE ICE DETECTOR PROBE, MAKE SURE THAT IT IS NOT HOT. A HOT PROBE CAN CAUSE INJURY TO YOU IF YOU TOUCH IT.

(1) Use a sealant cutting tool to remove sealant from the gap between the skin and the probe.

s 024-005

- (2) Remove the ice detector probe:
  - (a) Remove the 6 mounting bolts.
  - (b) Hold the strut of the probe and move the probe from side to side to loosen the gasket.
  - (c) Carefully pull the probe out from the airplane until you can touch the electrical connector on the back of the probe.
  - (d) Disconnect the electrical connector from the probe.
  - (e) Remove the probe.
  - (f) Attach the wires to hold them outside the opening in the airplane skin.
  - (g) Put a cap on the electrical connector on the wire bundle.
  - (h) Remove the gasket and discard it.

TASK 30-81-01-404-006

- Ice Detector Probe Installation (Fig. 401)
  - A. Consumable Materials
    - (1) B00083 Cleaner, Aliphatic Naphtha TT-N-95
    - (2) G00507 Cloth Lint Free
    - (3) A00247 Sealant BMS 5-95, Class B
  - B. References
    - (1) 30-81-00/501, Ice Detection System
    - (2) IPC 30-81-01 Fig. 1

EFFECTIVITY-

30-81-01

ALL



- (3) SSM 30-81-01
- (4) WDM 30-81-11
- C. Access
  - (1) Location Zone
    - 115 Area between Nose Gear Well and Fuselage, LH
    - 116 Area between Nose Gear Well and Fuselage, RH
- D. Procedure
  - s 114-007
  - (1) Clean the opening in the fuselage with cloth and cleaner.
    - s 424-008
  - (2) Install the ice detector probe:
    - (a) Put the new gasket into the opening.
    - (b) Connect the electrical connector to the probe.
    - (c) Insert the probe into the fuselage cutout.
    - (d) Install the bolts and torque them to 18-22 pound-inches.
    - s 224-009
  - (3) Make sure that the probe base is aligned with the airplane skin within .01 inch.
    - s 864-010
  - (4) Close these circuit breakers:
    - (a) P414 Left Power Distribution Center
      - 1) 414L10 L ICE DETECTOR
    - (b) P415 Right Power Distribution Center
      - 1) 415L33 R ICE DETECTOR
    - s 714-012
  - (5) Do this task: "Operational Test Ice Detection System" (Ref 30-81-00/501).
    - s 864-013
  - (6) Remove electrical power (Ref 24-22-00/201).
    - s 394-014
  - (7) Fill the gap between the probe and the fuselage with sealant. Make a smooth surface on the sealant.

EFFECTIVITY-

30-81-01

ALL